Specifications For

Michigan Technology University
Houghton, Michigan

Fisher Lecture Hall HVAC
Upgrades
MTU Project #15-16-01

Prepared By

ARCHITECTURE
ENGINEERING
CONSULTING

1021 West Baraga Avenue
Marquette, MI 49855
906-228-4480 Fax: 906-228-7524

Issued for Bids: May 22, 2017

Bid Date: June 6, 2017; 2:00 PM local time

IDI Project Number
17-694
INVITATION TO BID
MICHIGAN TECHNOLOGICAL UNIVERSITY
HOUGHTON, MICHIGAN 49931

PROJECT: Fisher Lecture Hall HVAC Upgrades
Michigan Technological University Project #15-16-01

PREBID MTG: A mandatory Pre-Bid Walk-Through for interested Mechanical Contractors, and Electrical sub-contractors, will be held on May 30, 2017, at Fisher Hall starting in lecture Hall 138 at 1 PM eastern time. Others are also welcome to attend.

DUE DATE: Until 2:00 P.M. local time on June 6, 2017, the Owner will receive sealed proposals for the work as herein set forth at the offices of:

Ms. Penny Foetisch
Facilities Management
100 Facilities Building - Waterfront
1400 Townsend Drive
Michigan Technological University
Houghton, MI 49931

at which time and place all proposals will be publicly opened and read aloud.

DOCUMENTS: Bidding documents consisting of proposal forms, plans, specifications, and other pertinent data will be available after Thursday May 18, 2017. These documents can be viewed and downloaded on that date from the Facilities Management web site at the following address: http://www.mtu.edu/facilities/planning/bids/ Please call Project Engineer at 906-228-4480, Steven Boettcher if you have technical questions.

PROPOSAL GUARANTEE: All bidders submitting bids in excess of $50,000 must provide a certified check or bank draft payable to Michigan Technological University, or a satisfactory Bid Bond executed by the Bidder and surety company, in an amount equal to but not less than five percent (5%) of the maximum proposal amount.

CONTRACT SECURITY: The successful bidders will be required to furnish a satisfactory performance bond and labor and material payment bond in amounts each of one-hundred percent (100%) of the accepted bid.

EQUAL EMPLOYMENT OPPORTUNITY: All bidders shall comply with current Federal and State Equal Employment Opportunity requirements.

Michigan Technological University is an equal opportunity educational institution/equal opportunity employer, which includes providing equal opportunity for protected veterans and individuals with disabilities.

This Project is a Prevailing Wage Project under the State of Michigan requirements.

Michigan Technological University reserves the right to reject any or all bids and to waive any informality or irregularity in any bid received.
DIVISION 0 – BIDDING AND CONTRACT REQUIREMENTS

Cover Page
Table of Contents
Invitation to Bid
00 42 00 Bid Proposal Form
00 52 00 Form of Agreement

DIVISION 1 - GENERAL REQUIREMENTS

01 00 00 General Requirements
01 00 01 Supplementary General Conditions
01 01 50 Contractor's Use of the Premises
01 10 00 Summary of the Work
01 23 00 Alternates
01 29 00 Applications for Payment
01 15 30 Change Order Procedure
01 35 10 Electronic Submittals
01 37 00 Schedule of Values
01 50 00 Temporary Facilities and Controls
01 60 00 Project Requirements
01 70 00 Contract Close-Out
01 71 00 Cleaning
01 72 00 Project Record Documents
01 73 29 Cutting and Patching

DIVISION 9 – FINISHES

09 29 00 Gypsum Board Systems
09 91 00 Painting

DIVISION 15 – MECHANICAL

23 05 00 Common Work Results for HVAC
23 05 93 Testing, Adjusting and Balancing
23 30 00 Mechanical Insulation
23 31 13 Metal Ducts
23 33 00 Air Duct Accessories
23 74 33 Packaged Electric Outdoor Cooling Units
23 81 26 Air Cooled Split System Condensing Units
23 82 19 Split System Fan Coil Units

DIVISION 16 – ELECTRICAL

26 05 00 Basic Electrical Requirements
26 05 19 Low-Voltage Electrical Power Conductors and Cables
26 05 29 Hangers and Supports for Electrical Systems
26 05 33 Raceway and Boxes for Electrical Systems
26 05 53 Identification of Electrical Systems
26 27 26 Wiring Devices
26 28 16 Enclosed Switches and Circuit Breakers

END OF SECTION
The Project consists of installation of new cooling only packaged rooftop units to serve Fisher Lecture Halls 135, 138 and 139; including but not limited to all roof curbs, supply and return air distribution duct work, acoustical duct liner, diffusers, dry wall ceiling cutting and patching to perform the work, BAS controls, miscellaneous electrical power, duct smoke detectors and fire alarm integration. See the drawings for more information on the scope of work.

Having carefully read the specifications and drawings dated May 22, 2017 for Michigan Technological University Project Fisher Lecture Hall HVAC Upgrades, the undersigned agrees to perform the work in accordance with the Contract Documents for Project No. 15-16-01.

Our lump sum base bid price to furnish and install all materials to complete the Fisher Lecture Hall HVAC Upgrades as noted on the drawings is:

$____________________ (Bid price in numbers and words)

ALTERNATE PRICES: The Undersigned submits for consideration by Michigan Tech, the following Alternate Prices. If the Alternate Price is accepted by the Michigan Tech, the variation becomes part of the Contract and the amount quoted is added to the Lump Sum Base Bid Price. Refer to Section 012300 Alternates for additional information.

| Alternate No. 1: Add the split system fan coil, air cooled condensing unit, refrigerant piping and condensate piping. | $ ____________ |

Bidder acknowledges receipt of the following addenda:

<table>
<thead>
<tr>
<th>Addendum No.</th>
<th>Dated:</th>
</tr>
</thead>
<tbody>
<tr>
<td>____________</td>
<td>____________</td>
</tr>
<tr>
<td>____________</td>
<td>____________</td>
</tr>
<tr>
<td>____________</td>
<td>____________</td>
</tr>
</tbody>
</table>

The undersigned has used the proposal of the following subcontractors to complete his bid and agrees to employ the firms listed below for the work:

Electrical:______________________________________________________________

Other: ________________________________________________________________
BID PROPOSAL FORM

Contractor: ____________________________________________________

Name: ________________________________________________________ Date: ________________
(Signature)

Name: ________________________________________________________
(Print)

Title: ________________________________________________________

Contact Information (Phone and email): ____________________________

Sealed proposals will be received at Facilities Management, Bldg. 44, on the waterfront of Michigan Technological University, Houghton, Michigan until 2:00 P.M. on Tuesday, June 6, 2017.
SECTION 00 52 00
DRAFT AGREEMENT BETWEEN CONTRACTOR AND OWNER

Owner: Michigan Tech University, 1400 Townsend Dr., Houghton, MI

Project: Fisher Lecture Hall HVAC Upgrades
Project #: 15-16-01
Contract for:

Contractor:

Construction Start Date: June 26, 2017 or Date of Notice to Proceed
Contract Completion Date: August 28, 2017 or Date of Final Payment

This Agreement, is authorized and made to be effective as of this 9th day of June, 2017 between Michigan Technological University, a Michigan constitutional corporation located in Houghton, Michigan, (the "University") and < >, (the "Contractor"), a corporation located at < >, for contract services to be provided by the Contractor to the University for, and in connection with, the following described project located at the University’s campus in Houghton, Michigan. The Contractor and the Owner, agree as follows:

ARTICLE 1 - THE CONTRACT DOCUMENTS:

The Contract Documents consists of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Specifications, Construction Plans/Drawings, etc. as listed in this Agreement and Modifications issued after execution of this Agreement; these form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents other than Modifications, appears in Article 6.

ARTICLE 2 - SCOPE OF THE WORK:

The Contractor shall furnish all of the materials and perform all of the Work shown on the Drawings and described in the Specifications for 15-16-01 for the Fisher Lecture Hall HVAC Upgrades Project prepared by IDI, 1021 West Baraga Avenue, Marquette, MI 49855.

The Project consists of Installation of new cooling only packaged rooftop units to serve Fisher Lecture Halls 135, 138 and 139; including but not limited to all roof curbs, supply and return air distribution duct work, acoustical duct liner, diffusers, dry wall ceiling cutting and patching to perform the work, BAS controls, miscellaneous electrical power, duct smoke detectors and fire alarm integration.

ARTICLE 3 – SCHEDULE AND LIQUIDATED DAMAGES

The Work to be performed under this Contract shall begin June 26, 2017 or Date of Notice to Proceed and shall be substantially completed on or before the Completion Date, August 28, 2017.
ARTICLE 4 - PROGRESS PAYMENTS:

Michigan Tech shall make payments as provided in Articles 1.2.14 of the General Requirements (2015) and 012900 Payment Procedures and conditions set forth and agreed upon herein:

Based upon Applications for Payment submitted to Michigan Tech by the Contractor and Certificates for Payment issued by Michigan Tech, Michigan Tech shall make payments on the Total Contract Amount to the Contractor as provided below and elsewhere in the Contract Documents.

The period covered by each Application for Payment shall be one month ending on the last day of each month.

Each Application for Payment and Conditional Waiver and Release on Progress Payment shall be based upon schedule of values consistent with format of AIA Documents G702, G703. The schedule of values (G703) shall allocate the entire Total Contract Amount among the various portions of the Work and supported by such data to substantiate its accuracy as Michigan Tech may require. This schedule of values, unless objected to by Michigan Tech, shall be used as a basis for reviewing the Contractor’s Application for Payment.

Applications for Payment shall indicate the percentage of completion of each portion of Work as of the end of the period covered by the Application for Payment. The amount of each Application for Payment (progress payment) shall be computed by:

1) Multiply the percentage complete of each portion of the work by the share of the Total Contract Amount allocated to that portion of the Work in the schedule of values, less retainage of ten (10%). Pending final determination of cost to Michigan Tech of changes in the Work, changes for amounts not in the dispute may be included per Section 1.2.8 of the General Requirements. The Total Contract Amount must be adjusted to reflect the changes in the Work by Change Order, then payment shall be allocated as to the completed portion of the Work in the adjusted schedule of values, less retainage of ten (10%).

2) The portion of the Total Contract Amount that is materials and equipment delivered and suitably stored off-site at a location agreed upon in writing by Michigan Tech for subsequent incorporation in the completed construction may be included in the Application for Payment.

3) Retainage will be 10% of the amount due to the contractor until the completion of the particular group of buildings being worked on. Upon issuance of Certificate of Final Completion by the Owner, Contractor may submit for 100% payment for that group of buildings. Contractors’ one year warranty for the work for each group of buildings being worked on will begin when the Substantial Completion Notice is issued for that group of buildings.

4) The amount of the Application for Payment requested shall not include any previous payments made by Michigan Tech.

5) The amount of the Application for Payment requested shall not include any previous amounts that Michigan Tech has withheld or a nullified Application for Payment.

6) Michigan Tech shall review the Application for Payment and if acceptable, sign it; thus it will become a Certificate of Payment.
7) Provided an Application for Payment and Conditional Waiver and Release for the Progress Payment are received by Michigan Tech, Michigan Tech shall make payment to the Contractor not later than thirty (30) days after receipt of the Application for Payment.

ARTICLE 5 - ACCEPTANCE AND FINAL PAYMENTS:

Final Payment, constituting the entire unpaid balance of the Total Contract Amount, shall be made by Michigan Tech to the Contractor when (1) the Contract has been fully performed by the Contractor except for the Contractor’s responsibility to correct nonconforming Work as provided in Subparagraph 1.2.12. of the General Conditions and to satisfy other requirements, if any, which necessarily survive final payment; and (2) a Final Certificate for Payment has been issued by Michigan Tech.

1) The Contractor must request in writing that Michigan Tech issue a notice of Substantial Completion. Upon receipt of written notice that the Work is ready for inspection and acceptance, Michigan Tech shall promptly inspect the Work.

2) If the Work for each set of buildings has been Substantially Completed and accepted, Michigan Tech shall issue upon request by the contractor, a notice of Substantial Completion and a Final Completion Checklist as necessary. Upon completion of the Final Completion Checklist to the satisfaction of Michigan Tech, Michigan Tech shall complete a Certificate of Completion for the set of buildings as listed.

3) When Michigan Tech finds the work is sufficiently complete per the Final Completion Checklist and Contract Documents in their entirety, Michigan Tech shall promptly issue the Certificate of Final Completion that states that the Work provided in this Contract is complete, and that the Final Payment is due the Contractor, as noted in the Certificate of Substantial Completion. Final payment shall be due thirty (30) days after the Contract is fully performed.

ARTICLE 6 - THE CONTRACT DOCUMENTS:

The Contract Documents, together with this Agreement, form the Contract, and they are as fully a part of the Contract as attached:

- Specifications for the project dated May 18, 2017 as listed in the Table of Contents
- Drawings for this project dated May 19, 2017 as listed on the Cover Sheet.
- Any Addendum issued prior to the bid date.

The Contractor’s signature on this Agreement indicates that the Contractor has read and will comply with each of these documents.

The **Contract Lump Sum** is based on and including the following **Substitutions** and **Alternates**: *To be determined prior to the contract signing.*

Alternate #1 – All work associated with the split system fan coil and air cooled condensing unit to provide cooling to the Projection Booth rooms.

The amount shown below shall be both in words and in figures. In case of discrepancy, the amount shown in words shall govern.

| Contract Lump Sum | $ ____________ |
IN WITNESS, WHEROF, each of the parties has caused this Contract to be executed by its duly authorized representatives on the date first mentioned above.

FOR THE CONTRACTOR

____________________________________________/___________________

Signature Date

Name and Title __________________________________________________________

FOR MICHIGAN TECHNOLOGICAL UNIVERSITY

___________________________________ Date __________________________

Kerri A. Sleeman
Executive Director of Facilities Management
SECTION 01 00 00
GENERAL REQUIREMENTS

1.1. INSTRUCTION TO BIDDERS

1.1.1. PREPARATION OF PROPOSALS: All proposals shall include supplying all materials, equipment, and labor, and shall be submitted on the attached proposal form. The forms are to be filled out in ink or typewritten, with the bidder's authorized agent's signature in longhand. Each proposal shall be delivered in an opaque sealed envelope marked with the project name, Bid No., and bidders name.

1.1.2. BID FORM: No telephonic, telegraphic or digital facsimile (FAX) bid or telephonic, telegraphic or digital facsimile (FAX) modification of a bid will be considered. No bids received after the time fixed for receiving them will be considered. Late bids will be filed unopened.

1.1.3. BID GUARANTEE: Each proposal for which the base bid exceeds $50,000.00 shall be accompanied by either a certified or cashier's check on an open, solvent bank or a bid bond with an authorized surety company in the amount of 5% of the base bid, payable to Michigan Technological University, as a guarantee of good faith. If the successful bidder fails to furnish satisfactory bonds and insurance as required by the General Conditions within 7 days after notice of award, such guarantee shall be forfeited to the Owner as liquidated damages and the Owner shall be entitled at its sole option to immediately cancel, revoke, withdraw, or rescind its award. The guarantees of the three lowest bidders will be retained until the bond and insurance of the Contractor have been approved by the University. The guarantees of all other bidders will be returned within 10 days after the bid opening.

1.1.4. REJECTION OR WITHDRAWAL: The Owner reserves the right to accept or reject any or all proposals, in whole or in part, and also herein reserves the right to waive any informalities or irregularities in any or all proposals and to make such award as it deems, in its sole discretion, to be in the best interest of the Owner. No bid may be withdrawn within 60 days after opening date without forfeiting bid security.

1.1.5. CONTRACT: Upon acceptance of any proposal by the Owner, a purchase order will be issued incorporating the accepted proposal and upon the Contractor furnishing satisfactory proof of compliance with all bond and insurance requirements will constitute the Contract. The Contract shall not be binding upon the Owner until the Contractor furnishes the Owner's Facilities Management Department satisfactory certification of compliance with the insurance and bond requirements under General Conditions and the Owner may withdraw or cancel its purchase order at any time prior to receipt of all such certifications.

1.1.6. TAXES: The Contractor shall include all applicable Michigan sales and use taxes currently imposed by Legislative enactment and as administered by the Michigan Department of Treasury, all applicable local or state permit, license or inspection fees, and all Federal taxes or fees applicable, and no additional payment over and above the bid amount shall be allowed for the same.

1.2. GENERAL CONDITIONS

1.2.1. DEFINITIONS

UNIVERSITY OR OWNER - Michigan Technological University
EXECUTIVE DIRECTOR OF FACILITIES MANAGEMENT – Kerri A. Sleeman
DIRECTOR OF ENGINEERING SERVICES - Gregg Richards

CONTRACTOR - The Bidder whose proposal is accepted by the University.
CONTRACT DOCUMENTS - This document, a purchase order, drawings, and specifications.

1.2.2. CONFLICT AND OMISSIONS: The intent of the Contract Documents is to provide everything necessary for the proper execution of the work. In case any dispute among or ambiguity in the Contract Documents the Contractor shall immediately notify the Director of Engineering Services and the work shall not proceed until a decision has been agreed upon by all parties concerned. Any adjustment or interpretation by the Contractor without such agreement shall be at his own risk and expense. No work stoppage by the Contractor will extend the time for completion.

1.2.3. ROYALTIES, PATENTS, NOTICES, AND FEES: The Contractor shall give all notices and pay all royalties and fees, shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, and shall comply with all laws, ordinances, and codes applicable to any portion of the work.

1.2.4. EXAMINATION OF PREMISES: The Contractor shall become familiar with local and on-site conditions affecting the job and the cost thereof, shall take independent measurements and make an examination and determination of all physical conditions affecting the work, and be responsible for the correctness of same even if they differ from those anticipated or indicated in the Contract. The Contractor shall be held to have made such examinations prior to bid submission and no allowances will be made in his behalf nor will any additional expenses be recoverable by reason of any error, omission, or misunderstanding on the part of the Contractor even if such actual conditions differ from those anticipated or indicated in the Contract. If any part of the Contractor's work depends for proper results upon existing work or the work of another contractor the Contractor shall examine such work and notify, before commencing work, the Director of Engineering Services of all defects or conditions that will affect the work. Failure to so notify will constitute acceptance of the conditions and render the Contractor responsible and liable for the results of any such defects or conditions which would have been revealed by complete examination and testing.

1.2.5. MOVING MATERIALS: If at any time it becomes necessary for the operation of the University to move materials temporarily located which are to enter into the final construction the Contractor furnishing the material shall, when so directed and without expense to the Owner, move them to another location.

1.2.6. MATERIALS AND WORKMANSHIP: All materials and workmanship shall be first-class in every respect and, unless otherwise specified, all materials and equipment shall be new and of the latest design. Should any disputes arise as to the quality and fitness of workmanship, equipment, materials or items, the decisions shall rest strictly with the University, and shall be based upon the requirements of the Contract Documents. The Contractor shall, if requested by the University, furnish evidence as to kind and quality of materials, at no additional cost to the University.

1.2.7. EMPLOYEES AND SUPERINTENDENCE: The Contractor shall enforce good order among his employees and shall not employ on the work any negligent, disorderly, intemperate or unfit person, or anyone not skilled in the work assigned. All work shall be performed in a skillful and workmanlike manner. The Contractor, or an authorized representative, shall be at the site at all times, and shall have the plans and specifications available.

1.2.8. EXTRA WORK AND CHANGES IN WORK: The Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the work, the Contract sum being adjusted accordingly. All such work shall
be executed under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

In giving instructions, the Owner shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order from the Owner and no claim for an addition to the Contract sum shall be valid unless as ordered.

When so directed, the Contractor shall promptly submit his itemized estimate and proposal for such extra work or changes, as well as separate unit prices on work for both additions to and deductions from the Contract.

Adjustments in the Contract sum for any such extra work or change shall be determined by one or more of the following methods:

Method Number 1: By an acceptable estimate and lump sum proposal from the Contractor.

Method Number 2: By unit prices stated in the Contract or subsequently agreed upon.

Method Number 3: By actual cost of all labor and materials and a percentage or fixed fee for all other charges, such as overhead, profit, insurance, taxes and bonds. On any change which involves a net credit to the Owner, no allowance for overhead and profit shall be figured.

If none of the foregoing methods is agreed upon, the Contractor, upon receipt of an order as hereinbefore stated, shall proceed with the work. In such case and also under Method Number 3, the Contractor shall keep and present in such form as the Owner may direct, a correct account of the cost, together with vouchers. In any case, the Owner shall certify to the amount including the specified allowance for overhead and profit, due the Contractor.

The allowable fee for added work by Contractor's own forces shall not exceed 15% of additional cost and his fee on work performed by Subcontractors shall not exceed 7 1/2% of additional cost. Quotations by Subcontractors at all times shall be subject to these same limitations.

1.2.9. OTHER CONTRACTS: The Owner may let other contracts in connection with the work and the Contractor shall properly connect and coordinate all work with the work of such other contractors. The Owner shall not be liable for any damages or increased cost occasioned by the failure of other contractors to execute their work as may be anticipated by these Contract Documents. No contractor shall commit any act which will interfere with the performance of the work by any other contractor.

1.2.10. INSURANCE: No work connected with this Contract shall be started until the Contractor has submitted evidence, satisfactory to the Owner, depicting insurance coverage in accordance with the following:

1. Worker's Disability Insurance

The Contractor shall procure and shall maintain, during the life of this contract, Worker's Disability Insurance in work on the project under this Contract. In case any such work is sublet, the Contractor shall require the Subcontractor similarly to provide Worker's Disability Insurance for all of the latter's employees engaged in such work unless such employees are covered by the protection afforded by the Contractor's Worker's Disability Insurance. In case any class of employees engaged in hazardous work on the project under this Contract is not protected under the Worker's Disability Statute, the Contractor shall provide and shall cause each Subcontractor to provide Employer's General Liability Insurance for the protection of all such employees not otherwise protected.

2. General Liability Insurance

The Contractor shall carry, from the beginning of this Contract until completion of the same, general liability in the amount of $1,000,000 for each occurrence and $2,000,000 aggregate.

3. Property Insurance

The Contractor shall carry, from the beginning of this Contract until completion of the same, $100,000 for each property accident other than the property covered by this Contract.

4. Builders' Risk Insurance

The Contractor shall assume all risk of loss for the first $100,000 on any single occurrence of damage to property of Owner or any third party, including the subject of this contract. This may be effected by purchase of insurance or by self-insurance, and must be primary and non-contributory. The Owner will assume all risk of loss for property damage in excess of $100,000 for any single occurrence.

5. Worker's Compensation/Employer's Liability

The Contractor shall carry, from the beginning of this Contract until completion of the same, Worker's Compensation Employer's Liability in accordance with Statutory required by the State and $500,000 per accident.

6. Automobile Liability

The Contractor shall carry, from the beginning of this Contract until the completion of the same, $1,000,000 in automobile insurance for each occurrence and the State Required Personal Injury Protection benefits.

Partial payments shall not relieve the Contractor from full responsibility for any claim which may result from any cause, including fire or any other casualty, until completion of the Contract and final payment. Any casualties shall not relieve the Contractor from performing the Contract.

Contractor will indemnify and hold harmless the University from and against all claims, judgements, liability and expense of any nature due to bodily injury, personal injury or damage to property arising out of, on account of or in connection with contractors (or any employee, subcontractor or agent of contractor) performance of the work or activity pursuant to the contract.

1.2.11. BONDS: The successful Contractor of a project for which the base bid exceeds $50,000.00 shall furnish in form and with sureties acceptable to the Owner, a performance bond and a labor and material bond, each in the amount of 100% of the Contract sum. As security for the faithful performance of all Work under the Contract, and payment of all charges in connection therewith. The cost of the aforesaid bonds shall be paid by the Contractor and included in the Contract Sum. No work connected with the Project shall be started until the Contractor has placed bonds, in proper form, on file with the University.

1.2.12. NONCOMPLIANCE WITH CONTRACT-TERMINATION: The Owner, at its option, may order suspension of the Work in whole or in part for such time as it
1. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, national origin, age, sex, height, weight, or marital status. The Contractor will take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, national origin, age, sex, height, weight, or marital status. Such action shall include, but not be limited to, the following: employment upgrading; demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

2. In addition to all other rights and remedies contained herein, or at law or equity, the Owner may terminate this Contract when any default is not stopped immediately and corrected within a reasonable length of time after notice thereof by the Owner. In the event of such termination the Owner may complete the contracted work and the Contractor and his surety will be liable for any excess cost occasioned by the Owner. In such case the Owner may take possession of and utilize in completing the work such necessary materials and equipment as may be on the Site.

1.2.13 GUARANTEE: The Contractor shall provide a written guarantee warranting all work under this Contract against faulty workmanship and defective materials, and to make good, at his own expense and promptly upon request by the Owner, all defective work and all damage to other work caused by such defective work, for 1 year from the date of signing of the Owner’s Notice of Completion of Contract Work form. The provisions of this express warranty shall not affect or impair any of the Owner’s rights under any other applicable, implied, or expressed warranties.

1.2.14. PAYMENT: Payment for the work will be made in one sum at the completion of the contract except that partial payments aggregating 90% of the value of the completed work may be made at monthly intervals. If the contractor expects to request partial payment he shall submit a schedule of costs and quantities of the various parts of the work aggregating the total contract sum. When applying for partial or full payments, the Contractor shall submit a statement based upon this schedule, itemized and supported as the Director of Facilities Management may require and a Sworn Statement and Conditional Waiver and Release on Progress Payment setting forth the amounts due each subcontractor, supplier, and laborer.

Retainage will be 10% of the amount due to the contractor until the completion of the particular group of buildings being worked on. Upon issuance of Certificate of Final Completion by the Owner, Contractor may submit for 100% payment for that group of buildings. Contractors’ one year warranty for the work for each group of buildings being worked on will begin when the Substantial Completion Notice is issued for that group of buildings.

The Contract will not be considered complete until the work has been finally accepted by the Director of Facilities Management and the following have been furnished: (1) the required guarantee, and (2) a sworn statement that all payrolls, material bills, and other indebtedness connected with the work have been paid, including such lien waivers as the Owner may request.

No presence, inspection, supervision, testing, or monitoring by the Owner or by any agent or representative thereof shall relieve the Contractor of responsibility for compliance with the terms of and performance pursuant to this Contract and the Contract Documents; nor shall any such conduct of the Owner or its agents or representatives constitute or be interpreted as constituting a waiver of any rights whatsoever or serve to stop them from requiring full performance by the Contractor.

1.2.15. NON-DISCRIMINATION CLAUSE: In connection with the performance of work under this Contract, the Contractor agrees as follows:

1. The Contractor will not discriminate against any
1.2.16 PERMITS, FEES AND NOTICES: The Contractor shall secure and pay for all permits, fees, and licenses required by State or Local governments necessary for the proper execution and completion of the work. The Contractor shall specifically secure Houghton County permits for Electrical, Mechanical and Plumbing work and schedule work inspections as required for approval. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and orders of any public authority bearing on the performance of the work. The University retains full jurisdiction of construction on campus and will make final determination of all variances.

1.2.17. USE OF SERVICES: The Contractor may use the Owner’s water and power by contacting Michigan Tech Facilities Management for arrangements.

1.2.18. SCHEDULING: The Contractor shall meet with the Director of Engineering Services as follows: (1) prior to the start of work; (2) to schedule any interruption of University services; and (3) monthly, or as directed, to review the progress of work.

At the time work is commenced on the project, the Contractor shall prepare a progress schedule showing the dates for the commencement and completion of the various stages of construction. This schedule shall be coordinated with the Owner’s required use of the facilities and other contractors construction schedules, and shall be arrived at in consultation with the Director of Engineering Services and approved by all affected parties.

The Contractor shall furnish sufficient forces and construction plant and equipment to insure protection and progress of the work in accordance with the schedule.

Any changes in the work schedule are to be approved in advance by the Director of Engineering Services.

1.2.19. TEMPORARY CONSTRUCTION FACILITIES: All temporary construction facilities shall be neatly constructed and arranged on the Site in an orderly manner.

Suitable weather tight storage sheds, with raised floors, of capacity required to contain all materials which might be damaged by storage in the open shall be provided.

Construction equipment and other facilities such as ladders, ramps, etc., shall be strong, substantial, safe, and suitable for the purpose intended and shall comply with all University, Federal, State, and local requirements so as to maintain adequate and safe temporary access to all existing facilities. Temporary walkways, bridges, etc., shall be built with proper handrails, curbs, etc.

The Contractor will assume all risk of loss for any damage or destruction to the Contractor’s temporary office, equipment, shanties, protective fence, scaffolding, staging, and all other miscellaneous materials and items owned or rented by the Contractor or any subcontractor used in the performance of this contract.

A temporary dust-proof enclosure of the work area, including existing machines and equipment, must be erected and maintained throughout the length of the project where required in the various Divisions herein.

1.2.20. CLEANLINESS OF THE WORK: The work and any public or private property occupied by the Contractor shall be kept in a neat and orderly condition at all times. Waste materials, rubbish, and debris shall be removed daily.

At the completion of the work all the Contractor’s temporary buildings, equipment, tools, surplus or waste materials, and rubbish of every nature shall be removed from all occupied public and private premises and such premises shall be restored, as nearly as practicable, to the original condition. Such restoration shall be subject to the approval of the Director of Engineering Services.

Debris removed from the site must be disposed of in a licensed landfill as required by the Solid Waste Management Act, 1978 PA 614, as amended, being MCLA 299.402; MSA 13.29(1) and the administrative rules applying to the Act contained in the Michigan Administrative Code R 299.4101. The Contractor shall provide the Director of Engineering Services with written, dated verification that all debris removed has been disposed of in a licensed landfill. Any cost incurred by the Owner as a result of the failure of the Contractor to comply with this paragraph will be a charge against the Contractor.

All exposed surfaces of the work shall be left clean and free from all mud, grease, stains, or other extraneous materials.

The streets and service roads occupied or used by the Contractor shall be continuously kept clean of waste materials and refuse resulting from the work operations. Should the Contractor be negligent in the duties of maintaining proper cleanliness, the Owner will take steps to cause the required cleaning to be done and will deduct the cost thereof from any monies due the Contractor.

The elevators, if used, shall not be overloaded and suitable protection for the walls, floor, and ceiling shall be provided during use. Any damage to the elevators must be repaired to the Facilities Management Manager of Planning, Engineering, and Construction satisfaction.

1.2.21. FIRE PROTECTION DURING CONSTRUCTION: The Contractor shall have on the Site at all times fire protection equipment as required by applicable codes and ordinances and requirements of the Owner’s insurance carriers. Prior to start of work, the Contractor shall be knowledgeable and proficient in Hot Work safety and in the Owner’s Hot Work policies, procedures and requirements. The Contractor shall faithfully follow the Owner’s Hot Work Policy, which regulates any temporary operation involving open flames or producing heat and/or sparks. The Contractor shall designate a Fire Safety Supervisor and Fire Watch for each Hot Work operation. The Fire Safety Supervisor shall not permit a hot work operation to proceed unless and until the provisions and required precautions checklist of the Owner’s Hot Work permit are adequately addressed. The Fire Watch shall monitor the Hot Work area during and after the hot work operation to take measures to prevent fires and to respond to fires if they start.

During all construction operations in occupied building space, the Contractor shall construct and maintain a one-hour fire resistance separation between the part of the building under construction and the occupied part of the building, per the Life Safety Code NFPA 101, Section 1-3.11, 1997 Edition.

1.2.22. PARKING AND USE OF ROADS: Immediately after the award of the Contract, the Contractor shall consult with the Director of Engineering Services to determine authorized parking and access to the Site, routing of all construction vehicles, and re-routing of other traffic during construction, and shall organize the work in relation thereto.

At the beginning of the field work, the Contractor shall post signs limiting construction parking, if available, to the construction area. Parking for worker’s cars is not guaranteed and is the Contractor’s responsibility.

During construction, when use of roads or sidewalks is restricted by construction work, the Contractor shall erect temporary barricades, post notices and warning lights, and when required
1.2.23. SAFETY PRECAUTIONS: During the progress of the work, the Contractor shall maintain adequate facilities for the protection and safety of all persons and property. All local, state, and federal laws, ordinances, rules, and regulations pertaining to the kind, use, and loading of all apparatus and equipment shall be complied with. Work shall be done in conformance with "General Safety Rules and Regulations for the Construction Industry" published by the Department of Labor, Construction Safety Standards Commission, Lansing, Michigan 48926.

The contractor will immediately report all accidents involving persons and property to the University Public Safety Dept. A copy of the accident report must be filed with the Public Safety Dept. The contractor shall conduct safety meetings during the progress of work. A copy of the minutes of these meetings must be submitted to the University. Contractor shall acknowledge Owner's Safety Requirements.

1.2.24. SUBSTITUTIONS:
1. The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

2. No substitution directly related to an "or equal" clause or similar language in the contract documents will be considered unless written request for approval has been submitted by the Bidder and has been received by the University at least ten days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance, and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the substitute would require shall be included. A burden of proof of the merit of the proposed substitute is upon the proposer. The University's decision of approval or disapproval of a proposed substitution shall be final.

3. If the University approves any proposed substitution, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

After receipt of bids, the University will consider a request for substitution only for the following reasons:

1. Products listed are no longer available.

2. Where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.

3. Where the specified product or method cannot receive necessary approval by a governing authority and the requested substitution can be approved.

4. Where a substantial advantage is offered to the University, in terms of cost, time, energy conservation, or other consideration of merit, after deducting offsetting responsibilities the University may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Architect for redesign and evaluation services, the increased cost of other work by the University or separate contractors, and similar considerations.

5. When the specified product or method cannot be provided in a manner which is compatible with other materials of the work, and where the contractor certifies that the substitution will overcome the incompatibility.

6. When the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.

7. When the specified product or method cannot receive a warranty as required by the Contract Documents and where the Contractor certifies that the proposed substitution receive the required warranty.

1.2.25. SUBCONTRACTS: The Contractor shall, as soon as practicable after the execution of the contract, notify the Owner in writing of the names of proposed subcontractors for the work. If the Contractor submits a list of proposed subcontractors to the execution of the contract, the Owner must be notified in writing of any change of subcontractor after the contract is executed. The Contractor will not employ any subcontractor that the Owner may, within a reasonable time, object to as incompetent or unfit.

The Contractor agrees to be fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for persons directly employed by him.

Nothing contained in the contract documents shall create any contractual relationship between any subcontractor and the Owner.

Should material or workmanship, or parties furnishing same prove objectionable under the provisions of the contract, or should violations of the contract exist at the building or elsewhere, and continue after the contractor has received from the Owner a reasonable warning, then, upon request of the Owner, such objectionable parties shall be dismissed, removed, and excluded from the building and work. Such work shall be remedied and continued by others satisfactory to the Owner.

1.2.26. RELATIONS OF CONTRACTOR AND SUBCONTRACTOR: The Contractor agrees to bind every subcontractor and every subcontractor agrees to be bound under the terms of the Contract Documents as applicable to his work, unless specifically noted to the contrary in a subcontract approved in writing by the Owner.

1.2.27. UNIVERSITY RULES AND REGULATIONS: The Contractor shall comply with all laws, ordinances, rules, regulations, and orders of the Owner, and be responsible for and shall direct his employees to conduct themselves so as not to interfere with or disrupt the University educational activities. The Contractor, Subcontractors, and their employees and suppliers shall not use or interfere with the Owner's existing accesses, drives, walks, and roads except as specifically indicated or by prior arrangement with the Owner. The Contractor shall confine his activities, equipment, and personnel to the area within the construction limits, except for minor operations as noted and by prior arrangement with the permission of the Owner. Existing areas disturbed outside the scope of the work shall be restored to their original state.

1.2.28. PREVAILING WAGE: Rates of wages and fringe benefits to be paid to each class of mechanics employed by the contractor and all subcontractors, shall be not less than the wage and fringe benefit rates prevailing in the locality in which the work is to be performed. 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 employed by him in connection with said contract. This record shall be available for reasonable inspection by the Michigan Department of Labor and the University. Contractor responsibilities under the law. Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place,

GENERAL REQUIREMENTS
01 00 00 - 5
a copy of all prevailing wage and fringe benefit rates prescribed in a contract. Every contractor and subcontractor shall keep an accurate certified payroll record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic employed by him in connection with said contract. This record shall be available for reasonable inspection by the contracting agent or the department. Each contractor or subcontractor is separately 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. The prime contractor is secondarily liable for payment of prevailing rates that are not paid by a subcontractor. 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 state project may file a complaint with the Wage and Hour Division. The department will investigate and attempt to resolve the complaint informally. Executive Order Number 2003-001 requires that contractors doing business with the State of Michigan be in compliance with state and federal law. A violation of Act 166 of 1965, as amended, the Prevailing Wages on State Projects act or Act 390 of 1978, as amended, the Payment of Wages and Fringe Benefits Act, may result in the debarment of a contractor from being awarded a contract for the provision of goods and services to the State of Michigan for a period of up to eight (8) years.

1.2.29. COMPLIANCE WITH ALL APPLICABLE LAWS, RULES AND REGULATIONS: Notwithstanding any other specific provision herein, contractor (and any subcontractor) shall, at its sole expense, comply with all applicable federal, state, local and other laws, ordinances, rules and regulations in any manner applicable to the performance of the work or contractors’ activities in furtherance of or in connection with the work. Contractor will indemnify and hold harmless the University from and against any and all costs, claims, expenses or orders (including any penalties or fines assessed to University) incurred as a result of contractor’s failure to comply or contractor’s failure to perform any obligation imposed by the contract documents.
PART 1 PROTECTION - Contractor shall properly protect all new and existing work from damage. Proper safety provisions shall be made at all times for the protection of all persons and property. Contractor shall contact "Miss Dig" for all underground construction work as required by Michigan Public Act No. 53, 1974 and amended by P.A. 204, 1975.

PART 2 SHOP DRAWINGS

2.01 The Contractor shall submit for approval a complete list of items that will require shop drawings.

2.02 The Contractor shall check and verify all field measurements and submit; with such promptness as to cause no delay in the Contractor's or any other contractor's work; electronic versions, checked and approved, of all shop or setting drawings and schedules where such submissions are stipulated in the various Divisions herein.

2.03 The University will check, with reasonable promptness, such drawings and schedules only for conformance with design concept and compliance with information given in the Contract Documents. The drawings will be stamped by the University as follows:

A. "RETURNED - NOT RELEASED" Deficiencies as marked indicate the drawings and schedules do not meet the requirements of the Contract Documents and shall be redrawn, revised, and resubmitted.

B. "REVIEWED AS NOTED" Deficiencies as marked indicate the drawings and schedules are subject to corrections to meet the requirements of the Contract Documents and are released for shop drawing work only. Drawings are released for shop work only, but are to be corrected and resubmitted for final approval.

C. "REVIEWED AND RELEASED" Indicate final action by the University and are released subject to meeting the requirements of the Contract Documents.

2.04 The University's approval of such drawings shall not relieve the Contractor from the responsibility for deviations from drawings and specifications unless he has, in accompanying letter, called the University's attention to such deviation at the time of submission and secured written approval. University's approval shall not relieve the Contractor from responsibility for errors in shop drawings and schedules.

PART 3 DEFINITIONS

A. Furnish: This term means procurement or fabrication of materials, equipment or components; or the performance of services to the extent indicated. Where used with respect to materials, equipment, or components, the term shall include delivery to and unloading at the Project site but is not intended to include the installation of the item, either temporary or final.

B. Install: This term means the placement of materials, equipment, or components including the receiving, unloading, transporting, storage, and installing; and the performance of such testing and finish work as is compatible with the degree of installation specified.

C. Provide: This term means to Furnish and Install, complete and in place, including all accessories, finishes, tests, and services as required to render the item so specified.
completely ready for use.

PART 4  AS-BUILT DRAWINGS - Each contractor shall record, legibly and to scale, all field change and deviations from the contract drawings as they occur. This record shall be kept on a set of contract drawings. This set of drawings shall be turned over to the University prior to final payment.

PART 5  OPERATION AND MAINTENANCE MANUALS: The Contractor shall provide complete operation and maintenance instructions, manuals, and other information for all architectural, electrical, mechanical, elevator equipment, and other systems installed and/or provided as part of the Work by the Contractor under the Contract. The Contractor shall furnish three complete sets of manuals bound in suitable quick release three ring binders. The intent of these manuals is that the University is provided with a complete operating and maintenance document for all significant systems, in a convenient, easy to use form.

PART 6  SCHEDULE OF VALUES: Within two weeks after start of job, the contractor shall provide the University with an itemized schedule of values for each division and major subdivision of work. The will be done on AIA form G703.

PART 7  DOCUMENT CLARIFICATION - All inquiries regarding project specifications and drawings shall be made to the Project Architect/Engineer listed on the Invitation to Bid.

PART 8  CONTRACT COMPLETION – Work on all buildings for this contract is expected to be completed on or before August 28, 2017.

PART 9  EQUAL EMPLOYMENT OPPORTUNITY – All bidders shall comply with current Federal and State Equal Employment Opportunity requirements.

PART 10  ASBESTOS -. This is not an asbestos abatement project The Contractor shall not start any work in any area that has not been inspected for asbestos by the Owner’s Occupational Safety and Health Services, or a qualified representative of the Owner, and found to be safe. If asbestos is found, safety measures as recommended by the Owner’s Occupational Safety and Health Services, or a qualified representative of the Owner, shall be implemented by the Owner before work is started. The Contractor is prohibited from using or supplying any asbestos containing materials for this project.

PART 11  SUMMARY OF WORK

11.01 Perform all work indicated in the Contract Documents.

11.02 The Project consists of Scope

11.03 See Specification Section 01 10 00 Summary for a more detailed description of the work.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: This Section applies to situations in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, enter upon the Owner's property.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division I of these Specifications.

1.2 QUALITY ASSURANCE

A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.

B. Require that all personnel who will enter upon the Owner's property certify their awareness of and familiarity with the requirements of this Section.

1.3 TRANSPORTATION FACILITIES

A. Truck and equipment access:

1. To avoid traffic conflict with vehicles of the staff and others using the building, and to avoid overloading of streets and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the designated area.

2. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site.

1.4 PERFORMANCE

A. The Contractor and his Sub-contractors shall conduct their operations in a manner so as to not cause any undue inconvenience or hazard to occupants and clients of the remainder of the site. Areas other than that of the project limits shall not be used for storage of material and shall be kept clean at all times at the Contractor's expense. Any damage to those areas shall be repaired or replaced at Contractor's expense. The Architect/Engineer shall make the determination as to the acceptability of the proposed repair or replacement.

1.5 SECURITY

A. Restrict the access of all persons entering upon the Owner's property in connection with the Work to the actual site of the Work.

END OF SECTION
PART 1 GENERAL

1.1 THE WORK

A. The project includes all material, labor, tools, equipment, field engineering, and transportation necessary to complete all work as identified in the Drawings and further defined in these Specifications. This includes all items not specifically mentioned, but incidental to the work to provide a complete and operational product.

B. This work includes, but is not limited to:

1. Install new cooling only packaged rooftop units to serve Fisher Lecture Halls 135, 138 and 139.
2. Install new supply and return air distribution duct work above the ceilings in each Hall. Install new supply diffusers thru the dry wall ceilings.
3. Install new acoustical duct liner in the main rectangular supply and return ducts.
4. Perform all electrical work and fire protection integration of duct smoke detectors to support the new mechanical systems being installed.
5. Provide all drywall ceiling cutting, repair, and painting to facilitate the new mechanical air distribution work.
6. HVAC Automation Controls for the new units are to be provided by Keweenaw Automation to integrate the new packaged rooftop units into the existing open-protocol controls as part of this bid.

END OF SECTION
SECTION 01 15 30
CHANGE ORDER PROCEDURE

PART I GENERAL

1.1 DESCRIPTION
A. Work included: Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as are described in written Change Orders signed by the Owner and the Architect/Engineer and issued after execution of the Contract, in accordance with the provisions of this Section.
B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Changes in the Work are described further in Article 7 of the General Conditions.

1.2 QUALITY ASSURANCE
A. Include within the Contractor's quality assurance program such measures as are needed to assure familiarity of the Contractor's staff and employees with these procedures for processing Change Order data.

1.3 SUBMITTALS
A. Make submittals directly to the Architect/Engineer at the address shown in the Project Manual.
B. Submit the number of copies called for under the various items listed in this Section.

1.4 PRODUCT HANDLING
A. Maintain a "Register of Bulletins and Change Orders" at the job site, accurately reflecting current status of all pertinent data.
B. Make the Register available to the Architect/Engineer for review at his request.

1.5 PROCESSING CHANGES INITIATED BY THE OWNER
A. Should the Owner contemplate making a change in the Work or a change in the Contract Time of Completion, the Architect/Engineer will issue a "Bulletin" to the Contractor.
   1. Bulletins will be dated and will be numbered in sequence.
   2. The Bulletins will describe the contemplated change, and will carry one of the following instructions to the Contractor.
      a. Make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion;
      b. Make the described change in the Work, credit or cost for which will be determined in accordance with Article 7 of the General Conditions.
      c. Promptly advise the Architect/Engineer (within 10 days) as to credit or cost proposed for the described change. This is not an authorization to proceed with the change.
B. If the Contractor has been directed by the Architect/Engineer to make the described change in the Work at no change in the Contract Sum and no change in the Contract Time of Completion, but the Contractor wishes to make a claim for one or both of such changes, the
Contractor shall proceed with the change and shall notify the Architect/Engineer as provided for under Paragraph 4.3.7 of the General Conditions.

C. If the Contractor has been directed by the Architect/Engineer to make the described change subject to later determination of cost or credit in accordance with Article 7.3.6 of the General Conditions, the Contractor shall:

1. Take such measures as needed to make the change.
2. Consult with the Architect/Engineer and reach agreement on the most appropriate method for determining credit or cost for the change.

D. If the Contractor has been directed by the Architect/Engineer to promptly advise him as to credit or cost proposed for the described change, the Contractor shall:

1. Analyze the described change and its impact on cost and time.
2. Secure the required information and forward it to the Architect/Engineer for review.
3. Meet with the Architect/Engineer as required to explain costs and, when appropriate, determine other acceptable ways to achieve the desired objective.
4. Alert pertinent personnel and subcontractors as to the impending change and, to the maximum extent possible, avoid such work as would increase the Owner's cost for making the change, advising the Architect/Engineer in writing when such avoidance is no longer practicable.

1.6 PROCESSING CHANGES INITIATED BY THE CONTRACTOR

A. Should the Contractor discover a discrepancy among the contract Documents, a concealed condition as described in Paragraph 4.3.6 of the General Conditions, or other cause for suggesting a change in the Work, a change in the Contract Sum, or a change in the Contract Time of Completion, he shall notify the Architect/Engineer as required by pertinent provisions of the Contract Documents.

B. Upon agreement by the Architect/Engineer that there is reasonable cause to consider the Contractor's proposed change, the Architect/Engineer will issue a Bulletin in accordance with the provisions described in Article 1.05 above.

1.7 BULLETIN RESPONSE PROCEDURE

A. Make written reply to the Architect/Engineer in response to each bulletin within 10 days of receipt.

1. State proposed change in the Contract Sum, if any.
2. State proposed change in the Contract Time of Completion, if any.
3. Clearly describe other changes in the Work required by the proposed change, or desirable therewith, if any.
4. Include full backup data such as subcontractor's letter of proposal or similar information.
5. Submit this response in single copy.

B. When cost or credit for the change has been agreed upon by the Owner and the Contractor, or the Owner has directed that cost or credit be determined in accordance with provisions of Paragraph 12.3.1 of the General Conditions, the Architect/Engineer will issue a "Change Order" to the Contractor.

1.8 PROCESSING CHANGE ORDERS

A. Change Orders will be dated and will be numbered in sequence.

B. The Change Order will describe the change or changes, will refer to the Bulletin or Bulletins involved, and will be signed by the Owner and the Architect/Engineer.
C. The Architect/Engineer will issue three copies of each Change Order to the Contractor.

1. The Contractor promptly shall sign all three copies and return them to the Architect/Engineer.
2. The Architect/Engineer will submit all copies to the Owner for signature, retain one copies in his file, will forward one signed copy to the Contractor, and one copy to the Owner.

D. Should the Contractor disagree with the stipulated change in Contract Sum or change in Contract Time of Completion, or both.

1. The Contractor promptly shall return two copies of the Change Order, unsigned by him, to the Architect/Engineer with a letter signed by the Contractor stating the reason or reasons for the Contractor's disagreement. In no case shall the Contractor proceed with a change until a signed order is issued to him.

END OF SECTION
SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of bid alternates
B. Submission procedures.
C. Documentation of changes to contract sum/price and contract time.

1.2 RELATED SECTIONS

A. Section 00600 - Form of Agreement: Incorporating monetary value of accepted Alternates.
B. Section 00100 - Instructions to Bidders; Section 00400 - Supplements to Bid Forms; Appendix B - Listing of Voluntary Alternates.
C. Section 01300 - Submittals: 1.04 Substitutions: approval of substitutions

1.3 REQUIREMENTS

A. Submit requested Alternate Bid costs where identified.
B. Submit Voluntary Alternates with full description of the proposed Alternate and the effect on adjacent or related components.
C. Voluntary alternates submitted with the Bid will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
D. Coordinate related work and modify surrounding work to integrate the work of each Alternate.

1.4 SELECTION AND AWARD OF ALTERNATIVES

A. Indicate variation of Bid Price for Alternates described below and listed in Document 00400 - Supplements to Bid Form. This form requests a "difference" in Bid Price by adding to or deducting from the bid price for requested bid alternates and voluntary alternates.
B. Bids will be initially evaluated on base bid amount. If Base Bids are within the Owner's project budget, consideration will be given to the lowest combination of Alternates and Base Bid and Alternates, subject to the Owner's right to accept or reject any or all bids or alternates and to accept any bid, alternate, or combination thereof, which is deemed to be in the best interest of the Owner.

1.5 ALTERNATE BID ITEMS

A. N/A

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Comply with procedures described in this Section when applying for progress payment and final payment under the Contract.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. The contract Sum and the schedule for payments are described in the form of agreement.

3. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions and in Section 01700 of these Specifications.

1.2 QUALITY ASSURANCE

A. Prior to start of construction, secure the owners approval of the schedule of values required to be submitted in accordance with the General Conditions, and further described in these Specifications.

B. During progress of the Work, modify the schedule of values as approved by the owner to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.

C. Base requests for payment on the approved schedule of values.

1.3 SUBMITTALS

A. Formal submittal: Unless otherwise directed by the owner:

1. Make formal submittal of request for payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment," plus continuation sheet or sheets G703.

2. Sign and notarize the Application and Certificate for Payment.

3. Submit the original of the Application and Certificate for Payment,

4. The owner will review the formal submittal and when approved, will sign the Application Certificate for Payment, and will distribute.

   a. One copy to Contractor;
   b. One copy to Owner;

5. The Owner will disburse directly to the Contractor within 30 days in accordance with the agreement between Owner and Contractor.
PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Submittals Required Before Execution of Contract: Before Contract will be executed, the Contractor shall submit to the Architect/Engineer the following:

1. Performance Bond and Labor and Material Payment Bond.
2. Insurance Certificates.

B. Submittals Required Immediately After Execution of Contract: Submit the following to Architect/Engineer within the specified period after the execution of the Contract:

1. Construction schedule.
2. Schedule of values.

C. Submittals Required During Construction Period:

1. Shop drawings;
2. Application for payment; and
3. Test reports, required by individual sections of Specifications.

D. Submittals Required at Time of Project Closeout: Refer to Section 01700 for submittals required.

E. Related Requirements Specified Elsewhere:

1. Section 01027: Application for Payment; and
2. Section 01700: Closeout Submittals.

1.2 CONSTRUCTION SCHEDULE

A. General: The General Construction contractor shall, promptly after award of Contract prepare and submit to the Architect/Engineer an estimated Construction Progress Schedule for the work, with sub-schedules of related activities which are essential to its progress. Submit revised progress schedules periodically.

B. Form of Schedules:

1. Format: Prepare schedules in the form of a horizontal bar chart, unless otherwise approved by the Architect/Engineer. Provide a separate horizontal bar for each trade or operation.
2. Time Scale: Identify first work day of each week.
3. Scale and Spacing: Use a scale and spacing which will allow space for notations and future revisions.
4. Format of Listings: Use the chronological order of the start of each item of work.
4. Identification of Listings: List by major specification section numbers.

C. Content of Schedule:

1. Sequence of Construction: Show complete sequence of construction by activity.
2. Dates: Show dates for beginning and completion of each major element of construction listed.

D. Progress Revisions: Show changes occurring since previous submission of schedule,
including the following:

1. Major changes in scope of work;
2. Activities modified since previous submission; and
3. Revised projections of progress and completion.

E. Submissions:

1. Submission of Initial Schedule: Submit initial schedule within 15 days after award of Contracts.
2. Submission of Revised Schedules: Submit revised progress schedules with each Application for Payment or at each schedule revisions, whichever is sooner.
3. Number of Copies Submitted: Submit 1 electronic copy to the Architect/Engineer.

1.3 SUPPLIERS AND PRODUCTS LIST

A. General: Within 10 days after award of the Contract, The Contractor shall submit, to the Architect/Engineer and Owner’s representative, a complete list of major suppliers being used in the work and products which are proposed for installation.

1.4 SHOP DRAWINGS AND PRODUCT DATA

A. General Requirements: Submit Shop Drawings and product data required by Contract Documents.
B. General Shop Drawing Requirements: Drawings shall be present in a clear and thorough manner. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
C. General Product Data Requirements: Product data submitted shall indicate the following:
   1. Clearly mark each copy to identify pertinent products or models. Submittals containing information which is not pertinent to this project will be returned unchecked unless they are clearly identified.
   2. Show performance characteristics and capacities.
   3. Show dimensions and clearances required.
   4. Show wiring and piping diagrams and controls.
   4. Delete information not applicable to the work.

D. Contractor’s Responsibilities:

1. Review Shop Drawings and product data prior to submission.
2. Determine and verify:
   a. Field measurements;
   b. Field construction criteria;
   c. Catalog numbers and similar data; and
   d. Conformance with specifications.
   e. Coordination of all trades.
3. Coordinate each submittal with requirements of the work and Contract Documents.
4. Stamp and sign copy of each submittal, indicating conformance with these requirements. Do not forward submittals to the architect/engineer until conformance with the requirements is coordinated between the contractor and his suppliers/subcontractors.
5. Deviations: Notify Architect/Engineer, in writing, at time of submission, of all
6. Begin no fabrication or work, which requires submittals until return of submittals with Architect/Engineer's approval.

F. Submission Requirements:

1. Submit Shop Drawings/Submittals electronically by email. Provide a transmittal letter indicating the full ARCHITECT/ENGINEER Project number and issuing a unique Shop Drawing Submittal Number. In addition, include name of Contractor’s Project Manager, or his/her representative’s name, mailing address, telephone number, and email address. Contractor shall submit Shop Drawings in Portable Data Format (pdf) at 300 dpi resolution.

2. Required Information: Submittals shall contain the following:
   a. The date of submission and dates of any previous submissions;
   b. Project title and number;
   c. Names of Contractor, suppliers and manufacturer;
   d. Field dimensions, clearly identified;
   e. Show relation to adjacent or critical features of the work or materials;
   f. Indicate applicable standards;
   g. Indicate specific model number of item to be reviewed. List all applicable accessories and optional features that are required.
   h. Identify deviations from Contract Documents;
   i. Identify revisions;
   j. Provide space for Contractor's and Architect/Engineer's stamp; and
   k. Contractor's stamp, initialed or signed, certifying review of submittal, verification of products, verification of field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and the Contract Documents. In the case that there is no place for the stamp on the front, please stamp the back side of each sheet, indicating the page number (i.e. back of page 1 of 6). Insure that this page is also scanned in pdf format when submitting the Shop Drawing electronically. Clearly label and number each sheet in the submittal to indicate the total number of sheets in the series (i.e. 1 of 12, 2 of 12...12 of 12). For Contractor originated design/redesign, it is required that the Contractor submit one (1) original set of calculations and drawings, signed and sealed by the responsible Specialty Engineer, in conjunction with the electronic submission, using mail or messenger service. The one (1) original set should be forwarded directly to ARCHITECT/ENGINEER.
   l. Failure to stamp and review submittals will result in return of same unreviewed.
   m. If the Shop Drawing consists of samples, Contractor will submit three (3) samples for proper processing and in addition, the number of samples needed by Contractor. Contractor will need to indicate in their transmittal letter that they have forwarded the samples to ARCHITECT/ENGINEER.

3. Timing of Submittals:
   a. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.
   b. In scheduling, allow at least ten (10) working days for review by the Architect/Engineer following his receipt of the submittal.
4. To facilitate logging and distribution of submittals and to expedite the Shop Drawing reviews, it is recommended that Contractor comply with the following:

a. Provide a separate transmittal for each package in a submittal. A package may consist of one or more related items. For a multiple item package, list each item in the transmittal. Interrelated items should be submitted as a package. Each transmittal letter will have a unique submittal number assigned.

b. For each submitted item, indicate the specification section it pertains to.

5. Contractor will not use shop drawings submittals for obtaining clarification regarding contract plans or specification requirements. Such clarifications required for preparation of complete and correct Shop Drawings will be requested by Request For Information (RFI) through ARCHITECT/ENGINEER.

6. Contractor’s request for contract change in time, cost, design, material or product type, specification requirements and/or remedial design for correcting construction/fabrication deficiencies will not be made as a Shop Drawing submittal to ARCHITECT/ENGINEER, but will be sent in proper format to ARCHITECT/ENGINEER for further handling and processing.

7. Final Shop Drawing Approval rests with ARCHITECT/ENGINEER’s Shop Drawing Review Stamp.

Electronic Shop Drawing Submittal Contact:

Steven Boettcher, Project Engineer
Telephone: (906) 228-4480
Email: steve@intdesigns.com
SHOP DRAWING SUBMITTAL CHECKLIST

ARCHITECT/ENGINEER Project #
Submittal #
Item Covered:

Prior to transmitting the submittal, the Contractor will verify and sign below, indicating that all applicable items on checklist are complied with:

__ Transmittal letter indicates project title, full ARCHITECT/ENGINEER project number, description of items enclosed and has a unique submittal number assigned.

__ Submittal package contains only related items. All items are separately described with page numbers or drawing numbers in the transmittal letter or in an attachment to the transmittal letter.

__ One (1) original set of prints (signed and sealed by the responsible professional engineer), when drawings are for the Contractor and/or specialty engineer originated transmittal letter.

__ Contractor approval stamp with company name, engineer’s signature and date on each drawing and on each of the other individual items included in the scanned submittal.

__ All revisions from previously processed submittals are identified by clouding with revision number and date.

__ Minor plan deviations not affecting contract time, cost, design intent (structural integrity and load carrying capacity) or reducing durability/maintainability are identified by clouding.

__ Specification section and contract plan number are referenced for each item in the submittal.

__ Dimensions and details checked and coordinated for compatibility with work of all subcontractors.

__ Existing conditions and dimensions used in developing Shop Drawing details are field verified.

Compliance Verified

_______________________________   ____________________________
(Signature)                            (Title)

G. Architect/Engineer’s Duties:

1. Review: Architect/Engineer will review submittals with reasonable promptness and in accordance with Construction Schedule.

2. Architect/Engineer’s Stamp: Architect/Engineer will stamp and sign each submittal and indicate approval of the submittal or requirements for re-submittal.

3. Returning Submittals: Architect/Engineer will retain one (1) hard copy of submittal and will email one (1) copy of submittal in PDF format to Contractor for distribution or for resubmission.

4. Architect/Engineer receives Shop Drawing from Contractor, “electronically”, via email. Submittal shall be in PDF format at 300 dpi resolution. Architect/Engineer prints out a copy, reviews it, implements additional comments in red and stamps every sheet with the disposition (“Reviewed”, “Revise and Resubmit” or “Non-
Compliant”), initials and date. Each item must have its own disposition, multiple dispositions on the same stamp is prohibited/illegal. Additional comments may be added either under the stamp or on the Transmittal or in an attached memo.

5. Architect/Engineer then rescans the Shop Drawings (including their letter of transmittal) into PDF format and 300 dpi resolution, which is then emailed to the Contractor. In the case that there is no place for the stamp on the front, please stamp the back side of each sheet, indicating the page number (back of page 1 of 6). Insure that this page is also scanned in PDF format when submitting the Shop Drawings electronically.

H. Distribution: The Contractor shall distribute Shop Drawings and product data which carry Architect/Engineer's stamp of approval to the following:

1. One copy to Contractor's job site file;
2. One copy to Contractor's record document file;
3. One or more copies returned to subcontractor (as required); and
4. One or more copies to supplier or fabricator (as required).

I. Resubmission Requirements: Make corrections or changes in the submittals required by the Architect/Engineer and resubmit until approved.

J. Substitutions:

1. The Contract is based on the standards of quality established in the Contract Documents. Substitutions will be considered only when listed at time of bidding, on the form provided therefore in the bidding documents, and when substantiated by the Contractor's submittal of required data within 10 calendar days after award of the Contract.
2. The following products may not require further approval except for interface within the work, contact the architect/engineer for direction.

   a. Products specified by reference to standard specifications such as ASTM and similar standards; and
   b. Products specified by manufacturer's name and catalog model number.

K. Or equal:

1. Where the phrase "or equal", or "or equal as approved by the Architect/Engineer", occurs in the Contract Documents, do not assume that the materials, equipment or methods will be approved as equal unless the item has been specifically so approved for this work by this Architect/Engineer.
2. The decision of the Architect/Engineer shall be final.

L. ARCHITECT/ENGINEER'S REVIEW

1. Review by the Architect/Engineer is for conformance with the design concept of the project only. The Contractor is responsible for compliance with information given in contract documents. Dimensions shall be correlated at job site, fabrication techniques and coordination of the work of all trades, remains the responsibility of the Contractor.
2. Revisions:

   a. Make revisions required by the Architect/Engineer;
   b. If the Contractor considers any required revisions to be a change, he shall so notify the Architect/Engineer as provided in Article 7 of the General Conditions; and
   c. Make only those revisions directed or approved by the
Architect/Engineer.

3. Reimbursement of Architect/Engineer's costs:

   a. The Architect/Engineer will review and process only two (2) submission of each Shop Drawing and/or Sample. If shop drawings or samples are returned because the Contractor has not complied with the above requirement, he/she shall pay the costs of the Architect/Engineer or their consultants for reviewing and processing the third and subsequent submissions.

      1. The Architect/Engineer's cost shall be computed at two and one-half (2½) times payroll, plus reproduction and mailing expenses.
      2. The cost for Architect/Engineer's consultants shall be computed at two and one-half (2½) times payroll, plus reproduction and mailing expenses.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
SECTION 01 37 00
SCHEDULE OF VALUES

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents. Provide detailed breakdowns of sub-contractors (i.e. mechanical, plumbing, electrical).

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
3. Schedule of values is required to be compatible with the "continuation sheet" AIA Form G703 Accompanying Applications for Payment

1.2 QUALITY ASSURANCE

A. Use required means to assure arithmetical accuracy of the sums described.
B. When so required by the Architect/Engineer, provide copies of the subcontracts or other data acceptable to the Architect/Engineer, substantiating the sums described.

1.3 SUBMITTALS

A. Prior to first application for payment, submit a proposed schedule of values to the Architect/Engineer.

1. Meet with the Architect/Engineer and determine additional data, if any, required to be submitted.
2. Secure the Architect/Engineer's approval of the schedule of values prior to submitting first application for payment

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Provide temporary facilities and controls needed for the Work including, but not necessarily limited to:

1. Temporary utilities: electricity and construction lighting (by Contractor), use Owner’s source.
2. Sanitary facilities: To be provided by contractor, on site.
3. Enclosures such as tarpaulins, barricades and canopies (by Contractor).
4. Telephone (by Contractor).

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Except that equipment furnished by subcontractors shall comply with requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions of the Work are not part of this Section.
3. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2 PRODUCT HANDLING

A. Maintain temporary facilities and controls in proper and safe conditions throughout progress of the Work.

PART 2 PRODUCTS

2.1 UTILITIES

A. Electricity and construction lighting – By Contractor. Cost of electricity by owner.
B. Telephone and fax - By Contractor.

2.2 SANITARY FACILITIES

A. Contractor to provide their own sanitary facilities and maintain in sanitary condition at all times.

2.3 ENCLOSURES

A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

2.4 PROJECT SIGNS

A. A jobsite sign is not required for this project.
B. Except as otherwise specifically approved by the Architect/Engineer, do not permit other signs or advertising on the job site.
PART 3 EXECUTION

3.1 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.

B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Owner.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products.
B. Product delivery requirements.
C. Product storage and handling requirements.
D. Product options.
E. Product substitution procedures.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer’s instructions.
B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers’ instructions.
B. Store with seals and labels intact and legible.
C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
D. For exterior storage of fabricated products, place on sloped supports above ground.
E. Provide off-site storage and protection when site does not permit on-site storage or protection.
F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in
accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
D. A request constitutes a representation that Bidder:
   E. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
   F. Will provide same warranty for Substitution as for specified product.
   G. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   H. Waives claims for additional costs or time extension that may subsequently become apparent.
   I. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
   J. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Provide an orderly and efficient transfer of the completed Work to the Owner.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Activities relative to Contract close-out are described in, but not necessarily limited to the General Conditions and Sections in Division 1 of these Specifications.

3. "Substantial Completion" is defined in Paragraph 9.8 of the General Conditions.

1.2 QUALITY ASSURANCE

A. Prior to requesting inspection by the Architect/Engineer, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection (punch list).

1.3 PROCEDURES

A. Substantial Completion:

1. Prepare and submit the list required by the first sentence of Paragraph 9.8.2 of the General Conditions.

2. Within a reasonable time after receipt of the list, the Architect/Engineer will inspect to determine status of completion.

3. Should the Architect/Engineer determine that the Work is not substantially complete:
   a. The Architect/Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
   b. Remedy the deficiencies and notify the Engineer when ready for inspection.
   c. The Architect/Engineer will reinspect the Work.

4. When the Architect/Engineer concurs that the Work is substantially complete:
   a. The Architect/Engineer will prepare a "Certificate of Substantial Completion" on AIA form G704, accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect/Engineer.
   b. The Architect/Engineer will submit the certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

B. Final Completion:

1. Prepare and submit the notice required by the first sentence of Paragraph 9.8.2 of the General Conditions.

2. Verify that the Work is complete including, but not necessarily limited to, the items mentioned in Paragraph 9.8.2 of the General Conditions.

3. Certify that:
   a. Contract Documents have been reviewed;
b. Work has been inspected for compliance with the Contract Documents;
c. Work has been completed in accordance with the Contract Documents;
d. Equipment and systems have been tested as required, and are operation; and
e. Work is completed and ready for final inspection.

4. The Architect/Engineer will make an inspection to verify status of completion (final punch list).

5. Should the Architect/Engineer determine that the Work is incomplete or defective:
   a. The Architect/Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.
   b. Remedy the deficiencies promptly, and notify the Architect/Engineer when ready for reinspection.

6. When the Architect/Engineer determines that the work is acceptable under the Contract Documents, he will request the Contractor to make close-out submittals.

C. Close-out submittals include, but are not necessarily limited to:

1. Operation and maintenance data for items so listed in pertinent other Sections of the Contract Documents, and for other items when so directed by the Architect/Engineer;
2. Contractor 1 year written warranty, manufacturer's warranties and bonds;
3. Manufacturers Technical Representative Report;
4. Spare parts and materials extra stock;
5. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
   a. Certificates of Inspection and Occupancy;
6. Certificates of Insurance for products and completed operations.
7. Evidence of payment and release of liens;
8. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.

D. Final adjustment of accounts:

1. Submit a final statement of accounting to the Architect/Engineer, showing all adjustments to the Contract Sum.
2. If so required, the Architect/Engineer will prepare a final Change Order showing adjustments to the Contract Sum which were not made previously by Change Orders.

1.4 INSTRUCTION

A. Instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the work.
SECTION 01 71 00
CLEANING

PART 1 GENERAL

1.1 DESCRIPTION
A. Work included: Contractor shall, throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section. Failure by any contractor to comply will result in action by the Owner to provide cleanup services which will be backcharged to all contractors on the project.
B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE
A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
B. In addition to standards described in this Section comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT
A. Contractor shall provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY
A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 EXECUTION

3.1 PROGRESS CLEANING
A. General; Contractor shall:
   1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing protection of materials from weather.
   2. Not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
   3. At least once a week, and more often if necessary, completely remove all scrap, debris, and waste material from the building and place in a dumpster.
   4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
B. Site:

1. Daily, and more often if necessary, inspect the site and pickup all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.01-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
   a. “Clean,” for the purposes of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

PART 4 FINAL CLEANING

A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.

C. Site:

1. Completely remove resultant debris.

D. Structures:

1. Exterior:
   a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
   b. Remove all traces of splashed materials from adjacent surfaces.
   c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
   d. In the event of stubborn stains not removable with water, the Architect/Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.

E. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Project.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included:

1. Throughout progress of the work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
2. Upon completion of the work, transfer the recorded changes to a single set of Record Documents, as described in Article 3.2 below.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff. Record the work of all subcontractors on a single sheet.

B. Accuracy of records:

1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to show the change properly.
2. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.

C. Make entries within 24 hours after receipt of information that the change has occurred.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01351.

B. The Architect/Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Architect/Engineer's approval of requests for progress payment and request for final payment under the Contract.

C. Prior to submitting each request for progress payment, secure the Architect/Engineer's approval of the current status of the Project Record Documents.

D. Prior to submitting the request for final payment, submit the final Project Record Documents to the Architect/Engineer and secure his approval.

1.4 PRODUCT HANDLING

A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the work and transfer of all recorded data to the final Project Record Documents.

B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect/Engineer's approval.
1. Such means shall include, if necessary in the opinion of the Architect/Engineer, removal and replacement of the concealing materials, at no cost to the Owner.
2. In such case, provide replacements to the standards originally required by the Contract Documents, at no cost to the Owner.

PART 2 PRODUCTS

2.1 RECORD DOCUMENTS

A. Job Set: Promptly following receipt of the Owner's Notice to Proceed, secure one complete set of all documents comprising the Contract.

PART 3 EXECUTION

3.1 MAINTENANCE OF JOB SET

A. Immediately upon receipt of the job set described in Paragraph 2.01-A above, identify each of the Documents with the title "RECORD DOCUMENTS - JOB SET."

B. Preservation:

1. Considering the contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set.
2. Do not use the job set for any purpose except entry of new data and for review by the Architect/Engineer.

C. Making entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required. Use a separate color for each trade.
2. Date all entries.
3. Call attention to the entry by a "cloud" drawn around the area(s) affected.
4. In the event of overlapping changes, use different colors for the overlapping changes.

D. Make entries in the pertinent other documents as approved by the Architect/Engineer.

3.2 FINAL PROJECT RECORD DOCUMENTS

A. The purpose of the final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of the work to proceed without lengthy and expensive site measurement, investigation, and examination.

B. Transfer of data to other documents:

1. If the documents other than Drawings have been kept clean during progress of the work, and if entries thereon have been orderly to the approval of the Architect/Engineer, the job set of those Documents other than Drawings will be accepted as final Record Documents.
2. If any such document is not so approved by the Architect/Engineer, secure a new copy of that document from the Architect/Engineer at the Architect/Engineer's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect/Engineer.

C. Review and submittal:
1. Submit the completed set of Project Record Documents to the Architect/Engineer as described in Paragraph 1.03-D above.
2. Participate in review meetings as required.
3. Make required changes and promptly deliver the final Project Record Documents to the Architect/Engineer.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor has no responsibility of recording changes in the work subsequent to final completion, except for change resulting from work performed under warranty.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: This Section establishes general requirements pertaining to cutting, fitting, and patching of the Work required to:

1. Make the several parts fit properly;
2. Uncover work to provide for installing, inspection, or both, of ill-timed work;
3. Remove and replace work not conforming to requirements of the Contract Documents; and
4. Remove and replace defective work.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Technical Sections of these Specifications.
2. In addition to other requirements specified, upon the Architect/Engineer's request uncover work to provide for inspection by the Architect/Engineer of covered work, and remove samples of installed materials for testing.
3. Do not cut or alter work performed under separate contracts without the Architect/Engineers written permission.

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Request for Architect/Engineer's consent:

1. Prior to cutting which effects structural safety, submit written request to the Architect/Engineer for permission to proceed with cutting.
2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Architect/Engineer and secure his written permission and the required Change Order prior to proceeding.

B. Notices to the Architect/Engineer:

1. Prior to cutting and patching performed pursuant to the Architect/Engineer's instructions, submit cost estimate to the Architect/Engineer. Secure the Architect/Engineer's approval of cost estimates and type of reimbursement before proceeding with cutting and patching.
2. Submit written notice to the Architect/Engineer designating the time the Work will be uncovered, to provide for the Architect/Engineer's observation.
3. Cutting and patching is required under some of the Sections of these Documents. The cost for that work is to be included in the base bid.
PART 2 PRODUCTS

2.1 MATERIALS
   A. For replacement of items removed, use materials complying with pertinent Sections of these Specifications. When no section covers the replacement of items removed, use materials identical to those removed.

2.2 PAYMENT FOR COSTS
   A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to any written Change Order, after claim for such reimbursement is submitted by the Contractor, and approved by the Architect/Engineer and Owner. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS
   A. Inspection:
      1. Inspect existing conditions, including elements subject to movement or damage during cutting, and patching.
      2. After uncovering the work, inspect conditions affecting installation of new work.
   B. Discrepancies:
      1. If uncovered conditions are not as anticipated, immediately notify the Architect/Engineer and/or owner and secure needed directions.
      2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING
   A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE
   A. Perform work required under pertinent other Sections of these Specifications.
      1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.
      2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION
PART 1 GENERAL

1.1 WORK INCLUDED
A. Gypsum board ceiling, and soffit covering.
B. Sealing for smoke tight walls at gypsum partitions.
C. Accessories

1.2 RELATED WORK
A. Section 09 90 00 - Painting: Surface Finish

1.3 REFERENCES
A. ANSI/ASTM C36 - Gypsum Wallboard
C. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
D. GA-201 - Gypsum Board for Walls and Ceilings.
E. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
F. Underwriter’s Laboratories - Tested assemblies.

1.4 QUALITY ASSURANCE
A. Applicator: Company specializing in the installation of gypsum board systems work with three years documented experience.

1.5 REGULATORY REQUIREMENTS
A. Follow requirements of the Michigan Building Code and NFPA for location of rated wall systems.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEM
A. Gold Bond
B. US Gypsum
C. Approved equal

2.2 GYPSUM BOARD MATERIALS
A. Fire Rated Gypsum Board: ANSI/ASTM C36; fire resistive type, UL rated; 5/8" thick, maximum permissible length; ends square cut, tapered and beveled with square or round edges.
B. Water resistant 5/8" fire resistive type UL rated, tapered and beveled.
C. 5/8" Dura-Rock or exterior grade gypsum board as recommended by Section 07241.
D. 5/8" Impact Resistant gypsum board

2.3 ACCESSORIES
A. Corner Beads: USG #901 Dur-A-Bead or equal.
B. Jamb Trim: Beadex "Jamb-X".
C. Joint Materials: GA 201 and GA 216; reinforcing tape, joint compound, adhesive, water and

GYPSUM BOARD SYSTEMS
09 29 00 - 1
fasteners.
D. Expansion Control Joints: Sheetrock Joint No. 093.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

3.2 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201 and GA 216.
B. Erect gypsum board in horizontal direction, with ends and edges occurring over firm bearing.
C. Following UL requirements for construction of fire rated partitions.
D. Use screws and adhesive when fastening gypsum board to furring or framing.
E. Install specified trim members. The use of "J-Mold" unless specifically called for will be cause for rejection of the work.
F. Install control joints per detail and at location indicated on the Drawings.
G. Seal tight with joint compound all mechanical and electrical penetrations in smoke tight walls. Minimum one side of wall.
H. Seal all voids between top of wall and roof deck in smoke tight walls. Minimum one side of wall.
I. Install water resistant gypsum board in locker rooms and shower rooms.

3.3 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
B. Feather coats onto adjoining surfaces so that camber is maximum 1/32".

3.4 TOLERANCES

A. Maximum Variation from True Flatness: 1/8" in 10' in any direction.

END OF SECTION
PART 1 GENERAL

1.1 WORK INCLUDED

A. Surface preparation.
B. Surface finish.
C. Prime and finish painting of interior walls, horizontal and vertical soffits, and all other areas, not specifically mentioned but incidental to the project which require finish paint, stain or varnish.
D. Stain and varnish exposed wood trim.
E. Paint finish on steel doors, frames, lintels, and miscellaneous metal fabrications.
F. Paint exterior metal fabrications and sheet metal flashing where scheduled.

1.2 RELATED WORK

A. Section 04300: Masonry
B. Section 05500: Miscellaneous Metals, finish painting.
C. Section 06200: Finish Carpentry
D. Section 08110: Steel Doors and Frames.
E. Section 09260: Gypsum Board Systems
F. Division 15000: Mechanical
G. Division 16000: Electrical

1.3 REFERENCES


1.4 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.5 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
B. Applicator: Company specializing in commercial painting and finishing with documented experience.
C. Color selections by Owner from standard color palette. Refer to finish schedule in drawing set for specific colors selected.

1.6 SUBMITTALS

A. Submittals shall be made in compliance with Division 1.
B. Provide standard paint and stain palette for color selection.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of Division 1.
B. Store and protect products under provisions of Division 1.
C. Deliver products to site in sealed labeled containers; inspect to verify acceptance.
D. Container labeling to include manufacturer's name, type of paint, brand name, brand code,
coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

E. Store paint materials at minimum ambient temperature of 45 degree F (7 degree C) and a maximum of 90 degree F (32 degree C), in well ventilated area, unless required otherwise by manufacturer's instructions.

F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperature above 45 degree F (7 degree C) and 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.

B. Minimum Application Temperatures for Latex Paints: 45 degree F (7 degree C) for interiors; 50 degree F (10 degree C) for exterior; unless required otherwise by manufacturer's instructions.

C. Minimum Application Temperature for Varnish and Stain Finishes: 65 degree F (18 degree C) for interior or exterior, unless required otherwise by manufacturer's instructions.

D. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

E. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

1.9 SEQUENCING

A. Division 1 - Summary: Work sequence.

B. Sequence application to the following:

1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.10 WARRANTY

A. Division 1 - Execution Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer warranty for paints and coatings.

1.11 EXTRA MATERIALS

A. Division 1 - Execution Requirements: Spare parts and maintenance products.

B. Supply one (1) unopened gallon of each color, type, and surface texture; store where directed by Owner.

C. Label each container with color, type, texture, and room locations, in addition to manufacturer's label.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PRIMER, PAINT, STAIN AND POLYURETHANE

A. Sherwin Williams.

B. Benjamin Moore.

C. ICI Paints.

D. Substitutions in accordance with Division 1.

2.2 MATERIALS

A. Coatings: Ready mixed. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
D. Patching and head cover material: latex filled.

2.3 FINISHES
A. Refer to Finish Schedule in the plan set for surface finish.

PART 3 EXECUTION

3.1 INSPECTION
A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to completion of work. Report any condition that may potentially affect proper application.
C. Test shop applied primer for compatibility with subsequent cover materials.
D. Measure moisture content of surfaces using electronic moisture meter. Do no apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 1 percent, measured in accordance with ASTM D4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
   5. Concrete Floors: 8 percent.

3.2 PREPARATION
A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
B. Correct minor defects and clean surfaces which affect work of this Section.
C. Shellac and seal marks which may bleed through surface finishes.
D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
E. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
F. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items, including touch up of shop primed items.
G. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Fill nail holes and cracks prior to application of first coat; sand between coats. Seal knots, pitch streaks and sappy sections with sealer.
H. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
I. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
J. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
K. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
L. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand, power tool wire brushing or
sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

M. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

3.3 PROTECTION
A. Protect elements surrounding the work of this Section from damage or disfiguration.
B. Repair damage to other surfaces caused by work of this Section.
C. Furnish drop cloths, shields, and protective methods to prevent spray or drips from disfiguring other surfaces.
D. Remove empty paint containers from site.

3.4 APPLICATION
A. Apply products in accordance with manufacturer's instructions.
   1. All hollow metal doors and frames to be spray applied.
B. Do not apply finishes to surfaces that are not dry.
C. Apply each coat to uniform finish.
D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
E. Sand lightly between coats to achieve required finish.
F. Allow applied coat to dry before next coat is applied.
G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.5 CLEANING
A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.
C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.6 SCHEDULE - INTERIOR SURFACES
A. Wood - Painted:
   1. One coat of latex primer sealer.
   2. Two coats of latex enamel.
   3. Refer to schedule in drawings for sheen.
B. Wood - Transparent:
   1. Filler one coat.
   2. One coat of stain.
   3. One coat sealer.
   4. Two coats of varnish.
C. Glue-Laminated Wood or Wood Timber Members:
   1. One coat of sealer.
   2. Two coats of varnish.
D. Concrete, Concrete Block, Restored Masonry or Cement Plaster:
   1. One coat of primer sealer.
   2. Two coats of Sherwin Williams Pro Mar 200 Latex or equal.
3. Refer to schedule in drawings for sheen.

E. Steel - Unprimed:
1. One coat of alkyd primer.
2. Two coats of alkyd enamel, semi-gloss.

F. Steel - Primed:
1. Touch-up with alkyd primer.
2. Two coats of alkyd enamel, semi-gloss.

G. Steel - Galvanized:
1. One coat galvanize primer.
2. Two coats of alkyd enamel, semi-gloss.

H. Aluminum - Mill Finish:
1. One coat etching primer.
2. Two coats of alkyd enamel, semi-gloss.

I. Concrete Floors:
1. One Coat of catalyzed epoxy primer.
2. Two coats of catalyzed epoxy enamel, gloss.

J. Gypsum Board and Plaster Walls:
1. One coat of primer sealer.
2. Two coats of Sherwin Williams Pro Mar 200 Latex or equal,
3. Refer to schedule on drawings for sheen.

K. Gypsum Board and Plaster Ceilings:
1. One coat of primer sealer.
2. Two coats of Sherwin Williams Pro Mar 200 Latex or equal,
3. Refer to schedule in drawings for sheen.

L. Burnished Masonry (Alternate Bid #4):
1. One coat of Chemprobe, Phylon 1422.

3.7 SCHEDULE EXTERIOR SURFACES

A. Wood - Painted (Opaque):
1. One coat of alkyd primer sealer.
2. Two coats of enamel, semi-gloss.

B. Wood - Transparent:
1. One coat of stain.
2. Three coats of polyurethane, satin finish.

C. Concrete, Concrete Block:
1. One coat of block filler.
2. Two coats of stain/filler.

D. Steel - Unprimed:
   1. One coat of alkyd primer.
   2. Two coats of alkyd enamel, semi-gloss.

E. Steel - Shop Primed:
   1. Touch-up with zinc rich primer.
   2. Two coats of alkyd enamel, semi-gloss.

F. Steel - Galvanized:
   1. One coat galvanize primer.
   2. Two coats of alkyd enamel, semi-gloss.

G. Aluminum - Mill Finish:
   1. One coat etching primer.
   2. Two coats of alkyd enamel, gloss.

3.8 Schedule - Colors

A. Colors to be determined by owner.

END OF SECTION
PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

B. 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.

C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item "A" above.

1.2 QUALITY ASSURANCE

A. Chemical and physical properties of all materials, design, performance characteristics and methods of construction of all items of equipment shall be in accordance with the following applicable regulations, references, and standards of current editions in effect 30 days prior to receipt of bids:

1. American Society of Heating, Refrigerating, Air Conditioning Engineers (ASHRAE)
2. American Society of Mechanical Engineers (ASME).
4. Factory Mutual Laboratories (FM).
5. National Electrical Manufacturer's Association (NEMA).
7. Plumbing and Drainage Institute (PDI).
8. Underwriters' Laboratories, Inc. (UL).

B. All work, materials and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state and federal authorities. Such codes, where applicable, shall take precedence over these drawings and specifications.

C. All grooved joint 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.

D. All castings used for coupling housings, fittings, and valve bodies shall be date stamped for quality assurance and traceability.

1.3 MATERIALS AND MANUFACTURERS

A. Unless otherwise noted all materials and equipment shall be new, free of defects, installed in accordance with manufacturer's current published recommendations in a neat manner and in accordance with standard practice of the Industry.

B. Certain materials and/or equipment in this specification are specified by manufacturer and catalog numbers. The design was based on the specified equipment and establishes a degree of quality, performance, physical configuration, etc. If the Contractor should elect to use equipment other than the equipment used as a basis for design but listed as "acceptable" in the Specifications, Contractor shall be responsible for space requirements, configuration, performance and changes in, bases, supports, vibration isolators, structural members, openings in structure and other apparatus that may be affected by its use.
C. Contractor further agrees that if deviations, discrepancies, or conflicts between reviewed submittals and shop drawings, and the Contract Documents in the form of design drawings and specifications are discovered after submittals and/or shop drawings are processed by the Architect/Engineer, the design drawings and specifications shall control and shall be followed at no additional cost to Owner or Engineer.

1.4 SUBSTITUTION APPROVALS

A. Equipment and/or materials manufactured by any one of the manufacturers listed in this specification or on the drawings shall be acceptable.
B. Where no specific manufacturer is listed, a first-class item of cataloged manufacturer shall be furnished.
C. Where specifications list a manufacturer and then state, ‘or approved equal’, it shall be the contractors responsibility to obtain in writing the Engineers approval of the proposed ‘equal’ product prior to bids. Contractor shall not simply assume a product will be approved ‘as equal’ based on supplier representatives verbal statements.
D. Coordinate with Division 1 for substitutions and forms to follow.

1.5 QUIET OPERATION AND VIBRATION

A. All mechanical equipment provided under this contract shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Architect/Engineer. In case of moving machinery, sound or vibration noticeable outside of its own room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Architect/Engineer shall be corrected in an approved manner by the Contractor at his expense. Vibration control shall be by means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.

1.6 DRAWINGS AND SPECIFICATIONS

A. The mechanical drawings are diagrammatic in character.
B. All drawings related to this structure, together with these specifications, shall be considered in bidding. The drawings and specifications are complementary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict arise between drawings and specifications, such conflict shall be brought to the attention of the Architect/Engineer for resolution.

1.7 GUARANTEE

A. The Contractor shall guarantee all materials, labor, workmanship, and the successful operation of all equipment and apparatus installed for a period of one year from the date of final acceptance of the entire work, not necessarily the manufacturer's guarantee of when it was installed, and shall guarantee to repair or replace at his own expense any part of the apparatus which may show defect during that time, provided such defect is, in the opinion of the Architect/Engineer, due to imperfect material or workmanship and not due to carelessness or improper use.

PART 2 PRODUCTS

2.1 VALVES, CHECK VALVES AND STRAINERS

A. All valves, except as otherwise specified in detail specifications, shall be of one manufacturer: Victaulic, Apollo, Milwaukee Valve, Crane, Kennedy, Jenkins, Hammond, Powell, or Nibco (gate valves - block pattern) and are to be manufactured in accordance
with the Manufacturer’s Standardization Society of the Valves and Fittings Industry Standards wherever applicable.

B. Ball valves shall be used in lieu of gate valves wherever the pressure and temperature ratings of same are satisfactory for the intended service and valve can be operated easily from floor or platform.

C. Listed manufacturer's numbers in detailed specifications are for cross reference purposes

D. Ball Valves:

1. Valves 2“ and smaller shall be rated 150 psi SWP, 600 psi nonshock CWP; and have two-piece, cash brass bodies, replaceable reinforced Teflon seats, full-port ¼“-1”, conventional-port 1½“-2”, blow-out-proof stems, chrome-plated brass ball, and threaded or soldered ends. Valves shall comply with MSS SP-110.

E. Gas Cocks:

1. Corrosion resistant plug permanently lubricated, corrosion resistant bearings, suitable seals for intended service, lever operation, DeZurik Series 400.

F. Balancing Valves:

1. One piece non-ferrous brass/bronze flow measuring and balancing/shut-off valve combination rated to 150 psig. Flow element shall be a low loss/high signal Venturi or orifice meter equipped with pressure and temperature test ports and caps. Valve shall be ball type with teflon seats and blow-out proof stem with teflon packing. Valves shall provide positive shut-off, memory stop, and union, equal to Flow Design, Inc. "AccuSetter" for sizes 1“ through 4”, or Circuit Setter by B & G, Taco, Victaulic / Tour & Andersen for sizes 1/2“ through 12“.

2. Provide gauge kit with flow-set valves consisting of Bellows-type meter capable of reading flow directly in GPM. Meter equipped with 6 foot hoses, Schrader-type end connectors, bleed and equalizing manifold and rugged plastic case.

3. In lieu of P/T ports, Schrader test ports may be used if separate gauges are installed at equipment being served.

4. Coil-Hook-up Connections: Victaulic Koil-Kits Series 799 or 79V may be used at coil connections. The kit shall include a Series 786/787/78K circuit balancing valve, Series 78Y Strainer-Ball, Series 78U Union-Port fitting, with Series 78T ball valve and required coil hoses. A Style 793 and/or 794 differential pressure controller shall be provided as required. A meter shall be provided by the valve manufacturer that shall remain with the building owner after commissioning.

G. Swing Check Valves:

1. 2“ and smaller shall be class 125, rated 125 psi SWP, 200 psi nonshock CWP; and have threaded or soldered ends, with body and cap conforming to ASTM B-62 cast bronze composition, y-pattern swing type disc. Valves shall comply with MSS SP-80.

2. Class 150 valves meeting the above specifications may be used where system pressure requires. For class 125 seat disc, specify Buna-N for WOG service and TFE for stream service. For class 150 seat disc, specify TFE for stream service.

2.2 HANGERS AND SUPPORTS

A. Pipe hangers shall be manufactured of the same material as the pipe or be non-corrosive to the piping system to which it serves.

B. Multiple pipe runs may be supported on trapeze hangers. Trapeze shall be Unistrut P-100. Hanger rods shall be one size larger than size specified herein for largest pipe on
trapeze. Where trapeze lengths exceeds 42”, additional hanger rod shall be installed at midspan.

C. Except where governed by local codes, maximum hanger spacing and minimum hanger rod sizes shall conform to the following table:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Spacing</th>
<th>Hanger Rod</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>6'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>3/4&quot; thru 1-1/4</td>
<td>8'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>1-1/2&quot;, 2&quot;</td>
<td>10'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td>10'-0&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
<td>12'-0&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>14'-0&quot;</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>6&quot; thru 8&quot;</td>
<td>16'-0&quot;</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>Copper Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>6'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>3/4&quot; thru 1&quot;</td>
<td>8'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>1-1/4&quot; thru 2&quot;</td>
<td>10'-0&quot;</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td>10'-0&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>3&quot; thru 4&quot;</td>
<td>12'-0&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>Plastic Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2&quot;</td>
<td>1 ea. joint</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
<td>1 ea. joint</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>1 ea. joint</td>
<td>5/8&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1 ea. joint</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

D. Vertical risers shall be supported at each floor line with steel riser clamps equal to Figure 230 as manufactured by "Auto-Grip" Division, Automatic Sprinkler Corporation of America or equal of Michigan Hanger Company.

E. Insulated pipe where specified to be continuous through hanger shall be protected at points of support with thermal hanger shields as manufactured by Pipe Shields, Inc. or equal of Insulshield or Uni-Grip. Thermal hanger shields shall consist of a 360° insert of high density, 100 psi, water-proofed calcium silicate, encased in a 360° sheet metal shield. Insert to be same thickness as adjoining pipe insulation. Shield length and minimum sheet metal gauges shown in chart below:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Shield Length</th>
<th>Minimum Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; - 1-1/2&quot;</td>
<td>4&quot;</td>
<td>26</td>
</tr>
<tr>
<td>2&quot; thru 8&quot;</td>
<td>6&quot;</td>
<td>20</td>
</tr>
</tbody>
</table>

F. Floor type pipe supports for flanged piping, backflow devices, water meters, etc. shall be equal to Material Resources, "Standon" adjustable steel pipe support Model 89 for up to 12", Class 125 flanges.

G. Victaulic pipe hangers and supports shall be spaced in accordance with the following pipe spacing table to allow for the proper installation of the insulating materials on the pipe and fittings.

**VICTAULIC PIPE SPACING**

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Spacing on Pipe Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/2</td>
<td>11 inches</td>
</tr>
<tr>
<td>3</td>
<td>11 inches</td>
</tr>
<tr>
<td>4</td>
<td>12 inches</td>
</tr>
<tr>
<td>5</td>
<td>14 inches</td>
</tr>
<tr>
<td>6</td>
<td>14 inches</td>
</tr>
<tr>
<td>7</td>
<td>15 inches</td>
</tr>
</tbody>
</table>
2.3 ELECTRICAL EQUIPMENT

A. All electrical equipment shall conform to the electrical specifications and shall be suitable for operation on the voltage and phase available at the building site. These characteristics shall be verified by the Contractor prior to ordering equipment.

B. Provide motors as required for proper operation of all equipment furnished under this Division.

1. Minimum motor horsepower ratings are specified or scheduled on the drawings. Minimum requirements for all motors are as follows:
   a. Constructed for operation at work site altitude and surrounding temperature.
   b. Dustproof/leakproof bearing rings.
   c. Built to NEMA standards.
   d. Factory balanced.
   e. Open dripproof unless noted otherwise.
   f. Integral thermal overload protection.

C. When not specifically noted under Division 16000 or electrical drawings, provide the following:

1. Furnish all necessary control devices such as speed controls, transformers and relays as required for proper operation of all equipment furnished under this Division.
2. Furnish identification as to purpose for each switch and/or pushbutton station furnished herein. Identification may be either engraved plastic sign or permanent mounting to wall below switch, or stamping on switch cover proper. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

2.4 PRESSURE GAUGES

A. Approved manufacturers are Duro Instrument Corp., Miljoco, H.O. Trerice Co., Ametek U.S. Gauge Division.

B. Pressure gauges shall have phenolic turret case; 4-1/2" dial with suitable range; phosphorous bronze Bourdon tube; corrosion-resistant movement; adjustable stainless steel pointer; 1% of full scale accuracy; 1/4" NPT brass connection.

C. Furnish the following with each pressure gauge: 1/4" brass needle valve Hammond IB415; pressure snubber Ray Model 1 Operating and Maintenance Specialties.

2.5 ACCESS DOORS

A. Mechanical Contractor shall provide and locate all required access doors where they may be required to service equipment, valves, dampers, etc. in inaccessible ceiling and walls. General Contractor shall install.
PART 3 EXECUTION

3.1 DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for the delivery and safe storage of materials and make the required arrangements with other contractors for the introduction into the building of equipment too large to pass through finished openings.

3.2 PIPE AND FITTINGS

A. Piping is to be installed as shown on the drawings insofar as practical. When a pipe size is not indicated the subcontractor shall request the pipe size from the Architect/Engineer through the general contractor.

B. Provide sufficient swing joints, anchors, expansion loops, and/or devices necessary and install so as to permit free expansion and contraction without causing undue stresses. Make all changes in direction with fittings. Support piping independently at all equipment so that its weight shall not be supported by the equipment.

C. For water systems, Victaulic flexible couplings may be used on header piping to accommodate thermal growth and contraction, and for the elimination of expansion loops (as approved by the engineer). Where loops are required, use flexible-type couplings on the loops.

D. Install piping without springing or forcing and clear all windows, doors, and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted.

E. All pipe shall be reamed to full pipe diameter before joining.

F. Install vertical risers plumb and straight, horizontal lines parallel with walls and partitions.

G. Provide shut-off valves and unions suitably located to isolate each item of equipment, branch circuit or section of piping.

H. Unions and flanges for servicing and disconnect are not required in installations using grooved joint couplings. (The couplings shall serve as disconnect points.)

I. Provide 1/2" drain valves at all low points of each system to enable complete drainage.

J. Provide dielectric unions or waterway fittings at all junctions of dissimilar metals in fresh water systems.

K. Grooved joint shall be installed in accordance with the manufacturer’s written recommendations. Grooved ends shall be clean and free from indentations, projections, or roll marks. The gasket shall be molded and produced by the coupling manufacturer of an elastomer suitable for the intended service. The coupling manufacturer’s factory trained representative shall provide on-site training for the contractor’s field personnel in the use of grooving tools and installation of product. The representative shall periodically visit the job site to ensure best practices in grooved product installation are being followed. (A distributor’s representative is not considered qualified to conduct the training.)

L. All piping shall be adequately supported from the building’s structural framing system with adjustable hangers to maintain grading where required and to prevent sagging and pocketing.

M. Provide supports between piping and building structure where necessary to prevent swaying.

N. The use of wire or perforated metal to support pipe will not be permitted.

O. Do not install back-to-back change of direction or offset fittings such as ells and tees without a minimum of 3" nipple for the purposes of insulating the pipe properly.

3.3 MECHANICAL WIRING

A. Provide all temperature control wiring, all interlock wiring, and equipment control wiring for the equipment that is to be provided under this Division unless specifically shown on electrical drawings.
B. All wiring shall be not less than No. 14 insulated color coded wire in thin wall conduit.

C. The following schedule is intended to summarize the division of work and material responsibilities between the mechanical contractor and the electrical contractor.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED BY</th>
<th>SET BY</th>
<th>POWER WIRING</th>
<th>CONTROL WIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment motors</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>--</td>
</tr>
<tr>
<td>Motor starters, contractors</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
<td>MC</td>
</tr>
<tr>
<td>and overload heaters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fused and unfused disconnect switches</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
<td></td>
</tr>
<tr>
<td>Manual operating switches,</td>
<td>MC</td>
<td>EC</td>
<td>EC</td>
<td>EC</td>
</tr>
<tr>
<td>multi-speed switches, push-button</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stations and pilot lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control relays and transformers</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>MC</td>
</tr>
<tr>
<td>Thermostats, time switches*</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>MC</td>
</tr>
<tr>
<td>Temperature control panels</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>MC</td>
</tr>
<tr>
<td>Motor and solenoid valves, damper</td>
<td>MC</td>
<td>MC</td>
<td>--</td>
<td>MC</td>
</tr>
<tr>
<td>motors, PE and EP switches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigeration equipment and controls</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>MC</td>
</tr>
<tr>
<td>Fire protection controls and</td>
<td>MC</td>
<td>MC</td>
<td>EC</td>
<td>MC(a)</td>
</tr>
<tr>
<td>switches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoke detectors (duct mounted)</td>
<td>EC</td>
<td>MC</td>
<td>EC(a)</td>
<td>MC(a)</td>
</tr>
</tbody>
</table>

MC = Mechanical Contractor  
EC = Electrical Contractor

* Motor driven units which are controlled from line voltage automatic controls such as line voltage thermostats, float switches or time switches which conduct full load current of the motor shall be wired for both power and control circuit under the electrical contract. However, if the control device does not conduct full load current, then the responsibility shall be set forth in the above schedule. (Example: a 208-volt, 3-phase, 3-wire motor requires 120-volt control. Electrical contractor shall furnish a 120-volt circuit for control and 208 volt circuit for power and wire the power circuit. Mechanical contractor shall wire the control circuit).

(a) Wiring from alarm contacts to alarm system by EC; all control function wiring by MC. MC to coordinate location with EC.
3.4 OPERATION INSTRUCTIONS

A. Upon completion of all work and all tests, Contractor shall furnish the necessary skilled labor for operating all systems and equipment installed under this Division. The purpose is to demonstrate the workability of all systems and to instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished utilizing the appropriate sections of the maintenance manual as a reference guide. Give at least 48 hours notice to the Owner and Architect/Engineer in advance of this period.

3.5 ACCEPTANCE TEST

A. Subsequent to the final air and water balance test, all environmental systems shall be tested to prove satisfactory performance of all units.
B. The entire heating system shall be tested during the first heating season following completion of the mechanical systems and it shall be established that all controls are calibrated accurately and performing properly and that all units are heating satisfactorily.
C. The entire air conditioning system shall be tested during first cooling season following the completion of the mechanical systems; and it shall be established that all controls are calibrated accurately and performing properly and that all units are cooling satisfactorily.
D. The entire ventilation system shall be tested at the completion of the project; and it shall be established that controls are performing properly and that all rooms are being ventilated satisfactorily.
E. Check all duct smoke detectors and freezeplastics to assure that they are functioning properly.

3.6 MAINTENANCE

A. The Contractor shall provide the necessary skills and labor to assure the proper operation and to provide all required maintenance for all equipment and controls provided under Division 15 for a period of one year after substantial completion of the contract as defined in paragraphs B through D below.
B. The Contractor shall receive calls for any and all problems experienced in the operation of the equipment provided under Division 15 and shall take steps to immediately correct any deficiencies that may exist.
C. All equipment that requires repairing shall be immediately serviced and repaired. Since the period of maintenance runs for one year concurrently with the warranty and guarantee, all parts and labor shall be furnished at no extra cost to Owner (including all controls).
D. When emergency service is required beyond working hours to maintain the system in operation, the Contractor shall furnish such service.

3.7 SCAFFOLDING, RIGGING, HOISTING

A. Provide all scaffolding, rigging, hoisting, and services necessary for delivery, erection, and placement within the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.8 THERMAL CONTINUITY

A. Where openings are created for duct work, piping, outdoor intake ducts, or any type of mechanical equipment penetration thru an insulated wall, roof, or partition, Mechanical Contractor shall be responsible for providing an air tight seal against air infiltration.
B. Where openings are larger than ¼", Mechanical Contractor shall fill opening with an insulation matching the existing R-value of the thermal barrier, but no less than R-18 for walls and R-30 for roofs, and then seal air tight.

COMMON WORK RESULTS FOR HVAC

23 05 00 - 8
3.9 WATERPROOFING

A. Where any work pierces waterproofing, the method of installation shall be as approved by the Architect/Engineer before work is done. Contractor shall furnish all necessary sleeves, caulking, and flashing required to make openings watertight.

3.10 ESCUTCHEON PLATES

A. Escutcheon plates shall be provided for all exposed uninsulated pipes passing through walls, floors, and ceilings. Plates shall be nickel plated metal, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.
B. Plates for water supplies into sinks or water closets shall be one-piece non-split ring.

3.11 REMOVAL AND RELOCATION OF EXISTING PIPING AND/OR EQUIPMENT

A. The layout of the existing mechanical system as shown on the drawings has been prepared from existing building drawings and from inspection of the site. All data shown is the most accurate that is available at this time. Contractor shall visit the site to determine the exact quantities and the extent of equipment and piping to be removed and/or relocated prior to bid.
B. All materials to be removed shall become the property of the Contractor and shall be removed from the site unless specifically otherwise indicated on the drawings and/or tagged by Owner.
C. The Owner has the right of first refusal of all removed equipment and materials.

3.12 CLEANING AND FLUSHING WATER CIRCULATING SYSTEMS

A. All water circulating systems for the project shall be thoroughly cleaned before placing in operation to rid the system of dirt, piping compound, mill scale, oil, and any and all other material foreign to the water being circulated.
B. Extreme care shall be exercised during construction to prevent all dirt and other foreign matter from entering the pipe or other parts of the system. Pipe stored on the project shall have the open ends capped and equipment shall have all openings fully protected. Before erection, each piece of pipe, fitting, or valves shall be visually examined and all dirt removed.
C. After non-potable system(s) are complete, the subcontractor shall add trisodium phosphate in an aqueous solution to the system at the proportion of 1 lb. per 50 gallons of water in the system. After the system is filled with this solution, the system shall be brought up to temperature and allowed to circulate for two hours. The system shall then be drained completely and refilled with fresh water. The Architect/Engineer shall be given 72 hour advanced notice of this cleaning operation and will have his representative present to observe the cleaning operation, and if, the Architect/Engineer's representative deems it necessary, the cleaning operation shall be repeated.
D. After the system has been completely cleaned as specified herein, it shall be tested by litmus paper or other dependable method and shall be left on the slightly alkaline side (pH = 7.5±). If the system is found to be still on the acid side, the cleaning by the use of trisodium phosphate shall be repeated.
E. "Stop-leak" compounds shall not be added to the system at any time.
3.13 INSTALLATION

A. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. Maintain maximum headroom and space conditions at all points.

3.14 ACCESSIBILITY

A. Locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include, but not be limited to, dampers, valves, traps, clean-outs, motors, controllers, switchgear, and drain points. If required for better accessibility, locate access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility.

3.15 CLEAN-UP

A. At the completion of work, all equipment on the project shall be checked and thoroughly cleaned including coils, plenum, under equipment and all other areas around or in equipment provided under this Section. Clean all exposed surfaces of all piping, hangers, ducts, and other exposed metal of all grease, plaster, or other foreign material. Remove all stick-on labels and clean surfaces.

B. At the completion of each work day, remove from the building, the premises, and surrounding streets, alleys, etc., all rubbish and debris resulting from the operations and leave all equipment spaces absolutely clean and ready for use.

3.16 DAMAGED SURFACES

A. At the completion of work, all mechanical equipment furnished under this contract shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet, jacket, or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.17 HOLES IN PRECAST CONCRETE

A. All openings in precast concrete over 6" square or 6" diameter shall be cast in place at the time of fabrication. The mechanical contractor shall cut all openings 6" and under at the site or shall make proper arrangements with the fabricator to cast same during fabrication. All openings if cut shall be cut with rotary-type drill, or other method as approved by the Architect. Holes cut with pneumatic hammer will not be accepted.

3.18 SLEEVES AND INSERTS

A. The contractor shall provide and locate all sleeves and inserts required before the floors and walls are built, or shall be responsible for the cost of cutting and patching required to facilitate installation after walls or floors are constructed.

B. Each contractor shall be responsible for any drilling required for installation of hangers.

C. Sleeves shall be provided for all mechanical piping passing through concrete floor slabs and concrete or masonry exterior wall construction.

D. Where sleeves are placed in exterior below grade walls, the space between pipe and the sleeve shall be made water tight using a link seal or other approved method of water seal.

E. Where pipe motion due to expansion or contraction will occur, make interior wall sleeves of sufficient diameter to permit free movement of pipe and insulation.

F. Terminate sleeves flush with wall. Extend floor sleeves ¼" above finished floor, except in rooms having floor drains, in which sleeves shall extend ¾" above finished floor.
G. All sleeves shall be constructed of steel pipe unless otherwise noted on the drawings or specifically specified for a particular installation.

3.19 OLD PIPE LINES

A. Old sewer, water, steam, or other pipes encountered which interfere with the proper installation of new work and which will not be used in connection with the new work, shall have openings closed in a proper manner concealed in wall; or, if necessary, relocate or remove the pipes as directed by the Architect/Engineer.

3.20 EXCAVATING AND BACKFILLING

A. Provide all excavating and backfilling required in connection with the work under this Division including the new building domestic water main.

B. Trench Excavation: The Contractor shall proceed with trench excavation with due regard for the protection of life, health, and property. Appropriate equipment shall be used to perform the work and, where necessary, extra measures such as the use of sheeting or shoring shall be used. The following shall be observed in excavating trenches:

1. Excavation shall not proceed until the location of nearby utilities have been ascertained and clearly marked by their owners and/or utility companies. Call "MISS DIG" (811 or 1-800-482-7171) at least three (3) full working days prior to any excavation.

2. Excavation in close proximity to utilities shall be done by hand to expose all utilities and physically locate in order to protect them from damage prior to the use of any power equipment.

3. Trenches shall be excavated in reasonably close proximity to the lines and grades on the plans or as established by the Engineer. Special attention shall be given to requirements for depth of burial.

4. The trench shall be of sufficient width to provide free access for completing the work.

5. Rock or hardpan shall be excavated to a depth of 4 inches below the bottom of the pipe and replaced with granular bedding material acceptable to the Engineer.

6. Where unstable soil conditions are encountered, the Engineer shall be notified for special requirements which may be required.

7. Where work is within a paved roadway, the pavement shall be cut and removed prior to excavation.

C. Backfilling Trench: Backfill material, free of rocks, sticks, and other debris, shall be placed by hand to a depth of six (6) inches over the service piping and compacted. Machine backfilling may then proceed by placing and compacting twelve (12) inch lifts of suitable material up to subgrade elevations (95% density Standard Proctor test). No muck, peat, stumps, roots, boulders, or other large debris will be included in the backfill in any part of the trench. Where the trench is within a roadway, backfill and subgrade material as required by the plans or other parts of this document shall be used, unless otherwise directed by the Engineer.

3.21 SURFACE RESTORATION

A. Upon completion of backfilling operations up to the required subgrade elevation, the surface will be restored in kind to the same or better condition as existing prior to excavation, unless otherwise directed by the Engineer.
3.22 COORDINATION AND COOPERATION WITH OTHER TRADES

A. The Contractor for this work shall examine the drawings and specifications for other parts of the work, and if head room or space conditions appear inadequate, or if any discrepancies occur between the plans and his work and the plans for the work of others, he shall report such discrepancies to the Architect/Engineer and shall obtain written instructions for any changes necessary to accommodate his work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the Contractor to report such discrepancies shall be made by and at the expense of this Contractor.

B. Where the mechanical work will be installed in close proximity to, or will interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than \( \frac{1}{4}'' = 1'\text{-0"} \), clearly showing his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

3.23 RECORD OF CHANGES

A. Show on blue line prints in red ink all changes from original plans made during installation of work and file with Architect/Engineer when work is complete.

B. Coordinate with Division 1 for "As-Built" drawings and specification requirements.

3.24 SURVEY AND MEASUREMENTS

A. Base all measurements, both horizontal and vertical, on established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

B. If any discrepancy between actual measurements and those indicated is discovered, which prevents following good practice or the intent of the drawings and specifications, the Architect shall be notified through the general Contractor, and work shall not proceed until instructions are received from the Architect.

3.25 PROTECTION

A. The Contractor shall protect all work and material from damage by his work or workmen, and shall be liable for all damage thus caused.

B. The Contractor shall be responsible for work and equipment until finally inspected, tested, and accepted; protecting work against theft, injury, or damage; and shall carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.26 RESPONSIBILITY OF CONTRACTOR

A. The Contractor is responsible for the complete and satisfactory installation of the work in accordance with the intent of the drawings and specifications. He shall provide, without extra charge, all incidental items required, as part of his work, even though not particularly specified or indicated. The installation shall be so made that its several component parts will function together as a workable system and shall be left with all parts adjusted and in working order.
3.27 EQUIPMENT ON ROOFS OR ELEVATED SURFACES

A. Where mechanical appliances are installed on a roof having a slope of 3 units vertical in 12 units horizontal (25% slope) or greater and having an edge more than 30" above grade, a level platform shall be provided on each side of the appliance to which access is required by the manufacturer’s installation instructions for service, repair, or maintenance. The platform shall not be less than 30" in any dimension and shall be provided with guards.

B. Do not locate mechanical appliances, equipment, or fans that require service within 10-feet of a roof edge or open side of a walking surface located more than 30" above the floor, roof, or grade below. Where equipment is placed closer than described herein, guards shall be furnished with top of the guard located not less than 42" above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch diameter sphere and shall comply with the loading requirements for guards specified in the Building Code.

3.28 PENETRATION OF FIRE AND SMOKE BARRIERS

A. Penetrations of floor, wall and/or ceiling assemblies required to have a fire or smoke resistance rating shall be protected in accordance with all applicable codes and as further described in Division 15 specification sections.

B. Fire stop insulation for all copper, iron and steel pipe/duct where passing through fire walls shall be ceramic fiber blanket equal to Manville “Cerablanket” 6 lb. density.

C. Fire stop insulation on plastic pipe penetrations through fire walls shall be an intumescent type wrap. Provide sleeves of adequate diameter to apply the required number of insulation wraps on pipe per manufacturer’s requirement.

D. Fire and smoke dampers for duct systems shall comply with Section 15800.

3.29 COMMISSIONING RESPONSIBILITIES

A. The mechanical contractor, all sub-contractors, and suppliers within Division 15 shall cooperate in the Commissioning process, to facilitate the successful completion of the Commissioning of all HVAC equipment, controls, and other items specified within this Division. Refer to Section 15995 – Commissioning for further details concerning the commissioning process.

B. The Contractor and following sub-contractors shall assign a representative to the Commissioning team:

3. Mechanical Contractor
4. Controls Contractor
5. Sheet Metal Contractor (if separate sub-contractor to Mechanical)
6. Testing, Adjusting, and Balancing Agent
7. Electrical Contractor

C. Each contractor representative shall have the authority to make decisions on behalf of the mechanical contractor as they relate to organization and scheduling of the Commissioning process.

D. The Mechanical Contractor shall ensure communication between Division 15 sub-contractors and suppliers with all other commissioning team members, and shall foster necessary cooperative action.

E. The Mechanical Contractor and sub-contractors shall participate in the commissioning process as follows:

1. Each contractor shall include in their bid, the cost of participating in the commissioning process.
2. Include requirements for Commissioning in each purchase order or sub-contract written.
3. Attend commissioning meetings.
4. Provide the Commissioning Agent (CA) a copy of all equipment cut sheets and shop drawing submittals, operational and maintenance submittals, equipment installation and start-up instructions, and other documentation or submittals pertinent to the commissioning process.
5. Ensure cooperation and participation of appropriate equipment manufacturers, or their authorized representatives, in start-up, testing and training activities.
6. Prior to commissioning, inspect, check and confirm the correct and complete installation of all equipment, piping, ductwork, and systems for which system verification checklists are included in the Commissioning plan. If deficient or incomplete work is discovered, ensure action is taken immediately to correct the problem and the system is ready to be commissioned.
7. Provide written notification to the Commissioning Agent that the HVAC work is complete, checked, tested and ready to be Commissioned.
8. Set up a meeting with the Test and Balancing (TAB) Contractor, Commissioning Agent, and Engineer at least one month prior to substantial completion of the HVAC work to discuss the requirements of the TAB Contractor for completing TAB work. Notify the TAB in writing a minimum of two weeks in advance, with a copy to the Commissioning Agent and the Engineer, that systems are installed, performance has been verified, and that TAB work can proceed.
9. Provide sufficient personnel to assist the Commissioning Agent as necessary during the systems verification and performance testing.
10. Operate all equipment and systems as directed by the Commissioning Agent to complete the Commissioning functional and performance verification processes. If, during the commissioning process, equipment or systems are not functioning correctly, or are incomplete, the Commissioning process may be stopped at the discretion of the CA. Those responsible for deficient or incomplete work will be responsible for all costs associated with re-participating in the commissioning of that particular equipment or system.
11. Provide instruction and demonstrations for the Owner’s designated operating staff, in conjunction with the Commissioning Agent and mechanical engineer, and with the participation of qualified technicians from major equipment suppliers and the controls contractor.

F. Division 15995 – Commissioning shall take precedent over these specifications should a conflict may arise.

3.30 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall prepare operation and maintenance manuals which shall cover all systems installed under Division 15.
B. The manuals shall be submitted to the Engineer in draft form for approval prior to preparation of three copies for final submission to the Architect for delivery to the Owner.
C. The manuals shall be 8-1/2” x 11” size and assembled in loose-leaf three ring or post binders. The manual shall be adequately indexed and contain the following information.

1. Contractors’ names, addresses, and telephone numbers
2. Alphabetical list of all system components with the names and addresses, and 24-hour phone number of the companies responsible for servicing each item during the warranty period.
3. Guarantees and warranties of all equipment whenever applicable.
4. All manufacturer’s data that are applicable to the installed equipment such as the following:
a. Shop drawings.
b. Installation instructions.
c. Lubrication instructions.
d. Wiring diagrams.

5. All equipment shall be clearly identified as to the model, size, flow data, electrical characteristics, and other design and sizing parameters as may be applicable to the actual installed piece of equipment or systems described.

6. A simplified description of the operation of all systems including the function of each system, and piece of equipment within a system. These descriptions shall be supported with a schematic flow diagram when applicable.

7. Temperature control diagrams including an explanation of the control sequence of each system along with the following instruction whenever applicable.
   a. Emergency procedures for failure of major equipment.
   b. Normal starting, operating and shutdown.
   c. Summer or winter shutdown.

8. System Balancing report.
9. Valve tag list when applicable.
10. An outline of a preventative maintenance program for each system or item of equipment, and shall include a schedule of inspection and maintenance. It shall suggest the maintenance and inspection that should be performed by the owner and that which should be completed with outside service.

3.31 DUST PROTECTION

A. During the course of demolition, work will be performed in areas where dust can be a nuisance to occupants or cause operating difficulties to equipment. The contractor shall take appropriate measures to minimize production of dust and provide dust barriers to separate the work area in an approved method to minimize dirt and dust migration with the use of tarpaulins, plastic enclosures, temporary walls, or other means as necessary, to be approved by the Owner.

B. The Contractor may, with approval of Owner, wet down concrete and masonry surfaces being demolished, but the contractor shall also provide means to control water migration to adjoining spaces, provide means to remove water which may accumulate due to this wetting process, and be responsible for any structural or occupants material damage caused from the use of water.

3.32 PAINTING EXTERIOR FERROUS PIPING

A. All exterior ferrous piping shall be primed and painted.
B. Contractor shall grind the pipe smooth.
C. Clean piping and make ready for paint.
D. Prime all exterior piping with metal primer.
E. Paint with two coats of industrial enamel.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

1.2 RELATED SECTIONS

A. Section 15800 - Air Distribution

1.3 REFERENCES

A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.

1.4 SUBMITTALS

A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.
B. Submit test reports as a submittal under provisions of Division 1.
C. Submit test reports under provisions of Division 1.
D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
E. Provide reports in letter size, bound manuals, complete with index page and indexing tabs, with cover identification at front and side.
F. Include detailed procedures, agenda, sample report forms, and copy of AABC National Project Performance Guaranty prior to commencing system balance.

1.5 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance or NEBB forms.
B. Forms shall include the following information:

1. Title page:
   a. Company name
   b. Company address
   c. Company telephone number
   d. Project name
   e. Project location
   f. Project Architect
   g. Project Engineer
   h. Project Contractor

2. Instrument list:
   a. Instrument
   b. Manufacturer
   c. Model
   d. Serial number
   e. Range
3. Air Moving Equipment:
   a. Location
   b. Manufacturer
   c. Model
   d. Air flow, specified and actual
   e. Return air flow, specified and actual
   f. Outside air flow, specified and actual
   g. Total static pressure (total external), specified and actual.
   h. Inlet pressure
   i. Discharge pressure
   j. Fan RPM
   k. Total static pressure and measured air flow in coil bypass mode
   l. Total static pressure and measured air flow in coil face operation

5. Air Distribution Test Sheet:
   a. Air terminal number
   b. Room number/location
   c. Terminal type
   d. Terminal size
   e. Area factor
   f. Design velocity
   g. Design air flow
   h. Test (final) velocity
   i. Test (final) air flow
   j. Percent of design air flow

1.6 PROJECT RECORD DOCUMENTS
   A. Submit record documents under provisions of Section 01720.
   B. Accurately record actual locations of balancing valves and rough setting.

1.7 QUALITY ASSURANCE
   A. Agency shall be company specializing in the adjusting and balancing of systems specified in this Section with minimum three years documented experience.

1.8 SEQUENCING AND SCHEDULING
   A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.
   B. All mechanical systems shall be tested, balanced, and operated to demonstrate to the Owner or his representative that the installation and performance of these systems conform to the requirements of the plans and specifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION
3.1 EXAMINATION
A. Before commencing work, verify that systems are complete and operable. Ensure the existing rooftop unit and new exhaust fan is operable and in a safe and normal condition.
B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.
C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.
D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
E. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION
A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
B. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES
A. Adjust air systems to plus or minus 5% of the design conditions indicated.

3.4 ADJUSTING
A. Recorded data shall represent actually measured, or observed condition.
B. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored.
C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
F. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE
A. Measure air quantities at air inlets and outlets.
B. Adjust outside air, return air, and exhaust dampers for design conditions.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. Furnish all labor, equipment, materials, and accessories, and perform all operations necessary for the installation of insulation in accordance with these specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 23 05 00 – Common Work Results for HVAC
B. Section 23 31 13 – Metal Duct
C. Section 23 81 26 - Air Cooled Split System Condensing Units

1.3 REFERENCES

A. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation
B. ASTM E84 - Surface Burning Characteristics of Building Materials
C. NFPA 255 - Surface Burning Characteristics of Building Materials

1.4 FIRE HAZARD CLASSIFICATION

A. All components of the insulation system including insulation facings, mastics and adhesives with the exception of the elastomeric material specified elsewhere herein shall not exceed the following hazard ratings as determined by NFPA 225 of ASTM E84.

<table>
<thead>
<tr>
<th></th>
<th>Pipe &amp; Equipment Coverings</th>
<th>Duct Coverings and/or Linings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flame spread rating</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Fuel contributed</td>
<td>50</td>
<td>--</td>
</tr>
<tr>
<td>Smoke developed</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

1.5 QUALITY ASSURANCE

A. Furnish insulation systems to the project site bearing the manufacturer's label.
B. Appearance shall be of equal importance with its mechanical correctness and efficiency.
C. Applicator: Company specializing in piping insulation application with three years minimum experience.

1.6 PROTECTION

A. Protect insulation against dirt, water, chemical, or mechanical damage before, during, and after installation. Any such insulation or covering damaged prior to final acceptance of the work shall be satisfactorily repaired or replaced.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Approved manufacturers for insulation are Manville, PPG, Owens-Corning and Knauf.
B. Approved manufacturer for adhesives, sealants, and coatings are Dow, Foster, Hardcast, and Childers Product Company.
2.2 PIPE INSULATION

A. Specification "A": Preformed fiberglass; ANSI/ASTM C547; with "K" factor of 0.23 maximum at 75 °F mean temperature. Jacket shall be factory applied kraft paper. Provide vapor barrier on all storm drain insulation, and on insulated piping possibly conveying fluids below 60 °F.

B. Specification "B": Flexible, elastomeric closed cell insulation with "K" factor of 0.27 at 75 mean temperature. This product is not to be installed in locations where its use is prohibited by local codes.

C. Pipe insulation schedule for piping not directly buried or heat traced unless noted otherwise.

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>PIPE SIZE</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Condensate Drains</td>
<td>All</td>
<td>1/2&quot; --</td>
</tr>
<tr>
<td>Refrigerant Suction</td>
<td>1&quot; &amp; smaller</td>
<td>1&quot;</td>
</tr>
<tr>
<td></td>
<td>1-1/4&quot; thru 3&quot;</td>
<td>1-1/2&quot;</td>
</tr>
<tr>
<td>Outdoor Use</td>
<td>All</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

D. Adhesives: Compatible with insulation.

2.3 DUCT INSULATION

A. Insulate all supply air duct; as well as any exhaust duct exposed in unheated spaces with 1-1/2" thick fiberglass blanket with factory applied heavy duty foil-scrim-kraft facing with vapor barrier and a "K" value of 0.28 maximum at 75 °F mean temperature.

B. When noted to be lined for conductivity, metal duct shall be lined with ½" duct liner for sound absorption. The acoustical liner shall be installed even where duct wrap may be required.

C. Duct liner shall be as follows:

1. Duct liner having a "K" value of 0.27 at 75 °F mean temperature and a density of 1.5pcf minimum shall be equal to AP Armaflex Gray Duct liner for pinned duct installation in accordance with SMACNA requirements and complying with the requirements of NFPA 90A and the "Duct Liner Materials Standard" of the Thermal Insulation Manufacturers Association.

2. Sizes shown on drawings are inside clear sizes.

3. Linings in air ducts and equipment shall meet the Erosion Test Method described in Underwriters' Laboratories, Inc., Publication No. 181. These linings, including coatings and adhesives, and insulation on exterior surfaces of pipes and ducts in building spaces used as air supply plenums, shall have a class A rating as determined by an independent testing laboratory in accordance with ASTM standard E 84.

4. Duct liner shall have built-in antimicrobial protection for an added level of resistance to mold and mildew.

5. Duct liner for thermal conductivity shall be a minimum of 1" thick.

D. Adhesives: Waterproof fire-retardant type.

E. Lagging Adhesive: Fire resistive to ASTM E84 and NFPA 255.
PART 3  EXECTION

3.1  GENERAL INSTALLATION

A.  Insulation shall be installed by workmen regularly engaged in this kind of work in accordance with the manufacturer's recommendations.
B.  Apply insulation on clean, dry surfaces free of any foreign matter and only after tests and approvals required by the specifications have been completed.
C.  Duct insulation shall be continuous through walls and floor openings except where walls and floors are required to be fire stopped or required to have fire resistive rating.  Where this occurs, the open space remaining between the sleeve and pipe shall be filled with fire stop insulation and/or sealant.
D.  Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal.  Supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
E.  All exposed raw edges shall be finished with finishing cement.
F.  The word "concealed" as used in this Section refers to insulation in ceiling plenums, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, unexcavated spaces, and crawl spaces.  The word "exposed" refers to insulation in all other areas.

3.2  INSTALLATION OF DUCT INSULATION

A.  Install materials in accordance with manufacturer's instructions.
B.  Provide insulation with vapor barrier when air conveyed may be below ambient temperature
C.  Insulation Application:
   1.  All insulation shall be applied with edges tightly butted with facing overlapping all joints at least 2".  Where vapor seal is required the joints shall be sealed with fire retardant adhesive.  The insulation shall be secured to the duct with approximately 4" wide strips at 8" o.c. of fire retardant adhesive.  Where the duct width exceeds 30", the underside insulation shall be additionally held in place with mechanical fasteners on about 18" maximum centers.
   2.  Where vapor seal is required all breaks and punctures shall be sealed with vapor barrier tape and fire retardant adhesive.
   3.  Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
   4.  All duct insulation on cold surfaces shall be continuous through walls and floors; no seam permitted at the floor or wall penetration.  Coordinate this work with the general contractor.
   5.  Insulation thicknesses called out as greater than 1-1/2" shall be applied as two layers of equal thickness; having all joints staggered.  Only the outer layer needs to have a vapor barrier jacket.
D.  Insulating contractor shall take care not to conceal the damper location identification tape markers hung from balancing dampers by the mechanical contractor.  The markers are installed for the purpose of identifying damper locations by the balancing contractor, and thus avoid damage to the insulation in locating dampers.

3.3  INSTALLATION OF DUCT LINER
A. Refer to Part 2 of this section for installation locations and thickness of duct liner.
B. Adhere all duct liner with a low V.O.C. adhesive equal to Armaflex 520 BLV for 100% coverage.
C. Duct liner shall be cut to assure snug corner joints.
D. The liner shall be additionally secured with mechanical fasteners which shall compress the duct liner sufficiently to hold it firmly in place. Start within 3" of the leading edge of each duct section (and any line transverse joints within the duct section) and shall be spaced no more than 6" O.C. around the perimeter of the duct, except that they need to be no closer than 6" to a corner break. Elsewhere, they shall be a maximum of 10" O.C., except that they shall be placed not more than 6" from a cut edge nor 12" from a corner break.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION

A. This Section includes metal ducts for supply and return air-distribution systems in pressure classes from minus 6- to plus 6-inch wg.

1.2 DEFINITIONS

A. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.
C. AMCA - Air Movement and Control Association International, Inc.

1.3 QUALITY CONTROL

A. Materials: 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. Fiber-Glass Liner: Comply with NFPA 90A or NFPA 90B, surfaces exposed to airstream shall be coated to prevent erosion of glass fibers.

PART 2 PRODUCTS

2.1 SHEET METAL

A. All sheet metal used for duct and plenum construction shall be galvanized steel unless otherwise specified. Galvanized steel shall be of lock forming quality with a zinc coating of 1.25 ounces per square foot on each side.
B. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
C. Round and Flat Oval, Spiral Lock-Seam Ducts: Furnish duct and fittings made by the same manufacturer to insure good fit of slip joints. When submitted and approved in advance, round and flat oval duct, with size converted on the basis of equal pressure drop, may be furnished in lieu of rectangular duct design shown on the drawings.

1. Elbows: Diameters 3 through 8 inches shall be two section die stamped, all others shall be gored construction, maximum 18 degree angle, with all seams continuously welded or standing seam. Coat galvanized areas of fittings damaged by welding with corrosion resistant aluminum paint or galvanized repair compound.
2. Provide bellmouth, conical tees or taps, laterals, reducers, and other low loss fittings as shown in SMACNA Standards.
3. Ribbed Duct Option: Lighter gage round/oval duct and fittings may be furnished provided certified tests indicating that the rigidity and performance is equivalent to SMACNA standard gage ducts are submitted.
   a. Ducts: Manufacturer's published standard gage, G90 coating, spiral lock seam construction with an intermediate standing rib.
   b. Fittings: May be manufacturer's standard as shown in published catalogs, fabricated by spot welding and bonding with neoprene base cement or machine formed seam in lieu of continuous welded seams.
3. Provide flat side reinforcement of oval ducts as recommended by the manufacturer and SMACNA Standard S3.13. Because of high pressure loss, do not use internal tie-rod reinforcement unless approved by the Resident Engineer.

D. Casings and Plenums: Construct in accordance with SMACNA Standards Section VI, including curbs, access doors, pipe penetrations, eliminators and drain pans. Access doors shall be hollow metal, insulated, with latches and door pulls, 20 inches wide by 48 - 54 inches high. Provide view port in the doors where shown. Provide drain for outside air louver plenum. Outside air plenum shall have exterior insulation. Drain piping shall be routed to the nearest floor drain.

E. Volume Dampers: Single blade or opposed blade, multi-louver type as detailed in SMACNA Standards.

F. Duct Hangers and Supports: Refer to SMACNA Standards Section IV. Avoid use of trapeze hangers for round duct.

2.2 DUCT LINER

A. Duct liner shall comply with the requirements of NFPA 90A and the "Duct Liner Materials Standard" of the Thermal Insulation Manufacturers Association.

B. Liner shall be installed in 25 feet of supply duct immediately downstream of fan system and the first 25 feet of return duct immediately upstream of the fan system. Liner may be 1/2" thick when noted as installed for sound attenuation and not for thermal conductivity.

C. Duct sizes indicated on plans are inside clear dimensions.

D. Round and Oval Duct Liner: Factory fabricated double-walled with one inch thick sound insulation and inner perforated galvanized metal liner. Construction shall comply with flame and smoke rating required by NFPA 90A. Metal liner shall be 20 to 24 gage having perforations not exceeding 3/32-inch diameter and approximately 22 percent free area. Metal liner for fittings need not be perforated. Assemblies shall be complete with continuous sheet mylar liner, 2 mil thickness, between the perforated liner and the insulation to prevent erosion of the insulation. Provide liner couplings/spacer for metal liner. At the end of insulated sections, provide insulation end fittings to reduce outer shell to liner size. Provide liner spacing/concentricity leaving airway unobstructed.

2.3 SEALANT

A. Approved manufacturers are Dow, Chicago Mastic Corporation and Hardcast.

B. The term "sealant" is not limited solely to materials of mastic nature but also includes two-part adhesive/open-weave fabric strip systems, and elastomeric sealant tape.

C. Elastomeric Sealant Tape: 3 inches wide; modified butyl adhesive backed.

D. Water-Based Joint and Seam Sealant: Flexible, mastic sealant, resistant to UV light when cured, UL listed, and complying with NFPA requirements for Class 1 ducts.

E. Flanged Joint Mastic: One-part, acid-curing, elastomeric joint sealant.

F. Gaskets: Chloroprene elastomer, 40 durometer, 1/8 inch thick, full face, one piece, or dovetailed at joints, vulcanized

G. Duct sealer shall be a metal-to-metal air pressure sealant which is flexible and self-curing.

H. Sealants shall be fire resistive when dry.

PART 3 EXECUTION

3.1 DUCT CONSTRUCTION AND INSTALLATION

A. All ducts and plenums shall be constructed in accordance with the applicable SMACNA Duct Manuals. Gauge of metal, type of joint and reinforcing shall be in accordance therewith.

B. All ductwork shall be fabricated and installed so that no undue vibration or noise results. All joints shall be air tight with sealant provided.
C. Transitions in ductwork, in changing shapes and sizes, shall be made with angles not exceed 15 degrees wherever possible.
D. Hang ducts with strap iron attached to bottom of ducts spaced not over five feet center to center.
E. Curved elbows, if used, shall have a center line radius equal to 1-1/2 times the duct width. Square elbows shall have turning vanes. Job fabricated turning vanes will not be accepted without prior approval of Architect/Engineer.
F. Provide all necessary dampers as required for proper adjustment and control of air distribution. Provide volume extractors similar to Titus AG-45 set at 20 degrees at all branches in ductwork where other means of control are not indicated or used. All dampers shall have rigid bearings and locking quadrants which allow no rattling. All damper rods shall be marked to indicate the relative position of the damper blade with respect to the rod.
G. Provide flexible connections at inlet and discharge connections of fan units to prevent mechanical noises from being transmitted to connecting ductwork.
H. At all places where inside of duct will be visible through return air grilles, louvers, etc., paint normally visible inside portion of duct with flat black paint.
I. Install hinged doors on ductwork and housing to provide access to all parts of every automatic damper, coil and all other items requiring maintenance or inspection.
J. Contractor shall not provide holes in the duct systems for the installation of hangers, conduits, etc. Work of all other trades shall be so coordinated as to render this unnecessary.
K. Flexible ducts shall be installed using a maximum of 6’ length to make the connection. Flexible duct shall be suspended on 36” centers with a minimum 3/4” wide flat banding material. All joints and connections shall be made with 1/2” wide positive locking plastic or steel straps. Flexible ducts shall not penetrate any fire or smoke barrier which is required to have a fire resistance rating of one hour or more. Provide insulated acoustical air duct connectors in supply air duct systems and elsewhere as shown.
L. Install duct hangers and supports in accordance with SMACNA Standards, Section IV.
M. Install fire dampers in accordance with the manufacturer’s instructions to conform to the installation used for the rating test.
N. Seal openings around duct penetrations of floors and fire rated partitions with fire stop material as required by NFPA 90A.
O. Provide access doors for inspection, cleaning, and service of all dampers.

3.2 INSTALLATION OF DUCT LINER

A. Refer to Section 15250 for installation locations and thickness of duct liner.
B. For velocities up to 2,000 fpm, duct liner shall be applied with 100% coverage of fire retardant adhesive. Duct liner shall be cut to assure snug corner joints. The liner shall be additionally secured with mechanical fasteners which shall compress the duct liner sufficiently to hold it firmly in place. They shall start within 3” of the leading edge of each duct section (and any line transverse joints within the duct section) and shall be spaced no more than 6” O.C. around the perimeter of the duct, except that they need to be no closer than 6” to a corner break. Elsewhere, they shall be a maximum of 10” O.C., except that they shall be placed not more than 6” from a cut edge nor 12” from a corner break.

3.3 SEALING OF DUCTS

A. All low pressure supply ducts located above the ceiling space shall be sealed with sealant. Metal surfaces to be joined must be clean, dry, grease-free. Apply a heavy brush coat of sealant to the interior metal surface of the duct slip joint, then interlock securely duct sections and position in place. Apply a finish heavy brush coat of sealant to the exterior metal surface duct joint or seam covering heads of lock joint screws, making sure that all voids are completely filled to insure a continuous air pressure sealant.
3.4 DUCT ACCESS PANELS AND DOORS

A. Where duct is located above lay-in ceilings, install access panels only after the ceiling grid is in place. Access panels shall be located so that they can be swung fully open and used for the purpose they were installed.

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION

A. Work under this Section shall include furnishing and installing material and equipment related to air distribution consisting of the following but not limited thereto:

1. Duct accessories.
2. Grilles, Registers and Diffusers.
3. Dampers.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Materials and Methods - Section 230500.

1.3 DEFINITIONS

A. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.
B. AMCA - Air Movement and Control Association International, Inc.

1.4 QUALITY CONTROL

A. All damper, and louver products shall be tested in accordance with appropriate AMCA AMCA standards, and each product used shall bear the AMCA certified rating seal. Products stating to be tested in accordance with AMCA standards, shall not be approved unless written permission is received by the engineer prior to installation. Shop drawing approval of a particular product shall not constitute written permission. It shall be the contractors responsibility to assure the products have been tested and carry the seal prior to installation.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 1.
B. Submit product data indicating general assembly, components, controls, safety controls, wiring diagrams, and service connections.
C. Submit manufacturer's installation instructions under provisions of Division.

PART 2 - PRODUCTS

2.1 DUCT ACCESS PANELS AND DOORS

A. Approved manufacturers are Ventfabrics, Inc. and C.E. Sparrow co.

B. Access panels shall consist of three one-piece stampings: the door frame, the door itself and the pan. Space between door and pan shall be filled with 1/2" thick insulation. The door shall be hung with loose pin hinges.

C. Access panel sizes shall be as follows unless otherwise specified on drawings:

<table>
<thead>
<tr>
<th>Size of Duct to be Accessed</th>
<th>Panel Size</th>
<th>Metal Gauges of</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Frame Door Pan Hinges Latches</td>
<td></td>
</tr>
<tr>
<td>6&quot; - 8&quot;</td>
<td>6&quot; x 8&quot;</td>
<td>24 26 28</td>
<td>2 1</td>
</tr>
<tr>
<td>10&quot; - 12&quot;</td>
<td>10&quot; x 12&quot;</td>
<td>22 24 28</td>
<td>2 1</td>
</tr>
<tr>
<td>12&quot; - 16&quot;</td>
<td>12&quot; x 16&quot;</td>
<td>20 24 28</td>
<td>2 2</td>
</tr>
<tr>
<td>18&quot; and over</td>
<td>16&quot; x 24&quot;</td>
<td>20 22 28</td>
<td>3 2</td>
</tr>
</tbody>
</table>
D. Access doors shall be fabricated in accordance with the details in the SMACNA Duct Manuals. Latches and hinges shall be equivalent to Ventlok of appropriate type and size.
E. Access doors above lay-in ceilings shall be installed after the ceiling grid is installed to coordinate location of panel and size necessary to provide for full swing out of hinged door.

2.2 GRILLES, REGISTERS AND DIFFUSERS
A. Approved manufacturers are Titus, Tuttle & Bailey, Anemostat and Krueger.
B. Provide diffusers of size and type as indicated on the drawings.
C. All grilles, registers and diffusers shall have baked enamel off-white finish unless otherwise specified.

2.3 CONTROL DAMPERS
A. Approved manufacturers equal to Greenheck model VCD-23.
B. Provide opposed blade tight close-off dampers at locations indicated on drawings.
C. Dampers shall have air loss (leakage), when closed, less than 1% of the full flow rate (based on approach velocity of 2,000 fpm) with a pressure differential across damper of 4” S.P. or less. Seals shall be extruded vinyl blade seals and flexible metal compression type jamb seals.
D. Construction shall be of No. 16 gauge galvanized, roll formed channel from No. 16 gauge galvanized roll formed blades. Maximum blade width 8”. Blades 36” and longer and driven blade shall be furnished with reinforcing cone.
E. Linkage shall be a side linkage out of airstream. Control shaft shall extend 6” beyond frame.
F. Install access panels in duct to service and inspect all dampers.

PART 3 - EXECUTION

3.1 DUCT CONSTRUCTION AND INSTALLATION
A. Provide all necessary dampers as required for proper adjustment and control of air distribution. Provide volume extractors similar to Titus AG-45 set at 20 degrees at all branches in ductwork where other means of control are not indicated or used. All dampers shall have rigid bearings and locking quadrants which allow no rattling. All damper rods shall be marked to indicate the relative position of the damper blade with respect to the rod.
B. Install hinged doors on ductwork and housing to provide access to all parts of every automatic damper, coil and all other items requiring maintenance or inspection.
C. Provide access doors for inspection, cleaning, and service of all dampers.

3.2 INSTALLATION OF DIFFUSERS, GRILLES, AND REGISTERS
A. Installation of diffusers, grilles, and registers shall include adjust all dampers, individual vanes, and throws of each diffuser so as to evenly distribute the air and create the least amount of draft on occupants as they would normally use the room.

3.3 DUCT ACCESS PANELS AND DOORS
A. Where duct is located above lay-in ceilings, install access panels only after the ceiling grid is in place. Access panels shall be located so that they can be swung fully open and used for the purpose they were installed.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION
A. Outdoor rooftop or ground mounted, electric cooling unit utilizing hermetic compressor for cooling and optional electric heating. Unit shall discharge supply air either vertically or horizontally as shown on drawings.
B. Unit Controls
C. Roof curb and base

1.2 SUBMITTALS
A. Submit shop drawings and design data under provisions of Division 1.
B. Submit shop drawings and product data indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections, electrical nameplate data, and wiring diagrams.
C. Submit manufacturer's installation instructions under provisions of Division 1.

1.3 OPERATION AND MAINTENANCE DATA
A. Submit operation and maintenance data under provisions of Division 1.
B. Include start-up instructions, maintenance instructions, parts lists, controls and accessories.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Deliver and store products on site under provisions of Division 1.
B. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

1.5 QUALITY ASSURANCE
A. Unit shall be rated in accordance with ARI Standards 210/240-94 and 270-95.
B. Unit shall be UL listed.
C. Roof curb shall conform to NRCA Standards.
D. Cabinet insulation shall meet ASHRAE Standard 62P. Insulation and all adhesives shall meet NFPA 90A requirements for flame spread and smoke generation.

PART 2 PRODUCTS

2.1 EQUIPMENT
A. Factory assembled, packaged electric cooling outdoor mounted unit. Unit shall be complete with compressors, coils, fans, fan motors, factory wiring and electrical controls, piping, refrigerant charge, and special features required.
B. Unit Cabinet shall be constructed of galvanized steel, bonderized and coated with a baked enamel finish on all externally exposed surfaces, and have prime coated interior panels.
C. Evaporator fan cabinet interior shall be insulated with a minimum 1/2" flexible fiberglass insulation coated on the air side. Aluminum foil faced insulation shall be used in the heating compartment.
D. Condenser Fan(s) shall be of the propeller type, direct driven by totally enclosed motor, and dynamically balanced. Fan(s) shall be arranged for vertical discharge with horizontal suction. Discharge side shall be protected by corrosion-proof fan guards.
E. Coils shall use copper tubes, aluminum plate fins (copper tube, copper fins acceptable) and
galvanized steel tube sheets. Fins will be bonded to tubes by mechanical expansion with all joints brazed.

F. Unit shall have a factory installed, sloped condensate drain pan made of a corrosion resistant material, and shall comply with ASHRAE 62.

G. Evaporator fan shall be three-speed direct-driven, double inlet, forward-curved centrifugal type, with corrosion resistant finish. Bearings shall be of the sealed, permanently lubricated, ball bearing type for longer life and lower maintenance.

H. Compressors shall be fully hermetic, internally protected, factory rubber-shock mounted and internally spring mounted for vibration isolation.

I. Refrigerant metering device shall be of the fixed orifice feed type.

J. Refrigerant circuit components shall include refrigerant strainer, service gage connections on suction, discharge, and liquid lines, filter drier, and manufacturers standard refrigerant feed system control.

K. Filters shall be standard factory installed low velocity, throwaway 1” thick fiberglass in sizes commercially available.

L. Compressor motors shall be of the refrigerant-cooled type with line-break thermal and current overload protection. All fan motors shall have thermal overload protection.

2.2 CONTROLS AND SAFETIES

A. Unit shall be complete with self-contained low-voltage control circuit protected by a fuse on the 24-v. Transformer side.

B. Unit shall incorporate a solid-state compressor protector which provides anti-cycle reset capability.

2.3 ELECTRICAL REQUIREMENTS

A. All unit power wiring shall enter the unit cabinet at a single location.

2.3 SPECIAL FEATURES

A. Provide the following special features:

1. Prefabricated roof curb capable of supporting entire unit weight, and allows for installing and securing ductwork to curb prior to mounting unit on curb.

2. Integrated integral modulating type economizer capable of simultaneous economizer and compressor operation. Equipped with low leakage dampers not to exceed 3% leakage at 1-in. wg pressure differential. Outside and relief/exhaust air dampers shall be designed to close upon loss of power, and be designed to introduce up to 100% outside air. Economizer shall be equipped with solid state enthalpy control and differential enthalpy sensor.

3. Head pressure control to either modulate the speed of fan(s) or cycle condenser fans in response to low outdoor temperature and provides operation down to 0 degrees F.

4. Electronic thermostat to provide staged cooling, fan control, built-in compressor cycle delay control.

5. Compressor cycle delay to prevent restarting for a minimum of 5 minutes after shutdown.

6. Unit mounted, non-fused disconnect switch.

7. Filter rack kit for mounting filters in down flow applications.

8. High and low pressure safety controls.

9. Crankcase heater shall provide anti-floodback protection for low load cooling applications.
PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.
B. Provide for connection to electrical service.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outdoor mounted, air cooled split system outdoor condenser suitable for rooftop installation. Units shall be used in a refrigerant circuit matched to a duct-free or ducted cooling fan coil unit.
B. Refrigerant.
C. Refrigerant piping.

1.2 RELATED SECTIONS

A. Section 23 30 00 – Mechanical Insulation.
B. Section 23 83 19– Split System Fan Coil Units

1.3 QUALITY ASSURANCE

A. Unit construction shall comply with the latest revision of ANSI/ASHRAE 15.
B. Air-cooled condenser coils shall be leak tested at 350-psig.

1.4 WARRANTY

A. Provide extended five-year parts warranty on compressor.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Approved units are Carrier, Trane, Mitsubishi, EMI, and Liebert.

2.2 EQUIPMENT

A. General: Factory assembled, single piece, air-cooled unit, pre-wired suitable for outdoor use consisting of cabinet, compressor, full charge of refrigerant, piping, condensing coil, fan and controls.
B. Unit Cabinet: Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a baked-enamel finish. Unit access panels shall provide full access to the compressor, fan, and control components. Housing shall be isolated and have an acoustical lining to assure quiet operation.
C. Fans: Condenser fans shall be direct-drive propeller type. Fan motors shall be totally enclosed, with permanently lubricated bearings of the phase and voltage listed on the electrical drawings. Fan blades and shaft shall be corrosion resistant and shall be statically and dynamically balanced.
D. Compressor: Compressor shall be fully hermetic scroll type. Compressor shall be equipped with operating oil charge. Internal overloads shall protect the compressor from over-temperature and over-current. Motor shall be NEMA rated class F, suitable for operation in refrigerant atmosphere. Compressor assembly shall be installed on rubber isolators and shall have internal spring isolation. Reciprocating compressor shall be equipped with crankcase heaters to minimize liquid refrigerant accumulation in compressor during shutdown and to prevent refrigerant dilution of oil. Compressors shall be phase and voltage as specified on the contract drawings.
E. Outdoor Coil: Coils shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes, which are cleaned, dehydrated, and sealed.
F. Refrigerant Components: Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader type fittings with brass caps, accumulator, pressure relief, and full charge of refrigerant.

G. Controls and Safeties: Operating controls and safety features shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

1. Time delay restart to prevent compressor reverse rotation on single-phase scroll compressors.
2. Automatic restart on power failure.
3. High-pressure and liquid line low-pressure switches.
5. Compressor motor current and temperature overload protection.
6. High-pressure relief.

H. Size and capacity of units as listed on drawings.

I. Electrical Requirements: Units shall operate on the voltage and phase listed on the electrical drawings. Unit electrical power shall be single point connection. All power and control wiring shall be installed per NEC, state and local building codes.

J. Service Valves: Forged brass, ball or angle type, copper sweat connections, service port, for maximum working pressure of 500 psi.

K. Include the following accessories and options:

1. Sheet metal wind baffle kit shall be provided when “Low ambient” controls are installed.
2. Electronically operated liquid solenoid shutoff valve when over 100 equivalent feet of refrigerant piping or lifts over 25-feet are used.
3. Crankcase heater (scroll or reciprocating compressors only); and
4. Winter start control to permit start-up and operation under low load conditions and at low ambient temperatures by by-passing the low-pressure switch for a preset delay period.
5. Low ambient temperature head pressure controls and safety features to regulate fan-motor cycles in response to saturated condensing temperatures for operation down to -20°F.

2.2 PIPING

A. Copper Tubing: ASTM B280, Type ACR hard drawn soft annealed. Type “K” copper tubing may be used on sizes 5/8” or smaller.

2. Joints: Brazed or standard SAE forged brass flare on 5/8” and smaller. Brazed on all lines larger than 5/8”.

2.3 REFRIGERANT

A. Refrigerant: R-410A.

2.4 REFRIGERANT SPECIALTIES

A. Approved manufacturers are Sporlan Valve company, Danfoss, Eaton Corporation, Parker Hannifin Corporation.
B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum working pressure of 500 psi and maximum temperature of 200°F.
C. Filter-Driers: ANSI/ARI 710, UL listed, brass shell and bronze cap, perforated brass shell and molded desiccant filter core; for maximum working pressure of 350 psi.
D. Expansion Valve: Angle or straight through type; ARI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hold, adjustable superheat setting, replaceable inlet strainer, with capillary tube and remote sensing bulb.

2.5 REFRIGERANT PIPE HANGERS
A. Hangers for refrigerant pipe shall be equal to Cooper B-Line BVT series Vbraclam or Vbra-cushion hangers, lined with a rubber providing an energy absorbing material between the lines and the hanger material.
B. Where lines are to be insulated with a closed cell insulation, a clamp similar to Cooper B-Line Armafix clamp shall be installed.

PART 3 EXECUTION

3.1 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Provide for connection to electrical service.
C. Provide initial cooling season start-up, and winter season shut down during first year of operation, including routine servicing and check out.
D. Install refrigeration specialties in accordance with manufacturer's instructions and standard refrigerant piping practices.
E. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
F. Slope piping 1% in direction of oil return.
G. Provide access to concealed valves and fittings.
H. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
I. Provide system evacuation and dehydration in accordance with manufacturer's standard service techniques and instructions.
J. Supply initial charge of refrigerant for each refrigerant circuit.
K. Check operation of condenser fan motor controls and rotation of fans.
L. Where refrigerant piping would otherwise be exposed within the building, or on exterior building walls, install covers over the refrigerant lines equal to “Line-Hide” Lineset cover system. Include all necessary couplings, elbows, joints, caps and other appurtenances required to completely conceal the refrigerant piping. Outdoor service shall use PVC with UV inhibitors.

END OF SECTION
PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. Indoor, direct expansion fan coil unit for duct-less installations, exposed ceiling cabinet, or high wall units matched with outdoor condensing unit.

1.2 RELATED SECTIONS

A. Section 23 81 26– Split System Air Cooled Condensing Units.

1.3 QUALITY ASSURANCE

A. Units shall be rated per ARI standard 210/240 and listed in the ARI directory.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be handled and stored in accordance with the manufacturer's instructions.

1.5 WARRANTY

A. One year parts, 5-year compressor limited warranty.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. General: Factory assembled, fan coil unit, complete with coil(s), fan, motor, drain pan, and all required wiring, piping, controls, and special features. Wall mounted units shall be furnished with integral wall-mounting bracket and mounting hardware.

B. Unit Cabinet: Cabinet discharge and inlet grilles shall be attractively styled, high impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

C. Fans: Direct-driven fan wheels shall have forward-curved blades, and be statically and dynamically balanced, with scrolls and fans constructed of galvanized steel. Throw pattern of non-ducted units shall be manually adjustable.

D. Coils: Coils shall have copper tubes, aluminum fins bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap and auxiliary drip pan under coil header. Units shall use either capillary tubes in the outdoor unit for refrigerant control, or metering device in the indoor unit.

E. Controls: Controls shall consist of a microprocessor-based control system, which shall control space temperature, determine optimum fan speed, and run self-diagnostics. As a minimum, the unit shall have the following functions:

1. An automatic restart after power failure with same operating parameters as before the failure.
2. A 24-hour timer cycle for system automatic start/stop and setback.
3. Temperature sensing controls shall sense return air temperature. Indoor air high discharge temperature shutdown shall be provided.
4. Indoor coil freeze protection.
5. Fan only operation shall provide room air circulation when no cooling is required.
6. Fan three-speed control.
7. Compressor short-cycle time delay.
F. Filters: Units shall have filter track with factory supplied cleanable filters.

G. Electrical Requirements: Standard unit shall operate on 115-v, 1-phase, 60-Hz electric power unless otherwise noted on electrical plans. All exposed wiring shall be in a flexible conduit.

H. Features:

1. A condensate pump shall be supplied to remove condensate from the drain pan when gravity drainage cannot be used. Pump shall be designed for quiet operation. Pump shall consist of a reservoir pan with sensor assembly, and a pump assembly. The lift shall be a minimum of 10-feet. A level sensor on the condensate pan shall stop cooling operation if the level in the condensate pan is high.

PART 3 EXECUTION

1.1 GENERAL REQUIREMENTS

A. Install fan coil unit as recommended by the manufacturer.

B. Pipe condensate out exterior wall (not necessarily indicated on the plans) and terminate with a beveled end and sloped slightly downward to create a drip spout type termination, eliminating moisture from running down walls. Do not terminate condensate drains high through exterior walls when located at or near public walk-ways.

C. When terminating condensate drain into an existing sanitary system, provide an air gap type fitting.

D. Assure all electrical connections are made between both the fan coil unit and condensing unit; and perform all control interlock wiring between fan coil and condensing unit.

E. Follow all ambient temperature requirements prior to operating unit.

F. Refer to condensing unit section for refrigerant piping and accessories.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
B. 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.
C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item "A" above.

1.2 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.
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 for resolution.

1.3 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 16 Sections, in addition to Division 1 - General Requirements.

1.4 COORDINATION

A. Coordinate the work specified in this division with all other divisions of these specifications.
B. Prepare drawings showing proposed rearrangement of work to meet job conditions, including changes to work specified under other sections. Obtain permission of Architect/Engineer before proceeding.

1.5 REFERENCES

C. NECA - Standard of Installation.
D. EIA/TIA Standards 568A, 569, 606, 607, T568B.

1.6 SUBMITTALS

A. Submit inspection and permit certificates under provisions of Division 1 – General requirements.
B. Include certificate of final inspection and acceptance from authority having jurisdiction.
C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
D. Mark dimensions and values in unit to match those specified.

1.7 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.
B. Conform to ANSI/IEEE C2.
C. Obtain permits, and request inspections from authority having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and Equipment: Acceptable to the authority having jurisdiction as suitable for the use intended.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. Install work using procedures defined in NECA Standard of Installation.
B. Install all Data/Communication systems raceways/pathways per TIA/EIA Standard 569A.

3.2 ELECTRICAL SHUTDOWNS/OUTAGES

A. Any required electrical shutdowns or outages shall be coordinated with owner personnel a minimum of ten (10) working days prior to the shutdown/outage. All shutdowns/outages shall be performed during premium hours (nights, weekends, holidays) so as to minimize normal day-to-day operations of the owner. All costs associated with the required shutdown/outage shall be included in the contractors bid.

END OF SECTION
SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Building wire.
B. Wiring connections and terminations.

1.2 REFERENCES

A. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Thermoplastic-insulated Building Wire: NEMA WC 5.
B. Feeders and Branch Circuits: Copper, stranded conductor, 600 volt insulation, THHN/THWN.
C. Control Circuits: Copper, 14 AWG stranded conductor 600 volt insulation, THWN/THHN.

2.2 METAL-CLAD CABLE

A. Metal-Clad Cable size 14 through 4 AWG: Copper conductor, 600 volt insulation rated for the use intended, type MC. Type MC cable may be used in concealed interior spaces only and where acceptable to the Authority having Jurisdiction. See architectural plans for fire-wall ratings and locations.

PART 3 - EXECUTION

3.1 GENERAL WIRING METHODS

A. Type MC cable as specified may be used where acceptable to the Authority Having Jurisdiction and where permitted by the national Electrical Code. Building wire in conduit/raceway shall be used where indicated on the drawings.
B. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
C. Use 10 AWG conductor for 20 ampere, 120 volt branch circuits longer than 100 feet and for 20 ampere, 277 volt branch circuits longer than 200 feet.
D. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
E. Splice only in junction or outlet boxes.
F. Neatly train and lace wiring inside boxes, equipment, and panelboards.
G. Make conductor lengths for parallel circuits equal.

3.2 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
C. Completely and thoroughly swab raceway system before installing conductors.
3.3 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.
B. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of the insulation value of conductor.
D. Thoroughly clean wires before installing lugs and connectors.
E. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
F. Terminate spare conductors with electrical tape.

3.4 FIELD QUALITY CONTROL

A. Inspect wire and cable for physical damage and proper connection.
B. Torque test conductor connections and terminations to manufacturer's recommended values.
C. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.5 WIRE AND CABLE INSTALLATION SCHEDULE

A. Concealed Interior Locations: Building wire in raceways.
B. Exposed Interior Locations: Building wire in raceways.
C. Wet or Damp Interior Locations: Building wire in raceways.
D. Exterior Locations: Building wire in raceways.
E. Underground Locations: Building wire in raceways.
SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
   B. 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.
   C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item “A” above.

1.2 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.
   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 for resolution.

1.3 WORK INCLUDED
   A. Conduit and equipment supports.
   B. Fastening hardware.

1.4 COORDINATION
   A. Coordinate size, shape and location of concrete pads with Division 3.

1.5 QUALITY ASSURANCE
   A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIAL
   A. Support Channel: Galvanized or painted steel.
   B. Hardware: Corrosion resistant.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts or beam clamps. Do not use spring steel clips and clamps.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use powder-actuated anchors.

E. Do not drill structural steel members.

F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

G. Install free-standing electrical equipment on 4” concrete housekeeping pads. Pads to extend 4” beyond equipment on front and sides.

H. Install surface mounted cabinets and panelboards with minimum of four anchors.

I. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

END OF SECTION
SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
B. 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.
C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item “A” above.

1.2 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.
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 for resolution.
E. The electrical “Division 26” contractor shall be responsible for all raceway and cable tray indicated on the electrical plans to be used for the installation of “Division 27” Network, Telephone, Coaxial and Fiber Optic Cable installations.

1.3 WORK INCLUDED
A. Rigid metal conduit and fittings.
B. Electrical metallic tubing and fittings.
C. Flexible metal conduit and fittings.
D. Liquidtight flexible metal conduit and fittings.
E. Non-metallic conduit and fittings.
F. Wall and ceiling outlet boxes.
G. Pull and junction boxes.

1.4 REFERENCES
A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
C. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
D. NEMA TC 2 - Electrical Plastic Conduit (EPC-40 and EPC-80).
E. NEMA TC 3 - PVC Fittings for use with PVC Conduit.
F. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
G. NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum).
PART 2 - PRODUCTS

2.1 RIGID METAL CONDUIT AND FITTINGS
A. Rigid Steel Conduit: ANSI C80.1.
B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.

2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS
A. EMT: ANSI C80.3 galvanized tubing.
B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; set screw type.

2.3 FLEXIBLE METAL CONDUIT AND FITTINGS
A. Conduit: steel.

2.4 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS
A. Conduit: Flexible metal conduit with PVC jacket.

2.5 PLASTIC CONDUIT AND FITTINGS
A. Conduit: NEMA TC 2; Schedule 40 PVC.
B. Fittings and Conduit Bodies: NEMA TC 3.

2.6 CONDUIT SUPPORTS
A. Conduit Clamps, Straps, and Supports: Steel or malleable iron.

2.7 OUTLET BOXES
A. Sheet Metal Outlet Boxes: ANSI/NEMA Os 1; galvanized steel, with 1/2" male fixture studs where required.
B. Cast Boxes: Aluminum, deep type, gasketed cover, threaded hubs.
C. Plastic Boxes: Where acceptable for use with types NM and NMC cable.

2.8 PULL AND JUNCTION BOXES
A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.
B. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure in accordance with Section 16160.
C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface mounted junction box, UL listed as raintight. Galvanized cast iron Cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT
A. Size conduit for conductor type installed or for Type THW conductors, whichever is larger; 3/4" minimum size. Unless noted otherwise, conduit for Data/Communication Cabling shall be 1" minimum.
B. Arrange conduit to maintain headroom and present a neat appearance.
C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
D. Maintain minimum 6" (150 mm) clearance between conduit and piping. Maintain 12" (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25% additional conduit.
G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
H. Support conduit at a maximum of 10' on center.

3.2 CONDUIT INSTALLATION
A. Cut conduit square using a saw or pipecutter; de-burr cut ends.
B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
D. Install no more than the equivalent of four 90° bends between boxes.
E. Use conduit bodies to make sharp changes in direction, as around beams.
F. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
G. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
H. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
I. Install expansion-deflection joints where conduit crosses building expansion joints.
J. Where conduit penetrates fire-rated walls and floors, provide firestopping per section 07270.
K. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.
L. Use rigid steel, long sweep, factory elbows for all 90 degree bends in plastic conduit runs installed below grade.
M. Wipe plastic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes.
N. Unless noted otherwise, conduit may not be run within concrete floor slabs.
O. All conduit noted to run to cable tray systems must connect to cable tray system in accessible ceiling areas, access to connections must be available without moving equipment or lighting fixtures, coordinate all locations with other trades prior to installation.

3.3 CONDUIT INSTALLATION SCHEDULE
A. Exposed Outdoor Locations: Rigid Steel Conduit.
B. Wet Interior Locations: Electrical metallic tubing.
C. Concealed Dry Interior Locations: Electrical metallic tubing.
D. Exposed Dry Interior Locations: Electrical metallic tubing.
E. Equipment Connections: Flexible metal conduit, liquid tight in wet or damp locations.
F. Underground Installations More Than Five Feet From Foundation Wall: Schedule 40 plastic conduit.
G. Installations Under Concrete Slab, or Underground within Five Feet of Foundation Wall: Rigid steel conduit.
H. Installations Within Concrete Slab, Schedule 40 plastic conduit, maximum ¾” trade size, single runs, conduit shall not cross within floor slab.
I. All conduit in finished areas shall be run concealed in walls or above ceilings. Exposed conduit acceptable in unfinished areas only.
3.4 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned.
C. Locate and install boxes to allow access.
D. Locate and install to maintain headroom and to present a neat appearance.

3.5 OUTLET BOX INSTALLATION

A. Do not install boxes back-to-back in walls. Provide minimum 6” separation, except provide minimum 24” separation in acoustic-rated walls.
B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
C. Provide knockout closures for unused openings.
D. Support boxes independently of conduit.
E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
F. Install boxes in walls without damaging wall insulation.
G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
H. Position outlets to locate luminaries as shown on reflected ceiling plans.
I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminary, to be accessible through luminary ceiling opening.
J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
K. Align wall-mounted outlet boxes for switches, thermostats and similar devices.
L. Provide cast outlet boxes in exterior locations exposed to weather and wet locations.

3.6 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
B. Support pull and junction boxes independent of conduit.

END OF SECTION
SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
B. 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.
C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item “A” above.

1.2 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.
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 for resolution.

1.3 WORK INCLUDED

A. Nameplates.
B. Wire and cable markers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.
B. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.
B. Install nameplates parallel to equipment lines.
C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplates to inside face of recessed panelboard doors in finished locations.
D. Embossed tape will not be permitted for any application.
3.2 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates to identify all electrical distribution and control equipment, and loads served. Letter Height: 1/8" (3 mm) for individual switches and loads served, 1/4" (6 mm) for distribution and control equipment identification.

END OF SECTION
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
B. 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.
C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item “A” above.

1.2 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.
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 for resolution.

1.3 WORK INCLUDED

A. Wall switches.
B. Receptacles.
C. Device plates and box covers.

1.4 REFERENCES

A. NEMA WD 1 - General-Purpose Wiring Devices.
B. NEMA WD 5 - Specific-Purpose Wiring Devices.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 1 – General Requirements.
B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - WALL SWITCHES

A. Bryant
B. Hubbell
C. Leviton
D. Arrow Hart

2.2 WALL SWITCHES


2.3 ACCEPTABLE MANUFACTURERS - RECEPTACLES

A. Bryant
B. Hubbell
C. Eagle
D. Arrow Hart

2.4 RECEPTACLES

A. Convenience and Straight-Blade Receptacles: NEMA WD 1.
B. Locking-Blade Receptacles: NEMA WD 5.
C. Convenience Receptacle Configuration: NEMA WD 1; Type 5-15 R, ivory plastic face.
D. Specific-Use Receptacle Configuration: NEMA WD 1 or WD 5; Type as indicated on Drawings, Black Plastic Face.
E. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter, Ivory Plastic Face.

2.5 ACCEPTABLE MANUFACTURERS - WALL PLATES

A. Bryant
B. Hubbell
C. Eagle
D. Arrow Hart

2.6 WALL PLATES

A. Decorative Cover Plate: Smooth Stainless Steel.
B. Weatherproof Cover Plate: Raintight While-In-Use Device Covers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wall switches 48" above floor to top, OFF position down.
B. Install convenience receptacles, unless noted otherwise, 16" above floor to bottom, 6" to bottom above counters, backsplash, grounding pole on bottom. When noted on plans, dimensions indicated are to bottom of device.
C. Install specific-use receptacles at heights shown on contract drawings, or at 16" above floor to bottom.
D. Install decorative plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.
E. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
F. Install devices and wall plates flush and level.

END OF SECTION
SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
B. 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.
C. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item “A” above.

1.2 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.
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 for resolution.

1.3 WORK INCLUDED

A. Disconnect switches.
B. Fuses.
C. Enclosures.

1.4 RELATED WORK

A. Section 26 05 53 - Identification for Electrical Systems.

1.5 REFERENCES

A. ANSI/UL 198C - High Intensity Capacity Fuses, Current Limiting Types.
B. ANSI/UL 198E - Class R Fuses.
C. NEMA KS 1 - Enclosed Switches.

1.6 SUBMITTALS

A. Submit product data under provisions of Division 1 – General Requirements.
B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. Square "D"
B. Westinghouse
C. General Electric

2.2 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R Fuses.
B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
C. Enclosures: NEMA KS 1; Type as indicated on Drawings.

2.3 ACCEPTABLE MANUFACTURERS - FUSES

A. Bussman
B. Gould/Shawmut
C. Substitutions: Under provisions of Division 1 – General requirements.

2.4 FUSES

A. Fuses 600 Amperes and Less: ANSI/UL 198E, Class RK1; dual element, current limiting, time delay, 600 volt.
B. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on Drawings.
B. Install fuses in fusible disconnect switches

END OF SECTION
State of Michigan
WHPWRequest@michigan.gov

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades
Project Number: 15-16-01

Houghton County
Official 2017 Prevailing Wage Rates for State Funded Projects
Issue Date: 5/23/2017
Contract must be awarded by: 8/21/2017

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos, Lead and Mold Abatement Laborer</td>
<td>Asbestos, Lead and Mold Abatement Laborer MLDC</td>
<td>$41.25</td>
<td>$55.00</td>
<td>$68.75</td>
<td>H H X X X X D Y</td>
</tr>
</tbody>
</table>

4 ten hour days @ straight time allowed
Monday-Saturday, must be consecutive
3/27/2017

Asbestos, Lead and Mold Abatement, Hazardous Material Handler | Asbestos, Lead and Mold Abatement, Hazardous Material Handler AS207 | $40.75 | $54.25 | $67.75 | H H X X X X D Y |

4 ten hour days @ straight time allowed
Monday-Saturday, must be consecutive
3/27/2017

Boilermaker | Boilermaker BO169 | $54.70 | $81.08 | $107.45 | H H H H H D Y |

2/17/2015

Apprentice Rates:
1st 6 months | $40.31 | $59.49 | $78.67 |
2nd 6 months | $41.45 | $61.21 | $80.95 |
3rd 6 months | $42.57 | $62.88 | $83.19 |
4th 6 months | $43.69 | $64.57 | $85.43 |
5th 6 months | $44.81 | $66.24 | $87.67 |
6th 6 months | $46.63 | $72.50 | $96.36 |
7th 6 months | $49.32 | $73.01 | $96.69 |
8th 6 months | $51.58 | $76.40 | $101.21 |

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Classification Last Updated Straight Time and a Half Overtime Provision

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricklayer</td>
<td>Marble, Tile and Terrazzo Finisher</td>
<td>BR6</td>
<td>$36.55</td>
<td>$45.79</td>
<td>$55.03</td>
<td>H H D X H D D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Four 10s allowed Monday-Thurs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make up days: Friday &amp; Saturday.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bricklayer</td>
<td>Bricklayer, stone mason, mosaic worker, plasterer, tuck pointer, pointer, caulker &amp; cleaner</td>
<td>BR6-2</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
<td>X X H X H D D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All time over 12 hours pr day - double</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 - 749 hours</td>
<td>$32.85</td>
<td>$40.24</td>
<td>$47.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>750 - 1499 hours</td>
<td>$34.09</td>
<td>$42.10</td>
<td>$50.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1500 - 2249 hours</td>
<td>$35.32</td>
<td>$43.95</td>
<td>$52.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2250 - 2999 hours</td>
<td>$36.55</td>
<td>$45.79</td>
<td>$55.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3000 - 3749 hours</td>
<td>$37.78</td>
<td>$47.63</td>
<td>$57.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3750 - 4499 hours</td>
<td>$39.01</td>
<td>$49.48</td>
<td>$59.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4500 - 5249 hours</td>
<td>$40.25</td>
<td>$51.34</td>
<td>$62.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5250 - 6000 hours</td>
<td>$41.48</td>
<td>$53.19</td>
<td>$64.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marble, Tile and Terrazzo Layer</td>
<td>BR6TL</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
<td>H H D X H D D Y</td>
<td>6/2/2014</td>
</tr>
<tr>
<td>Make up day allowed comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four 10s allowed Monday-Thurs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make up days: Friday &amp; Saturday.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Official Request #: 713**

Requestor: Michigan Technological University

Project Description: Fisher Lecture Hall HVAC Upgrades

Project Number: 15-16-01

County: Houghton

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Overtime</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenter</td>
<td>Carpenter, Drywall Taper &amp; Finisher, &amp; Floor</td>
<td>CA1510-C</td>
<td>$42.75</td>
<td>$54.46</td>
<td>$66.17</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td>7/26/2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$33.38</td>
<td>$40.41</td>
<td>$47.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$34.55</td>
<td>$42.16</td>
<td>$49.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$35.72</td>
<td>$43.91</td>
<td>$52.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$36.90</td>
<td>$45.69</td>
<td>$54.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$38.07</td>
<td>$47.44</td>
<td>$56.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$39.24</td>
<td>$49.19</td>
<td>$59.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th 6 months</td>
<td>$40.41</td>
<td>$50.95</td>
<td>$61.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th 6 months</td>
<td>$41.58</td>
<td>$52.71</td>
<td>$63.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pile driver</td>
<td>CA1510-P</td>
<td>$42.95</td>
<td>$54.76</td>
<td>$66.57</td>
<td>X X H X H H D Y</td>
<td></td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>7/26/2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$33.50</td>
<td>$40.59</td>
<td>$47.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$34.68</td>
<td>$42.35</td>
<td>$50.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$35.86</td>
<td>$44.13</td>
<td>$52.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$37.05</td>
<td>$45.91</td>
<td>$54.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$38.23</td>
<td>$47.68</td>
<td>$57.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$39.41</td>
<td>$49.45</td>
<td>$59.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th 6 months</td>
<td>$40.59</td>
<td>$51.22</td>
<td>$61.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th 6 months</td>
<td>$41.77</td>
<td>$52.99</td>
<td>$64.21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Official 2017 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 5/23/2017  
**Contract must be awarded by:** 8/21/2017

### Page 4 of 26

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Mason</td>
<td>BR6-CM</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35 H H D X H H D D Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td>6/2/2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Four 10s allowed Monday-Thurs.  
Make up days: Friday and Saturday.

### Apprentice Rates:

- **0 - 749 hours**: $34.09, $42.10, $50.11
- **750 - 1499 hours**: $35.32, $43.95, $52.57
- **1500 - 2249 hours**: $36.55, $45.79, $55.03
- **2250 - 2999 hours**: $37.78, $47.63, $57.49
- **3000 - 3749 hours**: $39.01, $49.48, $59.95
- **3750 - 4500 hours**: $40.25, $51.34, $62.43

---

Cement Mason  
Make up day allowed | comment  | 8/18/2016  

Four 10s allowed Monday-Thursday with Friday or Saturday inclement weather make up days.  
Saturday hours for inclement weather make up shall be paid straight rate unless over 40 hours worked.

### Apprentice Rates:

- **1st year**: $25.38, $32.49, $39.61
- **2nd year**: $27.57, $35.78, $43.99
- **3rd year**: $29.76, $39.07, $48.37

---

Official Request #: 713  
Requestor: Michigan Technological University  
Project Description: Fisher Lecture Hall HVAC Upgrades  
Project Number: 15-16-01  
County: Houghton

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Classification

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half</th>
<th>Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrician</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sound and Communications Technician</td>
<td>EC-1070</td>
<td>$36.60</td>
<td>$47.73</td>
<td>$58.85</td>
<td>H H H H H H D Y</td>
</tr>
<tr>
<td>4 10 hour days allowed M-Th</td>
<td>Make up day allowed comment</td>
<td>8/26/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Period</td>
<td></td>
<td>$27.70</td>
<td>$34.37</td>
<td>$41.04</td>
<td></td>
</tr>
<tr>
<td>2nd Period</td>
<td></td>
<td>$29.93</td>
<td>$37.72</td>
<td>$45.50</td>
<td></td>
</tr>
<tr>
<td>3rd Period</td>
<td></td>
<td>$31.04</td>
<td>$39.38</td>
<td>$47.72</td>
<td></td>
</tr>
<tr>
<td>4th Period</td>
<td></td>
<td>$32.15</td>
<td>$41.04</td>
<td>$49.94</td>
<td></td>
</tr>
<tr>
<td>5th Period</td>
<td></td>
<td>$33.27</td>
<td>$42.73</td>
<td>$52.18</td>
<td></td>
</tr>
<tr>
<td>6th Period</td>
<td></td>
<td>$34.38</td>
<td>$44.40</td>
<td>$54.40</td>
<td></td>
</tr>
</tbody>
</table>

Inside wireman for work above $160,000

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half</th>
<th>Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC-906z2H</td>
<td></td>
<td>$51.23</td>
<td>$68.06</td>
<td>$84.90</td>
<td>H H H H H H D Y</td>
</tr>
</tbody>
</table>

A 4 ten schedule may be worked if 4 consecutive days, M-Th

Make up day allowed comment

Friday for inclement weather or holidays

### Apprentice Rates:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half</th>
<th>Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd period indentured before 10/12/15</td>
<td>$32.77</td>
<td>$43.20</td>
<td>$53.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd period indentured before 10/12/15</td>
<td>$36.26</td>
<td>$48.44</td>
<td>$60.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th period indentured before 10/12/15</td>
<td>$39.73</td>
<td>$53.64</td>
<td>$67.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th period indentured before 10/12/15</td>
<td>$41.47</td>
<td>$56.25</td>
<td>$71.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th period indentured before 10/12/15</td>
<td>$43.21</td>
<td>$58.86</td>
<td>$74.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st period indentured after 10/12/15</td>
<td>$25.83</td>
<td>$32.79</td>
<td>$39.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd period indentured after 10/12/15</td>
<td>$27.56</td>
<td>$35.39</td>
<td>$43.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd period indentured after 10/12/15</td>
<td>$31.04</td>
<td>$40.60</td>
<td>$50.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th period indentured after 10/12/15</td>
<td>$34.52</td>
<td>$45.83</td>
<td>$57.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th period indentured after 10/12/15</td>
<td>$37.99</td>
<td>$51.03</td>
<td>$64.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th period indentured after 10/12/15</td>
<td>$41.47</td>
<td>$56.25</td>
<td>$71.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td>Name Description</td>
<td>EC-906z2L</td>
<td>Last Updated</td>
<td>Straight Time Hourly</td>
<td>Time and Half</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------</td>
<td>-----------</td>
<td>--------------</td>
<td>----------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Inside wireman for work below 160,000</td>
<td>A 4 ten schedule may be worked if 4 consecutive days, M-Th</td>
<td>$48.94</td>
<td>$64.63</td>
<td>$80.32</td>
<td>H H H H H H D Y</td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td>8/30/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

1st period indentured before 10/12/15 | $29.30 | $38.00 | $46.69 |

2nd period indentured before 10/12/15 | $32.77 | $43.20 | $53.63 |

3rd period indentured before 10/12/15 | $36.26 | $48.44 | $60.61 |

4th period indentured before 10/12/15 | $39.73 | $53.64 | $67.55 |

5th period indentured before 10/12/15 | $41.47 | $56.25 | $71.03 |

6th period indentured before 10/12/15 | $43.21 | $58.86 | $74.51 |

1st period indentured after 10/12/15 | $25.83 | $32.79 | $39.75 |

2nd period indentured after 10/12/15 | $27.56 | $35.39 | $43.21 |

3rd period indentured after 10/12/15 | $31.04 | $40.60 | $50.17 |

4th period indentured after 10/12/15 | $34.52 | $45.83 | $57.13 |

5th period indentured after 10/12/15 | $37.99 | $51.03 | $64.07 |

6th period indentured after 10/12/15 | $41.47 | $56.25 | $71.03 |

**Elevator Constructor**

<table>
<thead>
<tr>
<th>Name Description</th>
<th>EL-85</th>
<th>Last Updated</th>
<th>Straight Time Hourly</th>
<th>Time and Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevator Constructor Mechanic</td>
<td>$70.77</td>
<td>$116.32 D D D D D D D Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>comment</td>
<td>4/8/2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 tens allowed M-TH

**Apprentice Rates:**

1st year | $50.27 | $75.32 |

2nd year | $54.83 | $84.44 |

3rd year | $57.10 | $88.98 |

4th year | $61.66 | $98.10 |

<table>
<thead>
<tr>
<th>Official Request #: 713</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requestor: Michigan Technological University</td>
</tr>
<tr>
<td>Project Description: Fisher Lecture Hall HVAC Upgrades</td>
</tr>
<tr>
<td>Project Number: 15-16-01</td>
</tr>
<tr>
<td>County: Houghton</td>
</tr>
</tbody>
</table>

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time and a Half Hourly Rate</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glazier</td>
<td>Glazier GL-826</td>
<td></td>
<td>4/3/2016</td>
<td>$44.78 $60.87 $76.95 H H H H H H D Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 tens allowed on consecutive days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$31.91 $41.57 $51.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$33.52 $43.98 $54.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$35.12 $46.38 $57.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$36.74 $48.81 $60.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$38.35 $51.22 $64.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$39.96 $53.64 $67.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th 6 months</td>
<td>$41.57 $56.05 $70.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th 6 months</td>
<td>$43.17 $58.45 $73.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat and Frost Insulator</td>
<td>Heat and Frost Insulator as127</td>
<td>Make up day allowed</td>
<td>11/3/2014</td>
<td>$42.97 $55.93 $68.89 H H H D D D Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st year</td>
<td>$30.01 $36.49 $42.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd year</td>
<td>$32.60 $40.37 $48.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd year</td>
<td>$35.19 $44.26 $53.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th year</td>
<td>$37.79 $48.16 $58.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spray Insulation - Qualified Senior Sprayer,</td>
<td>AS2SS</td>
<td>application of all products</td>
<td>3/31/2017</td>
<td>$29.04 $42.35 X X X H H H H H N</td>
<td></td>
</tr>
</tbody>
</table>
### Classification

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ironworker</td>
<td>For work over $10 million:  Structural, Ornamental, Machinery Rigger &amp; Reinforcing Ironworker; installation of sheet metal siding</td>
<td>IR-8-A</td>
<td>$50.07</td>
<td>$69.76</td>
<td>$89.45</td>
<td>H H D H D D D Y</td>
</tr>
<tr>
<td></td>
<td>For work under $10 Million: Structural, Ornamental, Machinery Rigger &amp; Reinforcing Ironworker; pre-engineered metal buildings</td>
<td>IR-8-B</td>
<td>$46.73</td>
<td>$64.76</td>
<td>$82.79</td>
<td>H H D H D D D Y</td>
</tr>
</tbody>
</table>

A 4-10 work week allowed Monday thru Thursday. Friday may be used as a make-up day. Hours in excess of 40 must be paid time and one half.

**Make up day allowed**

#### Apprentice Rates:

<table>
<thead>
<tr>
<th>Hours</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1,000 hours</td>
<td>$25.39</td>
<td>$37.75</td>
<td>$50.11</td>
<td></td>
</tr>
<tr>
<td>1,001 - 2,000 hours</td>
<td>$37.71</td>
<td>$51.22</td>
<td>$64.73</td>
<td></td>
</tr>
<tr>
<td>2,001 - 3,000 hours</td>
<td>$39.01</td>
<td>$53.17</td>
<td>$67.33</td>
<td></td>
</tr>
<tr>
<td>3,001 - 4,000 hours</td>
<td>$40.31</td>
<td>$55.12</td>
<td>$69.93</td>
<td></td>
</tr>
<tr>
<td>4,001 - 5,000 hours</td>
<td>$41.61</td>
<td>$57.07</td>
<td>$72.53</td>
<td></td>
</tr>
<tr>
<td>5,001 - 6,000 hours</td>
<td>$42.92</td>
<td>$59.04</td>
<td>$75.15</td>
<td></td>
</tr>
<tr>
<td>6,001 - 7,000 hours</td>
<td>$44.22</td>
<td>$60.98</td>
<td>$77.75</td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 713  
Requestor: Michigan Technological University  
Project Description: Fisher Lecture Hall HVAC Upgrades  
Project Number: 15-16-01  
County: Houghton  

Official Rate Schedule  
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>L1329-</th>
<th>Last Updated</th>
<th>Straight Time and a Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborer</td>
<td>Class A Laborer - construction laborer on building and heavy construction work, storm, and sanitary sewers on all construction sites and streets which are not included in the road builder rates, tool crib attendant, civil engineer helper, rodman, oxi-gun operator, propane or acetylene cutting torch operator, motor driven buggies, chipping hammers, tamping machines, green cutting, sand blasters, mason tenders, mortar mixers, material mixers, vibrator operators, concrete mixers, laborers with concrete crew, mixer to pour, including pour time from trucks.</td>
<td>B-A</td>
<td>5/3/2017</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 - 1,000 hours</td>
<td>$28.87</td>
<td>$36.60</td>
<td>$44.34</td>
</tr>
<tr>
<td></td>
<td>1,001 - 2,000 hours</td>
<td>$29.90</td>
<td>$38.15</td>
<td>$46.40</td>
</tr>
<tr>
<td></td>
<td>2,001 - 3,000 hours</td>
<td>$30.94</td>
<td>$39.71</td>
<td>$48.48</td>
</tr>
<tr>
<td></td>
<td>3,001 - 4,000 hours</td>
<td>$33.00</td>
<td>$42.80</td>
<td>$52.60</td>
</tr>
<tr>
<td></td>
<td>Class B Laborer - Cement gun nozzleman, blasters, miners, drillers, buster operators, layers of all non-metallic pipe</td>
<td>B-B</td>
<td>5/3/2017</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>Class C Laborer - caisson worker &amp; airtrack</td>
<td>B-C</td>
<td>5/3/2017</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>Class D Laborer - Watchmen, Fire Watch and Hole Watch</td>
<td>B-D</td>
<td>5/3/2017</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>Class E Laborer - Digester, Tanks &amp; Kilns</td>
<td>B-E</td>
<td>5/3/2017</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</table>
### Laborer - Hazardous

**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 regulations; or a laborer performing work in conjunction with the removal, handling, or containment of hazardous waste substances when use of personal protective equipment level "D" is required.

**Apprentice Rates:**

- 0-1,000 work hours: $27.93, $38.90, $49.86
- 1,001-2,000 work hours: $28.93, $40.40, $51.86
- 2,001-3,000 work hours: $29.92, $41.88, $53.84
- 3,001-4,000 work hours: $31.91, $44.86, $57.82

---

**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.

**Apprentice Rates:**

- 0-1,000 work hours: $28.68, $40.02, $51.36
- 1,001-2,000 work hours: $29.73, $41.60, $53.46
- 2,001-3,000 work hours: $30.77, $43.16, $55.54
- 3,001-4,000 work hours: $32.86, $46.29, $59.72

---

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades
Project Number: 15-16-01
County: Houghton

Official Rate Schedule

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborer Underground - Tunnel, Shaft and Caisson</td>
<td>Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.</td>
<td>10/30/2014</td>
<td>$35.67</td>
<td>$47.07</td>
<td>$58.47</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>LAUCT-Z2-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-1,000 work hours</td>
<td>$30.52</td>
<td>$39.35</td>
<td>$48.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,001-2,000 work hours</td>
<td>$31.55</td>
<td>$40.90</td>
<td>$50.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,001-3,000 work hours</td>
<td>$32.58</td>
<td>$42.44</td>
<td>$52.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,001-4,000 work hours</td>
<td>$34.64</td>
<td>$45.53</td>
<td>$56.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder</td>
<td>10/30/2014</td>
<td>$35.76</td>
<td>$47.21</td>
<td>$58.65</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td></td>
<td>LAUCT-Z2-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-1,000 work hours</td>
<td>$30.58</td>
<td>$39.44</td>
<td>$48.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,001-2,000 work hours</td>
<td>$31.62</td>
<td>$41.00</td>
<td>$50.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,001-3,000 work hours</td>
<td>$32.66</td>
<td>$42.56</td>
<td>$52.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,001-4,000 work hours</td>
<td>$34.72</td>
<td>$45.65</td>
<td>$56.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td>Name Description</td>
<td>Updated</td>
<td>Hourly</td>
<td>Half Time Providing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------</td>
<td>---------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class III -</td>
<td>Air tool operator (jack hammer man, bush hammer man and grinding man), first</td>
<td>10/30/2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bottom man, second bottom man, cage tender, car pusher, carrier man, concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>man, concrete repair man, cement invert laborer, cement finisher, concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>shoveler, conveyor man, floor man, gasoline and electric tool operator, gunnite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>man, grout operator, welder, heading dinky man, inside lock tender, pea gravel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>operator, pump man, outside lock tender, scaffold man, top signal man, switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>man, track man, tugger man, utility man, vibrator man, winch operator, pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>jacking man, wagon drill and air track operator and concrete saw operator</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(under 40 h.p.).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Apprentice Rates:

- 0-1,000 work hours: $30.66, $39.56, $48.45
- 1,001-2,000 work hours: $31.70, $41.12, $50.53
- 2,001-3,000 work hours: $32.74, $42.68, $52.61
- 3,001-4,000 work hours: $34.82, $45.80, $56.77

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

Apprentice Rates:

- 0-1,000 work hours: $30.78, $39.74, $48.69
- 1,001-2,000 work hours: $31.83, $41.32, $50.79
- 2,001-3,000 work hours: $32.88, $42.89, $52.89
- 3,001-4,000 work hours: $34.97, $46.02, $57.07
### Official 2017 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 5/23/2017  
**Contract must be awarded by:** 8/21/2017

#### Page 13 of 26

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
<td>LAUCT-Z2-5</td>
<td></td>
<td>$36.28</td>
<td>$47.99</td>
<td>$59.69</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10/30/2014</td>
<td><strong>Apprentice Rates:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td>$30.98</td>
<td>$40.04</td>
<td>$49.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td>$32.04</td>
<td>$41.63</td>
<td>$51.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td>$33.10</td>
<td>$43.22</td>
<td>$53.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td>$35.22</td>
<td>$46.40</td>
<td>$57.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class VI - Dynamite man and powder man.</td>
<td>LAUCT-Z2-6</td>
<td></td>
<td>$36.59</td>
<td>$48.45</td>
<td>$60.31</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10/30/2014</td>
<td><strong>Apprentice Rates:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td>$31.21</td>
<td>$40.38</td>
<td>$49.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td>$32.28</td>
<td>$41.99</td>
<td>$51.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td>$33.36</td>
<td>$43.61</td>
<td>$53.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td>$35.51</td>
<td>$46.84</td>
<td>$58.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>LAUCT-Z2-7</td>
<td></td>
<td>$28.86</td>
<td>$36.86</td>
<td>$44.85</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10/30/2014</td>
<td><strong>Apprentice Rates:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td>$25.41</td>
<td>$31.68</td>
<td>$37.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td>$26.10</td>
<td>$32.72</td>
<td>$39.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td>$26.79</td>
<td>$33.76</td>
<td>$40.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td>$28.17</td>
<td>$35.82</td>
<td>$43.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Official Request #:** 713  
**Requestor:** Michigan Technological University  
**Project Description:** Fisher Lecture Hall HVAC Upgrades  
**Project Number:** 15-16-01  
**County:** Houghton  

---

**Official Rate Schedule**  
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time</th>
<th>Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landscape Laborer</strong></td>
<td>Landscape Specialist includes air, gas, and diesel equipment operator, skidsteer (or equivalent), lawn sprinkler installer on landscaping work where seeding, sodding, planting, cutting, trimming, backfilling, rough grading or maintenance of landscape projects occurs. Sundays paid at time &amp; one half. Holidays paid at double time.</td>
<td>10/13/2015</td>
<td>LLAN-Z2-A</td>
<td>$28.25</td>
<td>$39.04</td>
<td>$49.82</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Skilled Landscape Laborer</strong></td>
<td>small power tool operator, lawn sprinkler installers' tender, material mover, truck driver on when seeding, sodding, planting, cutting, trimming, backfilling, rough grading or maintaining of landscape projects occurs. Sundays paid at time &amp; one half. Holidays paid at double time.</td>
<td>10/13/2015</td>
<td>LLAN-Z2-B</td>
<td>$24.05</td>
<td>$32.74</td>
<td>$41.42</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Operating Engineer - DIVER</strong></td>
<td>Diver/Wet Tender/Tender/Rov Pilot/Rov Tender</td>
<td>4/2/2014</td>
<td>GLF D</td>
<td>$52.80</td>
<td>$79.20</td>
<td>$105.60</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td><strong>Operating Engineer - Marine Construction</strong></td>
<td>Diver/Wet Tender, Engineer (hydraulic dredge)</td>
<td>1/23/2017</td>
<td>GLF-1</td>
<td>$72.32</td>
<td>$93.82</td>
<td>$115.32</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Make up day allowed**

**Subdivision of county**

- all Great Lakes, islands therein, & connecting & tributary waters

**Crane/Backhoe Operator, 70 ton or over Tug Operator, Mechanic/Welder, Assistant Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender**

**Holiday pay = 2.5 times the straight hourly rate**

**Make up day allowed**

**Subdivision of county**

- All Great Lakes, islands therein, & connecting & tributary waters

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades
Project Number: 15-16-01
County: Statewide

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction, Lattice Boom or Crane License Certification</td>
<td>GLF-2B</td>
<td>$72.32</td>
<td>$93.82</td>
<td>$115.32</td>
<td>X H H H H D Y</td>
<td></td>
</tr>
</tbody>
</table>

- **Holiday pay = 2.5 times the straight hourly rate**
- **Make up day allowed**
- **1/23/2017**

**Subdivision of county**: All Great Lakes, islands therein, & connecting & tributary waters

**Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs or more), Tug/Launch Operator, Loader, Dozer on Barge, Deck Machinery**

- **GLF-3**
- **$66.27**
- **$84.75**
- **$103.22**
- **X H H H H D Y**

**Deck Equipment Operator, (Machineryman/Fireman), (4 equipment units or more), Off Road Trucks, Deck Hand, Tug Engineer, & Crane Maintenance 50 ton capacity and under or Backhoe 115,000 lbs or less, Assistant Tug Operator**

- **GLF-4**
- **$60.07**
- **$75.45**
- **$90.82**
- **X H H H D Y**

**Operating Engineer General Construction and Underground**

**Crane 120' boom & jib**

- **EN-324UP-120GU**
- **$52.20**
- **$66.73**
- **$81.26**
- **X H H H D N**

- **Double time after 12 hours Mon-Sat**

**Crane 140' boom & jib**

- **EN-324UP-140GU**
- **$52.45**
- **$67.11**
- **$81.76**
- **X H H H D N**

- **Double time after 12 hours Mon-Sat**

**Crane with 400' or longer main boom & jib**

- **EN-324UP-400GU**
- **$56.24**
- **$72.75**
- **$89.25**
- **X H H H D N**

- **Double time after 12 hours Mon-Sat**

Official Request #: 713

Requestor: Michigan Technological University

Project Description: Fisher Lecture Hall HVAC Upgrades

Project Number: 15-16-01

County: Houghton

Official Rate Schedule

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half</th>
<th>Double Time Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>Regular equipment operator, crane, dozer, front end loader, pumpcrete, squeeze crete, job mechanic, welder, concrete pump, excavator, milling &amp; pulverizing machines, &amp; scraper (self-propelled &amp; tractor drawn).</td>
<td>EN-324UP-AGU</td>
<td>$51.70</td>
<td>$65.98</td>
<td>$80.26 X X H H H H D N</td>
<td></td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td>comment</td>
<td>4/28/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$42.22</td>
<td>$52.22</td>
<td>$62.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$43.64</td>
<td>$54.35</td>
<td>$65.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$45.07</td>
<td>$56.49</td>
<td>$67.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$46.51</td>
<td>$58.65</td>
<td>$70.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$47.93</td>
<td>$60.78</td>
<td>$73.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$49.36</td>
<td>$62.92</td>
<td>$76.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class B</td>
<td>Air-Trac Drill, boom truck (non-swing), concrete mixers, material hoist and tugger, pumps 6&quot; and over, beltcrete, sweeping machine, trencher, head grease man, winches, well points and freeze systems.</td>
<td>EN-324UP-BGU</td>
<td>$48.45</td>
<td>$61.11</td>
<td>$73.76 X X H H H D N</td>
<td></td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td>comment</td>
<td>4/28/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class C</td>
<td>Fork Truck, air compressor, conveyer, concrete saw, farm tractor(without attachments), generator, guard post driver, mulching machines, pumps under 6&quot;, welding machines,</td>
<td>EN-324UP-CGU</td>
<td>$47.87</td>
<td>$60.24</td>
<td>$72.60 X X H H H D N</td>
<td></td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td>comment</td>
<td>4/28/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class D</td>
<td>Oiler, fireman, heater operator, brock concrete breaker, elevators (other than passenger), end dump &amp; skid steer</td>
<td>EN-324UP-DGU</td>
<td>$46.93</td>
<td>$58.83</td>
<td>$70.72 X X H H H D N</td>
<td></td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td>comment</td>
<td>4/28/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane 220' boom &amp; jib</td>
<td></td>
<td>EN-324UP-GU</td>
<td>$52.70</td>
<td>$67.48</td>
<td>$82.26 X X H H H D N</td>
<td></td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td>comment</td>
<td>4/28/2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades
Project Number: 15-16-01
County: Houghton

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time and Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MGU</td>
<td></td>
<td>4/28/2017</td>
<td>$53.20</td>
<td>$68.23</td>
<td>$83.26</td>
<td>X X H H H H D N</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Engineer Steel Work</td>
<td>Crane 120' boom &amp; jib</td>
<td>EN-324UP-120S</td>
<td>4/28/2017</td>
<td>$52.60</td>
<td>$67.33</td>
<td>$82.06</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crane 140' boom &amp; jib</td>
<td>EN-324UP-140S</td>
<td>4/28/2017</td>
<td>$52.85</td>
<td>$67.71</td>
<td>$82.56</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crane 220' boom &amp; jib</td>
<td>EN-324UP-220S</td>
<td>4/28/2017</td>
<td>$53.10</td>
<td>$68.08</td>
<td>$83.06</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crane with 300' boom &amp; jib</td>
<td>EN-324UP-300S</td>
<td>4/28/2017</td>
<td>$54.91</td>
<td>$70.75</td>
<td>$86.59</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crane with 400' boom &amp; jib</td>
<td>EN-324UP-400S</td>
<td>4/28/2017</td>
<td>$56.64</td>
<td>$73.35</td>
<td>$90.05</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compressor, Welder &amp; Forklift</td>
<td>EN-324UP-CWS</td>
<td>4/28/2017</td>
<td>$48.85</td>
<td>$61.71</td>
<td>$74.56</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MS</td>
<td>4/28/2017</td>
<td>$53.60</td>
<td>$68.83</td>
<td>$84.06</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oiler &amp; Fireman</td>
<td>EN-324UP-OFS</td>
<td>4/28/2017</td>
<td>$47.55</td>
<td>$59.76</td>
<td>$71.96</td>
<td>X X H H H H D Y</td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Official 2017 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 5/23/2017  
**Contract must be awarded by:** 8/21/2017

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Half Time</th>
<th>a Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operator</strong></td>
<td>EN-324UP-OS</td>
<td>4/28/2017</td>
<td>$52.10</td>
<td>$66.58</td>
<td>$81.06</td>
<td>X</td>
</tr>
<tr>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X X H H H H H D Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Double time after 12 hours Mon-Sat**

### Apprentice Rates:

- 1st 6 months: $42.50  
- 2nd 6 months: $43.95  
- 3rd 6 months: $45.39  
- 4th 6 months: $46.84  
- 5th 6 months: $48.29  
- 6th 6 months: $49.74

<table>
<thead>
<tr>
<th>Painter</th>
<th>PT-1011</th>
<th>7/17/2015</th>
<th>$31.25</th>
<th>$41.01</th>
<th>$50.76</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>H</th>
<th>D</th>
<th>N</th>
</tr>
</thead>
</table>

### Apprentice Rates:

- 1st 1000 hours: $23.45  
- 2nd 1000 hours: $24.42  
- 3rd 1000 hours: $25.40  
- 4th 1000 hours: $26.37  
- 5th 1000 hours: $27.35  
- 6th 1000 hours: $28.32  
- 7th 1000 hours: $29.30  
- 8th 1000 hours: $30.27

Every contractor and subcontractor shall keep posted on the construction site, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Bridge Painter (under 30 feet)

<table>
<thead>
<tr>
<th>Classification</th>
<th>PT-1011B</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$35.89</td>
<td>$47.97</td>
<td>$60.04</td>
<td></td>
<td>H H H H D N</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 1st 1,000 hours: $26.23, $33.48, $40.72
- 2nd 1,000 hours: $27.44, $35.29, $43.14
- 3rd 1,000 hours: $28.64, $37.09, $45.54
- 4th 1,000 hours: $29.85, $38.90, $47.96
- 5th 1,000 hours: $31.06, $40.72, $50.38
- 6th 1,000 hours: $32.27, $42.54, $52.80
- 7th 1,000 hours: $33.48, $44.35, $55.22
- 8th 1,000 hours: $34.68, $46.15, $57.62

### Drywall Finisher, Soundproofing, & Plural Component Applicator

<table>
<thead>
<tr>
<th>Classification</th>
<th>PT-1011-DF</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$37.67</td>
<td>$50.64</td>
<td>$63.60</td>
<td></td>
<td>H H H H D N</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 1st 1,000 hours: $27.30, $35.08, $42.86
- 2nd 1,000 hours: $28.59, $37.02, $45.44
- 3rd 1,000 hours: $29.89, $38.96, $48.04
- 4th 1,000 hours: $31.19, $40.92, $50.64
- 5th 1,000 hours: $32.48, $42.85, $53.22
- 6th 1,000 hours: $33.78, $44.80, $55.82
- 7th 1,000 hours: $35.08, $46.75, $58.42
- 8th 1,000 hours: $36.37, $48.68, $61.00

### Pipe and Manhole Rehab

**General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant**

<table>
<thead>
<tr>
<th>Classification</th>
<th>TM247</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$28.20</td>
<td>$38.20</td>
<td></td>
<td></td>
<td>H H H H H H H G N</td>
</tr>
</tbody>
</table>

**Official Request #: 713**

- **Requestor:** Michigan Technological University
- **Project Description:** Fisher Lecture Hall HVAC Upgrades
- **Project Number:** 15-16-01
- **County:** Statewide

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap cutter/CCTV Tech/Grout Equipment</td>
<td>TM247-2</td>
<td>Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment</td>
<td>4/17/2015</td>
<td>$32.70</td>
<td>$44.95</td>
<td>H H H H H H N</td>
<td></td>
</tr>
<tr>
<td>CCTV Technician/Combo Unit Operator</td>
<td>TM247-3</td>
<td>unit driver and operator of CCTV unit or combo unit in connection with normal cleaning and televising work</td>
<td>4/17/2015</td>
<td>$31.45</td>
<td>$43.07</td>
<td>H H H H H H N</td>
<td></td>
</tr>
<tr>
<td>Boiler Operator</td>
<td>TM247-4</td>
<td>unit driver and operator of steam/water heater units and all ancillary equipment associated</td>
<td>4/17/2015</td>
<td>$33.20</td>
<td>$45.70</td>
<td>H H H H H H N</td>
<td></td>
</tr>
<tr>
<td>Combo Unit driver &amp; Jetter-Vac Operator</td>
<td>TM247-5</td>
<td></td>
<td>4/17/2015</td>
<td>$33.20</td>
<td>$45.70</td>
<td>H H H H H H N</td>
<td></td>
</tr>
<tr>
<td>Pipe Bursting &amp; Slip-lining Equipment Operator</td>
<td>TM247-6</td>
<td></td>
<td>4/17/2015</td>
<td>$34.20</td>
<td>$47.20</td>
<td>H H H H H H N</td>
<td></td>
</tr>
<tr>
<td>Plasterer</td>
<td>PL16UP</td>
<td></td>
<td>10/23/2012</td>
<td>$38.71</td>
<td>$51.63</td>
<td>$64.54</td>
<td>H H H H D N</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 1st year $29.67 $38.06 $46.46
- 2nd year $32.25 $41.94 $51.62
- 3rd year $34.84 $45.82 $56.80
### Plumber, Pipefitter

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Classification</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumber, Pipefitter</td>
<td>Plumber &amp; Pipefitter</td>
<td>PL-111</td>
<td>$47.61</td>
<td>$71.42</td>
<td>$95.22</td>
<td>H</td>
<td>H H H H H D Y</td>
</tr>
</tbody>
</table>

4 ten hour days may be worked only Monday-Thursday

Make up day allowed

**Apprentice Rates:**

1st 6 months  $23.96  $35.94  $47.92
2nd 6 months  $25.44  $38.16  $50.88
3rd 6 months  $35.32  $52.98  $70.64
4th 6 months  $36.65  $54.98  $73.30
5th 6 months  $37.99  $56.98  $75.98
6th 6 months  $39.47  $59.20  $78.94
7th 6 months  $40.80  $61.20  $81.60
8th 6 months  $42.13  $63.20  $84.26
9th 6 months  $43.46  $65.19  $86.92

### Roofer

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Classification</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Roofer</td>
<td>Commercial Roofer</td>
<td>RO-149-UP</td>
<td>$28.23</td>
<td>$36.56</td>
<td>$44.88</td>
<td>X</td>
<td>X X X X X D Y</td>
</tr>
</tbody>
</table>

Make up day allowed

**Apprentice Rates:**

Apprentice 1  $20.84  $25.96  $31.08
Apprentice 2  $21.67  $27.17  $32.67
Apprentice 3  $22.48  $28.37  $34.26
Apprentice 4  $23.29  $29.56  $35.82
Apprentice 5  $24.09  $30.72  $37.36
Apprentice 6  $24.90  $31.91  $38.93

### Sewer Relining

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Classification</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV</td>
<td>SR-I</td>
<td>$43.66</td>
<td>$59.01</td>
<td>$74.36</td>
<td>H H H H H H D N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11/24/2015

---

**Official Request #:** 713

Requestor: Michigan Technological University

Project Description: Fisher Lecture Hall HVAC Upgrades

Project Number: 15-16-01

County: Statewide

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Official 2017 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 5/23/2017  
**Contract must be awarded by:** 8/21/2017

---

**Classification**  
Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.</td>
<td>SR-II</td>
<td>$42.13</td>
<td>$56.72</td>
<td>$71.30</td>
<td>H H H H H D N</td>
<td></td>
</tr>
</tbody>
</table>

11/24/2015

**Sheet Metal Worker**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheet Metal Worker</td>
<td>shm-7-5</td>
<td>$53.09</td>
<td>$67.30</td>
<td>$81.50</td>
<td>H H H D D D Y</td>
<td></td>
</tr>
</tbody>
</table>

Make up day allowed  
A make up day may be worked due to inclement weather, the make up hours shall be paid at the regular hourly rate of pay.

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Period</th>
<th>Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 6 months</td>
<td>$30.67</td>
<td>$37.78</td>
<td>$44.88</td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$30.67</td>
<td>$37.78</td>
<td>$44.88</td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$32.77</td>
<td>$40.59</td>
<td>$48.40</td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$34.87</td>
<td>$43.40</td>
<td>$51.92</td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$36.97</td>
<td>$46.21</td>
<td>$55.44</td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$39.08</td>
<td>$49.03</td>
<td>$58.97</td>
</tr>
<tr>
<td>7th 6 months</td>
<td>$41.19</td>
<td>$51.85</td>
<td>$62.50</td>
</tr>
<tr>
<td>8th 6 months</td>
<td>$43.29</td>
<td>$54.66</td>
<td>$66.02</td>
</tr>
</tbody>
</table>

---

**Official Request #:** 713  
**Requestor:** Michigan Technological University  
**Project Description:** Fisher Lecture Hall HVAC Upgrades  
**Project Number:** 15-16-01  
**County:** Houghton

---

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Sprinkler Fitter

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler Fitter</td>
<td>SP 669</td>
<td></td>
<td>1/4/2017</td>
<td>$51.64</td>
<td>$68.45</td>
<td>$85.26</td>
<td>H H H H H H D Y</td>
</tr>
</tbody>
</table>

Make up day allowed

### Apprentice Rates:

- **Class 1**: $23.03, $30.60, $38.16
- **Class 2**: $24.71, $33.12, $41.52
- **Class 3**: $34.01, $43.26, $52.50
- **Class 4**: $35.69, $45.78, $55.86
- **Class 5**: $37.62, $48.55, $59.47
- **Class 6**: $39.30, $51.07, $62.83
- **Class 7**: $40.99, $53.60, $66.21
- **Class 8**: $42.67, $56.12, $69.57
- **Class 9**: $44.35, $58.64, $72.93
- **Class 10**: $46.03, $61.16, $76.29

### Truck Driver

- **of all trucks of 8 cubic yd capacity or over**: TM-RB2 | $44.10, $48.81 | H H H H H H Y |

  | Last Updated | 6/7/2016 |

- **of all trucks of 8 cubic yard capacity or less**: TM-RB2A | $44.00, $48.66 | H H H H H H Y |

  | Last Updated | 6/7/2016 |

- **on euclid type equipment**: TM-RB2B | $44.25, $49.04 | H H H H H H Y |

<p>| Last Updated | 6/7/2016 |</p>
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated Date</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Overtime Provision</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground Laborer Open Cut, Class I</td>
<td>LAUC-Z5-1</td>
<td>Construction Laborer</td>
<td>10/30/2014</td>
<td>$32.75</td>
<td>$42.68</td>
<td>$52.61</td>
<td>X X X X X X D Y</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Apprentice Rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$28.35</td>
<td>$36.08</td>
<td>$43.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$29.23</td>
<td>$37.40</td>
<td>$45.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$30.11</td>
<td>$38.72</td>
<td>$47.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$31.87</td>
<td>$41.36</td>
<td>$50.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underground Laborer Open Cut, Class II</td>
<td>LAUC-Z5-2</td>
<td>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.</td>
<td>10/30/2014</td>
<td>$32.89</td>
<td>$42.89</td>
<td>$52.89</td>
<td>X X X X X X D Y</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Apprentice Rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$28.46</td>
<td>$36.25</td>
<td>$44.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$29.34</td>
<td>$37.57</td>
<td>$45.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$30.23</td>
<td>$38.90</td>
<td>$47.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$32.00</td>
<td>$41.56</td>
<td>$51.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underground Laborer Open Cut, Class III</td>
<td>LAUC-Z5-3</td>
<td>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 drill and air track operator and concrete saw operator (under 40 h.p.), windlass and tugger man, and directional boring man.</td>
<td>10/30/2014</td>
<td>$33.02</td>
<td>$43.09</td>
<td>$53.15</td>
<td>X X X X X X D Y</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Apprentice Rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$28.56</td>
<td>$36.40</td>
<td>$44.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$29.45</td>
<td>$37.74</td>
<td>$46.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$30.34</td>
<td>$39.07</td>
<td>$47.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$32.13</td>
<td>$41.76</td>
<td>$51.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 713
Requestor: Michigan Technological University
Project Description: Fisher Lecture Hall HVAC Upgrades
Project Number: 15-16-01
County: Houghton

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Underground Laborer Open Cut, Class IV
Trench or excavating grade man.

<table>
<thead>
<tr>
<th>Name Description</th>
<th>Updated 10/30/2014</th>
<th>Hourly $33.07</th>
<th>Half Time $43.16</th>
<th>Double Time $53.25</th>
</tr>
</thead>
</table>

**Apprentice Rates:**
- 0-1,000 work hours: $28.59
- 1,001-2,000 work hours: $29.49
- 2,001-3,000 work hours: $30.38
- 3,001-4,000 work hours: $32.17

### Underground Laborer Open Cut, Class V
Pipe Layer

<table>
<thead>
<tr>
<th>Name Description</th>
<th>Updated 10/30/2014</th>
<th>Hourly $33.12</th>
<th>Half Time $43.24</th>
<th>Double Time $53.35</th>
</tr>
</thead>
</table>

**Apprentice Rates:**
- 0-1,000 work hours: $28.63
- 1,001-2,000 work hours: $29.53
- 2,001-3,000 work hours: $30.43
- 3,001-4,000 work hours: $32.22

### Underground Laborer Open Cut, Class VI
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 & the installation and repair of water service pipe and appurtenances.

<table>
<thead>
<tr>
<th>Name Description</th>
<th>Updated 10/30/2014</th>
<th>Hourly $30.50</th>
<th>Half Time $39.31</th>
<th>Double Time $48.11</th>
</tr>
</thead>
</table>

**Apprentice Rates:**
- 0-1,000 work hours: $26.66
- 1,001-2,000 work hours: $27.43
- 2,001-3,000 work hours: $28.20
- 3,001-4,000 work hours: $29.73
### Underground Laborer Open Cut, 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, flagstones etc.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAUC-Z5-7</td>
<td>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.</td>
<td>10/30/2014</td>
<td>$28.61</td>
<td>$36.47</td>
<td>$44.33</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 0-1,000 work hours: $25.25, $31.44, $37.61
- 1,001-2,000 work hours: $25.92, $32.44, $38.95
- 2,001-3,000 work hours: $26.59, $33.44, $40.29
- 3,001-4,000 work hours: $27.94, $35.47, $42.99