TABLE OF CONTENTS

Division 0 - Procurement
  000101 Cover Page
  000111 Table of Contents
  001113 Invitation to Bid
  004200 Bid Proposal Form
  005200 Draft Contract

Division 1 – General Requirements
  010000 General Conditions
  010001 Supplementary General Conditions
  010002 Payment Procedures
  010003 AIA Document G702 Sample
  010004 AIA Document G703 Sample
  010008 Certificate of Substantial Completion
  010010 Final Completion Checklist
  010012 Guaranty
  010014 Consent of Surety to Final Payment
  010016 Sworn Statement
  010018 Full Unconditional Waiver
  010020 Certificate of Final Completion
  010022 Change Order
  011000 Summary of Work
  013300 Submittals

Division 26 – Electrical
  230923 Facilities Management & Control System

Attachment 1: Sequence of Operation

Attachment 2: Prevailing Wages for this Project.
INVITATION TO BID

PROJECT: Walker Arts and Humanities Center - Walker HVAC Controls Replacement

DUE DATE: Until 3:00 P.M. local time on November 12th, 2015, the Owner will receive sealed proposals for the work as herein set forth at the offices of:

Attn. 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 can be viewed and downloaded from the Facilities Management web site at the following address: http://www.mtu.edu/facilities/planning/bids/
Please call Project Engineer at 906-487-2305, Jim Rathbun if you have technical questions.

WALK THROUGH: Bidders are invited to a mandatory Pre-Bid Walk-through 2 PM November 5th 2015 in the 1st floor lobby of Walker Arts and Humanities Center on Michigan Tech's campus.

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 submitting bids in excess of $50,000.00 must be certified by the Department of Civil Rights for compliance with the State of Michigan Equal Employment Opportunity requirements prior to submission of bids. A copy of the bidder's valid certificate of compliance or award ability shall be submitted with the proposal. Failure to enclose the certificate with the proposal will not disqualify the bidder providing a valid certificate is submitted within a time acceptable to the owner.

Michigan Technological University reserves the right to reject any or all bids and to waive any informality or irregularity in any bid received.

Michigan Technological University is an equal opportunity educational institution/equal opportunity employer, which includes providing equal opportunity for protected veterans and individuals with disabilities.
BID PROPOSAL FORM 11-16-01

Attn: Penny Foetisch
Facilities Management
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Having carefully read the specifications and drawings dated OCTOBER 28, 2015 for the Walker Arts and Humanities Center - HVAC Controls Replacement Project, the undersigned agrees to perform the work in accordance with Invitation to Bid No. 11-16-01

The undersigned also agrees to complete all work for this project by January 30, 2016 or sooner

Our bid to furnish and install all materials complete is:

$______________________________  (Bid price in numbers and words)

Bidder acknowledges receipt of the following addenda:

Addendum No. ____________  Dated: ______________
Addendum No. ____________  Dated: ______________
Addendum No. ____________  Dated: ______________

Name: ____________________________  Date: _________
(Signature)

Name: ____________________________
(Print)

Title: ____________________________

Firm: ____________________________

Sealed proposals will be received at Facilities Management, Bldg. 44, on the waterfront of Michigan Technological University, Houghton, Michigan until 3:00 P.M. on November 12, 2015.

(Return one copy to Facilities Management. Retain one copy for your files.)
005200 Agreement between Contractor and Owner for Construction (DRAFT)

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

Project: HVAC Controls Replacement Project – Walker Arts and Humanities Center

Project #: Owner: 11-16-01

Contract for: HVAC Controls Replacement including, new controllers, new electronic activators, new CO2 sensors and VFD’s. The system will be connected to the University’s existing TridiumAX system

Contractor: TBD

Contract Start Date: TBD

Contract Completion Date: January 30, 2016 or Date of Final Payment

This Agreement, is authorized and made to be effective as of this day of __________ 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 WALKER ARTS AND HUMANITIES CENTER FIRE AND MASS NOTIFICATION SYSTEM-01 Walker HVAC Controls Replacement Project – Walker Arts and Humanities Center, prepared by Michigan Tech Facilities Management, 1400 Townsend Dr., Houghton, MI, 49931.

The Project consists of the purchase and installation of new HVAC Controls, sensors, actuators,
miscellaneous equipment and system integration. The system will be connected through BACnet protocol to existing University monitoring systems.

ARTICLE 3 - TIME OF COMPLETION:

The Work to be performed under this Contract shall begin on or about November 22, 2015 or Date of Notice to Proceed, and shall be substantially completed on or before the completion Date, January 30, 2016 or Date of Final Payment.

ARTICLE 4 - PROGRESS PAYMENTS:

Michigan Tech shall make payments as provided in Articles 1.2.14 of the General Requirements 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 14th 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 at the site for subsequent incorporation in the completed construction (or, if approved in advance by Michigan Tech, suitably stored off the site at a location agreed upon in writing), may be included in the Application for Payment less retainage ten (10%).

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

4) 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.

5) Michigan Tech shall review the Application for Payment and sign it certifying it, thus it will become a Certificate of Payment.

6) Provided an Application for Payment and Conditional Waiver and Release on Progress Payment are received and approved 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 may request in writing that Michigan Tech issue Substantial Completion. Upon receipt of written notice that the Work is ready for inspection and acceptance, Michigan Tech shall promptly inspect the Work.

2) When the Work has been Substantially Completed and accepted, Michigan Tech shall issue upon request by the contractor, Substantial Completion and a Final Completion Checklist as necessary. Upon completion of the Final Completion Checklist and upon request by the Contractor, Michigan Tech shall complete a Certificate of Completion. Michigan Tech shall make payments up to ninety five percent (95%); less such amounts as determined by Michigan Tech for incomplete Work, unsettled claims, and any Work that is materially delayed through no fault of the Contractor; of the Total Contract Amount of the balance due for that portion of the Work Substantially Completed and accepted.

3) The Contractor may request in writing that Michigan Tech issue a Certificate of Final Completion and Final Payment upon completion of the Final Completion Checklist. Upon receipt of written notice that the Work is ready for final inspection and acceptance, Michigan Tech shall promptly inspect the Work.

4) 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 this project dated 10/28/2015 as listed in the Table of Contents
- Reference Drawings - Original control as-builts including sequence of operation.
- 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.
ARTICLE 7 - THE CONTRACT AMOUNT:

The **Contract Lump Sum** is as noted below.

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

<table>
<thead>
<tr>
<th>Base Bid Lump Sum</th>
<th>$ ____________</th>
</tr>
</thead>
</table>

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

Title __________________________________________________________

FOR MICHIGAN TECHNOLOGICAL UNIVERSITY

____________________________________ Date______________________

Ellen S. Horsch
Vice President for Administration
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 of conflict 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 the Director of Engineering Services of all defects or conditions that will affect the results. Failure to so notify will constitute acceptance of the conditions and render the Contractor responsible and liable for the same.

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.

GENERAL CONDITIONS
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 hereinafter 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 ½% 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 insurance 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 will 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.

The 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.

1.2.13. 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 Certificate of Substantial Completion 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 payments 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.

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 M 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 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. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, national origin, age, sex, height, weight, or marital status.

3. The Contractor or his collective bargaining representative will send, to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or worker's representative of the Contractor's commitments under this section.

4. The Contractor will comply with all published rules, regulations, directives, and orders of the Michigan Civil Rights Commission relevant to Article 6, 1976 PA 453, as amended, which may be in effect prior to the taking of bids for any individual State project.
5. The Contractor will furnish and file compliance reports within such time and upon such forms as provided by the Michigan Civil Rights Commission; said forms may also elicit information as to the practices, policies, program, and employment statistics of each Subcontractor as the Contractor himself, and said Contractor will permit access to his books, records, and accounts by the Michigan Civil Rights Commission, and/or its agent, for purposes of investigation to ascertain compliance with this Contract and with rules, regulations, and orders of the Michigan Civil Rights Commission relevant to Article 6, 1976 PA 453, as amended.

6. In the event that the Civil Rights Commission finds, after a hearing held pursuant to its rules, that a contractor has not complied with the contractual obligations under this agreement, the Civil Rights Commission may, as part of its order based upon such findings, certify said findings to the State Administrative Board of the State of Michigan, which the Board may order the cancellation of the Contract found to have been violated, and/or declare the contractor ineligible for future contracts with the State and its political and civil subdivisions, departments, officers, and including the governing boards of institutions of higher education, until the contractor complies with said order of the Civil Rights Commission. Notice of said declaration of future ineligibility may be given to any or all of the persons with whom the contractor is declared ineligible to contract as a contracting party in future contracts. In any case before the Civil Rights Commission in which cancellation of an existing contract is a possibility, the contracting agency shall be notified of such possible remedy and shall be given the option by the Civil Rights Commission to participate in such proceedings.

7. The Contractor will include, or incorporate by reference, the provisions of the foregoing paragraphs “1” thru “6” in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Michigan Civil Rights Commission and will provide in every subcontract or purchase order that said provisions will be binding upon each subcontractor or seller.

1.2.16 PERMITS, FEES AND NOTICES: The Contractor 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 during working hours, direct traffic to prevent congestion. The Contractor shall maintain such as long as temporary work requires and then remove from the public areas.

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 to 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

GENERAL CONDITIONS
010000 - 5
10/28/2015
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 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 prior 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 or 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 by 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 Architect for redesign and evaluation services, the increased cost of other work by the University or separate contractors, and 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, 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.
01000 SUPPLEMENTARY GENERAL CONDITIONS

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

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

2.2 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.

2.3 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.

2.4 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. They may be done on AIA form G703.

PART 7 DOCUMENT CLARIFICATION - All inquiries regarding project specifications and drawings shall be made to the Director of Engineering Services.

PART 8 CONTRACT COMPLETION – Construction work Substantial Completion of the Contract shall be on or before January 22, 2016.

PART 9 EQUAL EMPLOYMENT OPPORTUNITY – In order to qualify for award, bidders submitting bids in excess of $50,000.00 must be certified by the Department of Civil Rights for compliance with State of Michigan Equal Employment Opportunity requirements. (Contract Compliance Team may be contacted at MDCR-CCT@michigan.gov or by phone at (313)456-3823. A copy of the bidder's valid certificate of compliance or awardability shall be submitted by the successful bidder prior to award of contract.

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 (3) 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

11.1 Perform all work indicated in the Contract Documents.

11.2 For AC-1, HV-2, HV-3, HV-4, HV-5, AC-6:
   a. Remove and replace existing JCI/Honeywell controllers with new controllers utilizing Bacnet protocol.
   b. Tie new controllers into the existing Tridium system.
   c. Verify the operation of Digital field sensors and reuse.
   d. Remove the existing pneumatic damper actuators, and replace with electronic actuators.
   e. Existing pneumatic valves to be controlled by new I/P transducers.
   f. New CO2 sensors will be added to the return air flow and tied to the Tridium system.
   g. Install new VFD’s for each motor (excluding A/C-6 roof top unit).
   h. All AHU’s will follow the existing sequence of operation. (See reference drawings)

11.3 Heat exchanger and pumps:
   i. Remove and replace existing JCI/Honeywell controllers with new controllers utilizing Bacnet protocol.
   j. Tie new controllers into the existing Tridium system.
   k. Verify the operation of Digital field sensors and reuse.
   l. Install new New OAT sensors.
   m. Existing pneumatic valves to be controlled by new I/P transducers.
   n. Install new VFD’s for each pump motor.
11.4 All unused and obsolete; copper tubing, poly tubing, damper and valve actuators, digital controllers, and enclosures need to be removed and delivered to the Central Energy Plant.

END OF SECTION
010001
010002 PAYMENT PROCEDURES

PART 1 – GENERAL

1.1  SUMMARY
A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2  SCHEDULE OF VALUES
A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor’s construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor’s construction schedule.

2. Submit the schedule of values to Michigan Tech at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Specifications table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Michigan Tech.
   c. Michigan Tech’s project number.
   d. Contractor’s name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Documents G702, G703.

3. Provide a breakdown of the Total Contract Amount in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Specifications table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Total Contract Amount.
   a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Total Contract Amount and subcontract amount.

4. Round amounts to nearest whole dollar; total shall equal the Total Contract Amount.
   a. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   b. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor’s option.

5. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders result in a change in the Total Contract Amount.
1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Michigan Tech and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Michigan Tech and the Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Michigan Tech will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders issued before last day of construction period covered by application.

E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Michigan Tech by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Lien: With each Application for Payment, submit waivers of lien as indicated in the Agreement.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.
10. Initial progress report.
12. Certificates of insurance and insurance policies.
H. Application for Payment at Substantial Completion: After Michigan Tech issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Total Contract Amount.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Total Contract Amount.
4. Completion of the Final Completion Checklist.
5. Evidence that claims have been settled.
6. Final liquidated damages settlement statement.

(a) END OF SECTION 010002
TO OWNER:  PROJECT:  APPLICATION NO:  Distribution to:  

FROM CONTRACTOR:  VIA ARCHITECT:  

**CONTRACT FOR:**  

**CONTRACTOR'S APPLICATION FOR PAYMENT**  

Application is made for payment, as shown below, in connection with the Contract.

Continuation Sheet, AIA Document G703, is attached.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ORIGINAL CONTRACT SUM</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>2. Net change by Change Orders</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>3. CONTRACT SUM TO DATE (Line 1 ± 2)</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>4. TOTAL COMPLETED &amp; STORED TO DATE (Column G on G703)</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>5. RETAINAGE:</td>
<td></td>
</tr>
<tr>
<td>a. 10% of Completed Work</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>(Column D + E on G703)</td>
<td></td>
</tr>
<tr>
<td>b. % of Stored Material</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>(Column F on G703)</td>
<td></td>
</tr>
<tr>
<td>Total Retainage (Lines 5a + 5b or Column I of G703)</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>8. CURRENT PAYMENT DUE</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less 6)</td>
<td>$ 0.00</td>
</tr>
</tbody>
</table>

**ARCHITECT'S CERTIFICATE FOR PAYMENT**  

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED . . . . . . . . . . . $  

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:  

By:  

Date:  

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.
Contractor’s signed certification is attached.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION OF WORK</th>
<th>SCHEDULED VALUE</th>
<th>WORK COMPLETED FROM PREVIOUS APPLICATION (D+E)</th>
<th>WORK COMPLETED THIS PERIOD</th>
<th>MATERIALS PRESENTLY STORED (NOT IN D OR E)</th>
<th>TOTAL COMPLETED AND STORED TO DATE (D+E+F)</th>
<th>% (G ÷ C)</th>
<th>BALANCE TO FINISH (C - G)</th>
<th>RETAINAGE (IF VARIABLE RATE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

**GRAND TOTALS**: $0.00 $0.00 $0.00 $0.00 $0.00 $0.00 $0.00 $0.00 $0.00

Users may obtain validation of this document by requesting of the license a completed AIA Document D401 - Certification of Document’s Authenticity.
### 010008 Certificate of Substantial Completion

<table>
<thead>
<tr>
<th>Project:</th>
<th>Owner:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walker Arts and Humanities Center Walker HVAC</td>
<td>Michigan Technological University</td>
</tr>
<tr>
<td></td>
<td>1400 Townsend Drive</td>
</tr>
<tr>
<td></td>
<td>Houghton, MI 49931</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>11-16-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract for:</td>
<td>Installation of Walker Arts and Humanities Center Walker HVAC Controls</td>
</tr>
<tr>
<td>Contractor:</td>
<td></td>
</tr>
<tr>
<td>Contract Date:</td>
<td></td>
</tr>
</tbody>
</table>

**Substantial Completion Date and Final Completion Checklist:**

The Work performed under this Contract as reviewed by the Contractor is substantially complete by the Contractor’s knowledge, information, and belief; the condition of the work is sufficiently complete per Contract Documents and the Owner can occupy for intended use.

The Contractor hereby requests that Michigan Tech issue Substantial Completion notification for the project noted above.

If necessary, any **Remaining Items** to be completed and/or corrected are included on the **010010 Final Completion Checklist**. The list does not alter the responsibility of the Contractor to complete Work per Contract Documents.

(4) By signing below, the Contractor acknowledges that they will complete and/or correct the Remaining Items as documented on the **Final Completion Checklist** by the date listed as **Completion Date** on the Agreement, or as modified by subsequent Change Orders.

(5) Contractor Signature ____________________ By Date ____________________

**Owner's Issuance of agreement for Substantial Agreement:**

Michigan Technological University’s representative hereby agrees that the project is substantially completed, and that this date shall be the **Date of Commencement of Warranties** for all items as established by the Contract Documents, including any listed in the Final Completion Checklist.

(6) Owners Signature ____________________ By Date ____________________

CERTIFICATE OF FINAL COMPLETION

010010 - 1

10/28/2015
MICHIGAN TECHNOLOGICAL UNIVERSITY
WALKER ARTS AND HUMANITIES CENTER – HVAC CONTROLS UPGRADE
11-16-01

010010 Final Completion Checklist

<table>
<thead>
<tr>
<th>Project:</th>
<th>Owner:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walker Arts and Humanities Center Walker HVAC Controls Replacement</td>
<td>Michigan Technological University</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Contractor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-16-01</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contract for:</th>
<th>Contract Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction: Installation of Walker Arts and Humanities Center Walker HVAC</td>
<td></td>
</tr>
</tbody>
</table>

General Items:

1. Provide specific product warranties as follows:
   a. 
2. Provide extra material as follows:
   a. 
3. Provided Guaranty (attached).
4. Provide Consent of Surety for final payment (attached).
5. Provide Sworn Statement (attached).
6. Provide Full Unconditional Waiver of Lien from Contractor and major suppliers (attached).

List of Remaining Items to be completed and/or corrected:

<table>
<thead>
<tr>
<th>Space</th>
<th>Items to Complete</th>
<th>Date of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
010012 GUARANTY

The CONTRACTOR, as a condition precedent to final payment, shall execute this Guaranty to the OWNER, guaranteeing for one (1) year from the date of final payment, to keep in good order and repair any defect in all the work completed under the Agreement. This includes work which may develop during said period due to improper materials, defective equipment, improper materials workmanship, or arrangements and in any work which may be affected in correcting any repairs or defects. This Guaranty will be binding upon the CONTRACTOR, his subcontractors and/or material suppliers and will be without any expense to the OWNER.

OWNER:

Print

Signature

Date

CONTRACTOR:

Print

Signature

Date
CONSENT OF SURETY TO FINAL PAYMENT
AIA Document G707
(Instructions on reverse side)

TO OWNER: ARCHITECTS PROJECT NO.:
(Name and address)

PROJECT: CONTRACT FOR:
(Name and address)

CONTRACT DATED:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(insert name and address of Contractor)

on bond of
(insert name and address of Surety)

, SURETY,

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(insert name and address of Owner)

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(insert in Writing the 11111111/bfo/01/ed by the 11111111/e/d date at 111/year)

(Surety)

Attest:
(Seal):
2. G707-1994
INSTRUCTION SHEET
FOR AIA DOCUMENT G707, CONSENT OF SURETY TO FINAL PAYMENT

A. GENERAL INFORMATION

1. Purpose
This document is intended for use as a companion to AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims, on construction projects, where the Contractor is required to furnish a bond. By obtaining the Surety's approval of final payment to the Contractor and its agreement that final payment will not relieve the Surety of any of its obligations, the Owner may preserve its rights under the bond.

2. Related Documents
This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, this is a companion document to AIA Document G706.

3. Use of Current Documents
Prior to using an AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

4. Limited License for Reproduction
AIA Document G707 is a copyrighted work and may not be reproduced or excerpted from in substantial part without the express written permission of the AIA. The G707 document is intended to be used as a consumable—that is, the original document purchased by the user is intended to be consumed in the course of being used. There is no implied permission to reproduce this document, nor does membership in The American Institute of Architects confer any further rights to reproduce G707.

A cautionary notice is primed in red on the original of this document. This notice distinguishes an original AIA document from copies and counterfeits. To ensure accuracy and uniformity of language, purchasers should use only an original AIA document or one that has been reproduced from an original under a special limited license from the AIA.

A limited license is hereby granted to retail purchasers to reproduce a maximum of ten copies of a completed or executed G707, but only for use in connection with a particular project. Further reproductions are prohibited without the express permission of the AIA.

B. CHANGES FROM THE PREVIOUS EDITION
Changes in the location of various items of information were made, without revising the text of the: substantially new documents.

C. COMPLETING THE G707 FORM

GENERAL: The bond form is the usual source of required information such as the contractor's date and the names and addresses of the Surety, Owner, Contractor and Project.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

D. EXECUTION OF THE DOCUMENT
The G707 requires both the Surety's seal and the signature of the Surety's authorized representative.

INSTRUCTION SHEET FOR AIA DOCUMENT G707 - CONSENT OF SURETY TO FINAL PAYMENT • COPYRIGHT © 1994
THE AMERICAN INSTITUTE OF ARCHITECTS, 1560 NEW YORK, NEW YORK 10019-5845.
4/94
STATE OF MICHIGAN

(1) County of } ss.

__________________________________________, being duly sworn, deposes and says:

That ____________________________ is the (contractor) (subcontractor) for an improvement to the following described real property situated in County, Michigan, described as follows:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(Insert legal description of property)

(2) That the following is a statement of each subcontractor and supplier and laborer with whom the (contractor) (subcontractor) has (contracted) (subcontracted) for performance under the contract with the owner or lessee thereof, and that the amounts due to the persons as of the date hereof are correctly and fully set forth opposite their names, as follows:

<table>
<thead>
<tr>
<th>Name of subcontractor, supplier, or laborer</th>
<th>Type of improvement furnished</th>
<th>Total contract price</th>
<th>Amount already paid</th>
<th>Amount currently owing</th>
<th>Accrued fringe benefits contributions (if applicable)</th>
<th>Balance to complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
That the contractor has not procured material from, or subcontracted with, any person other than those set forth on the reverse side and owes no money for the improvement other than the sums set forth on the reverse side.

Deponent further says that he or she makes the foregoing statement as the (contractor) (subcontractor) or as __________________________ of the (contractor) (subcontractor) for the purpose of representing to the owner or lessee of the premises described on the reverse side and his or her agents that the property described on the reverse side is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth on the reverse side.

WARNING: AN OWNER OR LESSEE OF THE PROPERTY DESCRIBED ON THE REVERSE SIDE MAY NOT RELY ON THIS SWORN STATEMENT TO AVOID THE CLAIM OF A SUBCONTRACTOR, SUPPLIER, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING TO THE DESIGNEE OR TO THE OWNER OR LESSEE IF THE DESIGNEE IS NOT NAMED OR HAS DIED.

__________________________________________
Deponent

(3) Subscribed and sworn to before me this____day of____, 20________

__________________________________________
Notary Public

(4) __________________________ County, Michigan

My Commission Expires: ________________________
(a) 010018 FULL UNCONDITIONAL WAIVER

My/our contract with _____________________________ to provide

(Other contracting party)

______________________________ for the improvement of the property described as

Walker Arts and Humanities Center Fire Alarm Replacement #WALKER ARTS AND
HUMANITIES CENTER FIRE AND MASS NOTIFICATION SYSTEM-01, having been fully
paid and satisfied, with respect to our rights under the Payment / Lien Bond covering said
Project and all of our rights to pursue payment under the Payment/Lien Bond No. issued by
<<<name of prime contractor>>> as principal and <<<name of payment bond surety>>> as surety, together with any rights, demands, or causes of action we may have against
<<<name of prime contractor>>> or <<<name of payment bond surety>>> , by signing this
waiver, all my/our construction lien rights against such property are hereby waived and
released.

______________________________

(5) (Printed Name of Lien Claimant)

______________________________

(Signature of lien claimant)

Signed on: ______________________ Date: ______________________

Address: ______________________

Telephone: ______________________

DO NOT SIGN BLANK OR INCOMPLETE FORMS. RETAIN A COPY.

END OF SECTION 010018
010020 Certificate of Final Completion

<table>
<thead>
<tr>
<th>Project: Walker Arts and Humanities Center – HVAC Controls Replacement</th>
<th>Owner:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Michigan Technological University</td>
</tr>
<tr>
<td></td>
<td>1400 Townsend Drive</td>
</tr>
<tr>
<td></td>
<td>Houghton, MI 49931</td>
</tr>
<tr>
<td>Project Number: 11-16-01</td>
<td></td>
</tr>
<tr>
<td>Contract for: Construction</td>
<td>Contractor:</td>
</tr>
<tr>
<td>Contract Date:</td>
<td></td>
</tr>
<tr>
<td>TBD or Date of Notice to Proceed</td>
<td></td>
</tr>
</tbody>
</table>

Substantial Completion Date ____________________________
Final Completion Checklist Date ________________________

The Contractor certifies that the Work and all other requirements have been completed in accordance with the Contract for Construction, including, but not limited to:
1. submission and approval of all remaining change order proposals, claims, and Applications for Payment
2. submission of “as-built” plans and specifications, shop drawings, and other record documents
3. completion of all discrepancies: List of Remaining Items noted on the Final Completion Checklist at the time of Substantial Completion:
   a. submission of all final closeout deliverables/document
   b. submission of Guaranty
   c. submission of Consent of Surety for Final Payment
   d. submission of Sworn Statement
   e. submission of Full Unconditional Waiver of Lien

The Contractor further certifies that:
4. no liens have been attached against the Project
5. no suits are pending by reason of Work on the Contract
6. all Workers’ compensation claims are covered by Workers’ Compensation Insurance as required by law
7. all insurance required of the Contractor beyond final payment, if any, is in effect and will not be cancelled or allowed to be expired without notice to the Owner
8. all public liability claims are adequately covered by insurance and that the Contractor shall save, protect, defend, indemnify, and hold the Owner harmless from and against any and all claims which arise as a direct or indirect result of any transaction, event occurrence, or omission related to performance of the Work contemplated under said Contract

CERTIFICATE OF FINAL COMPLETION
010020 - 1
10/28/2015
Upon execution below, this project will be considered complete. This consideration does not relieve the Contractor from its post-construction responsibilities, including correction of discrepancies noted during the first year after Substantial Completion, warranty issues, latent defects, and other requirements of the Contract or State law.

Name of Contractor: 

___________________________________________

Notary Public: 

Personally appeared before me this day of known (or made known) to me to be

the_________________________(title)

of_________________________(firm), who, being by me duly sworn, subscribed to the forgoing affidavit in my presence.

By: _________________________

Authorized Representative

My Commission Expires: _________________________

___________________________________________

Owner 

Owner Signature 

Final Completion Date

End of Section 010020
010022 CONTRACT CHANGE ORDER

<table>
<thead>
<tr>
<th>CONTRACTOR:</th>
<th>CHANGE ORDER No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROJECT:</th>
<th>Walker Arts and Humanities Center Fire Alarm Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT:</td>
<td>100124</td>
</tr>
<tr>
<td>PROJECT:</td>
<td>121501</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OWNER: Michigan Technological University</th>
<th>OWNER’S REPRESENTATIVE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400 Townsend Dr., Houghton, MI, 49931</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE OF ISSUE:</th>
<th>EFFECTIVE DATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Contractor is hereby directed to make the following changes in the Contract Documents.

Description:

Reason for Change Order:

Attachments: (List documents supporting change and justifying cost and time)

<table>
<thead>
<tr>
<th>CHANGE IN CONTRACT PRICE:</th>
<th>CHANGE IN CONTRACT TIMES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Contract Price:</td>
<td>Original Contract Times:</td>
</tr>
<tr>
<td>$</td>
<td>(calendar days or dates)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net changes from previous C. O.’s No. to $.</th>
<th>Net changes from previous C. O.’s No. to $.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contract Price Prior to this Change Order:</th>
<th>Contract Times prior to this Change Order:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>(calendar days or dates)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net Increase (decrease) of this Change Order:</th>
<th>Net Increase (decrease) of this Change Order:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>(calendar days)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contract Price with all Approved Change Orders:</th>
<th>Contract Times with all Approved Change Orders:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>(calendar days or dates)</td>
</tr>
</tbody>
</table>

RECOMMENDED: (Owner’s Representative)

By: [Signature]
Date: [Date]

APPROVED: (Owner): Michigan Tech University

By: [Signature]
Date: [Date]

ACCEPTED: (Contractor)

By: [Signature]
Date: [Date]

REVIEWED: (Funding Agency)

By: [Signature]
Date: [Date]

CHANGE ORDER

010022 - 1
10/28/2015
(c) PART 1 GENERAL

1. PROJECT 011000 SUMMARY OF WORK
   A. Project Name: Walker Arts and Humanities Center - Walker HVAC Controls Replacement
   B. Owner's Name: Michigan Technological University.

2. The Project consists of the purchase and installation of a new Walker HVAC Controls Replacement including, detectors, alarm devises, strobes and speakers. The system will be connect through University Telecom connections to MTU's Police and Public Safety Department.

2.1 CONTRACT DESCRIPTION
   A. A single prime contract based on a Stipulated Price.

2.2 DESCRIPTION OF WORK
   A. For AC-1, HV-2, HV-3, HV-4, HV-5, AC-6:
      1. Remove and replace existing JCI/Honeywell controllers with new controllers utilizing Bacnet protocol.
      2. Tie new controllers into the existing Tridium system.
      3. Verify the operation of Digital field sensors and reuse.
      4. Remove the existing pneumatic damper actuators, and replace with electronic actuators.
      5. Existing pneumatic valves to be controlled by new I/P transducers.
      6. New CO2 sensors will be added to the return air flow and tied to the Tridium system.
      7. Install new VFD's for each motor (excluding A/C-6 roof top unit).
      8. All AHU's will follow the existing sequence of operation. (See reference drawings)

   B. Heat exchanger and pumps:
      1. Remove and replace existing JCI/Honeywell controllers with new controllers utilizing Bacnet protocol.
      2. Tie new controllers into the existing Tridium system.
      3. Verify the operation of Digital field sensors and reuse.
4. Install new New OAT sensors.

5. Existing pneumatic valves to be controlled by new I/P transducers.

6. Install new VFD's for each pump motor.

7. The hot water system will follow the existing sequence of operation.

1.4 ITEMS TO BE SALVAGED BY CONTRACTOR

All unused and obsolete; copper tubing, poly tubing, damper and valve actuators, digital controllers, and enclosures need to be removed and delivered to the Central Energy Plant.

1.5 OWNER OCCUPANCY

A. Michigan Tech will occupy the adjacent areas during the entire construction period.

B. Cooperate with Michigan Tech to minimize conflict and to facilitate Michigan Tech’s operations. Schedule noise producing work in the early mornings and/or evenings.

1.6 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to actual construction area. Work in adjacent areas will be only as necessary for the project, and must be coordinate with Michigan Tech's project manager.

B. Arrange use of site and premises to:
   1. Limit use of the Corridor outside the work area.
   2. Limit use of the freight elevator on the west side of the building. Consolidate usage to extent possible.
   3. Keep all areas outside of the construction area clean and protect existing finishes in the corridor and elevator. Contractor will be responsible for damages to these areas caused by construction activities.
   4. Parking is limited, and parking permits will be required at the site (there will not be a charge for the permits). Limit the amount of vehicles and trailers to the extent possible, and coordinate with the Michigan Tech Project Manager.

C. Provide access to and from site as required by law and by Michigan Tech:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

E. Restrictions:
   1. Tobacco Free site: The entire site is tobacco free. See the Michigan Tech website for specific details.

F. Utility Outages and Shutdown:
   1. Limit disruption of utility services to hours the building is unoccupied.
   2. Prevent accidental disruption of utility services to other facilities.

1.7 WORK SEQUENCE

A. Coordinate system tie-ins, service interruptions, communication system tests and signal tests with Michigan Tech Central Heating Plant personnel.

END OF SECTION 011000
PART 1 - GENERAL

1.1 SUMMARY
A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS
A. Action Submittals: Written and graphic information and physical samples that require Michigan Tech’s responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Michigan Tech’s responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS
A. Prior to ordering materials and construction, provide an Action Submittal for items specified throughout the contract documents that include the phrase ‘as approved by Michigan Tech,’ if the exact item as specified cannot be obtained and a similar item must be provided. This is not intended to be a substitution procedure, substitutions must follow requirements of section 012500.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS
A. Electronic copies of digital data files of the specified items can be provided by Michigan Tech for Contractor's use in preparing submittals.

B. Processing Time: Provide submittals within one week after award of contract to insure sufficient lead time for materials in time to meet the construction schedule. Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Michigan Tech's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Michigan Tech will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 7 days for review of each resubmittal.

C. Electronic Submittals (preferred method of transmittal): Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Michigan Tech.
containing the following information:

a. Project name.
b. Date.
c. Name of General Contractor.
d. Name of firm or entity that prepared submittal.
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
   1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
i. Specification paragraph number or drawing designation and generic name for each of multiple items.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Related physical samples submitted directly.
m. Indication of full or partial submittal.
n. Transmittal number, numbered consecutively.
o. Submittal and transmittal distribution record.
p. Other necessary identification.
q. Remarks.
r. Signature of transmitter

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Michigan Tech.

3. Include the following information for processing and recording action taken:

a. Project name.
b. Date.
c. Name of General Contractor.
d. Name of firm or entity that prepared submittal.
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
   1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
i. Specification paragraph number or drawing designation and generic name for each of multiple items.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Related physical samples submitted directly.
m. Indication of full or partial submittal.
n. Transmittal number, numbered consecutively.
o. Submittal and transmittal distribution record.
p. Other necessary identification.
q. Remarks.
r. Signature of transmitter
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Michigan Tech observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

E. Options: Identify options requiring selection by Michigan Tech.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

A. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

B. H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Michigan Tech’s action stamp.

PART 2 - PRODUCTS

2.2 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:
   1. Submit electronic submittals via email as PDF electronic files.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Mark each copy of each submittal to show which products and options are applicable.
   2. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   3. Submit Product Data before or concurrent with Samples.
   4. Submit Product Data in the following format:
      a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base
Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents.
2. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
4. Submit Shop Drawings in the following format:
   a. PDF electronic file.
   b. Four opaque (bond) copies of each submittal. Michigan Tech will return two copy(ies).

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Michigan Tech will return submittal with options selected.
6. **Samples for Verification:** Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. **Number of Samples:** Submit one sets of Samples. Michigan Tech will retain.
      1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. **Application for Payment and Schedule of Values:** Comply with requirements specified in Section 010001 Payment Procedures.

F. **Closeout Submittals and Maintenance Material Submittals:** Comply with requirements specified in Section 017000 Closeout Procedures.

G. **Manufacturer Certificates:** Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. **Product Certificates:** Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. **Material Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

J. **Product Test Reports:** Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

2.3 **DELEGATED-DESIGN SERVICES**

A. **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Michigan Tech.

B. **Delegated-Design Services Certification:** In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Michigan Technological University.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017000 Closeout Procedures.

3.2 Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.3 MICHIGAN TECH'S ACTION

A. General: Michigan Tech will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Michigan Tech will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Michigan Tech will review each submittal and will not return it, or will return it if it does not comply with requirements. Michigan Tech will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

• END OF SECTION 013300
PART 1  GENERAL

1.1  SUMMARY

A. Furnish all labor, materials, equipment, and service necessary for the complete installation and function of new controllers, sensors, actuators, transducers and VFD’s as spelled out in the Summary of Work, Part 11 of the Supplemental General Conditions 010000. Facility Management and Control System (FMCS), utilizing Direct Digital Controls as shown as described herein. The FMCS shall be capable of total integration of the facility infrastructure systems with user access to all system data either locally over a secure Intranet within the building or by remote access by a standard Web Browser over the Internet. This shall include HVAC control, electrical, gas and water metering, energy management, alarm monitoring, security and personnel access control, fire-life safety systems, and all trending, reporting and maintenance management functions related to normal building operations all as indicated on the drawings or elsewhere in this specification.

B. All labor, material, equipment and software not specifically referred to herein or on the plans, that is required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.

C. This specification is written as though a complete control system is being installed. However, this project is an upgrade of specific components, while also utilizing existing components and infrastructure to support the functionality of the entire system. It is understood that the bidders will be required to gain knowledge of the existing control system during the walk through, from review of available drawings, familiarity with similar systems and follow-up questions to MTU staff. This specification is not meant as a document that fully describes the operation of the Walker Art and Humanities Building.

D. Installers, support technicians and programmers shall be certified by the control system manufacturer or its exclusive factory authorized installing contracting field office or authorized manufacturer representative. The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company’s relationship with the manufacturer.

1.2  SYSTEM DESCRIPTION

A. The entire Facility Management and Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open protocol communication network to a host computer within the facility (when specified) and communicating via the internet to a host computer in a remote location. The FMCS shall communicate to third party systems such as chillers, boilers, air handling systems, energy metering systems, other energy management systems, access control systems, fire-life safety systems and other building management related devices with open, interoperable communication capabilities.

1.3  SUBMITTAL
A. Four copies of shop drawings of the control system component shall be submitted and shall consist of a complete list of equipment and materials, including manufacturers catalog data sheets and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations, and any other details required to demonstrate that the system has been coordinated and will properly function as a system. Terminal identification for all control wiring shall be shown on the shop drawings. An “as is” complete written Sequence of Operation will be provided and is to be updated by the contractor and included with the submittal package.

B. Submittal shall also include a trunk cable schematic diagram depicting the Graphical User Interface (GUI) computer, control panel locations and a description of the communication type, media and protocol.

C. Submittal shall also include a complete point list of all connected points to the DDC system.

1.4 AGENCY AND CODE APPROVALS
A. All products of the FMCS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Systems or products not currently offering the following approvals are not acceptable.
   1. UL-916; Energy Management Systems
   2. ULC; UL - Canadian Standards Association
   3. FCC, Part 15, Subpart J, Class A Computing Devices

1.5 SOFTWARE LICENSE AGREEMENT
A. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.

1.6 DELIVERY, STORAGE AND HANDLING
A. Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

1.7 JOB CONDITIONS
A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to insure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

B. Walker Arts & Humanities Center houses many class rooms that are utilized during normal working hours, excessively noisy activities should be limited to early morning 7am to 9am or 3pm to 5pm. Cooperate with classes and instructors that are adjacent to work areas.

1.8 QUALITY ASSURANCE
A. The Manufacturer of the FMCS digital controllers shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production,
Installation and Servicing). Product literature provided by the FMCS digital controller manufacturer shall contain the ISO-9001 Certification Mark from the applicable registrar.

1.9 SPECIFICATION NOMENCLATURE
A. Acronyms used in this specification are as follows:
   
   FMCS Facility Management and Control System
   NAC Network Area Controller
   IDC Interoperable Digital Controller
   IBC Interoperable BACnet Controller
   GUI Graphical User Interface
   WBI Web Browser Interface
   POT Portable Operator’s Terminal
   PMI Power Measurement Interface
   DDC Direct Digital Controls
   LAN Local Area Network
   WAN Wide Area Network
   OOT Object Oriented Technology
   PICS Product Interoperability Compliance Statement

PART 2 MATERIALS

2.1 GENERAL
A. The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers, a computer system, graphical user interface software, portable operator terminals, printers, network devices and other devices as specified herein. All controllers and software within FMCS shall be supported by compliance documentation from the manufacturer.

B. The installed system shall provide secure password access to all features, functions and data contained in the overall FMCS.

2.2 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES
A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate both the ANSI/ASHRAE Standard 135-1995 BACnet and BACnet technology communication protocols in one open, interoperable system.

B. The supplied computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI / ASHRAE™ Standard 135-1995, BACnet and LonMark to assure interoperability between all system components is required. For each LonWorks device that does not have LonMark certification, the device supplier must provide an XIF file for the device. For each BACnet device, the device supplier must provide a PICS document showing the installed device’s compliance level. Minimum compliance is Level 3; with the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet.

C. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.
D. The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open DataBase Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database and user interface programs shall not be acceptable.

E. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.

1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.

2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.3 NETWORKS

A. The Local Area Network (LAN) shall be either a 10 or 100 Megabits/sec Ethernet network supporting BACnet.

2.4 NETWORK ACCESS –

A. Communicate with existing building management system.

2.5 NETWORK AREA CONTROLLER (NAC)

A. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of BACnet controller data
7. Network Management functions for all BACnet based devices

B. The Network Area Controller must provide the following hardware features as a minimum:

1. One Ethernet Port -10 / 100 Mbps
2. One RS-232 port
3. BACnet Interface Port – 78KB FTT-10A
4. Battery Backup
5. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
6. The NAC must be capable of operation over a temperature range of 0 to 55°C
7. The NAC must be capable of withstanding storage temperatures of between 0 and 70°C
8. The NAC must be capable of operation over a humidity range of 5 to 95% RH, non-condensing

C. The NAC shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.

D. The NAC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.

E. Event Alarm Notification and actions
   1. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
   2. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
   3. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
      a. To alarm
      b. Return to normal
      c. To fault
   4. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
   5. Provide timed (schedule) routing of alarms by class, object, group, or node.
   6. Provide alarm generation from binary object “runtime” and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

F. Control equipment and network failures shall be treated as alarms and annunciated.

G. Alarms shall be annunciated in any of the following manners as defined by the user:
   1. Screen message text
   2. Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
      a. Day of week
      b. Time of day
c. Recipient
3. Pagers via paging services that initiate a page on receipt of email message
4. Graphic with flashing alarm object(s)
5. Printed message, routed directly to a dedicated alarm printer

H. The following shall be recorded by the NAC for each alarm (at a minimum):
1. Time and date
2. Location (building, floor, zone, office number, etc.)
3. Equipment (air handler #, accessway, etc.)
4. Acknowledge time, date, and user who issued acknowledgement.
5. Number of occurrences since last acknowledgement.

I. Alarm actions may be initiated by user defined programmable objects created for that purpose.

J. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.

K. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.

L. Provide a “query” feature to allow review of specific alarms by user defined parameters.

M. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.

N. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

2.6 Data Collection and Storage
A. The NAC shall have the ability to collect data for any property of any object and store this data for future use.

B. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:
   1. Designating the log as interval or deviation.
   2. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.
   3. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.
   4. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.
   5. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.

C. All log data shall be stored in a relational database in the NAC and the data shall be accessed from a server (if the system is so configured) or a standard Web Browser.
D. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.

E. All log data shall be available to the user in the following data formats:
   1. HTML
   2. XML
   3. Plain Text
   4. Comma or tab separated values

F. Systems that do not provide log data in HTML and XML formats at a minimum shall not be acceptable.

G. The NAC shall have the ability to archive it’s log data either locally (to itself), or remotely to a server or other NAC on the network. Provide the ability to configure the following archiving properties, at a minimum:
   1. Archive on time of day
   2. Archive on user-defined number of data stores in the log (buffer size)
   3. Archive when log has reached it’s user-defined capacity of data stores
   4. Provide ability to clear logs once archived

2.7 AUDIT LOG

A. Provide and maintain an Audit Log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached it’s user-defined buffer size. Provide the ability to archive the log locally (to the NAC), to another NAC on the network, or to a server. For each log entry, provide the following data:
   1. Time and date
   2. User ID
   3. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

2.8 DATABASE BACKUP AND STORAGE

A. The NAC shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.

B. Copies of the current database and, at the most recently saved database shall be stored in the NAC. The age of the most recently saved database is dependent on the user-defined database save interval.

C. The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

D. Controls shall be microprocessor based Interoperable BACnet Controllers. Where possible, all Interoperable Digital Controllers shall bear the applicable LonMark™ interoperability logo on each product delivered.

E. HVAC control shall be accomplished using BACnet based devices. For each device that does not have BACnet certification, the device supplier must provide an XIF file for the device.
Publicly available specifications for the Applications Programming Interface (API) must be provided for each BACnet controller defining the programming or setup of each device. All programming, documentation and programming tools necessary to set up and configure the supplied devices per the specified sequences of operation shall be provided.

F. The BACnet network trunk shall be run to the nearest Network Area Controller (NAC). A maximum of 126 devices may occupy any one BACnet trunk and must be installed using the appropriate trunk termination device. All BACnet and devices must be supplied using FTT-10A BACnet communications transceivers.

G. The Network Area Controller will provide all scheduling, alarming, trending, and network management for the BACnet based devices.

H. The IDCs shall communicate with the NAC at a baud rate of not less than 78.8K baud. The IDC shall provide LED indication of communication and controller performance to the technician, without cover removal.

I. All IDCs shall be fully application programmable and shall at all times maintain their BACnet certification. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications. All control sequences within or programmed into the IDC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

J. The supplier of any programmable IDC shall provide one copy of the manufacturer’s programming tool, with documentation, to the owner.

2.9 INTEROPERABLE BACnet CONTROLLER (IBC)

A. Controls shall be microprocessor based Interoperable BACnet Controllers (IBC) in accordance with the ANSI/ASHRAE Standard 135-2012. IBCs shall be provided for Unit Ventilators, Fan Coils, Heat Pumps, Variable Air Volume (VAV) Terminals and other applications as shown on the drawings. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The system supplier must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2012. Minimum compliance is Level 3.

B. The IBCs shall communicate with the NAC via an Ethernet connection at a baud rate of not less than 10 Mbps.

C. The IBC Sensor shall connect directly to the IBC and shall not utilize any of the I/O points of the controller. The IBC Sensor shall provide a two-wire connection to the controller that is polarity and wire type insensitive. The IBC Sensor shall provide a communications jack for connection to the BACnet communication trunk to which the IBC controller is connected. The IBC Sensor, the connected controller, and all other devices on the BACnet bus shall be accessible by the POT.

D. All IBCs shall be fully application programmable and shall at all times maintain their BACnet Level 3 compliance. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications. All control sequences within or programmed into the IBC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
2.10 GRAPHICAL USER INTERFACE SOFTWARE

A. Operating System:
   1. The GUI shall run on Microsoft Windows NT Workstation 4.0, Service Pack 4 or later.

B. The GUI shall employ browser-like functionality for ease of navigation. It shall include a tree
   view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical
   structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons,
   commands and navigation to permit the operator to perform tasks with a minimum knowledge
   of the HVAC Control System and basic computing skills. These shall include, but are not
   limited to, forward/backward buttons, home button, and a context sensitive locator line (similar
   to a URL line), that displays the location and the selected object identification.

C. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and
   functions:
   1. Graphic screens shall be developed using any drawing package capable of generating a
      GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be
      acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the
      use of scanned pictures.
   2. Graphic screens shall have the capability to contain objects for text, real-time values,
      animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule
      objects, hyperlinks to other URL's, and links to other graphic screens.
   3. Graphics shall support layering and each graphic object shall be configurable for
      assignment to a layer. A minimum of six layers shall be supported.
   4. Modifying common application objects, such as schedules, calendars, and set points
      shall be accomplished in a graphical manner.
      a. Schedule times will be adjusted using a graphical slider, without requiring any
         keyboard entry from the operator.
      b. Holidays shall be set by using a graphical calendar, without requiring any keyboard
         entry from the operator.
   5. Commands to start and stop binary objects shall be done by right-clicking the selected
      object and selecting the appropriate command from the pop-up menu. No entry of text
      shall be required.
   6. Adjustments to analog objects, such as set points, shall be done by right-clicking the
      selected object and using a graphical slider to adjust the value. No entry of text shall be
      required.

D. System Configuration. At a minimum, the GUI shall permit the operator to perform the
   following tasks, with proper password access:
   a. Create, delete or modify control strategies.
   b. Add/delete objects to the system.
   c. Tune control loops through the adjustment of control loop parameters.
   d. Enable or disable control strategies.
   e. Generate hard copy records or control strategies on a printer.
   f. Select points to be alarmable and define the alarm state.
g. Select points to be trended over a period of time and initiate the recording of values automatically.

E. On-Line Help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.

F. Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

G. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

H. Alarm Console

1. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.

2. When the Alarm Console is enabled, a separate alarm notification window will supercede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and unacknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

2.11 SERVER FUNCTIONS AND HARDWARE

A. A central server, located (in, at) ____________________, shall be provided. The server shall support all Network Area Controllers (NAC) connected to the customer's network whether local or remote.

B. Local connections shall be via an Ethernet LAN. Remote connections can be via ISDN, ADSL, T1 or dial-up connection.

C. It shall be possible to provide access to all Network Area Controllers via a single connection to the server. In this configuration, each Network Area Controller can be accessed from the Graphical User Interface (GUI) or from a standard Web browser (WBI) by connecting to the server.

D. The server shall provide the following functions, at a minimum:

1. Global Data Access: The server shall provide complete access to distributed data defined anywhere in the system.
2. Distributed Control: The server shall provide the ability to execute global control strategies based on control and data objects in any NAC in the network, local or remote.

3. The server shall include a master clock service for its subsystems and provide time synchronization for all Network Area Controllers (NAC).

4. The server shall accept time synchronization messages from trusted precision Atomic Clock Internet sites and update its master clock based on this data.

5. The server shall provide scheduling for all Network Area Controllers and their underlying field control devices.

6. The server shall provide demand limiting that operates across all Network Area Controllers. The server must be capable of multiple demand programs for sites with multiple meters and or multiple sources of energy. Each demand program shall be capable of supporting separate demand shed lists for effective demand control.

7. The server shall implement the BACnet Command Prioritization scheme (16 levels) for safe and effective contention resolution of all commands issued to Network Area Controllers. Systems not employing this prioritization shall not be accepted.

8. Each Network Area Controller supported by the server shall have the ability to archive its log data, alarm data and database to the server, automatically. Archiving options shall be user-defined including archive time and archive frequency.

9. The server shall provide central alarm management for all Network Area Controllers supported by the server. Alarm management shall include:
   1. Routing of alarms to display, printer, email and pagers
   2. View and acknowledge of alarms
   3. Query alarm logs based on user-defined parameters

10. The server shall provide central management of log data for all Network Area Controllers supported by the server. Log data shall include process logs, runtime and event counter logs, audit logs and error logs. Log data management shall include:
    1. Viewing and printing log data
    2. Exporting log data to other software applications
    3. Query log data based on user-defined parameters

E. Server Hardware Requirements: The server hardware platform shall have the following requirements:

1. The computer shall be an Intel Pentium based computer (minimum processing speed of 400 MHz with 256 MB RAM and a 10-gigabyte minimum hard drive). It shall include a 32X CD-ROM drive, 3.5” floppy drive, a 100 MB Zip drive, 2-parallel ports, 2-asynchronous serial ports and 2-USB ports. A minimum 17", 28-dot pitch SVGA (1024 x 768) color monitor with a minimum 80 Hz refresh rate shall also be included.

2. The server operating system shall be Microsoft Windows NT Workstation 4.0, with Service Pack 4 or higher. Include Microsoft Internet Explorer 4.0 or later or Netscape Navigator 4.5 or later.

3. Connection to the FMCS network shall be via an Ethernet network interface card, 10 or 100 Mbps.
4. A system printer shall be provided. Printer shall be laser type with a minimum 600 x 600-dpi resolution and rated for 8-PPM print speed minimum.

5. For dedicated alarm printing, provide a dot matrix printer, either 80 or 132 column width. The printer shall have a parallel port interface.

2.12 SYSTEM PROGRAMMING

A. The Graphical User Interface software (GUI) shall provide the ability to perform system programming and graphic display engineering as part of a complete software package. Access to the programming functions and features of the GUI shall be through password access as assigned by the system administrator.

B. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide “real-time” data updates. Any real-time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface display shall not be acceptable.

C. Programming Methods

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user’s application. Objects shall be linked by a graphical linking scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects shall maintain their connections to other objects regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification. Links will vary in color depending on the type of link; i.e., internal, external, hardware, etc.

2. Configuration of each object will be done through the object’s property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.

3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.

4. All programming shall be done in real-time. Systems requiring the uploading, editing, and downloading of database objects shall not be allowed.

5. The system shall support object duplication within a customer’s database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

2.13 BACnet NETWORK MANAGEMENT

A. The Graphical User Interface software (GUI) shall provide a complete set of integrated BACnet network management tools for working with BACnet networks. These tools shall manage a
database for all BACnet devices by type and revision, and shall provide a software mechanism for identifying each device on the network. These tools shall also be capable of defining network data connections between BACnet devices, known as “binding”. Systems requiring the use of third party BACnet network management tools shall not be accepted.

B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device maintenance and network variable binding.

C. The Network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.

D. These tools shall provide the ability to “learn” an existing BACnet network, regardless of what network management tool(s) were used to install the existing network, so that existing BACnet devices and newly added devices are part of a single network management database.

E. The network management database shall be resident in the Network Area Controller (NAC), ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management databases that are not resident, at all times, within the control system shall not be accepted.

2.14 OBJECT LIBRARIES

A. A standard library of objects shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

B. The objects in this library shall be capable of being copied and pasted into the user’s database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.

C. In addition to the standard libraries specified here, the supplier of the system shall maintain an on-line accessible (over the Internet) library, available to all registered users to provide new or updated objects and applications as they are developed.

D. All control objects shall conform to the control objects specified in the BACnet specification.

E. The library shall include applications or objects for the following functions, at a minimum:

1. Scheduling Object. The schedule must conform to the schedule object as defined in the BACnet specification, providing 7-day plus holiday & temporary scheduling features and a minimum of 10 on/off events per day. Data entry to be by graphical sliders to speed creation and selection of on-off events.

2. Calendar Object. The calendar must conform to the calendar object as defined in the BACnet specification, providing 12-month calendar features to allow for holiday or special event data entry. Data entry to be by graphical “point-and-click” selection. This object must be “linkable” to any or all scheduling objects for effective event control.

3. Duty Cycling Object. Provide a universal duty cycle object to allow repetitive on/off time control of equipment as an energy conserving measure. Any number of these objects may be created to control equipment at varying intervals.

4. Temperature Override Object. Provide a temperature override object that is capable of overriding equipment turned off by other energy saving programs (scheduling, duty cycling etc.) to maintain occupant comfort or for equipment freeze protection.
5. Start-Stop Time Optimization Object. Provide a start-stop time optimization object to provide the capability of starting equipment just early enough to bring space conditions to desired conditions by the scheduled occupancy time. Also, allow equipment to be stopped before the scheduled un-occupancy time just far enough ahead to take advantage of the building’s “flywheel” effect for energy savings. Provide automatic tuning of all start / stop time object properties based on the previous day’s performance.

6. Demand Limiting Object. Provide a comprehensive demand-limiting object that is capable of controlling demand for any selected energy utility (electric, oil, and gas). The object shall provide the capability of monitoring a demand value and predicting (by use of a sliding window prediction algorithm) the demand at the end of the user defined interval period (1-60 minutes). This object shall also accommodate a utility meter time sync pulse for fixed interval demand control. Upon a prediction that will exceed the user defined demand limit (supply a minimum of 6 per day), the demand limiting object shall issue shed commands to either turn off user specified loads or modify equipment set points to effect the desired energy reduction. If the list of sheddable equipment is not enough to reduce the demand to below the set point, a message shall be displayed on the users screen (as an alarm) instructing the user to take manual actions to maintain the desired demand. The shed lists are specified by the user and shall be selectable to be shed in either a fixed or rotating order to control which equipment is shed the most often. Upon suitable reductions in demand, the demand-limiting object shall restore the equipment that was shed in the reverse order in which it was shed. Each sheddable object shall have a minimum and maximum shed time property to effect both equipment protection and occupant comfort.

F. The library shall include control objects for the following functions. All control objects shall conform to the objects as specified in the BACnet specification.

1. Analog Input Object - Minimum requirement is to comply with the BACnet standard for data sharing. Allow high, low and failure limits to be assigned for alarming. Also, provide a time delay filter property to prevent nuisance alarms caused by temporary excursions above or below the user defined alarm limits.

2. Analog Output Object - Minimum requirement is to comply with the BACnet standard for data sharing.

3. Binary Input Object - Minimum requirement is to comply with the BACnet standard for data sharing. The user must be able to specify either input condition for alarming. This object must also include the capability to record equipment run-time by counting the amount of time the hardware input is in an “on” condition. The user must be able to specify either input condition as the “on” condition.

4. Binary Output Object - Minimum requirement is to comply with the BACnet standard for data sharing. Properties to enable minimum on and off times for equipment protection as well as interstart delay must be provided. The BACnet Command Prioritization priority scheme shall be incorporated to allow multiple control applications to execute commands on this object with the highest priority command being invoked. Provide sixteen levels of priority as a minimum. Systems not employing the BACnet method of contention resolution shall not be acceptable.

5. PID Control Loop Object - Minimum requirement is to comply with the BACnet standard for data sharing. Each individual property must be adjustable as well as to be disabled to
allow proportional control only, or proportional with integral control, as well as proportional, integral and derivative control.

6. Comparison Object - Allow a minimum of two analog objects to be compared to select either the highest, lowest, or equality between the two linked inputs. Also, allow limits to be applied to the output value for alarm generation.

7. Math Object - Allow a minimum of four analog objects to be tested for the minimum or maximum, or the sum, difference, or average of linked objects. Also, allow limits to be applied to the output value for alarm generation.

8. Custom Programming Objects - Provide a blank object template for the creation of new custom objects to meet specific user application requirements. This object must provide a simple BASIC-like programming language that is used to define object behavior. Provide a library of functions including math and logic functions, string manipulation, and e-mail as a minimum. Also, provide a comprehensive on-line debug tool to allow complete testing of the new object. Allow new objects to be stored in the library for re-use.

9. Interlock Object - Provide an interlock object that provides a means of coordination of objects within a piece of equipment such as an Air Handler or other similar types of equipment. An example is to link the return fan to the supply fan such that when the supply fan is started, the return fan object is also started automatically without the user having to issue separate commands or to link each object to a schedule object. In addition, the control loops, damper objects, and alarm monitoring (such as return air, supply air, and mixed air temperature objects) will be inhibited from alarming during a user-defined period after startup to allow for stabilization. When the air handler is stopped, the interlocked return fan is also stopped, the outside air damper is closed, and other related objects within the air handler unit are inhibited from alarming thereby eliminating nuisance alarms during the off period.

10. Temperature Override Object - Provide an object whose purpose is to provide the capability of overriding a binary output to an “On” state in the event a user specified high or low limit value is exceeded. This object is to be linked to the desired binary output object as well as to an analog object for temperature monitoring, to cause the override to be enabled. This object will execute a Start command at the Temperature Override level of start/stop command priority unless changed by the user.

11. Composite Object - Provide a container object that allows a collection of objects representing an application to be encapsulated to protect the application from tampering, or to more easily represent large applications. This object must have the ability to allow the user to select the appropriate parameters of the “contained” application that are represented on the graphical shell of this container.

G. The object library shall include objects to support the integration of devices connected to the Network Area Controller (NAC). At a minimum, provide the following as part of the standard library included with the programming software:

1. BACnet devices. These devices shall include, but not be limited to, devices for control of HVAC, lighting, access, and metering. Provide LonMark manufacturer-specific objects to facilitate simple integration of these devices. All network variables defined in the LonMark profile shall be supported. Information (type and function) regarding network variables not defined in the LonMark profile shall be provided by the device manufacturer.
2. For devices not conforming to the LonMark standard, provide a dynamic object that can be assigned to the device based on network variable information provided by the device manufacturer. Device manufacturer shall provide an XIF file and documentation for the device to facilitate device integration.

3. For BACnet devices, provide the following objects at a minimum:
   a. BACnet AI
   b. BACnet AO
   c. BACnet BI
   d. BACnet BO
   e. BACnet Device

4. For each BACnet object, provide the ability to assign the object to a BACnet device and object's instance number.

2.15 DDE DEVICE INTEGRATION

A. The Network Area Controller shall support the integration of device data via Dynamic Data Exchange (DDE), over the Ethernet Network. The Network Area Controller shall act as a DDE client to another software application that functions as a DDE server.

B. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of these devices into the FMCS. Objects provided shall include at a minimum:
   1. DDE Generic AI Object
   2. DDE Generic AO Object
   3. DDE Generic BO Object
   4. DDE Generic BI Object

2.16 LEGACY SYSTEM INTEGRATION

A. The Network Area Controller shall support the integration of device data from the existing control system. The connection to the existing system shall be via an RS-232 connection between the Network Area Controller and the existing control system.

B. The owner, and/or the existing control system representative shall ensure that the existing system's database is setup to make all data to be integrated into the FMCS available at the RS-232 port. Any modifications to the existing system database to accomplish this shall be the responsibility of the owner.

C. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of the existing system data into the FMCS. Objects provided shall include at a minimum:
   1. LEGACY SYSTEM Generic AI Object
   2. LEGACY SYSTEM Generic AO Object
   3. LEGACY SYSTEM Generic BO Object
   4. LEGACY SYSTEM Generic BI Object
D. All scheduling, alarming, logging and global supervisory control functions (demand limiting, etc.), of the existing system devices, shall be performed by the Network Area Controller. Integration of the existing system’s schedules, alarms, logs, etc. is neither required nor desired.

E. The FMCS supplier shall provide a legacy system communications driver. The owner shall provide documentation of the existing system’s protocol to facilitate the development of this driver. Costs for the development of the driver are to be arranged between the owner and the FMCS supplier and are not included as part of this contract.

2.17 GRAPHICAL USER INTERFACE COMPUTER HARDWARE (DESKTOP)

A. The existing monitoring computer will be utilized for this project. No computer hardware will be required for the project.

2.18 OTHER CONTROL SYSTEM HARDWARE

A. Motorized Control Dampers (where furnished by the Temperature Control sub-contractor): Dampers shall be black enamel finish or galvanized, with nylon bearings. Blade edge and tip seals shall be included for all dampers. Blades shall be 16-gauge minimum and 6 inches wide maximum and frame shall be of welded channel iron. Dampers with both dimensions less than 18 inches may have strap iron frames.

B. Control Damper Actuators (where furnished by the Temperature Control sub-contractor): Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be spring return type. Provide one actuator per damper minimum.

C. Control Valves: Control valves shall be 2-way or 3-way pattern as shown constructed for tight shut-off and shall operate satisfactorily against system pressures and differentials. Two-position valves shall be ‘line’ size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Valves with sizes up to and including 2 inches shall be “screwed” configuration and 2-1/2 inch and larger valves shall be “flanged” configuration. Electrically controlled valves shall include spring return type actuators sized for tight shut-off against system pressures and furnished with integral switches for indication of valve position (open-closed). Pneumatically actuators for valves, when utilized, shall be sized for tight shut-off against system pressures. Three-way butterfly valves, when utilized, shall include a separate actuator for each butterfly segment.

D. Wall Mount Room Thermostats: Each room thermostat shall provide temperature indication to the digital controller, provide the capability for a software-limited set point adjustment and operation override capability. An integral LCD shall announce current room temperature and set point as well as override status indication. In addition, the thermostat shall include a port for connection of the portable operator’s terminal described elsewhere in this specification.

E. Duct Mount, Pipe Mount and Outside Air Temperature Sensors: 10,000-ohm thermistor temperature sensors with an accuracy of ± 0.2ºC. Outside air sensors shall include an integral sun shield.

F. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.
G. Power Monitoring Interface: The Power Measurement Interface (PMI) device shall include the appropriate current and potential (voltage) transformers. The PMI shall be certified under UL-3111. The PMI shall perform continuous true RMS measurement based on 32 samples-per-cycle sampling on all voltage and current signals. The PMI shall provide outputs to the FMCS based on the measurement and calculation of the following parameters: (a) current for each phase and average of all three phases, (b) kW for each phase and total of all three phases, (c) power factor for each phase and all three phases, (d) percent voltage unbalance and (e) percent current unbalance. These output values shall be hard-wired inputs to the FMCS or shall be communicated to the FMCS over the open-protocol LAN.

H. Water Flow Meters (when required): Water flow meters shall be axial turbine style flow meters which translate liquid motion into electronic output signals proportional to the flow sensed. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag. Flow meters shall be ‘insertion’ type complete with ‘hot-tap’ isolation valves to enable sensor removal without water supply system shutdown. Accuracy shall be ±2% of actual reading from 0.4 to 20 feet per second flow velocities.

I. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. Control panels shall meet all requirements of Title 24, California Administrative Code. All electrical devices within a control panel shall be factory wired. All external wiring shall be connected to terminal strips mounted within the panel. Provide engraved phenolic nameplates identifying all devices mounted on the face of control panels. A complete set of ‘as-built’ control drawings (relating to the controls within that panel) shall be furnished within each control panel.

PART 3 EXECUTION

3.1 INSTALLATION

A. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the temperature control system manufacturer or its exclusive factory authorized installing contracting field office or authorized manufacturer representative. The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company's relationship with the manufacturer. Supervision, calibration and checkout of the system shall be by the employees of the local exclusive factory authorized temperature control contracting field office (branch or representative).

B. Install system and materials in accordance with manufacturer’s instructions, and as detailed on the project drawing set.

C. Drawings of temperature control systems are diagrammatic only and any apparatus not shown, such as relays, accessories, etc., but required to make the system operative to the complete satisfaction of the Architect shall be furnished and installed without additional cost.

D. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the Temperature Control sub-contractor in accordance with these specifications.

E. Equipment furnished by the HVAC Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the Temperature Control sub-contractor.
F. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

3.2 WIRING
A. All electrical control wiring and power wiring to the control panels shall be the responsibility of the FMCS contractor.
B. All electrical power connections shall be made by qualified electricians.
C. All wiring shall be in accordance with the National Electrical Code and any applicable local codes. All FMCS wiring shall be installed in the conduit types specified in the National Electrical Code or applicable local codes. Where FMCS plenum rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

3.3 WARRANTY
A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.
B. Within this period, upon notice by the Owner, any defects in the FMCS due to faulty materials, methods of installation or workmanship shall be promptly (within 48 hours after receipt of notice) repaired or replaced by the Temperature Control sub-contractor at no expense to the Owner.

3.4 WARRANTY ACCESS
A. The Owner shall grant to the Temperature Control sub-contractor, reasonable access to the FMCS during the warranty period. The owner shall allow the contractor to access the FMCS from a remote location for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period.

3.5 ACCEPTANCE TESTING
A. Upon completion of the installation, the Temperature Control sub-contractor shall load all system software and start-up the system. The Temperature Control sub-contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.
B. The Temperature Control sub-contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.
C. Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in presence of Owner’s Representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner’s Representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.
D. System Acceptance: Satisfactory completion is when the Temperature Control sub-contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner’s Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.6 OPERATOR INSTRUCTION, TRAINING
A. During system commissioning and at such time acceptable performance of the FMCS hardware and software has been established the Temperature Control sub-contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

B. The Temperature Control sub-contractor shall provide 40 hours of instruction to the owner's designated personnel on the operation of the FMCS and describe its intended use with respect to the programmed functions specified. Operator orientation of the FMCS shall include, but not be limited to; the overall operation program, equipment functions (both individually and as part of the total integrated system), commands, systems generation, advisories, and appropriate operator intervention required in responding to the System's operation.

C. The training shall be in three sessions as follows:

1. Initial Training: One day session (8 hours) after system is started up and at least one week before first acceptance test. Manual shall have been submitted at least two weeks prior to training so that the owners’ personnel can start to familiarize themselves with the system before classroom instruction begins.

2. First Follow-Up Training: Two days (16 hours total) approximately two weeks after initial training, and before Formal Acceptance. These sessions will deal with more advanced topics and answer questions.

3. Warranty Follow Up: Two days (16 hours total) in no less than 4 hour increments, to be scheduled at the request of the owner during the one year warranty period. These sessions shall cover topics as requested by the owner such as; how to add additional points, create and gather data for trends, graphic screen generation or modification of control routines.

PART 4 SEQUENCES OF OPERATION

4.1 SUMMARY – See attached Honeywell Reference Drawings
PART 5  POINT LISTS

5.1  SUMMARY

A. The points in the following table shall be accessible from the Graphical User Interface (GUI) and/or the Web browser interface (WBI). The supplier of the IDC and IBC devices shall ensure that the points listed in this table are accessible on their respective networks, by the Network Area Controller (NAC).

B. The following abbreviations apply to the point table to indicate what level of functionality must be provided:

1. D = Display only
2. M = Modify value
3. A = Alarm
4. L = Log
5. S = Schedule
6. GC = Global supervisory control routine such as demand limiting

<table>
<thead>
<tr>
<th>System</th>
<th>Point</th>
<th>D</th>
<th>M</th>
<th>A</th>
<th>L</th>
<th>S</th>
<th>GC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF SECTION
MICHIGAN TECHNOLOGICAL UNIVERSITY
ARTS & HUMANITIES CENTER
HOUGHTON, MICHIGAN

HONEYWELL AUTOMATIC TEMPERATURE CONTROL SYSTEM
SEQUENCE OF OPERATION

COMPRESSED AIR SUPPLY SYSTEM

AIR FOR THE PNEUMATIC CONTROL SYSTEM PROVIDED BY A DUAL 1-1/2 HP AIR
COMPRESSOR EQUIPPED WITH AUTOMATIC LEAD COMPRESSOR ALTERNATION AND AUTOMATIC
TANK DRAINER. THE STAND-BY COMPRESSOR WILL OPERATE WHEN THE LEAD COMPRESSOR IS INCAPABLE OF
SUPPLYING THE SYSTEM NORMALLY. EACH COMPRESSOR IS CAPABLE OF
DELIVERING THE REQUIRED AIR CAPACITY WHILE RUNNING ONE-THIRD OF THE TIME.
THE REFRIGERATED AIR DRYER, OIL/DIRT FILTER AND PRESSURE REDUCING VALVE
PROVIDE CLEAN/DRIED AIR TO THE SYSTEM AT REDUCED PRESSURE.

AIR HANDLING UNIT AC-1

THE UNIT SUPPLY FAN AND INTERLOCKED RETURN/EXHAUST FAN WILL RUN
CONTINUOUSLY DURING OCCUPIED PROGRAM CYCLES AND BE OFF DURING UNOCCUPIED
PERIODS. A MANUAL PROGRAM OVERRIDE SWITCH IS PROVIDED FOR TIMES OF
UNEXPECTED OCCUPANCY.

THE SUPPLY AND RETURN/EXHAUST FAN SPEEDS ARE MANUALLY SELECTED AT THE
STARTER.

WHEN THE FANS ARE STARTED, THE PRIMARY SYSTEM O.A. & EXHAUST DAMPERS OPEN
THROUGH THE LOAD ANALYZER CONTROL AND THE UNIT O.A. DAMPERS OPEN TO THE SET
MINIMUM VENTILATION POSITION.

THE RETURN AIR CONTROLLER, THROUGH THE DISCHARGE AND MIXED AIR LOW-LIMIT
CONTROLS, WILL MODULATE AND POSITION IN SEQUENCE THE UNIT O.A. DAMPERS,
RETURN AIR DAMPERS, EXHAUST AIR DAMPERS, 3-WAY HEATING COIL VALVE AND DX COOLING SEQUENCE CONTROLS TO MAINTAIN
75°F SETPOINT TEMPERATURE.

WHenever OUTDOOR TEMPERATURE IS ABOVE 40°F, THE FACE DAMPERS ARE HELD
FULL OPEN AND THE 3-WAY HEATING VALVE IS MODULATED TO MAINTAIN TEMPERATURE
BElOW 40°F OUTDOORS. THE HEATING VALVE IS POSITIONED FULL OPEN TO THE COIL
WITH THE FACE/BYPASS DAMPERS UNDER CONTROL.

THE MIXED AIR LOW-LIMIT WILL RESTRICT THE INTRODUCTION OF OUTDOOR AIR BY
CLOSING THE O.A. DAMPERS - OPENING THE RETURN - TO MAINTAIN A MINIMUM MIXED
AIR TEMPERATURE SETTING OF 55°F.

THE DISCHARGE LOW LIMIT WILL OVERRIDE THE RETURN AIR CONTROL TO HOLD A
MINIMUM DISCHARGE TEMPERATURE SETTING OF 55°F.

WHenever OUTDOOR TEMPERATURE IS ABOVE 70°F, THE OUTDOOR DAMPERS RE-POSITION
TO THE MINIMUM VENT SETTING TO PREVENT THE MECHANICAL COOLING OF WARM OUTDOOR
AIR. AS THE UNIT OUTDOOR DAMPERS CLOSE, THE RETURN AIR DAMPERS OPEN AND THE
EXHAUST-RELIEF DAMPERS CLOSE PROPORTIONALLY.

THE MECHANICAL COOLING IS THEN ENERGIZED IN STEPS AS THE RETURN TEMPERATURE
Rises ABoVE THE 75°F CONTROL SETPOINT.

THE UNIT FREEZE DETECTION THERMOSTAT WILL STOP THE SUPPLY AND RETURN/EXHAUST
FANS ON SENSING A POTENTIAL FREEZE CONDITION AT THE UNIT HEATING COIL. THE
OUTDOOR INTAKE AND EXHAUST DAMPERS CLOSE ON FAN SHUTDOWN. THE FREEZE
DETECTION THERMOSTAT IS MANUALLY RESET.

SMOKE DETECTORS LOCATED IN THE UNIT DISCHARGE AND RETURN DUCTS WILL, IN THE
PRESENCE OF COMBUSTION PRODUCTS, STOP THE UNIT FANS AND CLOSE THE OUTDOOR AIR
AND EXHAUST DAMPERS. SMOKE ALARMS ARE INDICATED ON, AND RESET FROM A REMOTE
CENTRAL FIRE ALARM PANEL -- NOT PART OF THIS CONTRACT.

THE UNIT STEAM HUMIDIFIER VALVE IS THROTTLED BY THE RETURN AIR HUMIDITY
CONTROLLER TO MAINTAIN A VARIABLE HUMIDITY SETPOINT WHICH INCREASES AS
OUTDOOR AIR TEMPERATURE RISES ACCORDING TO THE INDICATED SCHEDULE. THE
HUMIDITY DISCHARGE LIMIT WILL OVERRIDE THE HUMIDITY CONTROLLER PREVENTING
HIGH HUMIDITY DISCHARGE CONDITIONS WHICH MIGHT CAUSE CONDENSATION IN THE
Ducts.

THE SUPPLY DUCT PRESSURE CONTROLLER WILL MODULATE AND POSITION THE AIR BYPASS
DAMPER OPEN IN RESPONSE TO RISING STATIC PRESSURE WHEN THE VARIABLE VOLUME
UNITS CLOSE OFF.

THE UNIT REMAINS OFF DURING UNOCCUPIED PERIODS WITH THE PRIMARY AIR SYSTEM
CONTROLS DAMPERS RELEASED THROUGH LOAD ANALYZER. WITH THE UNIT OFF, THE
DX COOLING IS INOPERATIVE. THE UNIT O.A. AND EXH/RELIEF DAMPERS CLOSE, THE
HUMIDIFIER JACKET VALVE CLOSES AND THE HUMIDIFIER BECOMES IN OPERATIVE.
AIR HANDLING UNIT HV-2

THE UNIT SUPPLY AND INTERLOCKED RETURN/EXHAUST FANS WILL RUN CONTINUOUSLY DURING OCCUPIED PERIODS AND BE OFF DURING UNOCCUPIED TIMES. THE OPTIMUM START/STOP PROGRAMMER WILL START THE SYSTEM FANS IN ADVANCE OF THE PROGRAMMED OCCUPANCY TO PROVIDE A VARIABLE PRE-OCCUPANCY WARM-UP PERIOD. THE DURATION OF THE WARM-UP CYCLE IS BASED ON PROGRAMMED MEMORY AND CHANGES IN RESPONSE TO BUILDING AND SYSTEM CHARACTERISTICS AND PREVAILING OUTDOOR WIND AND TEMPERATURE CONDITIONS.

THE PRE-OCCUPANCY WARMUP IS ACCOMPLISHED WITHOUT VENTILATION.

AFTER THIS WARM-UP CYCLE IS COMPLETED AND ACTUAL PROGRAMMED OCCUPANCY BEGINS, THE UNIT O.A. AIR DAMPERS OPEN TO THE SET MINIMUM VENTILATION POSITION AND THE PRIMARY SYSTEM O.A. AND EXHAUST DAMPERS ARE OPENED THROUGH THE LOAD ANALYZER CONTROL.

THE PILOT ROOM THERMOSTAT THROUGH THE MIXED AIR AND DISCHARGE LOW-LIMIT CONTROLS WILL MODULATE AND POSITION IN SEQUENCE THE UNIT O.A. DAMPERS, RETURN AIR DAMPERS, EXHAUST AIR DAMPERS, AND THE 3-WAY HEATING COIL VALVE TO MAINTAIN AREA TEMPERATURE.

THE DISCHARGE LOW LIMIT WILL OVERRIDE THE ROOM PILOT TO MAINTAIN A MINIMUM DISCHARGE TEMPERATURE SETTING OF 60°F.

THE MIXED AIR LOW LIMIT WILL RESTRICT THE INTRODUCTION OF OUTDOOR AIR BY CLOSING THE O.A. DAMPERS IN RESPONSE TO MIXED AIR TEMPERATURES BELOW 55°F.

AS THE UNIT OUTDOOR DAMPERS CLOSE, THE RETURN AIR DAMPERS OPEN AND THE EXHAUST/RELIEF DAMPERS CLOSE PROPORTIONALLY.

THE UNIT FREEZE DETECTION THERMOSTAT WILL STOP THE SUPPLY AND RETURN/EXHAUST FANS WHEN A POTENTIAL FREEZE CONDITION IS SENSED AT THE UNIT HEATING COIL. THE FREEZE DETECTION THERMOSTAT IS MANUALLY RESET.

SMOKE DETECTORS LOCATED IN THE UNIT DISCHARGE AND RETURN DUCTS WILL, IN THE PRESENCE OF COMBUSTION PRODUCTS, STOP THE UNIT FANS. SMOKE ALARMS ARE INDICATED ON AND RESET FROM A REMOTE CENTRAL FIRE ALARM PANEL -- NOT PART OF THIS CONTRACT. THE UNIT OUTDOOR INTAKE AND EXHAUST DAMPERS CLOSE ON FAN SHUTDOWN.

THE UNIT HUMIDIFIERS HAVE BEEN ELIMINATED BY DEED TO THE OWNER AND ARE HERE CONSIDERED FUTURE ITEMS.

THE RETURN AIR HUMIDITY CONTROLLER WILL BE PROVIDED FOR FUTURE USE. THE CONTROL LINE IS CAPPED AND TAGGED IN THE CONTROL PANEL.

THE UNIT REMAINS OFF DURING UNOCCUPIED PERIODS WITH THE PRIMARY AIR SYSTEM CONTROL DAMPERS RELEASED THROUGH THE LOAD ANALYZER. THE UNIT O.A. AND EXHAUST/RELIEF DAMPERS CLOSE ON FAN SHUTDOWN, AND THE HUMIDIFIERS BECOME INOPERATIVE.

AIR HANDLING UNIT HV-3

THE UNIT SUPPLY AND INTERLOCKED RETURN/EXHAUST FANS RUN CONTINUOUSLY DURING OCCUPIED PROGRAM CYCLES AND WILL BE OFF DURING UNOCCUPIED PERIODS. THE OPTIMUM START/STOP PROGRAMMER WILL PRE-START THE SYSTEM FANS IN ADVANCE OR PROGRAMMED OCCUPANCY TIME TO ALLOW FOR AREA WARM-UP.

AFTER WARM UP, THE ACTUAL PROGRAMMED OCCUPANCY CONTROL CYCLE WILL OPEN THE UNIT O.A. DAMPERS TO THE MINIMUM VENTILATION POSITION. THE PRIMARY AIR SYSTEM DAMPERS ARE FULLY OPENED THROUGH THE LOAD ANALYZER.

THE UNIT DISCHARGE AIR CONTROLLERS, THROUGH THE MIXED AIR LOW LIMIT, WILL MODULATE POSITION IN SEQUENCE THE O.A. DAMPERS, RETURN AIR DAMPERS, EXHAUST DAMPERS, AND 3-WAY HEATING COIL VALVE TO MAINTAIN DISCHARGE TEMPERATURE SETPOINT OF 60°F.

THE MIXED AIR LOW LIMIT REPOSITIONS THE OUTDOOR AIR DAMPERS CLOSED IN RESPONSE TO MIXED AIR TEMPERATURES BELOW 55°F. AS THE UNIT OUTDOOR DAMPERS CLOSE, THE RETURN AIR DAMPERS OPEN AND THE EXHAUST/RELIEF CLOSE IN REVERSE PROPORTION.

THE FREEZE DETECTION THERMOSTAT STOPS THE SYSTEM FANS UPON SENSING POTENTIAL FREEZING CONDITIONS AT THE LEAVING SIDE OF THE UNIT HEATING COIL. THIS THERMOSTAT IS MANUALLY RESET AT THE UNIT.

SMOKE DETECTORS IN THE UNIT DISCHARGE AND RETURN WILL STOP THE FANS UPON SENSING COMBUSTION PRODUCTS. SMOKE ALARMS ARE PROVIDED IN CONJUNCTION WITH THE BUILDING CENTRAL FIRE ALARM SYSTEM SUPPLIED UNDER ELECTRICAL CONTRACT.

THE UNIT OUTDOOR AIR AND EXHAUST DAMPERS SPRING CLOSE ON FAN SHUTDOWN.


THE UNIT REMAINS OFF DURING UNOCCUPIED PERIODS WITH THE PRIMARY AIR DAMPERS RELEASED. THE UNIT O.A./EXH/RELIEF DAMPERS CLOSE ON FAN SHUTDOWN AND THE HUMIDIFIER IS OFF.

AIR HANDLING UNIT HV-4

UNIT OCCUPIED CONTROL CYCLES ARE ESTABLISHED BY THE MANUALLY SET INTERVAL TIMER IN EXPERIMENTAL THEATRE.

THE UNIT SUPPLY FAN RUNS CONTINUOUSLY DURING OCCUPIED OPERATION AND IS HELD OFF DURING UNOCCUPIED PERIODS.

THE UNIT SUPPLY FAN SPEED IS MANUALLY SELECTED AT THE UNIT STARTER. STARTING THE FAN IN EITHER SPEED WILL ENERGIZE THE PRIMARY O.A. & EXHAUST DAMPERS THROUGH THE LOAD ANALYZER AND OPEN THE UNIT O.A. DAMPERS TO THE SET MINIMUM VENTILATION POSITION.

THE PILOT SPACE THERMOSTAT, THROUGH THE MIXED AIR AND DISCHARGE LOW LIMIT CONTROLS, WILL MODULATE AND POSITION IN SEQUENCE THE UNIT O.A. DAMPERS, RETURN AIR DAMPERS, 3-WAY HEATING COIL VALVE AND AREA EXHAUST/RELIEF DAMPER TO MAINTAIN THE SPACE TEMPERATURE SETTING.


THE ASSOCIATED AREA RELIEF DAMPERS, LOCATED IN THE EXHAUST DUCT OF ROOF HOOK NO. 1, ARE ENABLED WHENEVER UNIT RETURN AIR TEMPERATURES EXCEED 78°F. BELOW 78°F, THE RELIEF DAMPERS REMAIN CLOSED. ABOVE 78°F, THE RELIEF DAMPERS ARE THROTTLED OPEN IN A SEQUENCED RATIO WITH THE UNIT MIXING DAMPERS.

THE UNIT FREEZE DETECTION THERMOSTAT WILL STOP THE SUPPLY FAN WHEN FREEZING CONDITIONS ARE SENSED AT THE HEATING COIL. THE FREEZE DETECTION CONTROL IS MANUALLY RESET AT THE UNIT.

SMOKE DETECTORS ARE LOCATED IN THE UNIT DISCHARGE AND RETURN DUCTS AND WILL STOP THE SUPPLY FAN UPON SENSING COMBUSTION PRODUCTS IN THE AIR STREAM.

THE HUMIDIFIER CONTROL VALVE IS THROTTLED IN RESPONSE TO THE RETURN AIR HUMIDITY SETPOINT OF 30% R.H. A HUMIDIFIER DISCHARGE LIMIT WILL OVERRIDE THE RETURN AIR CONTROLLER TO REDUCE HUMIDIFIER OUTPUT AND PREVENT CONDENSATION IN THE LEAVING DUCTWORK.

UNIT HV-4 WOULD REMAIN OFF DURING UNOCCUPIED PERIODS AND THE PRIMARY AIR SYSTEM CONTROL DAMPERS ARE RELEASED. THE UNIT O.A. & EXH/RELIEF DAMPERS CLOSE ON FAN SHUTDOWN AND THE HUMIDIFIER BECOMES INOPERATIVE.
AIR_HANDLING_UNIT_BV-5

THE UNIT SUPPLY FAN RUNS CONTINUOUSLY DURING OCCUPIED PROGRAM CYCLES AND WILL BE OFF DURING UNOCCUPIED PERIODS. THE OPTIMUM START/STOP PROGRAMMER WILL START THE UNIT FAN IN ADVANCE OF PROGRAMMED OCCUPANCY TO ALLOW AREA TEMPERATURES TO REACH A NORMAL OCCUPIED LEVEL - AS SENSED BY THE INDOOR ROOM SENSOR.

THE VARIABLE WARM UP TIMES ARE BASED ON PROGRAMMER MEMORY OF BUILDING/SYSTEM RESPONSE CHARACTERISTICS AND THE WIND COMPENSATED OUTDOOR TEMP SENSOR INPUT. THE UNIT O.A. & EXHAUST DAMPERS ARE HELD CLOSED DURING THIS WARM-UP CYCLE.

FOLLOWING THE WARM-UP PERIOD, THE PROGRAMMED OCCUPANCY MODE IS INITIATED AND THE UNIT O.A. DAMPERS ARE OPENED FOR MINIMUM VENTILATION. THE PRIMARY AIR DAMPER SYSTEM IS ENGAGED THRU THE LOAD ANALYZER CONTROL.

THE UNIT DISCHARGE AIR CONTROLLER, THRU THE MIXED AIR LOW LIMIT, WILL MODULATE AND POSITION IN SEQUENCE THE O.A. DAMPERS, RETURN AIR DAMPERS, 3-WAY HEATING COIL VALVE AND AREA RELIEF/EXHAUST DAMPERS TO MAINTAIN DISCHARGE TEMP SETPOINT OF 60°F. THE AREA RELIEF DAMPERS, LOCATED IN THE SOFFIT AREAS OF ROOMS 304 AND 352, ARE MODULATED OPEN IN A SEQUENCED RATIO WITH THE UNIT MIXING DAMPERS.


THE UNIT FREEZE DETECTION THERMOSTAT WILL STOP THE SUPPLY FAN WHEN FREEZING CONDITIONS ARE SENSED AT THE HEATING COIL. THE FREEZE DETECTION CONTROL IS MANUALLY RESET AT THE UNIT.

DUCT SMOKE DETECTORS IN THE UNIT DISCHARGE AND RETURN WILL STOP THE SUPPLY FAN UPON SENSING AIRBORNE COMBUSTION PRODUCTS. THE UNIT O.A. DAMPERS AND THE EXH./RELIEF DAMPERS CLOSE ON FAN SHUTDOWN.

WHENEVER THE UNIT FAN IS RUNNING, THE HUMIDIFIER STOP VALVE IS OPENED. THE HUMIDIFIER CONTROL VALVE IS MODULATED IN RESPONSE TO THE RETURN AIR HUMIDITY CONTROL POINT OF 30% RH. THE HUMIDIFIER DISCHARGE LIMIT OVERIDES THE RETURN HUMIDITY CONTROLLER AND CLOSES THE HUMIDIFIER VALVE TO REDUCE OUTPUT WHEN LEAVING HUMIDITY CONDITIONS APPROACH SATURATION.

UNIT BV-5 WILL REMAIN OFF DURING UNOCCUPIED CONTROL PERIODS AND THE PRIMARY AIR SYSTEM CONTROL DAMPERS ARE ALLOWED TO CLOSE THRU THE LOAD ANALYZER. THE UNIT O.A. & EXH./RELIEF DAMPERS CLOSE ON FAN SHUTDOWN AND HUMIDIFIER CONTROLS BECOME INOPERATIVE.

BUILDING HOT WATER HEATING SYSTEM CONTROL

WHENEVER THE OUTDOOR TEMPERATURE DROPS BELOW 65°F., THE TWO HOT WATER CIRCULATING PUMPS ARE STARTED AND RUN CONTINUOUSLY.

WITH EITHER OR BOTH PUMPS OPERATING, THE CONVECTOR CONTROLS ARE ENABLED. THE HOT SUPPLY WATER TEMP. CONTROLLER, AS SET BY OUTDOOR AIR TEMP., WILL MODULATE THE CONVECTOR STEAM VALVE TO MAINTAIN A VARIABLE HOT WATER SUPPLY SETPOINT. THE VARIABLE HOT WATER SUPPLY TEMP. WILL INCREASE AS THE OUTDOOR AIR TEMP. DROPS AND WILL BE OPERATED THRU EITHER THE OCCUPIED (MODE 1) OR UNOCCUPIED (MODE 2) RESET WATER SCHEDULES. THE OCCUPIED OR UNOCCUPIED SCHEDULES ARE INDEXED BY THE AUTOMATIC PROGRAM TIMER.

DOMESTIC HOT WATER HEATING

THE DOMESTIC HOT WATER RECIRCULATING PUMP IS STARTED MANUALLY. WHEN THE PUMP IS ENERGIZED, THE STORAGE HEATER CONTROL SYSTEM IS ENABLED. THE NORMALLY CLOSED STEAM CONTROL VALVE WILL BE MODULATED AND POSITIONED TO MAINTAIN CONTROL SETPOINT OF 120°F. THE STORAGE TEMP. MAY BE MANUALLY ADJUSTED ±12°F. FROM INSIDE THE LOCAL CONTROL PANEL.

Honeywell

REVISIONS
SUPERSEDES
SUPERSEDED BY
DATE
APPP.
DRAWN BY: RC
DATE 1.25.85
DRAWING NUMBER 913-84102-23C1
REV.
PRIMARY OUTDOOR INTAKE & RELIEF AIR CONTROL

THE PRIMARY AIR SYSTEMS OUTDOOR AIR AND RELIEF/EXHAUST DAMPERS WILL OPEN FULLY WHENEVER AC-1 OR HV-2 THRU HV-5 ARE OPERATED IN THE OCCUPIED CONTROL MODE.

TOILET EXHAUST FAN P-5 CONTROL

THIS GENERAL TOILET ROOM EXHAUSTOR WILL OPERATE WITH THE EXHAUST CUT-OFF DAMPER OPEN WHENEVER AC-1 IS OPERATED IN THE OCCUPIED CONTROL MODE. IF ALL UNITS ARE IN THE UNOCCUPIED MODE. TOILET EXHAUSTOR P-5 IS OFF AND THE CUT-OFF DAMPER CLOSED.

TRANSFORMER ROOM VENTILATION CONTROL

A ROOM THERMOSTAT WILL START THE VENTILATION INTAKE AND EXHAUST FANS AND OPEN THE CUT-OFF DAMPERS WHENEVER ROOM TEMPERATURE EXCEEDS CONTROL SETPOINT OF 80°F.

BASEMENT EQUIPMENT ROOM VENTILATION

THE ROOM THERMOSTAT WILL START THE VENTILATION INTAKE AND EXHAUST FANS WHENEVER AREA TEMPERATURE EXCEEDS THERMOSTAT SET POINT.


TYPE A VARIABLE VOLUME BOXES

THE ROOM THERMOSTAT RESETS THE UNIT AIR VOLUME REGULATORS TO HIGHER C.P.M. CONTROL POINTS AS SPACE TEMPERATURE RISES. THE AIR VOLUME REGULATORS THROTTLE THE PNEUMATIC TERMINAL DAMPERS TO MAINTAIN THE SCHEDULED COOLING AIR VOLUME (C.P.M.) REQUIRED TO SATISFY THE ROOM THERMOSTAT SETTING.

TYPE B CONSTANT VOLUME BOXES

MANUALLY SET VOLUME CONTROLS MAINTAIN CONSTANT OUTPUT VOLUME.

TYPE C CONSTANT VOLUME - REHEAT BOXES

MANUALLY SET VOLUME CONTROLS MAINTAIN CONSTANT DISCHARGE AIR VOLUME. THE ROOM THERMOSTAT MODULATES THE REHEAT COIL VALVE TO MAINTAIN SET SPACE TEMPERATURE.

WALL PIN RADIATION CONTROL

THE ROOM THERMOSTAT MODULATES THE RADIATION CONTROL VALVE TO MAINTAIN AREA TEMPERATURE.

PROP..FAN HEATER CONTROL

THE ROOM THERMOSTAT CYCLES THE HEATER FAN WITH A DEMAND FOR HEATING.

CABINET UNIT HEATER CONTROL

THE ROOM THERMOSTAT CYCLES THE CABINET HEATER FAN TO MAINTAIN SET POINT TEMPERATURE.

CONVECTOR CONTROL

THE ROOM THERMOSTAT MODULATES THE CONVECTOR CONTROL VALVE OPEN WHEN AREA TEMPERATURE DROPS BELOW THE THERMOSTAT SETTING.
STATE OF MICHIGAN
Prevailing Wages
PO Box 30476
Lansing, MI 48909
517-284-7800

Informational Sheet: Prevailing Wages on State Projects

REQUIREMENTS OF
THE PREVAILING WAGES ON STATE PROJECTS ACT, PUBLIC ACT 166 OF 1965

The State of Michigan determines prevailing rates pursuant to the Prevailing Wages on State Projects Act, Public Act 166 of 1965, as amended. The purpose of establishing prevailing rates is to provide minimum rates of pay that must be paid to workers on construction projects for which the state or a school district is the contracting agent and which is financed or financially supported by the state. By law, prevailing rates are compiled from the rates contained in collectively bargained agreements which cover the locations of the state projects. The official prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated construction mechanic classifications. The overtime rates also include wage and fringe benefit totals. Please pay special attention to the overtime and premium pay requirements. Prevailing wage is satisfied when wages plus fringe benefits paid to a worker are equal to or greater than the required rate.

State of Michigan responsibilities under the law:

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

Contracting agent responsibilities under the law:

- If a contract is not awarded or construction does not start within 90 days of the date of the issuance of rates, a re-determination of rates must be requested by the contracting agent.
- Rates for classifications needed but not provided on the Prevailing Rate Schedule, must be obtained prior to contracts being let out for bid on a state project.
- The contracting agent, by written notice to the contractor and the sureties of the contractor known to the contracting agent, may terminate the contractor’s right to proceed with that part of the contract, for which less than the prevailing rates have been or will be paid, and may proceed to complete the contract by separate agreement with another contractor or otherwise, and the original contractor and his sureties shall be liable to the contracting agent for any excess costs occasioned thereby.

Contractor responsibilities under the law:

- Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing rates prescribed in a contract.
- Every contractor and subcontractor shall keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic employed by him in connection including certified payroll, as used in the industry, 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 State of Michigan. The department will investigate and attempt to resolve the complaint informally. During the course of an investigation, if the requested records and posting certification are not made available in compliance with Section 5 of Act 166, the investigation will be concluded and a referral to the Office of Attorney General for civil action will be made. The Office of Attorney General will pursue costs and fees associated with a lawsuit if filing is necessary to obtain records.
# Informational Sheet: Prevailing Wages on State Projects

## General Information Regarding Fringe Benefits

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

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

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

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

<table>
<thead>
<tr>
<th>Fringe Benefit</th>
<th>Calculation</th>
<th>Hourly Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacation</td>
<td>40 hours X $14.00 per hour = $560/2080 =</td>
<td>$.27</td>
</tr>
<tr>
<td>Dental insurance</td>
<td>$31.07 monthly premium X 12 mos. = $372.84 /2080 =</td>
<td>$.18</td>
</tr>
<tr>
<td>Vision insurance</td>
<td>$5.38 monthly premium X 12 mos. = $64.56/2080 =</td>
<td>$.03</td>
</tr>
<tr>
<td>Health insurance</td>
<td>$230.00 monthly premium X 12 mos. = $2,760.00/2080 =</td>
<td>$1.33</td>
</tr>
<tr>
<td>Life insurance</td>
<td>$27.04 monthly premium X 12 mos. = $324.48/2080 =</td>
<td>$.16</td>
</tr>
<tr>
<td>Tuition</td>
<td>$500.00 annual cost/2080 =</td>
<td>$.24</td>
</tr>
<tr>
<td>Bonus</td>
<td>4 quarterly bonus/year x $250 = $1000.00/2080 =</td>
<td>$.48</td>
</tr>
<tr>
<td>401k Employer Contribution</td>
<td>$2000.00 total annual contribution/2080 =</td>
<td>$.96</td>
</tr>
</tbody>
</table>

**Total Hourly Credit**: $3.65

Other examples of the types of fringe benefits allowed:

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

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

- Legally required payments, such as:
  - Unemployment Insurance payments
  - Workers’ Compensation Insurance payments
  - FICA (Social Security contributions, Medicare contributions)

- Reimbursable expenses, such as:
  - Clothing allowance or reimbursement
  - Uniform allowance or reimbursement
  - Gas allowance or reimbursement
  - Travel time or payment
  - Meals or lodging allowance or reimbursement
  - Per diem allowance or payment

- Other payments to or on behalf of a construction mechanic that are not wages or fringe benefits, such as:
  - Industry advancement funds
  - Financial or material loans
OVERTIME PROVISIONS for MICHIGAN PREVAILING WAGE RATE COMMERCIAL SCHEDULE

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

<table>
<thead>
<tr>
<th></th>
<th>Monday thru Friday</th>
<th>Saturday</th>
<th>Sunday &amp; Holidays</th>
<th>Four 10s</th>
</tr>
</thead>
<tbody>
<tr>
<td>First 8 Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10th Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 10 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overtime for Monday thru Friday after 8 hours:
The 1st character is for time worked in the 9th hour (8.1 - 9 hours)
The 2nd character is for time worked in the 10th hour (9.1 - 10 hours)
The 3rd character is for time worked beyond the 10th hour (10.1 and beyond)

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

Overtime on Sundays & Holidays
The 8th character is for time worked on Sunday or on a holiday

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

2. Overtime Indicators Used in the Overtime Provision:
H - means TIME AND ONE-HALF due
X - means TIME AND ONE-HALF due after 40 HOURS worked
D - means DOUBLE PAY due
Y - means YES an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked
N - means NO an optional 4-day 10-hour per day workweek can not be worked without paying overtime after 8 hours worked

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

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

<table>
<thead>
<tr>
<th>UNDERGROUND ENGINEERS</th>
<th>HAZARDOUS WASTE ABATEMENT ENGINEERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong> Backfiller Tamper, Backhoe, Batch Plant Operator, Clam-Shell, Concrete Paver (2 drums or larger), Conveyo...</td>
<td><strong>CLASS I</strong> Backhoe, Batch Plant Operator, Clamshell, Concrete Breaker when attached to hoe, Concrete Cleaning Decontamination Machine Operator, Concrete Pump, Concrete Paver, Crusher, Dozer, Elevating Grader, Endloader, Farm Tractor (90 h.p. and higher), Gradall, Grader, Heavy Equipment Robotics Operator, Hydro Excavator, Loader, Pug Mill, Pumpcrete Machines, Pump Trucks, Roller, Scraper (self-propelled or tractor drawn), Side Boom Tractor, Slip Form Paver, Slope Paver, Trencher, Ultra High Pressure Waterjet Cutting Tool System Operator, Vactors, Vacuum Blasting Machine Operator, Vertical Lifting Hoist, Vibrating Compaction Equipment (self-propelled), and Well Drilling Rig.</td>
</tr>
<tr>
<td><strong>CLASS II</strong> Boom Truck (power swing type boom), Crusher, Hoist, Pump (1 or more 6&quot; discharge or larger gas or diesel powered by generator of 300 amps or more, inclusive of generator), Side Boom Tractor (smaller than type D-4 or equivalent), Tractor (pneu-tired, other than backhoe or front end loader), Trencher (8’ digging capacity and smaller), Vac Truck.</td>
<td><strong>CLASS II</strong> Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, Water Wagon and Welding Machine.</td>
</tr>
<tr>
<td><strong>CLASS III</strong> Air Compressors (600 cfm or larger), Air Compressors (2 or more less than 600 cfm), Boom Truck (non-swinging, non-powered type boom), Concrete Breaker (self-propelled or truck mounted, includes compressor), Concrete Paver (1 drum, ½ yard or larger), Elevator (other than passenger), Maintenance Man, Mechanic Helper, Pump (2 or more 4&quot; up to 6&quot; discharge, gas or diesel powered, excluding submersible pump), Pumpcrete Machine (and similar equipment), Wagon Drill Machine, Welding Machine or Generator (2 or more 300 amp or larger, gas or diesel powered).</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS IV</strong> Boiler, Concrete Saw (40HP or over), Curing Machine (self-propelled), Farm Tractor (w/attachment), Finishing Machine (concrete), Firemen, Hydraulic Pipe Pushing Machine, Mulching Equipment, Oiler (2 or more up to 4&quot;, exclude submersible), Pumps (2 or more up to 4&quot; discharge if used 3 hrs or more a day-gas or diesel powered, excluding submersible pumps), Roller (other than asphalt), Stump Remover, Vibrating Compaction Equipment (6’ wide or over), Trencher (service) Sweeper (Wayne type and similar equipment), Water Wagon, Extend-a-Boom Forklift.</td>
<td></td>
</tr>
</tbody>
</table>
State of Michigan
WHPWRequest@michigan.gov

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls Replacement

Project Number: Houghton County

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls Replacement

Project Number: Houghton County

Official 2015 Prevailing Wage Rates for State Funded Projects

Issue Date: 10/26/2015
Contract must be awarded by: 1/24/2016

Page 1 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Hourly Provision</th>
<th>Half Time</th>
<th>Double Overtime</th>
<th>Time Provision</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos &amp; Lead Abatement Laborer</td>
<td>Asbestos &amp; Lead Abatement Laborer</td>
<td>MLDC 10/1/2014</td>
<td>$40.25 $53.64 $67.03</td>
<td>H H X X X D Y</td>
<td>4 ten hour days @ straight time allowed Monday-Saturday, must be consecutive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asbestos &amp; Lead Abatement, Hazardous Material Handler</td>
<td>Asbestos and Lead Abatement, Hazardous Material Handler</td>
<td>AS207 10/1/2014</td>
<td>$40.25 $53.58 $66.90</td>
<td>H H X X X D Y</td>
<td>4 ten hour days @ straight time allowed Monday-Saturday, must be consecutive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boilermaker</td>
<td>Boilermaker</td>
<td>BO169 2/17/2015</td>
<td>$54.70 $81.08 $107.45</td>
<td>H H H H H D Y</td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$40.31 $59.49 $78.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$41.45 $61.21 $80.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td>$42.57 $62.88 $83.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td>$43.69 $64.57 $85.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td>$44.81 $66.24 $87.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td>$48.63 $72.50 $96.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th 6 months</td>
<td>$49.32 $73.01 $96.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th 6 months</td>
<td>$51.58 $76.40 $101.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>Updated</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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marble, Tile and Terrazzo Finisher</td>
<td>BR6</td>
<td>6/2/2014</td>
<td>$36.55</td>
<td>$45.79</td>
<td>$55.03</td>
<td>H H D X H D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<td>Make up days: Friday &amp; Saturday.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bricklayer, stone mason, mosaic worker,</td>
<td>BR6-2</td>
<td>6/2/2014</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>plasterer, tuck pointer, pointer, caulk &amp; cleaner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td></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>
<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>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<td>0 - 749 hours</td>
<td></td>
<td></td>
<td>$32.85</td>
<td>$40.24</td>
<td>$47.63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750 - 1499 hours</td>
<td></td>
<td></td>
<td>$34.09</td>
<td>$42.10</td>
<td>$50.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1500 - 2249 hours</td>
<td></td>
<td></td>
<td>$35.32</td>
<td>$43.95</td>
<td>$52.57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2250 - 2999 hours</td>
<td></td>
<td></td>
<td>$36.55</td>
<td>$45.79</td>
<td>$55.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3000 - 3749 hours</td>
<td></td>
<td></td>
<td>$37.78</td>
<td>$47.63</td>
<td>$57.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3750 - 4499 hours</td>
<td></td>
<td></td>
<td>$39.01</td>
<td>$49.48</td>
<td>$59.95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4500 - 5249 hours</td>
<td></td>
<td></td>
<td>$40.25</td>
<td>$51.34</td>
<td>$62.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5250 - 6000 hours</td>
<td></td>
<td></td>
<td>$41.48</td>
<td>$53.19</td>
<td>$64.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marble, Tile and Terrazzo Layer</td>
<td>BR6TL</td>
<td>6/2/2014</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
<td>H H D X H D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<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 #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number: County: Houghton
<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>Carpenter</td>
<td>Carpenter, Drywall Taper &amp; Finisher, &amp; Floor</td>
<td>CA1510-C</td>
<td>$42.00</td>
<td>$53.66</td>
<td>$65.32</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturday</td>
<td></td>
<td>$42.20</td>
<td>$53.96</td>
<td>$65.72</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td>$32.67</td>
<td>$39.66</td>
<td>$46.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st 6 months</td>
<td></td>
<td>$33.84</td>
<td>$41.42</td>
<td>$49.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd 6 months</td>
<td></td>
<td>$35.00</td>
<td>$43.16</td>
<td>$51.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd 6 months</td>
<td></td>
<td>$36.17</td>
<td>$44.92</td>
<td>$53.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4th 6 months</td>
<td></td>
<td>$37.34</td>
<td>$46.67</td>
<td>$56.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5th 6 months</td>
<td></td>
<td>$38.50</td>
<td>$48.41</td>
<td>$58.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6th 6 months</td>
<td></td>
<td>$39.67</td>
<td>$50.16</td>
<td>$60.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7th 6 months</td>
<td></td>
<td>$40.83</td>
<td>$51.90</td>
<td>$62.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8th 6 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piledriver</td>
<td></td>
<td>CA1510-P</td>
<td>$42.20</td>
<td>$53.96</td>
<td>$65.72</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturday</td>
<td></td>
<td>$42.00</td>
<td>$53.66</td>
<td>$65.32</td>
<td>X X H X H H D Y</td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td>$32.67</td>
<td>$39.66</td>
<td>$46.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st 6 months</td>
<td></td>
<td>$33.84</td>
<td>$41.42</td>
<td>$49.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd 6 months</td>
<td></td>
<td>$35.00</td>
<td>$43.37</td>
<td>$51.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd 6 months</td>
<td></td>
<td>$36.17</td>
<td>$45.14</td>
<td>$53.96</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4th 6 months</td>
<td></td>
<td>$37.34</td>
<td>$46.91</td>
<td>$56.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5th 6 months</td>
<td></td>
<td>$38.67</td>
<td>$48.66</td>
<td>$58.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6th 6 months</td>
<td></td>
<td>$39.85</td>
<td>$50.44</td>
<td>$61.02</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7th 6 months</td>
<td></td>
<td>$41.02</td>
<td>$52.19</td>
<td>$63.36</td>
<td></td>
</tr>
</tbody>
</table>
# Official 2015 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 10/26/2015  
**Contract must be awarded by:** 1/24/2016

## Page 4 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight</th>
<th>Time and a Half</th>
<th>Double</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cement Mason</td>
<td>BR6-CM</td>
<td>6/2/2014</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
<td>H H D X H H D Y</td>
</tr>
<tr>
<td>Make up day allowed comment</td>
<td>Four 10s allowed Monday-Thurs. Make up days: Friday and Saturday.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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  
PL16-16  
10/23/2012  
$30.30 $40.39 $50.47 H H H H H D Y

**Apprentice Rates:**

- 1st year: $23.24, $29.79, $36.35
- 2nd year: $25.26, $32.83, $40.39
- 3rd year: $27.27, $35.84, $44.41

---

**Official Request #:** 1268  
**Requestor:** Michigan Technological University  
**Project Description:** 11-16-01 Walker Arts & Humanities Center HVAC Controls  
**Project Number:**  
**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.

Page 4 of 25
**Electrician**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound and Communications Installer/Technician</td>
<td>EC-219-SC</td>
<td>3/12/2013</td>
<td>$33.43</td>
<td>$43.97</td>
<td>$54.51</td>
<td>H H H H H D Y</td>
</tr>
</tbody>
</table>

A 4 day 10 hour day schedule is allowed.

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Period</th>
<th>Straight Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>$25.00</td>
<td>$31.32</td>
<td>$37.65</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td>$27.11</td>
<td>$34.49</td>
<td>$41.87</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>$28.16</td>
<td>$36.07</td>
<td>$43.97</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>$29.22</td>
<td>$37.66</td>
<td>$46.09</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>$30.27</td>
<td>$39.23</td>
<td>$48.19</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>$31.33</td>
<td>$40.83</td>
<td>$50.31</td>
<td></td>
</tr>
</tbody>
</table>

**Inside wireman for work above $180,000 total value.**

<table>
<thead>
<tr>
<th>Period</th>
<th>Straight Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>$47.03</td>
<td>$62.33</td>
<td>$77.62</td>
<td>H H H H H D Y</td>
</tr>
</tbody>
</table>

A 4 ten schedule may be worked if 4 consecutive days, M-Th or Tues-F. *Make up day allowed*

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Straight Hourly</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,500-8,000</td>
<td>$37.17</td>
<td>$50.94</td>
<td>$64.70</td>
<td></td>
</tr>
<tr>
<td>0-1,000</td>
<td>$23.41</td>
<td>$30.29</td>
<td>$37.17</td>
<td></td>
</tr>
<tr>
<td>1,000-2,000</td>
<td>$24.94</td>
<td>$32.58</td>
<td>$40.22</td>
<td></td>
</tr>
<tr>
<td>2,000-3,500</td>
<td>$28.01</td>
<td>$37.19</td>
<td>$48.36</td>
<td></td>
</tr>
<tr>
<td>3,500-5,000</td>
<td>$31.07</td>
<td>$41.77</td>
<td>$52.48</td>
<td></td>
</tr>
<tr>
<td>5,000-6,500</td>
<td>$34.13</td>
<td>$46.37</td>
<td>$58.60</td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td>Name Description</td>
<td>Last Updated</td>
<td>Straight Hourly</td>
<td>Time and Half Hourly</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Inside wireman for work below $180,000 total value.</td>
<td>EC-219-ZB-below</td>
<td>3/12/2013</td>
<td>$42.47</td>
<td>$55.48</td>
</tr>
<tr>
<td>A 4 ten schedule may be worked if 4 consecutive days, M-Th or Tues-F.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Hours Range</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>0-1,000</td>
<td>$21.36</td>
<td>$27.22</td>
<td>$33.08</td>
<td></td>
</tr>
<tr>
<td>1,000-2,000</td>
<td>$22.67</td>
<td>$29.17</td>
<td>$35.68</td>
<td></td>
</tr>
<tr>
<td>2,000-3,500</td>
<td>$25.26</td>
<td>$33.08</td>
<td>$40.87</td>
<td></td>
</tr>
<tr>
<td>3,500-5,000</td>
<td>$27.87</td>
<td>$36.97</td>
<td>$46.08</td>
<td></td>
</tr>
<tr>
<td>5,000-6,500</td>
<td>$30.47</td>
<td>$40.88</td>
<td>$51.29</td>
<td></td>
</tr>
<tr>
<td>6,500-8,000</td>
<td>$33.08</td>
<td>$44.79</td>
<td>$56.50</td>
<td></td>
</tr>
</tbody>
</table>

**Elevator Constructor**

<table>
<thead>
<tr>
<th>Name 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>Elevator Constructor Mechanic</td>
<td>EL-85</td>
<td>4/8/2013</td>
<td>$70.77</td>
<td>$116.32</td>
<td>D D D D D D D Y</td>
</tr>
<tr>
<td>4 tens allowed M-TH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Year</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>1st year</td>
<td>$50.27</td>
<td>$75.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd year</td>
<td>$54.83</td>
<td>$84.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd year</td>
<td>$57.10</td>
<td>$88.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th year</td>
<td>$61.66</td>
<td>$98.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Glazier

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Hourly Rate</th>
<th>Half Time Rate</th>
<th>Double Time Rate</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glazier</td>
<td>GL-826</td>
<td>7/16/2015</td>
<td>$44.16</td>
<td>$60.04</td>
<td>$75.91</td>
<td>H H H H H H D Y</td>
</tr>
</tbody>
</table>

4 tens allowed on consecutive days

**Apprentice Rates:**

- 1st 6 months: $31.46, $40.99, $50.51
- 2nd 6 months: $33.05, $43.37, $53.69
- 3rd 6 months: $34.63, $45.74, $56.85
- 4th 6 months: $36.22, $48.13, $60.03
- 5th 6 months: $37.81, $50.51, $63.21
- 6th 6 months: $39.40, $52.90, $66.39
- 7th 6 months: $40.99, $55.28, $69.57
- 8th 6 months: $42.57, $57.66, $72.73

### Heat and Frost Insulator

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Hourly Rate</th>
<th>Half Time Rate</th>
<th>Double Time Rate</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat and Frost Insulator</td>
<td>AS127</td>
<td>11/3/2014</td>
<td>$42.97</td>
<td>$55.93</td>
<td>$68.89</td>
<td>H H H D D Y</td>
</tr>
</tbody>
</table>

Make up day allowed

**Apprentice Rates:**

- 1st year: $30.01, $36.49, $42.97
- 2nd year: $32.60, $40.37, $48.15
- 3rd year: $35.19, $44.26, $53.33
- 4th year: $37.79, $48.16, $58.53

### Spray Insulation

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Hourly Rate</th>
<th>Half Time Rate</th>
<th>Double Time Rate</th>
<th>Overtime Provision</th>
</tr>
</thead>
</table>
## Official 2015 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 10/26/2015  
**Contract must be awarded by:** 1/24/2016

### Page 8 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time and Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ironworker</td>
<td>IR-8-A</td>
<td>9/29/2014</td>
<td>$50.07</td>
<td>$69.76</td>
<td>$89.45</td>
<td>H H D H D D D Y</td>
</tr>
</tbody>
</table>
| For work over $10 million:  
  Structural, Ornamental, Machinery Rigger & Reinforcing Ironworker; installation of sheet metal siding |
| 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>Rate per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000 hours</td>
<td>$25.39</td>
</tr>
<tr>
<td>1,001 - 2,000 hours</td>
<td>$37.71</td>
</tr>
<tr>
<td>2,001 - 3,000 hours</td>
<td>$39.01</td>
</tr>
<tr>
<td>3,001 - 4,000 hours</td>
<td>$40.31</td>
</tr>
<tr>
<td>4,001 - 5,000 hours</td>
<td>$41.61</td>
</tr>
<tr>
<td>5,001 - 6,000 hours</td>
<td>$42.92</td>
</tr>
<tr>
<td>6,001 - 7,000 hours</td>
<td>$44.22</td>
</tr>
</tbody>
</table>

#### For work under $10 Million:  
  Structural, Ornamental, Machinery Rigger & Reinforcing Ironworker; pre-engineered metal buildings

<table>
<thead>
<tr>
<th>Hours</th>
<th>Rate per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000 hours</td>
<td>$25.39</td>
</tr>
<tr>
<td>1,001 - 2,000 hours</td>
<td>$37.71</td>
</tr>
<tr>
<td>2,001 - 3,000 hours</td>
<td>$39.01</td>
</tr>
<tr>
<td>3,001 - 4,000 hours</td>
<td>$40.31</td>
</tr>
<tr>
<td>4,001 - 5,000 hours</td>
<td>$41.61</td>
</tr>
<tr>
<td>5,001 - 6,000 hours</td>
<td>$42.92</td>
</tr>
<tr>
<td>6,001 - 7,000 hours</td>
<td>$44.22</td>
</tr>
</tbody>
</table>

Official Request #: 1268  
Requestor: Michigan Technological University  
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls  
Project Number:  
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>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborer</td>
<td>Class A Laborer</td>
<td>- 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, marterial mixers, vibrator operators, concrete mixers, laborers with concrete crew, mixer to pour, including pour time from trucks.</td>
<td>10/15/2015</td>
<td>L1329-B-A</td>
<td>$33.40</td>
<td>$43.49</td>
<td>$53.57</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td>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 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$28.36</td>
<td>$35.93</td>
<td>$43.49</td>
<td></td>
</tr>
<tr>
<td>1,001 - 2,000 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$29.37</td>
<td>$37.44</td>
<td>$45.51</td>
<td></td>
</tr>
<tr>
<td>2,001 - 3,000 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$30.37</td>
<td>$38.94</td>
<td>$47.51</td>
<td></td>
</tr>
<tr>
<td>3,001 - 4,000 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$32.39</td>
<td>$41.97</td>
<td>$51.55</td>
<td></td>
</tr>
<tr>
<td>Class B Laborer</td>
<td>Cement Gun Nozzleman</td>
<td>blasters, miners, drillers, buster operators, layers of all non-metallic pipe</td>
<td>10/15/2015</td>
<td>L1329-B-B</td>
<td>$33.81</td>
<td>$44.10</td>
<td>$54.39</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td>Class C Laborer</td>
<td>Caisson Worker &amp; Airtrack</td>
<td></td>
<td>10/15/2015</td>
<td>L1329-B-C</td>
<td>$34.17</td>
<td>$44.64</td>
<td>$55.11</td>
<td>X X X X X X D Y</td>
</tr>
<tr>
<td>Class E Laborer</td>
<td>Digester, Tanks &amp; Kilns</td>
<td></td>
<td>10/15/2015</td>
<td>L1329-B-D</td>
<td>$35.51</td>
<td>$46.65</td>
<td>$57.79</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</table>

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number: 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>Updated</th>
<th>Last</th>
<th>Straight</th>
<th>Time and</th>
<th>Overtime</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborer - Hazardous</td>
<td>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 &quot;D&quot; is required.</td>
<td>LHAZ-Z11-A</td>
<td>11/7/2014</td>
<td>$32.91</td>
<td>$46.37</td>
<td>$59.82</td>
<td>H H H H H D Y</td>
</tr>
</tbody>
</table>

*Make up day allowed comment*

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

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Work Hours</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000</td>
<td>$27.93</td>
<td>$38.90</td>
<td>$49.86</td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>$28.93</td>
<td>$40.40</td>
<td>$51.86</td>
</tr>
<tr>
<td>2,001-3,000</td>
<td>$29.92</td>
<td>$41.88</td>
<td>$53.84</td>
</tr>
<tr>
<td>3,001-4,000</td>
<td>$31.91</td>
<td>$44.86</td>
<td>$57.82</td>
</tr>
</tbody>
</table>

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.

*Make up day allowed comment*

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

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Work Hours</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000</td>
<td>$28.68</td>
<td>$40.02</td>
<td>$51.36</td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>$29.73</td>
<td>$41.60</td>
<td>$53.46</td>
</tr>
<tr>
<td>2,001-3,000</td>
<td>$30.77</td>
<td>$43.16</td>
<td>$55.54</td>
</tr>
<tr>
<td>3,001-4,000</td>
<td>$32.86</td>
<td>$46.29</td>
<td>$59.72</td>
</tr>
<tr>
<td>Classification</td>
<td>Name Description</td>
<td>Last Updated</td>
<td>Straight Hourly</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Laborer Underground - Tunnel, Shaft &amp; 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>LAUCT-Z2-1</td>
<td>10/30/2014</td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-1,000 work hours</td>
<td></td>
<td>$30.52</td>
</tr>
<tr>
<td></td>
<td>1,001-2,000 work hours</td>
<td></td>
<td>$31.55</td>
</tr>
<tr>
<td></td>
<td>2,001-3,000 work hours</td>
<td></td>
<td>$32.58</td>
</tr>
<tr>
<td></td>
<td>3,001-4,000 work hours</td>
<td></td>
<td>$34.64</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>LAUCT-Z2-2</td>
<td>10/30/2014</td>
</tr>
<tr>
<td></td>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-1,000 work hours</td>
<td></td>
<td>$30.58</td>
</tr>
<tr>
<td></td>
<td>1,001-2,000 work hours</td>
<td></td>
<td>$31.62</td>
</tr>
<tr>
<td></td>
<td>2,001-3,000 work hours</td>
<td></td>
<td>$32.66</td>
</tr>
<tr>
<td></td>
<td>3,001-4,000 work hours</td>
<td></td>
<td>$34.72</td>
</tr>
</tbody>
</table>
### Classification: Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, concrete shovel, conveyor man, floor man, gasoline and electric tool operator, gunnite man, grout operator, welder, heading dinky man, inside lock tender, pea gravel operator, pump man, outside lock tender, scaffold man, top signal man, switch man, track man, tugger man, utility man, vibrator man, winch operator, pipe jacking man, wagon drill and air track operator and concrete saw operator (under 40 h.p.).

<table>
<thead>
<tr>
<th>Name</th>
<th>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>LAUCT-Z2-3</td>
<td>10/30/2014</td>
<td>$35.86</td>
<td>$47.36</td>
<td>$58.85</td>
<td>X X X X X X D Y</td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Work Hours</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>0-1,000 work hours</td>
<td>$30.66</td>
<td>$39.56</td>
<td>$48.45</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td>$31.70</td>
<td>$41.12</td>
<td>$50.53</td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td>$32.74</td>
<td>$42.68</td>
<td>$52.61</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td>$34.82</td>
<td>$45.80</td>
<td>$56.77</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Name</th>
<th>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>LAUCT-Z2-4</td>
<td>10/30/2014</td>
<td>$36.02</td>
<td>$47.60</td>
<td>$59.17</td>
<td>X X X X X X D Y</td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Work Hours</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>0-1,000 work hours</td>
<td>$30.78</td>
<td>$39.74</td>
<td>$48.69</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td>$31.83</td>
<td>$41.32</td>
<td>$50.79</td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td>$32.88</td>
<td>$42.89</td>
<td>$52.89</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td>$34.97</td>
<td>$46.02</td>
<td>$57.07</td>
<td></td>
</tr>
</tbody>
</table>

---

**Official Request #: 1268**

Requestor: Michigan Technological University

Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls

Project Number: 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>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>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>$36.28</td>
<td>$47.99</td>
<td>$59.69</td>
<td>X X X X X X D Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</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>$30.98</td>
<td>$40.04</td>
<td>$49.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td>$32.04</td>
<td>$41.63</td>
<td>$51.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td>$33.10</td>
<td>$43.22</td>
<td>$53.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td>$35.22</td>
<td>$46.40</td>
<td>$57.57</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class VI - Dynamite man and powder man.</td>
<td>LAUCT-Z2-6</td>
<td>$36.59</td>
<td>$48.45</td>
<td>$60.31</td>
<td>X X X X X X D Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</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>$31.21</td>
<td>$40.38</td>
<td>$49.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td>$32.28</td>
<td>$41.99</td>
<td>$51.69</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td>$33.36</td>
<td>$43.61</td>
<td>$53.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td>$35.51</td>
<td>$46.84</td>
<td>$58.15</td>
<td></td>
<td></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>$28.86</td>
<td>$36.86</td>
<td>$44.85</td>
<td>X X X X X X D Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apprentice Rates:</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>$25.41</td>
<td>$31.68</td>
<td>$37.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td>$26.10</td>
<td>$32.72</td>
<td>$39.33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td>$26.79</td>
<td>$33.76</td>
<td>$40.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td>$28.17</td>
<td>$35.82</td>
<td>$43.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Landscape Laborer

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 & one half. Holidays paid at double time.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Straight Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape Laborer</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>LLAN-Z2-A</td>
<td>10/13/2015</td>
<td>$28.25</td>
<td>$39.04</td>
<td>$49.82</td>
<td>X X H X X H D Y</td>
</tr>
</tbody>
</table>

### Skilled Landscape Laborer

Skilled Landscape Laborer: 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 & one half. Holidays paid at double time.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Straight Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled Landscape Laborer</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>LLAN-Z2-B</td>
<td>10/13/2015</td>
<td>$24.05</td>
<td>$32.74</td>
<td>$41.42</td>
<td>X X H X X H D Y</td>
</tr>
</tbody>
</table>

### Operating Engineer - DIVER

Diver/Wet Tender/Tender/Rov Pilot/Rov Tender

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Straight Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Engineer - DIVER</td>
<td>Diver/Wet Tender/Tender/Rov Pilot/Rov Tender</td>
<td>GLF D</td>
<td>4/2/2014</td>
<td>$52.80</td>
<td>$79.20</td>
<td>$105.60</td>
<td>H H H H H H D N</td>
</tr>
</tbody>
</table>

### Operating Engineer - Marine Construction

Diver/Wet Tender, Engineer (hydraulic dredge)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Straight Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Engineer - Marine Construction</td>
<td>Diver/Wet Tender, Engineer (hydraulic dredge)</td>
<td>GLF-1</td>
<td>2/12/2014</td>
<td>$65.00</td>
<td>$84.85</td>
<td>$104.70</td>
<td>X X H H H H D Y</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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>Updated</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Straight Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane/Backhoe Operator, 70 ton or over Tug Operator, Mechanic/Welder, Assistant Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender</td>
<td></td>
<td>GLF-2</td>
<td>2/12/2014</td>
<td>$63.50</td>
<td>$82.60</td>
<td>$101.70</td>
<td>X X H H H H D Y</td>
</tr>
</tbody>
</table>

Holiday pay = $120.80 per hour, wages &

Make up day allowed

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

Official Request #: 1268

Requestor: Michigan Technological University

Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls

Project Number: 1268

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>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction, Lattice Boom or Crane License Certification</td>
<td>GLF-2B</td>
<td>2/12/2014</td>
<td>$64.50</td>
<td>$84.10</td>
<td>$103.70</td>
<td>X</td>
<td>H</td>
</tr>
</tbody>
</table>

Holiday pay = $123.30

Make up day allowed

**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

Holiday pay = $110.30 per hour, wages &

Make up day allowed

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

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

Holiday pay = $96.05 per hour, wages & fringes

Make up day allowed

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

Operating Engineer General Construction & Underground

Crane 120' boom & jib

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN-324UP-120GU</td>
<td>2/12/2014</td>
<td>$50.70</td>
<td>$64.98</td>
<td>$79.26</td>
<td>X</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

Double time after 12 hours Mon-Sat

Crane 140' boom & jib

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN-324UP-140GU</td>
<td>7/1/2015</td>
<td>$50.95</td>
<td>$65.36</td>
<td>$79.76</td>
<td>X</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

Double time after 12 hours Mon-Sat

Crane with 300' or longer main boom & jib

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN-324UP-300GU</td>
<td>7/8/2015</td>
<td>$52.93</td>
<td>$68.33</td>
<td>$83.72</td>
<td>X</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

Double time after 12 hours Mon-Sat

Official Request #: 1268

Requestor: Michigan Technological University

Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls

Project Number: 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 Last Straight Time and a Overage
<table>
<thead>
<tr>
<th>Name Description</th>
<th>Updated</th>
<th>Hourly</th>
<th>Half</th>
<th>Double</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane with 400' or longer main boom &amp; jib</td>
<td>EN-324UP-400GU 7/8/2015</td>
<td>$54.65</td>
<td>$70.91</td>
<td>$87.16</td>
<td>X H H H H D</td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class A- 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 7/1/2015</td>
<td>$50.20</td>
<td>$64.23</td>
<td>$78.26</td>
<td>X X H H H H H D N</td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</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></td>
<td>$40.37</td>
<td>$50.19</td>
<td>$60.01</td>
<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td></td>
<td>$41.78</td>
<td>$52.31</td>
<td>$62.83</td>
<td></td>
</tr>
<tr>
<td>3rd 6 months</td>
<td></td>
<td>$43.18</td>
<td>$54.41</td>
<td>$65.63</td>
<td></td>
</tr>
<tr>
<td>4th 6 months</td>
<td></td>
<td>$44.58</td>
<td>$56.51</td>
<td>$68.43</td>
<td></td>
</tr>
<tr>
<td>5th 6 months</td>
<td></td>
<td>$45.98</td>
<td>$58.61</td>
<td>$71.23</td>
<td></td>
</tr>
<tr>
<td>6th 6 months</td>
<td></td>
<td>$47.39</td>
<td>$60.72</td>
<td>$74.05</td>
<td></td>
</tr>
<tr>
<td>Class B- 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 7/1/2015</td>
<td>$46.95</td>
<td>$59.36</td>
<td>$71.76</td>
<td>X X H H H H D N</td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class C- 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 7/1/2015</td>
<td>$46.37</td>
<td>$58.49</td>
<td>$70.60</td>
<td>X X H H H H D</td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class D- Oiler, fireman, heater operator, brock concrete breaker, elevators (other than passenger), end dump &amp; skid steer</td>
<td>EN-324UP-DGU 7/1/2015</td>
<td>$45.43</td>
<td>$57.08</td>
<td>$68.72</td>
<td>X X H H H H D</td>
</tr>
<tr>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number:  
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 Hourly</th>
<th>Double Overtime</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane 220' boom &amp; jib</td>
<td>EN-324UP-GU</td>
<td></td>
<td>7/1/2015</td>
<td>$51.20</td>
<td>$65.73</td>
<td>$80.26</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MGU</td>
<td></td>
<td>7/1/2015</td>
<td>$51.70</td>
<td>$66.48$81.26</td>
<td>$X$H$H$H$H$D$N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Engineer Steel Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane 120' boom &amp; jib</td>
<td>EN-324UP-120S</td>
<td></td>
<td>7/8/2015</td>
<td>$51.10</td>
<td>$65.58$80.06</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane 140' boom &amp; jib</td>
<td>EN-324UP-140S</td>
<td></td>
<td>7/8/2015</td>
<td>$51.35</td>
<td>$65.96$80.56</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane 220' boom &amp; jib</td>
<td>EN-324UP-220S</td>
<td></td>
<td>7/8/2015</td>
<td>$51.60</td>
<td>$66.33$81.06</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane with 300' boom &amp; jib</td>
<td>EN-324UP-300S</td>
<td></td>
<td>7/8/2015</td>
<td>$53.33</td>
<td>$68.93$84.52</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane with 400' boom &amp; jib</td>
<td>EN-324UP-400S</td>
<td></td>
<td>7/8/2015</td>
<td>$55.05</td>
<td>$71.51$87.96</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressor, Welder &amp; Forklift</td>
<td>EN-324UP-CWS</td>
<td></td>
<td>7/8/2015</td>
<td>$47.35</td>
<td>$59.96$72.56</td>
<td>$X$H$H$H$H$D</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MS</td>
<td></td>
<td>7/8/2015</td>
<td>$52.10</td>
<td>$67.08$82.06</td>
<td>$X$H$H$H$H$D$Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>comment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td>Name</td>
<td>Description</td>
<td>Last Updated</td>
<td>Straight Hourly</td>
<td>Time and Half Hourly</td>
<td>a Double Time</td>
<td>Overtime Provision</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>--------------</td>
<td>------------------</td>
<td>----------------------</td>
<td>---------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Oiler &amp; Fireman</td>
<td>EN-324UP-OFS</td>
<td>7/8/2015</td>
<td>$46.05</td>
<td>$58.01</td>
<td>$69.96 X X H H H H D Y</td>
<td></td>
<td></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>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator</td>
<td>EN-324UP-OS</td>
<td>7/8/2015</td>
<td>$50.60</td>
<td>$64.83</td>
<td>$79.06 X X H H H H D Y</td>
<td></td>
<td></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>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 1st 6 months: $40.56, $50.52, $60.48
- 2nd 6 months: $41.98, $52.65, $63.32
- 3rd 6 months: $43.41, $54.80, $66.18
- 4th 6 months: $44.84, $56.94, $69.04
- 5th 6 months: $46.26, $59.07, $71.88
- 6th 6 months: $47.68, $61.20, $74.72

**Painter**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>a Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painter</td>
<td>PT-1011</td>
<td>7/17/2015</td>
<td>$31.25</td>
<td>$41.01</td>
<td>$50.76 H H H H H H D N</td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 1st 1000 hours: $23.45, $29.30, $35.16
- 2nd 1000 hours: $24.42, $30.76, $37.10
- 3rd 1000 hours: $25.40, $32.23, $39.06
- 4th 1000 hours: $26.37, $33.68, $41.00
- 5th 1000 hours: $27.35, $35.16, $42.96
- 6th 1000 hours: $28.32, $36.61, $44.90
- 7th 1000 hours: $29.30, $38.08, $46.86
- 8th 1000 hours: $30.27, $39.54, $48.80

---

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number: 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.
### Bridge Painter (under 30 feet)

<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>
</tr>
</thead>
<tbody>
<tr>
<td>PT-1011B</td>
<td>8/28/2015</td>
<td>$35.89</td>
<td>$47.97</td>
<td>$60.04</td>
<td>$H $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>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT-1011-DF</td>
<td>7/17/2015</td>
<td>$37.67</td>
<td>$50.64</td>
<td>$63.60</td>
<td>$H $H $H $H $H $D $N</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 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

<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>
</tr>
</thead>
<tbody>
<tr>
<td>TM247</td>
<td>4/17/2015</td>
<td>$28.20</td>
<td>$38.20</td>
<td></td>
<td>$H $H $H $H $H $H</td>
</tr>
</tbody>
</table>

**General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant**

### Tap cutter/CCTV Tech/Grout Equipment Operator

<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>
</tr>
</thead>
<tbody>
<tr>
<td>TM247-2</td>
<td>4/17/2015</td>
<td>$32.70</td>
<td>$44.95</td>
<td></td>
<td>$H $H $H $H $H $H</td>
</tr>
</tbody>
</table>

**Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment**

---

Official Request #: 1268  
Requestor: Michigan Technological University  
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls  
Project Number:  
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>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCTV Technician/Combo Unit Operator:</td>
<td>TM247-3</td>
<td>$31.45</td>
<td>$43.07</td>
<td>H H H H H H H H</td>
<td>N</td>
</tr>
<tr>
<td>Combo Unit driver &amp; Jetter-Vac Operator</td>
<td>TM247-5</td>
<td>$33.20</td>
<td>$45.70</td>
<td>H H H H H H H H</td>
<td>N</td>
</tr>
<tr>
<td>Pipe Bursting &amp; Slip-lining Equipment Operator</td>
<td>TM247-6</td>
<td>$34.20</td>
<td>$47.20</td>
<td>H H H H H H H H</td>
<td>N</td>
</tr>
<tr>
<td>Plasterer</td>
<td>PL16UP</td>
<td>$38.71</td>
<td>$51.63</td>
<td>$64.54</td>
<td>H H 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

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number: 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.
## Official 2015 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 10/26/2015

**Contract must be awarded by:** 1/24/2016

Page 21 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Last Updated</th>
<th>Straight Time &amp; a Half Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumber &amp; Pipefitter</td>
<td>PL-111</td>
<td>7/30/2009</td>
<td>$47.61 $71.42 $95.22 H 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

| Commercial Roofer | RO-149-UP | 4/17/2015 | $28.23 $36.56 $44.88 X X X X X X D Y |

*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

| Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV | SR-1 | 11/3/2014 | $42.76 $57.75 $72.74 H H H H H H D N |

Official Request #: 1268

Requestor: Michigan Technological University

Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls

Project Number:

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>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II</td>
<td>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>11/3/2014</td>
<td>$41.23</td>
<td>$55.46</td>
<td>$69.68</td>
<td>H H H H H H D N</td>
</tr>
<tr>
<td>Sheet Metal Worker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 1 &amp; 2</td>
<td>$23.44</td>
<td>$31.31</td>
<td>$39.17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 3</td>
<td>$29.35</td>
<td>$37.75</td>
<td>$46.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 4</td>
<td>$30.93</td>
<td>$40.12</td>
<td>$49.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 5</td>
<td>$35.50</td>
<td>$45.47</td>
<td>$55.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 6</td>
<td>$37.07</td>
<td>$47.83</td>
<td>$58.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 7</td>
<td>$38.65</td>
<td>$50.20</td>
<td>$61.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 8</td>
<td>$40.22</td>
<td>$52.55</td>
<td>$64.89</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 9</td>
<td>$41.79</td>
<td>$54.91</td>
<td>$68.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 10</td>
<td>$43.36</td>
<td>$57.27</td>
<td>$71.17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Apprentice Rates:
1st 6 months $27.51 $33.82 $40.13
2nd 6 months $29.50 $36.51 $43.52
3rd 6 months $31.50 $39.21 $46.92
4th 6 months $33.51 $41.92 $50.33
5th 6 months $35.52 $44.63 $53.75
6th 6 months $37.53 $47.34 $57.16
7th 6 months $39.53 $50.04 $60.56
8th 6 months $41.53 $52.74 $63.96

Sprinkler Fitter

Apprentice Rates:
Class 1 & 2 $23.44 $31.31 $39.17
Class 3 $29.35 $37.75 $46.15
Class 4 $30.93 $40.12 $49.31
Class 5 $35.50 $45.47 $55.45
Class 6 $37.07 $47.83 $58.59
Class 7 $38.65 $50.20 $61.75
Class 8 $40.22 $52.55 $64.89
Class 9 $41.79 $54.91 $68.03
Class 10 $43.36 $57.27 $71.17

Official Request #: 1268
Requestor: Michigan Technological University
Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls
Project Number: 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 Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck Driver</td>
<td>TM-RB2</td>
<td>of all trucks of 8 cubic yd capacity or over</td>
<td>8/8/2013</td>
<td>$41.92</td>
<td>$37.85</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>TM-RB2A</td>
<td>of all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)</td>
<td>8/8/2013</td>
<td>$41.82</td>
<td>$37.70</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TM-RB2B</td>
<td>on euclid type equipment</td>
<td>8/8/2013</td>
<td>$41.35</td>
<td>$38.08</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th></th>
<th>0-1,000 work hours</th>
<th>1,001-2,000 work hours</th>
<th>2,001-3,000 work hours</th>
<th>3,001-4,000 work hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground Laborer Open Cut, Class I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Laborer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$28.35</td>
<td>$29.23</td>
<td>$30.11</td>
<td>$31.87</td>
</tr>
<tr>
<td></td>
<td>$36.08</td>
<td>$37.40</td>
<td>$38.72</td>
<td>$41.36</td>
</tr>
<tr>
<td></td>
<td>$43.81</td>
<td>$45.57</td>
<td>$47.33</td>
<td>$50.85</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th></th>
<th>0-1,000 work hours</th>
<th>1,001-2,000 work hours</th>
<th>2,001-3,000 work hours</th>
<th>3,001-4,000 work hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underground Laborer Open Cut, Class II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<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></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$28.46</td>
<td>$29.34</td>
<td>$30.23</td>
<td>$32.00</td>
</tr>
<tr>
<td></td>
<td>$36.25</td>
<td>$37.57</td>
<td>$38.90</td>
<td>$41.56</td>
</tr>
<tr>
<td></td>
<td>$44.03</td>
<td>$45.57</td>
<td>$47.33</td>
<td>$51.11</td>
</tr>
</tbody>
</table>

Official Request #: 1268

Requestor: Michigan Technological University

Project Description: 11-16-01 Walker Arts & Humanities Center HVAC Controls

Project Number:  

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.
### Official 2015 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 10/26/2015  
**Contract must be awarded by:** 1/24/2016  

#### Underground Laborer Open Cut, Class III

<table>
<thead>
<tr>
<th>Name 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>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>LAUC-Z5-3 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>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 0-1,000 work hours: $28.56  
- 1,001-2,000 work hours: $29.45  
- 2,001-3,000 work hours: $30.34  
- 3,001-4,000 work hours: $32.13

#### Underground Laborer Open Cut, Class IV

<table>
<thead>
<tr>
<th>Name 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>Trench or excavating grade man.</td>
<td>LAUC-Z5-4 10/30/2014</td>
<td>$33.07</td>
<td>$43.16</td>
<td>$53.25</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</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

<table>
<thead>
<tr>
<th>Name 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>Pipe Layer</td>
<td>LAUC-Z5-5 10/30/2014</td>
<td>$33.12</td>
<td>$43.24</td>
<td>$53.35</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</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

---

**Official Request #:** 1268  
**Requestor:** Michigan Technological University  
**Project Description:** 11-16-01 Walker Arts & Humanities Center HVAC Controls  
**Project Number:**  
**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 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>Classification</th>
<th>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>Underground Laborer Open Cut, Class VI</td>
<td>LAUC-Z5-6 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 &amp; the installation and repair of water service pipe and appurtenances.</td>
<td>10/30/2014</td>
<td>$30.50</td>
<td>$39.31</td>
<td>$48.11</td>
<td>X X X X X X D Y</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- 0-1,000 work hours: $26.66 $33.55 $40.43
- 1,001-2,000 work hours: $27.43 $34.70 $41.97
- 2,001-3,000 work hours: $28.20 $35.86 $43.51
- 3,001-4,000 work hours: $29.73 $38.16 $46.57

### 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>Classification</th>
<th>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>Underground Laborer Open Cut, Class VII</td>
<td>LAUC-Z5-7 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

---

**Official Request #:** 1268  
**Requestor:** Michigan Technological University  
**Project Description:** 11-16-01 Walker Arts & Humanities Center HVAC Controls  
**Project Number:**  
**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>Violations</th>
<th>Employer</th>
<th>Address</th>
<th>Claim</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HALE GROUP &amp; ASSOCIATES LLC</td>
<td>16623 PLYMOUTH RD DETROIT, MI 48227</td>
<td>168254</td>
<td>10/29/2013</td>
</tr>
<tr>
<td>3</td>
<td>MOSS TELECOMMUNICATIONS SERVICES</td>
<td>561 CENTURY SW GRAND RAPIDS, MI 49503</td>
<td>182798</td>
<td>06/25/2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>182796</td>
<td>06/25/2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>182795</td>
<td>09/17/2015</td>
</tr>
<tr>
<td>2</td>
<td>NEW CREATIONS GROUP PAINTING LLC</td>
<td>1061 TREVOR PLACE DETROIT, MI 48207</td>
<td>172288</td>
<td>04/30/2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>172285</td>
<td>04/30/2014</td>
</tr>
</tbody>
</table>
## Contractor Violation Unpaid

<table>
<thead>
<tr>
<th>Violations</th>
<th>Employer</th>
<th>Address</th>
<th>Claim</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A &amp; R ENTERPRISES INC</td>
<td>3721 W MICHIGAN AVE STE 102 LANSING, MI 48917</td>
<td>165580</td>
<td>06/17/2013</td>
</tr>
<tr>
<td>1</td>
<td>A &amp; R ENTERPRISES LLC</td>
<td>33849 GATES CLINTON TWP, MI 48035</td>
<td>165502</td>
<td>07/15/2013</td>
</tr>
<tr>
<td>2</td>
<td>AAA ELECTRICAL SERVICES INC</td>
<td>5462 ORO DR SHELBY TWP, MI 48315</td>
<td>177031</td>
<td>09/04/2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>177030</td>
<td>09/04/2014</td>
</tr>
<tr>
<td>1</td>
<td>ANDY J EGAN COMPANY</td>
<td>2001 WALDORF NW GRAND RAPIDS, MI 49544</td>
<td>167938</td>
<td>09/25/2014</td>
</tr>
<tr>
<td>1</td>
<td>BEAL CONSTRUCTION SERVICES INC</td>
<td>221 FELCH ST STE 11 ANN ARBOR, MI 48103</td>
<td>183806</td>
<td>09/09/2015</td>
</tr>
<tr>
<td>3</td>
<td>BOOMER COMPANY</td>
<td>1940 E FOREST AVE DETROIT, MI 48207</td>
<td>170005</td>
<td>04/17/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>169934</td>
<td>04/17/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>169307</td>
<td>04/17/2013</td>
</tr>
<tr>
<td>1</td>
<td>FOUR SEASONS BUILDING MAINTENANCE</td>
<td>14315 INDUSTRIAL CENTER SHELBY TWP, MI 48315</td>
<td>165205</td>
<td>02/11/2013</td>
</tr>
<tr>
<td>1</td>
<td>FOUR SEASONS ROOFING &amp; SHEETMETAL LLC</td>
<td>14315 INDUSTRIAL CENTER DR SHELBY TWP, MI 48315</td>
<td>168556</td>
<td>03/06/2013</td>
</tr>
<tr>
<td>6</td>
<td>G &amp; B ELECTRICAL</td>
<td>5393 DEERFIELD VILLAGE DR WEST BLOOMFIELD, MI 48322</td>
<td>174355</td>
<td>12/03/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>174354</td>
<td>12/03/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>174353</td>
<td>12/03/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>168558</td>
<td>12/03/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>164289</td>
<td>01/09/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>164057</td>
<td>01/09/2013</td>
</tr>
<tr>
<td>1</td>
<td>GREAT LAKES ELEVATOR</td>
<td>530 E GRAND RIVER RD WILLIAMSTON, MI 48895</td>
<td>182508</td>
<td>07/08/2015</td>
</tr>
<tr>
<td>1</td>
<td>MOSS AUDIO CORPORATION</td>
<td>561 CENTURY AVE SW GRAND RAPIDS, MI 49503</td>
<td>178867</td>
<td>02/10/2015</td>
</tr>
<tr>
<td>1</td>
<td>PENINSULA INSULATING</td>
<td>833 N ELMOSES LAKE CITY, MI 49651</td>
<td>174032</td>
<td>09/20/2013</td>
</tr>
<tr>
<td>7</td>
<td>PENINSULA INSULATION</td>
<td>833 N AL MOSES RD LAKE CITY, MI 49651</td>
<td>173527</td>
<td>08/23/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>173526</td>
<td>08/23/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>173525</td>
<td>08/23/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>173524</td>
<td>01/15/2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>172748</td>
<td>12/11/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>172654</td>
<td>08/02/2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>172653</td>
<td>11/26/2013</td>
</tr>
</tbody>
</table>