34-15-01

MUB RETAIL DINING RENOVATIONS
General Contractor Work

January 18, 2016 Bidding
MUB Retail Dining Renovations
34-15-01

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INVITATION TO BID
MICHIGAN TECHNOLOGICAL UNIVERSITY
HOUGHTON, MICHIGAN 49931

PROJECT: MUB Retail Dining Renovations, General Contractor Work
Michigan Technological University Project #34-15-01

PREBID MTG: A mandatory Pre-Bid Walk-Through for interested General Contractors, Electrical
sub-contractors, and Mechanical sub-contractors, will be held at 10 AM (eastern
time) on Thursday January 28, 2016, at the University Memorial Union Building
(MUB), Ground Floor Commons area. Others are also welcome to attend.

DUE DATE: The Owner will receive sealed proposals for the work as herein set forth until 10:00
A.M. local time on February 9, 2016, at the offices of:

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

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

DOCUMENTS: Bidding documents consisting of proposal forms, plans, specifications, and other
pertinent data 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 Architect Jake Guter at 906-487-2714 if you have technical
questions.

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

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

EQUAL EMPLOYMENT OPPORTUNITY: All bidders 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 awardability 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 is an equal opportunity educational institution/equal opportunity employer,
which includes providing equal opportunity for protected veterans and individuals with disabilities.

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

Michigan Technological University reserves the right to reject any or all bids and to waive any informality or
irregularity in any bid received.
Ms. Penny Foetisch  
Facilities Management  
Michigan Technological University  
1400 Townsend Drive  
Houghton, MI  49931-1295

The Project involves the remodel of approximately 3,000 SF of space with the University Memorial Union Building. Work includes demolition of CMU partitions, ceilings, flooring, and associated mechanical and electrical services. New work involves new drywall, ceilings, flooring, mechanical systems, and electrical service, coordinated with new kitchen equipment provided under a separate contract.

Having carefully read the specifications and drawings dated January 18, 2016 for Michigan Technological University MUB Retail Dining Renovation Project, the undersigned agrees to perform the work in accordance with the Contract Documents and the proposed schedule for Project No. 34-15-01.

Our lump sum base bid price 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: ____________________________

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

Mechanical:________________________________________________________

Electrical:________________________________________________________ 

Flooring:_________________________________________________________ 

Drywall Work:____________________________________________________ 

Other ______________________________:________________________________ 

34-15-01 / MUB Retail Dining  
Renovations  
00 42 00 - 1  
1/18/2016
BID PROPOSAL FORM

Contractor: _______________________________________________________

Name: __________________________________________________________________ Date: ________________
(Signature)

Name: __________________________________________________________________
(Print)

Title: ___________________________________________________________________

Contact Information (Phone and email): _______________________________________

Sealed proposals will be received at Facilities Management, Bldg. 44, on the waterfront of Michigan Technological University, Houghton, Michigan until 10:00 A.M. on January 18, 2016.
This Agreement, is authorized and made to be effective as of this < > day of February, 2016 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 34-15-01 for the MUB Retail Dining Renovations as prepared by UPEA of Houghton, MI and dated January 18, 2016

The Project involves the remodel of approximately 3,000 SF of space with the University Memorial Union Building. Work includes demolition of CMU partitions, ceilings, flooring, and associated mechanical and electrical services. New work involves new drywall, ceilings, flooring, mechanical systems, and electrical service, coordinated with new kitchen equipment provided under a separate contract.
Coordination with kitchen equipment supplied and installed by another contract with the University is to be part of the General Contractors scope of work.

ARTICLE 3 – SCHEDULE AND LIQUIDATED DAMAGES

The Contractor shall complete Work in per the Project Schedule noted in Specification Section 00 60 00.

The Work to be performed under this Contract shall begin February 29, 2016 or Date of Notice to Proceed and shall be substantially completed on or before the Completion Date, August 6, 2016.

It is mutually agreed that Michigan Tech shall withhold from the Contractor, as liquidated damages and not as penalty, the sum of four (4) times the approximate daily gross receipts for each calendar day that the Work remains uncompleted beyond the Project Completion Date.

ARTICLE 4 - PROGRESS PAYMENTS:

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

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

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

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

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

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

2) The portion of the Total Contract Amount that is materials and equipment delivered and suitably stored 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) Upon completion of 50% of the total project work, the retainage will be reduced to five percent (5%) of the amount completed to that point, and will remain at five percent (5%) for the remainder of the project.

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

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

6) Michigan Tech shall review the Application for Payment and if acceptable, sign it; thus it will become a Certificate of Payment.

7) Provided Certificate of Payment is 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 a notice of Substantial Completion. Upon receipt of written notice that the Work is ready for inspection and acceptance, Michigan Tech shall promptly inspect the Work.

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

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

ARTICLE 6 - THE CONTRACT DOCUMENTS:

The Contract Documents, together with this Agreement, form the Contract, and they are as fully a part of the Contract as attached:
- Specifications for the project dated January 18, 2016 as listed in the Table of Contents
- Drawings for this project dated January 18, 2016 as listed on the Cover Sheet.
- Any Addendum issued prior to the bid date.

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

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

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>Contract 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

Name and Title __________________________________________________________

34-15-04 / MUB Retail Dining Renovations
00 52 00 - 4
1/18/2016

DRAFT AGREEMENT
FOR MICHIGAN TECHNOLOGICAL UNIVERSITY

_______________________________________ Date ______________________
Ellen S. Horsch
Vice President for Administration
00 60 00 PROJECT SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Overall Project Schedule for the MUB Retail Dining Renovations.

1.02 RELATED REQUIREMENTS
   A. Section 01 10 00 - Summary: Contract descriptions, description of alterations work, work by
      others, future work, occupancy conditions, use of site and premises, work sequence.
   B. Section 01 20 00 - Price and Payment Procedures: Applications for payment, Schedule of
      Values, modifications procedures, closeout procedures.

1.03 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Contractors Schedule: As soon as practical after award of the contract, the contractor shall
      develop their own project schedule indicating the steps needed to achieve the Owner’s overall
      Project Schedule. Submit to the Owner for review and approval.
      1. Maintain project schedule and update monthly. Submit updates to Owner with each pay
         request.

PART 2 PRODUCTS: Not used

PART 3 EXECUTION

3.01 MAINTAINING OVERALL PROJECT SCHEDULE
   A. It is critical to the Owner that the overall project schedule be maintained. The Retail Dining
      Staff require sufficient time before the start of the Fall 2016 semester to stock and prepare the
      Retail Dining area for service. It is mandatory that the Retail Dining outlet be in operation for
      students at the start of the semester.
   B. Note that once renovated area is turned over for University occupancy, access will be very
      limited. Therefore, all work including but not limited to punch list completion and final cleaning,
      must be completed by 5 pm on the day noted as the completion date.

3.02 LIQUIDATED DAMAGES
   A. It is mutually agreed that Michigan Tech shall withhold from the Contractor, as liquidated
      damages and not as penalty, the sum of four (4) times the approximate daily gross receipts for
      each calendar day that the Work remains uncompleted beyond the Project Completion Date.

3.03 ATTACHMENTS
   A. Sample Schedule
   B. Overall Project Schedule

END OF SECTION
## MUB Retail Dining Renovations

### Overall Schedule

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Bidding</td>
<td>17 days</td>
<td>1/18/16</td>
<td>2/9/16</td>
</tr>
<tr>
<td>2</td>
<td>Bid Award, Contract</td>
<td>13 days</td>
<td>2/10/16</td>
<td>2/26/16</td>
</tr>
<tr>
<td>3</td>
<td>Submittals and pre-purchase</td>
<td>45 days</td>
<td>2/29/16</td>
<td>4/29/16</td>
</tr>
<tr>
<td>4</td>
<td>Last Day of Semester</td>
<td>0 days</td>
<td>4/29/16</td>
<td>4/29/16</td>
</tr>
<tr>
<td>5</td>
<td>Staff Cleanout of space</td>
<td>4 days</td>
<td>5/1/16</td>
<td>5/4/16</td>
</tr>
<tr>
<td>6</td>
<td>Construction</td>
<td>47 days</td>
<td>5/5/16</td>
<td>7/8/16</td>
</tr>
<tr>
<td>7</td>
<td>FSEC Install Hoods</td>
<td>3 days</td>
<td>6/6/16</td>
<td>6/8/16</td>
</tr>
<tr>
<td>8</td>
<td>FSEC Equipment Install</td>
<td>10 days</td>
<td>7/11/16</td>
<td>7/22/16</td>
</tr>
<tr>
<td>9</td>
<td>Final MEP Equipment Hookups</td>
<td>5 days</td>
<td>7/25/16</td>
<td>7/29/16</td>
</tr>
<tr>
<td>10</td>
<td>Equip startup, Public Health Inspections, Punch List</td>
<td>5 days</td>
<td>8/1/16</td>
<td>8/5/16</td>
</tr>
<tr>
<td>11</td>
<td>Staff move-in and set up</td>
<td>5 days</td>
<td>8/8/16</td>
<td>8/12/16</td>
</tr>
<tr>
<td>12</td>
<td>Dry-run of serving</td>
<td>5 days</td>
<td>8/15/16</td>
<td>8/19/16</td>
</tr>
<tr>
<td>13</td>
<td>Retail Dining Unit Open</td>
<td>0 days</td>
<td>8/22/16</td>
<td>8/22/16</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project Summary**

- **Project Name**: MUB Retail Dining Renovations
- **Date**: 1/18/16
010000 - GENERAL REQUIREMENTS

1.1. INSTRUCTION TO BIDDERS

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

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

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

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

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

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

1.2. GENERAL CONDITIONS

1.2.1. DEFINITIONS

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

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, before commencing work, 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 results of any such defects or conditions which would have been revealed by complete examination and testing.

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

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

1.2.7. EMPLOYEES AND SUPERINTENDENCE: The Contractor shall enforce good order among his employees and shall not employ on the work any negligent, disorderly, intemperate or unfit person, or any anticipated or indicated 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.

1.2.10. 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.

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

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

1.2.12. NONCOMPLIANCE WITH CONTRACT-TERMINATION: The Owner, at its option, may order suspension of the Work in whole or in part for such time as it deems necessary because of the failure of the Contractor to comply with the contractual requirements. The contract completion date shall not be extended on account of any suspension order by the Owner. In the event the Owner orders a suspension of the work, the Contractor shall not be entitled to any costs or damages resulting from such suspension; the Owner shall not in any manner be liable or responsible for such costs or damages. The rights of the Owner provided in this clause are in addition to any other rights or remedies provided under this Contract or by law.

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

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

1.2.14. PAYMENT: Payment for the work will be made in one sum at the completion of the contract except that partial payments aggregating 90% of the value of the completed work may be made at monthly intervals. If the contractor expects to request partial 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 assure 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 make the following orders or assessments:

- suspend the contractor from further work on the project
- require the contractor to pay damages to affected employees
- order the contractor to comply with the terms of the contract
- seek civil penalties or fines
- declare the contractor in default and terminate the contract
7. The Contractor will include, or incorporate by reference, with the Director of Engineering Services and approved by all construction schedules, and shall be arrived at in consultation with the commencement and completion of the various stages of work. The Contractor shall prepare a progress schedule showing the dates for the various Divisions herein.

7. The Contractor will include, or incorporate by reference, with the Director of Engineering Services and approved by all construction schedules, and shall be arrived at in consultation with the commencement and completion of the various stages of work. The Contractor shall prepare a progress schedule showing the dates for the various Divisions herein.

1.2.16 PERMITS, FEES AND NOTICES: The Contractor shall secure and pay for all permits, fees, and licenses required by State or Local governments necessary for the proper execution and completion of the work. The Contractor shall specifically secure Houghton County permits for Electrical, Mechanical and Plumbing work and schedule work inspections as required for approval. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and orders of any public authority bearing on the performance of the work. The University retains full jurisdiction of construction on campus and will make final determination of all variances.

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

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

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

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

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

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

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

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

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

A temporary dust-proof enclosure of the work area, including existing machinery 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 satisfaction of the Facilities Management Manager of Planning, Engineering, and Construction.

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

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

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

1. Products listed are no longer available.

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

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

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

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

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

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

1.2.25. SUBCONTRACTS: The Contractor shall, as soon as practicable after the execution of the contract, notify the Owner in writing of the names of proposed subcontractors for the work. If the Contractor submits a list of proposed subcontractors 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 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.
PART 1  PROTECTION - Contractor shall properly protect all new and existing work from damage. Proper safety provisions shall be made at all times for the protection of all persons and property. Contractor shall contact "Miss Dig" for all underground construction work as required by Michigan Public Act No. 53, 1974 and amended by P.A. 204, 1975.

PART 2  SHOP DRAWINGS

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

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

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

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

"REVIEWED AS NOTED & RELEASED" Deficiencies as marked indicate the drawings and schedules are subject to corrections, however deficiencies are such that resubmittal is not required and item is released subject to meeting the requirements of the Contract Documents.

"REVIEWED AS NOTED & SUBMIT" Deficiencies as marked indicate the drawings and schedules are subject to corrections, however deficiencies are such that resubmittal is required. Item is released for shop drawing work only; item is released for corrections and resubmittal for final approval.

"REJECTED AND RETURNED" Submittal does not meet the requirements of the Contract Documents and is rejected. Resubmittal of item meeting the Contract Document is required.

2.04 The University's approval of such drawings shall not relieve the Contractor from the responsibility for deviations from drawings and specifications unless he has, in accompanying letter, called the University's attention to such deviation at the time of submission and secured written approval. University's approval shall not relieve the Contractor from responsibility for errors in shop drawings and schedules.
PART 3 DEFINITIONS

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

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

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

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

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

PART 6 SCHEDULE OF VALUES: Within two weeks after start of job, the contractor shall provide the University with an itemized schedule of values for each division and major subdivision of work. The 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 shall follow the construction schedule shown in Specification Section 00 60 00. Work on all buildings for this contract is expected to be completed on or before August 6, 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
01 00 01 SUPPLEMENTARY GENERAL CONDITIONS

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

PART 11 SUMMARY OF WORK

11.01 Perform all work indicated in the Contract Documents.

11.02 The Project involves the remodel of approximately 3,000 SF of space with the University Memorial Union Building. Work includes demolition of CMU partitions, ceilings, flooring, and associated mechanical and electrical services. New work involves new drywall, ceilings, flooring, mechanical systems, and electrical service, coordinated with new kitchen equipment provided under a separate contract.

Coordination with kitchen equipment supplied and installed by another contract with the University is to be part of the General Contractors scope of work.

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

END OF SECTION 01000
01 00 02 PAYMENT PROCEDURES

PART 1 – GENERAL

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

1.02 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.

1.03 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. 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.
8. Certificates of insurance and insurance policies.

G. 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

H. 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.

END OF SECTION 010001
APPLICATION AND CERTIFICATION FOR PAYMENT

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.

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

CHANGE ORDER SUMMARY

<table>
<thead>
<tr>
<th>ADDITIONS</th>
<th>DEDUCTIONS</th>
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<td>Total changes approved in previous months by Owner</td>
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<td>Total approved this Month</td>
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<td>TOTALS</td>
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<td>NET CHANGES by Change Order</td>
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The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: __________________________ Date: __________________________

Subscribed and sworn to before me this ____________ day of _____________, 2009

County of: __________________________ State of: __________________________

Notary Public: ______________________________________________

My Commission expires on: ____________________________

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.
AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing  
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>MATERIALS PRESENTLY STORED (NOT IN D OR E)</th>
<th>THIS PERIOD</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>
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Users may obtain validation of this document by requesting of the license a completed AIA Document D401 - Certification of Document's Authenticity.
01 00 08 Certificate of Substantial Completion

<table>
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<th>Project: MUB Retail Dining Renovations</th>
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<td>1400 Townsend Drive</td>
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<td>Houghton, MI  49931</td>
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<td>Project Number: 34-15-01</td>
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<tr>
<td>Contract for: General Construction</td>
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<td>Contract Date:</td>
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**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 requests that Michigan Tech issue a notice of Substantial Completion 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.

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 **completion date listed on the Project Schedule**.

______________________ ______________________ ______________________
Contractor Signature  By     Date

______________________ ______________________ ______________________
Owner Signature  By     Substantial Completion Date

The **Date of Commencement of Warranties** for all items, as established by the Contract Documents, including those as listed below, is also the date of **Substantial Completion Date** for the aforementioned project.

______________________ ______________________
Owner Signature  By     Date of Commencement of Warranties Completion Date

34-15-01 / MUB Retail Dining Renovations  01 00 08 - 1  1/18/2016  CERTIFICATE OF SUBSTANTIAL COMPLETION
Project: MUB Retail Dining Renovations
Owner: Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Project Number: 34-15-01
Contract for: General Construction
Contract Date: 

Contractor:

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:

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The CONTRACTOR, as a condition precedent to final payment, shall execute this Guaranty to the OWNER, guaranteeing for one (1) year from the date noted below, 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.

The Date of Commencement for the Guaranty for all items as established by the Contract Documents, is _____________________________

OWNER:  
Print 
Signature 
Date

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

TO OWNER:
(Name and address)

ARCHITECT'S PROJECT NO.:

ARCHITECT
OWNER

CONTRACT FOR:

PROJECT:
(Name and address)

CONTRACT DATED:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
Surety, on bond of
Surety
Surety, Contractor,
Surety, Owner,
hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of
Contractor,
Owner,
any of its obligations to
Owner,
as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
Owner,
Surety,
Attest:
Seal:

CAUTION: You should sign an original AIA document that has this caution printed in red. An original assures that changes will not be obscured as may occur when documents are reproduced. See Instruction Sheet for Limited License for Reproduction of this document.
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 any 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

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B. CHANGES FROM THE PREVIOUS EDITION

Changes in the location of various items of information were made, without revision to the substance of the document.

C. COMPLETING THE G707 FORM

GENERAL: The bond form is the usual source of required information such as the contract 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 form requires both the Surety's seal and the signature of the Surety's authorized representative.
SWORN STATEMENT

STATE OF MICHIGAN

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)

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>
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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

Subscribed and sworn to before me this __________ day of ______________________________, 20 _____

________________________________________
Notary Public

___________________________County, Michigan

My Commission Expires: ______________________
My/our contract with ________________________________ to provide
(Other contracting party)

______________________________ for the improvement of the property described as

Michigan Technological University’s MUB Retail Dining Renovations 34-15-01, 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.

________________________________________
(Printed Name of Lien Claimant)

________________________________________
(Signature of lien claimant)

Signed on:__________________________

Address:__________________________

________________________________________

Telephone:__________________________

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

END OF SECTION 010018
010020 Certificate of Final Completion

Project: MUB Retail Dining Renovations
Owner: Michigan Technological University

Project Number: 34-15-01
Contract for: General Construction
Contract Date: ______________________

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

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 foregoing affidavit in my presence.

By: __________________________

Authorized Representative

My Commission Expires:

________________________ (date)

Owner __________________________

Owner Signature __________________________

Final Completion Date __________________________

End of Section 010020
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)

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<th>CHANGE IN CONTRACT PRICE:</th>
<th>CHANGE IN CONTRACT TIMES:</th>
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<tr>
<td>Original Contract Price: $</td>
<td>Original Contract Times: (calendar days or dates)</td>
</tr>
<tr>
<td>Net changes from previous C. O.’s No. _____ to _____ $</td>
<td>Net changes from previous C. O.’s No. _____ to _____ (calendar days)</td>
</tr>
<tr>
<td>Contract Price Prior to this Change Order: $</td>
<td>Contract Times prior to this Change Order: (calendar days or dates)</td>
</tr>
<tr>
<td>Net Increase (decrease) of this Change Order: $</td>
<td>Net Increase (decrease) of this Change Order: (calendar days)</td>
</tr>
<tr>
<td>Contract Price with all Approved Change Orders: $</td>
<td>Contract Times with all Approved Change Orders: (calendar days or dates)</td>
</tr>
</tbody>
</table>

**ACCEPTED:** (Contractor)

By: 
Date: 

**APPROVED:** (Owner): Michigan Tech University

By: 
Date:
PART 1 GENERAL

1.01 PROJECT
A. Project Name: MUB Retail Dining Renovations
B. Owner's Name: Michigan Technological University.
C. The Project involves the remodel of approximately 3,000 SF of space with the University Memorial Union Building. Work includes demolition of CMU partitions, ceilings, flooring, and associated mechanical and electrical services. New work involves new drywall, ceilings, flooring, mechanical systems, and electrical service, coordinated with new kitchen equipment provided under a separate contract.
D. Coordination with kitchen equipment supplied and installed by another contract with the University is to be part of the General Contractors scope of work.

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

1.03 DESCRIPTION OF WORK
A. Scope of demolition and removal work is shown on drawings and specified in Section 024100 Demolition. Demolition includes but is not limited to; removal of CMU walls and column surrounds, ceiling removal, flooring removal, equipment removal, electrical outlets & wiring & conduit removal, removal of lights, removal of ductwork and mechanical equipment, and other miscellaneous items.
B. Disposal of removal items is by the General Contractor, except for minor items that Michigan Tech Facilities Management may request.
C. The complete scope of the new work is shown on the drawings.
D. New work includes Installation of new metal stud and drywall partitions, new ceilings, new flooring, new doors, new soffit, and a new security gate.
E. New work also includes installation of new outlets, wiring, conduits, light fixtures, power and hookups for equipment provided by others, and other miscellaneous electrical work.
F. New work also includes installation of new mechanical equipment, plumbing work, HVAC ductwork, controls, and connections to equipment and exhaust fans provided by others.
G. Other work includes but is not limited to installation of conduits and boxes for data, as well as wiring and termination of data lines. Final installation of data items (security cameras, electronic menu boards, etc) shall be by Michigan Tech.
H. The General Contractor shall be responsible for coordinating the work of this project with the work of the equipment supplier, who is contracted with the University under a separate contract. The General Contractor shall include in his bid to provide this coordination which shall include review of equipment shop drawings and submittals, coordination of installation of equipment that impacts the work, and coordination of sub-contractors for electrical, mechanical and plumbing connections to the equipment. The General Contractor shall also coordinate the schedule of this project to allow for sufficient time and space for the equipment contractor to install the equipment.

1.04 WORK BY OWNER
A. Michigan Tech will remove all existing loose equipment and food with in-house staff prior to the contractor starting work.
B. Michigan Tech will award a separate contract for the purchase and installation of the kitchen equipment.
C. Michigan Tech will install final equipment and connect to data wiring and devices provided under this contract. This includes electronic menu boards, security cameras, printers, and registers.
1.05 OWNER OCCUPANCY
   A. Michigan Tech will be occupying adjacent areas of the building during the entire construction period.
   B. Michigan Tech intends to occupy the Project upon Substantial Completion.
   C. Cooperate with Michigan Tech to minimize conflict and to facilitate Michigan Tech’s operations.
   D. Refer to the schedule of work to accommodate Michigan Tech occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES
   A. Campus Restrictions: See the Michigan Technological University’s website for additional information on these items.
      1. Firearms are prohibited on the campus of Michigan Technological University
      2. The campus is a tobacco, smoke, and vapor free site.
   B. Construction Operations: Limited to areas immediately adjacent or in front of the buildings being worked on.
   C. Arrange use of site and premises to:
      1. Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
         a. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
            1) Schedule deliveries to minimize use of driveways and entrances by construction operations.
            2) Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   D. 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. Time Restrictions:
      1. Limit conduct of especially noisy work that could be heard in other parts of the building to early morning times if possible.
   F. Utility Outages and Shutdown:
      1. Coordinate all required utility shutdowns with Michigan Tech at least 3 business days prior to the shutdown.
      2. Limit disruption of utility services to hours the building is unoccupied.
      3. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE
   A. Coordinate construction schedule and operations with Michigan Tech.

END OF SECTION 011000
PART 1 – GENERAL

1.01 SUMMARY
A. Section includes administrative and procedural requirements for substitutions.
B. Related Requirements:
   1. Section 016000 Product Requirements for requirements for submitting comparable product submittals for products by listed manufacturers.

1.02 DEFINITIONS
A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.03 ACTION SUBMITTALS
A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use CSI Form 13.1A.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects with project names and addresses and names and addresses of architects, engineers, and owners.
      h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
      i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
      j. Cost information, including a proposal of change, if any, in the Contract Sum.
      k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
      l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
   3. Michigan Tech's Action: If necessary, Michigan Tech will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Michigan Tech will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
      a. Forms of Acceptance: Change Order, Construction Change Directive, or Michigan Tech's
Supplemental Instructions for minor changes in the Work.

b. Use product specified if Michigan Tech does not issue a decision on use of a proposed substitution within time allocated.

1.04 QUALITY ASSURANCE
A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 – PRODUCTS

2.01 SUBSTITUTIONS
A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 10 days prior to time required for preparation and review of related submittals.

1. Conditions: Michigan Tech will consider Contractor's request for substitution when the following conditions are satisfied:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Requested substitution will not adversely affect Contractor's construction schedule.
   c. Requested substitution has received necessary approvals of authorities having jurisdiction.
   d. Requested substitution is compatible with other portions of the Work.
   e. Requested substitution has been coordinated with other portions of the Work.
   f. Requested substitution provides specified warranty.
   g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

END OF SECTION 01 2500
### SUBSTITUTION REQUEST

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### Proposed Substitution:

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<tr>
<th>Installer:</th>
<th>Address:</th>
<th>Phone:</th>
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**History:**

- [ ] New product
- [ ] 1-4 years old
- [ ] 5-10 years old
- [ ] More than 10 years old

**Differences between proposed substitution and specified product:**

```

```

**Point-by-point comparative data attached — REQUIRED BY A/E**

**Reason for not providing specified item:**

```

```

### Similar Installation:

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<th>Project:</th>
<th>Architect:</th>
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<th>Date Installed:</th>
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**Proposed substitution affects other parts of Work:**

- [ ] No
- [ ] Yes; explain

**Savings to Owner for accepting substitution:**

- $( )

**Proposed substitution changes Contract Time:**

- [ ] No
- [ ] Yes [Add] [Deduct] ________ days.

**Supporting Data Attached:**

- [ ] Drawings
- [ ] Product Data
- [ ] Samples
- [ ] Tests
- [ ] Reports
- [ ] ________
SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:
• Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
• Same warranty will be furnished for proposed substitution as for specified product.
• Same maintenance service and source of replacement parts, as applicable, is available.
• Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
• Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
• Proposed substitution does not affect dimensions and functional clearances.
• Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
• Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: __________________________
Signed by: __________________________
Firm: __________________________
Address: __________________________
Telephone: __________________________
Attachments: __________________________

A/E’s REVIEW AND RECOMMENDATION
☐ Approve Substitution - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Approve Substitution as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Reject Substitution - Use specified materials.
☐ Substitution Request received too late - Use specified materials.
Signed by: __________________________ Date: __________________________

OWNER’S REVIEW AND ACTION
☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
☐ Substitution rejected - Use specified materials.
Signed by: __________________________ Date: __________________________

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E
PART 1 - GENERAL

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

1.02 DEFINITIONS
B. Action Submittals: Written and graphic information and physical samples that require Michigan Tech's responsive action.
C. 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.

1.03 ACTION SUBMITTALS
D. 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.

1.04 SUBMITTAL ADMINISTRATIVE REQUIREMENTS
E. Electronic copies of digital data files of the specified items can be provided by Michigan Tech for Contractor's use in preparing submittals.
F. Processing Time: Provide submittals as soon as possible after award of contract to insure sufficient lead time for materials in time for the May 2016 construction start date. 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.
G. Submittal form: All submittals shall be submitted electronically to extent possible. For actual samples, provide sample directly to the architect, and include electronic submittal cover page.
H. Electronic Submittals: 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.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.
   o. Indication of full or partial submittal.
   p. Transmittal number, numbered consecutively.
   q. Submittal and transmittal distribution record.
   r. Other necessary identification.
   s. Remarks.

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

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

K. 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.

L. 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.

M. 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

2.01 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:
   1. Submit electronic submittals via email as PDF electronic files.
   2. Submit to Architect and Michigan Tech simultaneously.
      a. Michigan Tech will review and forward comments to the Architect
      b. The Architect shall incorporate Michigan Tech’s comments with their own.
      c. Stamped and annotated submittal will be returned to Contractor and Michigan Tech simultaneously.
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. 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.
2. 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.
3. Submit Shop Drawings in the following format:
   a. PDF electronic file.

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-
01 3300 SUBMITTAL PROCEDURES

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.
b. 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.

2.02 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

3.01 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 Architect.

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

C. 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.

3.02 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 01 3300
01 5000 TEMPORARY FACILITIES

PART 1 – GENERAL

1.1 SUMMARY
A. Section includes requirements for temporary facilities, support facilities, storage facilities, and security and protection facilities.
B. Related Requirements:
   1. Section 011000 Summary for work restrictions and limitations on utility interruptions.
   2. Comply with requirements of Section 017419 - Waste Management, remove from site all materials not to be reused on site.
C. For this project the Contractor may use the existing building utilities as necessary at no charge. Contractor is responsible for making any temporary connections that may be necessary.
D. Storage on site and on Michigan Tech’s campus is extremely limited. Any storage of material for the project is the Contractor’s responsibility, and any cost for storage should be included in the base bid amount.

1.2 USE CHARGES
A. General: Installation and removal of and use charges for temporary facilities shall be included in the Total Contract Amount. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Michigan Tech, testing agencies, and authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS
A. If storage facilities are temporary facilities, the following must be provided and the facilities must adhere to the remainder of this specification, as necessary so stored materials remain free from damage.
   1. Site Plan: Coordinate with Michigan Tech regarding location temporary facilities, construction trailers, utility hookups, staging areas, and parking areas for construction personnel.
   2. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.
B. If storage facilities are rented or other facilities, the facilities must adhere to the remainder of this specification, as necessary so stored materials remain free from damage.

1.4 QUALITY ASSURANCE
A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS
A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Michigan Tech’s acceptance, regardless of previously assigned responsibilities.

PART 2 – PRODUCTS

2.1 EQUIPMENT
A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type
heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 – EXECUTION

3.1 GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

   1. Protect existing site improvements to remain including curbs, pavement, and utilities.

D. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

D. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Coordinate with Michigan Tech for any perceived use of electrical service.

3.3 VEHICULAR ACCESS AND PARKING

A. Comply with Michigan Tech regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Michigan Tech.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Coordinate with Michigan Tech Facilities Management and refer to construction plans for designated temporary parking areas to accommodate construction personnel.

3.4 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Michigan Tech’s operations from unauthorized entry, vandalism, or theft.

B. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed
areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
   1. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL
   A. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
   B. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
      1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
      2. Keep interior spaces reasonably clean and protected from water damage.
      3. Discard or replace water-damaged and wet material.
      4. Discard, replace, or clean stored or installed material that begins to grow mold.
      5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
   C. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
      1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
      2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.
   D. Control moisture so stored materials, furniture, and appliances are not damaged in (temporary) storage facilities during time of storage. Contractor will assume full replacement costs without reimbursement.

3.6 BARRIERS
   A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Michigan Tech's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
   B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
   C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

3.7 OPERATION, TERMINATION, AND REMOVAL
   A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
   B. Maintenance: Maintain facilities in good operating condition until removal.
      1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Michigan Tech reserves right to take possession of Project identification signs.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017000 Execution and Closeout Requirements.

END OF SECTION 015000
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Section 012500 Substitution Procedures for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

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

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Michigan Tech's Action: If necessary, Michigan Tech will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Michigan Tech will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
      a. Use product specified if Michigan Tech does not issue a decision on use of a comparable product request within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of...
016000 PRODUCT REQUIREMENTS

construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017000 Closeout Procedures.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Michigan Tech will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish
016000 PRODUCT REQUIREMENTS

salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
016000 PRODUCT REQUIREMENTS

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

END OF SECTION 016000
PART 1 GENERAL

1.01 RELATED REQUIREMENTS
   A. Section 010008 – Substantial Completion Notice
   B. Section 017010 – Final Cleaning: for final cleaning of each apartment
   C. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

1.02 COORDINATION
   A. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
   B. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
   C. Coordinate completion and clean-up of work of separate sections.
   D. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 SUBMITTAL OF PROJECT WARRANTIES
   A. Submit written warranties on request of Michigan Tech Facilities Management for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Michigan Tech's rights under warranty.
   B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS
   A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
   B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
   C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 012500 and Section 016000.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION
A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS
A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Michigan Tech four days in advance of meeting date.
D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS
A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS
A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.
B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, etc.): Remove, relocate, and extend existing systems to accommodate project work.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

H. Clean existing systems and equipment.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.
3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.
B. See Alterations article above for additional requirements.
C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-conforming work.
D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
G. Restore work with new products in accordance with requirements of Contract Documents.
H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 ADJUSTING
A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING
A. See Section 01 70 10 for Final Cleaning requirements for the apartments.

3.11 CLOSEOUT PROCEDURES
A. Each phase of the project will go through the closeout procedure when the phase is complete.
B. Notify Michigan Tech when work is considered ready for Substantial Completion, and submit the Substantial Completion Notice to the Owner.
C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Michigan Tech's review.
D. Correct items of work listed in executed Certificates of Substantial Completion and the Final Completion Checklist.
E. Notify Michigan Tech when work is considered finally complete.

END OF SECTION 01 7000
SECTION 01 07 10 FINAL CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Final cleaning of Project.

1.02 RELATED REQUIREMENTS
   A. Section 01 10 00 - Summary: Contract descriptions, description of alterations work, work by others, future work, occupancy conditions, use of site and premises, work sequence.
   B. Section 01 70 00 - Execution and Closeout Requirements: Examination, preparation, and general installation procedures; preinstallation meetings; cutting and patching; cleaning and protection; starting of systems; demonstration and instruction; closeout procedures except payment procedures; requirements for alterations work.

PART 2 PRODUCTS: Not Used

PART 3 EXECUTION

3.01 EXAMINATION
   A. Examine project area to verify that it is ready for final cleaning, and that all construction work has been completed.

3.02 FINAL CLEANING
   A. Use cleaning materials that are nonhazardous.
   B. Clean interior window glass, all surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
   C. Steam clean all carpets, mop all floors, and wipe with disinfectant all horizontal and vertical surfaces.
   D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
   E. Clean surfaces and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
   F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

END OF SECTION
PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.
B. Any cost or savings from scrap of any materials or appliances must be incorporated into the contract price.
C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
D. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
E. Optional Recycling, Salvage, Reuse, or Landfills.
F. Recycling is optional for this project; Contractor is responsible for implementation. Revenue or savings must be reflected in the Contractor’s bid price.
G. Methods of trash/waste disposal that are not acceptable are:
   1. Burning or burying on the project site.
   2. Dumping or burying on other property, public or private or other illegal dumping or burying.
   3. Incineration, either on- or off-site.
H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.
I. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
   Remove debris, junk, and trash from site periodically.
K. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers.
L. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
M. Leave site in clean condition, ready for subsequent work.
N. Clean up spillage and wind-blown debris from public and private lands.

1.02 RELATED REQUIREMENTS

A. Section 015000 Temporary Facilities and Controls: Additional related requirements.
B. Section 024100 Demolition: Additional related requirements.

1.03 DEFINITIONS

A. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
B. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
C. Reuse: To reuse a construction waste material in some manner on the project site.
D. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
E. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

END OF SECTION
SECTION 024119.13 - SELECTIVE BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolishing designated building equipment and fixtures.
2. Demolishing designated construction.
3. Cutting and alterations for completion of the Work.
4. Removing designated items for reuse and Owner’s retention.
5. Protecting items designated to remain.
6. Removing demolished materials.

1.2 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.

1.3 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.

C. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

1.4 QUALITY ASSURANCE

A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.

B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.5 PRE-INSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements: Pre-installation meeting.
B. Convene minimum one week prior to commencing work of this section.

1.6 SEQUENCING

A. Owner will conduct salvage operations before demolition begins to remove materials Owner chooses to retain.

1.7 SCHEDULING

A. Schedule Work to coincide with new construction.

B. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in adjoining spaces.

C. Coordinate utility and building service interruptions with Owner.

1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.8 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

C. Erect, and maintain temporary barriers and security devices at locations indicated, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
D. Provide appropriate temporary signage including signage for exit or building egress.
E. Do not close or obstruct building egress path.
F. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

3.2 SALVAGE REQUIREMENTS
A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
B. Tag components and equipment Owner designates for salvage.
C. Protect designated salvage items from demolition operations until items can be removed.
D. Carefully remove building components and equipment indicated to be salvaged.
E. Disassemble as required to permit removal from building.
F. Package small and loose parts to avoid loss.
G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.3 DEMOLITION
A. Conduct demolition to minimize interference with adjacent and occupied building areas.
B. Maintain protected egress from and access to adjacent existing buildings at all times.
C. Do not close or obstruct sidewalks without permits.
D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.
E. Disconnect and remove designated utilities within demolition areas.
F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.
G. Demolish in orderly and careful manner. Protect existing improvements, supporting structural members.
H. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations, until reinstalled.

I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

K. Remove temporary Work.

L. Patch existing remaining surfaces adjacent to demolition work to provide a seamless finish between new and existing surfaces.

M. Contractor shall be responsible for restoration of installed construction that is damaged as a result of construction and cutting and patching activities.

END OF SECTION 024119
SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Load-bearing formed-steel stud interior wall and soffit framing.
   2. Formed-steel slotted-channel framing and bridging.

B. Related Requirements:
   1. Section 061053 - Miscellaneous Rough Carpentry: Rough wood blocking.
   2. Section 072116 - Blanket Insulation: Insulation within framing members.
   3. Section 072600 - Vapor Retarders: Coordination with walls and finishes as specified by this Section.
   4. Section 072700 - Air Barriers: Coordination with walls and finishes as specified by this Section.
   5. Section 092116 - Gypsum Board Assemblies: Lightweight, non-load-bearing metal stud framing.

1.2 REFERENCE STANDARDS

A. American Iron and Steel Institute:
   1. AISI S213: North American Standard for Cold-Formed Steel Framing - Lateral Design.
   2. AISI S214: North American Standard for Cold-Formed Steel Framing - Truss Design.
   3. AISI General - Standard for Cold-Formed Steel Framing - General Provisions.
   4. AISI Header - Standard for Cold-Formed Steel Framing - Header Design.
   5. AISI NAS - North American Specification for the Design of Cold-Formed Steel Structural Members.
   6. AISI PM - Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings.
   7. AISI WSD - Standard for Cold-Formed Steel Framing - Wall Stud Design.

B. American Welding Society:
   1. AWS D1.1 - Structural Welding Code - Steel.
   2. AWS D1.3 - Structural Welding Code - Sheet Steel.

C. ASTM International:
   2. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
3. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

D. California Department of Health Services:

E. Green Seal:

F. National Association of Architectural Metal Manufacturers:

G. SSPC: The Society for Protective Coatings:
   1. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
   2. SSPC Paint 20 - Zinc-Rich Coating (Type I - Inorganic and Type II - Organic).

H. Steel Stud Manufacturers Association:
   1. SSMA - Product Technical Guide.

1.3 COORDINATION
   A. Section 013000 - Administrative Requirements: Requirements for coordination.

1.4 SUBMITTALS
   A. Section 013300 - Submittal Procedures: Requirements for submittals.
   B. Product Data: Submit data on standard framing members; describe materials and finish, product criteria.
   C. Shop Drawings:
      1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work.
      2. Indicate stud layout.
      3. Describe method for securing studs to tracks and for bolted and welded framing connections.
   D. Manufacturer's Installation Instructions: Submit special procedures and perimeter conditions requiring special attention.
   E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
F. Mill Certifications: Submit mill certifications for steel delivered to Site. Certify steel bare metal thickness of 1 mil, yield strength, tensile strength, total elongation in 2-inch or 8-inch gauge length, chemical analysis, and galvanized coating thickness.

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.

1.5 QUALITY ASSURANCE

A. Calculate structural properties of framing members according to AISI NAS.

B. Furnish framing materials according to SSMA - Product Technical Guide.

C. Perform Work according to following:
   1. Framing: AISI General and AISI NAS.
   4. Wall Studs: AISI WSD.
   6. Residential Framing: AISI PM.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

C. Welders and Welding Procedures: AWS D.1 qualified within previous 12 months for employed weld types.

PART 2 - PRODUCTS

2.1 COLD-FORMED METAL FRAMING

A. Manufacturers:
   1. Clark Steel Framing Systems.
   2. Steel Elements.
   3. Marino Ware
   4. Unimast Incorporated.
   5. Substitutions: Specified in Section 016000 - Product Requirements.
B. Description: ASTM C955.

2.2 FRAMING MATERIALS

A. Steel Sheet:
   1. ASTM A1003.
   2. Structural grade, Type H, metallic coated.
   3. Grade: As required by performance requirements.

B. Studs:
   1. Steel sheet, formed to channel shape, punched web, knurled faces.
   2. Size: 48 mils thick, face and depth as required.

C. Track:
   1. Steel sheet, formed to channel shape.
   2. Width: Same as studs, tight fit.
   4. Type: Solid web.

2.3 FASTENERS


B. Anchorage Devices: Power-actuated.

C. Welding: According to AWS D1.1 and AWS D1.3.

2.4 FABRICATION

A. Fabricate assemblies of formed sections of required sizes and profiles.

B. Fit, reinforce, and brace framing members to suit design requirements.

C. Fit and assemble in largest practical sections for delivery to Site, ready for installation.

2.5 ACCESSORIES

A. Bracing, Furring, and Bridging: Formed sheet steel, thickness determined by performance requirements specified.

B. Plates, Gussets, and Clips: Formed sheet steel, thickness determined by specified performance requirements.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that building framing components are ready to receive Work.

C. Verify that rough-in utilities are in proper location.

3.2 ERECTION

A. Studs:

1. Align floor and ceiling tracks and locate to wall partition layout.
2. Secure in place with fasteners at maximum 24 inches o.c.
3. Coordinate installation of acoustic sealant with floor and ceiling tracks Coordinate installation of acoustic sealant with floor tracks.
4. Place studs at 16 inches o.c., not more than 2 inches from abutting walls, and at each side of openings.
5. Connect studs to tracks using fastener method.
6. Construct corners using minimum of three studs.
7. Double-stud wall openings, door jambs, and window jambs.
8. Erect load-bearing studs one piece, full length; splicing of studs not permitted.
9. Erect load-bearing studs, brace, and reinforce to develop full strength to achieve design requirements.
10. Fully seat axial-loaded studs in receiving tracks at maximum 1/16-inch gap between stud and track web.
12. Install intermediate studs above and below openings to align with wall stud spacing.
13. Install studs with deflection allowance in stud track, directly below horizontal building framing at non-load-bearing framing.
14. Attach cross studs furring channels to studs for attachment of fixtures anchored to walls.
15. Install framing between studs for attachment of mechanical and electrical items and to prevent stud rotation.
16. Touch up field welds and damaged metallic-coatings primed surfaces with primer to match shop coating.

END OF SECTION 054000
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Miscellaneous blocking and sheathing.
   2. Concealed wood blocking for support soffit, plywood backer for menu boards, plastic laminates, security gate pocket and support for kitchen equipment.

1.2 REFERENCE STANDARDS

A. American National Standards Institute / American Hardboard Association:
   1. ANSI/AHA A135.4 - Basic Hardboard.

B. American Wood Protection Association:
   1. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.

C. APA - The Engineered Wood Association:
   1. APA - Plywood Design Specification, including supplements.
   2. APA AFG-01 - Adhesives for Field-Gluing Plywood to Wood Framing.
   3. APA PS 1 - Voluntary Product Standard - Structural Plywood.

D. ASTM International:
   5. ASTM C1396 - Standard Specification for Gypsum Board.

E. National Lumber Grades Authority:
   1. NLGA - Standard Grading Rules for Canadian Lumber.

F. Northeastern Lumber Manufacturers Association:
   1. NELMA - Standard Grading Rules for Northeastern Lumber.

G. Southern Pine Inspection Bureau:
   1. SPIB - Standard Grading Rules for Southern Pine Lumber.

H. U.S. Department of Commerce National Institute of Standards and Technology:
   1. DOC PS 1 - Structural Plywood.
   2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.

I. West Coast Lumber Inspection Bureau:
   1. WCLIB Standard 17 - Grading Rules for West Coast Lumber.

J. Western Wood Products Association:
   1. WWPA - Western Lumber Grading Rules.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:
   1. Protect trusses from warping or other distortion by stacking in vertical position and bracing to resist movement.
   2. Provide additional protection according to manufacturer instructions.

1.4 QUALITY ASSURANCE

A. Perform Work according to:
PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber:
   1. Non-structural Light Framing:
      a. Stress Group: D.
      b. Species: Spruce, Pine, Fir (S.P.F) species.
      c. Grade: 2.
      d. Maximum Moisture Content: 19 percent.
   2. Miscellaneous Framing:
      a. Stress Group: D.
      b. Species: Spruce, Pine, Fir (S.P.F) species.
      c. Maximum Moisture Content: 19 percent.
      d. Treatment: Pressure preservative.

B. Sheathing:

C. Underlayment:
   1. Plywood Underlayment:
      a. Description: APA underlayment Structural I.
      b. Span Rating: 24/16.
      c. Exposure Durability: 1 Exterior.
      d. Facing: Sanded.

2.2 SHEATHING AND UNDERLAYERMENT LOCATIONS

A. Floor Underlayment:
   1. Thickness: 1/4 inch thick.
2. Span Rating: 16”.

2.3 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners:
   2. Nails and Staples: Comply with ASTM F1667.
   3. Drywall Screws:
      a. Description: Bugle head, hardened steel, power-driven.
      b. Length: Three times thickness of sheathing To achieve full penetration of sheathing substrate.
   4. Anchors: Toggle bolt type for anchorage to hollow masonry Expansion shield and lag bolt type for anchorage to solid masonry or concrete Bolt or ballistic fastener for anchorages to steel.

B. Structural Framing Connectors Joist Hangers:
   2. Size: To suit framing conditions.

C. Subfloor Glue:
   1. Description: Waterproof, water-based, air cure type, cartridge dispensed.
   2. Comply with ASTM D3498.

PART 3 - EXECUTION

3.1 APPLICATION

A. Framing:
   1. Select individual pieces such that knots and defects will not interfere with placement of bolts when nailing or making connections.
   2. Discard defective pieces.
   3. Set structural members level, plumb, and in correct position.
   4. Fasten framing according to applicable code.
   5. Make provisions for erection loads and for sufficient temporary bracing to maintain that structure is safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
   6. Place horizontal members crown side up.
7. Construct load-bearing framing members full length without splices.
8. Openings:
   a. Double members at openings over 24 inches wide.
   b. Space short studs over and under opening to stud spacing.

B. Sheathing:
   1. Install gypsum sheathing according to ASTM C1280, Type X fire resistant 5/8”
   2. Fasten sheathing according to applicable code.
   3. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.
   4. Place building paper between floor underlayment and subflooring.
   5. Underlayment:
      a. Install flooring underlayment after dust- and dirt-generating activities have ceased and prior to application of finished flooring.
      b. Apply perpendicular to subflooring; stagger joints of underlayment.
      c. Secure with deformed shank-type fasteners.

6. Backboards:
   a. Install electrical panel backboards with wood structural panel sheathing material where indicated and required.
   b. Size back board 12 inches beyond size of panel.

C. Fireblocking:
   1. Install fireblocking as shown on drawings at column.

3.2 TOLERANCES
A. Section 014000 - Quality Requirements: Requirements for tolerances.
B. Framing and Furring Members to Receive a Finished Wall or Ceiling: Align finish surface to vary not more than 1/8 inch from a theoretical plane or surface of the room or space.
C. Other Framing Members: Maximum 1/4 inch from indicated position.
D. Surface Flatness of Floor:
   1. Minimum: 1/4 inch in 10 feet.
   2. Maximum: 1/2 inch in 30 feet.

END OF SECTION 061000
SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Wood trim at Beverage Center.

B. Related Requirements:
   2. Section 099000 - Painting and Coating: Painting and finishing of finish carpentry items.

1.2 REFERENCE STANDARDS

A. American National Standards Institute:
   1. ANSI A135.4 - Basic Hardboard.
   2. ANSI A156.9 - Cabinet Hardware.
   3. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. APA-The Engineered Wood Association:

C. Architectural Woodwork Institute, Woodwork Institute, and Architectural Woodwork Manufacturers Association of Canada:
   1. AWS - Architectural Woodwork Standards.
   2. Supplemented with The WI Approach.

D. ASTM International:

E. Hardwood Plywood and Veneer Association:
   1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

F. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates.

G. Redwood Inspection Service:
   1. RIS - Redwood Lumber Grades and Use.

H. South Coast Air Quality Management District:
   1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

I. U.S. Department of Commerce National Institute of Standards and Technology:

J. Western Red Cedar Association:
   1. WRCA - Lumber Grades and Standards.

K. Western Wood Products Association:
   1. WWPA - Lumber Grades and Standards.

L. Window and Door Manufacturers Association:
   1. WDMA I.S.4 - Water-Repellent Treatment for Millwork.

1.3 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with electrical rough-in installation of associated and adjacent components.

1.4 PREINSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements: Requirements for preinstallation meeting.

B. Convene minimum one week prior to commencing Work of this Section.

1.5 SEQUENCING

A. Section 011000 - Summary: Requirements for Work sequencing.

B. Sequence Work to ensure utility connections are achieved in orderly and expeditious manner.
1.6 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on:

   1. Fire-retardant treatment materials and application instructions.
   3. Attachment hardware and finish hardware.

C. Shop Drawings:

   1. Indicate materials, component profiles, fastening methods, jointing details and accessories, to minimum scale of 1-1/2 in to 1 ft.

D. Samples:

   1. Submit two samples of finish plywood, 8 x 10 inches in size, illustrating wood grain and specified finish.
   2. Submit two samples of wood trim 10 in long.
   3. Submit two samples of synthetic lumber, hardware items and shop finishes.

E. Qualification Statements:

   1. Submit manufacturer and fabricator experience qualifications.

1.7 QUALITY ASSURANCE

A. Perform Work according to AWS Section 6 and Section 7 custom grade grades identified in Section.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years’ documented experience similar to this Project.

B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years’ documented experience similar to this Project.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect Work from moisture damage.

C. Maintain storage space relative humidity within ranges indicated in AWS Section 2.
1.10 AMBIENT CONDITIONS

A. Section 015000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Maintain storage space relative humidity within ranges indicated in AWS, Section 2.

1.11 EXISTING CONDITIONS

A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 FABRICATION

A. Fabricate finish carpentry to AWS Section 6 custom grade.

B. Shop assemble Work for delivery to Site, permitting passage through building openings.

C. Fit exposed plywood edges with matching hardwood edging, where indicated. Use one piece for full length only.

D. Shop prepare and identify components for book match grain matching during Site erection.

E. When necessary to cut and fit on-Site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and Site cutting.

2.2 FINISHES

A. Sand Work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes.

D. Finish Work according to AWS Section 5; custom grade; clear transparent stained transparent opaque type:

E. Stain, seal and varnish exposed to view surfaces.

F. Seal semi-concealed surfaces.

G. Prime paint Seal surfaces in contact with cementitious materials.
2.3 ACCESSORIES

A. Fasteners, Bolts, and Anchors: ASTM A153, hot-dip galvanized ASTM B695, Class 55 mechanically galvanized Type 304 stainless Type 316 stainless steel.

B. Concealed Joint Fasteners: Threaded steel.


D. Primer: Acrylic primer sealer type.

E. Wood Filler: Solvent base, tinted to match surface finish color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting Work of this Section are placed and ready to receive this Work.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Prime paint surfaces of wood items and assemblies to be in contact with cementitious materials.

C. Prime paint surfaces of wood items and assemblies.

3.3 INSTALLATION

A. Modify and extend existing finish carpentry installations using materials and methods as specified.

B. Install Work according to AWS Section 6 and Section 7 custom grade and manufacturer's instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 in. Do not use additional overlay trim to conceal larger gaps.

E. Install components trim with finish nails or screws at 12 in o.c.
F. Install hardware **supplied by Section 08 71 00**.

G. Preparation for Site Finishing:
   
   2. Site Finishing: Comply with Section 099000 - Painting and Coating.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Requirements for tolerances.

B. Conform to AWS Section 6 requirements for the following:

   1. Smoothness.
   2. Gaps.
   3. Flushness.
   4. Flatness.

END OF SECTION 062000
SECTION 079000 - JOINT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sealants and joint backing, and accessories.

B. Related Sections:
1. Section 078400 - Firestopping: Firestopping sealants.
2. Section 092116 - Gypsum Board Assemblies: Acoustic sealant.
3. Section 093000 - Tiling: Sealant used as tile grout.

1.2 REFERENCES

A. ASTM International:
   2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

B. California Department of Health Services:

C. South Coast Air Quality Management District:

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Samples: Submit two samples, 2x1/8 inch in size illustrating sealant colors for selection.
D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.

E. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements.

B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

PART 2 - PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers
   1. BASF Building Systems
   2. DAP Products Inc
   3. Dow Corning Corporation
   4. GE Construction Sealants
   5. Pecora Corporation
   6. Sika Corporation
   7. Tremco Incorporated
   8. Substitutions: Section 016000 - Product Requirements.

B. Products Description:
   1. General Purpose Interior Sealant (Sealant): Acrylic emulsion latex; ASTM C834, single component, paintable.
      b. Applications: Use for interior wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated.
   2. Acoustical Sealant: Butyl or acrylic sealant; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
      a. Applications: Use for concealed locations only at acoustically rated construction.
1) Provide sealant bead between top stud runner and structure and between bottom stud track and floor.

2.2 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Verify substrate surfaces and joint openings are ready to receive work.

C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter impairing adhesion of sealant.

B. Clean and prime joints.

C. Perform preparation in accordance with ASTM C1193.

D. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

A. Perform installation in accordance with ASTM C1193.

B. Perform acoustical sealant application work in accordance with ASTM C919.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
2. Neck dimension no greater than 1/2 of joint width.
3. Surface bond area on each side not less than 75 percent of joint width.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.4 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Final cleaning.

B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 017000 - Execution and Closeout Requirements: Protecting installed construction.

B. Protect sealants until cured.

END OF SECTION 079000
SECTION 08 12 14

STANDARD STEEL FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes non-rated steel frames.
   1. Provide frames for interior doors.

B. Related Sections:
   1. Section 08 71 00 - Door Hardware: Hardware.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. National Fire Protection Association:
   2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.

D. Underwriters Laboratories Inc.:
   1. UL 10B - Fire Tests of Door Assemblies.
   2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
   3. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

C. Product Data: Submit frame configuration and finishes.

D. Manufacturer's Installation Instructions: Submit special installation instructions.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
1.4 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Smoke and Draft Control Door Frames: Tested in accordance with UL 1784 and installed in accordance with NFPA 105.
   1. Air Leakage: Maximum 3.0 cfm/sf of door opening with 0.10 inch water gage pressure differential.

C. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept frames on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.7 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with frame opening construction, door, and hardware installation.

PART 2 PRODUCTS

2.1 STANDARD STEEL FRAMES

A. Manufacturers:
   1. Amweld Building Products, Inc.
   2. Ceco Door Products.
   3. Dunbarton Corp..
   4. Kewanee Corp.
   5. Republic Builders Products.
   6. Steelcraft
   7. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Standard shop fabricated steel frames, fire rated and non-rated types.
   1. Interior Frames:
2.2 ACCESSORIES

A. Removable Stops: Rolled steel channel shape, butted corners; prepared for countersink style screws.

B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.

C. Silencers: Specified in Section 08 71 00. Resilient rubber set in steel fitted into drilled hole.

D. Weatherstripping: Specified in Section 08 71 00.

2.3 FABRICATION

A. Fabricate frames as required for site conditions for gypsum board slip on type.

B. Fabricate frames with hardware reinforcement plates welded in place.

C. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

D. Terminate door stops 6 inches above finished floor. Cut stop at 45 degree angle and close.

E. Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.

2.4 SHOP FINISHING

A. Primer: Baked.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with ANSI A250.8.

B. Coordinate with gypsum board wall construction for anchor placement.

C. Coordinate installation of glass and glazing specified in Section 08 80 00.
D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 14 16.

E. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.3 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.
SECTION 081313.13 - STANDARD HOLLOW METAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes non-rated, and acoustic steel doors.

B. Related Sections:
   1. Section 081214 - Standard Steel Frames.
   2. Section 087100 - Door Hardware.
   3. Section 099000 - Painting and Coating: Field painting of doors.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.

B. ASTM International:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. ASTM E413 - Classification for Rating Sound Insulation.

C. Hollow Metal Manufacturers Association:
   1. HMMA 810 - Hollow Metal Doors.

D. National Fire Protection Association:
   2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.

E. Steel Door Institute:

F. Underwriters Laboratories Inc.:
   1. UL 10B - Fire Tests of Door Assemblies.
2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
3. UL 1784 - Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for and finishes.

C. Product Data: Submit door configurations, location of cut-outs for hardware reinforcement.

D. Samples: Submit two samples of door face metal, 4x4 inch in size illustrating shop finish colors and surface texture.

E. Manufacturer's Installation Instructions: Submit special installation instructions.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI A250.8.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect doors with resilient packaging sealed with heat shrunk plastic.

1.7 COORDINATION

A. Section 013000 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work with door opening construction, door frame, and door hardware installation.

C. Coordinate installation to accommodate door hardware electric wire connections.
PART 2 - PRODUCTS

2.1 STANDARD STEEL DOORS

A. Manufacturers:
   1. Amweld International, LLC
   2. Apex Industries, Inc
   3. Ceco Door
   5. Substitutions: Section 016000 - Product Requirements.

B. Product Description:
      a. Level 3 - Extra heavy Duty, Model 1, full flush design.

2.2 COMPONENTS

A. Face: Steel sheet in accordance with ANSI A250. SDI 108.

B. End Closure: Channel, 0.04 inches thick, flush.

C. Core: vertical steel stiffeners.

D. Thermal Insulated Door: Total insulation R-Value of 2.4, measured in accordance with ASTM C1363.

E. Sound Rated Door: STC of 26, measured in accordance with ASTM E413.

2.3 ACCESSORIES

A. Removable Stops: Rolled steel, channel shape, mitered corners; prepared for countersink style screws.

B. Primer: ANSI A250.10 rust inhibitive type.

2.4 FABRICATION

A. Fabricate doors with hardware reinforcement welded in place.

2.5 SHOP FINISHING

A. Steel Sheet: Galvanized to ASTM A653/A653M A40 A60.

B. Steel Sheet: Galvanized to ASTM A653/A653M G40.

C. Primer: Baked.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors in accordance with ANSI A250.8.

B. Install door louvers, plumb and level.

C. Coordinate installation of glass and glazing specified in Section 088000.

D. Coordinate installation of doors with installation of frames specified in Section 081214 and hardware specified in Section 087100.

E. Touch-up damaged shop finishes.

3.3 ERECTION TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Maximum Diagonal Distortion: 1/16 1/8 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

A. Section 017000 - Execution and Closeout Requirements: Requirements for adjusting.

B. Adjust door for smooth and balanced door movement.

END OF SECTION 081313.13
PART 1 GENERAL

1.1 SUMMARY

   A. Section Includes:
      1. Flush wood doors.
      2. Door louvers.

   B. Related Requirements:
      1. Section 08 12 14 - Standard Steel Frames.
      2. Section 08 71 00 - Door Hardware.

1.2 REFERENCE STANDARDS

   A. American National Standards Institute:
      1. ANSI A135.4 - Basic Hardboard.

   B. ASTM International:
      2. ASTM E413 - Classification for Rating Sound Insulation.

   C. Architectural Woodwork Institute:
      1. AWI AWS - Architectural Woodwork Standards.

   D. Consumer Products Safety Commission:

   E. Hardwood Plywood and Veneer Association:
      1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

   F. National Electrical Manufacturers Association:
      1. NEMA LD 3 - High Pressure Decorative Laminates.

   G. National Fire Protection Association:
      2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.

   H. National Institute of Justice
      1. NIH 0108.1 - Ballistic Resistant Protective Materials.
I. Underwriters Laboratories Inc.:
   1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
   2. UL 1784 - Air Leakage Tests of Door Assemblies.

J. Wood Window and Door Manufacturers Association:
   1. WDMA LS 1A - Architectural Wood Flush Doors.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with door opening construction, door frame and door hardware installation.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Submit data for door core materials and construction.
   2. Submit data for veneer species, type and characteristics.
   3. Submit data for factory finishes.

C. Shop Drawings:
   1. Indicate door opening criteria, elevations, sizes, types, swings, undercuts required special blocking for hardware, and factory machining criteria.
   2. Indicate cutouts for glazing.

D. Samples:
   1. Submit two samples of door veneer, 6x6 inch in size illustrating wood grain, stain color, and sheen.

E. Manufacturers' Instructions: Submit special installation instructions.

F. Qualification Statements:
   1. Submit manufacturer experience qualifications.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AWI AWS Section 9, Premium Grade grades identified in section.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer when stored more than one week.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.
   1. Break seal on site to permit ventilation.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

C. Interior Doors:
   1. Factory Finished Doors: Furnish manufacturer’s life of installation warranty.
   2. Field Finished Doors: Furnish manufacturer’s two year warranty.

PART 2 PRODUCTS

2.1 FLUSH WOOD DOORS

A. Manufacturer List:
   1. Algoma Hardwoods Inc.
   2. Eggers Industries
   3. Graham Manufacturing Corp.
   4. Marshfield Door Systems
   5. Mohawk Flush Doors, Inc.
   6. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

B. Flush Interior Doors: Solid core.
   1. Thickness: 1-3/4 inches
   2. Core: PC.
   3. Face Construction: five ply.
   5. Quality Grade: Premium.
   7. Finish: Factory applied, to match existing.

C. Performance / Design Criteria:
   1. Performance Duty Level: WDMA I.S. 1A.
2.2 MATERIALS

A. Door Cores: AWI AWS Section 9.
   1. Solid Core, Non-Fire Rated:
      a. Type: PC.

B. Interior Door Faces:
   1. Transparent Finished Faces: Wood veneer.
      a. Species: Birch
      b. Veneer Cut: Plain sliced.
      c. Veneer Matching: Book matched.
      d. Face Matching: Center balanced. Pair match multiple door leaves in single opening.
      e. Finish: Factory applied to match existing.

C. Hardboard: ANSI A135.4; type as specified for door faces; 1/8 inch thick.

2.3 FABRICATION

A. Fabricate doors in accordance with AWI AWS Section 9 requirements.

B. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement.

C. Vertical Exposed Edge of Stiles: Wood veneer matching door facing.

D. Fit door edge trim to edge of stiles after applying veneer facing.

E. Bond edge banding to cores.

F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.[Furnish solid blocking for through bolted hardware.

G. Factory fit doors for frame opening dimensions identified on shop drawings.

H. Provide edge clearances in accordance with AWI AWS Section 9.

2.4 FINISHES

A. Finish work in accordance with AWI AWS Section 5; Premium Grade.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color clear sealer to match door facing.
PART 3 EXECUTION

3.1 EXAMINATION
   A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
   B. Verify opening sizes and tolerances are acceptable.
   C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION
   A. Install doors in accordance with AWI AWS Section 9 and manufacturer's instructions.
   B. Verify opening sizes and tolerances are acceptable.
   C. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.

3.3 TOLERANCES
   A. Section 01 40 00 - Quality Requirements: Tolerances.
   B. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over imaginary 36 x 84 inches surface area.
   C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over imaginary 36 x 84 inches surface area.
   D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over imaginary 36 x 84 inches surface area.

3.4 ADJUSTING
   A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
   B. Adjust door for smooth and balanced door movement.
   C. Adjust door closer for full closure.

   END OF SECTION
SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware for wood doors.
   1. Provide door gaskets, including seals, and thresholds.

B. Related Sections:
   1. Section 06 20 00 - Finish Carpentry: Wood door frames.
   2. Section 08 12 14 - Standard Steel Frames: Silencers integral with steel frames.
   3. Section 08 14 16 - Flush Wood Doors.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A156.1 - Butts and Hinges.
   2. ANSI A156.2 - Bored and Preassembled Locks and Latches.
   3. ANSI A156.3 - Exit Devices.
   4. ANSI A156.4 - Door Controls - Closures.
   5. ANSI A156.5 - Auxiliary Locks and Associated Products.
   6. ANSI A156.6 - Architectural Door Trim.
   7. ANSI A156.7 - Template Hinge Dimensions.
   8. ANSI A156.8 - Door Controls - Overhead Holders.
   9. ANSI A156.12 - Interconnected Locks and Latches.
  10. ANSI A156.13 - Mortise Locks and Latches.
  11. ANSI A156.14 - Sliding and Folding Door Hardware.
  12. ANSI A156.15 - Closer Holder Release Devices.
  13. ANSI A156.16 - Auxiliary Hardware.
  14. ANSI A156.18 - Materials and Finishes
  15. ANSI A156.19 - Power Assist and Low Energy Power Operated Doors.
  16. ANSI A156.23 - Electromagnetic Locks.
  17. ANSI A156.24 - Delayed Egress Locks.
  18. ANSI A156 - Complete Set of 24 BHMA Standards (A156 Series) with Binder.

B. Builders Hardware Manufacturers Association:
   1. BHMA Directory of Certified Products.

C. National Fire Protection Association:

D. Underwriters Laboratories Inc.:
   1. UL 10B - Fire Tests of Door Assemblies.
   2. UL 305 - Panic Hardware.
1.3 PERFORMANCE REQUIREMENTS

A. Fire Rated Openings: Provide door hardware listed by UL or Intertek Testing Services (Warnock Hersey Listed), or other testing laboratory approved by applicable authorities.
   1. Hardware: Tested in accordance with NFPA 252.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
   2. Submit manufacturer's parts lists, and templates.

C. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of installed cylinders and their master key code.

C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
   1. ANSI A156 series.
   2. NFPA 80.
   3. UL 305.

B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

C. Perform Work in accordance with State Michigan standard.

D. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
B. Hardware Supplier: Company specializing in supplying commercial door hardware with minimum three years documented experience approved by primary hardware manufacturers.
   1. Substitutions: Section 01 60 00 - Product Requirements / Not Permitted for cylindrical locks.

C. Hardware Supplier Personnel: Employ qualified person to assist in work of this section.

D. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.9 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
   1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

C. Sequence installation to accommodate required utility connections.

D. Coordinate Owner's keying requirements during course of Work.

1.10 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for locksets and door closers.

1.11 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance materials.

B. Furnish special wrenches and tools applicable for each different and for each special hardware component.

C. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

1.12 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish ten extra key lock cylinders for each master keyed group.
PART 2 PRODUCTS

2.1 DOOR HARDWARE

A. Manufacturers:
   1. Glynn-Johnson.
   2. Hager Companies.
   3. LCN Closers.
   5. Reese Industries.
   7. Stanley Hardware.
   8. Von Duprin, Inc.
   9. Best, 7-pin cylindrical lock – no substitutions permitted.
   10. Substitutions: Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
   1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
   2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
   3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
      a. Finish: Match hardware item being fastened.
   4. Fire Ratings: Provide hardware with UL or Intertek Testing Services (Warnock Hersey Listed) listings for type of application involved.
   5. Electrical Devices: Make provisions and coordinate requirements for electrical devices and connections for hardware.

B. Hinges: ANSI A156.1, full mortise type, template type, ANSI A156.7, complying with following general requirements unless otherwise scheduled.
   1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
   2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
   3. Tips: Flat button tips with matching plug.

C. Locksets: Furnish locksets compatible with specified cylinders. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
   1. Mortise Locksets: ANSI A156.2, Series 4000, Grade 1.
   2. Lever handle with through bolted trim, Round rose – varying in size between 2-9/16” to 3-3/8” or largest available size. Lockset shall be complete with combined core and must accept a Best 7-pin interchangeable core. NOR SUBSTITUTES. Provide one of the options noted below;
      a. Corbin Russwin ML3000 Series
      b. Schlage L9000 Series
c. Stanley Best 40H Series.

D. Latch Sets: Match locksets. Typical 2-3/4 inch backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
   1. Mortise Latch Sets: ANSI A156.13, Series 1000, Grade 1 unless otherwise indicated.
   2. Bored (Cylindrical) Latch Sets: ANSI A156.2, Series 4000, Grade 1 unless otherwise indicated.

E. Exit Devices: ANSI A156.3, Grade 1 rim type, with cross bar, unless otherwise indicated. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames, with dust-proof floor strikes.
   1. Types: Suitable for doors requiring exit devices.
   2. Coordinators: Furnish overhead type at pairs of doors.

F. Cylinders: Best 7-Pin interchangeable core type cylinders *Substitutions NOT permitted.

G. Closers: ANSI A156.4 modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
   1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
   2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
   3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
   4. Operating Pressure: Maximum operating pressure as follows.
      a. Interior Doors: Maximum 5 pounds.
   5. Super Smoothy LCN-4040 Regular or Super Smoothy LCN-4041 Handicapped.

H. Protection Plates: Furnish to match existing, unless otherwise indicated, with accessories as required for complete operational door installations., with accessories as required for complete operational door installations.
   1. Kickplates: ANSI A156.6, metal; height indicated in Schedule by 1 inch less than door width; minimum 0.050 inch thick stainless steel.
   2. Clean existing kickplates to like new condition.
   3. Wall Stops: ANSI A156.1, Grade 1, concave pad wall stop with no visible screws.

2.3 ACCESSORIES

A. Lock Trim: Furnish levers with rose escutcheon plate to match existing.

B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible. Through bolts to be concealed where required.

2.4 FINISHING

A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
   1. Hinges:
a. BHMA 630, satin finished stainless steel.

2. Typical High Use Interior Door Hardware:
   a. BHMA 630, satin finished stainless steel.

3. Typical Interior Door Hardware:
   a. BHMA 630, satin finished stainless steel.

4. Closers: Finish appearance to match door hardware on same face of door.
   a. BHMA 630, satin finished stainless steel

5. Other Items: Furnish manufacturer’s standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

C. Verify electric power is available to power operated devices and is of correct characteristics.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights From Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.

1. Locksets: 38 inch.
2. Push/Pulls: 42 inch.
3. Dead Locks: 48 inch.
4. Push Pad Type Exit Devices: 42 inch.
5. Cross Bar Type Exit Devices: 38 inch.
6. Top Hinge: Jamb manufacturer’s standard, but not greater than 10 inches from head of frame to center line of hinge.
7. Bottom Hinge: Jamb manufacturer’s standard, but not greater than 12-1/2 inches from floor to center line of hinge.
8. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
9. Hinge Mortise on Door Leaf: 1/4 inch. to 5/16 inch from stop side of door.

C. Work by Owner; University personnel shall accomplish the final keying and installation of cores. Construction cores may be installed by the Contractor during construction, but must be removed prior to occupancy.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
B. Inspect installation and certify hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust hardware for smooth operation.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

B. Do not permit adjacent work to damage hardware or hardware finish.

Hardware Set 1 (Classroom)
1. Hinges
2. Best 7 pin Cylinder
3. Lever handle Latchset, Schlage L-Series 02 with satin chrome finish. (Classroom)

END OF SECTION
SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal stud wall framing.
2. Metal channel ceiling framing.
5. Tile backer board.
6. Acoustic insulation.

B. Related Requirements:

1. Section 054000 - Cold-Formed Metal Framing.
2. Section 061000 - Rough Carpentry: Building wood framing system.
3. Section 072116 - Blanket Insulation: Acoustic insulation.

1.2 REFERENCE STANDARDS

A. ASTM International:

8. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal stud wall framing.
2. Metal channel ceiling framing.
5. Tile backer board.
6. Acoustic insulation.

B. Related Requirements:

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B. American Society of Civil Engineers:

C. California Department of Health Services:

D. Gypsum Association:
   1. GA 214 - Recommended Levels of Gypsum Board Finish.
   2. GA 216 - Application and Finishing of Gypsum Board.

E. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

F. National Fire Protection Association:
   1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B.

G. South Coast Air Quality Management District:

H. Underwriters Laboratories Inc.:
   1. UL - Fire Resistance Directory.

1.3 PRE-INSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.
1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on metal framing, gypsum board, joint tape; acoustic accessories and.

C. Shop Drawings:
   1. Indicate special details associated with fireproofing and acoustic seals.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Manufacturers:
   1. USG.
   2. NGC.
   3. Georgia-Pacific
   4. Substitutions: Section 016000 - Product Requirements.

B. Framing Manufacturers:
   1. CEMCO
   2. Custom Stud
   3. Diedrich
   4. Substitutions: Section 01 60 00 – Product Requirements.

2.2 COMPONENTS

A. Framing Materials:
   1. Studs and Tracks: GA-216 and GA-600; galvanized sheet steel, thicknesses as required for application.
   2. Furring, Framing, and Accessories: GA-216 and GA-600.
   3. Fasteners: GA-216; length to suit application.
   4. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

B. Gypsum Board Materials: ASTM C1396/C1396M; Type X fire resistant where indicated on Drawings.
1. Standard Gypsum Board: ½ and 5/8 inch thick, maximum available length in place; ends square cut, tapered and beveled edges.
2. Moisture Resistant Gypsum Board: ½ or 5/8 inch thick, maximum available length in place; ends square cut, tapered and beveled square edges.
3. Gypsum Sheathing Board: 1/2 5/8 inch thick, maximum available size in place; ends square cut, square tongue and grooved edges; water repellent paper faces.

C. Tile Backer Boards:
   1. Glass Mat Gypsum Tile Backer Board: ASTM C1178/C1178M; 1/2 inch thick, Type X fire resistant where indicated on Drawings, maximum available length in place; ends square cut, tapered edges; mold resistant.
   2. Tile Backer Board Joint Tape: 2 inch wide, coated glass fiber tape for joints and corners.

2.3 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced, thickness required for sound rating.
B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
C. Gypsum Board Accessories: ASTM C1047; metal; corner beads, edge trim, and expansion joints.
   1. Metal Accessories: Zinc.
   2. Edge Trim: Type L bead.
D. Joint Materials: ASTM C475/C475M; GA-216; reinforcing tape, joint compound, and water.
E. Gypsum Board Screws: ASTM C954 ASTM C1002; length to suit application.
   1. Screws for Steel Framing: Type S.
   2. Screws for Wood Framing: Type W.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.
B. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

3.2 DEMOLITION

A. Extend existing gypsum board installations using materials and methods as specified.
B. Repair and remodel existing gypsum board assemblies which remain or are to be altered.
3.3 INSTALLATION

A. Metal Stud Installation:

1. Install studs in accordance with ASTM C754 ASTM C1007 GA-216 and GA-600.
2. Metal Stud Spacing: 16 inches on center. Extend stud framing to ceiling only. Attach ceiling runner securely to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
3. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
4. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.
5. Blocking: Install blocking for support of plumbing fixtures, wall cabinets, and hardware.

B. Wall Furring Installation:

1. Erect wall furring for direct attachment to concrete masonry walls with adjustable attachment for thru-insulation applications.
2. Install thermal insulation in conjunction with Section 072113 between Z-furring channels directly attached to concrete masonry walls.

C. Furring For Fire Ratings: Install furring as required for fire resistance ratings indicated and to GA-600 requirements.

D. Ceiling Framing Installation:

1. Install in accordance with ASTM C754. GA-216.
2. Coordinate location of hangers with other work.
3. Install ceiling framing independent of walls, columns, and above ceiling work.
4. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
5. Laterally brace entire suspension system.

E. Acoustic Accessories Installation:

1. Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
2. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.
3. Install acoustic sealant within partitions.
4. Install acoustic sealant at gypsum board perimeter at:
   a. Metal Framing: One beads.
   b. Base Layer.
   c. Face Layer.
   d. Seal penetrations of partitions by conduit, pipe, duct work and rough-in boxes.
F. **Gypsum Board Installation:**

1. Install gypsum board in accordance with ASTM C840, GA-216, and GA-600.
2. Erect single layer standard gypsum board, with ends and edges occurring over firm bearing.
3. Erect single layer fire rated gypsum board, with edges and ends occurring over firm bearing.
4. Erect exterior gypsum sheathing in accordance with ASTM C1280, horizontally, with edges butted and ends occurring over firm bearing.
5. Use screws when fastening gypsum board to metal furring or framing.
6. Use screws when fastening gypsum board to wood furring or framing.
7. Double Layer Applications: Use gypsum base for first layer, placed perpendicular to framing or furring members. Use fire rated gypsum base for fire rated partitions and ceilings.
8. Double Layer Applications: Secure second layer to first with adhesive and sufficient support to hold in place. Apply adhesive.
9. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
10. Treat cut edges and holes in moisture resistant gypsum board with sealant.
11. Place control joints consistent with lines of building spaces. Review layout with Architect prior to placement.
12. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials
13. Install cementitious backing board over gypsum board.
14. Apply gypsum board to curved walls in accordance with GA-216.

G. **Joint Treatment:**

1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
2. Feather coats on to adjoining surfaces so that camber is maximum 1/32 inch.
3. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
4. Fill and finish joints and corners of cementitious backing board.

3.4 **TOLERANCES**

A. Section 014000 - Quality Requirements: Tolerances.

B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet.

END OF SECTION 092116
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glass and ceramic, tile for wall applications; thin-set mortar bed application method; cementitious backer board as tile substrate; thresholds at door openings; and ceramic accessories.

B. Related Sections:
   1. Section 079000 - Joint Protection.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A108.1 - Installation of Ceramic Tile, A collection.
   2. ANSI A108.1A - Specifications for Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
   5. ANSI A108.4 - Specifications for Ceramic Tile Installed with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
   6. ANSI A108.5 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   7. ANSI A108.6 - Specifications for Ceramic Tile Installed with Chemical-Resistant, Water-Cleanable Tile-Setting and -Grouting Epoxy.
   8. ANSI A108.7 - Specifications for Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar.
   9. ANSI A108.8 - Specifications for Ceramic Tile Installed with Chemical-Resistant Furan Mortar and Grout.
  10. ANSI A108.9 - Specifications for Ceramic Tile Installed with Modified Epoxy Emulsion Mortar/Grout.
  13. ANSI A118.3 - Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
  14. ANSI A118.4 - Latex-Portland Cement Mortar.
  15. ANSI A118.5 - Chemical-Resistant Furan Mortar and Grout.
  16. ANSI A118.6 - Ceramic Tile Grouts.
  17. ANSI A118.8 - Modified Epoxy Emulsion Mortar/Grout.
  18. ANSI A118.9 - Test Methods and Specifications for Cementitious Backer Units.
20. ANSI A137.1 - Ceramic Tile.

B. ASTM International:

C. California Department of Health Services:

D. Scientific Certification Systems:
   1. SCS EC10.2 - Environmental Certification Program Indoor Air Quality Performance.

E. South Coast Air Quality Management District:

F. Tile Council of America:

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate tile layout, patterns, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

C. Product Data: Submit instructions for using grouts and adhesives.

D. Samples: Submit tile and grout samples, 4x4 inch in size, color variations.

1.4 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.
1.6 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS
A. Section 013000 - Administrative Requirements: Pre-installation meeting.
B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING
A. Section 016000 - Product Requirements: Product storage and handling requirements.
B. Protect adhesives and grouts from freezing or overheating.

1.9 ENVIRONMENTAL REQUIREMENTS
A. Section 016000 - Product Requirements.
B. Do not install adhesives and grouts in unventilated environment.
C. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.10 EXTRA MATERIALS
A. Section 017000 - Execution and Closeout Requirements: Spare parts and maintenance products.
B. Supply one box of each tile size, color, and surface finish of tile specified.

PART 2 - PRODUCTS

2.1 TILE
A. Manufacturers:
   1. Daltile.
   2. Florida Tile
   3. Interceramic
2.2 COMPONENTS

A. Porcelain Wall and Floor Tile: ANSI A137.1, conforming to the following (Design based on Mannington, Seregneti Slate):
   1. Moisture Absorption: 0 to 0.5 percent.
   2. Size: 6x6x1/4 inch.
   3. Shape: Bullnose and Corner.
   4. Edge: Square.
   5. Surface Finish: Matte glazed.
   6. Color: As selected.

B. Base: Same as floor tile.
   1. Length: Tile length.
   2. Height: 6 inch.
   3. Top Edge: Bull nosed.
   4. Internal Corner: Coved.
   5. External Corner: Bullnosed.
   6. Moisture Absorption: 0 to 0.5 percent.
   7. Surface Finish: Matte glazed.
   8. Color: As selected.

C. Glass Tile:
   1. 1x1 mosaic. Based on Sark Acquaris, “SAHE”.

2.3 ACCESSORIES

A. Adhesive Materials:

B. Mortar Materials:
   1. Mortar Bed Materials: ANSI A108.1A; portland cement, sand, latex additive, and water; proportioned in accordance with applicable code.
   2. Mortar Bond Coat Materials:
      b. Latex-Portland Cement type: ANSI A118.4.
      c. Epoxy: ANSI A118.3.

C. Grout Materials:
   b. Color: As selected from manufacturer standard.
2. Grout for Glass tile: Custom Fusion Pro
   b. Color: As selected from manufacturer standard.

D. Cleavage Membrane: 4 mil thick polyethylene film. Reinforced asphalt paper.
E. Waterproofing Membrane at Floors: As specified in Section 093000.
F. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Section 013000 - Administrative Requirements: Coordination and project conditions.
   B. Verify surfaces are ready to receive work.

3.2 PREPARATION
   A. Protect surrounding work from damage.
   B. Vacuum clean surfaces and damp clean.
   C. Seal substrate surface cracks with filler.
   D. Install cementitious backer board. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.

3.3 EXISTING WORK
   A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance service.
   B. Prepare and remodel existing tile installations using materials and methods as specified.
   C. Clean and repair existing tile which remains.

3.4 INSTALLATION
   A. Install tile, thresholds, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook recommendations.
B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Place thresholds edge strips at exposed tile edges.

D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints.

E. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

F. Form internal angles coved and external angles bullnosed.

G. Install ceramic accessories rigidly in prepared openings.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control joints free of adhesive or grout. Apply sealant to joints.

J. Allow tile to set for a minimum of 48 hours prior to grouting.

K. Grout tile joints. Use standard grout unless otherwise indicated.

L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

M. Installation - Wall Tile:
   1. Over cementitious backer units install in accordance with TCA Handbook Method W244, using membrane at toilet rooms, kitchens and W223, organic adhesive.
   2. Over gypsum wallboard on wood or metal studs install in accordance with TCA Handbook Method W243, thin-set with dry-set or latex-portland cement bond coat W223, thin-set with organic adhesive.
      a. Where mortar bed is indicated, install in accordance with TCA Handbook Method W222, one coat method.
      b. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCA Handbook Method W222, one coat method.
   3. Over metal studs without backer install in accordance with TCA Handbook Method W241, mortar bed, with membrane where indicated.

3.5 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Final cleaning.

B. Clean tile and grout surfaces.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 017000 - Execution and Closeout Requirements: Protecting installed construction.
B. Do not permit traffic over finished floor surface for 4 days after installation.

3.7 SCHEDULES

A. Base:
   1. Tile: Porcelain Tile.
   2. Size: 6 x 6 inch bullnose.
      a. Base: Coved, 6 inches high, bullnosed top edge.
      b. Installation method: Mortar bed.
      c. Grout: Silicone rubber.

B. Wall.
   1. Tile: Glass
   2. Size: 1 x 1 inch mosaic
   3. Color:
      a. Installation method: Mortar bed
      b. Grout: Custom, Fusion Pro

END OF SECTION 093000
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustic tile.
2. Suspended metal grid ceiling system and perimeter trim.

B. Related Requirements:

1. Section 072116 - Blanket Insulation.
2. Section 079000 - Joint Protection.
4. Section 233700 - Air Outlets and Inlets: Air diffusion devices in ceiling system.
5. Section 265100 - Interior Lighting: Light fixtures in ceiling system.

1.2 REFERENCE STANDARDS

A. ASTM International:

5. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

B. American Society of Civil Engineers:


C. Ceilings and Interior Systems Construction Association:

1. CISCA - Acoustical Ceilings: Use and Practice.

D. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

E. National Fire Protection Association:

F. Underwriters Laboratories Inc.:

1. UL - Fire Resistance Directory.

1.3 PRE-INSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum two weeks prior to commencing work of this section to locate and verify radius of ceiling with Owner, Architect and Contractor.

C. Require attendance of parties directly affecting, or affected by Work of this Section.

D. Notify Owner four days in advance of meeting date.

E. Prepare agenda and preside over meeting:
   1. Review preparation of existing subfloor.
   2. Review subfloor conditions that will be required prior to starting work.
   3. Review installation procedures.
   4. Review coordination with related Work.
   5. Record minutes and distribute to participants within two days after meeting to Owner, and those affected by decisions made.

F. Commencing installation is an indication of Contractor’s acceptance of conditions.

1.4 SEQUENCING

A. Section 011000 - Summary: Requirements for sequencing.

B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

C. Install acoustic units after interior wet work is dry.

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on metal grid system components and acoustic units.

C. Shop Drawings:
   1. Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system and connection requirements. Indicate method of suspension where interference exists.
2. Indicate installation details required for seismic design loads.

D. Samples:

1. Submit two samples 6x6 inch in size illustrating material and finish of acoustic units.
2. Submit two samples each, 6 inches long, of suspension system main runner, cross runner and perimeter molding.

E. Manufacturer's Instructions: Submit special procedures and perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Conform to CISCA requirements.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

1.8 AMBIENT CONDITIONS

A. Section 015000 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

1.9 EXTRA MATERIALS

A. Section 01 70 00 – Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one (1) box plus remaining open box of each type of ceiling tile for ACT 1 and ACT 2. Provide to Owner any remaining materials for ACT3.

PART 2 - PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

A. Manufacturers:

1. Armstrong.
2. USG

3. Certainteed

4. Substitutions: Section 016000 - Product Requirements.

B. Performance / Design Criteria:

1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360 of span.

2.2 COMPONENTS

A. ACT 1: Acoustic Panels: ASTM E1264, conforming to the following: (Based on Armstrong Kitchen Zone Square Lay-in 673).

1. Size: 24 x 24 inches.
2. Thickness: 5/8 inches.
5. Fire Performance: ASTM E84.
6. Flame Spread Index: 25 or less.
7. Fire Class A.
8. Smoke Developed Index: 50 or less.
9. Weight: 0.67 lb/sq. ft.
10. Light Reflectance: 0.89 percent.
11. Edge: Square.
15. 30-Year Performance Guarantee & Warranty.
16.

B. ACT 2: Acoustic Panels: ASTM E1264, conforming to the following: (Based on Armstrong Ultima High NRC fine texture 1901).

1. Size: 24 x 24 inches.
2. Thickness: 3/4 inches.
5. Fire Performance: ASTM E84.
6. Fire Class A, ASTM E1264 Type IV Form 2, Pattern E.
8. Density: 1.08 lb/cu ft.
9. Light Reflectance: 0.90 percent.
10. NRC Range: 0.75.
14. 30-Year Performance Guarantee & Warranty.
C. ACT3: Armstrong, MetalWorks Radial with Torsion Spring with Acoustical Fleece concealed grid system and Axiom perimeter edge.
   1. Surface Texture: Smooth
   2. Composition: Aluminum
   3. Perforations: Standard M15 Round Diagonal
   4. Finish: Natural Maple Wood
   5. Colors: (Natural Maple #LNMP1E) FXMP
   6. Size: Custom Radial per Architectural drawings
   7. Edge Profile: Butt Edge
   8. Torsion Spring

D. Grid: (For ACT 1 and ACT 2)
   1. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T; components die cut and interlocking.
   2. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
   3. Exposed Grid Surface Width: 15/16 inch with reveal.
   5. Perimeter Molding Width: Minimum 7/8 inch
   6. Grid Finish: White
   7. Accessories: Stabilizer bars, clips, splices, perimeter moldings, hold down clips, required for suspended grid system.
   8. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

E. Grid: (For ACT 3)
   3. Cross Tee 1-1/2” x 1-3/4” Extruded Aluminum Mill finish with Angled Couplers and wind load clips.
   4. Accessories:
      a. Formed Perimeter Trim (Height TBD)
      b. Torsion Spring Hook Access Tool Item # (7129)
      c. Torsion Spring Suction Access Tool Item # (7130)

2.3 ACCESSORIES

A. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.
B. Verify layout of hangers will not interfere with other work.

3.2 DEMOLITION

A. Extend existing acoustical ceiling installations using materials and methods as specified.

B. Clean and repair existing acoustical ceilings which remain or are to be reinstalled.

3.3 INSTALLATION

A. Lay-In Grid Suspension System:

1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
2. Locate system on room axis according to reflected plan.
3. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
4. Install hanger clips during steel deck erection. Install additional hangers and inserts as required.
5. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
6. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
7. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
8. Do not eccentrically load system, or produce rotation of runners.
9. Perimeter Molding:
   a. Install edge molding at intersection of ceiling and vertical surfaces into bed of acoustic sealant.
   b. Use longest practical lengths.
   c. Miter and rivet corners.
   d. Install at junctions with other interruptions.

10. Form expansion joints. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

B. Acoustic Units:

1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
2. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border trim neatly against abutting surfaces.
3. Install units after above ceiling work is complete.
4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
5. Cutting Acoustic Units:
a. Cut to fit irregular grid and perimeter edge trim.
b. Cut bevel edges to field cut units.
c. Double cut and field paint exposed edges of tegular units.

6. Where bullnosed concrete block corners occur, install preformed closures to match perimeter molding.
7. Lay acoustic insulation for distance of 48 inches on both sides of acoustic partitions.
8. Install hold-down clips to retain panels tight to grid system within 20 ft of exterior door.

3.4 TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 095113
1.1 SUMMARY
A. Section includes resilient sheet flooring; resilient tile and sheet flooring; resilient base; and accessories.
B. Related Sections:
   1. Section 035400 - Cast Underlayment.

1.2 REFERENCES
A. ASTM International:
B. California Department of Health Services:
C. Federal Specification Unit:
   1. FS L-F-475 - Floor Covering Vinyl, Surface (Tile and Roll), with Backing.
   2. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant.
D. National Fire Protection Association:
E. Scientific Certification Systems:
   1. SCS EC10.2 - Environmental Certification Program Indoor Air Quality Performance.

1.3 PRE-INSTALLATION MEETINGS
A. Section 01 30 00 – Administrative Requirements: Pre-installation meeting.
B. Convene minimum two weeks prior to commencing work of this section to locate and verify radius of flooring with Owner, Architect and Contractor.
C. Require attendance of parties directly affecting, or affected by Work of this Section.
D. Notify Owner four days in advance of meeting date.

E. Prepare agenda and preside over meeting:
   1. Review preparation of existing subfloor.
   2. Review subfloor conditions that will be required prior to starting work.
   3. Review installation procedures.
   4. Review coordination with related Work.
   5. Record minutes and distribute to participants within two days after meeting to Owner, and those affected by decisions made.

F. Commencing installation is an indication of Contractor’s acceptance of conditions.

1.4 SUBMITTALS
   A. Section 013300 - Submittal Procedures: Submittal procedures.
   B. Product Data: Submit data describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
   C. Samples:
      1. Submit manufacturer's complete set of color samples for initial selection.
      2. Submit two samples, 6x6 inch in size illustrating color and pattern for each resilient flooring product specified.

1.5 CLOSEOUT SUBMITTALS
   A. Section 017000 - Execution and Closeout Requirements: Closeout procedures.
   B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Section 016000 - Product Requirements: Product storage and handling requirements.
   B. Protect roll materials from damage by storing on end.
1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements.

B. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

C. Store materials for not less than 48 hours prior to installation in area of installation at temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.9 EXTRA MATERIALS

A. Section 01 70 00 – Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one (1) box plus remaining open box of each type of flooring material. Sheet flooring, provide any extra material.

PART 2 - PRODUCTS

2.1 SHEET FLOORING

A. Manufacturers:
   1. Altro
   2. Mannington
   3. Armstrong
   4. Substitutions: Section 016000 - Product Requirements

B. R1 - Safety Flooring (Altro, StrongHold 30 Basis for design)
   1. Thickness: 0.10 inch.
   2. Slip Resistance: ASTM D2047 Static Coefficient of Friction
   3. Warranty: 12 Year
   5. Durable: rated heavy duty, 24/7 commercial kitchens

2.2 TILE FLOORING

A. Manufacturers:
   1. Mannington
   2. Armstrong
   3. Substitutions: Section 016000 - Product Requirements

B. R2 - Luxury Vinyl Tile: (Nature’s Paths Select basis for design): ASTM F1700; Class III – Type B Printed Film:
   1. Size: 18 x 18 inch.
   2. Thickness: 0.25 mm.
   3. Wear Layer: Quantum Guard HP Urethane Aluminum Oxide Topcoat
5. Edge: Microbevel
6. Warranty: 10 year Commercial

C. R3 – Luxury Vinyl Tile: (Mannington, Amtico, Wood – Neutral basis for design, Aged Oak) ASTM F1700; Class III – Type B:
   1. Size: 6 x 36 inch.
   2. Thickness: 2.5 mm.
   3. Wear Layer: Urethane
   5. Edge: Beveled
   6. Warranty: 20 year commercial

2.3 RESILIENT BASE

A. Manufacturers:
   1. Johnsonite.
   2. Roppe
   3. Mannington
   4. Armstrong
   5. Substitutions: Section 016000 - Product Requirements.

B. Wall Base:
   1. Height: 4 inch.
   2. Thickness: 0.080 inch thick.
   5. Length: Roll.

2.4 ACCESSORIES

A. Subfloor Filler: Cementitious Premix latex; type recommended by adhesive material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Moldings and Edge Strips: Same material as flooring; manufactured by flooring manufacturer.

D. Vinyl welding rod: Altox weld rod

E. Cove former:

F. Cap Strip: Acceptable material, sized to suit application, vinyl, stainless steel: Altox Cap Strip C4, C7, C8 and C11.

G. Metal edge strips: Aluminum extruded, smooth, mill finish, stainless steel with lip to extend over flooring.

H. Adhesives:
1. Altrofix 30-2 part polyurethane for areas prone to moisture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify concrete floors are dry to maximum moisture content of percent as recommended by manufacturer, and exhibit negative alkalinity, carbonization, and dusting.

C. Verify floor and lower wall surfaces are free of substances capable of impairing adhesion of new adhesive and finish materials.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Flooring shall be installed over subfloors conforming to ASTM F710 for concrete and other monolithic floors or ASTM F1482 for wood subfloors.

C. Prohibit traffic until filler is cured. Always conduct moisture tests per ASTM F-2170 on all concrete slabs regardless of age or grade level. ASTM F-2170 Internal Relative Humidity (IRH) test results must not exceed 85%.

D. Do not proceed with work until results of moisture condition tests are acceptable.

E. When patching, a moisture tolerant patching compound must always be used.

F. Clean substrate.

G. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances cannot be removed. Apply primer to surfaces.

H. Proceeding with installation means “acceptance” of subsurface conditions.

3.3 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.
3.4 INSTALLATION – SHEET FLOORING

A. Maxis Unity Installation: Install Altro safety flooring in accordance with the current posted Altro Installation Practices and Quick Facts Guide. All Seams shall be heat welded with Altro Weldrod™ only. Failure to install Altro safety flooring in accordance with recommended procedures will void the Altro Limited Product Warranty.

B. Coved Installation: Where Altro safety flooring is coved up wall surfaces and other abutments, installation shall be in accordance with Altro safety flooring Installation Practices using the following accessories:
   1. At standard wall finishes: Use Altro C7 vinyl cap strip to accommodate sheet vinyl to a height as indicated.
   2. At 1.5” radius coving at juncture of vertical and horizontal surfaces: Use Altro Vinyl Cove Former 38R.
   3. Top set cove base: Install in accordance with manufacturer’s instructions.

3.5 INSTALLATION – LUXURY VINYL TILE (LVT)

A. Install luxury vinyl tile in accordance with manufacturer installation instructions and recommendations.

B. Mix tile from container to ensure shade variations are consistent when tile is placed.

C. Lay tiles with joints and seams quarter turned and staggered (R3). Plank flooring shall have end joints offset by at least 6” and staggered to create a random appearance that avoids alignment of end joints and at 45 degrees to building lines to produce symmetrical tile pattern (R2).

D. Install tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Secure metal strips before after installation of flooring with stainless steel screws.

H. Install flooring in recessed floor access covers. Maintain floor pattern.

I. At movable partitions, install flooring under partitions without interrupting floor pattern.

J. Install feature strips and floor markings where indicated. Fit joints tightly.

3.6 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Final cleaning.

B. Remove excess adhesive from floor, base, and wall surfaces without damage.
C. Clean, seal, and maintain resilient flooring products.

3.7 PROTECTION OF INSTALLED CONSTRUCTION
A. Section 017000 - Execution and Closeout Requirements: Protecting installed construction.
B. Prohibit traffic on resilient flooring for 48 hours after installation.

3.8 SCHEDULE
A. Transition LVT to LVT – butt joint.
B. Transition LVT to existing VCT – butt joint.
C. Transition LVT to Sheet Vinyl – threshold.
D. Transition LVT to existing quarry tile – stainless steel saddle threshold.

END OF SECTION 096500
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and field application of paints, stains, varnishes, and other coatings.

B. Related Requirements:
   1. Section 220553 - Identification for Plumbing Piping and Equipment: Stenciling, color-coding, and identification banding.
   2. Section 230553 - Identification for HVAC Piping and Equipment: Stenciling, color-coding, and identification banding.

1.2 DEFINITIONS

A. Refer to ASTM D16 for definitions of terms used in this Section.

1.3 REFERENCE STANDARDS

A. ASTM International:

B. California Department of Public Health:

C. Green Seal:
   1. GS-03 - Anti-Corrosive Paints.
   2. GS-11 - Paints and Coatings.

D. Master Painters Institute:
   1. MPI - Approved Products List.
1.4 PREINSTALLATION MEETINGS
A. Section 013000 - Administrative Requirements: Requirements for preinstallation meeting.
B. Convene minimum one week prior to commencing Work of this Section.

1.5 SEQUENCING
A. Section 011000 - Summary: Requirements for sequencing.
B. Do not apply finish coats until paintable sealant is applied.
C. Back prime wood trim before installation of trim.

1.6 SUBMITTALS
A. Section 013300 - Submittal Procedures: Requirements for submittals.
B. Product Data:
   1. Submit manufacturer data on finishing products and special coatings.
   2. Include MPI - Approved Products Lists with proposed products highlighted.
C. Samples:
   1. Submit two paper chip samples, illustrating range of colors and textures available for each surface finishing product as scheduled.
D. Manufacturer Instructions: Submit special surface preparation procedures, substrate conditions requiring special attention.
E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.7 CLOSEOUT SUBMITTALS
A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.
B. Operation and Maintenance Data: Submit information on cleaning, touchup, and repair of painted and coated surfaces.
1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Extra Stock Materials:
   1. Furnish all opened gal. of each color, type, and surface texture as provided for Project.
   2. Label each container with manufacturer's label, color, type, texture, room number and/or Site location.
   3. Store where directed by Owner.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Container Labeling: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Inspection:
   1. Accept materials on Site in manufacturer's sealed and labeled containers.
   2. Inspect for damage and to verify acceptability.

D. Store materials in ventilated area and otherwise according to manufacturer instructions.

E. Protection:
   1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
   2. Provide additional protection according to manufacturer instructions.

1.11 AMBIENT CONDITIONS

A. Section 015000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Storage Conditions:
1. Minimum Ambient Temperature: 45 degrees F.
2. Maximum Ambient Temperature: 90 degrees F

C. Application Conditions:

1. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint manufacturer.
2. Do not apply exterior coatings during rain or snow, when relative humidity is outside humidity ranges, or when moisture content of surfaces exceeds those required by paint manufacturer.
3. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors and 50 degrees F for exteriors, unless otherwise indicated by manufacturer instructions.
4. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interiors and exteriors, unless otherwise indicated by manufacturer instructions.
5. Lighting Level: 80 fc measured mid-height at substrate surface.

1.12 WARRANTY

A. Section 017000 - Execution and Closeout Requirements: Requirements for warranties.

B. Furnish five-year manufacturer's warranty for paint and coatings.

PART 2 - PRODUCTS

2.1 PAINTS AND COATINGS

A. Manufacturers:

1. Sherwin Williams.
2. Substitutions: As specified in Section 016000 - Product Requirements.

B. Materials:

1. Coatings:
   a. Ready mixed, except field-catalyzed coatings.
   b. Capable of drying or curing free of streaks or sags.
3. Fastener Head Cover Materials: Latex filler.
4. Accessories:
   a. Grade: Commercial.
   b. Linseed oil.
   c. Shellac.
   d. Turpentine.
   e. Paint thinners.
   f. Other materials not specifically indicated but required to achieve specified finishes.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for application examination.

B. Verify that surfaces are ready to receive Work as recommended by product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of Work, and report conditions capable of affecting proper application to Architect/Engineer.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Moisture Content:
   1. Measure moisture content of surfaces using electronic moisture meter.
   2. Do not apply finishes unless moisture content of surfaces are below following maximums:
      a. Plaster and Gypsum Wallboard: 12 percent.
      b. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
      c. Interior Wood: 15 percent, measured according to ASTM D4442.
      d. Exterior Wood: 15 percent, measured according to ASTM D4442.
      e. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for application preparation.

B. Prepare coatings as follows:
   1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
   2. For smooth flow and brushing properties.

C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

D. Defects:
   1. Correct defects and clean surfaces capable of affecting Work of this Section.

E. Marks: Seal marks that may bleed through surface finishes with shellac.

F. Impervious Surfaces:
   1. Remove mildew by scrubbing with solution of tetra-sodium tri-sodium phosphate and bleach.
2. Rinse with clean water and allow surface to dry.

G. Aluminum Surfaces Scheduled for Paint Finish:
   1. Remove surface contamination by steam or high-pressure water.
   2. Remove oxidation with acid etch and solvent washing.
   3. Apply etching primer immediately following cleaning.

H. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

I. Copper Surfaces Scheduled for Paint Finish:
   1. Remove contamination by steam, high-pressure water, or solvent washing.
   2. Apply vinyl-etch primer immediately following cleaning.

J. Copper Surfaces Scheduled for Natural Oxidized Finish:
   1. Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid.
   2. Rub on repeatedly for required effect, and, once attained, rinse surfaces with clear water and allow to dry.

K. Gypsum Board Surfaces:
   1. Fill minor defects with filler compound.
   2. Spot-prime defects after repair.

L. Galvanized Surfaces:
   1. Remove surface contamination and oils, and wash with solvent.
   2. Apply coat of etching primer.

M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish:
   1. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.
   2. Remove oil and grease with solution of tri-sodium phosphate, rinse well, and allow to dry.
   3. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water, and allow to dry.

N. Uncoated Steel and Iron Surfaces:
   1. Remove grease, mill scale, weld splatter, dirt, and rust.
   2. If heavy coatings of scale are evident, remove by power tool wire brushing or by sandblasting.
   3. Clean by washing with solvent.
   4. Apply treatment of phosphoric acid solution, ensuring that weld joints, bolts, and nuts are similarly cleaned.
   5. Spot-prime paint after repairs.

O. Shop-Primed Steel Surfaces:
1. Sand and scrape to remove loose primer and rust.
2. Feather edges to make touch-up patches inconspicuous.
3. Clean surfaces with solvent.
4. Prime bare steel surfaces Prime metal items, including shop-primed items.

P. Interior Wood Items Scheduled to Receive Paint Finish:
   1. Wipe off dust and grit prior to priming.
   2. Seal knots, pitch streaks, and sappy sections with sealer.
   3. Fill nail holes and cracks after primer has dried.
   4. Sand between coats.

Q. Interior Wood Items Scheduled to Receive Transparent Finish:
   1. Wipe off dust and grit prior to sealing.
   2. Seal knots, pitch streaks, and sappy sections with sealer.
   3. Fill nail holes and cracks after sealer has dried.
   4. Sand lightly between coats.

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

3.3 APPLICATION

A. Comply with MPI - Architectural Painting Manual.
B. Do not apply finishes to surfaces that are not dry.
C. Apply each coat to uniform appearance.
D. Apply each coat of paint slightly darker than preceding coat, unless specified otherwise.
E. Sand wood and metal surfaces lightly between coats to achieve required finish.
F. Cleaning:
   1. Vacuum surfaces to remove loose particles.
   2. Use tack cloth to remove dust and particles just prior to applying next coat.
G. Fillers:
   1. If clear finishes are required, tint fillers to match wood.
   2. Work fillers into grain before set, and wipe excess from surface.
H. Concealed Surfaces:
   1. Prime concealed surfaces of interior and exterior woodwork with primer paint.
   2. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.
I. Finishing Mechanical and Electrical Equipment:

2. Paint shop-primed equipment.

3. Paint shop-finished items installed in interior areas.

4. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components, and paint separately.

5. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where these items are shop finished.

6. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint to visible surfaces.

7. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.

8. Paint exposed conduit and electrical equipment installed in finished areas.

9. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

10. Color-Coding:

   a. Color-code equipment, piping, conduit, and exposed duct work according to indicated requirements.

   b. Color band and identify with flow arrows, names, and numbering.

11. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings that were removed prior to finishing.

3.4 FIELD QUALITY CONTROL

   A. Section 017000 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.


3.5 CLEANING

   A. Section 017000 - Execution and Closeout Requirements: Requirements for cleaning.

   B. Collect waste material that may constitute fire hazards, place in closed metal containers, and remove daily from Site.

3.6 ATTACHMENTS

   A. Schedule - Shop-Primed Items for Site Finishing:

      1. Section 055000 - Metal Fabrications: Exposed surfaces of lintels.

   B. Schedule - Interior Surfaces:
1. Wood - Painted:
   a. One coat of latex prime sealer.
   b. Two coats of latex enamel, eggshell.

2. Wood - Transparent:
   a. Oil Varnish System:
      1) Filler coat (for open grained wood only).
      2) One Coat: S-W Wood Classics Oil Stain, A49 Series.
      3) Two Coats: S-W Wood Classics Oil Base Varnish, A66-300 Series

3. Concrete Block:
   a. Latex System:
   b. Block Filler: Block filler, latex, interior/exterior; S-W PrepRite Block Filler B25W25 on new block. If shiny or oil based 1-coat Multi-purpose latex primer B51 W450 1-coat(4 mils wet, 1.2 mils dry). If dry, clean, dull and in sound condition, no coating is necessary.
   c. Two coats: Two coats of Water Based Catalyzed Epoxy, S-W B73 W36, Eg-Shel finish, 2-coats (4 mils wet, 1.2 mils dry). Drawing Reference PNT 3.

4. Steel - Primed:
   a. Touch up with latex primer.
   b. Two coats of latex enamel, semigloss.

5. Gypsum Board and Plaster Walls:
   a. One coat of latex primer sealer, S-W ProMar 200 Latex Primer B28 W2600, (4 mils wet, 1.2 mils dry). For existing surfaces; verify surface is dry, clean, dull and smooth. When surface does not meet above conditions, prime with Multi-purpose latex primer B51 W450 1-coat(4 mils wet, 1.2 mils dry).
   b. Two coats of Water Based Catalyzed Epoxy, S-W B73 W36, Eg-Shel finish, 2-coats (4 mils wet, 1.2 mils dry). Drawing Reference
      1) PNT 2 Pocket and Soffit,
      2) PNT 3 walls.

6. Gypsum Board and Plaster Ceilings:
   a. One coat of latex primer sealer, S-W ProMar 200 Latex Primer B28 W2600.
   b. Two coats of latex enamel, S-W ProMar 200, extra white flat finish, S-W B30W2651 (4 mils wet, 1.4 mils dry per coat). Drawing Reference PNT 1.

3.7 SCHEDULE

A. PNT 1 – Extra White SW 7006.
B. PNT 2 – Ligonier Tan SW 7717.
C. PNT 3 – Fragile Beauty SW 7553.

END OF SECTION 099000
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wire mesh system for walls and ceiling; and access gate.

1.2 REFERENCES

A. ASTM International:

3. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
9. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

B. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

C. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
1.3 DESIGN REQUIREMENTS

A. Design partition system to provide for movement of components without damage, undue stress on fasteners or other detrimental effects, when subject to design loads.

B. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate plan and vertical dimensions, elevations, component details; head, jamb, and sill details; location of hardware. Include component details, framed openings, bearing, anchorage, loading, type and location of fasteners, and accessories or items required of related work.

C. Product Data: Submit data for screen materials, finishes.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements are as shown on Drawings shop drawings. Provide tracing of soffit in field.

PART 2 - PRODUCTS

2.1 WIRE MESH PARTITIONS

A. Manufacturers:

1. Mobilflex.
2. Substitutions: Section 016000 - Product Requirements.

2.2 COMPONENTS

A. Curtain

1. The top and bottom of each section is fitted with an aluminum panel 4” high. This panel consists of an aluminum extrusion 1/16” thick and composed of modules with a 15° angle between them to facilitate the operation of the closure. The curtain is constructed of vertical rods of 5/16” in diameter. The spacing between the rods is 2-5/8” in a brick
pattern. These rods are linked together by flat horizontal bars of 1/8” x 5/8” x 6-5/8”. These bars are spaced vertically every 12” by aluminum sleeves of 1/2“ in diameter.

B. Locking
1. Lead post shall be equipped with a hook bolt lock with MobilFlex cylinders each side.
2. Lead post shall engage a full height wall jamb.
3. Trailing post shall be self-locking at the top and bottom inside the storage pocket.
4. Free floating intermediate posts shall be located at all curves and at recommended intervals of 10 feet (3m) or 5 feet (1,5m) for counter top units. Intermediate posts shall be equipped with self-adjusting spring loaded drop bolts activated from the inside only. Drop bolts shall engage dustproof stainless steel receptacles.

C. Track
1. Curtain shall be hung from an overhead track 1-5/16” wide by 1-9/16” high. Track shall be tempered aluminum alloy 6351-T6.
2. Curves where required shall be 14” radius standard.

D. Stacking
1. Stacking shall not exceed a depth of 1.15” per foot of closure width plus 3” for each post (lead, end or intermediate).

E. Finish
1. Finish shall be standard clear anodized.

2.3 ACCESSORIES

A. Bracing: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

C. Post Caps: Manufacturer's standard.

D. Floor and Ceiling Pilaster Shoe: Manufacturer's standard.

E. Floor Base: Manufacturer's standard. Formed aluminum.

F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

G. Cylinder Locks: As specified in Section 087100.

2.4 FABRICATION

A. Fit and assemble in largest practical sections for delivery to site, ready for installation.

B. Make exposed joints flush or tight.

C. Furnish components required for anchorage to adjacent construction.
D. Frame openings made for penetrating mechanical and electrical components.
E. Fabricate gate for operation.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Section 013000 - Administrative Requirements: Coordination and project conditions.
B. Verify substrate surfaces and required openings are ready to receive work.

3.2 PREPARATION
A. Clean substrate surfaces.

3.3 INSTALLATION
A. Install items plumb and level, accurately fitted, free from distortion or defects.
B. Perform field welding in accordance with AWS D1.1.
C. After installation, touch-up field welds, scratched or damaged surfaces with shop applied finish.

3.4 ERECTION TOLERANCES
A. Section 014000 - Quality Requirements: Tolerances.
B. Maximum Variation From Plumb or Level: 1/4 inch.
C. Maximum Misalignment From Indicated Position: 1/4 inch.

3.5 ADJUSTING
A. Section 017000 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
B. Adjust hinged gates to achieve free movement.

END OF SECTION 102213
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes corner guards.

1.2 REFERENCES

A. California Department of Health Services:

B. Forest Stewardship Council:
   1. FSC Guidelines - Forest Stewardship Council Guidelines.

1.3 PERFORMANCE REQUIREMENTS

A. Corner Guards: Resist lateral impact force of 100 lbs at any point without damage or permanent set.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

C. Samples: Submit two sections of corner guard, 24 inch long, illustrating component design, configuration, color and finish.

D. Manufacturer's Installation Instructions: Submit procedures and perimeter conditions requiring special attention.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.
1.6 COORDINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with wall or partition sections for installation of concealed blocking or anchor devices.

PART 2 - PRODUCTS

2.1 WALL AND CORNER GUARDS

A. Manufacturers:
   1. InPro Corporation.
   2. Korogard Wall Protection Systems, Inc.
   3. Pawling Corp.
   4. WallGuard.
   5. Substitutions: Section 016000 - Product Requirements.

B. Product Description: Surface mount, Stainless steel corner guard and end wall channel guard.

2.2 COMPONENTS

A. Corner Guard - Surface Mounted:
   1. Material: 16 gauge stainless steel type 304, satin finish.
   2. Projection From Wall to Outside of Guard: 3 inch with wing edge crimped.
   3. Length: One piece.

B. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.3 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Verify rough-in for components are correctly sized and located.
3.2 INSTALLATION
   A. Position corner guard 6 inches above finished floor to 48 inches high.
   B. Coordinate installation of vinyl fabric wall covering with corner guard frame and cover.

3.3 ERECTION TOLERANCES
   A. Section 014000 - Quality Requirements: Tolerances.
   B. Maximum Variation From Required Height for Horizontal Rails: 1/4 inch.
   C. Maximum Variation From Level or Plane For Visible Length for Horizontal Rails: 1/4 inch.

END OF SECTION 102600
SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Fire extinguishers.
      2. Fire extinguisher cabinets.
   B. Related Requirements:
      1. Section 061053 - Miscellaneous Rough Carpentry: Wood blocking and shims.
      2. Section 099000 - Painting and Coating: Field-applied paint finishes.

1.2 DEFINITIONS
   A. ADA: Americans with Disabilities Act.

1.3 REFERENCE STANDARDS
   A. ASTM International:
   B. National Fire Protection Association:
      1. NFPA 10 - Standard for Portable Fire Extinguishers.
   C. UL:
      1. UL - Fire Protection Equipment Directory.

1.4 SUBMITTALS
   A. Section 013300 - Submittal Procedures: Requirements for submittals.
   B. Product Data: Submit extinguisher classifications, operational features, color and finish, and anchorage details.
   C. Shop Drawings:
      1. Indicate cabinet physical dimensions, location, rough in measurements for semi-recessed cabinets, mounting, and fire ratings.
   D. Manufacturer's Instructions: Submit special criteria and wall opening coordination requirements.
1.5 CLOSEOUT SUBMITTALS
   A. Section 017000 - Execution and Closeout Requirements: Requirements for closeout procedures.
   B. Operation and Maintenance Data:
      1. Submit test, refill, or recharge schedules.
      2. Submit recertification requirements.

1.6 QUALITY ASSURANCE
   A. Comply with NFPA 10.
   B. Provide extinguishers classified and labeled by UL for indicated purposes.
   C. Provide fire extinguisher cabinets classified and labeled by UL for indicated purpose.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
   B. Inspection: Accept materials on Site and inspect for damage.
   C. Store and protect materials according to manufacturer's instructions.

1.8 WARRANTY
   A. Section 017000 - Execution and Closeout Requirements: Requirements for warranties.
   B. Furnish five-year manufacturer's warranty for fire extinguishers and fire extinguisher cabinets.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS
   A. Manufacturers:
      1. JL Industries, Inc.
      2. Kidde Commercial
      3. Larsens Manufacturing
   B. Multi-Purpose Dry Chemical Type:
      1. Tank: Cast steel.
      2. Furnish pressure gage.
      3. Class: 4A-80BC.
   C. Finishes:
      1. Steel: Enamel to RED color.
2.2 FIRE EXTINGUISHER CABINETS

A. Manufacturers:
   1. Same as Fire Extinguisher Manufacturer.

B. Type:
   1. UL fire-rated.
   2. ASTM E814.

C. Metal:

D. Configuration:
   1. Type: Semi-recessed or Surface-mounted as shown on drawings.
   2. Size: To accommodate fire extinguisher.

E. Trim Type:
   1. Mounting: Returned to wall surface, with 4-inch projection unless surface mount.

F. Door:
   1. Reinforced for flatness and rigidity.
   2. Door Glazing:
      a. Type: Clear.
      b. Glass Type: Float.
      c. Thickness: 1/8 inch.
      d. Design: Vertical duo.

2.3 FABRICATION

A. Form cabinet enclosure with right angle inside corners and seams.

B. Form perimeter trim and door frame.

C. Pre-drill for anchors.

D. Doors:
   1. Hinge doors for 180-degree opening with continuous piano hinge.
   2. Furnish catch.
   3. Glaze doors with resilient channel gasket glazing.

E. Weld, fill, and grind components smooth.

2.4 FINISHES

A. Cabinet Exterior Trim and Door:
   1. Baked enamel to color white.

B. Cabinet Interior:
   1. Baked enamel to color white.
2.5 ACCESSORIES

A. Cabinet Latch:
   1. Type: Friction.
   2. Pull: Manufacturer's standard tubular style.

B. Cabinet Mounting Hardware: Manufacturer's standard appropriate to cabinet and substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install cabinets plumb and level on walls.

B. Install cabinets maximum 48 inches from finished floor to top of extinguisher handle.

C. Secure cabinets rigidly in place.

D. Place extinguishers in cabinets.

END OF SECTION 104400
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Flashing.
   4. Sleeves.
   5. Mechanical sleeve seals.
   6. Equipment bases and supports.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

C. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
   2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

D. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.

B. Perform Work in accordance with State of Michigan standard.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. Glope Pipe Hanger Products Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Plumbing Piping - DWV:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   4. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
   5. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
   7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   8. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
   7. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
   8. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

2.2 ACCESSORIES
A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 FLASHING
A. Metal Flashing: 26 gage thick galvanized steel.
B. Metal Counterflashing: 22 gage thick galvanized steel.
C. Lead Flashing:
   1. Waterproofing: 5 lb./sq. ft sheet lead.
   2. Soundproofing: 1 lb./sq. ft sheet lead.
D. Flexible Flashing: 47 mil thick sheet compatible with roofing.
E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.4 SLEEVES
A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.
B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
C. Sealant: Acrylic.

2.5 MECHANICAL SLEEVE SEALS
A. Link Seal
B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
PART 3 EXECUTION

3.1 EXAMINATION
A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
B. Verify openings are ready to receive sleeves.
C. Verify openings are ready to receive firestopping.

3.2 PREPARATION
A. Obtain permission from Architect/Engineer before using powder-actuated anchors.
B. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS
A. Install inserts for placement in concrete forms.
B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS
A. Support horizontal piping as scheduled.
B. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
C. Place hangers within 12 inches of each horizontal elbow.
D. Use hangers with 1-1/2 inch minimum vertical adjustment.
E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
H. Support riser piping independently of connected horizontal piping.
I. Provide copper plated hangers and supports for copper piping.
J. Design hangers for pipe movement without disengagement of supported pipe.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 21 05 48.

3.6 INSTALLATION - FLASHING

A. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor drains, shower drains, and mop sink drains watertight to adjacent materials.

E. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Install chrome plated steel escutcheons at finished surfaces.
3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

3.9 SCHEDULES

<table>
<thead>
<tr>
<th>PIPE HANGER SPACING</th>
<th>MAXIMUM HANGER SPACING</th>
<th>HANGER ROD DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE MATERIAL</td>
<td>Feet</td>
<td>Inches</td>
</tr>
<tr>
<td>ABS (All sizes)</td>
<td>4</td>
<td>3/8</td>
</tr>
<tr>
<td>Aluminum (All sizes)</td>
<td>10</td>
<td>1/2</td>
</tr>
<tr>
<td>Brass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cast Iron (All Sizes)</td>
<td>5</td>
<td>5/8</td>
</tr>
<tr>
<td>Cast Iron (All Sizes) with 10 foot length of pipe</td>
<td>10</td>
<td>5/8</td>
</tr>
<tr>
<td>CPVC, 1 inch and smaller</td>
<td>3</td>
<td>1/2</td>
</tr>
<tr>
<td>CPVC, 1-1/4 inches and larger</td>
<td>4</td>
<td>1/2</td>
</tr>
<tr>
<td>Copper Tube, 1-1/4 inches and smaller</td>
<td>6</td>
<td>1/2</td>
</tr>
<tr>
<td>Copper Tube, 1-1/2 inches and larger</td>
<td>10</td>
<td>1/2</td>
</tr>
<tr>
<td>Fiberglass</td>
<td>8</td>
<td>1/2</td>
</tr>
<tr>
<td>Glass</td>
<td>8</td>
<td>1/2</td>
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<tr>
<td>Polybutylene</td>
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</tr>
<tr>
<td>Polypropylene</td>
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<tr>
<td>PVC (All Sizes)</td>
<td>4</td>
<td>3/8</td>
</tr>
<tr>
<td>Steel, 3 inches and smaller</td>
<td>12</td>
<td>1/2</td>
</tr>
<tr>
<td>Steel, 4 inches and larger</td>
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<td>5/8</td>
</tr>
</tbody>
</table>

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Tags.
   3. Stencils.
   4. Pipe markers.
   5. Ceiling tacks.
   7. Lockout devices.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Execution requirements for painting specified by this section.
   2. Section 22 60 13 - Medical Gas and Vacuum Systems: Product requirements for medical gas and vacuum system labeling and identification.

1.2 REFERENCES

A. American Society of Mechanical Engineers:

B. National Fire Protection Association:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturers catalog literature for each product required.

C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
1.4 CLOSEOUT SUBMITTALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
   B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.5 QUALITY ASSURANCE
   A. Conform to NFPA 99 requirements for labeling and identification of medical gas piping systems and accessories.
   B. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 NAMEPLATES
   A. Manufacturers:
      2. Safety Sign Co.
      4. Substitutions: Section 01 60 00 - Product Requirements
   B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS
   A. Plastic Tags:
      1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
   B. Metal Tags:
      1. Brass with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.
C. Information Tags:

D. Tag Chart: Typewritten letter size list of applied tags and location.

2.3 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2 inch high letters.
   2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch high letters.
   3. Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4 inches high letters.

B. Stencil Paint: As specified in Section 09 90 00, semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.4 PIPE MARKERS


B. Plastic Pipe Markers:
   1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers:
   1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Plastic Underground Pipe Markers:
   1. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.5 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color-coded head.

B. Color code as follows:
   1. HVAC equipment: Yellow.
   2. Fire dampers/smoke dampers: Red.
   3. Plumbing valves: Green.

2.6 LABELS

A. Description: Aluminum or Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification.
2.7 LOCKOUT DEVICES

A. Lockout Hasps:
   1. Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

B. Valve Lockout Devices:
   1. Steel device preventing access to valve operator, accepting lock shackle.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

3.2 INSTALLATION

A. Apply stencil painting in accordance with Section 09 90 00.

B. Install identifying devices after completion of coverings and painting.

C. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

D. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

E. Install tags using corrosion resistant chain. Number tags consecutively by location.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Install piping identification on medical gas systems. Refer to Section 22 60 13.

H. Identify water heaters, pumps, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.

I. Identify control panels and major control components outside panels with plastic nameplates.

J. Identify valves in main and branch piping with tags.

K. Identify piping, concealed or exposed, with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
L. Provide ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Domestic water piping, within 5 feet of building.
   2. Domestic water piping, above grade.
   3. Unions and flanges.
   4. Valves.
   5. Pressure gages.
   6. Pressure gage taps.
   7. Thermometers.
  10. Relief valves.
  11. Strainers.
  14. Thermostatic mixing valves.
  15. Pressure balanced mixing valves.

B. Related Sections:
   1. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports [and firestopping] for placement by this section.
   2. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Product requirements for pipe identification and valve tags for placement by this section.
   3. Section 22 07 00 - Plumbing Insulation: Product and execution requirements for pipe insulation.

1.2 REFERENCES

A. American National Standards Institute:

B. American Society of Mechanical Engineers:
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
   4. ASME B31.9 - Building Services Piping.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.

1.4 CLOSEOUT SUBMITTALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

1.5 QUALIFICATIONS
   A. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
   B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.
   C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
   D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS
   A. Section 01 60 00 - Product Requirements.
   B. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.9 WARRANTY
   A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
   A. Ductile Iron Pipe: 2-1/2” and larger. AWWA C151.
      1. Fittings: AWWA C110, ductile iron, standard thickness.
      2. Joints: AWWA C111, rubber gasket with rods.

B. Copper Tubing: 2” and smaller ASTM B88, Type K, annealed.
   2. Joints: Compression connection or Brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

2.2 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, solder AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

B. Copper Tubing: ASTM B88, Type L, drawn, rolled grooved ends.
   1. Fittings: ASME B16.18 cast copper alloy, grooved ends.
   2. Joints: Grooved mechanical couplings meeting ASTM F1476.
      a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
      b. Gasket: Elastomer composition for operating temperature range from -30 degrees F to 230 degrees F.
      c. Accessories: Stainless steel bolts, nuts, and washers.

2.3 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Piping: Class 150, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with soldered.
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
   2. Copper Piping: Class 150, slip-on bronze flanges.

2.4 GATE VALVES

A. Manufacturers:
   1. Milwaukee Valve Company
   2. NIBCO, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inches and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, rising stem, inside screw with back-seating stem, solid wedge disc, alloy seat rings, solder or threaded ends.
C. 2-1/2 inches and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.5 GLOBE VALVES

A. Manufacturers:
   1. Milwaukee Valve Company
   2. NIBCO, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inches and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, threaded bonnet, hand wheel, Buna-N composition disc, solder or threaded ends.

C. 2-1/2 inches and Larger: MSS SP 85, Class 125, cast iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.6 BALL VALVES

A. Manufacturers:
   1. Milwaukee Valve Company
   2. NIBCO, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inches and Smaller: MSS SP 110, Class 150, bronze, three piece body, chrome plated bronze ball, regular port, teflon seats, blow-out proof stem, solder or threaded ends, lever handle.

2.7 PLUG VALVES

A. Manufacturers:
   1. DeZURIK, Unit of SPX Corp.
   2. Flow Control Equipment, Inc
   3. Homestead Valve
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inches and Smaller: MSS SP 78, Class 150, semi-steel construction, round port, full pipe area, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.

C. 2-1/2 inches and Larger: MSS SP 78, Class 150, semi-steel construction, round port, regular opening, pressure lubricated, teflon packing, flanged ends. Furnish wrench-operated.

2.8 CHECK VALVES

A. Horizontal Swing Check Valves:
   1. Manufacturers; Horizontal Swing Check Valves:
      a. NIBCO INC.
b. Substitutions: Section 01 60 00 - Product Requirements.
2. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, solder or threaded ends.
3. 2-1/2 inches and Larger: MSS SP 71, Class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.

B. Spring Loaded Check Valves:
1. Manufacturers; Spring Loaded Check Valves:
   a. NIBCO INC.
   b. Substitutions: Section 01 60 00 - Product Requirements.
2. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, solder or threaded ends.
3. 2-1/2 inches and Larger: MSS SP 71, Class 125, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

2.9 PRESSURE GAGES

A. Manufacturers:
   1. Hayward Flow Control; A division of Hayward Industries, Inc.
   2. Watts; A Watts Water Technologies Company
   3. Zurn Industries, LLC.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Gage: ASME B40.1, UL 393 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
   2. Bourdon Tube: Brass.
   3. Dial Size: 2 inch diameter.
   4. Mid-Scale Accuracy: One percent.
   5. Scale: Psi.

2.10 PRESSURE GAGE TAPS

A. Manufacturers:
   1. Hayward Flow Control; A division of Hayward Industries, Inc.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Needle Valve: Brass, 1/4 inch NPT for minimum 300 psi.

C. Ball Valve: Brass, 1/8 inch NPT for 250 psi.

D. Pulsation Damper: Pressure snubby, brass with 1/4 inch NPT connections.

2.11 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Weiss Instruments, Inc.
   2. Substitutions: Section 01 60 00 - Product Requirements
B. Thermometer: ASTM E1, red appearing mercury, lens front tube, cast aluminum case with enamel finish.
   1. Size: 7-inch scale.
   2. Window: Clear glass.
   4. Accuracy: ASTM E77 2 percent.
   5. Calibration: Degrees F.

2.12 FLOW CONTROL VALVES

A. Manufacturers:
   1. Hayward Flow Control; A division of Hayward Industries, Inc.
   2. Watts; A Watts Water Technologies Company
   3. Zurn Industries, LLC.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet.

C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 5 psi.

2.13 WATER PRESSURE REDUCING VALVES

A. Manufacturers:
   1. Zurn Industries, LLC.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inches and Smaller: MSS SP 80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded ends.

C. 2 inches and Larger: MSS SP 85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.14 RELIEF VALVES

A. Manufacturers:
   1. Hayward Flow Control; A division of Hayward Industries, Inc.
   2. Watts; A Watts Water Technologies Company
   3. Zurn Industries, LLC.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. Pressure Relief:
   1. ANSI Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

C. Temperature and Pressure Relief:
1. ANSI Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME certified and labeled.

2.15 STRAINERS

A. Manufacturers:
   1. Hayward Flow Control; A division of Hayward Industries, Inc.
   2. NIĘCO INC.
   3. Zurn Industries, LLC.
   4. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inch and Smaller: Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

C. 1-1/2 inch to 4 inch: Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.

D. 5 inch and Larger: Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.16 BACKFLOW PREVENTERS

A. Manufacturers:
   1. Watts; A Watts Water Technologies Company
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Reduced Pressure Backflow Preventers:
   1. Comply with ASSE 1013.
   2. Bronze body, with bronze internal parts and stainless steel springs.
   3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

C. Double Check Valve Assemblies: Comply with ASSE ASSE 1015 or AWWA C510; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.17 WATER HAMMER ARRESTORS

A. Manufacturers:
   1. Sioux Chief
   2. Watts; A Watts Water Technologies Company

B. Substitutions: Section 01 60 00 - Product Requirements ASSE 1010; copper construction, bellows type sized in accordance with PDI WH-201.
C. Pre-charged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.18 THERMOSTATIC MIXING VALVES

A. Manufacturers:
   1. Watts; A Watts Water Technologies Company
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment. Conform to ASSE 1070 to temper water to maximum 110 degrees F.

C. Accessories:
   1. Check valve on inlets.
   2. Volume control shut-off valve on outlet.
   3. Stem thermometer on outlet.
   4. Strainer stop checks on inlets.

D. Cabinet: 16 gage prime coated stainless steel, for recessed mounting with keyed lock.

2.19 PRESSURE BALANCED MIXING VALVES

A. Manufacturers:
   1. Watts; A Watts Water Technologies Company
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Valve: Chrome plated cast brass body, stainless steel cylinder and integral temperature adjustment.

C. Accessories:
   1. Volume control shut-off valve on outlet.
   2. Stem thermometer on outlet.
   3. Strainer stop checks on inlets.

D. Cabinet: 16 gage prime coated stainless steel, for recessed mounting with keyed lock.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.
B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - THERMOMETERS AND GAGES

A. Install one pressure gage for each pump, locate taps before strainers and on suction and discharge of pump; pipe to gage.

B. Install gage taps in piping.

C. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage.

D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.

E. Provide instruments with scale ranges selected according to service with largest appropriate scale.

F. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

G. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

B. Establish minimum separation of 10 ft from sanitary sewer piping in accordance with current code.

C. Remove scale and dirt on inside of piping before assembly.

D. Excavate pipe trench in accordance with Section 31 23 16.

E. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.

F. Install pipe on prepared bedding.

G. Route pipe in straight line.

H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install shutoff valves at locations indicated on Drawings in accordance with this Section.

J. Install plastic ribbon tape continuous over top of pipe. above pipe line.

K. Install trace wire continuous over top of pipe. above pipe line.
L. Pipe Cover and Backfilling:
   1. Backfill trench in accordance with Section 31 23 23.
   2. Maintain optimum moisture content of fill material to attain required compaction density.
   3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 12 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
   4. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
   5. Do not use wheeled or tracked vehicles for tamping.

3.5 INSTALLATION - ABOVE GROUND PIPING

A. Install non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

C. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

D. Group piping whenever practical at common elevations.

E. Slope piping and arrange systems to drain at low points.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 21 05 16.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.

H. Provide access where valves and fittings are not accessible.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Provide support for utility meters in accordance with requirements of utility companies.

K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 90 00.

L. Install domestic water piping in accordance with ASME B31.9.

M. Sleeve pipes passing through partitions, walls and floors. Refer to Section 22 05 29.

N. Install unions downstream of valves and at equipment or apparatus connections.

O. Install valves with stems upright or horizontal, not inverted.

P. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
Q. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

R. Install ball valves for throttling, bypass, or manual flow control services.

S. Provide lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

T. Provide spring loaded check valves on discharge of water pumps.

U. Provide flow controls in water circulating systems as indicated on Drawings.

V. Install potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.

W. Pipe relief from valves, back-flow preventers and drains to nearest floor drain.

X. Test backflow preventers in accordance with ASSE 5013.

Y. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks and washing machine outlets.

Z. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

3.6 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Test domestic water piping system in accordance with local authority having jurisdiction.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sanitary sewer piping buried within 5 feet of building.
   2. Sanitary sewer piping above grade.
   3. Floor drains.
   4. Floor sinks.
   5. Cleanouts.
   7. Interceptors.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   2. ASME A112.14.3 - Grease Interceptors.
   4. ASME A112.21.1 - Floor Drains.
   5. ASME B31.9 - Building Services Piping.

B. Plumbing and Drainage Institute:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit frequency of treatment required for interceptors. Include, spare parts lists, exploded assembly views for pumps and equipment.
1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. PVC Pipe: ASTM D2729, polyvinyl chloride (PVC) material, bell and spigot solvent sealed ends.
   1. Fittings: PVC, ASTM D2729.
   3. 

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. PVC Pipe: ASTM D2729, polyvinyl chloride (PVC) material.
   1. Fittings: ASTM D2729, PVC.

B. PVC Pipe: ASTM D2665, polyvinyl chloride (PVC) material.
   1. Fittings: ASTM D2665, PVC.

2.3 FLOOR DRAINS

A. Manufacturers:
   1. MIFAB.
2. Zurn Industries, LLC
3. Watts
4. J.R. Smith
5. Substitutions: Section 01 60 00 - Product Requirements.

2.4 FLOOR SINKS

A. Manufacturers:
   1. MIFAB.
   2. Zurn Industries, LLC
   3. Watts
   4. J.R. Smith
   5. Substitutions: Section 01 60 00 - Product Requirements.

2.5 CLEANOUTS

A. Manufacturers:
   1. MIFAB.
   2. Zurn Industries, LLC
   3. Watts
   4. J.R. Smith
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Exterior Surfaced Areas: Round cast nickel bronze access frame and non-skid cover.

C. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket.

D. Interior Finished Floor Areas: Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish in finished floor areas.

E. Interior Finished Wall Areas (CO-4): Line type with lacquered cast iron body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.

F. Interior Unfinished Accessible Areas (CO-5): Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.6 BACK WATER VALVES

A. Manufacturers:
   1. MIFAB.
   2. Zurn Industries, LLC
   3. Watts
   4. J.R. Smith
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Cast Iron: ASME A112.14.1; lacquered cast iron body and cover, brass valve, and access cover.
C. Plastic: PVC body and valve, and access cover.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.
D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.
B. Establish elevations of buried piping with not less than 4 ft of cover.
C. Establish minimum separation from other services in accordance with current Michigan Plumbing code.
D. Remove scale and dirt on inside of piping before assembly.
E. Excavate pipe trench in accordance with Section 31 23 16.
F. Install pipe on prepared bedding.
G. Route pipe in straight line.
H. Install plastic ribbon tape continuous over top of pipe. buried 6 inches below finish grade, above pipe line; coordinate with Section 31 23 23.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
C. Encase exterior cleanouts in concrete flush with grade.
D. Install floor cleanouts at elevation to accommodate finished floor.

E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

G. Install piping to maintain headroom. Do not spread piping, conserve space.

H. Group piping whenever practical at common elevations.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 21 05 16.

J. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

K. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.

L. Install piping penetrating roofed areas to maintain integrity of roof assembly.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

N. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 90 00.

O. Install bell and spigot pipe with bell end upstream.

P. Sleeve pipes passing through partitions, walls and floors.

Q. Support cast iron drainage piping at every joint.

3.5 FIELD QUALITY CONTROL

A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.

B. Test sanitary waste and vent piping system in accordance with applicable code.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pipe hangers and supports.
   2. Hanger rods.
   3. Inserts.
   4. Flashing.
   5. Equipment curbs.
   7. Mechanical sleeve seals.
   8. Equipment bases and supports.

B. Related Sections:
   1. Section 23 05 03 - Pipes and Tubes for HVAC Piping and Equipment: Execution requirements for placement of hangers and supports specified by this section.
   2. Section 23 11 23 - Facility Natural-Gas Piping: Execution requirements for placement of hangers and supports specified by this section.

1.2 REFERENCES

A. ASTM International:

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
   3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

C. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.
E. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Maintain one copy of each document on site.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Provide ventilation in areas to receive solvent cured materials.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for pipe hangers and supports.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. ERICO International Corporation.
   2. Hilti, Inc.
   3. NIBCO INC.
4. Substitutions: Section 01 60 00 - Product Requirements.

B. Hydronic Piping:
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
   5. Hangers for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
   6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
   8. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
  10. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
  12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  13. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  14. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
  15. Copper Pipe Support: Copper-plated, carbon steel ring.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

A. Manufacturers:
   1. ERICO International Corporation.
   2. Hilti, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 EQUIPMENT CURBS

A. Manufacturers:
   1. Greenheck Fan Corp.
   2. Lloyd Industries, Inc.
   3. Substitutions: Section 01 60 00 - Product Requirements.
B. Fabrication: Welded 18 gage galvanized steel shell and base, 14” min height, mitered 3 inch cant, 1-1/2 inch thick insulation, factory installed wood nailer.

2.5 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sleeves for Round Ductwork: Galvanized steel.

D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.

E. Sealant: Acrylic.

2.6 MECHANICAL SLEEVE SEALS

A. Manufacturers:
   1. Linkseal-EnPro Industries.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

3.2 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME B31.1.

B. Support horizontal piping as scheduled.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

3.4 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 21 05 48.
3.5 INSTALLATION - FLASHING

A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.

C. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach Counterflashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Set sleeves in position in forms. Provide reinforcing around sleeves.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Install chrome plated steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

3.9 SCHEDULES

A. Copper and Steel Pipe Hanger Spacing: per applicable code.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Natural gas piping buried within 5 feet of building.
   2. Natural gas piping above grade.
   3. Unions and flanges.
   4. Valves.
   5. Pipe hangers and supports.
   7. Natural gas pressure regulators.
   8. Natural gas pressure relief valves.

B. Related Sections:
   2. Section 23 05 03 - Pipes and Tubes for HVAC Piping and Equipment: Piping materials for gas piping systems.
   3. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports [and firestopping] for placement by this section.
   4. Section 23 05 53 - Identification for HVAC Piping and Equipment: Product requirements for valve and pipe identification for placement by this section.

1.2 REFERENCES

A. American National Standards Institute:

B. American Society of Mechanical Engineers:
   1. ASME B16.3 - Malleable Iron Threaded Fittings.
   2. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
   3. ASME B16.33 - Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (sizes 1/2 - 2).
   4. ASME B31.9 - Building Services Piping.

C. ASTM International:

D. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
2. MSS SP 67 - Butterfly Valves.
3. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
5. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

E. National Fire Protection Association:

F. Underwriters Laboratories Inc.:
1. UL 842 - Valves for Flammable Fluids.

1.3 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.

B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.

C. Provide pipe hangers and supports in accordance with ASME B31.9.

D. Use plug, or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
2. Piping Specialties: Submit manufacturers catalog information including capacity, rough-in requirements, and service sizes for the following:
   a. Strainers.
   b. Natural gas pressure regulators.
   c. Natural gas pressure relief valves.

C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.
1.5 CLOSEOUT SUBMITTALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
   B. Project Record Documents: Record actual locations of valves, piping system, and system components.
   C. Operation and Maintenance Data: Submit for gas pressure regulators installation instructions, spare parts lists, and exploded assembly views.

1.6 QUALITY ASSURANCE
   A. Perform natural gas Work in accordance with NFPA 54.
   B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
   C. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.

1.7 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
   B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
   C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Furnish temporary protective coating on cast iron and steel valves.

1.9 ENVIRONMENTAL REQUIREMENTS
   A. Section 01 60 00 - Product Requirements.
   B. Do not install underground piping when bedding is wet or frozen.

1.10 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.11 COORDINATION
   A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
PART 2 PRODUCTS

2.1 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASTM A234/A234M forged steel welding type.
   3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.2 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

2.3 REGULATOR VENT PIPING, ABOVE GRADE

A. Indoors: Same as natural gas piping, above grade.
B. Outdoors: PVC pipe, tubing, and fittings, UL 651.

2.4 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
   1. Ferrous Piping: Class 150, malleable iron, threaded.
   2. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints].
   3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:
   1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
   2. Copper Piping: Class 150, slip-on bronze flanges.

2.5 BALL VALVES

A. Manufacturers:
   1. Milwaukee Valve Company Model.
   2. NIBCO, Inc. Model.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full port.

C. 1-1/4 inch to 3 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, conventional port.
2.6 PLUG VALVES

A. Manufacturers:
   1. DeZURIK, Unit of SPX Corp. Model.
   2. Homestead Valve Model.
   3. Substitutions: Section 01 60 00 - Product Requirements

B. 2 inches and Smaller: MSS SP 78, Class 150, semi-steel construction, round port, regular opening, pressure lubricated, teflon packing, threaded ends. Furnish one plug valve wrench for every ten plug-valves with minimum of one wrench.

C. 2-1/2 inches and Larger: MSS SP 78, Class 150, semi-steel construction, round port, regular opening, pressure lubricated, teflon packing, flanged ends. Furnish wrench-operated.

2.7 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Conform to NFPA 54.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.

D. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.

E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

F. Wall Support for Pipe 3 inches and Smaller: Cast iron hook.

G. Vertical Support: Steel riser clamp.

H. Exterior Roof support: Foam based support with integral unistrut mounting.

I. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

J. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

K. Sheet Lead: ASTM B749, 2.5 lb/sq ft inch thick.

2.8 STRAINERS

A. Manufacturers:
1. Spirax Sarco, Inc. Model.
2. Substitutions: Section 01 60 00 - Product Requirements.

B. 2 inch and Smaller: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

D. 5 inch and Larger: Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.9 UNDERGROUND PIPE MARKERS

A. Manufacturers:
   1. Pipemarker; Brimar Industries, Inc..
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Plastic Detectable Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service. Magnetic and detectable, imprinted with "Natural Gas Service" in large letters.

PART 3 EXECUTION

3.1 EXAMINATION

A. 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - INSERTS

A. Provide inserts for placement in concrete forms.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install hangers and supports in accordance with ASME B31.9.

B. Support horizontal piping hangers as scheduled.

C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.

G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.

H. Install pipe hangers and supports in accordance with Section 23 05 29.

3.5 INSTALLATION - BURIED PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54.

B. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

C. Remove scale and dirt on inside of piping before assembly.

D. Install pipe on prepared bedding.

E. Route pipe in straight line.

F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Install plastic ribbon tape continuous over top of pipe. buried 6 inches below finish grade, above pipe line.

3.6 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
C. Route piping in orderly manner and maintain gradient.

D. Where required, bend pipe with pipe bending tools in accordance with procedures intended for that purpose.

E. Install piping to conserve building space and not interfere with use of space.

F. Size and install gas piping to provide sufficient gas to supply maximum appliance demand at pressure higher than appliance minimum inlet pressure.

G. Group piping whenever practical at common elevations.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

I. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 29.

J. Provide clearance for installation of insulation and access to valves and fittings.

K. Provide access where valves and fittings are not exposed.

L. Provide support for utility meters in accordance with requirements of utility company.

M. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood. Protect vent against entry of insects and foreign material.
   1. Minimum Vent Size: Connection size at regulator vent connection.
   2. Run individual vent line from each relief device, independent of breather vents.

N. Breather vents may be manifolded together with piping sized for combined appliance vent requirements.

O. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 09 90 00.

P. Install identification on piping systems including underground piping. Refer to Section 23 05 53.

Q. Install valves with stems upright or horizontal, not inverted.

R. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

S. Provide new gas service. Gas service distribution piping to have initial minimum pressure of 11 inch wg.

3.7 FIELD QUALITY CONTROL

A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
B. Where gas appliance will be damaged by test pressure, disconnect appliance and cap piping during pressure test. Reconnect appliance after pressure test and leak test connection.

C. Where gas appliance is designed for operating pressures equal to or greater than piping test pressure, provide gas valve to isolate appliance or equipment from gas test pressure.

D. Pressure test natural gas piping in accordance with NFPA 54.

E. Where new branch piping is extended from existing system, pressure test new branch piping only. Leak test joint between new and existing piping with noncorrosive leak detection fluid or other approved method.

F. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

G. Immediately after gas is applied to a new system, or a system has been restored after gas service interruption, check pipe for leakage.
   1. Where leakage is detected, shut off gas supply until necessary repairs are complete.

H. Do not place appliances in service until leak testing and repairs are complete.

3.8 SCHEDULES

A. Pipe Hanger Spacing:

<table>
<thead>
<tr>
<th>PIPE SIZE Inches</th>
<th>STEEL PIPE MAXIMUM HANGER SPACING Feet</th>
<th>STEEL PIPE MINIMUM HANGER ROD DIAMETER Inches</th>
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</thead>
<tbody>
<tr>
<td>1/2</td>
<td>6</td>
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<td>2-1/2</td>
<td>10</td>
<td>1/2</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>1/2</td>
</tr>
</tbody>
</table>

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Duct Materials.
   2. Flexible ducts.
   3. Insulated flexible ducts.
   5. Ductwork fabrication.
   7. Duct cleaning.

B. Related Sections:
   1. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this section.
   2. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

1.2 REFERENCES

A. ASTM International:
   2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

B. National Fire Protection Association:
   2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

C. Sheet Metal and Air Conditioning Contractors:
   2. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

D. Underwriters Laboratories Inc.:
   1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.4 QUALITY ASSURANCE
   A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.
   B. Construct ductwork to NFPA 90A standards.
   C. Maintain one copy of each document on site.

1.5 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
   B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.6 ENVIRONMENTAL REQUIREMENTS
   A. Section 01 60 00 - Product Requirements.
   B. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
   C. Maintain temperatures during and after installation of duct sealant.

1.7 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 DUCT MATERIALS
   A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 (zinc coating of in conformance with ASTM A90/A90M.
   B. Steel Ducts: ASTM A1008/A1008M.
   D. Stainless Steel Ducts: ASTM A240/A240M or ASTM A666, Type 304.
   E. Fasteners: Rivets, bolts, or sheet metal screws.
F. Hanger Rod: ASTM A36/A36M; steel; threaded both ends, threaded one end, or continuously threaded.

2.2 INSULATED FLEXIBLE DUCTS

A. Manufacturers:
   1. Owens Corning.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Two ply vinyl film supported by helical wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
   1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
   3. Temperature Range: -10 degrees F to 160 degrees F.
   4. Thermal Resistance: 4.2 square feet-hour-degree F per BTU.
   6. Temperature Range: -20 degrees F to 250 degrees F.
   7. Thermal Resistance: 4.2 square feet-hour-degree F per BTU.

2.3 SINGLE WALL SPIRAL ROUND DUCTS

A. Manufacturers:
   2. Semco Incorporated.
   3. Tangent Air Corp.
   5. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.

C. Duct Coating: Polyvinyl chloride plastic, 4 mil thick on outside and 2 mil thick on inside.

   Temperature range: minus 30 degrees F to 200 degrees F.

D. Construct duct with the following minimum gages:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inches to 14 inches</td>
<td>26</td>
</tr>
<tr>
<td>15 inches to 26 inches</td>
<td>24</td>
</tr>
<tr>
<td>28 inches to 36 inches</td>
<td>22</td>
</tr>
<tr>
<td>38 inches to 50 inches</td>
<td>20</td>
</tr>
<tr>
<td>52 inches to 84 inches</td>
<td>18</td>
</tr>
</tbody>
</table>

E. Construct fittings with the following minimum gages:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inches to 14 inches</td>
<td>24</td>
</tr>
<tr>
<td>15 inches to 26 inches</td>
<td>22</td>
</tr>
<tr>
<td>28 inches to 36 inches</td>
<td>20</td>
</tr>
</tbody>
</table>
2.4 DUCTWORK FABRICATION

A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards), and. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T’s, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

G. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
   1. Sealants, Mastics and Tapes: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
   2. Do not provide sealing products not bearing UL approval markings.

2.5 KITCHEN HOOD EXHAUST DUCTWORK FABRICATION

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and NFPA 96.


C. Concealed Kitchen Hood Exhaust Ducts: Construct of 16 gage carbon steel or 18 gage stainless steel ASTM ASTM A240/A240M OR ASTM 666, type 304 using continuous external welded joints.
D. Grease Duct: Provide factory built commercial grease ducts labeled and listed in accordance with UL 1978.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch and smaller.
D. Install duct hangers and supports in accordance with Section 23 05 29.
E. Use double nuts and lock washers on threaded rod supports.
F. Slope underground ducts to plenums or low pump out points at 1: 500. Install access doors for inspection.
G. Connect flexible ducts to metal ducts with draw bands.
H. Install kitchen range hoods in accordance with NFPA 96. Refer to Section 11 40 00.
I. Install residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out.
J. Kitchen hood exhaust ducts: Use stainless steel for ductwork exposed to view and stainless steel or carbon steel where ducts are concealed.
K. Exhaust Outlet Locations:
   1. Minimum Distance from Property Lines: 3 feet.
   2. Minimum Distance from Building Openings: 3 feet.
   3. Minimum Distance from Outside Air Intakes: 10 feet.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with
spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.

B. Connect air terminal units to supply ducts with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

3.4 CONCEALED GREASE DUCT TESTING

A. Prior to concealing, wrapping, or insulating grease ductwork, or placing grease duct in service, perform leakage test in accordance with ICC IMC, in presence of authority having jurisdiction.

B. Perform light test by pulling minimum 100 W light through duct and observing for light leaks at duct joints.

C. Test complete extent of duct installed, including joint at which duct connects to exhaust hood.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   2. Combination fire-and-smoke dampers.
   3. Duct access doors.
   4. Volume control dampers.

B. Related Sections:
   1. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.

1.2 REFERENCES

A. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and duct access doors.

C. Product Data: Submit data for shop fabricated assemblies and hardware used.

D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
   1. Fire dampers including locations and ratings.
   2. Smoke dampers including locations and ratings.
   4. Flexible duct connections.
   5. Volume control dampers.
   6. Duct access doors.

E. Product Data: For fire dampers smoke dampers combination fire and smoke dampers submit the following:
   1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
   2. Indicate materials, construction, dimensions, and installation details.
   3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
F. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
   B. Project Record Documents: Record actual locations of access doors.
   C. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.5 QUALITY ASSURANCE
   A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
   B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

1.6 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
   B. Protect dampers from damage to operating linkages and blades.
   C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
   D. Storage: Store materials in a dry area indoor, protected from damage.
   E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.8 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.9 COORDINATION
   A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
   B. Coordinate Work where appropriate with building control Work.
PART 2 PRODUCTS

2.1 BACK-DRAFT DAMPERS

A. Manufacturers:
   1. Greenheck.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gage thick steel, or extruded aluminum. Blades, maximum 6 inch width, center pivoted, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.2 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:
   1. Greenheck.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with NFPA 90A, UL 555, and UL 555S.

C. Fire Resistance: 1-1/2 hours.

D. Leakage Rating: Class II, maximum of 20 cfm at 4 inches wg differential pressure.

E. Damper Temperature Rating: 250 degrees F.

F. Frame: 16 gage, galvanized steel.

G. Blades:
   1. Style: Single skin with 3 longitudinal grooves.
   3. Orientation: Horizontal.
   5. Width: Maximum 6 inches.

H. Bearings: Stainless steel pressed into frame.

I. Seals: Silicone blade edge seals and flexible stainless steel jamb seals.

J. Linkage: Concealed in frame.

K. Release Device: Close in controlled manner and lock damper through actuator closure spring.

L. Actuator:
   1. Type: Electric 120 volt, 60 hertz, two-position, fail close.
M. Fusible Link Release Temperature: 165 degrees F.

N. Finish: Mill galvanized.

O. Factory installed sleeve and mounting angles. Furnish silicone caulk factory applied to sleeve at damper frame to comply with leakage rating requirements.

2.3 DUCT ACCESS DOORS

A. Manufacturers:
   1. Greenheck.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.

C. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1 inch thick insulation with sheet metal cover.
   1. Less than 12 inches square, secure with sash locks.
   2. Up to 18 inches Square: Furnish two hinges and two sash locks.
   3. Up to 24 x 48 inches: Three hinges and two compression latches.
   4. Larger Sizes: Furnish additional hinge.
   5. Access panels with sheet metal screw fasteners are not acceptable.

2.4 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. Greenheck.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.

C. Splitter Dampers:
   1. Material: Same gage as duct to 24 inches size in both dimensions, and two gages heavier for sizes over 24 inches.
   2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.

E. End Bearings: Except in round ductwork 12 inches and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg.
F. Quadrants:
   1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches furnish regulator at both ends.

PART 3 EXECUTION

3.1 EXAMINATION

   A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
   B. Verify rated walls are ready for fire damper installation.
   C. Verify ducts and equipment installation are ready for accessories.
   D. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

   A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
   B. Access Doors: Install access doors at the following locations and as indicated on Drawings:
      1. Spaced every 50 feet of straight duct.
      2. Upstream of each reheat coil.
      3. Before and after each duct mounted filter.
      4. Before and after each duct mounted coil.
      5. Before and after each duct mounted fan.
      6. Before and after each automatic control damper.
      7. Before and after each fire damper smoke damper combination fire and smoke damper.
      8. Downstream of each VAV box.
      9. Install at locations for cleaning kitchen exhaust ductwork in accordance with NFPA 96.
   C. Access Door Sizes: Install minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access. Review locations prior to fabrication.
      1. Mark access doors for fire and smoke dampers on outside surface, with minimum 1/2 inch high letters reading: FIRE/SMOKE DAMPER, SMOKE DAMPER, OR FIRE DAMPER.
   D. Install fire dampers, combination fire and smoke dampers and smoke dampers at locations as indicated on Drawings. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
      1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A.
      2. Install dampers square and free from racking with blades running horizontally.
      3. Do not compress or stretch damper frame into duct or opening.
4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.
5. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

END OF SECTION
SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Diffusers.
   2. Registers

B. Related Sections:
   1. Section 23 33 00 - Air Duct Accessories: Volume dampers for inlets and outlets.

1.2 REFERENCES

A. Air Movement and Control Association International, Inc.:
   1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
   1. ASHRAE 70 - Method of Testing for Rating the Performance of Air Outlets and Inlets.

C. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Samples: Submit two of each required air outlet and inlet type.

D. Test Reports: Rating of air outlet and inlet performance.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of air outlets and inlets.
1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for air outlets and inlets.

PART 2 PRODUCTS

2.1 RECTANGULAR CEILING DIFFUSERS

A. Manufacturers:
   1. Nailor Industries, Inc.
   2. Titus.
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Type: Square, stamped, multi-core diffuser to discharge air in four-way pattern.

C. Frame: Inverted T-bar type. In plaster ceilings, furnish plaster frame and ceiling frame.

D. Fabrication: Steel with baked enamel off-white finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify inlet and outlet locations.

C. Verify ceiling systems are ready for installation.

3.2 INSTALLATION

A. Install diffusers to ductwork with airtight connection.

B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly. Refer to Section 23 33 00.

C. Paint visible portion of ductwork behind air outlets and inlets matte black. Refer to Section 09 90 00.

D. Do not locate air registers, diffusers or grilles in floors of toilet or bathing rooms.
3.3 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.4 SCHEDULES

A. See Shee-M501

END OF SECTION
SECTION 23 74 13

PACKAGED, OUTDOOR, DIRECT GAS FIRED MAKE-UP AIR UNITS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes modular factory fabricated air-handling units and accessories.

B. Related Sections:
   1. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation applying to units in this section.
   2. Section 23 33 00 - Air Duct Accessories: Product requirements for flexible duct connections for placement by this section.

1.2 REFERENCES

A. Air-Conditioning and Refrigeration Institute:
   1. ARI 430 - Central-Station Air-Handling Units.
   2. ARI Guideline D - Application and Installation of Central Station Air-Handling Units.

B. Sheet Metal and Air Conditioning Contractors:
   1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. Underwriters Laboratories Inc.:
   1. UL 900 - Air Filter Units.
   2. UL - Fire Resistance Directory.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.

C. Product Data, Submit the following:
   1. Published Literature: Indicate capacities, ratings, gages and finishes of materials, and electrical characteristics and connection requirements.
   2. Filters: Data for filter media, filter performance data, filter assembly, and filter frames.
   3. Fans: Performance and fan curves with specified operating point plotted, power, RPM.
   4. Sound Power Level Data: Fan outlet and casing radiation at rated capacity.
   6. Electrical Requirements: Power supply wiring including wiring diagrams for interlock and control wiring. Indicate factory installed and field installed wiring.
D. Samples: Submit two of each type of replacement filter media with frame.

E. Manufacturer's Installation Instructions: Submit.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.5 QUALITY ASSURANCE

A. Outside Air Damper Leakage: Test in accordance with AMCA 500.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Accept units and components on site in factory protective containers, with factory shipping skids and lifting lugs. Inspect for damage.

C. Protect units from weather and construction traffic by storing in dry, roofed location.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for air handling units.

1.9 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish one set of fan belts for each unit.

C. Furnish one set of filters for each unit.
PART 2 PRODUCTS

2.1 DIRECT GAS FIRED MAKE-UP AIR UNITS

A. Manufacturers:
   1. Greenheck
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Configuration: Fan section plus accessories, including:
   1. Heating coil.
   2. Humidifier.
   3. Filter section.
   4. Combination filter/mixing box section.
   5. Mixing box section.
   6. Face and bypass damper section.
   7. Multi-zone damper section.

C. Fabrication: Conform to AMCA 99 and ARI 430.

D. Roof Curb:
   1. Factory assembled galvanized steel mounting curb designed and manufactured by unit manufacturer.
   2. Perimeter type with support of air handling sections.
   3. Furnish supply and return opening duct frames as part of curb structure allowing duct connections to be made directly to curb.
   4. Minimum of 14 inches high and include wood nailer strip.
   5. Furnish gaskets for field mounting.

2.2 MANUFACTURED UNITS

A. Unit with Integral Heating shall be fully assembled at the factory and consist of an insulated metal cabinet, outdoor air intake weather hood with aluminum mesh filter, condensate drain pan, P trap, motorized intake damper and motorized recirculating damper, sensors, curb assembly, service receptacle, freeze protection, filter assembly for intake air, supply air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for [single-point high voltage connection.

2.3 CABINET

A. Materials: Formed, double wall insulated metal cabinet fabricated to permit access to internal components for maintenance.
   1. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Pre-painted components as supplied by the factory shall have polyester urethane paint on 18 gauge G60 galvaneal steel. Base rail is 12 gauge, galvazined (G90) steel. Components that receive a painted finish per A/E specification shall be of 18 gauge type A60 galvaneal steel and shall be painted with a baked industrial enamel finish. Components that receive a painted finish per A/E specification shall be painted with a polyester urethane powder coat.
2. Internal assemblies: 24 gauge, galvanized (G90) steel except for motor supports which shall be minimum 14 gauge galvanized (G90) steel.

B. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
   1. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
      a. Thickness: 1 inch (25 mm)
      b. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
      c. Location and application: Floor of each unit shall be insulated with fiberglass insulation. Full interior coverage of entire cabinet to include walls and roof of unit shall be semi-rigid type and installed between inner and outer shells of all cabinet exterior components when double walls are specified.
      d. Access panels: Unit shall be equipped with insulated hinged access panels to provide easy access to all major components. Access panels shall be fabricated of 18 gauge galvanized G90 steel.
      e. Supply Air blower assembly options:
         1. Forward curve blower: Blower assembly consists of an electric motor and a belt driven, double width, and double inlet forward curve blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on [minimum 1.125 inch thick neoprene vibration isolators] [spring isolation devices]. Or
         2. Direct-drive fan(s) Blower assembly shall consist of an electric motor as specified by A / E. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on 1.125 inch thick neoprene vibration isolators. Blower motor(s) shall be capable of continuous speed modulation and controlled by a factory supplied VFD.

C. Control center / connections: unit shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections.

D. Direct Gas-Fired Burner:
   1. Unit shall be factory assembled, piped and wired. Direct gas-fired system will be 92% efficient while supplying a burner that is capable of providing 25:1 turndown. Unit will utilize a draw through design and incorporate adjustable burner baffles plates for filed adjustments. Unit will have a direct spark ignition system.
   2. of a cast aluminum burner manifold and 400 series stainless steel mixing plates. No air from the inside space shall be allowed to pass across the burner at any time. Flame sensing shall be provided by a flame rod. Burner control shall have a digital coded fault indicator capable of storing the last five faults.
   3. Shall be equipped for operation on natural gas with a maximum rated inlet gas pressure of 1/2 psi. An External Gas pressure regulator shall be provided by the factory.
   4. Burner control options to include the following discharge temperature.
   5. Shall include the following safety controls:
a. Manual Reset, High Limit Switch: Main gas valve closes if high-limit temperature is exceeded.
b. Dual safety shutoff valves shall be that do not exceed 120 VAC control signals.
c. Low Gas Pressure Switch(s): Main gas valve closes if high or low pressure switch faults.
d. Clear visual signal demonstrating the position of the main gas safety shutoff valves. Visual indication provides a clear visual signal that demonstrates the position of the main safety shutoff valves.

E. Condensate drain pan: Drain Pan shall be an integral part of the unit whenever a cooling option is included. Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded stainless steel drain connection at the front for connection to a P trap. Drain pan shall be double pitched, sloped in opposite directions to provide positive draining. Drain connector shall be sealed at penetration through cabinet wall.

F. P trap: If the unit is equipped with a condensate drain pan, contractor shall provide, or fabricate, and install an appropriate P trap, in accordance with all local and area codes and Best Practices.

G. Motorized Inlet Air Damper: to be of low leakage type and shall be factory installed.

H. Sensors are considered to be part of various optional operational modes or device controllers and are to be factory supplied and installed as specified by the A/E.

I. Curb Assembly: A curb assembly shall be made of galvanized steel provided by the factory for field assembly and installation as part of this division. The curb shall include a duct adapter(s) for supply air and return air. The installing contractor shall be responsible for coordinating with roofing contractor to ensure curb unit is properly flashed to provide protection against weather/moisture penetration. Contractor shall provide and install appropriate insulation for the curb assembly.

J. Service receptacle: 120 VAC GFCI service outlet shall be factory-provided and installed by this contractor in a location designated by the A/E.

2.4 BLOWER-FC (Standard)

A. Blower section construction, Supply Air: Belt drive motor and blower shall be assembled onto a minimum 14 gauge galvanized steel platform and must have [neoprene vibration isolation devices, minimum of 1 – 1/8 inches thick] [helical coil spring vibration devices].

B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

C. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.

D. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with
set screws.

E. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, “Laboratory Methods of Testing Fans for Rating.”

2.4 MOTORS

A. General: Blower motors greater than ¾ horsepower shall be “NEMA Premium™” unless otherwise indicated. Compliance with EPAct minimum energy-efficiency standards for single speed ODP and TE enclosures is not acceptable. Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower and pulleys shall be fully machined cast-type, keyed and fully secured to the fan wheel and motor shafts. Electric motors of ten horsepower or less shall be supplied with an adjustable drive pulley. Comply with requirements in Division 23 05 13, matched with fan load.

B. Motors shall be as indicated in schedule.

2.5 UNIT CONTROLS

A. The unit shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied remote panel, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS).

B. Unit shall be interlocked with operation of corresponding exhaust fan and kitchen hood systems.

C. Sensors to be provided with the unit
   1. Heating Inlet Air Sensor
   2. Dirty Filter Sensor

2.7 FILTERS

A. Unit shall have 2” thick MERV 8 disposable pleated filters following the outdoor air intake in a V-bank arrangement and shall be accessible from the exterior of the unit.

3.0 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer’s field services.
B. Furnish initial start-up and shutdown during first year of operation, including routine servicing and checkout.

4.0  CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
B. Vacuum clean coils and inside of unit cabinet.
C. Install new throwaway filters in units at Substantial Completion.

5.0  DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
B. Demonstrate unit operation and maintenance.
C. Furnish services of manufacturer's technical representative for one 8 hour day to instruct Owner's personnel in operation and maintenance of units. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.

6.0  PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
B. Do not operate units until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION
SECTION 26 05 00
GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

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

1.02 SUMMARY
A. Section Includes:
   1. Electrical equipment coordination and installation.
   2. Sleeves for raceways and cables.
   3. Sleeve seals.
   5. Common electrical installation requirements.
B. Provide all interior electric wiring including, but not limited to:
   1. Disconnection, removal, demolition, and related work for kitchen/serving area and related support areas, including demolition for kitchen equipment, lighting, receptacles,
   2. Modifications, alterations, cleaning, and circuit verification/tracing for existing panels, including panel relocation(s) and cover modifications/replacements,
   3. New circuit breakers, Conduits & Wires, Grounding and Bonding per NEC requirements,
   4. Extension/Modification to existing Feeders to branch circuit panels,
   5. New feeders to HVAC equipment, Owner provided equipment, and other equipment as detailed.
   6. Branch circuit wiring from the distribution and branch circuit panels for lighting, receptacles, motors, and other detailed circuit wiring.
   7. Luminaires, exits signs, control switches, disconnect switches, receptacles, relays, supports, and other accessory items.
   8. Conduits and boxes only for telecommunications systems (computer and telephone). MTU will provide all wiring, equipment, jacks, faceplates, switches, etc. for network telecommunication (computer and telephone) systems. The owner will purchase and install network switches.
   9. All conduits, boxes, equipment and wiring for minor modifications to existing Fire Alarm System.
C. Obtain and pay for all electrical permits and inspections from the Authority Having Jurisdiction (Electrical Permit from Houghton County Building Department)

1.03 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.
B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Refer to Section 01 33 00 for additional submittal requirements.
B. Shop Drawings: Provide certified shop drawing submittals (approved by the Prime contractor) for the following items and any other items where indicated in other specification sections:
   1. Fire Alarm
C. Product Data: Provide certified submittals (approved by the Prime contractor) for the following items and any other items where indicated in other specification sections:
   1. Branch Circuit Panelboards, including modifications to existing
   2. Circuit Breakers
   3. Disconnect Switches and Fuses
   4. Conduit, boxes, fittings, and support items
   5. Wire and Cable
   6. Electrical Devices, including receptacles, switches, and device cover plates.
   7. Motor Control equipment; starters, contactors, push-buttons, and the like
   8. Light fixtures
   9. Occupancy Sensors
   10. For sleeve seals.

1.05 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope.
   4. So connecting raceways and cables will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide like items from one manufacturer; such as, luminaire types, switches, receptacles, breakers, panels, and the like.

B. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established.

C. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system or systems, in a safe and satisfactory working condition.

D. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type, or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the bid.

2.02 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:
   a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052-inch.
   b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138-inch.

2.03 SLEEVE SEALS

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

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA I, NFPA 70 (National Electrical Code – current edition adopted by the Authority Having Jurisdiction), and any local amendments.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.
F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

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

3.04 FIRESTOPPING
   A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY
A. Section includes electrical connections to equipment.
B. Related Sections:
   1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
   2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES
A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.
C. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements: Submittal procedures.
B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION
A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
C. Determine connection locations and requirements.
D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
E. Sequence electrical connections to coordinate with start-up of equipment.
PART 2 PRODUCTS

2.1 CORD AND PLUGS

A. Attachment Plug Construction: Conform to NEMA WD 1.
B. Must be UL Listed and Labeled.
C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
D. Cord Construction: Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 EXISTING WORK

A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.
B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.
C. Extend existing equipment connections using materials and methods compatible with existing electrical installations, or as specified.

3.3 INSTALLATION

A. Make electrical connections.
B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
D. Install receptacle outlet to accommodate connection with attachment plug.
E. Install cord and cap for field-supplied attachment plug.
F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

3.5 EQUIPMENT CONNECTION SCHEDULE

A. Provide electrical connection of equipment (voltage, amperage, fusing, etc.) per equipment manufacturer’s requirements.

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

PART 1 GENERAL

1.1 SUMMARY
A. Section includes building wire and cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES
A. International Electrical Testing Association:
B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
C. Underwriters Laboratories, Inc.:
   1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.3 SYSTEM DESCRIPTION
A. Product Requirements: Provide products as follows:
   1. Stranded conductors.
   2. Conductor not smaller than 12 AWG for power and lighting circuits.
   3. Conductor not smaller than 16 AWG for control circuits.
B. Conduit:
   1. Wire shall be installed in conduit.
   2. Conduit may be used in exposed locations only in unfinished spaces (such as mechanical rooms). All conduit in finished spaces shall be concealed in walls and above ceilings.
   3. MC cable may be used as fixture whips when concealed.

1.4 DESIGN REQUIREMENTS
A. Conductor sizes are based on copper. DO NOT use aluminum wire.

1.5 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures.
B. Material information.

1.6 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout.
B. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE
A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

1.8 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.9 FIELD MEASUREMENTS
A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION
A. Section 01 30 00 - Administrative.
B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
C. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 ft of length shown.

1.11 DEFINITIONS
A. Furnish: To supply and deliver, unload and inspect for damage.
B. Install: To unpack, assemble, erect, mount, apply, place, finish, cure, protect, clean, energize, program, adjust, test and make completely functional and operational.
C. Provide: To furnish and install.

PART 2 PRODUCTS
2.1 BUILDING WIRE
A. Manufacturers:
   1. General Cable Co.
2. Rome Cable.  

B. Product Description: Single conductor insulated wire.  
C. Conductor: Stranded copper.  
D. Insulation Voltage Rating: 600 volts.  
E. Insulation Temperature Rating: 90 degrees C.  

2.2 METAL CLAD CABLE  
A. Conductor: Copper.  
B. Insulation Voltage Rating: 600 volts.  
C. Insulation Temperature Rating: 90 degrees C.  
D. Armor Material: Aluminum.  
E. Armor Design: Interlocked metal tape or corrugated tube.  
F. Jacket: None.  

2.3 WIRING CONNECTORS  
A. Split Bolt Connectors:  
B. Solderless Pressure Connectors:  
C. Spring Wire Connectors:  
D. Compression Connectors:  

2.4 TERMINATIONS  
A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.  
B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.  

PART 3 EXECUTION  

3.1 EXAMINATION  
A. Section 01 30 00 - Administrative Requirements.  
B. Verify interior of building has been protected from weather.
C. Verify mechanical work likely to damage wire and cable has been completed.

D. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:
   1. Pull conductors into raceway at same time.
   2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Cable:
   1. Protect exposed cable from damage.
   2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
   3. Use suitable cable fittings and connectors.

F. Special Techniques - Wiring Connections:
   1. Clean conductor surfaces before installing lugs and connectors.
   2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
   4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
   5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
   6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

G. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

H. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.
I. Size lugs in accordance with manufacturer’s recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.

J. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.4 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
      a. Black and red for single phase circuits at 120/240 volts.
      b. Black, red, and blue for circuits at 120/208 volts single or three phase.
      c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION
SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wire.
   2. Mechanical connectors.
   3. Exothermic connections.
   4. Equipment grounding.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Equipment Ground.
   1. Provide separate insulated equipment grounding conductor in each conduit and raceway. DO NOT rely on conduit as the sole means of equipment grounding.

1.4 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

PART 2 PRODUCTS

2.1 WIRE

A. Material: Stranded copper.
2.2 MECHANICAL CONNECTORS
   A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.3 EXOTHERMIC CONNECTIONS
   A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.1 PREPARATION
   A. Remove paint, rust, mill oils and surface contaminants at connection points.

3.2 INSTALLATION
   A. Install in accordance with IEEE 142.
   B. Bond together each metallic raceway, pipe, duct and other metal objects.
   C. Provide separate insulated equipment grounding conductor in each conduit and raceway. Conductor shall be sized per National Electrical Code requirements.

3.3 FIELD QUALITY CONTROL
   A. Inspect and test in accordance with NETA ATS, except Section 4.
   B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
   C. Perform ground resistance testing in accordance with IEEE 142.
   D. Perform leakage current tests in accordance with NFPA 99.
   E. Perform continuity testing in accordance with IEEE 142.
   F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION
SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conduit supports.
   2. Formed steel channel.
   4. Sleeves.
   5. Mechanical sleeve seals.
   6. Firestopping relating to electrical work.
   7. Firestopping accessories.
   8. Equipment bases and supports.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of
      Building Materials.
      and Materials.
      Stops.

B. FM Global:
      By Factory Mutual Research For Property Conservation.

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:
   3. UL 1479 - Fire Tests of Through-Penetration Firestops.
   5. UL - Fire Resistance Directory.

E. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.
1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479] to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
   1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.

B. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

C. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
   2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.

F. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.
   2. Firestopping: Submit preparation and installation instructions.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
H. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
   1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
   2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
      a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

B. Through Penetration Firestopping of Non-Fire Rated Floor [and Roof] Assemblies: Materials to resist free passage of flame and products of combustion.
   2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

A. Manufacturers:
   1. Allied Tube & Conduit Corp.
   2. Electroline Manufacturing Company.
   3. O-Z Gedney Co.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

A. Product Description: Mounting hole and screw closure.

2.4 MECHANICAL SLEEVE SEALS

A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.5 FIRESTOPPING

A. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single or Multiple component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

2.6 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

C. General:
   1. Furnish UL listed products or products tested by independent testing laboratory.
   2. Select products with rating not less than rating of wall or floor being penetrated.

D. Non-Rated Surfaces:
   1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
   2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive sleeves.

B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.
C. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:
   1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors and preset inserts.
   2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
   3. Concrete Surfaces: Provide expansion anchors.
   5. Solid Masonry Walls: Provide expansion anchors.
   7. Wood Elements: Provide wood screws.

B. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

C. Install conduit and raceway support and spacing in accordance with NEC.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Install multiple conduit runs on common hangers.

F. Supports:
   1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
   2. Install surface mounted cabinets and panelboards with minimum of four anchors.
   3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
   4. Support vertical conduit at every floor.

3.4 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.
3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS
A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment.
B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

3.6 INSTALLATION - SLEEVES
A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
C. Set sleeves in position in forms. Provide reinforcing around sleeves.
D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
E. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.7 FIELD QUALITY CONTROL
A. Inspect installed firestopping for compliance with specifications.

3.8 CLEANING
A. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK
A. Protect adjacent surfaces from damage by material installation.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
   3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
   4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
   5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
   7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

B. Underslab conduit shall be 1 inch minimum.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit for the following:
1. Flexible metal conduit.
2. Liquidtight flexible metal conduit.
3. Nonmetallic conduit.
4. Flexible nonmetallic conduit.
5. Nonmetallic tubing.
6. Raceway fittings.
7. Conduit bodies.
8. Surface raceway.
9. Wireway.
10. Pull and junction boxes.
11. Handholes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch.
   2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements.

B. Coordinate installation of outlet boxes for equipment.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Carlon Electrical Products.
B. Allied Tube.
C. Wheatland.

2.2 METAL CONDUIT
A. Rigid Steel Conduit: ANSI C80.1.
B. Rigid Aluminum Conduit: ANSI C80.5.
C. Intermediate Metal Conduit (IMC): Rigid steel.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT
A. Product Description: Interlocked aluminum construction with PVC jacket.
B. Fittings: NEMA FB 1.

2.4 ELECTRICAL METALLIC TUBING (EMT)
A. Product Description: ANSI C80.3; galvanized tubing.
B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.5 NONMETALLIC CONDUIT
A. Product Description: NEMA TC 2; Schedule 40 or 80 PVC as indicated on the drawings.
B. Fittings and Conduit Bodies: NEMA TC 3.

2.6 SURFACE METAL RACEWAY
A. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.
B. Acceptable Manufacturers:
   1. Thomas & Betts
   2. Wiremold
C. Size: as required for circuits, conductors, and cables to be installed. DO NOT exceed fill capacity as determined by the National Electrical Code and manufacturer’s requirements.
D. Finish: manufacturer’s standard primer, suitable for field painting.
E. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

2.7 WIREWAY
A. Product Description: General purpose, oiltight and dust-tight or raintight type wireway as suited for location installed.
B. Knockouts: Manufacturer's standard on bottom only.

C. Size: As indicated on Drawings.

D. Cover: Hinged with full gaskets.

E. Connector: Flanged.

F. Finish: Rust inhibiting primer coating with gray enamel finish.

2.8 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, cast ferroly. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.9 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. Concrete composite Handholes: Die-molded:
   1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
   2. Cover: concrete composite, weatherproof cover with nonskid finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.
3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods [compatible with existing electrical installations, or] as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes.

B. Fasten raceway and box supports to structure and finishes.

C. Identify raceway and boxes.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Use surface raceway (wiremold) only on existing brick walls where it is not possible to “fish” in the existing wall cavity. All other walls shall utilize conduit concealed within the wall.

C. Arrange raceway supports to prevent misalignment during wiring installation.

D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related raceway; support using conduit rack. Construct rack using steel channel. Provide space on each for 25 percent additional raceways.

F. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.

G. Do not attach raceway to ceiling support wires or other piping systems.
H. Construct wireway supports from steel channel.
I. Route exposed raceway parallel and perpendicular to walls.
J. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
K. Route conduit in and under slab from point-to-point.
L. Minimum Size Conduit under Slab: 1 inch.
M. Maintain clearance between raceway and piping for maintenance purposes.
N. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
P. Bring conduit to shoulder of fittings; fasten securely.
Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
R. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
T. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
U. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
W. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
B. Orient boxes to accommodate wiring devices.
C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
D. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
E. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

F. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

G. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

H. Install stamped steel bridges to fasten flush mounting outlet box between studs.

I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

J. Install adjustable steel channel fasteners for hung ceiling outlet box.

K. Do not fasten boxes to ceiling support wires or other piping systems.

L. Support boxes independently of conduit.

M. Install gang box where more than one device is mounted together. Do not use sectional box.

N. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

B. Locate outlet boxes to allow luminaires positioned as indicated.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Labels.
   3. Wire markers.
   5. Stencils.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data:
   1. Submit manufacturer’s catalog literature for each product required.
   2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on white contrasting background color.

B. Letter Size:
   1. 1/8 inch high letters for identifying individual equipment and loads.
   2. 1/4 inch high letters for identifying grouped equipment and loads.

C. Minimum nameplate thickness: 1/8 inch.

2.2 LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

A. Description: Cloth tape, split sleeve, or tubing type wire markers.

B. Legend:
   1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
   2. Control Circuits: Control wire number as indicated on shop drawings.

2.4 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
   1. Up to 2 inches Outside Diameter of Raceway: 1/2 inch high letters.
   2. 2-1/2 to 6 inches Outside Diameter of Raceway: 1 inch high letters.

B. Stencil Paint: semi-gloss enamel.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.
3.2 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:
   1. Install nameplate parallel to equipment lines.
   2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
   3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
   4. Secure nameplate to equipment front using screws, rivets, or adhesive.
   5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
   6. Install nameplates for the following:
      a. Switchboards.
      b. Panelboards.
      c. Disconnects.

C. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install label for identification of individual control device stations.
   3. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:
   1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes for each load connection.
   2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
   3. Install labels at data outlets identifying patch panel and port designation.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Remote control lighting relays.
   2. Lighting contactors.
   4. Switch plates.
   5. Occupancy sensors.
   6. Photocells.
   7. Photocell control unit.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA FU 1 - Low Voltage Cartridge Fuses.
   3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   4. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
   5. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
   6. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
   7. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.3 SYSTEM DESCRIPTION

A. Distributed switching control using self contained individually mounted lighting relays.

B. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting inside building larger than 5000 square feet. Control shutoff by method conforming to ICC IECC.

C. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting outside building. Control shutoff by method conforming to ICC IECC.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
   1. One Line Diagram: Indicating system configuration indicating panels, number and type of switches or devices.
2. Include typical wiring diagrams for each component.

C. Product Data: Submit manufacturer’s standard product data for each system component.

D. Manufacturer’s Installation Instructions: Submit for each system component.


1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Project Record Documents: Record the following information:
   1. Actual locations of components and record circuiting and switching arrangements.
   2. Wiring diagrams reflecting field installed conditions with identified and numbered, system components and devices.

C. Operation and Maintenance Data:
   1. Submit replacement parts numbers.
   2. Submit manufacturer’s published installation instructions and operating instructions.
   3. Recommended renewal parts list.

1.6 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Accept components on site in manufacturer’s packaging. Inspect for damage.

C. Protect components by storing in manufacturer’s containers indoor protected from weather.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Furnish five year manufacturer warranty for components.

1.9 EXTRA MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Furnish two of each switch type.

C. Furnish two of each occupancy sensor type.

D. Furnish two of each photocell type.
1.10 DEFINITIONS

A. Furnish: To supply and deliver, unload and inspect for damage.

B. Install: To unpack, assemble, erect, mount, apply, place, finish, cure, protect, clean, energize, program, adjust, test and make completely functional and operational.

C. Provide: To furnish and install.

PART 2 PRODUCTS

2.1 LIGHTING CONTACTORS

A. Product Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Mechanically held, with 3 wire control.

C. Coil Operating Voltage: as shown on the drawing or as determined by contractor to meet manufacturer’s requirements, 60 Hertz.

D. Poles: To match circuit configuration and control function.

E. Contact Rating: Conductor overcurrent protection, considering derating for continuous loads.

F. Accessories:
   1. Cover Mounted Pilot Devices: NEMA ICS 5, heavy-duty oiltight type with Form C contacts.
   2. Pushbutton: ON and OFF.
   3. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
   4. Indicating Light: Red/Green lens, transformer type, with led lamp.
   5. Auxiliary Contacts: One form C.

G. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R with gasketed door.

2.2 SWITCHES

A. Wall Switch: Specification Grade locator light, momentary pushbutton type for overriding relays.

B. Wall Switch: Industrial Grade non-pilot light toggle switches for overriding relays.
2.3 SWITCH PLATES
A. Product Description: Specification Grade.

2.4 OCCUPANCY SENSOR
A. Compatible with modular relay panels. Capable of being wired directly to Class 2P wiring without auxiliary components or devices.
B. Separate sensitivity and time delay adjustments with LED indication of sensed movement. User adjustable time-delay: 30 seconds to 12 minutes.
C. Furnish with manual override.
D. Operation: Silent.
E. Room Sensors: 180°, multi-technology.
F. Corridor and Hallway Sensors:
   1. Capable of detecting motion 14 feet wide and 80 feet long with one sensor mounted 10 feet above floor.
   2. Capable of detecting motion in warehouse aisle 10 feet wide and 60 feet long or 100 feet long when mounted 22 feet above floor.
   3. Capable of being wired in master-slave configuration to extend area of coverage.

2.5 PHOTOCHELS
A. General: Consist of sensor mounted with separate daylighting control module. Sensor connected to module via single shielded conductor with maximum distance of 500 feet.
B. Sensor Devices: Each sensor employs photo diode technology to allow linear response to daylight within illuminance range.

PART 3 EXECUTION
3.1 INSTALLATION
A. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings.
B. Label each low voltage wire clearly indicating connecting relay panel.
C. Mount relay as indicated on Drawings. Wire numbered relays in panel to control power to each load. Install relays to be accessible. Allow space around relays for ventilation and circulation of air.
D. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
E. Label each low voltage wire with relay number at each switch or sensor.
3.2 ADJUSTING

A. Test each system component after installation to verify proper operation.
B. Test controls and switches after installation to confirm proper operation.
C. Confirm correct loads are recorded on directory card in each panel.

3.3 DEMONSTRATION

A. Demonstrate operation of the following system components:
   1. Operation of switches.
   2. Operation and adjustments of occupancy sensors.
   3. Operation and adjustments of photocell.
   4. Operation and setting parameters for control units.
B. Instruct Owner's personnel in operation and maintenance of system. Schedule training with Owner, provide at least 7 days notice to Architect of training date.
C. Allow for a minimum of four hours instructional time.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes distribution and branch circuit panelboards, including modifications to existing panelboards.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA FU 1 - Low Voltage Cartridge Fuses.
   3. Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
   5. NEMA PB 1 - Panelboards.
   6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:

D. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

E. Underwriters Laboratories Inc.:
   1. UL 67 - Safety for Panelboards.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Product Data: Submit catalog data showing specified features of standard products.
1.4 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements.
B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 MAINTENANCE MATERIALS
A. Section 01 70 00 - Execution and Closeout Requirements.
B. Furnish two of each panelboard key. Panelboards keyed alike.

PART 2 PRODUCTS
2.1 BRANCH CIRCUIT PANELBOARDS
A. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
B. Acceptable Manufacturers:
   1. Square-D
C. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus and copper neutral bus in each panelboard.
D. Integrated short circuit rating: 42,000 amperes rms symmetrical minimum.
E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
F. Enclosure: NEMA PB 1, Type 1.
G. Cabinet Front: Flush or Surface cabinet front with concealed hinged trim, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.
2.2 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb.

C. Install recessed panelboards flush with wall finishes.

D. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

E. Install filler plates for unused spaces in panelboards.

F. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.

G. Install engraved plastic nameplates.

H. Ground and bond panelboard enclosure. Connect equipment ground bars of panels in accordance with NFPA 70.

2.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes wall switches; wall dimmers; receptacles; and device plates and decorative box covers.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 1 - General Requirements for Wiring Devices.
   2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

PART 2 PRODUCTS

2.1 WALL SWITCHES

A. Product Description: NEMA WD 1, Specification grade, AC only general-use snap switch.

B. Body and Handle: plastic with rocker handle, color to match existing.

C. Ratings:
   1. Voltage: 120-277 volts, AC.

2.2 RECEPTACLES

A. Product Description: NEMA WD 1, Heavy-duty general use receptacle.

B. Device Body: plastic, color to match existing.

C. Configuration: NEMA WD 6, type.

D. Convenience Receptacle: Type 5-20.
2.3 DEVICE PLATES
A. All device plates shall be of type, style, and color to match existing.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify outlet boxes are installed at proper height.
B. Verify wall openings are neatly cut and completely covered by wall plates.
C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION
A. Clean debris from outlet boxes.

3.3 EXISTING WORK
A. Disconnect and remove abandoned wiring devices.
B. Modify installation to maintain access to existing wiring devices to remain active.
C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 INSTALLATION
A. Install devices plumb and level.
B. Install switches with OFF position down.
C. Connect wiring device grounding terminal to ground system.
D. Install cover plates on switch, receptacle, and blank outlets.

3.5 INTERFACE WITH OTHER PRODUCTS
A. Install wall switch 48 inches above finished floor.
B. Install convenience receptacle 18 inches above finished floor.
C. Install convenience receptacle 6 inches above back splash of counter.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
3.6 FIELD QUALITY CONTROL
   A. Inspect each wiring device for defects.
   B. Operate each wall switch with circuit energized and verify proper operation.
   C. Verify each receptacle device is energized.
   D. Test each receptacle device for proper polarity.
   E. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING
   A. Adjust devices and wall plates to be flush and level.

3.8 CLEANING
   A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fuses.

1.2 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.5 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials

B. Spare Parts:
   1. Furnish two fuse pullers.

C. Extra Materials:
   1. Furnish three spare fuses of each Class, size, and rating installed.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer List:
   1. Bussman

B. Substitution Limitations:
   1. Section 01 60 00 - Product Requirements: Requirements for substitutions for other manufacturers and products.

2.2 DESIGN REQUIREMENTS

A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for the following components: wire, cable, bus structures, and other equipment. Design system to maintain component damage within acceptable levels during faults.

B. Select fuses to coordinate with time current characteristics of other overcurrent protective elements, including other fuses, circuit breakers, and protective relays. Design system to maintain operation of device closest to fault operates.

2.3 FUSES

A. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.4 CLASS RK1 (TIME DELAY) FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.5 CLASS RK1 (NON-TIME-DELAY) FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.6 CLASS RK5 FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.7 CLASS J (TIME DELAY) FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.
2.8 CLASS J (NON-TIME-DELAY) FUSES
   A. Dimensions and Performance: NEMA FU 1.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.9 CLASS T FUSES
   A. Dimensions and Performance: NEMA FU 1.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.10 CLASS L (FAST-ACTING) FUSES
   A. Dimensions and Performance: NEMA FU 1.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.11 CLASS L (TIME DELAY) FUSES
   A. Dimensions and Performance: NEMA FU 1.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.12 CLASS G FUSES
   A. Dimensions and Performance: NEMA FU 1.
   B. Voltage: Rating suitable for circuit phase-to-phase voltage.

PART 3 EXECUTION

3.1 DEMOLITION
   A. Remove fuses from abandoned circuits.
   B. Maintain access to existing fuses and other installations remaining active and requiring access.
      Modify installation or provide access panel.

3.2 INSTALLATION
   A. Install fuse with label oriented so manufacturer, type, and size are easily read.

END OF SECTION
SECTION 26 28 19
ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SUMMARY
   A. Section includes fusible and nonfusible switches.

1.2 REFERENCES
   A. National Electrical Manufacturers Association:
      1. NEMA FU 1 - Low Voltage Cartridge Fuses.
      2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches
         (600 Volts Maximum).
   B. International Electrical Testing Association:
      1. NETA ATS - Acceptance Testing Specifications for Electrical Power
         Distribution Equipment and Systems.

1.3 SUBMITTALS
   A. Section 01 33 00 - Submittal Procedures.
   B. Product Data: Submit switch ratings and enclosure dimensions.

1.4 CLOSEOUT SUBMITTALS
   A. Section 01 70 00 - Execution and Closeout Requirements.
   B. Project Record Documents: Record actual locations of enclosed switches and ratings of
      installed fuses.

1.5 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section
      with minimum three years documented experience.

PART 2 PRODUCTS

2.1 FUSIBLE SWITCH ASSEMBLIES
   A. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked
      to prevent opening front cover with switch in ON position, enclosed load interrupter knife
      switch. Handle lockable in OFF position.
B. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.

C. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

2.2 NONFUSIBLE SWITCH ASSEMBLIES
A. Product Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position.

B. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

2.3 SWITCH RATINGS
A. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings, 30A minimum.

B. Short Circuit Current Rating: UL listed for 200,000 rms symmetrical amperes when used with or protected by Class R fuses.

PART 3 EXECUTION
3.1 INSTALLATION
A. Install fuses for fusible disconnect switches.

B. Install engraved plastic nameplates.

C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.2 FIELD QUALITY CONTROL
A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.5.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes molded-case and insulated-case circuit breakers in individual enclosures.

B. Related Sections:
   1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
   3. Section 26 05 53 - Identification for Electrical Systems.

1.2 REFERENCES

A. International Electrical Testing Association:

B. Underwriters Laboratories Inc.:
   1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and continuous current ratings of enclosed circuit breakers.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
PART 2 PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER

A. Manufacturers:
   1. Square D Company.
   2. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Enclosed, molded-case circuit breaker conforming to UL 489.

C. Accessories: Conform to UL 489.
   1. Grounding Lug: In each enclosure.

D. Enclosure: UL 489, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard enamel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed circuit breakers.

B. Maintain access to existing enclosed circuit breakers and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed circuit breakers to remain or to be reinstalled.

3.2 INSTALLATION

A. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.

B. Height: 5 feet to operating handle.

C. Install grounding and bonding in accordance with requirements of Section 26 05 26.

D. Locate and install engraved plastic nameplates in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS.

END OF SECTION
SECTION 26 29 13
ENCLOSED CONTROLLERS

PART 1 GENERAL

1.1 SUMMARY
A. Section includes manual and magnetic motor controllers in individual enclosures.
B. Related Sections:
   1. Section 26 28 13 - Fuses.

1.2 REFERENCES
A. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA FU 1 - Low Voltage Cartridge Fuses.
   3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
   5. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
   6. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1.3 SUBMITTALS
A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
B. Product Data: Submit catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
C. Test Reports: Indicate field test and inspection procedures and test results.

1.4 CLOSEOUT SUBMITTALS
A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
B. Project Record Documents: Record actual locations and ratings of enclosed controllers.
C. Operation and Maintenance Data: Submit Replacement parts list for controllers.
1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 MANUAL MOTOR CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller with overload element, 1-NO and 1-NC auxiliary contact and toggle operator.

B. Enclosure: NEMA ICS 6, Type 1.

2.2 FRACTIONAL-HORSEPOWER MANUAL CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, toggle operator.

B. Enclosure: NEMA ICS 6, Type 1.

2.3 FULL-VOLTAGE NON-REVERSING CONTROLLERS

A. Product Description: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.

B. Control Voltage: 120 volts, 60 Hertz.

C. Overload Relay: NEMA ICS 2; bimetal.

D. Product Features:
1. Auxiliary Contacts: NEMA ICS 2, 2 each normally open and normally closed contacts in addition to seal-in contact.
2. Cover Mounted Pilot Devices: NEMA ICS 5, standard duty oiltight type.
4. Pushbuttons: Recessed type.
5. Indicating Lights: Transformer LED type.

E. Combination Controllers: Combine motor controllers with disconnect in common enclosure, using thermal magnetic circuit breaker conforming to NEMA AB 1, with integral thermal and instantaneous magnetic trip in each pole.
F. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install enclosed controllers plumb.
B. Height: 5 feet to operating handle.
C. Install fuses for fusible switches. Refer to Section 26 28 13 for product requirements.
D. Select and install overload heater elements in motor controllers to match installed motor characteristics.
E. Install engraved plastic nameplates.
F. Neatly type label and place inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.
B. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section includes enclosed contactors for lighting and general purposes.

B. Related Sections:
   1. Section 26 28 13 - Fuses.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA FU 1 - Low Voltage Cartridge Fuses.
   2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
   4. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
   5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

C. Underwriters Laboratories Inc.:
   1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit dimensions, size, voltage ratings and current ratings.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and ratings of enclosed contactors.

C. Operation and Maintenance Data: Submit instructions for replacing and maintaining coil and contacts.
1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 GENERAL PURPOSE CONTACTORS

A. Product Description: NEMA ICS 2, AC general purpose magnetic contactor.

B. Coil operating voltage: 24 or 120 volts, 60 Hertz; verify with controls contractor prior to ordering.

C. Poles: To match circuit configuration and control function.

D. Product Features:
   2. Pushbutton: ON/OFF function, with shrouded configuration.
   3. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
   4. Indicating Light: RED or GREEN lens, resistor type, with led lamp.
   5. Auxiliary Contacts: Two, field convertible in addition to seal-in contact.

E. Combination Contactors: Combine contactors with enclosed knife switch conforming to NEMA KS 1, with externally operable handle and fuse clips designed to accommodate NEMA FU 1, Class R or J fuses.

F. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard enamel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

2.2 LIGHTING CONTACTORS

A. Product Description: NEMA ICS 2, magnetic lighting contactor.

B. Coil operating voltage: 24 or 120 volts, 60 Hertz, verify with controls contractor prior to ordering.

C. Poles: To match circuit configuration and control function.

D. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads.

E. Accessories:
2. Pushbutton: ON/OFF function, with shrouded configuration.
3. Selector Switch: ON/OFF/AUTOMATIC function, with rotary action.
4. Indicating Light: RED or GREEN lens, resistor type, with led lamp.
5. Auxiliary Contacts: Two, field convertible in addition to seal-in contact.

F. Combination Contactors: Combine contactors with enclosed knife switch conforming to NEMA KS 1, with externally operable handle and fuse clips designed to accommodate NEMA FU 1, Class R or J fuses.

G. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard enamel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect abandoned enclosed contactors and remove abandoned enclosed contactors.

B. Maintain access to existing enclosed contactors and other installations remaining active and requiring access. Modify installation or provide access panel.

C. Clean and repair existing enclosed contactors to remain or to be reinstalled.

3.2 INSTALLATION

A. Install enclosed contactors as indicated on Drawings, in accordance with NECA "Standard of Installation."

B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 05 29.

C. Height: 5 ft to operating handle.

D. Install fuses for fusible switches. Refer to Section 26 28 13 for product requirements.

E. Install engraved plastic nameplates. Refer to Section 26 05 53 for product requirements and location.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes variable frequency controllers.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FU 1 - Low Voltage Cartridge Fuses.
   3. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives.

C. International Electrical Testing Association:

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

C. Product Data: Submit catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

D. Test Reports: Indicate field test and inspection procedures and test results.

E. Manufacturer's Field Reports: Indicate start-up inspection findings.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit instructions complying with NEMA ICS 7.1. Include procedures for starting and operating controllers, and describe operating limits possibly resulting in hazardous or unsafe conditions. Include routine preventive maintenance schedule.
1.5 QUALIFICATIONS
   
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 100 miles of project.

1.6 DELIVERY, STORAGE, AND HANDLING
   
   A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
   
   B. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.
   
   C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

1.7 ENVIRONMENTAL REQUIREMENTS
   
   A. Section 01 60 00 - Product Requirements.
   
   B. Conform to NEMA ICS 7 service conditions during and after installation of variable frequency controllers.

1.8 WARRANTY
   
   A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
   
   B. Furnish five year manufacturer warranty for variable frequency controller.

1.9 MAINTENANCE SERVICE
   
   A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance service.
   
   B. Furnish service and maintenance of variable frequency controller for one year from Date of Substantial Completion.

1.10 MAINTENANCE MATERIALS
   
   A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
   
   B. Furnish two of each air filter.

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY CONTROLLER
   
   A. Manufacturers:
      
2. Eaton (Cutler-Hammer).
3. Or pre-approved equal

B. Product Description: NEMA ICS 7, enclosed variable frequency controller suitable for operating indicated loads. Select unspecified features and options in accordance with NEMA ICS 7.1.

C. Ratings:
1. Rated Input Voltage: 480 volts, three-phase, 60 Hertz.
3. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
4. Operating Ambient: 0 degrees C to 40 degrees C.

D. Design Features:
1. Employ microprocessor-based inverter logic isolated from power circuits.
2. Employ pulse-width-modulated inverter system.
3. Design for ability to operate controller with motor disconnected from output.
4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
5. Provide enclosure with continuous hinged door for drive and all accessories, with though-the-door keypad/display & the following switches: Hand-Off-Auto, Drive-Off-Bypass, Fault reset, and Manual Speed Control. Include through-the-door handle for main circuit breaker with door interlock. Include contactors & overloads (for bypass), control transformer, and miscellaneous relays & indicator lights. Include air inlet filters & enclosure ventilation fans.

E. Indicators and Manual Controls:
1. Input Signal: 4 - 20 mA DC.
2. Display: Furnish integral digital display to indicate output voltage, output frequency, and output current.
3. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.
4. Entire range adjustment of: Volts Per Hertz, Current Limit, Acceleration Rate and Deceleration Rate.
5. HAND-OFF-AUTOMATIC (or LOCAL-OFF-REMOTE), as appropriate, selector switch and manual speed control.
6. Control Power Source: Integral control transformer and DC power supply.

F. Safeties and Interlocks:
1. Includes undervoltage release.
2. Door Interlocks: Mechanical means to prevent opening of equipment with power connected, or to disconnect power when door is opened; include means for defeating interlock by qualified persons.
3. Safety Interlocks: Terminals for remote contact to inhibit starting under both manual and automatic mode.
4. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.
5. Emergency Stop.
6. Disconnecting Means: Integral circuit breaker on line side of each controller.
2. Fabrication:
   1. Wiring Terminations: Match conductor materials and sizes as indicated on Drawings.
   2. Finish: Manufacturer's standard enamel.

2.2 SOURCE QUALITY CONTROL

A. Shop inspect and perform standard productions tests for each controller.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify building environment is maintained within service conditions required by manufacturer.

3.2 INSTALLATION

A. Install in accordance with NEMA ICS 7.1.
B. Tighten accessible connections and mechanical fasteners after placing controller.
C. Install fuses in fusible switches.
D. Select and install overload heater elements in motor controllers to match installed motor characteristics.
E. Install engraved plastic nameplates.
F. Neatly type label inside controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.
G. Ground and bond controller.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.
B. Perform inspections and tests listed in NETA ATS, Section 7.16 and NEMA ICS 7.1.

3.4 MANUFACTURER'S FIELD SERVICES

A. Prepare and startup variable frequency controller.

END OF SECTION
SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.1 SUMMARY
   A. Section includes interior luminaires, lamps, ballasts, and accessories.
   B. Related Sections:
      1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
      2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
      3. Section 26 52 00 - Emergency Lighting.

1.2 REFERENCES
   A. American National Standards Institute:

1.3 SUBMITTALS
   A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
   B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.
   C. Product Data: Submit dimensions, ratings, and performance data.

1.4 QUALIFICATIONS
   A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.5 FIELD MEASUREMENTS
   A. Verify field measurements prior to fabrication.

1.6 MAINTENANCE MATERIALS
   A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
   B. Furnish two of each plastic lens type.
   C. Furnish one box of replacement lamps for each type of lamp installed.
   D. Furnish two of each ballast type.
PART 2 PRODUCTS

2.1 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

B. Refer to Section 01 60 00 - Product Requirements for product options. Substitutions are not permitted.

2.2 FLUORESCENT BALLASTS

A. Manufacturers:
   1. Osram/Sylvania.

B. Product Description: Electronic ballast less than 10 percent THD certified by Certified Ballast Manufacturers, Inc. to comply with ANSI C82.1, suitable for lamps specified, with voltage to match luminaire voltage.

2.3 FLUORESCENT LAMPS

A. Manufacturers:
   1. Osram/Sylvania
   2. Philips

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned luminaires, lamps, and accessories.

B. Extend existing interior luminaire installations using materials and methods compatible with existing installations, or as specified.

C. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.2 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

B. Support luminaires independent of ceiling framing.
C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Exposed Grid Ceilings: Support surface-mounted luminaires on grid ceiling directly from building structure.

F. Install recessed luminaires to permit removal from below.

G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

H. Install clips to secure recessed grid-supported luminaires in place.

I. Install wall-mounted luminaires at height as indicated on Drawings.

J. Install accessories furnished with each luminaire.

K. Connect luminaires to branch circuit outlets provided under Section 26 05 33 using flexible conduit.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Provide disconnect in each fixture per National Electrical Code requirements.

N. Install specified lamps in each luminaire.

O. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Aim and adjust luminaires.

3.5 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Remove dirt and debris from enclosures.
C. Clean photometric control surfaces as recommended by manufacturer.
D. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
B. Relamp luminaires having failed lamps at Substantial Completion.

END OF SECTION
SECTION 26 52 00
EMERGENCY LIGHTING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes emergency lighting units and exit signs.

B. Related Sections:
   1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
   3. Section 26 51 00 - Interior Lighting: Exit signs.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
   1. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SYSTEM DESCRIPTION

A. Emergency lighting to comply with requirements.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit dimensions, ratings, and performance data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 MAINTENANCE MATERIALS

A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

PART 2 PRODUCTS

2.1 EMERGENCY LIGHTING UNITS

A. Manufacturers: per schedule on drawings
   1. Substitutions: Section 01 60 00 - Product Requirements.

B. TEST switch: Transfers unit from external power supply to integral battery supply.
C. Input Voltage: 120-277 volts unless otherwise indicated.

2.2 EXIT SIGNS

A. Manufacturers: per schedule on drawings
   1. Substitutions: Section 01 60 00 - Product Requirements.

B. Face: plastic face with red letters on white background

C. Directional Arrows: Universal type for field adjustment.

D. Mounting: Universal, for field selection.

E. Battery:, with 1.5 hour capacity.

F. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.

G. Lamps: LED.

H. Input Voltage: 120-277 volts unless otherwise indicated.

2.3 FLUORESCENT LAMP EMERGENCY POWER SUPPLY

A. Manufacturers: per schedule on drawings
   1. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire.

C. Lamp Ratings: One 32-watt T8 lamp providing 1100 lumens, minimum.

D. Battery: Sealed type, rated for 10 year life.

E. Include TEST switch and AC ON indicator light, installed to be operable and visible from outside of assembled luminaire.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned emergency lighting units, exit signs, lamps, and accessories. Turn over to Owner.

B. Extend existing emergency lighting and exit sign installations using materials and methods compatible with existing installations, or as specified.

C. Clean and repair existing emergency lighting units and exit signs remaining or are to be reinstalled.
3.2 INSTALLATION

A. Install suspended exit signs using pendants supported from swivel hangers. Install pendant length required to suspend sign at indicated height.

B. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install wall-mounted emergency lighting units and exit signs at height as indicated on Drawings.

D. Install accessories furnished with each emergency lighting unit and exit sign.

E. Connect emergency lighting units and exit signs to branch circuit outlets provided in Section 26 05 33 as indicated on Drawings. Connect of any local switches.

F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within unit.

G. Install specified lamps in each emergency lighting unit and exit sign.

H. Ground and bond emergency lighting units and exit signs in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Operate each unit after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Aim and adjust lamp fixtures as indicated on Drawings.

C. Position exit sign directional arrows as indicated on Drawings.

3.5 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Relamp emergency lighting units and exit signs having failed lamps at Substantial Completion.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conduit supports.
   2. Formed steel channel.
   4. Sleeves.
   5. Mechanical sleeve seals.
   6. Firestopping relating to communications work.
   7. Firestopping accessories.
   8. Equipment bases and supports.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.
   2. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.

1.2 REFERENCES

A. ASTM International:

B. FM Global:

C. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:
   3. UL 1479 - Fire Tests of Through-Penetration Firestops.
   5. UL - Fire Resistance Directory.
E. Intertek Testing Services (Warnock Hersey Listed):
   1. WH - Certification Listings.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, or UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
   1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.

B. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

C. Product Data:
   1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.

F. Manufacturer's Installation Instructions:
   1. Hangers and Supports: Submit special procedures and assembly of components.
   2. Firestopping: Submit preparation and installation instructions.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
H. Firestopping Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
   1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
   2. Floor Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
      a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
   2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

F. Perform Work in accordance with State of Michigan requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

A. Furnish materials in accordance with State of Michigan requirements.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

A. Product Description: Mounting hole and screw closure.

2.4 SLEEVES

A. Sleeves for cable trays or conduits Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for cable trays or conduits Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sleeves for cable trays or conduits Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

D. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.5 MECHANICAL SLEEVE SEALS

A. Furnish materials in accordance with State of Michigan requirements.
B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FIRESTOPPING

A. Furnish materials in accordance with State of Michigan requirements.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
   1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
   2. Foam Firestopping Compounds: Single or Multiple component foam compound.
   3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
   4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
   5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
   6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
   7. Firestop Pillows: Formed mineral fiber pillows.

C. Color: Dark gray Black As selected from manufacturer’s full range of colors.

2.7 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: As appropriate for installation, recommended by manufacturer.
   1. Mineral fiberboard.
   3. Sheet metal.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:
   1. Furnish UL listed products or products tested by independent testing laboratory.
   2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:
   1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing/damming materials to arrest liquid material leakage.

D. Obtain permission from Owner and Architect/Engineer before using powder-actuated anchors.

E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:
   1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors and preset inserts.
   2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
   3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
   5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
   7. Wood Elements: Provide wood screws.

B. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

C. Install conduit and raceway support and spacing in accordance with NEC.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Install multiple conduit runs on common hangers.

F. Supports:
   1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
   2. Install surface mounted cabinets and panelboards with minimum of four anchors.
   3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
   4. Support vertical conduit at every floor.

G. Install Work in accordance with State of Michigan requirements.

3.4 INSTALLATION - FIRESTOPPING

A. Install Work in accordance with State of Michigan requirements

B. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

C. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

D. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating to uniform density and texture.

E. Compress fibered material to maximum 40 percent of its uncompressed size.

F. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.

G. Remove dam material after firestopping material has cured. Dam material may remain.

H. Fire Rated Surface:
   1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
2. Where cable tray and conduit penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.

I. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Install type of firestopping material recommended by manufacturer.
   2. Install escutcheons or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
   4. Interior partitions: Seal pipe penetrations at telecommunication rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

B. Construct supports of formed steel channel. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

C. Set sleeves in position in forms. Provide reinforcing around sleeves.

D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

G. Install chrome plated steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.
3.8 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION
SECTION 27 05 33
CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:
1. Section 26 05 03 - Equipment Wiring Connections.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
3. Section 26 05 34 - Floor Boxes for Electrical Systems.
4. Section 26 27 16 - Electrical Cabinets and Enclosures.
5. Section 26 27 26 - Wiring Devices.
6. Section 27 05 26 - Grounding and Bonding for Communications Systems.
7. Section 27 05 29 - Hangers and Supports for Communications Systems.
8. Section 27 05 36 - Cable Trays for Communications Systems.
9. Section 27 05 53 - Identification for Communications Systems.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

C. Underground Within 5 feet from Foundation Wall: Provide thickwall nonmetallic conduit. Provide nonmetallic boxes.

D. Under Slab on Grade: Provide thin-wall nonmetallic conduit. Provide nonmetallic boxes.

E. In Slab: DO NOT route conduits in slabs.


1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 1 inch unless otherwise specified.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following:
   1. Flexible metal conduit.
   2. Liquidtight flexible metal conduit.
   3. Nonmetallic conduit.
   4. Flexible nonmetallic conduit.
   5. Nonmetallic tubing.
   6. Raceway fittings.
   7. Conduit bodies.
   8. Surface raceway.
   9. Wireway.
  10. Pull and junction boxes.
  11. Handholes.

C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch.
   2. Record actual locations and mounting heights of outlet, pull, and junction boxes.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel or aluminum construction.

B. Fittings: NEMA FB 1.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel or aluminum construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.3 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, set screw type.

2.4 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 or 80 PVC, as required for the application.

B. Fittings and Conduit Bodies: NEMA TC 3.

2.5 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.6 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:
   1. Material: Cast aluminum.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
   1. Material: Cast aluminum.
   2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
   3. Cover Legend: "ELECTRIC".

E. Fiberglass Handholes: Die-molded, glass-fiber hand holes:
   1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
   2. Cover: Glass-fiber, weatherproof cover with nonskid finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.
C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Install Work in accordance with State of Michigan requirements.

B. Ground and bond raceway and boxes in accordance with Section 26 05 26.

C. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

D. Identify raceway and boxes in accordance with Section 26 05 53.

E. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports.

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 26 05 29.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit in and under slab from point-to-point.

K. Maintain clearance between raceway and piping for maintenance purposes.
L. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

M. Cut conduit square using saw or pipe cutter; de-burr cut ends.

N. Bring conduit to shoulder of fittings; fasten securely.

O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

P. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

Q. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size.

R. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

S. Install fittings to accommodate expansion and deflection where raceway crosses, and expansion joints.

T. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

U. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

W. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Install stamped steel bridges to fasten flush mounting outlet box between studs.

J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

K. Install adjustable steel channel fasteners for hung ceiling outlet box.

L. Do not fasten boxes to ceiling support wires or other piping systems.

M. Support boxes independently of conduit.

N. Install gang box where more than one device is mounted together. Do not use sectional box.

O. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in compliance with prescribed fire ratings.

B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION
SECTION 27 05 36
FLEXTRAY WIRE BASKET SUPPORT SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, tests and services to install complete wire basket support systems as shown on the drawings.

B. Wire basket support systems are defined to include, but are not limited to straight sections of continuous wire mesh, field formed horizontal and vertical bends, tees, drop outs, supports and accessories.

1.02 REFERENCES


B. ASTM B 633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel

C. ASTM A 653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process

D. ASTM A 123 – Specification for Zinc (Hot Galvanized) Coatings on Iron and Steel

E. ASTM A 510 – Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

F. NEMA VE 1-2002 – Metal Cable Tray Systems

G. NEMA VE 2-2002 – Cable Tray Installation Guidelines


J. ASTM D 769 – Standard Specification for Black Oxide Coatings

1.03 DRAWINGS

A. The drawings, which constitute a part of these specifications, indicate the general route of the wire basket support systems. Data presented on these drawings is as accurate as preliminary surveys and planning can determine until final equipment selection is made. Accuracy is not guaranteed and field verification of all dimensions, routing, etc., is required.
B. Specifications and drawings are for assistance and guidance, but exact routing, locations, distances and levels will be governed by actual field conditions. Contractor is directed to make field surveys as part of his work prior to submitting system layout drawings.

1.04 SUBMITTALS

A. Submittal Drawings: Submit drawings of wire basket and accessories including connector assemblies, clamp assemblies, brackets, splice plates, splice bars, grounding clamps and hold down plates showing accurately scaled components.

B. Product Data: Submit manufacturer’s data on wire basket support system including, but not limited to, types, materials, finishes and inside depths.

1.05 QUALITY ASSURANCE

A. NEC Compliance: Comply with NEC, as applicable to construction and installation of cable tray and cable channel systems (Article 318, NEC).

B. NFPA Compliance Comply with NFPA 70B, “Recommended Practice for Electrical Equipment Maintenance” pertaining to installation of cable tray systems.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver wire basket support systems and components carefully to avoid breakage, bending and scoring finishes. Do not install damaged equipment.

B. Store wire basket and accessories in original cartons and in clean dry space; protect from weather and construction traffic.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, wire basket support systems to be installed shall be as manufactured by Cooper B-Line, Inc. or engineer-approved equal.

2.02 WIRE BASKET SECTIONS AND COMPONENTS

A. General: Provide wire basket of types and sizes indicated; with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features.

B. Materials and Finishes: Material and finish specifications for Carbon Steel Wire or Pre-Galvanized Steel Wire are as follows:

1. Electro-Plated Zinc Galvanizing: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A 510, Grade 1008 and shall be electro-plated zinc in accordance with ASTM B633, Type III, SC-1.
2. Black Powder Coat: Straight sections shall be powder coated black with an average paint thickness of 1.2mils (30microns) to 3.0mils (75microns).

3. Pre-Galvanized Zinc: Straight section shall be made from pre-galvanized steel meeting the minimum mechanical properties of ASTM A 641.

4. Hot Dipped Galvanizing: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A 510, Grade 1008 and shall be hot dipped galvanized after fabrication in accordance with ASTM A 123.

5. Black Oxide: Certain support accessories and miscellaneous hardware shall be manufactured with a black oxide finish in accordance with ASTM D 769.

2.03 TYPE OF WIRE BASKET SUPPORT SYSTEM

A. All straight section longitudinal wires shall be constructed with a continuous top wire safety edge. Safety edge must be kinked and T-welded on all tray sizes.

B. Wire basket shall be made of high strength steel wires and formed into a standard 2 inch by 4 inch wire mesh pattern with intersecting wires welded together. All mesh sections must have at least one bottom longitudinal wire along entire length of straight section.

C. Wire basket sizes shall conform to the following nominal criteria:

1. Straight sections shall be furnished in standard 118 inch lengths.

2. Wire diameter shall be 0.196” (5mm) minimum on all mesh sections (minimum size of 4.5mm on stainless steel).

3. Wire basket shall have a 4 inch usable loading depth by 20 inches wide.

D. All fittings shall be field formed, from straight sections, in accordance with manufacturer’s instructions.

E. All splicing assemblies shall be UL/CSA approved as an Equipment Ground Conductor (EGC). When using powder coated wire basket as an EGC, the paint must be completely removed at all contact points of splice/ground bolt attachment.

F. Wire basket supports shall be center support hangers, trapeze hangers or wall brackets as manufactured by Cooper B-Line, Inc. or engineer approved equal.

G. Trapeze hangers or center support hangers shall be supported by 1/4 inch or 3/8 inch diameter rods.

H. Special accessories shall be furnished as required to protect, support and install a wire basket support system.
2.04 WARNING SIGNS

A. Engraved Namplates: 1 inch black letters on yellow laminated plastic nameplate, engraved with: WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install wire basket as indicated; in accordance with recognized industry practices (NEMA VE-2 2000), to ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70B and NECA’s “Standards of Installation” pertaining to general electrical installation practices.

B. Coordinate wire basket with other electrical work as necessary to properly interface installation of wire basket runway with other work.

C. Provide sufficient space encompassing wire basket to permit access for installing and maintaining cables.

D. Install warning signs at 20 foot centers along cable tray, located to be visible.

3.02 TESTING

A. Test wire basket support systems to ensure electrical continuity of bonding and grounding connections, and to demonstrate compliance with specified maximum grounding resistance. See NFPA 70B, Chapter 18, for testing and test methods.

B. Manufacturer shall provide test reports witnessed by an independent testing laboratory of the “worst case” loading conditions outlined in this specification and performed in accordance with the latest revision of NEMA VE-1.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nameplates.
   2. Labels.
   3. Wire markers.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Execution requirements for painting specified by this section.
   2. Section 26 05 53 - Identification for Electrical Systems.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Submit manufacturer’s catalog literature for each product required.
   2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.2 WIRE MARKERS

A. Description: Cloth tape, split sleeve, or tubing type wire markers.

B. Legend:
   1. Per owner’s requirements.

2.3 CONDUIT AND RACEWAY MARKERS

A. Description: Nameplate fastened with adhesive.

B. Color:
   1. Telephone and Data System: Blue lettering on white background.

C. Legend:
   1. Telephone and Data System: TELECOMM.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.
3.2 EXISTING WORK

A. Install identification on existing equipment to remain in accordance with this section.

B. Install identification on unmarked existing equipment.

C. Replace lost nameplates.

D. Re-stencil existing equipment.

3.3 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:
   1. Install nameplate parallel to equipment lines.
   2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
   3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
   4. Secure nameplate to equipment front using adhesive.
   5. Secure nameplate to inside surface of door on recessed panels in finished locations.

C. Label Installation:
   1. Install label parallel to equipment lines.
   2. Install label for identification of individual control device stations.
   3. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:
   1. Install wire marker for each conductor at pull boxes, outlet and junction boxes, and each rack.
   2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
   3. Install labels at data outlets identifying patch panel and port designation as indicated on Drawings.

E. Conduit Raceway Marker Installation:
   1. Install conduit raceway marker for each conduit raceway longer than 6 feet.
   2. Conduit Raceway Marker Spacing: 20 feet on center.
   3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00.
      a. Paint colored band on each conduit longer than 6 feet.
      b. Paint bands 20 feet on center.
      c. Color:
         1) Telephone and Data System: Green.

END OF SECTION
SECTION 27 13 43
TELECOMMUNICATIONS CABLELING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes premises wiring, equipment and devices for phone & data communications systems. "MTU IT department" is responsible for all wiring & cable, equipment rack & accessories, all patch panels & patch cords, jacks/outlets, and all installation, labeling, termination, and testing.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Painting backboards.
   2. Section 26 05 34 - Floor Boxes for Electrical Systems.
   4. Section 27 05 26 - Grounding and Bonding for Communications Systems.
   5. Section 27 05 33 - Conduits and Backboxes for Communications Systems.
   6. Section 27 05 36 - Cable Trays for Communications Systems.
   7. Section 27 05 53 - Identification for Communications Systems.

1.2 REFERENCES

A. International Electrical Testing Association:

B. National Fire Protection Association:
   1. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

C. Telecommunications Industry Association/Electronic Industries Alliance:
   1. TIA/EIA 568 - Commercial Building Telecommunications Cabling Standard.
   2. TIA/EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.

D. Underwriters Laboratories, Inc.:

1.3 SYSTEM DESCRIPTION

A. Backbone Pathway: Conform to TIA/EIA 569 using conduit, sleeves, cable tray, j-hooks, and fiber optic cable as indicated on Drawings.

B. Horizontal Pathway: Conform to TIA/EIA 569, using raceway, racks, and cabinets as indicated on Drawings.
C. Entrance Wiring: By Telephone Utility Company.

D. Backbone Wiring: Complete from existing closet to each new telecommunications closet using optical fiber backbone cables.

E. Horizontal Wiring: Complete from telecommunications closet to each outlet using unshielded horizontal cables.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit catalog data for each termination device, cable, and outlet device.

C. Test Reports: Indicate procedures and results for specified field testing and inspection.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and sizes of pathways and outlets.

1.6 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

B. Perform Work in accordance with State of Michigan requirements.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in installing products specified in this section with minimum three years documented experience, and with service facilities within 50 miles of project.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 COORDINATION

A. Coordinate with utility company and owner, relocation of overhead or underground lines interfering with construction.
PART 2 PRODUCTS

2.1 TELEPHONE TERMINATION BACKBOARDS
   A. Material: Fire retardant Plywood.
   B. Size: 4 x 8 or as indicated on Drawings, 3/4 inch thick.

2.2 CROSS-CONNECT – for voice cabling
   A. Product Description: TIA/EIA 568, rack-mounted assembly of terminals with adequate capacity for active and spare circuits.
   B. 110 blocks for termination of analog telephone wiring

2.3 PATCH PANELS – for data
   A. Manufacturers:
      1. AMP Model 1375015-2
      2. Substitutions: Section 01 60 00 - Product Requirements.
   B. Product Description: TIA/EIA 568, rack-mounted assembly of terminals and accessory patch cords, with adequate capacity for active and spare circuits. Patch panels shall be 48-port, Category 6.

2.4 TELEPHONE and DATA OUTLET JACKS and FACEPLATES
   A. Manufacturers:
      1. Jacks - AMP Model 1375055-x
      2. 2-port Faceplates – AMP Model 557505-x
      3. 4-port Faceplates – AMP Model 558088-x
      4. Substitutions: Section 01 60 00 - Product Requirements.
   B. Product Description: Conform to TIA/EIA 568 requirements for cable connectors for specific cable types. All jacks shall be Category 6, universal (T568A/T568B) wiring. Verify colors with owner prior to ordering (almond, black, white, gray, orange, blue, red, yellow, or green).

2.5 UNSHIELDED BACKBONE CABLE – for analog phone service
   A. Manufacturers:
      1. AMP NETCONNECT Model 1933047-x.
      2. Belden
      3. Substitutions: Section 01 60 00 - Product Requirements.
   B. Product Description: TIA/EIA 568, unshielded twisted pair plenum rated where required cable with 4 pairs, 23 AWG copper conductor. Verify cable jacket color (white, gray, blue, or yellow) with owner prior to ordering.
2.6 OPTICAL FIBER BACKBONE CABLE

A. Manufacturers:
   1. Corning
   2. Belden
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: TIA/EIA 568, 62.5/125 um Multi-Mode optical fiber plenum rated where required cable. Cable shall have flame resistant outer jacket and interlocking armor cover.

2.7 UNSHIELDED HORIZONTAL CABLE

A. Manufacturers:
   1. AMP NETCONNECT Model 1933047-x.
   2. Belden
   3. Substitutions: Section 01 60 00 - Product Requirements.

B. Product Description: TIA/EIA 568, unshielded twisted pair plenum rated where required cable with 4 pairs, 23 AWG copper conductor. Verify cable jacket color (white, gray, blue, or yellow) with owner prior to ordering.

2.8 OPTICAL FIBER ACCESSORIES

A. Connectors: SC type, for 62.5/125 Multi-Mode fiber optic cable.

B. Rack-Mount Enclosure: Panduit # FRME3 or equal.

C. Fibre Adapter Panels: Panduit SC Opticom or equal.

D. Splice Tray Unit: Panduit # FST24 or equal.

E. Splice Tray Holder: Panduit # FST24H3 or equal.

2.9 EQUIPMENT RACK AND ACCESSORIES

A. Rack: 19”, 2-post, gray, open floor mount; Chatsworth #55053-X03 or equal

B. Horizontal Cable Managers: Panduit # WMP1E or equal.

C. Vertical Cable Manager: Panduit # WMPV45E or equal.

D. Category 6 Patch Cords: AMP or equal; verify length & color with owner prior to ordering.
PART 3 EXECUTION

3.1 EXISTING WORK

A. Remove exposed abandoned telecommunications cables and pathways, including abandoned cables and pathways above accessible ceiling finishes. Cut flush with walls and floors, and patch surfaces.

B. Disconnect and remove abandoned telecommunications equipment.

C. Maintain access to existing telecommunications equipment, cabling, and terminations and other installations remaining active and requiring access. Modify installation or provide access panel.

D. Extend existing telecommunications installations using materials and methods compatible with existing installations, or as specified.

E. Clean and repair existing telecommunications equipment remaining or is to be reinstalled.

3.2 INSTALLATION

A. Install pathways in accordance with TIA/EIA 569.

B. Install wire and cable in accordance with TIA/EIA 568.

C. Finish paint termination backboards with durable white enamel in accordance with Section 09 90 00 prior to installation of telephone equipment.

D. Install termination backboards and equipment racks plumb, and attach securely to building structure at each corner.

E. Install engraved plastic nameplates in accordance with Section 27 05 53. Mark backboards and cabinets with legend "TELEPHONE."

F. Ground and bond pathways, cable shields, and equipment in accordance with Section 27 05 26.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test optical fiber cables in accordance with NETA ATS, except Section 4. Perform inspections and tests listed in NETA ATS, Section 7.25.

C. Inspect and test copper cables and terminations in accordance with TIA/EIA 568.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire-alarm control unit.
   3. System smoke detectors.
   8. Digital alarm communicator transmitter.

1.2 SYSTEM DESCRIPTION

A. Provide minor circuit extensions and device relocations for existing fire-alarm system in the area of renovation only. Any new devices must be compatible with existing fire alarm.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
   2. Include voltage drop calculations for notification appliance circuits.
   3. Include battery size calculations.
   4. Include performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
   5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
   6. Include floor plans to indicate final outlet locations showing the zone designation of each device. Show size and route of cable and conduits.

C. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction. Provide copy of all correspondence with the authorities having jurisdiction to the Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
   a. Trained and certified by manufacturer in fire-alarm system design.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For qualified Installer.
   B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
      1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
      2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
      3. Record copy of site-specific software.
      4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
         a. Frequency of testing of installed components.
         b. Frequency of inspection of installed components.
         c. Requirements and recommendations related to results of maintenance.
         d. Manufacturer's user training manuals.
      5. Manufacturer's required maintenance related to system warranty requirements.
      6. Abbreviated operating instructions for mounting at fire-alarm control unit.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
   B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
   C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide all products by the following:

B. All new devices and equipment must be compatible with the existing system.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:
   2. Heat detectors.
   3. Smoke detectors.
   4. Duct smoke detectors.
   5. Automatic sprinkler system water flow.

B. Fire-alarm signal shall initiate the following actions:
   1. Continuously operate alarm notification appliances.
   2. Identify alarm zone at fire-alarm control unit and remote annunciators.
   3. Transmit an alarm signal to the remote alarm receiving station.
   4. Release all magnetic door holders.

C. System trouble signal initiation shall be by one or more of the following devices and actions:
   1. Open circuits, shorts, and grounds in designated circuits.
   2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   3. Loss of primary power at fire-alarm control unit.
   4. Ground or a single break in fire-alarm control unit internal circuits.
   5. Abnormal ac voltage at fire-alarm control unit.
   7. Failure of battery charging.
   8. Abnormal position of any switch at fire-alarm control unit or annunciator.

D. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators.

2.3 FIRE-ALARM CONTROL UNIT – Existing

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   1. Single-action mechanism, breaking-glass or plastic-rod type.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. Contractor to check with Owner if they want protective shield.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:
1. Operating at 24-V dc, nominal.
2. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
4. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors: Comply with UL 268.

C. Duct Smoke Detectors: Photoelectric type, complying with UL 268A.
1. Remote indication and test station.
2. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
3. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

2.6 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

D. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch high letters on the lens.
1. Rated Light Output:
a. Indicated on Drawings.
b. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted or Ceiling mounted.
3. Flashing shall be in a temporal pattern, synchronized with other units.

2.7 DOOR RELEASE

A. Products: provided by door hardware supplier, Section 08 71 00, installed by EC.
B. Product Description: Magnetic door holder with integral diodes to reduce buzzing.
C. Coil voltage: Match existing system.

2.8 WIRE AND CABLE

A. Product Description: Non-power limited fire-protective signaling cable, copper conductor, 150 volt insulation rated 60 degrees C, or Power limited fire-protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.
B. Cable Located Exposed in Plenums: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.
C. Fire alarm circuit conductors have insulation color or code as follows:
   1. Power Branch Circuit Conductors: Black, red, white.
   2. Initiating Device Circuit: Black, red.
   4. Signal Device Circuit: Blue (positive), white (negative).

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.
B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
   1. Connect new equipment to the existing control panel in the existing part of the building.
   2. Connect new equipment to the existing monitoring equipment at the supervising station.
   3. Expand, modify, and supplement the existing control and monitoring equipment as necessary to extend the existing control and monitoring functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.
4. Provide new booster panels for each addition as shown on plans.

C. Smoke- or Heat-Detector Spacing:
   3. Smooth ceiling spacing shall not exceed 30 feet.
   4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
   5. HVAC: Locate detectors not closer than 5 feet from air-supply diffuser or return-air opening.
   6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

E. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

G. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.

H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

I. Fire-Alarm Control Unit: Surface mounting, with tops of cabinets not more than 72 inches above the finished floor.

J. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Connect supervised interface devices to the following devices and systems. Install the interface device less than 3 feet from the device controlled.
   1. Smoke dampers in air ducts of designated air-conditioning duct systems.
   2. Supervisory connections at valve supervisory switches.
3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Architect, authorities having jurisdiction and Owner.

B. Perform tests and inspections.

C. Tests and Inspections:
   1. Visual Inspection: Conduct the visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
   3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
   4. Test visible appliances for the public operating mode according to manufacturer's written instructions.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with the visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION
STATE OF MICHIGAN

Prevaling 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.
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>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 = $372.84 /2080 = $0.27</td>
<td></td>
</tr>
<tr>
<td>Dental insurance</td>
<td>$31.07 monthly premium X 12 mos. = $372.84 /2080 = $0.18</td>
<td></td>
</tr>
<tr>
<td>Vision insurance</td>
<td>$5.38 monthly premium X 12 mos. = $64.56/2080 = $0.30</td>
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</tr>
<tr>
<td>Health insurance</td>
<td>$230.00 monthly premium X 12 mos. = $2,760.00/2080 = $1.33</td>
<td></td>
</tr>
<tr>
<td>Life insurance</td>
<td>$27.04 monthly premium X 12 mos. = $324.48/2080 = $0.16</td>
<td></td>
</tr>
<tr>
<td>Tuition</td>
<td>$500.00 annual cost/2080 = $2000.00/2080 = $0.48</td>
<td></td>
</tr>
<tr>
<td>Bonus</td>
<td>4 quarterly bonus/year x $250 = $1000.00/2080 = $0.48</td>
<td></td>
</tr>
<tr>
<td>401k Employer Contribution</td>
<td>$2000.00 total annual contribution/2080 = $0.96</td>
<td></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>
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<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>
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</tr>
<tr>
<td>Over 10 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>9</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.

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

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

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

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

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

### HAZARDOUS WASTE ABATEMENT ENGINEERS

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

**CLASS II**
Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, Water Wagon and Welding Machine.
**Official Request #**: 69  
**Requestor**: Michigan Technological University  
**Project Description**: Memorial Union Building Retail Dining Renovations installing food service equipment  
**Project Number**: 34-15-01

---

**Houghton County**

**Official 2016 Prevailing Wage Rates for State Funded Projects**

**Issue Date**: 1/14/2016

**Contract must be awarded by**: 4/13/2016

**Page 1 of 25**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Last Updated</th>
<th>Straight Time</th>
<th>Half Time</th>
<th>Double Time</th>
<th>Overtime Provision</th>
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</thead>
<tbody>
<tr>
<td>classification</td>
<td>Name</td>
<td>Description</td>
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<td>Hourly</td>
<td>$40.75 $54.34 $67.93 $H $H $X $X $X $X $D $Y</td>
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<td>Asbestos &amp; Lead Abatement Laborer</td>
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<td>4 ten hour days @ straight time allowed</td>
<td>Monday-Saturday, must be consecutive</td>
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<td>Asbestos &amp; Lead Abatement, Hazardous Material Handler</td>
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<td>$54.25</td>
<td>$67.75</td>
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<tr>
<td>4 ten hour days @ straight time allowed</td>
<td>Monday-Saturday, must be consecutive</td>
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<tr>
<td>Boilermaker</td>
<td>BO169</td>
<td>2/17/2015</td>
<td>$54.70</td>
<td>$81.08</td>
<td>$107.45</td>
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**Apprentice Rates:**

| 1st 6 months  | $40.31 |
| 2nd 6 months | $41.45 |
| 3rd 6 months | $42.57 |
| 4th 6 months | $43.69 |
| 5th 6 months | $44.81 |
| 6th 6 months | $46.83 |
| 7th 6 months | $49.32 |
| 8th 6 months | $51.58 |

---

**Official Rate Schedule**

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

<table>
<thead>
<tr>
<th>Name 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>
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</thead>
<tbody>
<tr>
<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>
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</table>

Make up day allowed comment

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

<table>
<thead>
<tr>
<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>Bricklayer, stone mason, moisaic worker, plasterer, tuck pointer, pointer, caulker &amp; cleaner</td>
<td>BR6-2</td>
<td>6/2/2014</td>
<td>$42.71</td>
<td>$55.03</td>
<td>$67.35</td>
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</table>

Make up day allowed comment

Saturday

All time over 12 hours pr day - double

### Apprentice Rates:

<table>
<thead>
<tr>
<th>Hours Range</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
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<tr>
<td>0 - 749 hours</td>
<td>$32.85</td>
<td>$40.24</td>
<td>$47.63</td>
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<tr>
<td>750 - 1499 hours</td>
<td>$34.09</td>
<td>$42.10</td>
<td>$50.11</td>
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<tr>
<td>1500 - 2249 hours</td>
<td>$35.32</td>
<td>$43.95</td>
<td>$52.57</td>
</tr>
<tr>
<td>2250 - 2999 hours</td>
<td>$36.55</td>
<td>$45.79</td>
<td>$55.03</td>
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<tr>
<td>3000 - 3749 hours</td>
<td>$37.78</td>
<td>$47.63</td>
<td>$57.49</td>
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<td>3750 - 4499 hours</td>
<td>$39.01</td>
<td>$49.48</td>
<td>$59.95</td>
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<td>4500 - 5249 hours</td>
<td>$40.25</td>
<td>$51.34</td>
<td>$62.43</td>
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<tr>
<td>5250 - 6000 hours</td>
<td>$41.48</td>
<td>$53.19</td>
<td>$64.89</td>
</tr>
</tbody>
</table>

Marble, Tile and Terrazzo Layer

BR6TL | 6/2/2014 | $42.71 | $55.03 | $67.35 | H | H | D | X | H | H | D | D | Y |

Make up day allowed comment

Four 10s allowed Monday-Thurs. Make up days: Friday & Saturday.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
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<tr>
<td>Carpenter</td>
<td>CA1510-C</td>
<td>Carpenter, Drywall Taper &amp; Finisher, &amp; Floor</td>
<td>10/14/2015</td>
<td>$42.00 $53.66 $65.32 X X H X H H D Y</td>
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<tr>
<td></td>
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<td>Make up day allowed comment Saturday</td>
</tr>
<tr>
<td>Apprentice Rates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$32.67</td>
<td>$39.66</td>
<td>$46.66</td>
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<tr>
<td>2nd 6 months</td>
<td>$33.84</td>
<td>$41.42</td>
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<td>3rd 6 months</td>
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<td>$37.34</td>
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<td>7th 6 months</td>
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<td>8th 6 months</td>
<td>$40.83</td>
<td>$51.90</td>
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<tr>
<td>Piledriver</td>
<td>CA1510-P</td>
<td>Make up day allowed comment Saturday</td>
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<td>3rd 6 months</td>
<td>$35.14</td>
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<td>$51.60</td>
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<tr>
<td>4th 6 months</td>
<td>$36.32</td>
<td>$45.14</td>
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</tr>
<tr>
<td>5th 6 months</td>
<td>$37.50</td>
<td>$46.91</td>
<td>$56.32</td>
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</tr>
<tr>
<td>6th 6 months</td>
<td>$38.67</td>
<td>$48.66</td>
<td>$58.66</td>
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<tr>
<td>7th 6 months</td>
<td>$39.85</td>
<td>$50.44</td>
<td>$61.02</td>
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</tr>
<tr>
<td>8th 6 months</td>
<td>$41.02</td>
<td>$52.19</td>
<td>$63.36</td>
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</tr>
</tbody>
</table>

Project Number: 34-15-01
County: Houghton

Official Request #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight</th>
<th>Time and a Half</th>
<th>Double</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<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 D Y</td>
</tr>
</tbody>
</table>

**Make up day allowed**

Make up days: Friday and Saturday.

**Apprentice Rates**:

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

Cement Mason

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight</th>
<th>Time and a Half</th>
<th>Double</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL16-16</td>
<td>10/23/2012</td>
<td>$30.30</td>
<td>$40.39</td>
<td>$50.47</td>
<td>H H H H H H D Y</td>
<td></td>
</tr>
</tbody>
</table>

Four 10s allowed Monday-Thursday with Friday or Saturday inclement weather make up days.

Saturday hours for inclement weather make up shall be paid straight rate unless over 40 hours worked.

**Make up day allowed**

[Friday or Saturday for inclement weather](#)

**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 #: 69**

**Requestor:** Michigan Technological University

**Project Description:** Memorial Union Building Retail Dining Renovations installing

**Project Number:** 34-15-01

**County:** Houghton

---

**Official Rate Schedule**

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

**Sound and Communications Installer/Technician**  
EC-219-SC  
3/12/2013  
$33.43  
$43.97  
$54.51  
H H H H H H H  
H  
H  
H  
D  
Y

A 4 day 10 hour day schedule is allowed

### Apprentice Rates:

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

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

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>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
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<tbody>
<tr>
<td>6,500-8,000 hours</td>
<td>$37.17</td>
<td>$50.94</td>
<td>$64.70</td>
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</tr>
<tr>
<td>0-1,000 hours</td>
<td>$23.41</td>
<td>$30.29</td>
<td>$37.17</td>
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</tr>
<tr>
<td>1,000-2,000 hours</td>
<td>$24.94</td>
<td>$32.58</td>
<td>$40.22</td>
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</tr>
<tr>
<td>2,000-3,500 hours</td>
<td>$28.01</td>
<td>$37.19</td>
<td>$46.36</td>
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<tr>
<td>3,500-5,000 hours</td>
<td>$31.07</td>
<td>$41.77</td>
<td>$52.48</td>
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</tr>
<tr>
<td>5,000-6,500 hours</td>
<td>$34.13</td>
<td>$46.37</td>
<td>$58.60</td>
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</tbody>
</table>
### Classification

<table>
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<th>Description</th>
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<th>Time and Half Hourly</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<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$68.49$H$H$H$H$D</td>
<td>H</td>
<td>H</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:

- **0-1,000 hours**: $21.36 $27.22 $33.08
- **1,000-2,000 hours**: $22.67 $29.17 $35.68
- **2,000-3,500 hours**: $25.26 $33.08 $40.87
- **3,500-5,000 hours**: $27.87 $36.97 $46.08
- **5,000-6,500 hours**: $30.47 $40.88 $51.29
- **6,500-8,000 hours**: $33.08 $44.79 $56.50

#### Elevator Constructor

<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</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>$116.32$D$D$D$D$D$Y</td>
<td>D</td>
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4 tens allowed M-TH

#### Apprentice Rates:

- **1st year**: $50.27 $75.32
- **2nd year**: $54.83 $84.44
- **3rd year**: $57.10 $88.98
- **4th year**: $61.66 $98.10

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**Official Request #:** 69  
**Requestor:** Michigan Technological University  
**Project Description:** Memorial Union Building Retail Dining Renovations installing  
**Project Number:** 34-15-01  
**County:** Houghton  

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
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<tr>
<td>Glazier</td>
<td>Glazier</td>
<td>GL-826</td>
<td>$44.16</td>
<td>$60.04</td>
<td>$75.91</td>
<td>H H H H H H D Y</td>
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<td>4 tens allowed on consecutive days</td>
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<tr>
<td>Heat and Frost Insulator</td>
<td>Heat and Frost Insulator</td>
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<td>$42.97</td>
<td>$55.93</td>
<td>$68.89</td>
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<td></td>
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<td>Make up day allowed</td>
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<tr>
<td>Spray Insulation</td>
<td>Spray Insulation</td>
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<td>$20.14</td>
<td>$29.14</td>
<td></td>
<td>H H H H H H H N</td>
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<td></td>
<td>3/5/2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

Official Request #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing
Project Number: 34-15-01
County: Statewide

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
Official 2016 Prevailing Wage Rates for State Funded Projects

**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
**Classification:** Official Prevailing Wage Rates for State Funded Projects
**Issue Date:** 1/14/2016

**Contract must be awarded by:** 4/13/2016

Page 8 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight Time</th>
<th>Hourly</th>
<th>Half</th>
<th>Time and a Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ironworker</td>
<td>For work over $10 million: Structural, Ornamental, Machinery Rigger &amp; Reinforcing Ironworker; installation of sheet metal siding</td>
<td>IR-8-A</td>
<td>9/29/2014</td>
<td>$50.07</td>
<td>$69.76</td>
<td>$89.45</td>
<td>H D H D D Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For work under $10 Million: Structural, Ornamental, Machinery Rigger &amp; Reinforcing Ironworker; pre-engineered metal buildings</td>
<td>IR-8-B</td>
<td>9/29/2014</td>
<td>$46.73</td>
<td>$64.76</td>
<td>$82.79</td>
<td>H D D D Y</td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

- **0 - 1,000 hours**
  - $25.39
  - $37.75
  - $50.11
- **1,001 - 2,000 hours**
  - $37.71
  - $51.22
  - $64.73
- **2,001 - 3,000 hours**
  - $39.01
  - $53.17
  - $67.33
- **3,001 - 4,000 hours**
  - $40.31
  - $55.12
  - $69.93
- **4,001 - 5,000 hours**
  - $41.61
  - $57.07
  - $72.53
- **5,001 - 6,000 hours**
  - $42.92
  - $59.04
  - $75.15
- **6,001 - 7,000 hours**
  - $44.22
  - $60.98
  - $77.75

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*

Official Request #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing

Project Number: 34-15-01
County: Houghton
### Laborer

#### Class A Laborer - construction laborer on building and heavy construction work, storm, and sanitary sewers on all construction sites and streets which are not included in the road builder rates, tool crib attendant, civil engineer helper, rodman, oxi-gun operator, propane or acetylene cutting torch operator, motor driven buggies, chipping hammers, tamping machines, green cutting, sand blasters, mason tenders, mortar mixers, marterial mixers, vibrator operators, concrete mixers, laborers with concrete crew, mixer to pour, including pour time from trucks.

<table>
<thead>
<tr>
<th>Last Updated</th>
<th>Straight Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1329-B-A</td>
<td>10/15/2015</td>
<td>$33.40</td>
<td>$43.49</td>
</tr>
</tbody>
</table>

#### Apprentice Rates:

- 0 - 1,000 hours: $28.36 $35.93 $43.49
- 1,001 - 2,000 hours: $29.37 $37.44 $45.51
- 2,001 - 3,000 hours: $30.37 $38.94 $47.51
- 3,001 - 4,000 hours: $32.39 $41.97 $51.55

#### Class B Laborer - Cement gun nozzleman, blasters, miners, drillers, buster operators, layers of all non-metallic pipe

<table>
<thead>
<tr>
<th>Last Updated</th>
<th>Straight Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1329-B-B</td>
<td>10/15/2015</td>
<td>$33.81</td>
<td>$44.10</td>
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</tbody>
</table>

#### Class C Laborer - caisson worker & airtrack

<table>
<thead>
<tr>
<th>Last Updated</th>
<th>Straight Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
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<tbody>
<tr>
<td>L1329-B-C</td>
<td>10/15/2015</td>
<td>$34.17</td>
<td>$44.64</td>
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</table>

#### Class E Laborer - digester, tanks & kilns

<table>
<thead>
<tr>
<th>Last Updated</th>
<th>Straight Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
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<tbody>
<tr>
<td>L1329-B-D</td>
<td>10/15/2015</td>
<td>$35.51</td>
<td>$46.65</td>
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<td>Name</td>
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<tr>
<td>----------------</td>
<td>------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Laborer - Hazardous</td>
<td>LHAZ-Z11-A</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 “D” is required.</td>
<td>11/7/2014</td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td>4 10s allowed M-Th or T-F; inclement weather makeup day Friday</td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Last Hourly</th>
<th>Straight Time</th>
<th>Double</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborer - Hazardous</td>
<td>LHAZ-Z11-B</td>
<td>Class B - performing work in conjunction with the removal, handling, or containment of hazardous waste substances when the use of personal protective equipment levels &quot;A&quot;, &quot;B&quot; or &quot;C&quot; is required.</td>
<td>11/7/2014</td>
<td>$33.91</td>
<td>$47.87</td>
<td>$61.82</td>
<td>H H H H H D Y</td>
</tr>
<tr>
<td>Make up day allowed</td>
<td>comment</td>
<td>4 10s allowed M-Th or T-F; inclement weather makeup day Friday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

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

<table>
<thead>
<tr>
<th>Name Description</th>
<th>Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Time Hourly</th>
<th>Overtime Provision</th>
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<tbody>
<tr>
<td>Laborer Underground - Tunnel, Shaft &amp; Caisson</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.</td>
<td>10/30/2014</td>
<td>$35.67</td>
<td>$47.07</td>
<td>$58.47</td>
<td>X X X X X X D Y</td>
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<td></td>
<td></td>
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<tr>
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<td>3,001-4,000 work hours</td>
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<td>$34.64</td>
<td>$45.53</td>
<td>$56.41</td>
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<tr>
<td>Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder</td>
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<td></td>
<td>$35.76</td>
<td>$47.21</td>
<td>$58.65</td>
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<td>Apprentice Rates:</td>
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<tr>
<td>0-1,000 work hours</td>
<td></td>
<td>$30.58</td>
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<td>1,001-2,000 work hours</td>
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<td>$32.66</td>
<td>$42.56</td>
<td>$52.45</td>
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<tr>
<td>3,001-4,000 work hours</td>
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<td>$34.72</td>
<td>$45.65</td>
<td>$56.57</td>
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### Official 2016 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 1/14/2016  
**Contract must be awarded by:** 4/13/2016

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
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<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
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<tbody>
<tr>
<td>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.).</td>
<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>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>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>Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.</td>
<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 X D Y</td>
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</tbody>
</table>

**Apprentice Rates:**  
0-1,000 work hours: $30.78  $39.74  $48.69  
1,001-2,000 work hours: $31.83  $41.32  $50.79  
2,001-3,000 work hours: $32.88  $42.89  $52.89  
3,001-4,000 work hours: $34.97  $46.02  $57.07

---

Official Request #: 69  
Requestor: Michigan Technological University  
Project Description: Memorial Union Building Retail Dining Renovations installing  
Project Number: 34-15-01  
County: Houghton

Official Rate Schedule: Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Last Updated</th>
<th>Straight 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>10/30/2014</td>
<td>$36.28</td>
<td>$47.99</td>
<td>$59.69</td>
<td>X X X X X X D Y</td>
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<tr>
<td>Apprentice Rates:</td>
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<tr>
<td>0-1,000 work hours</td>
<td>$30.98</td>
<td>$40.04</td>
<td>$49.09</td>
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<tr>
<td>1,001-2,000 work hours</td>
<td>$32.04</td>
<td>$41.63</td>
<td>$51.21</td>
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<td>2,001-3,000 work hours</td>
<td>$33.10</td>
<td>$43.22</td>
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<td>$35.22</td>
<td>$46.40</td>
<td>$57.57</td>
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<tr>
<td>Class VI - Dynamite man and powder man.</td>
<td>LAUCT-Z2-6</td>
<td>10/30/2014</td>
<td>$36.59</td>
<td>$48.45</td>
<td>$60.31</td>
<td>X X X X X X D Y</td>
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<td>0-1,000 work hours</td>
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<td>$51.69</td>
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<tr>
<td>2,001-3,000 work hours</td>
<td>$33.36</td>
<td>$43.61</td>
<td>$53.85</td>
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<td>3,001-4,000 work hours</td>
<td>$35.51</td>
<td>$46.84</td>
<td>$58.15</td>
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<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>10/30/2014</td>
<td>$28.86</td>
<td>$36.86</td>
<td>$44.85</td>
<td>X X X X X X D Y</td>
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<td>Apprentice Rates:</td>
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<tr>
<td>0-1,000 work hours</td>
<td>$25.41</td>
<td>$31.68</td>
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<tr>
<td>1,001-2,000 work hours</td>
<td>$26.10</td>
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<td>$39.33</td>
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<tr>
<td>2,001-3,000 work hours</td>
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<td>$33.76</td>
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<tr>
<td>3,001-4,000 work hours</td>
<td>$28.17</td>
<td>$35.82</td>
<td>$43.47</td>
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</tbody>
</table>

Official Request #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing
Project Number: 34-15-01
County: Houghton

Official Rate Schedule
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name Description</th>
<th>Last Updated</th>
<th>Straight Time and a Double Time 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>10/13/2015</td>
<td>$28.25 $39.04 $49.82 X X H X X H D Y</td>
</tr>
<tr>
<td></td>
<td>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 &amp; one half. Holidays paid at double time.</td>
<td>10/13/2015</td>
<td>$24.05 $32.74 $41.42 X X H X X H D Y</td>
</tr>
<tr>
<td>Operating Engineer - DIVER</td>
<td>Diver/Wet Tender/Tender/Rov Pilot/Rov Tender</td>
<td>4/2/2014</td>
<td>$52.80 $79.20 $105.60 H H H H H H D N</td>
</tr>
<tr>
<td>Operating Engineer - Marine Construction</td>
<td>Diver/Wet Tender, Engineer (hydraulic dredge)</td>
<td>2/12/2014</td>
<td>$65.00 $84.85 $104.70 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

Holiday pay = $120.80 per hour, wages &
Make up day allowed

Subdivision of county All Great Lakes, islands therein, & connecting & tributary waters
### Official 2016 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 1/14/2016  
**Contract must be awarded by:** 4/13/2016

### Official Request #: 69  
Requestor: Michigan Technological University  
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Project Number: 34-15-01  
County: Houghton

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>a Double Hourly</th>
<th>Overtime Provision</th>
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</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 X H H H H D Y</td>
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</tr>
<tr>
<td></td>
<td>Holiday pay = $123.30</td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subdivision of county</td>
<td>All Great Lakes, islands therein, &amp; connecting &amp; tributary waters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>GLF-3</td>
<td>2/12/2014</td>
<td>$59.30</td>
<td>$76.30</td>
<td>$93.30</td>
<td>X X H H H H D Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Holiday pay = $110.30 per hour, wages &amp;</td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subdivision of county</td>
<td>All Great Lakes, islands therein, &amp; connecting &amp; tributary waters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck Equipment Operator, (Machineryman/Fireman), (4 equipment units or more), Off Road Trucks, Deck Hand, Tug Engineer, &amp; Crane Maintenance 50 ton capacity and under or Backhoe 115,000 lbs or less, Assistant Tug Operator</td>
<td>GLF-4</td>
<td>2/12/2014</td>
<td>$53.60</td>
<td>$67.75</td>
<td>$81.90</td>
<td>X X H H H H D Y</td>
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</tr>
<tr>
<td></td>
<td>Holiday pay = $96.05 per hour, wages &amp; fringes</td>
<td>Make up day allowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subdivision of county</td>
<td>All Great Lakes, islands therein, &amp; connecting &amp; tributary waters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Engineer General Construction &amp; Underground</td>
<td>Crane 120' boom &amp; jib N</td>
<td>EN-324UP-120GU</td>
<td>7/1/2015</td>
<td>$50.70</td>
<td>$64.98</td>
<td>$79.26</td>
<td>X X H H H H D</td>
</tr>
<tr>
<td></td>
<td>comment</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 N</td>
<td>EN-324UP-140GU</td>
<td>7/1/2015</td>
<td>$50.95</td>
<td>$65.36</td>
<td>$79.76</td>
<td>X X H H H H D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td>Double time after 12 hours Mon-Sat</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Crane with 300' or longer main boom &amp; jib N</td>
<td>EN-324UP-300GU</td>
<td>7/8/2015</td>
<td>$52.93</td>
<td>$68.33</td>
<td>$83.72</td>
<td>X X H H H H D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>comment</td>
<td>Double time after 12 hours Mon-Sat</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 Description</th>
<th>Updated</th>
<th>Last Time and Hourly</th>
<th>Straight Half</th>
<th>a Double Time Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane with 400' or longer main boom &amp; jib</td>
<td>EN-324UP-400GU</td>
<td>7/8/2015</td>
<td>$54.65</td>
<td>$70.91$87.16X</td>
<td>X H H H H D</td>
</tr>
<tr>
<td>Class A- Regular equipment operator, crane, dozer, front end loader, pumpcrete, squeezecrete, job mechanic, welder, concrete pump, excavator, milling &amp; pulverizing machines, &amp; scraper (self-propelled &amp; tractor drawn).</td>
<td>EN-324UP-AGU7/1/2015</td>
<td>$50.20</td>
<td>$64.23</td>
<td>$78.26X X H H H H D N</td>
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</tr>
<tr>
<td>Apprentice Rates:</td>
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<td></td>
</tr>
<tr>
<td>1st 6 months</td>
<td>$40.37</td>
<td>$50.19</td>
<td>$60.01</td>
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<td></td>
</tr>
<tr>
<td>2nd 6 months</td>
<td>$41.78</td>
<td>$52.31</td>
<td>$62.83</td>
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<tr>
<td>3rd 6 months</td>
<td>$43.18</td>
<td>$54.41</td>
<td>$65.63</td>
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<tr>
<td>4th 6 months</td>
<td>$44.58</td>
<td>$56.51</td>
<td>$68.43</td>
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<tr>
<td>5th 6 months</td>
<td>$45.98</td>
<td>$58.61</td>
<td>$71.23</td>
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<tr>
<td>6th 6 months</td>
<td>$47.39</td>
<td>$60.72</td>
<td>$74.05</td>
<td></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-BGU7/1/2015</td>
<td>$46.95</td>
<td>$59.36</td>
<td>$71.76X X H H H H D N</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$70.60X X H H H H D</td>
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<td></td>
</tr>
<tr>
<td>Class D- Oiler, fireman, heater operator, broccoli 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$68.72X X H H H H D</td>
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<td></td>
</tr>
</tbody>
</table>

Official Request #: 69
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<th>Name Description</th>
<th>Updated</th>
<th>Rate $</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane 220' boom &amp; jib</td>
<td>EN-324UP-GU</td>
<td>7/1/2015</td>
<td>$51.20 $65.73 $80.26 X X H H H H D N</td>
<td>Double time after 12 hours Mon-Sat</td>
</tr>
<tr>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MGU</td>
<td>7/1/2015</td>
<td>$51.70 $66.48 $81.26 X H H H H D</td>
<td>Double time after 12 hours Mon-Sat</td>
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</table>

<table>
<thead>
<tr>
<th>Operating Engineer Steel Work</th>
<th>Crane 120' boom &amp; jib</th>
<th>EN-324UP-120S</th>
<th>7/8/2015</th>
<th>$51.10 $65.58 $80.06 X H H H H D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Engineer Steel Work</td>
<td>Crane 140' boom &amp; jib</td>
<td>EN-324UP-140S</td>
<td>7/8/2015</td>
<td>$51.35 $65.96 $80.56 X H H H H D</td>
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<tr>
<td>Operating Engineer Steel Work</td>
<td>Crane 220' boom &amp; jib</td>
<td>EN-324UP-220S</td>
<td>7/8/2015</td>
<td>$51.60 $66.33 $81.06 X H H H H D</td>
</tr>
<tr>
<td>Operating Engineer Steel Work</td>
<td>Crane with 300' boom &amp; jib</td>
<td>EN-324UP-300S</td>
<td>7/8/2015</td>
<td>$53.33 $68.93 $84.52 X H H H H D</td>
</tr>
<tr>
<td>Operating Engineer Steel Work</td>
<td>Crane with 400' boom &amp; jib</td>
<td>EN-324UP-400S</td>
<td>7/8/2015</td>
<td>$55.05 $71.51 $87.96 X H H H H D</td>
</tr>
<tr>
<td>Operating Engineer Steel Work</td>
<td>Compressor, Welder &amp; Forklift</td>
<td>EN-324UP-CWS</td>
<td>7/8/2015</td>
<td>$47.35 $59.96 $72.56 X H H H H D</td>
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<tr>
<td>Operating Engineer Steel Work</td>
<td>Mechanic w/ truck &amp; tools</td>
<td>EN-324UP-MS</td>
<td>7/8/2015</td>
<td>$52.10 $67.08 $82.06 X X H H H H D Y</td>
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</tbody>
</table>

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### Official 2016 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 1/14/2016  
**Contract must be awarded by:** 4/13/2016

### Page 18 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half Hourly</th>
<th>Double Overtime</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil &amp; Fireman</td>
<td>EN-324UP-OFS</td>
<td>7/8/2015</td>
<td>$46.05</td>
<td>$58.01</td>
<td>$69.96</td>
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<td><strong>comment</strong></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>Operator</td>
<td>EN-324UP-OS</td>
<td>7/8/2015</td>
<td>$50.60</td>
<td>$64.83</td>
<td>$79.06</td>
<td>X X H H H H D Y</td>
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<td></td>
<td>Double time after 12 hours Mon-Sat</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**

| Painter | PT-1011 | 7/17/2015 | $31.25 | $41.01 | $50.76 | H H H H H H D N |

**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 #: 69  
Requestor: Michigan Technological University  
Project Description: Memorial Union Building Retail Dining Renovations installing  
Project Number: 34-15-01  
County: Houghton  

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>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>Bridge Painter (under 30 feet)</td>
<td>8/28/2015</td>
<td>$35.89</td>
<td>$47.97</td>
<td>$60.04</td>
<td>H H H H H H H N</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 1,000 hours</td>
<td>$26.23</td>
<td>$33.48</td>
<td>$40.72</td>
</tr>
<tr>
<td>2nd 1,000 hours</td>
<td>$27.44</td>
<td>$35.29</td>
<td>$43.14</td>
</tr>
<tr>
<td>3rd 1,000 hours</td>
<td>$28.64</td>
<td>$37.09</td>
<td>$45.54</td>
</tr>
<tr>
<td>4th 1,000 hours</td>
<td>$29.85</td>
<td>$38.90</td>
<td>$47.96</td>
</tr>
<tr>
<td>5th 1,000 hours</td>
<td>$31.06</td>
<td>$40.72</td>
<td>$50.38</td>
</tr>
<tr>
<td>6th 1,000 hours</td>
<td>$32.27</td>
<td>$42.54</td>
<td>$52.80</td>
</tr>
<tr>
<td>7th 1,000 hours</td>
<td>$33.48</td>
<td>$44.35</td>
<td>$55.22</td>
</tr>
<tr>
<td>8th 1,000 hours</td>
<td>$34.68</td>
<td>$46.15</td>
<td>$57.62</td>
</tr>
</tbody>
</table>

| Drywall Finisher, Soundproofing, & Plural Component Applicator | PT-1011-DF 7/17/2015 | $37.67 | $50.64 | $63.60 | H H H H H H D N |

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Straight Hourly</th>
<th>Time and a Half Hourly</th>
<th>Double Time Hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd 1,000 hours</td>
<td>$28.59</td>
<td>$37.02</td>
<td>$45.44</td>
</tr>
<tr>
<td>3rd 1,000 hours</td>
<td>$29.89</td>
<td>$38.96</td>
<td>$48.04</td>
</tr>
<tr>
<td>4th 1,000 hours</td>
<td>$31.19</td>
<td>$40.92</td>
<td>$50.64</td>
</tr>
<tr>
<td>5th 1,000 hours</td>
<td>$32.48</td>
<td>$42.85</td>
<td>$53.22</td>
</tr>
<tr>
<td>6th 1,000 hours</td>
<td>$33.78</td>
<td>$44.80</td>
<td>$55.82</td>
</tr>
<tr>
<td>7th 1,000 hours</td>
<td>$35.08</td>
<td>$46.75</td>
<td>$58.42</td>
</tr>
<tr>
<td>8th 1,000 hours</td>
<td>$36.37</td>
<td>$48.68</td>
<td>$61.00</td>
</tr>
</tbody>
</table>

| Pipe and Manhole Rehab | TM247 4/17/2015 | $28.20 | $38.20 | H H H H H H H N |

| 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: unit driver and operator of CCTV; grouting equipment and tap cutting equipment | TM247-2 4/17/2015 | $32.70 | $44.95 | H H H H H H H N |

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 2016 Prevailing Wage Rates for State Funded Projects

**Issue Date:** 1/14/2016  
**Contract must be awarded by:** 4/13/2016

#### Page 20 of 25

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Updated Hourly</th>
<th>Half Time Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CCTV Technician/Combo Unit Operator:</strong></td>
<td>TM247-3</td>
<td>unit driver and operator of cctv unit or combo unit in connection with normal cleaning and televising work</td>
<td>4/17/2015</td>
<td>$31.45</td>
<td>H H H H H H H N</td>
</tr>
<tr>
<td><strong>Boiler Operator:</strong></td>
<td>TM247-4</td>
<td>unit driver and operator of steam/water heater units and all ancillary equipment associated</td>
<td>4/17/2015</td>
<td>$33.20</td>
<td>H H H H H H H N</td>
</tr>
<tr>
<td><strong>Combo Unit driver &amp; Jetter-Vac Operator</strong></td>
<td>TM247-5</td>
<td></td>
<td>4/17/2015</td>
<td>$33.20</td>
<td>H H H H H H H N</td>
</tr>
<tr>
<td><strong>Pipe Bursting &amp; Slip-lining Equipment Operator</strong></td>
<td>TM247-6</td>
<td></td>
<td>4/17/2015</td>
<td>$34.20</td>
<td>H H H H H H H N</td>
</tr>
<tr>
<td><strong>Plasterer:</strong></td>
<td>PL16UP</td>
<td></td>
<td>10/23/2012</td>
<td>$38.71</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 #: 69**  
Requestor: Michigan Technological University  
Project Description: Memorial Union Building Retail Dining Renovations installing  
Project Number: 34-15-01  
County: Houghton  

**Official Rate Schedule**  
Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
### Plumber & Pipefitter

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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight Time and a Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commercial Roofer</td>
<td>RO-149-UP 4/17/2015</td>
<td>$28.23</td>
<td>$36.56 $44.88 X X X X X X D Y</td>
</tr>
</tbody>
</table>

*Make up day allowed*

#### Apprentice Rates:

- **Apprentice 1**: $20.84 $25.96 $31.08
- **Apprentice 2**: $21.67 $27.17 $32.67
- **Apprentice 3**: $22.48 $28.37 $34.26
- **Apprentice 4**: $23.29 $29.56 $35.82
- **Apprentice 5**: $24.09 $30.72 $37.36
- **Apprentice 6**: $24.90 $31.91 $38.93

### Sewer Relining

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Straight Time and a Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sewer Relining</td>
<td>Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV</td>
<td>SR-I 11/24/2015</td>
<td>$43.66 $59.01 $74.36 H H H H H H D N</td>
</tr>
</tbody>
</table>

---

**Official Request #: 69**

Requestor: Michigan Technological University

Project Description: Memorial Union Building Retail Dining Renovations installing

Project Number: 34-15-01

County: Statewide

**Official Rate Schedule**

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

Page 21 of 25
**Classification**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Last Straight Time and Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.</td>
<td>SR-II 11/24/2015</td>
<td>$42.13 $56.72 $71.30 H H H H H H D N</td>
<td></td>
</tr>
<tr>
<td>Sheet Metal Worker</td>
<td>shm-7-5 11/5/2015 $51.59 $65.60 $79.60 H H H D D Y</td>
<td>4 10s allowed as consecutive days, M-Th Make up day allowed comment Friday</td>
<td>Apprentice Rates:</td>
</tr>
<tr>
<td>Sprinkler Fitter</td>
<td>SP 669 9/17/2009 $46.51 $61.99 $77.47 H H H H H D Y</td>
<td>Make up day allowed</td>
<td>Apprentice Rates:</td>
</tr>
</tbody>
</table>

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Class 1 &amp; 2</th>
<th>1st 6 months $27.84 $34.14 $40.44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>2nd 6 months $29.88 $36.88 $43.88</td>
</tr>
<tr>
<td>Class 4</td>
<td>3rd 6 months $31.93 $39.64 $47.34</td>
</tr>
<tr>
<td>Class 5</td>
<td>4th 6 months $33.96 $42.37 $50.77</td>
</tr>
<tr>
<td>Class 6</td>
<td>5th 6 months $36.01 $45.12 $54.22</td>
</tr>
<tr>
<td>Class 7</td>
<td>6th 6 months $38.05 $47.86 $57.66</td>
</tr>
<tr>
<td>Class 8</td>
<td>7th 6 months $40.09 $50.60 $61.10</td>
</tr>
<tr>
<td>Class 9</td>
<td>8th 6 months $42.13 $53.34 $64.54</td>
</tr>
</tbody>
</table>

**Sprinkler Fitter**

| Sprinkler Fitter | SP 669 9/17/2009 $46.51 $61.99 $77.47 H H H H H D Y |

**Apprentice Rates:**

<table>
<thead>
<tr>
<th>Class 1 &amp; 2</th>
<th>1st 6 months $27.84 $34.14 $40.44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>2nd 6 months $29.88 $36.88 $43.88</td>
</tr>
<tr>
<td>Class 4</td>
<td>3rd 6 months $30.93 $40.12 $49.31</td>
</tr>
<tr>
<td>Class 5</td>
<td>4th 6 months $35.50 $45.47 $55.45</td>
</tr>
<tr>
<td>Class 6</td>
<td>5th 6 months $37.07 $47.83 $58.59</td>
</tr>
<tr>
<td>Class 7</td>
<td>6th 6 months $38.65 $50.20 $61.75</td>
</tr>
<tr>
<td>Class 8</td>
<td>7th 6 months $40.22 $52.55 $64.89</td>
</tr>
<tr>
<td>Class 9</td>
<td>8th 6 months $41.79 $54.91 $68.03</td>
</tr>
<tr>
<td>Class 10</td>
<td>$43.36 $57.27 $71.17</td>
</tr>
</tbody>
</table>

**Official Request #: 69**

Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing
Project Number: 34-15-01
County: Houghton

**Official Rate Schedule**

Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing wage and fringe benefit rates prescribed in a contract.
<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Last Updated</th>
<th>Straight Hourly</th>
<th>Time and Half</th>
<th>a Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Truck Driver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of all trucks of 8 cubic yd capacity or over</td>
<td>TM-RB2</td>
<td></td>
<td>8/8/2013</td>
<td>$41.92</td>
<td>$37.85</td>
<td>H H H H H H H Y</td>
<td></td>
</tr>
<tr>
<td>of all trucks of 8 cubic yard capacity or less</td>
<td>TM-RB2A</td>
<td></td>
<td>8/8/2013</td>
<td>$41.82</td>
<td>$37.70</td>
<td>H H H H H H H Y</td>
<td></td>
</tr>
<tr>
<td>(except dump trucks of 8 cubic yard capacity or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>over, tandem axle trucks, transit mix and semis,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>euclid type equipment, double bottoms and low boys)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on euclid type equipment</td>
<td>TM-RB2B</td>
<td></td>
<td>8/8/2013</td>
<td>$41.35</td>
<td>$38.08</td>
<td>H H H H H H H Y</td>
<td></td>
</tr>
<tr>
<td><strong>Underground Laborer Open Cut, Class I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Laborer</td>
<td>LAUC-Z5-1</td>
<td></td>
<td>10/30/2014</td>
<td>$32.75</td>
<td>$42.68</td>
<td>$52.61</td>
<td>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>
</tr>
<tr>
<td>0-1,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$28.35</td>
<td>$36.08</td>
<td>$43.81</td>
<td></td>
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<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$29.23</td>
<td>$37.40</td>
<td>$45.57</td>
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<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$30.11</td>
<td>$38.72</td>
<td>$47.33</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$31.87</td>
<td>$41.36</td>
<td>$50.85</td>
<td></td>
</tr>
<tr>
<td><strong>Underground Laborer Open Cut, Class II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortar and material mixer, concrete form man,</td>
<td>LAUC-Z5-2</td>
<td></td>
<td>10/30/2014</td>
<td>$32.89</td>
<td>$42.89</td>
<td>$52.89</td>
<td>X X X X X D Y</td>
</tr>
<tr>
<td>signal man, well point man, manhole, headwall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and catch basin builder, guard rail builders,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>headwall, seawall, breakwall, dock builder and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fence erector.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Apprentice Rates:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1,000 work hours</td>
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<td></td>
<td></td>
<td>$28.46</td>
<td>$36.25</td>
<td>$44.03</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$29.34</td>
<td>$37.57</td>
<td>$45.79</td>
<td></td>
</tr>
<tr>
<td>2,001-3,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$30.23</td>
<td>$38.90</td>
<td>$47.57</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000 work hours</td>
<td></td>
<td></td>
<td></td>
<td>$32.00</td>
<td>$41.56</td>
<td>$51.11</td>
<td></td>
</tr>
</tbody>
</table>

Official Request #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing
Project Number: 34-15-01
County: Houghton

Official Rate Schedule
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Page 23 of 25
### Underground Laborer Open Cut, Class III

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.

#### Apprentice Rates:

<table>
<thead>
<tr>
<th>Work Hours</th>
<th>Basic Rate</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000</td>
<td>$28.56</td>
<td>$36.40</td>
<td>$44.23</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>$29.45</td>
<td>$37.74</td>
<td>$46.01</td>
<td></td>
</tr>
<tr>
<td>2,001-3,000</td>
<td>$30.34</td>
<td>$39.07</td>
<td>$47.79</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000</td>
<td>$32.13</td>
<td>$41.76</td>
<td>$51.37</td>
<td></td>
</tr>
</tbody>
</table>

### Underground Laborer Open Cut, Class IV

Trench or excavating grade man.

#### Apprentice Rates:

<table>
<thead>
<tr>
<th>Work Hours</th>
<th>Basic Rate</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000</td>
<td>$28.59</td>
<td>$36.44</td>
<td>$44.29</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>$29.49</td>
<td>$37.80</td>
<td>$46.09</td>
<td></td>
</tr>
<tr>
<td>2,001-3,000</td>
<td>$30.38</td>
<td>$39.13</td>
<td>$47.87</td>
<td></td>
</tr>
<tr>
<td>3,001-4,000</td>
<td>$32.17</td>
<td>$41.82</td>
<td>$51.45</td>
<td></td>
</tr>
</tbody>
</table>

### Underground Laborer Open Cut, Class V

Pipe Layer

#### Apprentice Rates:

<table>
<thead>
<tr>
<th>Work Hours</th>
<th>Basic Rate</th>
<th>Time and a Half</th>
<th>Double Time</th>
<th>Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1,000</td>
<td>$28.63</td>
<td>$36.50</td>
<td>$44.37</td>
<td></td>
</tr>
<tr>
<td>1,001-2,000</td>
<td>$29.53</td>
<td>$37.86</td>
<td>$46.17</td>
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<tr>
<td>2,001-3,000</td>
<td>$30.43</td>
<td>$39.20</td>
<td>$47.97</td>
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<tr>
<td>3,001-4,000</td>
<td>$32.22</td>
<td>$41.89</td>
<td>$51.55</td>
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</tbody>
</table>
### 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>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Last Straight</th>
<th>Time and Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Cut, Class VI</td>
<td>LAUC-Z5-6</td>
<td>$28.61 $36.47 $44.33</td>
<td>10/30/2014</td>
<td>$28.61</td>
<td>$36.47 X X X X X X D Y</td>
</tr>
<tr>
<td>Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Apprentice Rates:

- **0-1,000 work hours**
  - $28.61 $36.47 $44.33  
- **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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Name</th>
<th>Description</th>
<th>Updated</th>
<th>Last Straight</th>
<th>Time and Double Overtime Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Cut, Class VII</td>
<td>LAUC-Z5-7</td>
<td>$26.61 $33.55 $40.43</td>
<td>10/30/2014</td>
<td>$26.61</td>
<td>$33.55 X X X X X X D Y</td>
</tr>
<tr>
<td>Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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 #: 69
Requestor: Michigan Technological University
Project Description: Memorial Union Building Retail Dining Renovations installing
Project Number: 34-15-01
County: Houghton

**Official Rate Schedule**

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