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ADVERTISEMENT FOR BIDS

Sealed Bids for: Mankato Clinical Sciences Building
Minnesota State University
Mankato, Minnesota

will be received by: Donna Hensel: Facilities Purchasing Coordinator
Minnesota State University, Mankato
Wiecking Center Room 358
415 Main Street
Mankato, Minnesota 56001

Until [Insert Time AM/PM], local time, [Insert Date] at which time the bids will be opened and publicly read aloud.

Project Scope: The new MSU,M CSB will be a 59,451 gsf building and will provide general classrooms and dedicated labs for nursing, dental hygiene, speech hearing and rehabilitation services, and faculty offices. The CSB is an new building on MSU,M’s campus. The three story new building will be internally connected to the campus through a new tunnel to be constructed to connect to the adjacent Ford Hall building. There will be a south west and north entrance to the building with adjacent surface parking and drop-off lane. The landscaped site will be integrated with the existing adjacent campus arboretum. The project will solicit 2 base bids, “base bid a” for a 59,451 GSF 3 story building with a minimal basement, and “base bid b” for a 79,022 GSF 3 story building with an basement shell below the entire first floor footprint.

A Pre-Bid Meeting will be held at [Insert Time AM/PM], [Insert Day of Week], [Insert Date], in Room [XXX], [Insert Name of Building, Name of College/University]. The Architect/Engineer and/or College/University Representatives will review the bidding procedures, Bidding Documents and other conditions with interested Bidders and answer questions.

Bidding Documents as prepared by the Project Architect/Engineer; Perkins + Will, are on file at the offices of the:

1) above named Project Architect/Engineer.
2) Quest CDN
3) following Builders’ Exchanges: Minneapolis, St. Paul, Duluth, Fargo-Moorhead, St. Cloud.
4) McGraw Hill Construction Plan Room
5) Reed Construction Data Plan Room
6) MEDA Minority Contractors Plan Room
7) National Association of Minority Contractors of Upper Midwest

Complete sets only of Bidding Documents for use by Bidders in submitting a bid may be obtained at the following address:

Perkins + Will
84 South 10th Street
Minneapolis, MN 55403
612-851-5000

A deposit of $XX.00 is required for each set.
Prospective Bidders requesting that Bidding Documents (complete sets only) be mailed to them, may send a separate non-refundable payment (check made out to the Architect) for [$XX.00] per set for shipping & handling (in addition to the [Insert Deposit Amount same as above $XX.00] deposit) to the Architect. Such deposits and payments may be sent prior to [Insert Date]. Documents will be sent to street addresses only (P.O. Boxes not acceptable).

Each bid which totals over $15,000.00 shall be accompanied by a certified check, payable to Minnesota State Colleges and Universities, in the sum of not less than 5% of the total base bid; or a corporate surety bond of a surety company duly authorized to do business in the state of Minnesota in the same amount; which is submitted as bid security, conditioned upon the Bidder entering into a contract with Minnesota State Colleges and Universities in accordance with the terms of the bid.

END OF SECTION
INSTRUCTIONS TO BIDDERS

EXAMINATION OF SITE AND DOCUMENTS

Bidders shall examine all documents, shall visit the site and record their own investigations, and shall inform themselves of all conditions under which the Work is to be performed at the site of the Work, the structure of the ground, the obstacles which may be encountered, all of the conditions of the documents, including superintendence of the Work, requirements of temporary facilities, time of completion, furnishing submittals and a list of Subcontractors, and all other relevant matters which may affect the Work or the bidding.

The Bidder shall base the bid on materials complying with the Bidding Documents, Drawings and Specifications, and shall list all information where the bid form requires.

LABOR STANDARDS AND WAGES

This project is subject to Minnesota Labor Standards and Wages requirements of Minnesota Statutes Chapter 177.

Pursuant to Minnesota Statutes 177.41 to 177.44 and corresponding Rules 5200.1000 to 5200.1120, this project contract is subject to the prevailing wages as established by the Minnesota Department of Labor and Industry. Specifically, all contractors and subcontractors must pay all laborers and mechanics the established prevailing wages for work performed under the contract. Failure to comply with the aforementioned may result in civil or criminal penalties.

For more information regarding prevailing wage and its application, contact:

Minnesota Department of Labor and Industry
Prevailing Wage unit
443 Lafayette Road N.
St. Paul, MN  55155
Phone:  (651) 284-5091
E-mail:  dli.prevwage@state.mn.us
Web:  www.dli.mn.gov

The Bidder shall review Specifications Section 00 73 46, Prevailing Wage Rate Requirements, to determine the applicable prevailing wage rates, prevailing hours of labor, and hourly basic rates of pay that are applicable to this project contract.

Hours of Labor
Pursuant to Minnesota Statutes 177.43:
(1) no laborer or mechanic employed directly on the project work site by the contractor or any subcontractor, agent, or other person doing or contracting to do all or a part of the work of the project, is permitted or required to work more hours than the prevailing hours of labor.
unless paid for all hours in excess of the prevailing hours at a rate of at least 1-1/2 times the hourly basic rate of pay; and

(2) a laborer or mechanic may not be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area.

**Exceptions**
This requirement does not apply to wage rates and hours of employment of laborers or mechanics who process or manufacture materials or products or to the delivery of materials or products by or for commercial establishments which have a fixed place of business from which they regularly supply processed or manufactured materials or products. This section applies to laborers or mechanics who deliver mineral aggregate such as sand, gravel, or stone which is incorporated into the work under the contract by depositing the material substantially in place, directly or through spreaders, from the transporting vehicle.

**Posting**
The prevailing wage rates, prevailing hours of labor, and hourly basic rates of pay for all trades and occupations required in any project must be ascertained before the state asks for bids. Each contractor and subcontractor performing work on a public project shall keep the information posted on the project in at least one conspicuous place for the information of the employees working on the project.

**Penalty**
It is a misdemeanor for an officer or employee of the state to execute a contract for a project without complying with this section, or for a contractor, subcontractor, or agent to pay any laborer, worker, or mechanic employed directly on the project site a lesser wage for work done under the contract than the prevailing wage rate as stated in the contract. This misdemeanor is punishable by a fine of not more than $700, or imprisonment for not more than 90 days, or both. Each agent or subcontractor shall furnish to the contractor evidence of compliance with this section. Each day a violation of this section continues is a separate offense.

**Examination of Records; Investigation**
The Department of Labor and Industry shall enforce this section. The department may demand, and the contractor and subcontractor shall furnish to the department, copies of any or all payrolls. The department may examine all records relating to wages paid laborers or mechanics on work to which sections 177.41 to 177.44 apply.

The Contractor and subcontractors shall comply with Minnesota Statutes 177.41-.44. To facilitate compliance pursuant to the Statute, wage determinations (prevailing wages) were prepared for different trades for each county from which labor for said project would be secured and are included and published in the Contract Specifications. Any wage determinations that are found not to be so promulgated do not relieve the Contractor from any responsibility for paying the prevailing wage rate of the trade in question. Additional classifications may develop between certifications by the Minnesota Department of Labor and Industry. Therefore, no inference may be drawn from the omission of a classification which has local usage.
Prevailing Wage Violations
Upon issuing a compliance order to an employer pursuant to section 177.27, subdivision 4, for violation of sections 177.41 to 177.44, the commissioner shall issue a withholding order to the contracting authority ordering the contracting authority to withhold payment of sufficient sum to the prime or general contractor on the project to satisfy the back wages assessed or otherwise cure the violation, and the contracting authority must withhold the sum ordered until the compliance order has become a final order of the commissioner and has been fully paid or otherwise resolved by the employer.

During an investigation of a violation of sections 177.41 to 177.44 which the commissioner reasonably determines is likely to result in the finding of a violation of sections 177.41 to 177.44 and the issuance of a compliance order pursuant to section 177.27, subdivision 4, the commissioner may notify the contracting authority of the determination and the amount expected to be assessed and the contracting authority shall give the commissioner 90 days' prior notice of the date the contracting authority intends to make final payment.

Pursuant to Minnesota Statutes Section 177.43, Subd. 3, all contractors and subcontractors shall submit to the Owner’s contracting entity copies of payrolls that contain all the data required by Minnesota Statutes §177.30. Contractors and subcontractors shall use Form MnSCU073 for this purpose.

Keeping Records; Penalty:
(a) Every employer subject to Minnesota Statutes Section 177.21 to 177.44 must make and keep a record of:
   (1) the name, address, and occupation of each employee;
   (2) the rate of pay, and the amount paid each pay period to each employee;
   (3) the hours worked each day and each workweek by the employee;
   (4) for each employer subject to sections 177.41 to 177.44, and while performing work on public works projects funded in whole or in part with state funds, the employer shall furnish under oath signed by an owner or officer of an employer to the contracting authority and the project owner every two weeks, a certified payroll report with respect to the wages and benefits paid each employee during the preceding weeks specifying for each employee: name; identifying number; prevailing wage master job classification; hours worked each day; total hours; rate of pay; gross amount earned; each deduction for taxes; total deductions; net pay for week; dollars contributed per hour for each benefit, including name and address of administrator; benefit account number; and telephone number for health and welfare, vacation or holiday, apprenticeship training, pension, and other benefit programs; and
   (5) other information the commissioner finds necessary and appropriate to enforce sections 177.21 to 177.435. The records must be kept for three years in or near the premises where an employee works except each employer subject to sections 177.41 to 177.44, and while performing work on public works projects funded in whole or in part with state funds, the records must be kept for three years after the contracting authority has made final payment on the public works project.
(b) The commissioner may fine an employer up to $1,000 for each failure to maintain records as required by this section. This penalty is in addition to any penalties provided under section 177.32, subdivision 1. In determining the amount of a civil penalty under this subdivision, the appropriateness of such penalty to the size of the employer’s business and the gravity of the violation shall be considered.

JOBS REPORTING
The Contractor is hereby advised that this Project may be funded in whole or in part by state bond funds and subject to the reporting requirements of Minnesota Statute 16A.633, Subdivision 4 (MN Laws of 2012 Chapter 293, Section 28). (see MnSCU Form 110 for whether the Project is subject to these reporting requirements).

JOBS REPORTING PROVISION FOR AGENCY CONSTRUCTION AGREEMENTS WITH CONTRACTORS (FOR STATE-OWNED PROJECTS)

Pursuant to M.S. Sec. 16A.633, subd. 4, which was added during the 2012 legislative session, MnSCU is required to report the number of jobs created or retained by the Project. To enable MnSCU to comply with M.S. Sec. 16A.633, subd. 4, the Contractor must submit job reports for the Project through Project completion for contracts that are funded whole or in part with General Obligation funds. Jobs Reporting form is on web at http://www.finance.mnscu.edu/facilities/design-construction/pm_emanual/index.html. Each report must contain the following information:

(1) The name of the Project and Purchase Order (PO) or (contract) number.

(2) The county where the Project is located or, if it is located in more than one county, where it is primarily located.

(3) The Contractor must report its workforce and the workforce of its subcontractors, active during the Reporting Period. This includes employees actively engaged in the Project who work on the jobsite, in the Project office, in the home office or telecommute from home or other alternative office location. This includes, but is not limited to, any engineering personnel, inspectors, sampling and testing technicians, and lab technicians performing work directly in support of the Project. This does not include material suppliers such as steel, culverts, guardrail and tool suppliers. Only hours that relate to time spent on the Project should be reported.

(4) Jobs should be classified as either (i) jobs created or (ii) jobs retained; they cannot be counted as both. A “job created” is a new position created and filled, or an existing unfilled position that is filled, because of the Project. A “job retained” means a job at a specific wage level that existed prior to beginning the Project that would have been lost but for the Project. Only jobs in Minnesota should be counted.
(5) Jobs should be classified as follows; (i) engineering/professional, (ii) construction, or (iii) other. Manager and supervisor jobs shall be classified as category (i), (ii) or (iii) based on the nature of the work those individuals spent the majority of their time overseeing.

(6) Jobs should be classified according to the hourly pay ranges below. Overhead or indirect costs or the value of pensions or other benefits should not be included in wages.

   (i) less than $10.00,
   (ii) $10.01 to $15.00,
   (iii) $15.01 to $20.00,
   (iv) $20.01 to $25.00,
   (v) $25.01 to $30.00,
   (vi) $30.01 to $35.00,
   (vii) $35.01 to $40.00, or
   (viii) more than $40.00.

(7) Jobs should be expressed in “full-time equivalents” (FTE). In calculating an FTE, the number of hours worked through the end of the current Reporting Period should be divided by 2,080 (the number of hours representing full time work for one year period). Jobs should be reported regardless of when the Project or an individual’s employment began or ended. Jobs are to be calculated based on hours worked through the end of the current Reporting Period, and report is cumulative.

(8) End of the Reporting Period shall be the same end date as the Pay Application work period. Failure to submit the Jobs Report will result in delay in processing payment until the Report is submitted.

(8) Jobs should not be separated into full-time, part-time, temporary, seasonal, etc. Instead, all hours should be totaled and converted into FTEs as indicated above.

(9) The Contractor must incorporate these reporting requirements into its contracts with its subcontractors, and impose deadlines on reporting by subcontractors so that contractors will have sufficient time to meet the deadlines for reporting to MnSCU set forth in this article.

BID SECURITY

Each bid which totals over $50,000.00 shall be accompanied by a certified check, payable to Minnesota State Colleges and Universities, in the sum of not less than 5% of the total base bid; or a corporate surety bond of a surety company duly authorized to do business in the state of Minnesota in the same amount; which is submitted as bid security, conditioned upon the Bidder entering into a contract with Minnesota State Colleges and Universities in accordance with the terms of the bid. It is agreed that bid security will constitute liquidated damages, and not a penalty, for the failure or refusal of the successful Bidder to execute and deliver the Owner-Contractor Agreement, in a correct form, within ten (10) days after receipt.
INTERPRETATIONS AND CHANGES BY ADDENDA

If any Bidder is in doubt as to the meaning of any part of the Bidding Documents, Drawings and Specifications, they may submit a written request to the Architect for an interpretation of that part. Any interpretation or change will be made only by Addenda numbered, dated, and issued to each Bidder on record of receiving a set of Bidding Documents. The Owner or Architect will not be responsible for any other explanations or interpretations of the Bidding Documents.

PREPARATION OF BID FOR CONTRACT WORK

The Bidder shall submit their bids on the form furnished. If the bid includes alternates, Bidders shall bid on each alternate. The Bidder shall enter the bid and any alternate amounts in both written format and numerically. The blank spaces in the bid form shall be filled in correctly with ink or typewritten. A bid form containing an alteration or erasure of any item or price contained in the bid which is used to determine the lowest responsible bid shall be rejected unless the alteration or erasure is corrected as herein provided. An alteration or erasure may be crossed out and the correction printed in ink or typewritten adjacent to the alterations or erasure. In addition, the person signing the bid must initial the correction in ink. In the event that any price used in determining the lowest responsible bid is in discrepancy, the written representation shall take precedence. Failure to comply may be cause for rejection.

A bid submitted from a sole owner shall be signed by the individual. A bid submitted from a partnership shall be signed by two partners. A bid submitted from a corporation shall contain the correct name of the corporation and the state of incorporation. The signature of the president or other authorized officer(s) of the corporation shall be manually written below the name of the corporation, together with the title of the officer. If a corporation bid is signed by an official other than the president, a certified copy of the resolution of the board of directors showing the authority of the official to sign the bid shall be attached to the bid.

Bids from individuals or partnerships, if signed by an attorney-in-fact, shall have attached to the bid the power of attorney, evidencing the authority to sign the bid. If the bid is signed by any other legal entity, the authority of the person signing shall be attached to the bid.

DEPARTMENT OF LABOR AND INDUSTRY (DLI) REGISTRATION

Building construction contractors and subcontractors, including independent contractors and business entities, are required to be registered with Department of Labor and Industry (DLI) per Minnesota Statute 181.723. Registration is completed online at www.dli.mn.gov/register. General contractors are required to verify that both their company and all of their subcontractors are registered on the searchable DLI web site, http://www.dli.mn.gov/ccld/register.asp prior to submitting their bid.

To clarify, this new requirement does not require a contractor to be licensed unless their specific trade requires licensing. This new requirement only requires that contractors be registered with DLI. Questions can be addressed by DLI at 651.284.5074 or email at dli.register@state.mn.us.
QUALIFIED BID

The Bidder shall not stipulate in the bid any condition not contained in the Bidding Documents, Drawings, Specifications or other documents submitted for bid. Failure to comply may be cause for rejection.

DELIVERY OF BID

Each bid and all papers bound and attached to the bid, together with the bid security shall be placed in an envelope and securely sealed therein. The envelope shall be marked to indicate the following:

1. Name and address of the Bidder.
2. Name of the Project and location.

The envelope shall be addressed and delivered to:

Donna Hensel: Facilities Purchasing Coordinator  
Minnesota State University, Mankato  
Wiecking Center Room 358  
415 Main Street  
Mankato, Minnesota 56001

Contractors shall be responsible to make sure bids are delivered before the time set for the opening of the bids. The Owner will not be responsible for bids arriving by mail, express delivery or other delivery that are delivered to the designated building and room after the time designated for the bid opening. Bids delivered after the time designated for the bid opening shall be returned unopened. Oral, telephone, facsimile, or electronic mail bids shall not be accepted.

WITHDRAWAL OF BID

A Bidder may withdraw the bid at any time before the time set for the opening of bids or thirty (30) calendar days after the date of the opening, unless otherwise amended on the bid form, if the Owner has not acted thereon.

CONSIDERATION OF BID

The Owner reserves the right to reject all bids or parts of bids, and to waive informalities therein.

For the purpose of determining the lowest responsive bid in the consideration of all bids submitted, the Owner reserves the right to accept or reject any or all alternates in the numerical order in which they appear on the bid form and as they may consider in the best interests of the Owner.

STATE EXCISE AND USE TAX
In submitting the bid, the Bidder is understood to have included in the bid price any and all local, State or Federal sales, excise, or use taxes on all materials, supplies, and equipment that are to be utilized on this Project.

**CONTRACT**

The successful Bidder, if awarded the Project, shall sign a formal Owner-Contractor Agreement and furnish Payment and Performance Bonds and required insurance in conformance with the General Conditions of the Contract for Construction. However, no such Agreement shall be in force and effect until it is executed by all parties and the full amount of the Agreement liability of the Owner has been encumbered by Minnesota State Colleges and Universities, and the Payment and Performance Bonds and insurance certification have been approved. Within ten (10) calendar days of receiving the Owner-Contractor Agreement, the Contractor shall execute the Agreement and return it to the Owner; failure to return the Agreement within ten (10) calendar days may result in the rescinding of the Contract award.

**SUBCONTRACTORS LIST**

The Contractor shall, within fourteen (14) calendar days after the date of the letter of Contract Award, submit in writing to the Architect a complete list of all items of Work which the Contractor proposes to subcontract and the names of the Subcontractors to whom the Contractor proposes to subcontract such Work. The Subcontractors named shall be of recognized history of satisfactory performance.

**RETURN OF BID SECURITY**

All negotiable bid securities will be returned after execution of the Contract.

**TARGETED GROUP (T.G.) AND/OR ECONOMICALLY DISADVANTAGED (E.D.) SUBCONTRACTOR REQUIREMENTS**

See Bid Form, Section 00 41 13, paragraph (2). The Bidder shall mark their company’s status in this category on the bid form, page 1.

**VETERAN-OWNED/SERVICE DISABLED VETERAN-OWNED CONTRACTOR REQUIREMENTS**

See Bid Form, Section 00 41 13, paragraph (2). The Bidder shall mark their company’s status in this category on the bid form, page 1 and complete the information in paragraph (2). Provide the required documentation with your response. If you don’t check a box in Paragraph (2), or you don’t provide the required documentation, you will not be considered for this preference.
MINNESOTA STATE COLLEGES AND UNIVERSITIES

(Use of Prime Contractor Statement of Qualifications is optional. If section 004513 is not to be used, delete the following paragraph from the Instructions to Bidders)

PRIME CONTRACTOR STATEMENT OF QUALIFICATIONS

See Section 00 41 15. The Bidder shall complete the form provided in this section. This form must be submitted with the Bidder’s response to this solicitation. If the solicitation response is received without the qualification form, the response shall be rejected.

END OF SECTION
ADMINISTRATIVE REQUIREMENTS

The Contractor shall use Minnesota State Colleges & Universities (MnSCU’s) internet-based Enterprise Project Management System (EPMS). The functionality of this software may include, but is not limited to, the processing of: a) contract modifications, including Requests For Information (RFI’s), Proposal Requests (PR’s), Construction Change Directives (CCD’S), and Change Orders (CO’s), b) financial correspondence, including Applications for Payment, c) submittals, including construction schedules, product data, shop drawings, samples, and d) other project related information. MnSCU will provide the Contractor with a login license and initial software training for the selected Contractor’s designated Project representative(s) at no cost to the Contractor. Except for licenses and initial training, MnSCU assumes no responsibility for any real or potential costs associated with the use of EPMS by the Contractor.

END OF SECTION
PROCUREMENT SUBSTITUTION PROCEDURES

1.1 SUBSTITUTIONS DURING PROCUREMENT PERIOD

A. Bids shall be submitted only on the basis of materials, products, and equipment specified in the Specifications, indicated on the Drawings, or as named by Addenda pursuant to approval of Requests for Substitution.

B. Materials, products, and equipment included in the Bidding Documents are specified for the purpose of establishing a minimum standard of quality, cost, appearance, design, and function. It is not the intent to limit the acceptance of materials, products or equipment specified, but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or acceptable substitution," requests for substitution will nevertheless be considered if properly submitted to and received by the Architect prior to the designated date.

C. If any Bidder wishes to substitute equipment or materials, which is believed to be equal to those specified, the Bidder shall make a request in writing to the Architect for approval of such substitute equipment or materials at least seven (7) calendar days prior to the date for receipt of Bids, following the rules stated herein.

1.2 SUBMITTAL REQUIREMENTS

A. The Substitution Request Form included as an attachment to this Document shall be used for all Substitution requests. Failure to use the attached Substitution Request form, or the failure of the Bidder to fully execute the form as required, will result in rejection of the proposed substitution request without review.

B. Requests for substitution shall be accompanied by manufacturer's product data, specifications, drawings, catalog cuts, samples, installation instructions, performance data, list of projects completed of similar size and scope, and other references and information necessary to completely describe the item, and to facilitate a thorough and complete review by the Architect. Requests not meeting all these requirements may be rejected without evaluation.

C. All requests shall originate from the prime Bidder. Manufacturers, manufacturer's representatives, dealers, distributors, suppliers, and subcontractors shall not direct or make requests to substitute equipment or materials.

D. Substitutions shall be submitted to the Architect only; no substitutions shall be submitted directly to any consultant, the Owner, or any of the Owner's consultants.

1.3 ARCHITECT’S ACTION

A. If the Architect and Owner should approve of such substitute equipment or materials, an Addendum evidencing such approval will be promulgated by the Architect and issued to all prospective Prime Bidders of whom the Architect has a record.

B. Approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Architect at the time decision is rendered and
Addendum is issued. Approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed. In proposing items for consideration, Bidder assumes all risk, costs, and responsibility for item's final acceptance, compliance with the Bidding Documents and Contract Documents, integration into the Work, and performance.

1. If an accepted substitution is later found to be not in compliance with the Contract Documents, Bidder / Contractor shall provide the specified product at no additional cost to Owner.

1.4 SUBSTITUTIONS AFTER AWARD OF CONTRACT
   A. Comply with provisions of Section 01 25 00. Contractor shall execute the Substitution Request Form attached thereto.

1.5 ATTACHMENTS
   A. Substitution Request Form (Procurement Period).
SUBSTITUTION REQUEST FORM

PROJECT: ______________________________________ (Procurement Period)

TO: Perkins+Will FROM: __________________________________

84 10th St. South, Suite 200
Minneapolis, MN 55403

NO. P+W _______________ DATE: _______________

Bidder hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Division 00 Document - Instructions to Bidders, and Division 01 Section “Substitution Procedures.”

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: ________________________________________________

Specification Section No.: _______________ Article / Paragraph: ________________

2. REASON FOR SUBSTITUTION REQUEST

SPECIFIED PRODUCT . . . PROPOSED PRODUCT . . .

☐ Is no longer available. ☐ Will reduce construction time
☐ Is unable to meet project schedule. ☐ Will result in cost savings
☐ Is unsuitable for the designated application. ☐ Is for supplier’s convenience
☐ Cannot interface with adjacent materials. ☐ Is for subcontractor’s convenience
☐ Is not compatible with adjacent materials. ☐ Other: __________________________
☐ Cannot provide the specified warranty. ...........................................
☐ Cannot be constructed as indicated. ..............................................
☐ Cannot be obtained due to one or more of the following:
  ☐ Strike ☐ Bankruptcy of manufacturer or supplier
  ☐ Lockout ☐ Similar occurrence (explain below)

3. SUPPORTING DATA

☐ Drawings, specifications, product data, performance data, test data, and any other necessary information to facilitate review of the Substitution Request is attached.

☐ Sample is attached. ☐ Sample will be sent if requested.
4. **QUALITY COMPARISON**

Provide all necessary side-by-side comparative data as required to facilitate review of Substitution Request:

<table>
<thead>
<tr>
<th>SPECIFIED PRODUCT</th>
<th>PROPOSED PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Name / Brand:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Catalog No.:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Vendor:</td>
<td>__________________________</td>
</tr>
<tr>
<td>Variations:</td>
<td>__________________________</td>
</tr>
<tr>
<td></td>
<td>__________________________</td>
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<tr>
<td></td>
<td>__________________________</td>
</tr>
<tr>
<td></td>
<td>__________________________</td>
</tr>
</tbody>
</table>

(Add Additional Sheets If Necessary)

Local Distributor or Supplier: __________________________________________

Maintenance Service Available: □ Yes □ No

Spare Parts Source: __________________________________________________

Warranty: □ Yes □ No _____ Years

5. **PREVIOUS INSTALLATIONS**

Identification of at least four similar projects on which proposed substitution was used:

**PROJECT #1:**

<table>
<thead>
<tr>
<th>Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
</tr>
<tr>
<td>Architect:</td>
</tr>
<tr>
<td>Owner:</td>
</tr>
<tr>
<td>Contractor:</td>
</tr>
<tr>
<td>Date Installed:</td>
</tr>
</tbody>
</table>
PROCUREMENT SUBSTITUTION PROCEDURES

PROJECT #2:

Project: _______________________________________________________
Address: _______________________________________________________

Architect: _______________________________________________________
Owner: _______________________________________________________
Contractor: _______________________________________________________
Date Installed: _______________________________________________________

PROJECT #3:

Project: _______________________________________________________
Address: _______________________________________________________

Architect: _______________________________________________________
Owner: _______________________________________________________
Contractor: _______________________________________________________
Date Installed: _______________________________________________________

PROJECT #4:

Project: _______________________________________________________
Address: _______________________________________________________

Architect: _______________________________________________________
Owner: _______________________________________________________
Contractor: _______________________________________________________
Date Installed: _______________________________________________________

Note: All questions must be answered and all blanks filled in.
6. EFFECT OF SUBSTITUTE

Proposed substitution affects other work or trades:  □ No   □ Yes (if yes, explain)

_________________________________________________________________________________
_________________________________________________________________________________

Proposed substitution requires dimensional revisions or redesign of architectural, structural, M-E-P, life safety, or other work:

□ No  □ Yes (if yes, attach data explaining revisions)

7. STATEMENT OF CONFORMANCE OF REQUEST TO CONTRACT REQUIREMENTS

Contractor and Subcontractor have investigated the proposed substitution and hereby represent that:

A. They have personally investigated the proposed substitution and believe that it is equal to or superior in all respects to specified product, except as stated above;

B. The proposed substitution is in compliance with applicable codes and ordinances;

C. The proposed substitution will provide same warranty as specified for specified product;

D. They will coordinate the incorporation of the proposed substitution into the Work, and will include modifications to the Work as required to fully integrate the substitution;

E. They have included complete cost data and implications of the substitution (attached);

F. They will pay any redesign fees incurred by the Architect or any of the Architect’s consultants, and any special inspection costs incurred by the Owner, caused by the use of this product;

G. They waive all future claims for added cost or time to the Contract related to the substitution, or that become known after substitution is accepted.

H. The Architect’s approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Architect at the time decision is rendered and Addendum is issued; and that Architect’s approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

Bidding Contractor: ____________________________
(Name of prime bidding contractor)

Date: ___________________   By: ____________________________

Bidding Subcontractor: ____________________________
(Name of bidding subcontractor)

Date: ___________________   By: ____________________________

Note: Unresponsive or incomplete requests will be rejected and returned without review.
8. ARCHITECT’S REVIEW AND ACTION

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: ______________________
____________________________________________________________________
____________________________________________________________________

☐ Resubmit Substitution Request:

☐ Provide more information in the following areas: ______________________
____________________________________________________________________
____________________________________________________________________

☐ Bidding Contractor shall sign Bidder’s Statement of Conformance

☐ Bidding Subcontractor shall sign Bidder’s Statement of Conformance

☐ Substitution is not accepted:

☐ Substitution Request received too late.

☐ Substitution Request received directly from subcontractor or supplier.

☐ Substitution Request not submitted in accordance with requirements.

☐ Substitution Request Form is not properly executed.

☐ Substitution Request does not indicate what item is being proposed.

☐ Insufficient information submitted to facilitate proper evaluation.

☐ Proposed product does not appear to comply with specified requirements.

☐ Proposed product will require substantial revisions to Contract Documents.

Perkins+Will

By:_____________________________ Date:_____________________________

Perkins+Will has relied upon the information provided by the Bidder, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Bidding Documents or Contract Documents, Bidder / Contractor shall provide the specified product at no additional cost to Owner.

END OF DOCUMENT
This page is intentionally left blank.
1.1 SOILS AND FOUNDATION INVESTIGATION

A. Soils and Foundation Investigation:

1. The Geotechnical Report has been prepared for the project by American Engineering and Testing; AET Geotechnical Report #08-11009 (2013).
2. The report follows this section and is included for information only and is not part of the Contract Documents. Neither the Owner nor the Architect makes any promise, representation, guaranty or warranty, with respect to anything expressed or implied in the following.

The General Geotechnical Report will be added for the Construction Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)
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BID FORM

BID OPENING TIME: ____________ local time
[Insert Time XX:00 AM/PM]
BID OPENING DATE: [Insert Date]

SUBMITTED BY: ________________________________________________________________

Company Name – Hereinafter referred to as the “Bidder”

ARE YOU A CERTIFIED, TARGETED GROUP PRIME CONTRACT BIDDER? ___Yes ___No
ARE YOU A CERTIFIED, ECONOMICALLY DISADVANTAGED PRIME CONTRACT BIDDER? ___Yes ___No
ARE YOU A CERTIFIED, VETERAN-OWNED PRIME CONTRACT BIDDER? ___Yes ___No

BID FOR CONTRACT WORK

(1) We, the undersigned, being familiar with the local conditions affecting the cost of the Work and with the Contract Documents, including the Advertisement for Bids, Bid Form, General Conditions of the Contract for Construction as amended therein, Special Conditions, Drawings, Specifications and Addenda Numbers _________________________, on file in the Office of:

Donna Hensel: Facilities Purchasing Coordinator
Minnesota State University, Mankato
Wiecking Center Room 358
415 Main Street
Mankato, Minnesota 56001

and in accordance with the provisions thereof, hereby proposes to furnish all labor, materials, equipment and services necessary for the following Project:

Clinical Sciences Building
[Insert Building Name, if applicable]
Minnesota State University, Mankato
Mankato, Minnesota

A. BASE BID A

OUR TOTAL BASE BID FOR THE WORK OF THIS PROJECT IS:

_____________________________________________ DOLLARS ($______________)
(Amount in words)
B. **DEDUCT ALTERNATES**

ALTERNATE NO. 1: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

(Amount in words)

ALTERNATE NO. 2: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

(Amount in words)

ALTERNATE NO. 3: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

(Amount in words)

C. **BASE BID B**

OUR TOTAL BASE BID FOR THE WORK OF THIS PROJECT IS:

_____________________________________________ DOLLARS ($________________)

D. **DEDUCT ALTERNATES FROM BID B**

ALTERNATE NO. 1: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

ALTERNATE NO. 2: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

ALTERNATE NO. 3: *(Insert Title of Alternate)*

_____________________________________________ DOLLARS ($________________)

(2) **PREFERENCE:** In accordance with M.S. 16C.16, the basis of award is that eligible certified targeted group (T.G.) prime Bidders will receive a six percent (6%) preference and certified economically disadvantaged (E.D.) prime Bidders will receive a four percent (4%) preference. Preference will only be allowed if the Bidder is certified prior to the scheduled bid opening. Both the targeted group (T.G.) preference and the economically disadvantaged (E.D.) preference are applied only to the first $500,000 of the bid. Preferences are not cumulative; the total percentage of preference granted on a contract may not exceed the highest percentage of
 preference allowed for that contract. Bidders interested in becoming a certified vendor or to verify their T.G. eligibility and certification or E.D. certification, should refer to the state of Minnesota, Department of Administration, Materials Management Division’s website at www.mmd.admin.state.mn.us under “Vendor Information”, or call the division’s help line at (651) 296-2600. The Bidder shall designate their company’s status in the spaces provided on this bid form.

In accordance with M.S. 16C.16 and 16C.19, eligible certified veteran-owned small businesses of which the principal place of business is in Minnesota will receive a 6 percent (6%) preference on the basis of award for this RFB. The preference is applied only to the first $500,000 of the bid. Preferences are not cumulative; the total percentage of preference granted on a contract may not exceed the highest percentage of preference allowed for that contract. Eligible veteran-owned small businesses include certified small businesses that are majority-owned and operated by a veteran and are certified by the United States Department of Veteran Affairs as a veteran-owned small business.

☐ Check this box if you are claiming the veteran’s preference. Provide a screen print of the Department of Veterans Affairs website showing you are certified.

Eligible veteran-owned small businesses must be currently certified by the U.S. Department of Veterans Affairs prior to the solicitation opening date and time to receive the preference. Information regarding certification by the United States Department of Veterans Affairs may be found at http://www.vetbiz.gov .

Provide the applicable documentation above with your response. If you don’t check the box above in Paragraph (2), or you don’t provide the required documentation, you will not be considered for this preference.

(3) BID SECURITY: Each bid which totals over $50,000 shall be accompanied by either a certified check, payable to Minnesota State Colleges and Universities, in the sum of not less than five percent (5%) of the total base bid, or a corporate surety bond for the same amount issued by a surety company duly authorized to do business in the state of Minnesota. The check or bond is submitted as bid security, conditioned upon the Bidder entering into a Contract with the Owner in accordance with the terms of the bid. It is agreed that the bid security will constitute liquidated damages, and not a penalty, for the failure or refusal of the successful Bidder to execute and deliver the Owner-Contractor Agreement, in a correct form, within ten (10) days after receipt.

(4) ADDENDA ACKNOWLEDGEMENT: All Addenda shall become part of this bid and the Contract. As acknowledgement of this requirement, the Bidder shall insert the numbers of all Addenda included in this bid in the space provided in paragraph (1) on the first page of this bid form. Failure to list all Addenda issued shall be cause for rejection.

(5) ALTERATIONS/ERASURES: A bid form shall be rejected if it contains any alteration or erasure unless the alteration or erasure is corrected as herein provided. An alteration or erasure must be crossed out and the correction thereof printed in ink or typewritten adjacent to the
SECTION 00 41 13

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alteration or erasure and initialed in ink by the person signing the bid. Enter the bid and any alternate amounts in both written format and numerically. In the event that any price used in determining the lowest responsible bid is in discrepancy, the written representation shall take precedence.

(6) STATE OF INCORPORATION: For corporations, please list the state of incorporation:

________________________________________________________________________

(7) NAMES OF PARTNERS: For partnerships, please list the full names of the partners:

________________________________________________________________________

(8) REJECTION OF BIDS/ BID WITHDRAWAL: In submitting this bid it is understood that the Owner reserves the right to reject any and all bids. It is agreed that this bid cannot be withdrawn until after thirty (30) calendar days have passed from the date of the bid opening if the Owner has not yet acted thereon.

(9) ENCLOSURES: If the Specifications require the Bidder to submit catalogues, drawings, specifications, performance data, descriptive information of special equipment, or other items, the Bidder shall include the required items with the bid form.

(10) TIME OF COMPLETION: The undersigned Bidder hereby affirms and states that, if awarded the Contract for said Project, Work will commence within 10 (ten) consecutive calendar days after the written Notice to Proceed and the entire Contract will be Substantially Complete by [Insert either a specific date or a specific number of calendar days after the date of the written Notice to Proceed.] as a condition of the Contract. We understand further, that the Contractor shall be assessed liquidated damages for each consecutive calendar day any Project Work component remains incomplete after the required date(s) of completion. Contract processing delays by the Bidder shall not extend the Time of Completion.

(11) CERTIFICATE OF COMPLIANCE: REQUIRED FOR BIDS SUBMITTED IN EXCESS OF $100,000.00

BIDDERS ARE CAUTIONED TO READ CLOSELY THE SECTION LISTED ELSEWHERE IN THE BIDDING DOCUMENTS TITLED, “NOTICE TO BIDDERS - AFFIRMATIVE ACTION CERTIFICATE OF COMPLIANCE.” THE BIDDER SHALL COMPLETE THE FOLLOWING INFORMATION. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID.

1. Have you employed more than 40 full-time employees within Minnesota on a single working day during the previous 12 months?

_____ YES _____ NO

If your answer is "NO", proceed to Number 3. If your answer is “Yes”, your bid will be rejected unless your firm or business has a Certificate of Compliance issued by the State...
of Minnesota, Commissioner of Human Rights, or has submitted an affirmative action plan to the Commissioner of Human Rights for approval by the time the bids are due.

2. Please check one of the following statements:

Yes ____ we have a current Certificate of Compliance that has been issued by the State of Minnesota, Commissioner of Human Rights. (Include a copy of your certificate with your bid.)

No ____ we do not have a Certificate of Compliance, however we submitted an affirmative action plan to the State of Minnesota, Commissioner of Human Rights for approval on ______________________. We acknowledge that the Commissioner of Human Rights must approve the plan before any Contract will be executed.

No ____ we have not submitted a plan. (If your plan is not submitted to the Minnesota Department of Human Rights by the time the bids are due, your bid will be rejected.)

PLEASE NOTE: Minnesota responders needing certification must have a certificate issued by the Minnesota Department of Human Rights. Affirmative Action plans approved by the Federal government, a county, or a municipality must still be reviewed and approved by the Minnesota Department of Human Rights for a certificate to be issued.

3. Have you employed more than 40 full-time employees on a single working day during the previous 12 months in the state where you have your primary place of business and that primary place of business is outside the State of Minnesota, but within the United States?

YES ____ NO ____

If your answer is “Yes”, you may achieve compliance with the Human Rights Act by certifying that you are in compliance with Federal Affirmative Action requirements. If your answer is “No” to both this question and to Number 1, you are not subject to the Minnesota Human Rights Act Certification requirement.

4. Please check one of the following statements:

YES ____ Although we do not now meet the requirements to answer yes in Number 3, we have a previously issued, but current Certificate of Compliance issued by the Minnesota Department of Human Rights. (Include a copy of your certificate with your bid.)

YES ____ We are in compliance with any applicable Federal Affirmative Action requirements.

NO ____ We cannot certify that we are in compliance with Federal Affirmative Action requirements.
(12) UNIT PRICES: The Owner may direct Modifications affecting the quantity of certain items. The Unit Prices for such Modifications include all materials, labor, equipment, insurance, taxes, transportation, overhead and profit to cover the finished Work as described, and shall apply to both additions and deductions in quantities, except that if deductions are made after materials are fabricated and/or delivered, the price deductions shall be adjusted accordingly. The Owner reserves the right to reject any Unit Price which it considers unreasonable. The Bidder shall complete this section of the bid form as follows:

[Example: The following is an example only of one possible type of Unit Price. See Instructions for additional information.

1. New granular fill, replacement & compaction: $__________ per cubic yard as measured in place after compaction.]

COMPANY NAME

(Insert Company Name)

By: ____________________________ By: ____________________________
(Print or Type) (Print or Type)
Signature: ____________________________ Signature: ____________________________

Title: ____________________________ Title: ____________________________

Date: ____________________________ Date: ____________________________

Company’s Official Address: ______________________________________________________

____________________________________________________

____________________________________________________

Company’s Telephone Number: ___________________________________________________

Company’s Facsimile Number: ____________________________________________________

Company’s E-mail Address: ______________________________________________________

END OF SECTION
PRIME CONTRACTOR STATEMENT OF QUALIFICATIONS

This form must be submitted with your response to this solicitation. If the solicitation response is received without the qualification form the response shall be rejected.

Each Respondent must answer all of the questions and provide all requested information contained herein. Any Respondent failing to meet this requirement may be deemed to be non-responsive at the sole discretion of the Minnesota State Colleges and Universities. If a Respondent is deemed to be non-responsive, their response will be rejected.

Before an award is made, the Owner reserves the right to clarify/verify this Qualification Statement to determine that all qualifications listed below have been met. In the event that any price used in reviewing the qualifications is in discrepancy, the written representation shall take precedence.

If the qualification requirements listed below are not met, either on the basis of the submitted information or after such clarification/verification as the Owner may request, then the Contractor’s response shall be rejected.

1. Requirement: Contractor is not a vendor currently debarred or suspended by the federal government, the State of Minnesota or any of its departments or agencies or another government entity for any cause.

   My Company (check one) ____ “IS”     ____ “IS NOT” debarred or suspended by the federal government, the State of Minnesota or any of its departments or agencies or another government entity.

2. Requirement: Contractor has been in business under current business name or current Federal Employer ID Number since January 1, 2012.

   My Company (check one) ____“HAS”     ____ “HAS NOT” been in business under current business name or current Federal Employer ID Number since January 1, 2012 or longer.

   If business name has changed since January 1, 2012, previous Company Name was ____________________________.

3. Requirement: Company has substantially completed, as a prime contractor (not a subcontractor), the work for at least three contracts since January 1, 2012 on a New major building of size and scope similar to this project. Each of these contracts must have had a construction contract value of $20,000,000 or greater. A minimum of one of these project contracts must be for a Federal, State, County or Municipal facility.

   List below the required information for your contracts:

   a) Federal, state, county or municipal project (check one)?     ___Yes or ___No
SECTION 00 41 15
MINNESOTA STATE COLLEGES AND UNIVERSITIES

Property Owner* ____________________________________________
Property Owner Contact Person name and title: ____________________________
Contact Person Telephone: __________________________________________
Dollar Amount of Contract ($x,xxx): $______________________________
Dollar Amount of Contract (in words):$_____________________________
Substantial Completion Date _______________________________________
Contract was substantially completed under (check one)
   _____ Current Company Name or
   _____ Previous Company Name_________________________________

b) Federal, state, county or municipal project (check one)?   ____Yes or ___No
Property Owner* ____________________________________________
Property Owner Contact Person name and title: ____________________________
Contact Person Telephone: __________________________________________
Dollar Amount of Contract ($x,xxx): $______________________________
Dollar Amount of Contract (in words):$_____________________________
Substantial Completion Date _______________________________________
Contract was substantially completed under (check one)
   _____ Current Company Name or
   _____ Previous Company Name_________________________________

c) Federal, state, or municipal project (check one)?   ____Yes or ___No
Property Owner* ____________________________________________
Property Owner Contact Person name and title: ____________________________
Contact Person Telephone: __________________________________________
Dollar Amount of Contract ($x,xxx): $______________________________
Dollar Amount of Contract (in words):$_____________________________
Substantial Completion Date _______________________________________
Contract was substantially completed under (check one)
   _____ Current Company Name or
   _____ Previous Company Name_________________________________

*The term “Property Owner” means the person or entity identified as the Owner of the property wherein the above referenced work was performed.

4. Requirement: Company has not been charged liquidated damages in the last twenty-four (24) months for not meeting work deadlines.

My company (check one) ____“HAS”   ____“HAS NOT” been charged liquidated damages in the last twenty-four (24) months.
5. Requirement: Company has not had any willful or repeated safety citations within the past twenty-four (24) months.

   My company (check one) ____ “HAS”     ____ “HAS NOT” received willful or repeated safety citations within the last twenty-four (24) months.

6. Requirement: Company has not received an ORDER TO COMPLY from the Department of Labor and Industry for violations of the Minnesota Prevailing Wage Act, Minnesota Statutes §§ 177.41 through 177.43 within the last twenty-four (24) months.

   My company (check one) ____ “HAS”     ____ “HAS NOT” received an ORDER TO COMPLY for violations of the Minnesota Prevailing Wage Act, Minnesota Statutes §§ 177.41 through 177.43 within the last twenty-four (24) months.

7. Requirement: Each individual that will be responsible for this project has had at least 10 years of experience with complete building construction of projects of size and scope similar to this project.

   List below the required information for the individual(s) who will be responsible for this project:

   Name ____________________________ Current Position ____________________________

   Years of Experience | Type of Work | In what capacity?
   ---------------------|-------------|-----------------
   ____________________|             |______________
   ____________________|             |______________
   ____________________|             |______________

   Name ____________________________ Current Position ____________________________

   Years of Experience | Type of Work | In what capacity?
   ---------------------|-------------|-----------------
   ____________________|             |______________
   ____________________|             |______________
   ____________________|             |______________

   Name ____________________________ Current Position ____________________________

   Years of Experience | Type of Work | In what capacity?
   ---------------------|-------------|-----------------
   ____________________|             |______________
   ____________________|             |______________
   ____________________|             |______________

Rev. 8/19/2013
PRIME CONTRACTOR STATEMENT OF QUALIFICATIONS

CERTIFICATION

By signing this statement, I certify that the appropriate person has executed the Certification on behalf of the Prime Contractor as required by applicable articles, by-laws, resolutions or ordinances; and, that the information provided above is complete and accurate.

__________________________  ____________________________
Prime Contractor Company Name

__________________________  ____________________________
Authorized Signature        Printed Name

__________________________  ____________________________
Title                      Date
BID BOND FOR CONSTRUCTION PROJECT

KNOW ALL PERSONS BY THESE PRESENTS, that we,
______________________________________________________________, as Principal, and
_________________________________________________________________, as Surety, are
held and firmly bound unto the State of Minnesota as Obligee, in the sum of
_____________________________________ DOLLARS ($_____________.00) lawful money
of the United States of America, for the payment of which sum well and truly to be made, we
bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally,
and firmly by these presents.

Dated this ____________________ day of _________________ 20__.  

The condition of this obligation is such that whereas the Principal has submitted the
accompanying bid for the articles described in the following Project:

Mankato Clinical Sciences Building
Minnesota State University
150 South Road
Mankato, MN 56001

NOW, THEREFORE, if the aforesaid Principal shall be awarded a Contract upon said bid, and
shall within the required number of days after the notice of such award, enter into a Contract
with the Minnesota State Colleges and Universities, and give bond for the faithful performance
of the Contract as may be required, then this obligation shall be null and void; otherwise the
Principal and Surety will pay unto the Obligee the sum of FIVE PERCENT (5%) OF AMOUNT
OF BASE BID DOLLARS not as a penalty, but as liquidated damages sustained by the
Minnesota State Colleges and Universities as a result of such failure.

______________________________________________________________

Principal

______________________________________________________________

Surety

______________________________________________________________

Attorney-in-fact
STATE OF MINNESOTA
MINNESOTA STATE COLLEGES AND UNIVERSITIES
ACKNOWLEDGMENT OF CONTRACTOR

CORPORATE ACKNOWLEDGMENT FOR CONTRACTOR

STATE OF___________________________ )
                    ) SS
COUNTY OF __________________________

On this _____ day of ___________ , 20____, before me personally appeared

__________________________ and
    (name of individual)    (name of individual)

to me personally known, who, being by me duly sworn, did say that they are respectively

__________________________ and
    (corporate title)    (corporate title)

of ______________________,
    (Name of corporation)

a ______________________ Corporation;
    (State of Incorporation)

that the seal affixed to the foregoing contract and bond is the Corporate Seal of the Corporation, and that said instruments were executed in behalf of the corporation by authority of its Board of Directors; and they acknowledged said instruments to be the free act and deed of the Corporation.

__________________________________
Signature of Notary Public

Notary Public, ________________ County,

Notarial Seal                    My Commission Expires
STATE OF MINNESOTA
MINNESOTA STATE COLLEGES AND UNIVERSITIES
ACKNOWLEDGMENT OF CONTRACTOR

INDIVIDUAL AND CO-PARTNERSHIP ACKNOWLEDGMENT

STATE OF _____________________________ )
COUNTY OF _____________________________ ) SS

On this _____ day of _____________, 20___, before me personally appeared

to me known to be the person(s) described in and who executed the foregoing contract and bond,
and acknowledged that he, she, or they executed the same as his, her, or their free act and deed.

______________________________
Signature of Notary Public

Notary Public, ________________ County,

Notarial Seal My Commission Expires
STATE OF MINNESOTA
MINNESOTA STATE COLLEGES AND UNIVERSITIES
ACKNOWLEDGMENT OF CORPORATE SURETY

STATE OF _____________________________ )
COUNTY OF _____________________________ ) SS

On this ______ day of ________________, 20____, before me personally appeared
____________________________________ and ____________________________________
(name of individual) (name of individual)

to be personally known, who, being by me duly sworn, did say that he or she is the aforesaid
officer or attorney in fact of the _________________________________, a

corporation; that the seal affixed to the foregoing instrument is the corporate seal of said
corporation, and that said instrument was signed and sealed in behalf of said corporation by the
aforesaid officer, by authority of its Board of Directors; and the aforesaid officer acknowledged
said instrument to be the free act and deed of said corporation.

________________________________________ Signature of Notary Public

Notary Public, _________________ County,

Notarial Seal My Commission Expires

Full Name of Surety Company:____________________________________________________

Home Office Address:_____________________________________________________________

Name of Attorney-in-Fact:___________________________________________________________

Name of Local Agency:____________________________________________________________

Address of Local Agency:___________________________________________________________

If the bond is executed by an Attorney-in-Fact located outside of the State of Minnesota, a
Minnesota Resident Agent for the Surety must countersign the bond.

Name of Minnesota Resident Agency:_______________________________________________

Address:______________________________________________________________________
NOTICE TO BIDDERS

AFFIRMATIVE ACTION CERTIFICATE OF COMPLIANCE

The amended Minnesota Human Rights Act (Minnesota Statute 363A.36) divides the contract compliance program into two categories. Both categories apply to any contracts for goods or services in excess of $100,000.

The first category applies to businesses that have had more than 40 full-time employees within Minnesota on a single working day during the previous 12 months. The businesses in this category must have submitted an affirmative action plan to the commissioner of the Department of Human Rights prior to the date and time set for the response and must have received a Certificate of Compliance prior to the execution of the contract or agreement.

The second category applies to businesses that have had more than 40 employees on a single working day in the previous 12 months in the state in which they have their primary place of business. The businesses in this category must either have a current Certificate of Compliance previously issued by the Department of Human Rights or certify to the continuation State agency that they are in compliance with federal affirmative action requirements before execution of the contract.

It is hereby agreed between the parties that Minnesota Statutes, section 363A.36 and Minnesota Rules, parts 5000.3400 to 5000.3600 are incorporated into any contract between these parties based upon this specification or any modification of it.

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

1. The offeror’s or Bidder’s attention is called to the “equal opportunity clause” set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor’s aggregate workforce in each trade on all construction work in the covered area are listed in the "Revised Affirmative Action Participation Goals for Minorities and Women in State Construction Projects", as follows.
REVISED AFFIRMATIVE ACTION PARTICIPATION GOALS FOR MINORITIES AND WOMEN IN STATE CONSTRUCTION PROJECTS

**Timetables**: Upon publication, effective February 1, 2006, until further notice.

**Goals** for participation of minorities in each trade are divided into six areas:

**Seven County Metropolitan Area**  
Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington  
11%

**Central MN**  
Benton, Chisago, Isanti, Kanabec, Kandiyohi, McLeod, Meeker, Mille Lacs, Pine, Renville, Sherburne, Stearns, Wright  
3%

**Southwest MN**  
Big Stone, Blue Earth, Brown, Chippewa, Cottonwood, Faribault, Jackson, Lac Qui Parle, Le Sueur, Lincoln, Lyon, Martin, Murray, Nicollet, Nobles, Pipestone, Redwood, Rock, Sibley, Swift, Waseca, Watonwan, Yellow Medicine  
4%

**Southeast MN**  
Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona  
4%

**Northeast MN**  
Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis  
5%

**Northwest MN**  
Becker, Beltrami, Cass, Clay, Clearwater, Crow Wing, Douglas, Grant, Hubbard, Kittson, Mahnomen, Lake of the Woods, Marshall, Morrison, Norman, Otter Tail, Pennington, Polk, Pope, Red Lake, Roseau, Stevens, Todd, Traverse, Wadena, Wilkin  
6%

**Goal** for participation by women in each trade in all counties is 6%.

These goals are applicable to all the contractor’s construction work (whether or not it is state or state-assisted) performed in the covered area.
The contractor’s compliance with Minnesota Statutes, section 363A.36 and part 5000.3520 shall be based on its implementation of the equal opportunity clause, specific affirmative action obligations required by the specifications in part 5000.3540, and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor must make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor’s goals is a violation of the contract, Minnesota Statutes, section 363A.36 and part 5000.3520. Compliance with the goals will be measured against the total work hours performed.

3. The contractor must provide written notification to the Compliance Division of the Minnesota Department of Human Rights within ten working days of award of any construction subcontract at any tier for construction work under the contract resulting from the solicitation. The notification must list the name, address, and telephone number of the subcontractor; employer identification number, estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this notice, and in the contract resulting from this solicitation, the “covered area” is the geographical area where the contract is to be performed. The contracting state agency must insert the description of the geographical areas where the contract is to be performed describing the state, county, city, town, or municipality of the geographical area in the notice, and in the contract resulting from this solicitation.

**DISABLED PERSONS AFFIRMATIVE ACTION CLAUSE**

(a) The contractor must not discriminate against any employee or applicant for employment because of physical or mental disability in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified disabled individuals without discrimination based upon their physical or mental disability in all employment practices such as 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.

(b) The contractor agrees to comply with the rules and relevant order of the Minnesota Department of Human Rights issued pursuant to the Minnesota Human Rights Act.

(c) In the event of the contractor’s noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with Minnesota Statutes, section 363A.36 and the rules and relevant orders of the Minnesota Department of Human Rights issued pursuant to the Minnesota Human Rights Act.
(d) The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the commissioner of the Minnesota Department of Human Rights. Such notices shall state the contractor’s obligation under the law to take affirmative action to employ and advance in employment qualified disabled employees and applicants for employment, and the rights of applicants and employees.

(e) The contractor must notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the contractor is bound by the terms of Minnesota Statutes, section 363A.36 of the Minnesota Human Rights Act and is committed to take affirmative action to employ and advance in employment physically and mentally disabled individuals.

STANDARD STATE EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS

1. The contractor must implement the specific affirmative action standards provided in paragraphs 4(a) to (o) of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor must reasonably be able to achieve in each construction trade in which it has employees in the covered area. The contractor must make substantially uniform progress toward its goals in each craft during the period specified.

2. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the contractor’s obligations under these specifications, Minnesota Statutes, section 363A.36 of the Minnesota Human Rights Act, or the rules adopted under the act.

3. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained according to training programs approved by the Minnesota Department of Human Rights, the Minnesota Department of Labor and Industry, or the United States Department of Labor.

4. The contractor must take specific affirmative action to ensure equal employment opportunity. The evaluation of the contractor’s compliance with these specifications must be based upon its effort to achieve maximum results from its actions. The contractor must document these efforts fully, and must implement affirmative action steps at least as extensive as the following:
(a) Make a good faith effort to maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor’s employees are assigned to work. The contractor must specifically ensure that all lead supervisors, superintendents, and other on-site supervisory personnel are aware of and carry out the contractor’s obligation to maintain such a working environment, with specific attention to minority or female persons working at such sites or in such facilities.

(b) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations’ responses.

(c) Maintain a current file of the names, address, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each person. If the person was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this must be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.

(d) Provide immediate written notification to the commissioner of the Minnesota Department of Human Rights when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor’s efforts to meet its obligations.

(e) Develop on-the-job training opportunities and/or participate in training programs for the areas which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor’s employment needs, especially those programs funded or approved by the state of Minnesota. The contractor must provide notice of these programs to the sources compiled under (b).

(f) Disseminate the contractor’s equal employment opportunity policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its equal employment opportunity obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company equal employment opportunity policy on bulletin boards accessible to all employees at each location where construction work is performed.
(g) Review, at least annually, the company’s equal employment opportunity policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as superintendents, general lead supervisors, etc., prior to the first day of construction work at any job site. A written record must be made of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

(h) Disseminate the contractor’s equal employment opportunity policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor’s equal employment opportunity policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

(i) Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the contractor’s recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source the contractor must send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

(j) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor’s work force.

(k) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek to prepare for, through appropriate training, such opportunities.

(l) Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the equal employment opportunity policy and the contractor’s obligations under these specifications are being carried out.

(m) Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

(n) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitation to minority and female contractor associations and other business associations.
(o) Conduct a review, at least annually, of all supervisors’ adherence to and performance under the contractor’s equal employment opportunity policies and affirmative action obligations.

5. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations [4(a) to (o)]. The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 4(a) to (o) of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor’s minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation, however, is the contractor’s and failure of such a group to fulfill an obligation must not be a defense for the contractor’s noncompliance.

6. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the contractor may be in violation of part 5000.3520 if a particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally, the contractor may be in violation of part 5000.3520 if a specific minority group of women is under-utilized).

7. The contractor must not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, creed, religion, sex, national origin, marital status, status with regard to public assistance, disability, sexual orientation, or age.

8. The contractor must not enter into any subcontract with any person or firm debarred from government contracts under the federal Executive Order 11246 or a local human rights ordinance, or whose certificate of compliance has been suspended or revoked pursuant to Minnesota Statutes, section 363A.36.

9. The contractor must carry out such sanctions for violation of these specifications and of the equal opportunity clause, including suspension, termination, and cancellation of existing contracts as may be imposed or ordered pursuant to Minnesota Statutes, section 363A.36, and its implementing rules. Any contractor who fails to carry out such sanctions shall be in violation of these specifications and Minnesota Statutes, section 363A.36.
10. The contractor, in fulfilling its obligations under these specifications, must implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 4, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of Minnesota Statutes, section 363A.36, its implementing rules, or these specifications, the commissioner must proceed in accordance with part 5000.3570.

11. The contractor must designate a responsible official to monitor all employment-related activity to ensure that the company equal employment opportunity policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Minnesota Department of Human Rights, and to keep records. Records must at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (for example, mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed.

Records must be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors must not be required to maintain separate records.

12. Nothing herein provided in this part shall be construed as a limitation upon the application of other state or federal laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents.

END OF SECTION
SPECIAL INSTRUCTIONS FOR NON-MINNESOTA CONTRACTORS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS:

Minnesota Statutes 290.9705 requires that public entities withhold eight (8) percent of cumulative calendar year payments to Non-Minnesota Contractors which exceed $50,000.00. The statute allows for a waiver of this requirement under the following circumstances if:

(1) The contractor gives the commissioner of the Department of Revenue a cash surety or a bond, secured by an insurance company licensed by Minnesota, conditioned that the contractor will comply with all applicable provisions of this Chapter 290.9705 and Chapter 297A,

or

(2) The contractor has done construction work in Minnesota at any time during the three calendar years prior to entering the contract and has fully complied with all the provisions of this Chapter 290.9705 and Chapter 297A for the three prior years.

A decision by the Department of Revenue allows for a third basis for waiver, that being the providing of a payment and performance bond to the Minnesota State Colleges and Universities pursuant to Minnesota Statute 574.26. Such a bond is required for this contract.

1.02 PROCEDURE:

To formalize this waiver you must complete Form SD-E. Contractors interested in using this procedure should refer to the Minnesota Department of Revenue’s website at www.taxes.state.mn.us/forms/sde.pdf. The Contractor shall provide the Minnesota State Colleges and Universities with a copy executed by the Department of Revenue. If you are basing your waiver on the fact that you are providing a bond, note in the bonding company information section that the bond is to the Minnesota State Colleges and Universities. You need not in this case attach a copy of the bond to the Form SD-E.

The Contractor shall send forms for execution to:

Minnesota Department of Revenue
Business Trust Tax Section
Mail Section 6525
St. Paul, Minnesota 55146-6525

END OF SECTION
I request a waiver of surety deposit under Minnesota law (M.S. 290.9705) for the following reason:

☐ 1. I have provided a cash surety or a bond secured by an insurance company licensed in Minnesota. (Attached a copy of the bonding agreement.)

   Bonding Company _______________________________________________________
   Address ______________________________________________________________
   Period of bond _________________________________________________________
   Project completion date ________________________________________________

☐ 2. I have construction work in Minnesota during the past three calendar years and have fully complied with Minnesota law regarding Minnesota income, sales, and withholding taxes.

I authorize sending a copy of this to the contracting agency and give the Department of Revenue permission to discuss this case and related taxes with the bonding company.

Signature ____________________________ Date ____________________________

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**REVENUE DEPARTMENT CERTIFICATION**

☐ The above named out of state contractor is exempt from the surety requirements of Minnesota Statute 290.9705

Signature of authorized Revenue Department Representative

☐ The above named out-of state contractor is **NOT EXEMPT** from the surety requirements of Minnesota Statute 290.9705. See instructions for information about how to report and deposit withholding on payments made to the out-of-state contractor.

Signature of authorized Revenue Department Representative
Instructions for Form SD-E

Who should file?

If a non-Minnesota Contractor or Subcontractor has contracted for work in Minnesota, and the amount of the contract is over $100,000, the Contractor or Subcontractor must file form SD-E with the Minnesota Department of Revenue.

Form SD-E will be used to determine whether or not the Contractor is exempt from the surety deposit requirements for the State of Minnesota.

When to file

If the contractor wants to file for an exemption from the surety deposit requirements, for SD-E should be filed at the inception of the Contract. A separate form is required for each Project.

How to file

In order to submit form SD-E, you must have a Minnesota business identification number. If you do not have a number, please contact the Department of Revenue for application information.

Check the appropriate box on the form. If the first box is checked, you must fill in the information about the bond. You must also attach a copy of the bonding agreement to form SD-E when you send it to the Department of Revenue for certification. If the form is certified by the Department of Revenue, we will return the certified form to you.

If the department determines that you are not exempt, 8% of each payment made to you as the Contractor must be deposited with the Department of Revenue. These deposits will be returned when the project is completed, if you have complied with all Minnesota income, withholding, and sales tax laws.

Where to file

The Contractor should fill out form SD-E and mail the original and one copy to:

Minnesota Department of Revenue
Business Trust Tax Section
Mail Station 6525
St. Paul, MN 55146-6525

Use of Information

The Department of Revenue requires all the information requested on this form, except your telephone number. All information on this form is guaranteed private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee it will be kept private, and certain county or state agencies.

Need help?

If you need help or additional information to fill out this form, call (651) 296-6181 in the Twin Cities area. From elsewhere in Minnesota or from outside the state, call (toll-free) 1-800-657-3777.
AGREEMENT FORMS DOCUMENTS
INCORPORATED BY REFERENCE

1. **OWNER-CONTRACTOR AGREEMENT FOR CONSTRUCTION SERVICES AND RELATED FORMS**

The successful Bidder will be required to enter into a Contract with the Owner. The Contract also includes the following documents:

- Owner-Contractor Agreement for Construction Services - Form MnSCU110
- Performance and Payment Bond - Form MnSCU130
- Acknowledgment of Contractor - Form MnSCU133
- Acknowledgment of Corporate Surety - Form MnSCU135
- Certificate of Insurance - Form Acord 25
- Prevailing Wage Information / Statement of Compliance - Form MnSCU073
END OF SECTION
STATE OF MINNESOTA
MINNESOTA STATE COLLEGES AND UNIVERSITIES
PAYMENT AND PERFORMANCE BOND
FOR CONSTRUCTION PROJECTS

PART A: PAYMENT

KNOW ALL MEN BY THESE PRESENTS, That We [Insert Contractor’s full legal name], Contractor, as Principal, and ______________________________________, a corporation authorized to act as Surety on contract bonds, as Surety, are held and firmly bound unto the State of Minnesota through its Board of Trustees of the Minnesota State Colleges and Universities (hereinafter “MnSCU”) in the amount ______________________ ($ ), for payment of all claims, costs and charges as hereinafter set forth.

For the payment of this well and truly to be made we jointly and severally bind ourselves, our representatives and successors firmly by these presents.

The condition of this obligation is such that whereas the Principal has entered into an agreement with MnSCU, evidenced by written agreement (hereinafter “Contract”), for the following Project:

Mankato Clinical Sciences Building
Minnesota State University
Mankato, Minnesota

including all labor and materials therefor, the regularity and validity of which Contract is hereby affirmed; and thereunder and in accordance with the provision of Minnesota Statutes 574.26, is required to give bond to the state in the amount of the penalty hereof, conditioned as herein and as by law required;

NOW THEREFORE,
if the Principal shall pay as they may become due all just claims for work done, and for furnishing labor, work, skills, tools, machinery, materials, insurance premiums, equipment, and supplies for the purpose and completion of the Contract in accordance with its terms, and all taxes incurred under Minnesota Statutes, Section 290.92 or Chapter 297A, and shall pay all costs of enforcement of the terms of the bond, if action is brought thereon, including reasonable attorney’s fees, in any case in which such action is successfully maintained, and shall comply with the laws of the state appertaining to such Contract, then this obligation shall be void but otherwise it shall remain in full force and effect pursuant to Minnesota Statutes, Chapter 574.
PART B: PERFORMANCE

KNOW ALL MEN BY THESE PRESENTS, That the aforesaid Principal and Surety are held and firmly bound unto MnSCU in the additional amount insert contract amount ($                      ) for the faithful performance of the Contract as hereinafter set forth.

For the payment of this well and truly to be made we jointly and severally bind ourselves, our representatives and successors firmly by these presents.

The condition of this obligation is such that whereas the Principal has entered into the Contract more particularly described in Part A hereof, the regularity and validity of which is hereby affirmed;

NOW, THEREFORE, if the Principal shall faithfully perform the Contract according to its terms and shall save the State of Minnesota harmless from all costs and charges that may accrue on account of the doing of the work specified and shall pay all costs of enforcement of the terms of the bond, if action is brought thereon, including reasonable attorney's fees, in any case in which such action is successfully maintained, and shall comply with the laws of the state appertaining to such Contract, then this obligation shall be void but otherwise it shall remain in full force and effect pursuant to Minnesota Statutes, Chapter 574.
THE LIABILITY UNDER PART A AND PART B HEREOF IS

____ [Insert Contract Amount]______________________ DOLLARS ($___________)

Any alterations which may be made in the terms of the Contract or in the Work to be done under it, or any extension of time for the performance thereof, or any forbearance on the part of MnSCU shall not in any way release the Principal and Surety, or any of their valid successors or assigns, from their liability hereunder, notice to the Surety of any such alteration, extension or forbearance being hereby waived. **Surety hereby expressly acknowledges and agrees that, under the Contract, no assignment by Principal of its rights under the Contract, whether in whole or in part (including, without limitation, Principal’s right to receive payments under the Contract), is valid and effective without the express written approval of MnSCU.**

**SIGNATURES**

Contractor, as Principal

_____________________________ _______________________
Name typed or printed Title

By: ____________________________
Signature

Surety

_____________________________ _______________________
Name typed or printed Title

By: ____________________________
Signature

Surety Corporate Seal

_____________________________ _______________________
Name typed or printed

If the Attorney-in-Fact is located outside of the State of Minnesota, then the Surety’s Minnesota Resident Agent must countersign the bond

_____________________________ _______________________
Name typed or printed
THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – (FORM B)

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART.

SCHEDULE

Name of Person or Organization:

This is where all the Additional Insureds should be listed, if the endorsement is not a Blanket Additional Insured Endorsement.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "Your work" for that insured by or for you.

Example
**APPLICATION FOR PAYMENT - CONSTRUCTION WORK**

<table>
<thead>
<tr>
<th>REQUEST #: __________________ (Partial) (Final)</th>
<th>PURCHASE ORDER NO: __________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRACTOR: ________________________________</td>
<td>PROJECT: ____________________________</td>
</tr>
<tr>
<td>__________________________________________</td>
<td>____________________________________</td>
</tr>
</tbody>
</table>

For the period from ________________ to ________________ inclusive

Attach AIA Document G703 “APPLICATION AND CERTIFICATION FOR PAYMENT” or equivalent to the back of this form.

**CONTRACT SUMMARY:**
1. Original Contract Sum ................................................................. $ ________________
2. Change Order(s) Additions approved to date (Nos. ____________) $ ________________
3. Change Order(s) Deductions approved to date (Nos. ____________) $ ________________
4. Revised Contract Sum to date ....................................................... $ ________________

**STATUS OF ACCOUNT:**
5. Contract Sum to date ................................................................. $ ________________
6. Value of completed Work to date ................................................ $ ________________
7. Value of Materials stored on site (Attach Schedule) ....................... $ ________________
8. Less ______ percent retained ......................................................... $ ________________
9. Total earned less retained amount ............................................... $ ________________
10. Total of previous Applications for Payment .................................... $ ________________

11. **AMOUNT DUE THIS APPLICATION** .............................................. $ ________________

**CERTIFICATE OF CONTRACTORS:**
We certify that all Work for which this Application for Payment is made has been completed in full, in accordance with the Contract Documents. We also certify that payment has been made for all just claims for labor, material and services in connection with the Work performed on all preceding Applications for Payment. We further certify that we have provided to the Owner, copies of all payrolls for all previous Contractor and Subcontractor(s) pay periods as required by Minnesota Statutes 177.

Contractor: ________________________________     Date: ________________________________
Authorized Signature: ____________________    Title: ________________________________

**APPROVAL OF ARCHITECT:**
The Work of the Project and this Application for Payment have been examined and the amount shown above is recommended for payment.

Signature: ________________________________     Date: ________________________________

**APPROVAL OF PROJECT MANAGER:**
The College/University/Office of the Chancellor has reviewed and accepted the Work of this Project for this Application and authorizes payment of the amount shown.

Signature: ________________________________     Title: ________________________________
Date: ________________________________
REQUEST FOR INFORMATION

Project Name: Mankato Clinical Sciences Building
Minnesota State University
Mankato, Minnesota

Date: ___________________

To - Name/Company: Perkins + Will
84 10th Street South
Suite 200
Minneapolis, Minnesota 55403

From – Name/Company: ________________________________
________________________________
________________________________
________________________________

RFI #: ______

Subject: __________________________________________________
_________________________________________________________

Request: __________________________________________________
_________________________________________________________
_________________________________________________________
_________________________________________________________
_________________________________________________________
_________________________________________________________

Priority: ______ Earliest Convenience ______ A.S.A.P ______ Date Needed

Request by: ________________________________
MINNESOTA STATE COLLEGES AND UNIVERSITIES

CONSTRUCTION CHANGE DIRECTIVE

PROJECT:  Mankato Clinical Sciences Building

LOCATION: Minnesota State University Mankato, Minnesota

CONTRACTOR:

DIRECTIVE NUMBER:___________

DATE ISSUED:___________

COPY TO:
Owner
MnSCU
Architect
Contractor

The following change in the Contract Documents is approved and the Work is authorized to proceed accordingly. Determine and submit final costs and time adjustments (if any) in accordance with the conditions of the contract. This change will be incorporated in a subsequent Change Order.

Description:

Attachments:

PROPOSED ADJUSTMENTS

Determine adjustments to the Contract Sum and the Contract Time as provided in Article 7.3 of AIA Document A201-1997, as modified by the Minnesota State Colleges and Universities.

Increase to: Contract sum not to exceed $ ___________ Contract time ______calendar days.

Decrease to: Contract sum not to exceed $ (_______); Contract time _____ calendar days.

<table>
<thead>
<tr>
<th>Issued By ARCHITECT/ENGINEER:</th>
<th>Authorized by OWNER:</th>
<th>Acknowledged by CONTRACTOR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td>Address:</td>
<td>Address:</td>
</tr>
<tr>
<td>By</td>
<td>By</td>
<td>By</td>
</tr>
<tr>
<td>Date</td>
<td>Date</td>
<td>Date</td>
</tr>
</tbody>
</table>
MINNESOTA STATE COLLEGES AND UNIVERSITIES

CHANGE ORDER FOR CONSTRUCTION CONTRACT

CONTRACT NUMBER:_________________   CHANGE ORDER NUMBER: _____________
DATE:______________

PROJECT NAME:     CONTRACTOR:
LOCATION:     ADDRESS:

===================================================================== 
Contract Number ________ is hereby amended as follows, and the following Work is authorized in accordance with the Contract Documents and referenced Modifications when this Change Order is properly signed by the Architect, CONTRACTOR and OWNER (hereinafter “MnSCU”) and funds are encumbered by MnSCU: (Cost breakdowns are required per Conditions of the Contract for Construction.)

WHEREAS, MnSCU has an Agreement with the CONTRACTOR identified to provide [Give a brief description of the Scope of the Work provided under the original Agreement for Construction Services]; and

WHEREAS, the scope of the Work, Contract Sum or Contract Time have changed due to [Provide explanations.]; and

WHEREAS, MnSCU and the CONTRACTOR agree to amend the Agreement as stated below;

THEREFORE,

NO OTHER TERMS OF THE AGREEMENT WILL CHANGE AS A RESULT OF THIS CHANGE ORDER.

NOTE: All information and signatures on page 2 must be fully completed. Full justification for the requested changes must be included on or attached to this form.
CONTRACT SUMMARY:

1. The original Contract Sum was………………………………………………………. $________________

2. Previously authorized Change Order additions to date (C.O. Nos:_________)…..$________________

3. Previously authorized Change Order deductions to date (C.O. Nos:_________)...$________________

4. The Contract Sum prior to this Change Order was…………………………………... $________________

5. The Contract Sum will be (increased) (decreased) (unchanged) by this Change Order in the amount of………………………………………………………….. $________________

6. The new Contract Sum including this Change Order will be…………………………...$________________

7. The Contract Time shall be (increased) (decreased) (unchanged) by…………………._____________days

8. The date(s) of Substantial Completion as of the date of this Change Order therefore is ________________

SIGNATURES OF APPROVAL:

A. ARCHITECT __________________________________ Date _______________________
   By __________________________________ Title ______________________

B. CONTRACTOR _______________________________ Date _______________________
   By __________________________________ Title ______________________

C. MnSCU _________________________________ Date _______________________
   Authorized Signature __________________________________ Title ______________________

ENCUMBERED: (For MnSCU use only.) Employee certifies that funds have been encumbered as required by Minnesota Statute §16A.15.

By __________________________________ Date ______________________
Instructions for Form IC134

Who must file
If you are a prime contractor, a contractor, or a subcontractor, who did work on a project for the state of Minnesota or any of its local government subdivisions - such as a county, city or school district - you must file Form IC134 with the Minnesota Department of Revenue.

This affidavit must be certified and returned before the state or any of its subdivisions can make final payment for your work.

If you're a prime contractor and a subcontractor on the same project
If you were hired as a subcontractor to do work on a project, and you subcontracted all or a part of your portion of the project to another contractor, you are a prime contractor as well. Complete both the subcontractor and prime contractor areas on a single form.

When to file
The IC134 cannot be processed until you finish the work. If you submit the form before the project is completed, it will be returned to you unprocessed. Mail Form IC134 to the address at the bottom of the form.

If you are a subcontractor or sole contractor, send in the form when you have completed your part of the project.

If you are a prime contractor, send in the form when the entire project is completed and you have received certified affidavits from all of your subcontractors.

How to file
If you have fulfilled the requirements of Minnesota withholding tax laws, the Department of Revenue will sign your affidavit and return it to you.

If any withholding payments are due to the state, Minnesota law requires certified payments before we approve the IC134.

Submit the certified affidavit to the government unit for which the work was done to receive your final payment. If you are a subcontractor, submit the certified affidavit to your prime contractor to receive your final payment.

Minnesota tax ID number
You must enter your Minnesota tax ID number on the form. You must have a Minnesota tax ID number if you have employees who work in Minnesota.

If you don't have a Minnesota ID number, you must apply for one. Call 651-282-5225.

An applications (Form ABR) is also available on our website at www.taxes.state.mn.us.

If you have no employees and did all the work yourself, you do not need a Minnesota tax ID number. If this is the case, enter your Social Security number in the space for Minnesota tax ID number and explain who did the work.

Information and assistance
If you need help or more information to complete this form, call 651-282-9999.

Additional forms are available on our website at www.taxes.state.mn.us or by calling 651-296-4444. TTY: Call 711 for Minnesota Relay.

We’ll provide information in other formats upon request to persons with disabilities.

Use of information
The Department of Revenue needs all the information to determine if you have met all state income tax withholding requirements. If all required information is not provided, the IC134 will be returned to you for completion.

All information on this affidavit is private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee the same privacy and certain government agencies as provided by law.
GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

GENERAL CONDITIONS

The “General Conditions of the Contract for Construction” for this Project shall be AIA Document A201, 1997 Edition, Electronic Format, as amended by the Owner, and included herein.

The General conditions document will be added for the Construction Documents.
PREVAILING WAGE RATE REQUIREMENTS
AND PROJECT SPECIFIC WAGE RATES

This project is subject to Minnesota Labor Standards and Wages requirements of Minnesota Statutes Chapter 177.

1. Pursuant to Minnesota Statutes 177.41 to 177.44 and corresponding Rules 5200.1000 to 5200.1120, this project contract is subject to the prevailing wages as established by the Minnesota Department of Labor and Industry. Specifically, all contractors and subcontractors must pay all laborers and mechanics the established prevailing wages for work performed under the contract. Failure to comply with the aforementioned may result in civil or criminal penalties.

For more information regarding prevailing wage and its application, contact:

Minnesota Department of Labor and Industry
Prevailing Wage unit
443 Lafayette Road N.
St. Paul, MN  55155
Phone:  (651) 284-5091
E-mail:  dli.prevwage@state.mn.us
Web:  www.dli.mn.gov

2. The Bidder shall review Specifications Section 00 73 46, Prevailing Wage Rate Requirements, to determine the applicable prevailing wage rates, prevailing hours of labor, and hourly basic rates of pay that are applicable to this project contract. A copy of the applicable Prevailing Wage Rate Determination Schedule, as published by Minnesota Department of Labor and Industry, is attached as an appendix following this Section 00 73 46 for reference purposes.

**Hours of labor**

Pursuant to Minnesota Statutes 177.43:
(1) no laborer or mechanic employed directly on the project work site by the contractor or any subcontractor, agent, or other person doing or contracting to do all or a part of the work of the project, is permitted or required to work more hours than the prevailing hours of labor unless paid for all hours in excess of the prevailing hours at a rate of at least 1-1/2 times the hourly basic rate of pay; and
(2) a laborer or mechanic may not be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area.

**Exceptions**

This requirement does not apply to wage rates and hours of employment of laborers or mechanics who process or manufacture materials or products or to the delivery of materials or products by or for commercial establishments which have a fixed place of business from which they regularly supply...
processed or manufactured materials or products. This section applies to laborers or mechanics who deliver mineral aggregate such as sand, gravel, or stone which is incorporated into the work under the contract by depositing the material substantially in place, directly or through spreaders, from the transporting vehicle.

**Posting**
The prevailing wage rates, prevailing hours of labor, and hourly basic rates of pay for all trades and occupations required in any project must be ascertained before the state asks for bids. Each contractor and subcontractor performing work on a public project shall keep the information posted on the project in at least one conspicuous place for the information of the employees working on the project.

**Penalty**
It is a misdemeanor for an officer or employee of the state to execute a contract for a project without complying with this section, or for a contractor, subcontractor, or agent to pay any laborer, worker, or mechanic employed directly on the project site a lesser wage for work done under the contract than the prevailing wage rate as stated in the contract. This misdemeanor is punishable by a fine of not more than $700, or imprisonment for not more than 90 days, or both. Each agent or subcontractor shall furnish to the contractor evidence of compliance with this section. Each day a violation of this section continues is a separate offense.

**Examination of records; investigation**
The Department of Labor and Industry shall enforce this section. The department may demand, and the contractor and subcontractor shall furnish to the department, copies of any or all payrolls. The department may examine all records relating to wages paid laborers or mechanics on work to which sections 177.41 to 177.44 apply.

The Contractor and subcontractors shall comply with Minnesota Statutes 177.41-.44. To facilitate compliance pursuant to the Statute, wage determinations (prevailing wages) were prepared for different trades for each county from which labor for said project would be secured and are included and published in the Contract Specifications. Any wage determinations that are found not to be so promulgated do not relieve the Contractor from any responsibility for paying the prevailing wage rate of the trade in question. Additional classifications may develop between certifications by the Minnesota Department of Labor and Industry. Therefore, no inference may be drawn from the omission of a classification which has local usage.

**Prevailing wage violations**
Upon issuing a compliance order to an employer pursuant to section 177.27, subdivision 4, for violation of sections 177.41 to 177.44, the commissioner shall issue a withholding order to the contracting authority ordering the contracting authority to withhold payment of sufficient sum to the prime or general contractor on the project to satisfy the back wages assessed or otherwise cure the violation, and the contracting authority must withhold the sum ordered until the compliance order has become a final order of the commissioner and has been fully paid or otherwise resolved by the employer.

During an investigation of a violation of sections 177.41 to 177.44 which the commissioner reasonably determines is likely to result in the finding of a violation of sections 177.41 to 177.44 and the issuance
of a compliance order pursuant to section 177.27, subdivision 4, the commissioner may notify the contracting authority of the determination and the amount expected to be assessed and the contracting authority shall give the commissioner 90 days' prior notice of the date the contracting authority intends to make final payment.

3. Pursuant to Minnesota Statutes Section 177.43, Subd. 3, all contractors and subcontractors shall submit to the Owner’s contracting entity copies of payrolls that contain all the data required by Minnesota Statutes §177.30. Contractors and subcontractors shall use Form MnSCU073 for this purpose.

4. Keeping Records; Penalty:
   (a) Every employer subject to Minnesota Statutes Section 177.21 to 177.44 must make and keep a record of:
      (1) the name, address, and occupation of each employee;
      (2) the rate of pay, and the amount paid each pay period to each employee;
      (3) the hours worked each day and each workweek by the employee;
      (4) for each employer subject to sections 177.41 to 177.44, and while performing work on public works projects funded in whole or in part with state funds, the employer shall furnish under oath signed by an owner or officer of an employer to the contracting authority and the project owner every two weeks, a certified payroll report with respect to the wages and benefits paid each employee during the preceding weeks specifying for each employee: name; identifying number; prevailing wage master job classification; hours worked each day; total hours; rate of pay; gross amount earned; each deduction for taxes; total deductions; net pay for week; dollars contributed per hour for each benefit, including name and address of administrator; benefit account number; and telephone number for health and welfare, vacation or holiday, apprenticeship training, pension, and other benefit programs; and
      (5) other information the commissioner finds necessary and appropriate to enforce sections 177.21 to 177.435. The records must be kept for three years in or near the premises where an employee works except each employer subject to sections 177.41 to 177.44, and while performing work on public works projects funded in whole or in part with state funds, the records must be kept for three years after the contracting authority has made final payment on the public works project.

   (b) The commissioner may fine an employer up to $1,000 for each failure to maintain records as required by this section. This penalty is in addition to any penalties provided under section 177.32, subdivision 1. In determining the amount of a civil penalty under this subdivision, the appropriateness of such penalty to the size of the employer’s business and the gravity of the violation shall be considered.
Construction Type: Commercial

County Number: 07

County Name: BLUE EARTH

Effective: 2013-11-18

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate.

Violations should be reported to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

* Indicates that adjacent county rates were used for the labor class listed.

County: BLUE EARTH (07)

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<thead>
<tr>
<th>LABOR CODE AND CLASS</th>
<th>EFFECT DATE</th>
<th>BASIC RATE</th>
<th>FRINGE RATE</th>
<th>TOTAL RATE</th>
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<tr>
<td>LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)</td>
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<td>101 LABORER, COMMON (GENERAL LABOR WORK)</td>
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<td>102</td>
<td>LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)</td>
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<td>15.59</td>
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<td>33.08</td>
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<td>34.08</td>
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<td>FLAG PERSON</td>
<td>17.95</td>
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<tr>
<td>105</td>
<td>WATCH PERSON</td>
<td>FOR RATE CALL 651-284-5091 OR EMAIL <a href="mailto:DLI.PREVWAGE@STATE.MN.US">DLI.PREVWAGE@STATE.MN.US</a></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>PIPELAYER (WATER, SEWER AND GAS)</td>
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<td>41.27</td>
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<td>TUNNEL MINER</td>
<td>FOR RATE CALL 651-284-5091 OR EMAIL <a href="mailto:DLI.PREVWAGE@STATE.MN.US">DLI.PREVWAGE@STATE.MN.US</a></td>
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<td>UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)</td>
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<td>24.77</td>
<td>15.20</td>
<td>39.97</td>
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<td>SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK</td>
<td>16.00</td>
<td>11.63</td>
<td>27.63</td>
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<tr>
<td></td>
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</tbody>
</table>
CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.

| 111 | TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE) | +1000000 | 2013-11-18 | 20.44 | 15.09 | 35.53 |
|     |                                              |          |            |       |       |       |
|     |                                              |          | 2014-05-01 | 20.94 | 15.59 | 36.53 |
|     |                                              | -1000000 | 2013-11-18 | 18.77 | 14.31 | 33.08 |
|     |                                              |          | 2014-05-01 | 19.27 | 14.81 | 34.08 |

**SPECIAL EQUIPMENT (201 - 204)**

| 201* | ARTICULATED HAULER | 2013-11-18 | 17.00 | 3.50 | 20.50 |
| 202* | BOOM TRUCK          | 2013-11-18 | 19.00 | 0.00 | 19.00 |
| 203  | LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS | 2013-11-18 | 16.25 | 0.00 | 16.25 |
| 204* | OFF-ROAD TRUCK      | FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVWAGE@STATE.MN.US |
| 205  | PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS. | 2013-11-18 | 21.25 | 5.00 | 26.25 |

**HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR**
### GROUP 2 *

<table>
<thead>
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<th>Code</th>
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<th>Date</th>
<th>Rate</th>
<th>Hrs</th>
<th>Rate</th>
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<tr>
<td>306</td>
<td>GRADER OR MOTOR PATROL</td>
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<td>308</td>
<td>TUGBOAT 100 H.P. AND OVER WHEN LICENSE REQUIRED (HIGHWAY AND HEAVY ONLY)</td>
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### GROUP 3

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<td>309</td>
<td>ASPHALT BITUMINOUS STABILIZER PLANT</td>
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<td>CABLEWAY</td>
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<td>312</td>
<td>DERRICK (GUY OR STIFFLEG)(POWER)(SKIDS OR STATIONARY) (HIGHWAY AND HEAVY ONLY)</td>
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<td>314</td>
<td>DREDGE OR ENGINEERS, DREDGE (POWER) AND ENGINEER</td>
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<td>316</td>
<td>LOCOMOTIVE CRANE OPERATOR</td>
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<td>320</td>
<td>TANDEM SCRAPER</td>
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<td>322</td>
<td>TUGBOAT 100 H.P AND OVER (HIGHWAY AND HEAVY ONLY)</td>
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### GROUP 4

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<td>AUTOMATIC ROAD MACHINE (CMI OR SIMILAR) (HIGHWAY AND HEAVY ONLY)</td>
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<td>327</td>
<td>BITUMINOUS ROLLERS, RUBBER TIRED OR STEEL DRUMMED (EIGHT TONS AND OVER)</td>
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<td>328</td>
<td>BITUMINOUS SPREADER AND FINISHING MACHINES (POWER), INCLUDING PAVERS, MACRO SURFACING AND MICRO SURFACING, OR SIMILAR TYPES (OPERATOR AND SCREED PERSON)</td>
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<td>329</td>
<td>BROKK OR R.T.C. REMOTE CONTROL OR SIMILAR TYPE WITH ALL ATTACHMENTS</td>
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<td>330</td>
<td>CAT CHALLENGER TRACTORS OR SIMILAR TYPES PULLING ROCK WAGONS, BULLDOZERS AND SCRAPERS</td>
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<td>331</td>
<td>CHIP HARVESTER AND TREE CUTTER</td>
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<td>332</td>
<td>CONCRETE DISTRIBUTOR AND SPREADER FINISHING MACHINE, LONGITUDINAL FLOAT, JOINT MACHINE, AND SPRAY MACHINE</td>
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<td>CONCRETE MOBIL (HIGHWAY AND HEAVY ONLY)</td>
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<td>CRUSHING PLANT (GRAVEL AND STONE) OR GRAVEL WASHING, CRUSHING AND SCREENING PLANT</td>
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<td>336</td>
<td>CURB MACHINE</td>
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<td>DIRECTIONAL BORING MACHINE</td>
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<td>DOPE MACHINE (PIPELINE)</td>
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<td>DUAL TRACTOR</td>
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<td>ELEVATING GRADER</td>
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<td>345</td>
<td>GPS REMOTE OPERATING OF EQUIPMENT</td>
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<td>347</td>
<td>HYDRAULIC TREE PLANTER</td>
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<td>348</td>
<td>LAUNCHER PERSON (TANKER PERSON OR PILOT LICENSE)</td>
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<td>350</td>
<td>MILLING, GRINDING, PLANNING, FINE GRADE, OR TRIMMER MACHINE</td>
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<td>PAVEMENT BREAKER OR TAMPPING MACHINE (POWER DRIVEN) MIGHTY MITE OR SIMILAR TYPE</td>
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<td>PIPELINE WRAPPING, CLEANING OR BENDING MACHINE</td>
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<td>356</td>
<td>POWER ACTUATED HORIZONTAL BORING MACHINE, OVER SIX INCHES</td>
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<td>357</td>
<td>PUGMILL</td>
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<td>359</td>
<td>RUBBER-TIRED FARM TRACTOR WITH BACKHOE INCLUDING ATTACHMENTS (HIGHWAY AND HEAVY ONLY)</td>
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<td>SCRAPER</td>
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<td>SELF-PROPELLED SOIL STABILIZER</td>
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<td>SLIP FORM (POWER DRIVEN) (PAVING)</td>
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<td>TIE TAMPER AND BALLAST MACHINE</td>
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<td>367</td>
<td>TUB GRINDER, MORBARK, OR SIMILAR TYPE</td>
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**GROUP 5**

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<td>370</td>
<td>BITUMINOUS ROLLER (UNDER EIGHT TONS)</td>
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<td>371</td>
<td>CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)</td>
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<td>FORM TRENCH DIGGER (POWER)</td>
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<td>375</td>
<td>HYDRAULIC LOG SPLITTER</td>
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<td>376</td>
<td>LOADER (BARBER GREENE OR SIMILAR TYPE)</td>
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<td>377</td>
<td>POST HOLE DRIVING MACHINE/POST HOLE AUGER</td>
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<td>379</td>
<td>POWER ACTUATED JACK</td>
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<td>381</td>
<td>SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)</td>
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<td>382</td>
<td>SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER</td>
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<td>383</td>
<td>SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER</td>
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<td>384</td>
<td>STUMP CHIPPER AND TREE CHIPPER</td>
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<td>TREE FARMER (MACHINE)</td>
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**GROUP 6**

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<th>Second</th>
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<tr>
<td>387</td>
<td>CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER</td>
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<td>389</td>
<td>DREDGE DECK HAND</td>
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<tr>
<td>391</td>
<td>GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)</td>
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<tr>
<td>393</td>
<td>LEVER PERSON</td>
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<td>395</td>
<td>POWER SWEEPER</td>
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<td>396</td>
<td>SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS</td>
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**COMMERCIAL POWER EQUIPMENT OPERATOR**

**GROUP 1 * **

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501 HELICOPTER PILOT (COMMERCIAL CONSTRUCTION ONLY)
502 TOWER CRANE 250 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)
503 TRUCK CRAWLER CRANE WITH 200 FEET OF BOOM AND OVER, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

**GROUP 2**

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504 CONCRETE PUMP WITH 50 METERS/164 FEET OF BOOM AND OVER (COMMERCIAL CONSTRUCTION ONLY)
505 PILE DRIVING WHEN THREE DRUMS IN USE (COMMERCIAL CONSTRUCTION ONLY)
506 TOWER CRANE 200 FEET AND OVER (COMMERCIAL CONSTRUCTION ONLY)
507 TRUCK OR CRAWLER CRANE WITH 150 FEET OF BOOM UP TO AND NOT INCLUDING 200 FEET, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

**GROUP 3**

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508 ALL-TERRAIN VEHICLE CRANES (COMMERCIAL CONSTRUCTION ONLY)
509 CONCRETE PUMP 32-49 METERS/102-164 FEET (COMMERCIAL CONSTRUCTION ONLY)
510 DERRICK (GUY & STIFFLEG) (COMMERCIAL CONSTRUCTION ONLY)
511 STATIONARY TOWER CRANE UP TO 200 FEET
512 SELF-ERECTING TOWER CRANE 100 FEET AND OVER MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)
513 TRAVELING TOWER CRANE (COMMERCIAL CONSTRUCTION ONLY)
514 TRUCK OR CRAWLER CRANE UP TO AND NOT INCLUDING 150 FEET OF BOOM, INCLUDING JIB (COMMERCIAL CONSTRUCTION ONLY)

**GROUP 4 * **

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06/16/14
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<td>CRAWLER BACKHOE INCLUDING ATTACHMENTS (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>FIREPERSON, CHIEF BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>517</td>
<td>HOIST ENGINEER (THREE DRUMS OR MORE) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>LOCOMOTIVE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>OVERHEAD CRANE (INSIDE BUILDING PERIMETER) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>TRACTOR . BOOM TYPE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>521</td>
<td>AIR COMPRESSOR 450 CFM OR OVER (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>CONCRETE MIXER (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>CONCRETE PUMP UP TO 31 METERS/101 FEET OF BOOM</td>
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<td>DRILL RIGS, HEAVY ROTARY OR CHURN OR CABLE DRILL WHEN USED FOR CAISSON FOR ELEVATOR OR BUILDING CONSTRUCTION ONLY</td>
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<td>FORKLIFT (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>FRONT END, SKID STEER 1 C YD AND OVER</td>
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<td>HOIST ENGINEER (ONE OR TWO DRUMS) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>MECHANIC-WELDER (ON POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>POWER PLANT (100 KW AND OVER OR MULTIPLES EQUAL TO 100KW AND OVER) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>PUMP OPERATOR AND/OR CONVEYOR (TWO OR MORE MACHINES) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>531</td>
<td>SELF-ERECTING TOWER CRANE UNDER 100 FEET MEASURED FROM BOOM FOOT PIN (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>STRADDLE CARRIER (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>TRACTOR OVER D2 (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>WELL POINT PUMP (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>GUNITE MACHINE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>TRENCHING MACHINE (SEWER, WATER, GAS) EXCLUDES WALK BEHIND TRENCHER</td>
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<td>16.45</td>
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<td>AIR COMPRESSOR 600 CFM OR OVER (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>542</td>
<td>BRAKEPERSON (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>543</td>
<td>CONCRETE PUMP/PUMPCRETE OR COMPLACO TYPE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>544</td>
<td>FIREPERSON, TEMPORARY HEAT SECOND CLASS BOILER LICENSE (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>545</td>
<td>OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS AND MILLING MACHINES, OR OTHER SIMILAR POWER EQUIPMENT) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>546</td>
<td>PICK UP SWEEPER (ONE CUBIC YARD HOPPER CAPACITY) (COMMERCIAL CONSTRUCTION ONLY)</td>
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<td>547</td>
<td>PUMP AND/OR CONVEYOR (COMMERCIAL CONSTRUCTION ONLY)</td>
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</tbody>
</table>

| GROUP 8 * | 2013-11-18 | 29.19 | 15.95 | 45.14 |
|          | 2014-05-01 | 30.04 | 16.45 | 46.49 |
| 548    | ELEVATOR OPERATOR (COMMERCIAL CONSTRUCTION ONLY) |
| 549    | GREASER (COMMERCIAL CONSTRUCTION ONLY) |
| 550    | MECHANICAL SPACE HEATER (TEMPORARY HEAT NO BOILER LICENSE REQUIRED) (COMMERCIAL CONSTRUCTION ONLY) |

**TRUCK DRIVERS**

| GROUP 1 * | 2013-11-18 | 20.67 | 12.75 | 33.42 |
|           | 2013-11-18 | 21.00 | 4.50  | 25.50 |
| 601     | MECHANIC, WELDER |
| 602     | TRACTOR TRAILER DRIVER |
| 603     | TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES) |

| GROUP 2 * | 2013-11-18 | 19.50 | 4.50  | 24.00 |
|           | 2013-11-18 | 19.50 | 4.50  | 24.00 |
| 604     | FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK |

<p>| GROUP 3 * | 2013-11-18 | 19.50 | 4.50  | 24.00 |
|           | 2013-11-18 | 19.50 | 4.50  | 24.00 |
| 605     | BITUMINOUS DISTRIBUTOR DRIVER |
| 606     | BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION) |
| 607     | THREE AXLE UNITS |</p>
<table>
<thead>
<tr>
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<th>Description</th>
<th>Start Date</th>
<th>Year 1</th>
<th>Year 2</th>
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<td>BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)</td>
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<td>611</td>
<td>PILOT CAR DRIVER</td>
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<td>RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS</td>
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<td>613</td>
<td>TWO AXLE UNIT</td>
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<td>614</td>
<td>SLURRY OPERATOR</td>
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<td>TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)</td>
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<td>616</td>
<td>TRACTOR OPERATOR, UNDER 50 H.P.</td>
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**SPECIAL CRAFTS**

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<td>FOR RATE CALL 651-284-5091 OR EMAIL <a href="mailto:DLI.PREVWAGE@STATE.MN.US">DLI.PREVWAGE@STATE.MN.US</a></td>
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06/16/14
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MINNESOTA STATE COLLEGES AND UNIVERSITIES

SPECIAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION
TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. In the event that Substantial Completion of the Work has not occurred on or before
__________________________ [Insert Completion Date or number of calendar days after
the date of the written Notice to Proceed], then commencing on
____________________ [Insert Completion Date plus one or number of calendar days after
the date of the written Notice to Proceed], and continuing for each day or fraction thereof
until Substantial Completion of the Work is established, the Contractor shall pay to the
Owner, at the sole option of the Owner, the amount of 1,000 and No/100 Dollars ($1,000)
per diem (“Damage Amount”).

B. The Contractor and the Owner agree that in the event the Substantial Completion of the
Work does not occur on or prior to __________________ [Insert Completion Date
or number of calendar days after the date of the written Notice to Proceed], the Owner will
suffer damages in an amount which may, due to the special nature of the Project, the
Owner’s business and the Owner’s reliance upon the Substantial Completion date, be
impractical or extremely difficult to ascertain. The Owner and the Contractor agree that the
Damage Amount is a reasonable estimate of the damages that the Owner will suffer in the
event that Substantial Completion of the Work does not occur on or prior to the Substantial
Completion Date.

C. Also refer to roofing systems technical Specifications Sections including: Section 07 51 00:
Built-Up Bituminous Roofing, Section 07 53 00: Elastomeric Membrane Roofing, and
Section 07 62 00: Sheet Metal Flashing and Trim. [When the project includes roofing,
roof repairs or reroofing work, verify applicable roofing systems Specifications Section
numbers and names with the Architect/Engineer.] For construction Work which exceeds
the time period(s) provided in these Sections, the Contractor shall pay to the Owner, at the
sole option of the Owner, the amount of ______________ and No/100 Dollars
($__________) [Insert Amount in figures] per diem (“Damage Amount”). [Insert
anticipated costs to be incurred by the Owner if the roofing and/or reroofing construction
extends longer than the time allowed by the Contract Documents for this work.] in addition
to other liquidated damages amounts.

D. Payment of liquidated damages shall be in the form of a Change Order reducing the
Contractor’s Contract Sum by the amount of the liquidated damages. If the Contractor
refuses to sign the Change Order for liquidated damages, the Owner reserves the right to
unilaterally reduce the Contract Sum by the amount of the liquidated damages. If the amount
of the liquidated damages exceeds the remaining unpaid balance of the Contract, the Contract
Sum shall be reduced by the amount of the unpaid balance and the Contractor shall pay the
Owner the difference between the liquidated damages and the unpaid balance.

END OF SECTION
SECTION 01 10 00

SUMMARY

1.1 PROJECT INFORMATION

A. Project Identification: Mankato Clinical Sciences Building

B. Project Location: Minnesota State University
150 South Road
Mankato, MN 56001.

C. Owner: Minnesota State University, Mankato

D. Owner's Representative: Paul Corcoran, PE
MSU, M Director of Planning and Construction
111 Wiecking Center
Mankato, MN 56001

E. Architect: Perkins + Will
84 South 10th Street
Minneapolis, MN 55403

F. Other Owner Consultants:

1. Akiba Architects
P O Box 24476
Minneapolis. MN 55424

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of the Project: The new Clinical Science Building (CSB) will consolidate many of the departments of the College of Allied Health and Nursing (CAHN) into a single new building. The new building will include a public dental clinic and speech and rehabilitation clinic. CAHN faculty offices and graduate student spaces support training classrooms for nursing, speech and rehabilitation, and dental programs. The building will also include 5 general purpose lecture/classrooms for priority use by CAHN and general use by the university. The new CSB will also provide common spaces for encouraging collaboration and interaction between faculty and students. The project includes 57,500 gross square feet of new building area. This total area will include an underground tunnel that connects the new CSB to the existing Ford Hall building.

B. The Building consists of 3 stories, of approximately 55,491 Square feet, and one basement story. "Base Bid A" basement = 3,960 GSF. "Base Bid B" basement = 23531 GSF.
C. Type of Contract: single prime contract.

D. Use of Site: Limited to work in areas indicated.
   1. Owner occupancy and use by public allowed.

E. Owner's Occupancy Requirements: Full Owner occupancy upon substantial completion.

F. Work Restrictions:
   1. Hours: 7:00 AM – 5:00 PM Monday through Friday.
   2. Smoking: Not allowed in the building or on the site.

G. Hazardous Materials: Hazardous materials are not anticipated to be present.

END OF SECTION 01 10 00
SECTION 01 21 00

ALLOWANCES

1.1 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance: Include the sum of [TO BE DETERMINED]: Include porcelain tile material for stairs, setting and accessory materials are base bid not a part of the allowance.
SECTION 01 23 00

ALTERNATES

1.1 SCHEDULE OF ALTERNATES

END OF SECTION 01 23 00
SECTION 01 25 00
SUBSTITUTION PROCEDURES

1.1 SUBMITTALS

A. Substitution Request Form: Form included.

B. Documentation:
   1. Justification.
   2. Coordination information.
   3. Detailed comparison.
   4. Product Data.
   5. Samples.
   6. Certificates and qualification data.
   7. List of similar installations.
   8. Material test reports.
   9. Research reports.
   10. Detailed comparison of Contractor's construction schedule.
   11. Cost information.
   12. Contractor's certification.
   13. Contractor's waiver of rights to additional payment or time.

C. Architect's Action: If necessary, Architect will request additional information within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection within 15 days of receipt, or seven days of receipt of additional information.

1.2 SUBSTITUTIONS

A. Substitutions for Cause: Not later than 15 days prior to time required for submittals.

B. Substitutions for Convenience: Not allowed.
END OF SECTION 01 25 00
SUBSTITUTION REQUEST FORM
(use after bidding phase)

TO: PERKINS+WILL
84 South 10th St.
Minneapolis, MN 55403

FROM: ____________________________

Substitution Request No: __________________  DATE: ____________________________

PROJECT SPECIFICATION
Specification Name/Number___________________________________________________
Article, Paragraph, Page Number_______________________________________________
Item/System to be Substituted________________________________________________

REASON FOR SUBSTITUTION REQUEST
SPECIFIED PRODUCT . . . PROPOSED PRODUCT . . .
☐ Is no longer available. ☐ Will reduce Contract Time
☐ Is unable to meet project schedule. ☐ Will Contract Sum by
☐ Is unsuitable for the designated application. ☐ Is for supplier’s convenience
☐ Cannot interface with adjacent materials. ☐ Is for subcontractor’s convenience
☐ Is not compatible with adjacent materials. ☐ Cannot provide the specified warranty.
☐ Cannot be constructed as indicated. ☐ Is an Owner-initiated substitution
☐ Other: ____________________________________________________________

☐ Cannot be obtained due to one or more of the following:
☐ Strike ☐ Bankruptcy of manufacturer or supplier
☐ Lockout ☐ Similar occurrence

Explanation of each item marked above (attach documentation):
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

SUBSTITUTION REQUEST FORM
01 25 00 Appendix 1 - 1
EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: □ No □ Yes (if yes, explain)

Proposed substitution requires dimensional revisions or redesign of architectural, structural, mechanical, electrical, plumbing, life safety, or other work:
□ No □ Yes (if yes, attach data explaining revisions)

PRODUCT COMPARISON

Provide side-by-side comparison between proposed substitution and specified product to facilitate review of Substitution Request:

<table>
<thead>
<tr>
<th>SPECIFIED PRODUCT</th>
<th>PROPOSED PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Name / Brand:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Catalog No.:</td>
<td>___________________________</td>
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<td>Supplier:</td>
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</tbody>
</table>

(Attach additional sheets if necessary) (Attach additional sheets if necessary)

Local Distributor or Supplier: _________________________________________________

Manufacturer's Representative: _______________________________________________

Maintenance Service Available: □ Yes □ No

Spare Parts Source and Location: _______________________________________________

Warranty Available is equivalent to the specified warranty: □ Yes □ No _____ Years

Describe any variation from specified warranty: __________________________________

Product Manufacturing History □ New □ 2-5 yrs □ 6-10 yrs □ More than 10 yrs old

SUPPORTING DATA ATTACHED (REQUIRED WHERE APPLICABLE)

□ Point-by-point comparison of performance criteria, materials, and components of specified product with proposed substitution.

□ Drawings □ Specifications □ Product Data □ Samples
REFERENCES INSTALLED

Identify at least three similar local projects on which proposed substitution was used:

PROJECT #1:
Project: _____________________________________ Date Installed: ____________
Address: ________________________________________________________________
Architect: ________________________________________________________________
Contact: _____________________________________ Telephone __________________
Owner: _________________________________________________________________
Facility Manager: ________________________________ Telephone:_______________
Contractor: ________________________________________________________________
Contact: _____________________________________ Telephone:_______________

PROJECT #2:
Project: _____________________________________ Date Installed: ____________
Address: ________________________________________________________________
Architect: ________________________________________________________________
Contact: _____________________________________ Telephone __________________
Owner: _________________________________________________________________
Facility Manager: ________________________________ Telephone:_______________
Contractor: ________________________________________________________________
Contact: _____________________________________ Telephone:_______________

PROJECT #3:
Project: _____________________________________ Date Installed: ____________
Address: ________________________________________________________________
Architect: ________________________________________________________________
Contact: _____________________________________ Telephone __________________
Owner: _________________________________________________________________
Facility Manager: ________________________________ Telephone:_______________
ACKNOWLEDGEMENTS: The undersigned certify that:

- **Performance**: Proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product, including appearance, quality, performance, code compliance, and sustainability compliance.

- **Warranty**: Same warranty will be furnished for proposed substitution as for specified product.

- **LEED Compliance (LEED projects only)**: Same contribution to LEED program.

- **Operations and Maintenance**: Same maintenance service and source of replacement parts, as applicable, are available locally for the proposed substitution.

- **No Adverse Effect**: Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

- **No Adverse Time or Cost**: Cost data and time as stated above are complete. Claims for additional costs or time related to accepted substitution which may subsequently become apparent are waived.
  
  - Payment will be made to the Owner for changes to the project design, including Architect’s and Engineer’s redesign fees and engineering, detailing, special inspection, and construction costs incurred by the Owner caused by acceptance of the substitution.
  
  - Coordination to incorporate the proposed substitution and associated modifications to the Work has been performed.

- **Dimensions and Clearances**: Proposed substitution does not affect dimensions or functional clearances.

- **Conditions of Acceptance**: The Architect’s recommendation for approval, if granted, relies on data submitted and the opinion and knowledge of the Architect at the time decision is rendered. The approval is conditional in nature and subject to re-evaluation and reconsideration if additional data or materials are submitted, or coordination with other work is observed to invalidate claims that substitution is equal to items originally specified.

Contractor: _____________________________________________________________

Date: ___________________   By: ________________________________________

Subcontractor: ____________________________________________________________

Date: ___________________   By: _______________________________________

(Name of Contractor)

(Name of Subcontractor)
Note: Substitution requests are not part of the standard submittal process and shall not be submitted as part of shop drawings, product data, or samples submittals. Substitution requests must be filled out completely. Unresponsive or incomplete requests will be rejected and returned without review.

ARCHITECT’S REVIEW AND ACTION

☐ Substitution acceptance is recommended.
☐ Substitution acceptance is recommended, with the following comments:

________________________________________________________________________

☐ Architect’s additional services proposal attached.
☐ Resubmit Substitution Request:
  ☐ Provide the following: __________________________

  __________________________________________

☐ Provide proposal indicating amount of savings / credit to Owner
☐ Substitution acceptance is not recommended:
  ☐ Substitution Request received too late.
  ☐ Substitution Request received directly from subcontractor or supplier.
  ☐ Substitution Request not submitted in accordance with requirements.
  ☐ Substitution Request Form is not properly executed.
  ☐ Substitution Request does not indicate what item is being proposed.
  ☐ Insufficient information submitted to facilitate proper evaluation.
  ☐ Proposed product does not appear to comply with specified requirements.
  ☐ Proposed product will require substantial revisions to Contract Documents.

PERKINS+WILL

Perkins+Will acknowledges its reliance upon information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to not comply with requirements of the Contract Documents, the Contractor shall be solely responsible for performance of the work in accordance with requirements of the Contract Documents.

By: ____________________________________  Date: _____________________

OWNER’S REVIEW AND ACTION

☐ Substitution is accepted; Architect to prepare Change Order.
☐ Substitution is not accepted.
By accepting this substitution, Owner agrees to compensate Perkins+Will for additional services, if any, necessary to implement the substitution.

Additional Services: $__________________

By: ____________________________________  Date: _______________________

(Owner’s Representative)

END OF FORM
SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

A. Minor Changes in the Work: Form included issued by Architect.

B. Owner-Initiated Proposal Requests: Issued by Architect.
   1. Respond within time specified in Proposal Request.
   2. Quotation Form: forms acceptable to Architect.

C. Contractor-Initiated Proposals: Submit to Architect.
   1. Proposal Request Form: form acceptable to Architect.

D. Change Orders: Form included issued by Architect for signatures of Owner and Contractor.

E. Construction Change Directives: Form included issued by Architect.
SECTION 01 29 00

PAYMENT PROCEDURES

1.1 SUMMARY

A. Schedule of Values:
   2. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.

B. Applications for Payment:
   1. Payment Application Times: Indicated in the Agreement.
   3. Waiver of Mechanic's Lien: Submitted from subcontractors, sub-subcontractors, and suppliers for construction period covered by previous application.
END OF SECTION 01 29 00
SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

1.1 COORDINATION DRAWINGS

A. Prepare coordination drawings where space is limited or if required to integrate products.

B. Coordination Digital Data Files: RVT, Version 2014, operating in Microsoft Windows operating system.
   1. The Drawings are available in RVT, Version 2014, operating in Microsoft Windows operating system.
   2. Contractor shall execute a data licensing agreement in the form of Agreement included in the Project Manual.

1.2 REQUESTS FOR INFORMATION (RFIs)

A. RFI Forms: Software-generated form, through Architect’s info exchange website.

B. Architect’s Action: Allow seven working days for Architect’s response for each RFI. Allow 24 days for architect’s response to multi-discipline RFI’s.

C. RFI Log: Maintain a tabular log of RFIs. Submit log bi-weekly. [Use CSI Log Form 13.2B.] [Use software log that is part of Project Web site.]

1.3 PROJECT WEB SITE

A. Use Architect's Info exchange Web site for project communication and documentation.

1.4 PROJECT MEETINGS

A. Schedule and conduct meetings.

B. Preconstruction conference.

C. Preinstallation Conferences: Before each construction activity that requires coordination.

D. Project Closeout Conference: No later than 90 days prior to the scheduled date of Substantial Completion.

E. Progress Meetings: At biweekly intervals, coordinated with preparation of payment requests.
F. Coordination Meetings: At weekly intervals, in addition to specific meetings held for other purposes.

END OF SECTION 01 31 00
SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

1.1 INFORMATIONAL SUBMITTALS

B. Start-up construction schedule.
C. Start-up network diagram.
D. Contractor's construction schedule.
   1. Submit a working electronic copy of schedule.
E. CPM reports.
F. Daily Construction Reports: Submit at monthly intervals.
G. Material Location Reports: Submit at monthly intervals.
H. Field Condition Reports: Submit at time of discovery of differing conditions.
I. Special Reports: Submit at time of unusual event.

1.2 QUALITY ASSURANCE

A. Scheduling Consultant: Experienced specialist in CPM scheduling and reporting.

1.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Activity Duration: No longer than 20 days.
B. Constraints:
   1. Work under more than one contract.
   2. Work by Owner.
   3. Products ordered in advance.
   4. Owner-furnished products.
   5. Work restrictions.
   7. Construction areas.
   8. Other Constraints:
C. Milestones: Notice to Proceed, Substantial Completion, and final completion.
D. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules. Schedule Type: CPM.

F. Updating: At monthly intervals, issued one week before each progress meeting.

END OF SECTION 01 32 00
SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

1.1 PRODUCTS

A. Digital Photographs: 8 megapixels.
   1. Prints: Two 8-by-10-inch (203-by-254-mm) matte prints.

B. Preconstruction Photographs:
   1. 20 photographs showing existing conditions adjacent to property before starting the Work.
   2. 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

C. Periodic Construction Photographs: 20 photographs monthly.

D. Final Completion Construction Photographs: 20 color photographs.
SECTION 01 33 00

SUBMITTAL PROCEDURES

1.1 DEFINITIONS

A. Action Submittals: Information that requires Architect's responsive action.

B. Informational Submittals: Information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.2 PROCEDURES

A. Electronic copies of CAD Drawings of the Contract Documents will be provided by Architect for Contractor's use, for a fee.

B. Processing Time:
   1. Initial Review: 15 days.
   2. Resubmittal Review: 15 days.
   3. Sequential Review: 21 days.
   4. Concurrent Consultant Review: 15 days.

C. Submittal Procedures:
   1. Submit via email as PDF files.
   2. Certificates and Certifications Submittals: Includes signature of entity responsible for preparing certification.

D. Delegated Design Services Certification: In addition to other required submittals, submit digitally-signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional.

E. Contractor's Review:
   1. Submittals: Marked with approval stamp before submitting to Architect.

F. Architect's Action:
   1. Action Submittals: Stamped with an action stamp and returned.
   2. Informational Submittals: Reviewed but not returned, or rejected if it does not comply with requirements.
   3. Incomplete submittals will be returned without review.
   4. Submittals Not Required: May not be reviewed and may be discarded.
SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.

2. Division 01 Section “Structural Testing and Special Inspection.”

3. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements,
indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components.
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Special Structural Testing and Inspection Program Summary Schedule."
3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

G. The Contractor, notwithstanding the requirements of General Conditions, A201 Subparagraph 13.5.1, shall provide a minimum of 5 working days notice to appropriate Owner consultants before starting Work requiring observation or testing, and a minimum of 3 working days notice thereafter for each testing and observation for the continuation of the Work items, and a reasonable date and time fixed for such observation and testing. If the Work is covered up prior to any required testing or observation, it shall be uncovered for review at the Contractor’s expense.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
QUALITY REQUIREMENTS

2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to
inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project unless otherwise indicated.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Owner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

   a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed, unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup in accordance with approved Shop Drawings as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials.
QUALITY REQUIREMENTS

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. When any testing or observations indicate that the Work is in non-compliance with the Contract Documents, then all retesting and re-observations shall be performed by the Owner’s testing or observation agencies, regardless whether the original test was the Contractor’s responsibility. All costs for retesting and re-observations, including additional services of the A/E, A/E’s consultants and the Owner’s consultants, are the Contractor’s responsibility and shall be deducted from the Contract amount by deductive Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor’s responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

2. Where services are indicated as Contractor’s responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies a minimum of 5 working days before starting Work requiring observation or testing, and a minimum of 3 working days notice thereafter when Work that requires testing or inspecting will be performed.

4. Where quality-control services are indicated as Contractor’s responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor’s responsibility.

6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer’s Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer’s Technical Services: Where indicated, engage a manufacturer’s technical representative to observe and inspect the Work. Manufacturer’s technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of
Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work, including any necessary scaffolding and lifts.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting personal and equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Contractor's quality-control plan. Coordinate and submit
concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency and special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to the Owner, A/E Structural Engineering Consultant, Owner's consultant, Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.
7. Refer to Division 01 Section “Owner’s Observation and Testing Schedule”
8. Refer to Division 01 Section “Special Structural Testing and Inspections” for additional information.
9. Observation and testing agencies are not authorized to release, revoke, alter or enlarge requirements of the Contract Documents or approve, reject or accept any portions of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.
B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect’s reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor’s responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00
## SECTION 01 40 02

### OWNER’S OBSERVATION AND TESTING SCHEDULE

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<th>Specification Section</th>
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<th>Owner’s Field Consultant</th>
<th>Owner’s Roof Consultant</th>
<th>Owner’s Window Consultant</th>
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<td>03 15 10 - POST-INSTALLED ANCHORS</td>
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<td>03 20 00 - CONCRETE REINFORCING</td>
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X*: See Section 01 45 33 – Structural Testing and Inspections for requirements.
END OF SECTION 01 40 02
SECTION 01 42 00

REFERENCES

1.1 DEFINITIONS

A. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

B. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

C. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

D. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

E. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

F. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. "Provide": Furnish and install, complete and ready for the intended use.

H. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Publication Dates: In effect as of the date of the Contract Documents unless otherwise indicated.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: List included in this Section.

B. Code Agencies: List included in this Section.
C. Federal Government Agencies: List included in this Section.

D. Standards and Regulations: List included in this Section.

E. State Government Agencies: List included in this Section.

END OF SECTION 01 42 00
SECTION 01 45 33
SPECIAL STRUCTURAL TESTING AND INSPECTION

PART 1 - GENERAL

1.1 INTENT AND CONDITIONS

A. Intent
   1. Define and coordinate structural testing and special inspection services.
   2. Define and coordinate conventional testing and inspection services.
   3. Provide greater confidence that the specified work is constructed in compliance with the contract documents and Chapter 17 of the 2006 International Building Code as adopted by the current Minnesota State Building Code.

B. Conditions
   1. If inspection of fabricator’s work is required, the Owner’s representative may require testing and inspection of the work at the plant, before shipment. Owner, Architect and Structural Engineer of Record (SER) reserve the right to reject material not complying with the contract documents.
   2. Testing and inspection shall be performed in accordance with the industry standard used as the reference for the specific material or procedure unless other criteria are specified. In the absence of a referenced standard, tests shall be accomplished in accordance with generally accepted industry standards.
   3. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection if defective work or materials are discovered, nor shall it obligate Owner to accept such work.

1.2 RELATED REQUIREMENTS

A. Refer to PART 3 for technical scope sections regarding specific qualifications, inspections, tests, frequency and standards required.

1.3 DEFINITIONS

A. Testing – Evaluation of systems, primarily requiring physical manipulation and analysis of materials, in accordance with approved standards.

B. Inspection – Evaluation of systems, primarily requiring observation and engineering judgment.

C. Structural Testing and Special Inspection – Structural Testing and Special Inspection Services herein include items required by the 2006 IBC as adopted by the current Minnesota State Building Code, and other items which in the professional judgment of the Structural Engineer of Record, are critical to the integrity of the building structure.

D. Conventional Testing and Inspection – Conventional Testing and Inspection Services herein describe those items not specially required by Code but may be considered essential to the proper performance of the building systems.

E. Architect of Record – The prime consultant in charge of overall design and coordination of the project.
F. Structural Engineer of Record (SER) – The Licensed Engineer in responsible charge of the structural design for the project.

G. Licensed Structural Engineer: – A professional engineer with education and experience in the design of structures similar to this project licensed to practice in the state in which the project is located.

H. Testing Agency (TA) – The properly qualified firm performing testing services.

I. Special Inspector (SI) – A properly qualified individual or firm performing special inspections.

J. Building Official – The Officer or his duly authorized representative charged with the administration and enforcement of the Minnesota State Building Code.

K. Continuous –The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

L. Periodic –The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

1.4 REFERENCES


C. ASTM C1077-02 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

D. ASTM C1093-95 - Practice for Accreditation of Testing Agencies for Unit Masonry.

E. ASTM D3740-01 - Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.


H. See technical sections of PART 3 for specific references.

1.5 QUALIFICATIONS

A. Testing Agency (TA) – The testing agency shall be an approved independent testing agency acceptable to the Owner, Architect, SER and as noted below:

   1. Authorized to operate in the state in which the project is located and experienced with the requirements and testing methods specified in the technical scope sections of PART 2.

   2. Meeting applicable requirements of Section 1.04 "References".

   3. Testing equipment shall be calibrated at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards, or to accepted values of natural physical constants.

B. Special Inspector (SI) – The special inspector shall be under the direct supervision of a registered civil/structural engineer, experienced with the type of work requiring structural testing and special inspection.

   1. The categories of special inspector are:
1.6 RESPONSIBILITIES

A. Structural Testing and Special Inspection

1. Special Inspectors:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
   b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   c. Use the approved design drawings and specifications, supplemented by the approved shop drawings for review of the work.
   d. Test and/or inspect the work assigned for conformance with the building department approved design drawings, specifications and applicable material and workmanship provisions of the Code. Perform testing and inspection in a timely manner to avoid delay of work.
   e. Bring discrepancies to the immediate attention of the contractor for correction, confirm that they are corrected and, if uncorrected after a reasonable period of time, bring to the attention of the Structural Engineer of Record, the Building Official, and to the Architect.
   f. Submit test and/or inspection reports to the Building Official, Contractor, the Structural Engineer of Record, and other designated persons in accordance with the Structural Testing and Special Inspection Summary Schedule.
   g. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the Code.

2. Testing Agency:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
   b. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   c. When engaged as a special inspector, provide structural testing and special inspection services as previously described.

3. Architect of Record (or other prime consultant):
   a. Complete and sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction. Provide a completed copy of the schedule to all signed parties including Building Official.
   b. If appropriate, arrange and attend a pre-construction meeting to review the scope of structural testing and special inspection. Include Contractor, Building Official, SER, Testing Agency and other parties concerned.
c. Coordinate the flow of reports and related information to expedite resolution of construction issues.

4. Structural Engineer of Record (SER):
   a. Identify items requiring structural testing and special inspection including special cases.
   b. Define "type" of special inspector required for "description" of work indicated on the structural testing and special inspection schedule.
   c. Complete and sign the Structural Testing and Special Inspection Summary Schedule prior to commencement of construction.
   d. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   e. Review reports submitted by special inspectors.
   f. If engaged as a special inspector, provide structural testing and special inspection services as previously described.

5. Contractor:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.
   b. Coordinate efforts to gain signatures of all signing parties other than the Architect and Structural Engineer of Record (SER).
   c. If requested, attend a pre-construction meeting to review the scope of structural testing and special inspection.
   d. Post or make available the Structural Testing and Special Inspection Summary Schedule within its office at the job site. Also, provide adequate notification to those parties designated on the schedule so they may properly prepare for and schedule their work.
   e. Provide the special inspectors access to the approved design drawings, approved shop drawings and specifications at the job site.
   f. Review reports submitted by special inspectors.
   g. Retain at the job site all reports submitted by the special inspectors for review by the building official upon request.
   h. Correct in a timely manner, deficiencies identified in inspection and/or testing reports.
   i. Provide the special inspector safe access to the work requiring inspection and/or testing.
   j. Provide labor and facilities to provide access to the work and to obtain, handle and deliver samples, to facilitate testing and inspection and for storage and curing of test samples.
   k. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.

6. Fabricator:
   a. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencing construction.
   b. Submit a Certificate of Compliance to the Building Official, Special Inspector, and Structural Engineer of Record that the work was performed in accordance with the approved plans and specifications.

7. Building Official (Typical responsibilities noted for information only):
   a. Determine work, which in the Building Officials opinion, involves unusual hazards or conditions in accordance with the IBC.
b. Review special inspector qualifications.
c. Accept and sign the completed Structural Testing and Special Inspection Summary Schedule.
d. Review all fabricators who perform work in their shop, which requires special inspection.
e. Review reports and recommendations submitted by the special inspectors.
f. Review the "final signed reports" submitted by the special inspector(s). These documents should be accepted and approved by the building department prior to issuance of a Certificate of Occupancy.

8. Owner:
   a. Establish direct funding to provide for cost of structural testing and special inspection services.
   b. Provide special inspector with approved design drawings, specifications and approved shop drawings.
   c. Provide special inspectors and testing agencies with full access to site at all times.
   d. Sign the Structural Testing and Special Inspection Summary Schedule in conjunction with other responsible parties prior to commencement of construction.

B. Conventional Testing and Inspection
   1. Testing Agency:
      a. Test or inspect the work assigned, for conformance with building department approved plans, specifications and applicable workmanship provisions of the IBC.
      b. Bring non-conforming items to the immediate attention of the Contractor, and if uncorrected to the Architect of Record.
      c. Submit test and/or inspection reports to the Architect of Record, the Contractor and other designated persons.
   
   2. Contractor:
      a. Provide adequate notification to testing agency so they may properly prepare for and schedule their work.
      b. Provide testing agency with access to the approved design drawings, approved shop drawings and specifications at the job site.
      c. Correct in a timely manner, deficiencies identified in test and/or inspection reports.
      d. Provide testing agency with safe access to the work requiring testing and inspection.
      e. Provide labor and facilities to provide access to the work and to obtain and handle samples, to facilitate testing and inspection and for storage and curing of test samples.
      f. Verification of conformance of the work within specified construction tolerances is solely the Contractor's responsibility.
   
   3. Architect of Record (or other prime consultant):
      a. Coordinate the flow of reporting and related information to expedite resolution of construction issues.

C. Inspections by Building Official
   1. Contractor shall provide adequate notice for inspections performed by the Building Official, as required by the 2006 IBC, the Minnesota State Building Code, and local ordinance.

SPECIAL STRUCTURAL TESTING AND INSPECTION
01 35 10 - 5
D. Periodic Site Observations by Design Consultant
   1. Special structural testing and inspection, conventional testing and inspection, and periodic inspections by the Building Official do not preclude the normal field involvement and site observations by Architect or Structural Engineer of Record, nor shall it relieve the Contractor of any responsibility to complete the work in accordance with the approved drawings and specifications.

E. Limits of Authority
   1. Testing agents and/or special inspectors may not waive or alter contract requirements, or approve or accept any portion of the work unless specifically authorized by the Architect or Structural Engineer of Record. They may not assume any duties of the Contractor, and they have no authority to stop or reject “Work”.

1.7 PAYMENT
   A. Owner shall directly employ and pay for services of the special inspectors to perform required Structural Testing and Special Inspection.
   B. Owner shall employ and pay for services of the testing agency to perform required Conventional Testing and Inspection.
   C. Unless noted otherwise, the Contractor shall provide and pay for all materials, samples, mock-ups, and assemblies required for testing and inspection and shall pay for all shipping costs related to delivery of this work. Testing agency will pay for shipping costs of samples transported from site to lab.
   D. If exploratory work is required to determine the cause of defects, the cost of such work shall be paid by the Contractor, if the work is found to be defective, in the judgment of the Architect/Engineer. Contractor shall reimburse the Owner for all costs incurred in this event.
   E. Any tests required to qualify the Contractor, or the workmen for any phase of the work, shall be performed at no additional cost to the Owner.

1.8 INSPECTION NOTICE
   A. Contractor shall provide minimum of 24 hours notice for all items requiring testing or inspection. Items requiring testing and inspection services prior to or during placement shall not be placed until testing and inspection services are available. Items requiring testing and inspection services after placement shall not be enclosed or obscured until testing and inspection services are performed.

1.9 REPORTS
   A. Testing agency and/or special inspectors shall submit reports in accordance with the Structural Testing and Special Inspection Summary Schedule and shall conduct and interpret tests and inspections and state in each report whether; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in work, (3) record work required and performed, to correct deficiencies.
   B. Reports for structural testing and special inspection, shall be submitted in timely manner to the Contractor, Building Official, SER, and Architect of Record.
   1. Submit reports for ongoing work, to provide the information noted below:
      a. Date issued.
b. Project title and number.
c. Firm name and address.
d. Name and signature of tester or inspector.
e. Date and time of sampling.
f. Date of test or inspection.
g. Identification of product and specification section.
h. Location in project, including elevations, grid location and detail.
i. Type of test or inspections.
j. Results of tests or inspections and interpretation of same.
k. Observations regarding compliance with Contract Documents or deviations there from.

2. Submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans, specifications and the applicable workmanship provisions of the code.

C. Reports for conventional testing and inspection shall be submitted in a timely manner to the Contractor and the Architect of Record.

1.10 FREQUENCY OF TESTING AND INSPECTION
A. For detailed requirements see technical sections of PART 3.

1.11 PROTECTION AND REPAIR
A. Upon completion of testing, sample-taking, or inspection, the Contractor shall repair damaged work and restore substrates and finishes to eliminate deficiencies, including deficiencies in the visual qualities of exposed surfaces, as judged solely by the Architect/Engineer of Record. Protect work exposed by or for testing and/or inspection and protect repaired work. Repair and protection is the Contractor’s responsibility, regardless of the assignment of responsibility for testing and/or inspection.

1.12 TESTS TO DEMONSTRATE QUALIFICATION
A. If the Contractor proposes a product material, method, or other system that has not been pre-qualified, the Architect may require applicable tests, to establish a basis for acceptance or rejection. These tests will be paid for by the Contractor.
B. The Architect/Engineer of Record reserves the right to require certification or other proof that the system proposed, is in compliance with any tests, criteria or standards called for. The certificate shall be signed by a representative of an independent testing agency.

PART 2 - MATERIALS (NOT USED)

PART 3 - SCOPE OF TESTING AND INSPECTION

3.1 STRUCTURAL TESTING AND SPECIAL INSPECTION PROGRAM SUMMARY
A. The parties involved shall complete and sign the Structural Testing and Special Inspection Summary Schedule. The Program, including Summary Schedule, shall
be submitted to the building official for approval prior to issuance of a building permit. The competed schedule includes the following:

1. A specific listing of the items requiring inspection and testing.
2. The associated technical scope sections that define the applicable standards by which to judge conformance with the approved plans and specifications in accordance with the IBC, as adopted by the Minnesota State Building Code. The technical scope sections should also include the degree or basis of inspection and testing; i.e., intermittent/will-call or full-time/continuous.
3. The frequency of reporting, i.e., weekly, monthly, per test/inspection, per floor, etc.
4. The parties responsible for performing the inspection and testing work.
5. The required acknowledgments by each designated party.

3.2 CONVENTIONAL TESTING AND INSPECTION

A. (Not Used)

3.3 TECHNICAL SECTIONS

A. Section 31 22 00 - Earthwork - Grading, Excavation Filling

1. (Not Used)

2. Definitions
   a. Refer to PART 1 for standard definitions.
   b. Special Inspector – Technical
      1) Technical I: Technician shall be under the direct supervision of a Technical III. Work shall be performed in a qualified geotechnical/testing laboratory.
      2) Technical II: Technical with a minimum of 2 years experience, or a graduate engineer, and is an employee of a qualified and approved geotechnical/testing laboratory, under the direct supervision of a Technical III.
      3) Technical III: A civil/geotechnical engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved geotechnical/testing laboratory. This licensed engineer shall review and approve all final field reports.

3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
   a. Classification of materials used and encountered during construction per ASTM:D2488 and ASTM:D2487. Technical I
   b. Performance of laboratory testing of materials, as needed (Proctor, Sieve Analysis, Atterberg Limits, Consolidation Test, etc.). Technical I
   d. Provide periodic results of field compaction and laboratory work for general compliance with Contract Documents and Geotechnical Reports. Technical I
   e. Observe all subgrades/excavation bases below footings and slabs and verify design bearing capacity is achieved. Technical II
   f. Document presence of groundwater within excavations. Technical I
   g. Provide reports of subgrade observations for general compliance with Contract Documents and Geotechnical Report. Technical II
h. Verify cut and fill slopes as specified in the contract documents. Technical III

4. Conventional Testing and Inspections Requirements
   a. Contractor shall verify that footings comply with frost depth requirements and shall report any variances to the SER in a timely manner.

B. **Section 03 30 00 - Cast-in-Place Concrete**
   1. General
      a. (Not Used)
   2. Definitions
      a. Refer to PART 1 for standard definitions.
      b. Special Inspector – Technical
         1) Technical I: ACI Certified Grade I inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
         2) Technical II: ACI Certified Grade II inspector. Inspector shall be employed by a testing laboratory, under the direct supervision of a Technical III.
         3) Technical III: A civil/structural engineer regularly engaged in this type of work, with a minimum of 4 years experience and licensed in the State in which the project is located and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approved all reports.
         4) Testing laboratory shall have C.C.R.L. certification at the National Bureau of Standards.
      c. Special Inspector – Structural
         1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
         2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the State in which the project is located. The licensed engineer shall review and approve all inspection reports.
         3) Special Inspector - Structural may be an employee of the SER.
   3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
      a. Sample and test all cast in place concrete.
         1) Prepare compression test specimens (ASTM C31), one set of four standard cylinders of concrete for each compressive strength test, mold and store cylinders for laboratory-cured specimens.
         2) Perform compressive strength tests (ASTM C39). One set of four cylinders for each day's pour between one and 25 cubic yards. If a day's pour exceeds 25 cubic yards, one set of four cylinders for each additional 50 cubic yards, or fraction thereof. One specimen at seven days, two at 28 days, and one specimen retained in reserve for later testing if required. For post tensioned concrete, make and test an additional cylinder at three days to verify strength prior to stressing. (When frequency of testing will provide less than five strength tests for a given class of concrete, conduct at least five strength tests from
randomly selected batches. If fewer than five batches are used, conduct one test from each batch.)

3) Slump (ASTM C143): One test at point of discharge for each set of compression test specimens; additional tests when concrete consistency appears to have changed.

4) Air entrainment (ASTM C231): Test the first batch of air entrained concrete and one additional test for each set of compression test specimens.

5) Concrete Temperature: Test concrete temperature hourly when air temperature is 40F and below and when 80F and above, and each time a set of compression test specimens is made. Technical I

b. Perform concrete mix verification.
1) Verify mixer truck trip ticket conforms to approved mix design.
2) Verify that total water added to mix on site does not exceed that allowed by concrete mix design.
3) Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits. Technical I

c. Inspect preparation and placement of all concrete, excluding:
1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock.
2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a $f_{c}'$ no greater than 2500 psi.
3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).
5) Verify the following:
   (a) Verify acceptable general condition of concrete base prior to placement.
   (b) Verify that concrete conveyance and depositing avoids segregation and contamination.
   (c) Verify that concrete is properly consolidated.
   (d) Verify reinforcement remains at proper location.
   (e) Unless noted, inspections shall be continuous. Inspections shall be performed on a periodic basis for the following types of work:

d. Observe protection and curing methods for all concrete, excluding:
1) Isolated spread footings of buildings three stories or less in height that are fully supported on earth or rock.
2) Strip footings of buildings three stories or less in height that are fully supported on earth or rock, where the footings support walls of light frame construction, the footings are designed in accordance with Table 1805.4.2, or the footing structural design is based on a $f_{c}'$ no greater than 2500 psi.
3) Non-structural slabs on grade, including prestressed slabs on grade when effective prestress in concrete is less than 150 pounds per square inch.
4) Concrete foundation walls constructed in accordance with Table 1805.5(2), Table 1805.5(3) or Table 1805.5(4).

5) Verify the following:
   (a) Verify specified curing procedures are followed.
   (b) Verify that specified hot and cold weather procedures are followed. Structural I

e) Inspect all bolts installed in concrete.
   1) Verify specified size, type, spacing, configuration, embedment, and quantity.
   2) Verify proper concrete placement and means have been taken to achieve consolidation around all bolts. Structural I

4. Conventional Testing and Inspection Requirements
   a. (Not Used)

C. **Section 04 20 00 – Masonry**
   1. General
      a. Special inspection of masonry is required during preparation of masonry wall prisms or test specimens, sampling and placing of masonry units, placement of structural reinforcement, cleanout of grout space immediately prior to closing of elements, and during all grouting operations.
      b. Inspections noted below as being periodic shall be performed at least once per 500 square feet, except 100% of shear walls, masonry beams, and masonry columns shall be inspected.

2. Definitions
   a. Refer to PART 1 for standard definitions.
   b. Special Inspector – Technical
      1) Technical I: Technician shall be under the direct supervision of a Technical III regularly engaged in testing and inspection of this type of work. The licensed engineer shall review and approve all inspection reports.
      2) Technical II: Graduate civil/structural engineer, with experience in this type of work. Supervised by a Technical III. The licensed engineer shall review and approve all inspection reports.
      3) Technical III: A civil/structural engineer regularly engaged in this type of work with a minimum of 4 years experience, licensed in the State in which the project is located, and is an employee of a qualified and approved testing laboratory. The licensed engineer shall review and approve all reports.

   c. Special Inspector – Structural
      1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
      2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
      3) Special Inspector - Structural may be an employee of the SER.

3. Structural Testing and Special Inspection Requirements – **Level 1** (Item and Frequency and Qualifications)
a. Samples and Tests for Special Inspections

1) Masonry Unit Test – shall be performed in accordance with IBC Section 2105 and IBC Section 1704.5, as follows:
   (a) Units conform to ASTM C 55 or ASTM C 90.
   (b) Test units according to ASTM C 140 prior to the start of construction.
   (c) During construction one set of tests for each 5,000 SF of wall area, but not less than one set for the project. Technical I

2) Prism Tests - number and frequency in accordance with IBC Section 2105, as follows:
   (a) A set of 3 masonry prisms for each masonry type requiring testing, shall be built and tested in accordance with ASTM C1314 prior to the start of construction.
   (b) During construction a set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 for each 5,000 SF of wall area in question, but not less than one set of 3 masonry prisms for the project.
   (c) The compressive strength of masonry determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed specified f’m. Technical I

3) Preparation, storage, handling of prism tests. (Contractor shall provide labor and materials to construct all prism tests.) Technical I

b. Masonry Preparation and Placement

1) Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.

2) Condition of Units: On a periodic basis, verify that masonry units are clean and sound and dry.

3) Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.

4) Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.

5) On a periodic basis, verify hot and cold weather procedures are followed.

6) On a periodic basis, verify wall cavities are protected against entry of precipitation. Structural I

c. Masonry Reinforcement:

1) Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls, and positioning of steel.

2) Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls, and alignment.

3) Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size.
4) Dowels and Anchors: On a periodic basis, inspect the installation of masonry anchor bolts, joist anchors, inserts, straps, and dowels. Structural I

d. Prior to Masonry Grouting and Capping
   1) Grout Spaces: On a periodic basis, verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting.
   2) Reinforcement: On a periodic basis, verify placement of reinforcement and connectors remains consistent with construction documents.
   3) Site Prepared Grout: On a periodic basis, verify proportions of site prepared grout are consistent with previously submitted materials. Structural I

e. During Grouting Operations
   1) Grouting: On a periodic basis, verify proper grouting technique including consolidation to approved height of grout space, reconsolidation and vibration.
   2) Dry Packing: On a periodic basis, verify proper application of dry packing. Structural I

f. General Compliance
   1) On a periodic basis, verify that work is being performed in accordance with the contract documents and the approved submittals and that materials used are consistent with prior submittals. Structural I

4. Structural Testing and Special Inspection Requirements – Level 2 (Item and Frequency and Qualifications)

   a. Samples and Tests for Special Inspections
      1) Masonry Unit Test – shall be performed in accordance with IBC Section 2105 and IBC Section 1704.5, as follows:
         (a) Units conform to ASTM C 55 or ASTM C 90.
         (b) Test units according to ASTM C 140 prior to the start of construction.
         (c) During construction one set of tests for each 5,000 SF of wall area, but not less than one set for the project. Technical I
      2) Prism Tests - number and frequency in accordance with IBC Section 2105, as follows:
         (a) A set of 3 masonry prisms for each masonry type requiring testing, shall be built and tested in accordance with ASTM C1314 prior to the start of construction.
         (b) During construction a set of 3 masonry prisms shall be built and tested in accordance with ASTM C1314 for each 5,000 SF of wall area in question, but not less than one set of 3 masonry prisms for the project.
         (c) The compressive strength of masonry determined in accordance with ASTM C1314 for each set of prisms shall equal or exceed specified f'm. Technical I
      3) Preparation, storage, handling of prism tests. (Contractor shall provide labor and materials to construct all prism tests.) Technical I

   b. Masonry Preparation and Placement
      1) Base Conditions: On a periodic basis, verify that masonry bearing surfaces are clean.
2) Condition of Units: On a periodic basis, verify that masonry units are clean and sound and dry.

3) Proportions of prepared mortar Technical I

4) Placement: On a periodic basis, inspect laying of masonry units for the following: nominal unit widths, stack or running bond, proper thickness and tooling of mortar joints, acceptable depth of furrowing of bed joints. Note temperature at time of inspection.

5) Joints: On a periodic basis, inspect construction, expansion and contraction joints for location and continuity of steel.

6) On a periodic basis, verify hot and cold weather procedures are followed.

7) On a periodic basis, verify wall cavities are protected against entry of precipitation. Structural I

c. Masonry Reinforcement:
   1) Vertical Reinforcement: On a periodic basis, inspect placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and outside face of walls, and positioning of steel.

   2) Horizontal Reinforcement: On a periodic basis, inspect horizontal joint reinforcement steel and masonry reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and outside face of walls, and alignment.

   3) Ties: On a periodic basis, inspect ties in masonry for type, straightness, embedment, spacing and size. Structural I

   4) Dowels and Anchors: Inspect the installation of all masonry anchor bolts, joist anchors, inserts, straps, and dowels. Continuous Structural I

d. Prior to Masonry Grouting and Capping
   1) Grout Spaces: Verify that grout spaces are correctly sized and clean, cleanouts are closed after inspection and grout barriers are in place before grouting. Structural I

   2) Reinforcement: Verify placement of reinforcement and connectors remains consistent with construction documents.

   3) Site Prepared Grout: Verify proportions of site prepared grout are consistent with previously submitted materials. Structural I

e. During Grouting Operations
   1) Grouting: On a periodic basis, verify proper grouting technique including consolidation to approved height of grout space, reconsolidation and vibration.

   2) Dry Packing: On a periodic basis, verify proper application of dry packing. Structural I

f. General Compliance
   1) On a periodic basis, verify that work is being performed in accordance with the contract documents and the approved submittals and that materials used are consistent with prior submittals. Structural I

5. Conventional Testing and Inspection Requirements
   a. Not Used.

D. **Section 05 12 00 - Structural Steel**
   1. General
a. If special inspection of fabricators work is required, testing agent may test and inspect structural steel at plant before shipment. Owner and SER reserve right to reject material not complying with Contract Documents at any time before final acceptance.

2. Definitions
a. Refer to PART 1 for standard definitions.
f. R.C.S.C: Research Council On Structural Connections

g. Special Inspector – Technical: Shall be employed by a testing agency and shall be supervised by an A.W.S./C.W.I. with a minimum of 10 years experience or an A.S.N.T. Level III with a minimum of 10 years experience. These individuals shall satisfy the following requirements:
1) Technical I: Non-destructive Testing Technician S.N.T.-TC-1A Level I, and/or A.W.S. Certified Associate Weld Inspector (C.A.W.I.)
2) Technical II: Non-destructive Testing Technician A.S.N.T. TC-1A Level II, (NDE Technician II), A.W.S./C.A.W.I., with minimum 3 years experience, or an A.W.S./C.W.I.
3) Technical III: A.S.N.T. Level III with a minimum of 10 years experience or an A.W.S./C.W.I. with a minimum of 10 years experience.

h. Special Inspector – Structural
1) Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in design of structural systems of this type. Inspections shall be performed under the direct supervision of a Structural II.
2) Structural II: Civil/structural engineer regularly engaged in the design of structural systems of this type, licensed in the state in which the project is located. The licensed engineer shall review and approve all inspection reports.
3) Special Inspectors - Structural may be an employee of the SER.

3. Structural Testing and Special Inspection Requirements (Item and Frequency and Qualifications)
a. High Strength Bolting (Field Installed):
1) General
(a) On a periodic basis, visually inspect mating surfaces and bolt type for all slip-critical bolted connections for general conformance with the contract documents prior to bolting.
(b) Determine the requirements for bolts, nuts, washers, paint and installation/tightening standards are met.
(c) Observe calibration procedures when such procedures are required in the contract documents and verify that selected procedure is used to tighten bolts. Technical II
2) Slip Critical Bolts and Tension Bolts
(a) Test bolt tightening in 10% of all bolts. Test a minimum of two bolts in each connection. Verify that all plies of connected elements have been brought into contact, at 100% of
connections. Verify all tips are removed from "twist"-off bolts. Technical II

3) Bearing Bolts
   (a) On a periodic basis, visually inspect to confirm all plies of connected elements have been brought into contact, at 100% of connections. (Applies only to bolts designed for values not requiring exclusion of threads from failure plane, all other bolts require testing as for tension bolts.) Technical II

4) Standard
   (a) Test High Strength bolted connections per R.C.S.C. "Specifications for Structural Joints Using ASTM A325 or A490 Bolts."

b. High Strength Bolting (Shop Installed):
   1) For shop fabricated work, perform tests required for field installation, except that bolt testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, or is approved by building official and SER.

c. Welding (General): The Special Inspector shall perform the following on a periodic basis:
   1) Prior to start of fabrication determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
   2) Verify qualifications of all welders as AWS certified.
   3) Verify Manufacturer’s certificate of compliance for weld filler materials.
   4) Verify proposed welding procedures and materials.
   5) Verify adequate preparation of faying surfaces.
   6) Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required. Technical II

d. Welding (Field):
   1) Fillet Welds: On a periodic basis, visually inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1. Technical II
   2) Partial Penetration Welds: Test 100% of all partial penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1. Test 25% of all partial penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld. Technical II
   3) Full Penetration Welds: Test 100% of all full penetration welds exceeding 5/16 inch, using Ultrasonic Testing per A.W.S. D1.1. Test 25% of all full penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E-109, performed on root pass and on finished weld. Technical II
   4) Stud Shear Connector Welds: Visually inspect 100% of installed studs for full 360° flash. Test all questionable studs, not showing full 360° flash by bending studs to 15° from vertical, away from weld discontinuity, per AWS D1.1. All ceramic welding ferrules shall be removed by contractor. Randomly test all other studs by bending to 15° from vertical as noted:
      (a) Studs welded thru deck 15%.
      (b) Studs welded to bare steel 5%.
(c) Alternatively, sound 100% of installed studs, for full penetration weld, using an 8 lb. maul. Test questionable studs as noted above. Welding ferrules need not be removed. Technical I.

5) Steel Joist/Joist Girder Welds: Provide testing and inspection for field welds previously described.

6) Deck Welds: On a periodic basis, visually inspect size, location, length and burn thru for 100% of puddle welds on metal deck designed as a structural element, per AWS D1.3. Technical I.

7) Cold Formed Metal Framing Welds: On a periodic basis, visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element. Technical I.

8) Welding of Reinforcing Bars: Visually inspect 100% of all reinforcing bar welds as the welding is performed, per AWS D1.4.
   (a) Verify weldability of reinforcing steel other than ASTM A706.
   (b) Verify proper joint preparation is provided and proper electrodes are used and properly stored and dried. Technical II.

9) Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.

e. Welding (Shop):
   1) Perform inspections as for field welding except weld testing may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, and is approved by building official and SER.

f. Mechanical Fasteners (Misc.):
   1) Fasteners: Visually inspect specified size, spacing, embedment, and location. Technical I.

g. Structural Configuration:
   1) Submittals: Verify mill test reports and other submitted documentation, for compliance with contract document. Structural I.

   2) Materials: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:
      (a) Structural Steel
      (b) Bolts
      (c) Electrodes
      (d) Mechanical fasteners
      (e) Deck gauge Technical I.

   3) Detail Compatibility. On a periodic basis:
      (a) Review project documents affecting integrity of the structure, including contract documents and pertinent submittals (approved shop drawings).
      (b) Visit site, at intervals appropriate to the stage of construction, to perform review of the structure and visually confirm general compliance with the project documents.

      (c) Inspect the following to verify member orientation, configuration, type, and size complies with details indicated on the contract documents an approved shop drawings:
         (1) Bracing and stiffening members.
(2) Proper applications of joint details at connections for structural members.
(3) Other work critical to the integrity of the building structure.

4. Conventional Testing and Inspection Requirements (Item and Frequency and Qualifications)
a. High Strength Bolting
   1) Bolt Material Test: Test a minimum of two bolts of each ASTM class specified, for bolt hardness and tensile properties. SNT-TC-1A
   2) Fabrication and Erection Tolerances: Verify in-place structure satisfies specified tolerances.

END OF SECTION 01 35 10
**Special Structural Testing and Inspection Program Summary Schedule**

**Project Name:** MSU Clinical Sciences Building  
**Project No.:** 14-16466  
**Location:** Mankato, Minnesota  
**Permit No.:** ______ (1)

<table>
<thead>
<tr>
<th>Technical (2)</th>
<th>Description (3)</th>
<th>Type of Inspector (4)</th>
<th>Specific Report Frequency (5)</th>
<th>Assigned Firm (6)</th>
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<td>Soils</td>
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<td>IBC Table 1704.7</td>
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<td>Cast-In-Place Concrete</td>
<td>TA</td>
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<td>05 1200</td>
<td>Welding</td>
<td>SI-T</td>
<td>IBC Table 1704.3</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** This schedule shall be filled out and included in a Special Structural Testing and Inspection Program.  
(If not otherwise specified, assumed program will be “Guidelines for Special Inspection & Testing” as contained in the State Building Code and as modified by the state adopted IBC.)  
*A complete specification-ready program can be downloaded directly by visiting CASE/MN at www.cecm.org*

(1) Permit No. to be provided by the Building Official  
(2) Referenced to the specific technical scope section in the program.  
(3) Use descriptions per IBC Chapter 17.  
(4) Special Inspector – Technical (SIT); Special Inspector – Structural (SIS)  
(5) Weekly, monthly, per test/inspection, per floor, etc. Per section 01 3510 of spec book.  
(6) Name of Firm contracted to perform services.

**ACKNOWLEDGEMENTS**  
(Each appropriate representative shall sign below)

Owner: ___________________________ Firm: ___________________________ Date: ________________
Contractor: ______________________ Firm: ___________________________ Date: ________________
Architect: ________________________ Firm: ___________________________ Date: ________________
SER: _____________________________ Firm: ___________________________ Date: ________________
SI-S: ____________________________ Firm: ___________________________ Date: ________________
TA: _______________________________ Firm: ___________________________ Date: ________________
SI-T: _____________________________ Firm: ___________________________ Date: ________________

If requested by engineer/architect of record or building official, the individual names of all prospective special inspectors and the work they intend to observe shall be identified as an attachment.

Legend:  
SER = Structural Engineer of Record  
SI-T = Special Inspector - Technical  
SI-S = Special Inspector - Structural  
TA = Testing Agency  
F = Fabricator

Accepted for the Building Department By ___________________________ Date __________________
SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

1.1 USE CHARGES
   A. Sewer Service: Pay charges.
   C. Electric Power Service: Pay charges.
   D. Sewer, Water, and Electric Power Service: Use charges are specified in Division 01 Section "Multiple Contract Summary."

1.2 INFORMATIONAL SUBMITTALS
   A. Erosion- and sedimentation-control plan.
   B. Moisture-protection plan.
   C. Dust-control and HVAC-control plan.

1.3 MATERIALS
   A. Chain-link fencing.
   B. Portable chain-link fencing.

1.4 TEMPORARY FACILITIES
   A. Common-Use Field Office: Prefabricated or mobile units, including conference room.
   B. Storage and fabrication sheds.

1.5 EQUIPMENT
   A. Fire extinguishers.
   B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained heaters with individual space thermostatic control.
      1. Permanent HVAC System: If Owner authorizes use of HVAC system, provide filter with MERV of 8 at each return air grille and clean HVAC system.
C. Air Filtration Units: HEPA filter-equipped portable units. Configure to run continuously.

1.6 TEMPORARY UTILITY INSTALLATION

A. Sewers and drainage.
B. Water service: Connect to existing service.
C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water.
D. Heating: Provide temporary heating required by construction activities.
E. Isolation of work areas in occupied facilities.
F. Ventilation and humidity control.
G. Electric Power Service: Connect to adjacent building existing E.S. substation; provide temporary electric power required by construction activities.
H. Lighting: Provide temporary lighting.
I. Telephone Service: Provide temporary telephone service in common-use facilities.
J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications.

1.7 SUPPORT FACILITIES INSTALLATION

A. Temporary Roads and Paved Areas: Locate temporary roads and paved areas as indicated on Drawings.
B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas.
C. Parking: Provide temporary parking areas.
D. Dewatering Facilities and Drains: Maintain Project site, excavations, and construction free of water.
E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
F. Temporary Elevator Use: Refer to Division 14 Sections.
1.8 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Temporary erosion and sedimentation control.

B. Stormwater control.

C. Tree and plant protection.

D. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site.

E. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to separate areas occupied by Owner from fumes and noise.
TEMPORARY FACILITIES AND CONTROLS

END OF SECTION 01 50 00
SECTION 01 57 14

STORM WATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.1 SUMMARY
A. This section summarizes the requirements of the Contractor to comply with the Storm Water Pollution Prevention Plan (SWPPP) as designed in compliance with the Minnesota Pollution Control Agency’s General Storm Water Permit for Construction Activity.
B. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to temporary erosion control as indicated on the plans or as specified herein or directed by the Architect.

1.2 GENERAL STORM WATER PERMIT FOR CONSTRUCTION ACTIVITY
A. A MPCA General Storm Water Permit will be prepared and submitted by the Contractor. The cost of the permit shall be paid by the Contractor and included in the bid. The Owner shall be a cosigner to the permit.

1.3 METHOD OF MEASUREMENT AND PAYMENT
A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:
   1. Payment for Temporary Erosion Control shall be incidental to the project and shall be considered full compensation for furnishing, installing, maintaining, and removing the materials.
   2. Payment for Preassembled Silt Fence, Inlet Protection, and other measures shall be paid for individually only if a provision is made for the item in the proposal.
B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the lump sum bid for the associated erosion control and excavation items. Such items of work include but are not limited to:
   1. Complying with the MPCA’s "General Storm Water Permit for Construction Activity", where applicable.
   2. Maintaining clean exit areas or roads from the site.
   3. Sweeping adjacent streets clean of excess soil.

1.4 SPECIFICATION REFERENCES
A. MnDOT Specification Sections 1717 and 2573 shall apply to the construction of temporary erosion control, except as modified herein.
B. Unless otherwise noted, the provisions in this section are in addition to the referenced specification.
PART 2 - PRODUCTS

2.1 MATERIALS
   A. No exception to the referenced specification is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS
   A. The Contractor shall install erosion control devices where control is required and/or where directed by the Architect.
   B. Inlet Protection shall be used around catch basins and/or other surface water accesses to any existing or proposed storm water conveyance system.
   C. The Contractor shall take all steps necessary to prevent excess soil erosion of the project. Temporary erosion control devices shall be constructed, maintained, and left in place to such time as permanent erosion control measures are in place or instructed to remove them by the Architect. Exit areas or roads shall be kept clean of excess soil by routine sweeping.
   D. Where necessary, the Contractor shall stockpile a sufficient quantity of suitable fill material to regrade sedimentation ponds and temporary ditches to match the grade of the surrounding area.

END OF SECTION 01 57 14
SECTION 01 60 00

PRODUCT REQUIREMENTS

1.1 ACTION SUBMITTALS

A. Comparable Product Requests: Architect will notify Contractor of approval or rejection within 15 days of receipt of request, or seven days of receipt of additional information.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Use means and methods that will prevent damage, deterioration, and loss, including theft.

B. Store products to allow for inspection and measurement or counting of units.

C. Provide for storage of materials and equipment by Owner.

1.3 PRODUCT WARRANTIES

A. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1.4 PRODUCT SELECTION PROCEDURES

A. Product Selection Procedures:

1. Product: Product named that complies with requirements.

2. Manufacturer/Source: Product by manufacturer or from source named that complies with requirements.

3. Products: One of the products listed that complies with requirements. Comparable products will not be considered, unless otherwise indicated.

4. Manufacturers: Product by one of the manufacturers listed that complies with requirements. Comparable products will not be considered, unless otherwise indicated.

5. Basis-of-Design Product: Either the specified product or a comparable product by one of the other named manufacturers.


7. Visual Selection Specification: Product (and manufacturer) that complies with other specified requirements. Architect will select color, gloss, pattern,
density, or texture from manufacturer's product line that includes both standard and premium items.

1.5 COMPARABLE PRODUCTS

A. Conditions for Consideration:

1. Product does not require revisions to the Contract Documents, is consistent with the Contract Documents and will produce the indicated results, and is compatible with other portions of the Work.
2. Comparison of proposed product with those named in the Specifications.
3. Product provides specified warranty.
4. Similar installations, if requested.
5. Samples, if requested.

END OF SECTION 01 60 00
SECTION 01 73 00

EXECUTION

1.1 INFORMATIONAL SUBMITTALS

A. Qualification data.

B. Certificates: Signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and patching plan.

D. Certified Surveys: Signed by land surveyor.

E. Final property survey.

1.2 EXECUTION

A. Existing Conditions: Existence and location of site improvements, utilities, and other construction affecting the Work must be investigated and verified.

B. Review of Contract Documents and field conditions.

C. Construction Layout: Engage a land surveyor to lay out the Work using accepted surveying practices.

D. Field Engineering: Owner will identify existing benchmarks, control points, and property corners. Locate existing permanent benchmarks, control points, and similar reference points.

   1. Benchmarks: Establish two permanent benchmarks on Project site.
   2. Certified survey of construction and sitework.
   3. Final property survey.

E. Installation: Comply with manufacturer's written instructions.

1.3 CUTTING AND PATCHING

A. Provide temporary support.

B. Protect in-place construction.

C. Protect adjacent occupied areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Prevent interruption to occupied areas.
E. Cutting: In general, use hand or small power tools. Cut holes and slots neatly to minimum size required. Temporarily cover openings when not in use.

F. Patching: Patch with durable seams that are as invisible as practicable. Restore exposed finishes.

1.4 OWNER-INSTALLED PRODUCTS

A. Provide access to Project site for Owner's personnel.

B. Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable.

C. Include Owner's personnel at preinstallation conferences.

1.5 PROGRESS CLEANING

A. Clean Project site and work areas daily. Dispose of materials lawfully.

B. Keep installed work clean.

C. Remove debris from concealed spaces.

1.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation.

B. Adjust equipment for proper operation.

1.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure Work is without damage.

1.8 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces if not repaired without visible evidence of repair.

END OF SECTION 01 73 00
SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.1 SUMMARY

A. Salvaging nonhazardous demolition and construction waste and packaging.
B. Recycling nonhazardous demolition and construction waste and packaging.
C. Disposing of nonhazardous demolition and construction waste and packaging.

1.2 PERFORMANCE REQUIREMENTS

B. End-of-Project Rate for return or reuse of packaging materials, Salvage/Recycling: 50 percent of Packaging Materials.

1.3 WASTE MANAGEMENT PLAN

A. Types and quantities of demolition site-clearing and construction waste.
B. Type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.
C. Net additional cost or net savings resulting from waste management plan.

1.4 PLAN IMPLEMENTATION

A. Engage a waste management coordinator.
B. Train workers, subcontractors, and suppliers on proper waste management procedures.
D. Recycling Incentives: Revenues and other incentives for recycling will accrue to Contractor.
END OF SECTION 01 74 19
SECTION 01 77 00
CLOSEOUT PROCEDURES

1.1 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection, complete the following.

1. List of incomplete items (punch list) prepared.
   a. Submit PDF electronic file.

2. Owner advised of pending insurance changeover.
3. Warranties, maintenance service agreements, and similar documents submitted.
4. Releases, occupancy permits, and operating certificates submitted.
5. Project Record Documents submitted.
6. Tools, spare parts, and extra materials delivered.
7. Final changeover of locks performed.
8. Startup testing completed.
10. Temporary facilities removed.
11. Owner advised of heat and utility changeover.
13. Final cleaning performed.
14. Touchup performed.

1.2 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection, complete the following:

1. Final Application for Payment submitted.
2. List of incomplete items (punch list) endorsed by Architect as completed or otherwise resolved for acceptance.
3. Evidence of continuing insurance coverage submitted.
5. Owner’s personnel instructed in operation, adjustment, and maintenance of equipment and systems.

1.3 WARRANTIES

A. Partial Occupancy: Submit warranties within 15 days of completion of designated portions of the Work that are occupied or used by Owner.

CLOSEOUT PROCEDURES
01 77 00 - 2

C. Scan warranties and bonds into a single indexed electronic PDF file.

1.4 FINAL CLEANING

A. Each surface or unit cleaned to condition expected in an average commercial building cleaning and maintenance program.

B. Replace disposable air filters and clean permanent air filters.

C. Clean ducts, blowers, and coils if units were operated without filters during construction.


END OF SECTION 01 77 00
SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

1.1 SUMMARY

A. Emergency operation and maintenance manuals.

1.2 PRODUCTS

A. Format:

1. PDF electronic files with composite electronic index on digital media acceptable to Architect and Owner. Include a complete electronically-linked operation and maintenance directory.
2. Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, 2 set(s) of copies.

B. Emergency Manuals: Types of emergencies, emergency instructions, and emergency procedures.

C. Operation Manuals: System, subsystem, and equipment descriptions, operating procedures, wiring diagrams, control diagrams and sequence of operation, and piped system diagrams.

D. Product Maintenance Manuals: Source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds.

E. Systems and Equipment Maintenance Manuals: Source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds.
SECTION 01 78 39

PROJECT RECORD DOCUMENTS

1.1 PRODUCTS

A. Record Drawings:
   1. One set(s) of marked-up record prints.
   2. Initial Submittal: One paper copy set and PDF electronic files of marked-up record prints and one set(s) of plots from corrected record digital data files.
   3. Final Submittal: Submit one paper copy set PDF electronic files of marked-up record prints, one set(s) of record digital data files, and three set(s) of record digital data file plots.

B. Record Specifications: One paper copy and Annotated PDF electronic files.

C. Record Product Data: One paper copy and Annotated PDF electronic files and directories.

D. Miscellaneous Record Submittals: One paper copy and Annotated PDF electronic files and directories.

1.2 PRODUCTS

A. Record Prints: One set of paper copies of Contract Documents and Shop Drawings, marked to show actual installation.

B. Record Digital Data Files: Corrected digital data files of the Contract Drawings, as follows:
   1. Format: One of the following formats, as required by the Owner.
      b. RVT, Version: 2014, operating in Microsoft Windows operating system.
END OF SECTION 01 78 39
SECTION 01 79 00

DEMONSTRATION AND TRAINING

1.1 INSTRUCTION PROGRAM

A. Program Structure: Training modules for each system and for equipment not part of a system, including the following:

1. Basis of system design, operational requirements, and criteria.
2. Documentation.
3. Emergencies.
5. Adjustments.
6. Troubleshooting.
7. Maintenance.
8. Repairs.

B. Facilitator to prepare instruction program and training modules and to coordinate instructors.

C. Evaluation: Written or Demonstration performance-based test.
CHAPTER 01 81 13
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures related to B3 MSBG requirements and needed for Project to obtain compliance with B3 MSBG Version 2.0.

1. Other criteria needed to obtain B3 MSBG compliance depend on material selections and may not be specifically identified. Compliance with requirements needed to obtain B3 MSBG compliance may be used as one criterion to evaluate substitution requests and comparable product requests.

2. Additional criteria needed to obtain the indicated B3 MSBG compliance depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

3. A copy of the B3 MSBG compliance checklist will be attached at the end of this Section for information only.

B. Related Sections:

1. Divisions 01 through 33 Sections for sustainable design requirements specific to the work of each of these Sections. Requirements may or may not include reference to B3 MSBG.

1.2 DEFINITIONS

A. B3 MSBG: Buildings, Benchmarks, and Beyond: Minnesota Sustainable Building Guidelines.

B. Rapidly Renewable Materials: Materials made from plants that are typically harvested within a 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

C. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 250 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

D. Regionally Manufactured Materials: Materials that are manufactured within a radius of 250 miles from Project site. Manufacturing refers to the final assembly of components into the building product that is installed at Project site.
E. Regionally Extracted and Manufactured Materials: Regionally manufactured materials made from raw materials that are extracted, harvested, or recovered within a radius of 250 miles from Project site.

F. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

G. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

1.3 SUBMITTALS

A. General: Submit additional B3 MSBG compliance submittals required by other Specification Sections.

B. B3 MSBG compliance submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated B3 MSBG compliance requirements.

C. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project, excluding mechanical, electrical, and plumbing components, and specialty items such as elevators and equipment. Include statement indicating total cost for wood-based materials used for Project.

D. B3 MSBG Compliance Action Plans: Provide preliminary submittals within 30 days of date established for the Notice to Proceed indicating how the following requirements will be met:

1. Waste management plan complying with Division 01 Section "Construction Waste Management and Disposal."
2. Construction indoor-air-quality management plan.
E. B3 MSBG Compliance Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with B3 MSBG compliance action plans for the following:

1. Waste reduction progress reports complying with Division 01 Section "Construction Waste Management and Disposal."
2. Salvaged and refurbished materials.

F. B3 MSBG Compliance Documentation Submittals:

1. Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over time.
2. Comply with Division 01 Section "Construction Waste Management and Disposal."
3. Receipts for salvaged and refurbished materials used for Project, indicating sources and costs for salvaged and refurbished materials.
4. Construction IAQ Management Plan:
   a. Construction indoor-air-quality management plan.
   b. Product data for temporary filtration media.
   c. Product data for filtration media used during occupancy.
   d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
   e. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
   f. Product data for filtration media used during flush-out and during occupancy.
   g. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.
5. Modular Office Furnishings: Manufacturers shall comply with the most current version of the document “State of California Office Furniture Systems INDOOR AIR QUALITY-VOC EMISSIONS” Dated June 7, 2006, and must send a sign letter affirming that the product to be provided have been tested to comply with this standard within a year of delivery to the project.

1.4 QUALITY ASSURANCE

A. B3 MSBG Compliance Coordinator: Engage an experienced professional to coordinate B3 MSBG compliance requirements. Coordinator may also serve as waste management coordinator.
PART 2 - PRODUCTS

2.1 LOW-EMITTING MATERIALS

A. All interior materials (including but not limited to: flooring adhesives, sealants, and concrete sealers, carpets, resilient flooring, wood flooring, paints, thermal and acoustical insulation products, gypsum board, acoustical ceilings, acoustical wall panels, cabinetry, composite wood subflooring, and furnishings) shall be certified to comply with the most current Indoor Air Quality portion of California Section 01350 standard.

B. All modular office furnishings shall comply with the most current version of the document “State of California Office Furniture Systems INDOOR AIR QUALITY-VOC EMISSIONS” Dated June 7, 2006.

C. Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 MEASUREMENT AND VERIFICATION

A. Implement measurement and verification plan consistent with [Option B: Energy Conservation Measure Isolation] [Option D: Calibrated Simulation, Savings Estimation Method 2] in the EVO's "International Performance Measurement and Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction," and as further defined by the following:

B. If not already in place, install metering equipment to measure energy usage. Monitor, record, and trend log measurements.

C. Evaluate energy performance and efficiency by comparing actual to predicted performance.

D. Measurement and verification period shall cover at least one year of postconstruction occupancy.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Comply with Division 01 Section "Construction Waste Management and Disposal."

3.3 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT


SUSTAINABLE DESIGN REQUIREMENTS
01 81 13-4
B. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.

2. Replace all air filters immediately prior to occupancy.

3. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.

4. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.

5. Air-Quality Testing:
   a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air,"
   b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
      1) Formaldehyde: 50 ppb.
      2) Particulates (PM10): 50 micrograms/cu. m.
      3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
      4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
      5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
   c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.
   d. Air-sample testing shall be conducted as follows:
      1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation
system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.

2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.

3) Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.

4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

3.4 CORRECTION PERIOD AIR QUALITY MANAGEMENT PLAN

A. Correction Period Air Quality Management Plan:

1. The Correction Period Air Quality Management Plan is part of the Design and Construction Commissioning Plan and shall involve periodic indoor air quality testing. Evaluate building air quality three months, six months, and ten months after occupancy with testing that verifies ventilation system is better than or within design guidelines.

B. Three Month Building Air Quality Evaluation & Modifications

1. Three months into the Correction Period measure the key factor that determines ventilation rate for building (major pollutant and/or CO2) in all building occupied zones. “Occupied zones” shall be, at a minimum, one per air handling system. No single “occupied zone” shall be greater than 5,000 square feet. building (major pollutant and/or CO2) in all building occupied zones. “Occupied zones” shall be, at a minimum, one per air handling system. No single “occupied zone” shall be greater than 5,000 square feet. The testing plan shall take into account high occupancy spaces and the locations of specific pollutant sources and shall not necessarily depend on combined/average return air concentrations at each airhandler.

a. Record CO2 concentrations in each zone. If using ventilation strategy B or C, compare to expected value for this zone.

b. If using ventilation strategy B or C and CO2 levels are above expected values, additional ventilation must be provided until concentrations fall below these levels.

C. Six Month Building Air Quality Evaluation & Modifications
1. Six months into the Correction Period repeat the Indoor Air Quality testing performed at three months and make any necessary correction until concentrations fall below action levels.

D. Ten Month Building Air Quality Evaluation & Modifications

1. Ten months into the Correction Period repeat the Indoor Air Quality testing performed at ten months and make any necessary correction until concentrations fall below expected levels

3.5 CORRECTION PERIOD USER COMFORT & SATISFACTION ASSESSMENT

A. Correction Period User Comfort & Satisfaction Assessment Plan

1. The Correction Period User Comfort & Satisfaction Assessment Plan is part of the Design and Construction Commissioning Plan and shall involve periodic occupant surveys. Assess comfort and satisfaction via occupant surveys three months and ten months after occupancy. A similar survey during the move-in process is recommended.

2. Issues for assessment include the following areas outlined in the IEQ Guidelines:

   a. Air Quality (I.4)
   b. Thermal Comfort (I.5)
   c. Access to Daylight, Quality of lighting, View space and window access (I.8, I.9, I.10)
   d. Vibrations, Acoustics and Noise (I.11, I.12)
   e. Personal Control of IEQ conditions and impacts (I.13)
   f. Opportunities and encouragement for healthful physical activity (I.14.)

B. Three Month Occupant Survey

1. Three months into the Correction Period conduct the first User Comfort & Satisfaction Survey as defined in the Assessment Plan.

C. Ten Month Occupant Survey

1. Ten months into the Correction Period conduct the second User Comfort & Satisfaction Survey as defined in the Assessment Plan.
END OF SECTION 01 81 13
### Compliance Summary Form - Assignments and Status

#### B3 Minnesota Sustainable Building Guidelines—VERSION 2.2

**Project Name:** Minnesota State University, Mankato - Clinical Sciences Building  
**Project Address:**

Schematic Design - May 8, 2013  
57,500 square feet of new construction

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<th>PREDENGE-SITE SELECTION</th>
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<th>DESIGN DEVELOPMENT</th>
<th>CONSTRUCTION DOCUMENTS</th>
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<td>P4D Scope of items to be commissioned</td>
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<td>P4E Scope: plumbing, interior materials, envelope, acoustics</td>
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**SITE AND WATER**

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<td>S2D</td>
<td>Design to remove 60% of total phosphorous (TP)</td>
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<td>S2I</td>
<td>Abstract all storm water on Type D soils</td>
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<td>S2J</td>
<td>Abstract all storm water on sites within or adjacent to wellhead areas</td>
<td>Y</td>
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<td>S2K</td>
<td>All stormwater BMPs to have O &amp; M manuals</td>
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<td>S2L</td>
<td>Maintain or increase infiltration rates from pre-project site</td>
<td>Y</td>
<td>X</td>
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<td>S2M</td>
<td>Design Treatment System to remove solids &amp; phosphorus</td>
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<td>S2N</td>
<td>Implement a stormwater management plan</td>
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<td>S3</td>
<td>Soil Management</td>
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<td>S3A</td>
<td>Create a Soil Management Plan</td>
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<td>S3B</td>
<td>Limit site disturbance</td>
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<td>Maintain 350 ft. buffer for delineated wetland boundaries</td>
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<td>S3D</td>
<td>Protect all trees as individuals or in groups</td>
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<td>S3E</td>
<td>Mitigate all compaction impacts during construction</td>
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<td>S3F</td>
<td>Do not sell or export any topsoil from project site</td>
<td>Y</td>
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<td>S3G</td>
<td>Maintain mycorrhizae populations in topsoil stockpiles</td>
<td>Y</td>
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<td>S3H</td>
<td>Inoculate all future planting areas with mycorrhizae</td>
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<td>S3I</td>
<td>For trees in hardsurface maintain 500 cubic feet of soil</td>
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<td>S3J</td>
<td>Maintain soil porosity</td>
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<td>S4</td>
<td>Sustainable Vegetation Design</td>
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<tr>
<td>S4A</td>
<td>Maintain site functions and biodiversity for 50% of site area</td>
<td>Y</td>
<td>X</td>
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<tr>
<td>S4B</td>
<td>Make 75% of all trees and vegetated area from native material</td>
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<tr>
<td>S4C</td>
<td>Maintain or supplement tree trunk area on the site</td>
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<td>S4D</td>
<td>If guideline S.1A is not met, implement a protection plan</td>
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<td>X</td>
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<td>S4E</td>
<td>If guideline S.1C is not met, implement a protection plan</td>
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<td>S4F</td>
<td>If guideline S.1D is not met, implement a protection plan</td>
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<td>S4G</td>
<td>Identify and mitigate invasive species</td>
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<td>S4H</td>
<td>Maintain site functions and biodiversity for 90% of site area</td>
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<tr>
<td>S5A</td>
<td>Light trespass: Do not exceed specified illuminance values</td>
<td>Y</td>
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<tr>
<td>S5B</td>
<td>Reduce upward emissions of light with cutoff fixtures</td>
<td>N</td>
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<tr>
<td>S5C</td>
<td>Create outdoor lighting control zones and devices</td>
<td>N</td>
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<tr>
<td>S5D</td>
<td>Use lamps with color spectrum closer to daylight for safety</td>
<td>N</td>
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</table>

S.2 Stormwater Management

S2A. Meet runoff rate
S2B. Create Micro catchments
S2C. Design to remove 80% of total suspended solids (TSS)
S2D. Design to remove 60% of total phosphorous (TP)
S2I. Abstract all storm water on Type D soils
S2J. Abstract all storm water on sites within or adjacent to wellhead areas
S2K. All stormwater BMPs to have O & M manuals
S2L. Maintain or increase infiltration rates from pre-project site
S2M. Design Treatment System to remove solids & phosphorus
S2N. Implement a stormwater management plan

S.3 Soil Management

S3A. Create a Soil Management Plan
S3B. Limit site disturbance
S3C. Maintain 350 ft. buffer for delineated wetland boundaries
S3D. Protect all trees as individuals or in groups
S3E. Mitigate all compaction impacts during construction
S3F. Do not sell or export any topsoil from project site
S3G. Maintain mycorrhizae populations in topsoil stockpiles
S3H. Inoculate all future planting areas with mycorrhizae
S3I. For trees in hardsurface maintain 500 cubic feet of soil
S3J. Maintain soil porosity

S.4 Sustainable Vegetation Design

S4A. Maintain site functions and biodiversity for 50% of site area
S4B. Make 75% of all trees and vegetated area from native material
S4C. Maintain or supplement tree trunk area on the site
S4D. If guideline S.1A is not met, implement a protection plan
S4E. If guideline S.1C is not met, implement a protection plan
S4F. If guideline S.1D is not met, implement a protection plan
S4G. Identify and mitigate invasive species
S4H. Maintain site functions and biodiversity for 90% of site area

S.5 Light Pollution Reduction

S5A. Light trespass: Do not exceed specified illuminance values
S5B. Reduce upward emissions of light with cutoff fixtures
S5C. Create outdoor lighting control zones and devices
S5D. Use lamps with color spectrum closer to daylight for safety

S.6 Erosion and Sedimentation Control During Construction
<table>
<thead>
<tr>
<th>No.</th>
<th>Guideline</th>
<th>Requisite</th>
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<tbody>
<tr>
<td>S6A</td>
<td>Leave no soil open for greater than 48 hours</td>
<td>Y</td>
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<tr>
<td>S6B</td>
<td>Repair and cover erosion-damaged areas within 6 hours of storm</td>
<td>Y</td>
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<tr>
<td>S6C</td>
<td>Create a Storm Water Pollution Prevention Plan and submit</td>
<td>Y</td>
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<tr>
<td>S6D</td>
<td>Enact a fine structure for all erosion control infractions</td>
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<tr>
<td>S6E</td>
<td>Identify and protect all downstream (TMDL) impaired waters</td>
<td>Y</td>
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<tr>
<td>S6F</td>
<td>Limit sediment discharge</td>
<td>Y</td>
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<tr>
<td>S6G</td>
<td>Maintain Temporary Erosion Control</td>
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<tr>
<td>S7A</td>
<td>Reduce potable water use for irrigation by 50%</td>
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<tr>
<td>S7B</td>
<td>Reduce potable water use for irrigation by 100%</td>
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<tr>
<td>S8A</td>
<td>Reduce potable water use for irrigation by 50%</td>
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<tr>
<td>S8B</td>
<td>Reduce potable water use for irrigation by 100%</td>
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<tr>
<td>S9A</td>
<td>Select a site with the most comprehensively positive impact</td>
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<tr>
<td>S9B</td>
<td>Maintain or improve upon site land use type and condition</td>
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<tr>
<td>S9C</td>
<td>Maintain or increase density in urban/suburban locations</td>
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<tr>
<td>S9D</td>
<td>Maintain or increase open space</td>
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<tr>
<td>S9E</td>
<td>Maintain or increase Green Corridors</td>
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<tr>
<td>S10A</td>
<td>Redevelop Brownfield sites</td>
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<tr>
<td>S10B</td>
<td>Provide remediation as required</td>
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<td>S10C</td>
<td>Develop a site classified as a Brownfield into a Green space</td>
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<tr>
<td>S11A</td>
<td>Provide high reflectance paving or shading on 50% of the site</td>
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<tr>
<td>S11B</td>
<td>Use high-reflectance roofing OR a green roof</td>
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<tr>
<td>S12A</td>
<td>Locate 1/4 mile from mass transit, retail and public services</td>
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<tr>
<td>S12B</td>
<td>Locate project 1/4 mile from restaurants and service facilities</td>
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<tr>
<td>S12C</td>
<td>Provide-securing bicycle storage and changing/shower facilities</td>
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<tr>
<td>S12D</td>
<td>Install alternative-fuel refueling station(s)</td>
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<tr>
<td>S12E</td>
<td>Limit parking area and encourage shared parking with other uses</td>
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<tr>
<td>S12F</td>
<td>Provide preferred parking for hybrid vehicles, carpool or van pools</td>
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<tr>
<td>S12G</td>
<td>Locate preferred parking, bicycle parking, near building entrances</td>
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<td>S12H</td>
<td>Offer work pattern alternatives such as telecommuting</td>
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<tr>
<td>S12I</td>
<td>Set a company policy to buy carbon emission offsets for air travel</td>
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<td>S12J</td>
<td>Offer free or discounted bus or train passes</td>
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<td>S12K</td>
<td>Track travel pollution impacts in annual environmental report</td>
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<td>S13A</td>
<td>Reduce black water entering municipal system by 50%</td>
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<td>E.1</td>
<td>Reduce Energy Use by at least 30%</td>
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<td>E1C</td>
<td>Meet SB 2030 Energy Standards</td>
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<td>E1D</td>
<td>Document predicted energy use by type</td>
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<td>E.2</td>
<td>Evaluate Renewable and Distributed Energy Generation</td>
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<td>E2A</td>
<td>Provide 2% energy demand with on-site wind or solar</td>
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<td>E2B</td>
<td>Provide 10% energy needs with renewables</td>
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<td>E2C</td>
<td>Provide 100% of energy needs with renewables</td>
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<td>E.3</td>
<td>Efficient Equipment and Appliances</td>
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<td>E3A</td>
<td>Select Energy Star equipment and appliances</td>
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<td>E.4</td>
<td>Atmospheric Protection</td>
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<tr>
<td>E4A</td>
<td>Achieve an atmospheric Lifetime (AtL) &lt; 33</td>
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<td>E4B</td>
<td>Achieve an Ozone Depletion Potential (ODP) &lt; 0.034</td>
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<td>E4C</td>
<td>Achieve a Global Warming Potential (GWP) &lt; 3500</td>
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<td>E4D</td>
<td>Design, maintain and operate to reduce refrigerant leakage</td>
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<td>I.1</td>
<td>Restrict Environmental Tobacco Smoke</td>
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<td>I1A</td>
<td>Establish a no smoking policy for the building</td>
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<td>I1B</td>
<td>Designate outdoor smoking areas in smoking policy</td>
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<td>I1C</td>
<td>Indicate the no smoking building assumption in design documentation</td>
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<td>I1D</td>
<td>Design smoking and non-smoking areas outside the building</td>
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<td>I.2</td>
<td>Specify Low-emitting Materials</td>
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<td>I2A</td>
<td>Comply with limits for indoor air pollutants</td>
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<td>I2B</td>
<td>Comply with Calif. Office Furniture Systems IAQ-VOC requirements</td>
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<td>I.3</td>
<td>Moisture Control</td>
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<td>I3A</td>
<td>Design the building envelope to resist moisture penetration</td>
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<td>I3B</td>
<td>Keep the indoor dew point below 35°F(2°C)</td>
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<td>I3C</td>
<td>Specify moisture content of materials used in construction</td>
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<td>Ventilation Design</td>
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<td>I4A</td>
<td>Control Radon using source prevention techniques</td>
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<td>I4B</td>
<td>Meet ASHRAE ventilation standard 62.1 a baseline</td>
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<td>I4C</td>
<td>Monitor CO2 concentrations continuously</td>
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<td>I4D</td>
<td>Keep CO2 levels below 450 ppm above outdoor concentrations</td>
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<td>I.5</td>
<td>Thermal Comfort</td>
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<tr>
<td>I5A</td>
<td>Maintain temperature less than 80°F and greater than 64°F</td>
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<tr>
<td>I5B</td>
<td>Maintain the wall, floor, and ceiling surface temps. within 20 °F</td>
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<tr>
<td>I5C</td>
<td>Maintain air velocity greater than or equal to 10 fpm</td>
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<tr>
<td>I5D</td>
<td>Maintain relative humidity (RH) between 20% and 50%</td>
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<td>I5E</td>
<td>Keep thermal variables within ASHRAE 55-2004 comfort zones</td>
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<td>I5F</td>
<td>Vary dry bulb temperature (DBT) via building control system</td>
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<td>I.6</td>
<td>Quality Lighting</td>
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<tr>
<td>I6A</td>
<td>Design lighting system with multiple modes</td>
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<tr>
<td>I6B</td>
<td>Provide work plane illumination of 35 to 50 foot-candles.</td>
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<td>I6C</td>
<td>Consult the IESNA handbook for other recommended light levels</td>
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<tr>
<td>I6D</td>
<td>Keep contrast ratios to no greater than 10:1</td>
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<td>I6E</td>
<td>Achieve a Color Rendering Index (CRI) based on IESNA handbook</td>
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<td>I6F</td>
<td>Conduct a point-by-point analysis of horizontal illumination levels</td>
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<td>I6G</td>
<td>Determine lighting system performance characteristics</td>
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<td>Guideline</td>
<td>AGENCY PLANNING</td>
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<tr>
<td>I.7</td>
<td>Effective Acoustics and Positive Soundscapes</td>
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<td>I7A</td>
<td>Background noise shall not exceed 70 dBA</td>
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<td>I7B</td>
<td>Office space shall meet a NC of no greater than NC-50</td>
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<tr>
<td>I7C</td>
<td>Classroom space shall meet an NC of no greater than NC-45</td>
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</tr>
<tr>
<td>I7D</td>
<td>Reverberation time shall be between 0.2 sec and 0.8 sec.</td>
<td>Y</td>
</tr>
<tr>
<td>I7E</td>
<td>Articulation Index below 0.20 (open offices) above 0.70 (closed offices)</td>
<td>N</td>
</tr>
<tr>
<td>I7F</td>
<td>No greater than NC 45 for offices</td>
<td>N</td>
</tr>
<tr>
<td>I7G</td>
<td>No greater than NC 40 for conference rooms and classrooms</td>
<td>N</td>
</tr>
<tr>
<td>I7H</td>
<td>Reverberation times based on professional acoustic judgment</td>
<td>N</td>
</tr>
<tr>
<td>I.8</td>
<td>Reduce Vibration in Buildings</td>
<td></td>
</tr>
<tr>
<td>I8A</td>
<td>For steel structures, follow AISC Design Guide 11</td>
<td>Y</td>
</tr>
<tr>
<td>I8B</td>
<td>For Steel Joists, follow SJI Technical Digest #5</td>
<td>Y</td>
</tr>
<tr>
<td>I8C</td>
<td>For Wood/Concrete: Live Load Deflect: L/480, Total Deflect: L/360</td>
<td>Y</td>
</tr>
<tr>
<td>I8D</td>
<td>Do not construct floors using bar joists</td>
<td>N</td>
</tr>
<tr>
<td>I8E</td>
<td>Return period in top third of high rise not less than 6 years</td>
<td>N</td>
</tr>
<tr>
<td>I8F</td>
<td>Floor vibration above Splittgerber Minimum Complaint Level</td>
<td>N</td>
</tr>
<tr>
<td>I8G</td>
<td>Extend Item F to all intermittently occupied spaces</td>
<td>N</td>
</tr>
<tr>
<td>I.9</td>
<td>Daylight</td>
<td></td>
</tr>
<tr>
<td>I9A</td>
<td>Provide minimum daylight factor of 1% in 75% of floor area</td>
<td>Y</td>
</tr>
<tr>
<td>I9B</td>
<td>Do not exceed uniformity ratio of 10:1 in over 15% of floor area</td>
<td>Y</td>
</tr>
<tr>
<td>I9C</td>
<td>Control direct solar penetration with shading devices</td>
<td>Y</td>
</tr>
<tr>
<td>I9D</td>
<td>Use daylight controls to turn off or dim the electric lights</td>
<td>Y</td>
</tr>
<tr>
<td>I.10</td>
<td>View Space and Window Access</td>
<td></td>
</tr>
<tr>
<td>I10A</td>
<td>Provide visual access to exterior window</td>
<td>N</td>
</tr>
<tr>
<td>I10B</td>
<td>Provide view space as specified from seated position</td>
<td>N</td>
</tr>
<tr>
<td>I10C</td>
<td>Provide high performance view content</td>
<td>N</td>
</tr>
<tr>
<td>I.11</td>
<td>Personal Control of IEQ Conditions &amp; Impacts</td>
<td></td>
</tr>
<tr>
<td>I11A</td>
<td>Provide adjustable task lighting</td>
<td>N</td>
</tr>
<tr>
<td>I11B</td>
<td>Provide means of alleviating direct solar gain</td>
<td>N</td>
</tr>
<tr>
<td>I11C</td>
<td>Provide means of mitigating noise, drafts or low air circulation</td>
<td>N</td>
</tr>
<tr>
<td>I11D</td>
<td>Provide means of alleviating building control malfunctions</td>
<td>N</td>
</tr>
<tr>
<td>I11E</td>
<td>Provide access to operable windows</td>
<td>N</td>
</tr>
<tr>
<td>I11F</td>
<td>Limit neck extension and head rotation for viewing monitors</td>
<td>N</td>
</tr>
<tr>
<td>I11G</td>
<td>Provide ergonomically comfortable keyboard</td>
<td>N</td>
</tr>
<tr>
<td>I11H</td>
<td>Provide ergonomically adjustable and movable furniture elements</td>
<td>N</td>
</tr>
<tr>
<td>I11I</td>
<td>Use tools to improve flexibility and habitability of workspace</td>
<td>N</td>
</tr>
<tr>
<td>I.12</td>
<td>Encourage Healthful Physical Activity</td>
<td></td>
</tr>
<tr>
<td>I12A</td>
<td>Provide an 'open' or 'enhanced' stair design</td>
<td>N</td>
</tr>
<tr>
<td>I12B</td>
<td>Encourage staff to walk to building service centers</td>
<td>N</td>
</tr>
<tr>
<td>I12C</td>
<td>Design circulation paths to encourage staff interaction</td>
<td>N</td>
</tr>
<tr>
<td>I12D</td>
<td>Design circulation paths to encourage staff interaction</td>
<td>N</td>
</tr>
</tbody>
</table>

**MATERIALS AND WASTE**

<table>
<thead>
<tr>
<th>No.</th>
<th>Guideline</th>
<th>REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.1</td>
<td>Life Cycle Assessment of Building Assemblies</td>
<td>Y</td>
</tr>
<tr>
<td>M1A</td>
<td>Meet LCA Benchmark for total assemblies GWP</td>
<td>Y</td>
</tr>
<tr>
<td>No.</td>
<td>Guideline</td>
<td>REQUIRED</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>M1B</td>
<td>Conduct LCA on additional materials using BEES</td>
<td>N</td>
</tr>
<tr>
<td>M2A</td>
<td>Evaluate materials with environmentally preferable properties</td>
<td>Y</td>
</tr>
<tr>
<td>M2B</td>
<td>Use salvaged or reused materials</td>
<td>Y</td>
</tr>
<tr>
<td>M2C</td>
<td>Use material with recycled content of 20-50%</td>
<td>Y</td>
</tr>
<tr>
<td>M2D</td>
<td>Use materials manufactured within 250 miles</td>
<td>N</td>
</tr>
<tr>
<td>M2E</td>
<td>Use renewable, 5% bio-based raw materials</td>
<td>N</td>
</tr>
<tr>
<td>M2F</td>
<td>Use materials with 50-100 year durability for service life</td>
<td>N</td>
</tr>
<tr>
<td>M3A</td>
<td>Minimize waste through detailing and specs</td>
<td>Y</td>
</tr>
<tr>
<td>M3B</td>
<td>Divert 75% construction and demolition waste from landfill</td>
<td>Y</td>
</tr>
<tr>
<td>M3C</td>
<td>Reuse or return 50% of all packaging material</td>
<td>Y</td>
</tr>
<tr>
<td>M3D</td>
<td>Reduce and recycle waste generated during building operation</td>
<td>N</td>
</tr>
<tr>
<td>M3E</td>
<td>Divert an additional 15% (90% total) construction waste</td>
<td>N</td>
</tr>
</tbody>
</table>
SECTION 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

1.1 SUMMARY

A. Commissioning Team:
   1. Members representing each contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists.
   2. Members representing Owner, including CxA, facility user and operation and maintenance personnel, and Architect and engineering design professionals.

B. Owner's Responsibilities:
   1. Provide OPR and BoD documentation.
   2. Assign operation and maintenance personnel and schedule them for commissioning activities.

C. Contractor's Responsibilities: Assign personnel and schedule them for commissioning activities.

D. CxA's Responsibilities:
   1. Organize and lead commissioning team.
   2. Provide commissioning plan.
   3. Convene commissioning team meetings.
   4. Provide Project-specific checklists and test procedures.
   5. Verify the execution of commissioning process activities using random sampling.
   6. Prepare and maintain Issues Log.
   7. Prepare and maintain completed construction checklist log.
   8. Witness systems, assemblies, equipment, and component startup.
   9. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.
END OF SECTION 01 91 13
SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

1.1 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area.

B. Hazardous Materials: Not expected.

1.2 EXECUTION

A. Utility Services and Mechanical/Electrical Systems: Maintained to occupied facilities.
   1. Shut Off: By Contractor.

B. Site Access and Temporary Controls: Minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities

C. Temporary Facilities:
   1. Temporary barricades to prevent injury to people.
   2. Temporary weather protection.
   3. Protection of existing finish work to remain.
   4. Protection of furnishings and equipment.

D. Temporary shoring.

E. Removed and Reinstalled Items: Cleaned, repaired, crated, stored, and reinstalled.

F. Existing Items to Remain: Existing construction protected against damage.

G. Disposal of Demolished Items:
   2. Disposal: Off Owner's property, per the requirements of Division 01 Section "Construction Waste Management and Disposal."
END OF SECTION 02 41 19
SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Concrete formwork.
B. Floors and slabs on grade.
C. Concrete foundation walls and footings.
D. Concrete reinforcement.
E. Joint devices associated with concrete work.
F. Concrete curing.
G. Concrete finishing.
   1. Floor surfaces to be left exposed.

1.2 REFERENCE STANDARDS
A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
B. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International.
C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.
D. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.
F. ACI 305R - Hot Weather Concreting; American Concrete Institute International.
G. ACI 306R - Cold Weather Concreting; American Concrete Institute International.
H. ACI 308R - Guide to Curing Concrete; American Concrete Institute International.
I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.
J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Billet-Steel Bars for Concrete Reinforcement.
K. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

1.3 SUBMITTALS
A. See Section 01 33 00 - Submittal procedures.
B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
C. Mix designs: Submit mix design for each mix showing compliance with specified requirements.
D. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.4 QUALITY ASSURANCE
A. Perform work of this section in accordance with ACI 301 and ACI 318.
B. Follow recommendations of ACI 305R when concreting during hot weather.
C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 - PRODUCTS

2.1 FORMWORK
A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Steel.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Contractor's choice of standard product type that will leave no metal within 1-1/2 inches of concrete surface.
2.2 REINFORCEMENT
   A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
      1. Type: Deformed billet-steel bars.
      2. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.

   B. Reinforcement Accessories:
      1. Tie Wire: Annealed, minimum 16 gage.
      2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
      3. Provide epoxy coated components for all locations.

2.3 CONCRETE MATERIALS
   A. Cement: ASTM C150, Type I - Normal Portland type.
      1. Acquire all cement for entire project from same source.

      1. Acquire all aggregates for entire project from same source.
      2. Provide aggregate free of shale at all slab locations exposed to freeze/thaw action.

   C. Fly ash or other cement substitutes in concrete mixes are not allowed except for the following locations:
      1. Fly ash is approved for use only in the concrete mix designs for footings and foundation walls.
      2. Fly ash shall meet or exceed the requirements of Mn/DOT Specifications (2005) 3115, Fly Ash for Use in Portland Cement Concrete.
      3. All fly ash used for this total Project shall be from one single manufacturer, one single source only, and shall be certified for use by Mn/DOT.
      4. All concrete mix designs using fly ash shall be in accordance with all other requirements of the Project Contract Documents and shall be reviewed and approved for use, and recorded in writing by the Architect and Structural Engineer of Record.
      5. The Contractor shall inform the Special Inspections Laboratory, a firm yet to be determined, in advance of all concrete pours which include design mixes containing fly ash.
      6. The Special Inspections Laboratory shall note the use of fly ash in each and all Project Inspection reports they prepare so that the locations of all concrete containing fly ash is documented for permanent record purposes.

   D. Water: Clean and not detrimental to concrete.

2.4 ADMIXTURES
   A. Chemical Admixture Manufacturers by concrete suppliers:
      1. BASF.
      2. Grace Construction Products.
      3. Fritz Pak.
      5. Sika Corporation U.S.
      6. The Euclid Chemical Company.
B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
C. Admixtures shall comply with ASTM C494.
D. Air Entrainment Admixture: ASTM C260/C260M.

2.5 ACCESSORY MATERIALS
A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
   2. Minimum Compressive Strength at 28 Days: 7,000 psi.

2.6 BONDING AND JOINTING PRODUCTS
A. Latex Bonding Agent: Non-redispersible acrylic latex, complying with ASTM C1059 Type II.
   1. Products:
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   1. Place peel-off feature at top of slab when sealants are specified. Remove peel-off portion of expansion-joint filler prior to application of sealants.
   2. Place peel off feature at bottom of slab when no sealants are specified.
C. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.
D. Sealant and Primer: As specified in Section 07 90 05.

2.7 CURING MATERIALS
A. Liquid Membrane Curing Compound: ASTM C 309, Type 2, Class B, White Pigmented.
   1. Product: CURE R-2 by L&M Construction Materials, Inc. or approved equivalent.
   2. Application Locations: Exterior Concrete surfaces unless indicated otherwise. Finish surfaces to a light broom finish prior to applying curing compound.
B. Moisture-Retaining Sheet: ASTM C171.
   1. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd, 40 inches wide.

2.8 CONCRETE MIX DESIGN
A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Materials In General: Do not use materials or combinations thereof that will result in a reaction that is detrimental to the structural integrity or visual appearance of concrete.

E. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As scheduled.
      a. Footings/Foundations: f’c=3000 psi MaxW/CR=0.50.
      b. Floors on Grade: f’c=3500 psi MaxW/CR=0.45.
      c. Above-Grade Concrete Slabs: f’c=4000 psi MaxW/CR=0.45.
      d. Columns: f’c=4000 psi MaxW/CR=0.50.
      e. Exposed Exterior Walls: f’c=4500 psi Max W/CR=0.45 with 5-7 percent air entrainment.
   2. Water-Cement Ratio: Maximum 45 percent by weight.
   3. Total Air Content: 5-7 percent, determined in accordance with ASTM C173/C173M.
   4. Maximum Slump: 3 inches.

2.9 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Concrete deliveries shall be scheduled to ensure that the concrete in each load is placed within 90 minutes after water was added for non-air entrained concrete and 60 minutes after water was added for air entrained concrete.

D. If the concrete of a concrete delivery truck was rejected for any reason, the truck shall not be allowed on-site for the next 12 hours.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
   1. Use latex bonding agent only for non-load-bearing applications.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
   1. Install vapor barrier in lieu of retarder at indicated locations. Refer to accessory materials of this section.

G. Prepare surface of precast plank prior to setting concrete topping by removing and dust or debris that will impede a proper bond.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS
A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.4 PLACING CONCRETE
A. Place concrete in accordance with ACI 304R.
B. Place concrete for floor slabs in accordance with ACI 302.1R.
C. Ensure reinforcement, inserts, and other similar items will not be disturbed during concrete placement.
D. Wet surfaces of precast plank prior to setting concrete.
E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.5 SLAB JOINTING
A. Locate joints as indicated on the drawings.
   1. If no pattern is shown, contractor shall provide for 15'x15' saw cut areas and shall contact Engineer for exact locations of joints.
B. Anchor joint fillers and devices to prevent movement during concrete placement.
C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
   1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 24 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
1. Do not exceed 2 inches deep when/if slab thicknesses are greater than 8 inches.

E. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
   1. Exposed to View and Foot Traffic: F(F) of 35; F(L) of 25, on-grade only.
   2. Under Carpeting: F(F) of 35; F(L) of 25, on-grade only.
   3. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.

B. Measure F(F) and F(L) in accordance with ASTM E1155, within 48 hours after slab installation; report both composite overall values and local values for each measured section.

C. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.

D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.7 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
      a. Installation of sealant is recommended prior to installation of floor sealers to prevent the need for cleaning of saw cut joints for proper sealant adhesion.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

F. At exterior slabs, aprons, and other horizontal locations provide a light broom finish and liquid membrane curing compound finish unless indicated otherwise.

G. At interior slabs do not over trowel where concrete is to be left exposed to avoid slippery surfaces when wet. Review finishing with Architect's representative prior to completing the work.
3.8 CURING AND PROTECTION
   A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   C. Surfaces Not in Contact with Forms:
      1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 7 days by saturated burlap unless noted otherwise.
         a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
      2. Final Curing: Begin after initial curing but before surface is dry.

3.9 FIELD QUALITY CONTROL
   A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 33.
   B. Provide free access to concrete operations at project site and cooperate with appointed firm.
   C. The Special Inspections Laboratory shall note the use of fly ash in each and all Project Inspection reports they prepare so that the locations of all concrete containing fly ash is documented for permanent record purposes.
   D. Submit proposed mix design of each class of concrete to testing firm for review prior to commencement of concrete operations.
   E. Submit proposed mix design of each class of concrete to Architect for review prior to commencement of concrete operations.
   F. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples from the first truck and for every 100 cu yd or less of each class of concrete placed.
   G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
   H. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE
   A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
   B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
      1. Concrete damaged by the construction activities required to complete the Work of this section shall also be considered defective concrete.
   C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

END OF SECTION 03 30 00
SECTION 03 33 00

ARCHITECTURAL CONCRETE

1.1 SUMMARY
A. Polished dyed concrete floors [CONC STAIN-1].

1.2 QUALITY ASSURANCE
A. Quality Standards: ACI 301 and ACI 303.1.
B. Field sample panels for each finish, color, and texture variation.
C. Mockups to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.

1.3 MATERIALS
A. Form-Facing Materials: Nonabsorptive form-facing panels, rustication strips, chamfer strips, and form ties.
B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
C. Bar supports.
D. Concrete Materials:
   2. Aggregate: Normal weight, uniformly graded.
   3. Water.
E. Curing: Wet cured.

1.4 CONCRETE MIXTURES
A. Compressive Strength (28 Days): As per the requirements of Division 03 Section “Cast-in-Place Concrete”, ready mixed.

1.5 INSTALLATION
A. Polished dyed Finish: 3000 grit high polish.
END OF SECTION 03 33 00
SECTION 03 41 13
PRECAST HOLLOW CORE PLANKS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Floor planks.
B. Accessories.

1.2 RELATED REQUIREMENTS
A. Division 01 – General Requirements.
B. Section 03 30 00 – Cast-in-Place Concrete.
C. Section 04 20 00 – Unit Masonry.
D. Section 05 12 00 – Structural Steel Framing.

1.3 REFERENCE STANDARDS
A. Reference the “Latest Edition” of all Standards unless noted otherwise.
B. ACI – American Concrete Institute International.
C. ACI 318 – Building Code Requirements for Structural Concrete.
D. AWS – American Welding Society.
F. PCI – Precast/Prestressed Concrete Institute.
G. PCI MNL-116 – Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordination: Coordinate openings sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units.
B. Sequencing: Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.
C. Preinstallation Meeting: Conduct a preinstallation meeting a minimum of two weeks prior to installation of precast concrete. Require attendance of related trades and the Architect. Review the following items:
   1. Review shop drawings and installation details.
   2. Anchor and weld plate locations.
   3. Opening locations including those cut in the field.
   4. Limitations on field cutting and core drilling.
5. Site access requirements and obstructions including but not limited:
   a. Access roads and maintenance thereof.
   b. Protection and repair of existing paving.
   c. Dewatering of footing trenches.
   d. Job site snow removal.
   e. Job site debris removal.
   f. Overhead obstructions including power lines.
6. Cold weather grouting requirements and expectations.
7. Cleaning responsibilities and expectations.

1.5 PERFORMANCE REQUIREMENTS
   A. Structural Performance: Provide precast concrete units and connections capable of
      withstanding design loads within limits and under conditions indicated on Drawings.
      1. Loading Requirements: As indicated on the drawings.
      2. Fire Resistance Ratings per 2006 International Building Code: As indicated on
         the drawings.

1.6 SUBMITTALS
   A. See Section 01 33 00 - Submittal procedures.
   B. Shop Drawings: Include layout plans with unit locations, bearing and top of unit
      elevations, overall dimensions, building cross sections, wall sections, details, and
      opening locations.
      1. Separately elevate and dimension each type of unit. Indicate location of each
         unit on overall layout by using the same identification mark placed on the
         actual unit.
      2. Indicate all cast-in openings 12 inches or larger in dimension. Label each
         opening as “cast-in”. Generally note all other non-cast-in openings are to be
         cut in the field by related trades after approval by precaster’s engineer.
      3. Indicate welded connections by AWS standard symbols and show size, length,
         and type of each weld.
      4. Indicate locations of and detail hardware and anchorage devices to be cast-in
         to precast units with relationship to structure.
      5. Indicate locations of and detail hardware and anchorage devices to be
         embedded into or attached to structure or other construction with relationship
         to structure.
      6. Schedule loose hardware and anchorage devices to be installed by others;
         include in schedule: identification marks, item descriptions, and total
         quantities.
      7. Indicate sections and details showing quantities and position of reinforcing
         steel and related items including special reinforcement.
      8. Indicate shim sizes and grouting sequence and cold weather grouting
         requirements.
      9. Handling procedures, sequence of erection, and bracing plan.
   C. Comprehensive Engineering: Signed and sealed by a professional engineer
      responsible for its preparation who is registered in the state in which the project is
      located. Include all dead, live, and other applicable loads used in the design.
      Indicate loading on shop drawings.
D. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify the Architect immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials. Maintain the general design concept when altering size of units and alignment.

E. Samples: Provide Owner/Architect with samples representing the finish color and texture of exposed surfaces when requested. Samples to be a minimum of 12 by 12 by 2 inches in size. Owner/Architect to verify finish meets or exceeds the expectation of the design intent.

F. Test Reports: At the request of the Owner/Architect provide test reports for concrete and other structural materials tested during fabrication including cement mill reports, mix reports, cylinder break reports.

1.7 QUALITY ASSURANCE

A. Single Source Requirement: Provide precast concrete of this section and the following sections by one manufacturer: (Provide precast concrete of this section by other approved manufacturers where products of this section are not available from a single source.)

B. Designer Qualifications: Precast concrete to be designed under the direct supervision of a Professional Structural Engineer licensed in the state where the project resides.

C. Fabricator Qualifications: A firm that specializes in manufacturing the types of precast concrete specified in good standing in the PCI Plant Certification Program, and that complies with the following requirements: No Exceptions. No other plant certification will be accepted.
   1. Assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and Comprehensive Engineering analysis by a qualified Professional Engineer.
   2. Participates in PCI’s Plant Certification program at the time of bidding and through the construction process.
   3. Has sufficient production capacity to produce required units without delaying the Work.
   4. Is registered with and approved by authorities having jurisdiction.

D. Erector Qualifications: PCI Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Erector’s workman shall be properly trained to handle and erect precast units.

E. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, “PCI Design Handbook – Precast and Prestressed Concrete,” applicable to types of structural precast concrete units indicated.

F. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, “Manual for Quality Control for Plants and Production of Structural Concrete Products.”
G. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years experience in the erection of precast concrete similar to the requirements of this project. Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code – Steel”; and AWS D1.4, “Structural Welding Code – Reinforcing Steel.”

H. Pollution Control Regulations: Comply with all pollution control regulations in fabricating and finishing of all products. Protection of underground water and water runoff is the utmost priority.

1.8 DELIVERY, STORAGE, AND HANDLING
A. General Requirement: All lifting and handling, transportation and delivery, storage and support, and erection of precast panels to be performed by qualified personnel using methods and equipment approved by manufacturer.

B. Identification: Label each unit with date of production and mark indicating unit location on the shop drawings.

C. Lifting and Handling: Lift and handle units at all times by lifting points indicated on the shop drawings. Lift with manufacturer approved lifting devices. Lifting devices to have a minimum safety factor of 5 to 1.

D. Transportation and Delivery: Transport units in accordance with manufacturer requirements.

E. Storage and Support: At all times store and support units off ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Do not use stacked precast units for storage of other units or equipment.

1.9 FIELD CONDITIONS
A. General Contractor shall prepare and maintain site free of obstructions as required by precast erector for the work of this section.

B. Cold Weather Grouting: Provide written procedures to address cold weather grouting to Owner/Architect prior to the erection process.

1.10 WARRANTY
A. Provide twelve-month guarantee for workmanship, materials, and satisfactory performance from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Precast Concrete:
   2. County Materials Corporation: www.countymaterials.com <C:and SettingsSettingsInternet Files.OutlookPMP1GZ.countymaterials.com>
   3. Molin Concrete Products: www.molin.com <C:and SettingsSettingsInternet Files.OutlookPMP1GZ.molin.com>
4. Substitutions: See Section 01 60 00 – Product Requirements; including the following requirements:
   a. Manufacturer and plant must be PCI Certified. No Exceptions.
   b. Manufacturer must submit product information including typical details, proposed product construction, handling information, etc. for approval by Architect.
   c. Manufacturer must obtained written approval of project Architect prior to submitting bid.
   d. Manufacturer must obtained written approval of General Contractor prior to submitting bid.

2.2 PRECAST UNITS

A. Floor Planks.
   1. Size/Shape/Profile: As indicated on the drawings.
   2. Top: Suitable surface for application of concrete topping.
   3. Bottom and End/Edge: Manufacturer's standard. Visible surface are subject to approval by Owner/Architect.

2.3 MATERIALS

A. All materials shall comply with the specifications, standards and codes quoted herein. The Architect/Engineer upon request shall be furnished satisfactory certification that all material incorporated in the precast concrete products comply with the requirements herein specified.

B. Forms and Forming: Material and equipment that will provide semi-smooth/anticipated finish with the understanding that common forming marks and bottom tearing will be evident. Review expectations with the Owner/Architect.

C. Portland Cement: ASTM C150 - Type I or III: ASTM C150.


E. Admixtures:

F. Aggregates: ASTM C33 except that coarse aggregates for precast concrete surfaces exposed to damp conditions shall contain zero iron oxides.

G. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

H. Reinforcing Steel: Reinforcing steel or mesh will be selected from the following materials to conform to precaster’s design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded without specific approval of Architect/Engineer.
   1. Bars:
      b. Deformed rail steel: ASTM A616.
   2. Wire: Cold drawn steel: ASTM A82.
PRECAST HOLLOW CORE PLANKS

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I. Strand: Uncoated, 7-wire, Stress-Relieved Strand: ASTM A416-Grade 250K or 270K.

J. Anchors and Inserts:
   1. Materials:
         1) Shop Primer: Manufacturer's standards.
            (a) Location: Items protected by sealants or finish coatings.
            (a) Location: Items left exposed unless otherwise indicated. Cold galvanize field welds.
         3) Zinc-rich Coating: MIL-P-2135, self curing, one component, sacrificial.
            (a) Location: As indicated.
         4) Cadmium Coating (Electroplated).
            (a) Location: As indicated.
      b. Stainless Steel: ASTM A666, type 304.
         1) Location: As indicated.

2.4 ACCESSORIES

A. Cement Grout: Type I (ASTM C150 / C150M), "Dry Pack", portland cement, sand and water having a minimum of 3,000 psi compressive strength at 28 days. (Approximately 3 to 1 sand/cement ratio.)

B. Bearing Pads: (Selection will be made by precast designer unless indicated otherwise.)
   1. Unless noted otherwise on the plans, Elastomeric Bearing Pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used.
   2. The PCI Design Handbook, Second Edition, Part 5.1 through Part 5.5 shall be used for the design of bearing pads.
   3. Teraflouroethylene (TFE) reinforced with glass fibers and applied to stainless or structural steel plates.

C. Sealants:
   1. Refer to Section 07 92 00 - Joint Sealants; Precast to precast products.
   2. Refer to Section 07 84 00 – Firestopping; Installation to be performed by a licensed contractor (Not Precast Erector) in the area in which the project is located.

   compatible with materials being welded.

E. Welded Studs: Per AWS D1.1/D1.1M, “Structural Welding Code – Steel”;
   compatible with materials being welded.

F. Anchor Bolts: As designed by precast manufacturer, cast-in place by others.

G. Other Load Bearing Loose Steel Items: As designed by precast manufacturer.

2.5 FABRICATION

A. Pre-stress all precast units.
B. All reinforcing steel shall have minimum cover as required by code and shall be accurately located as indicated on the approved shop drawings. Metal chairs, with or without coatings, shall not be permitted in the finished face.

C. All of the fabrication procedures shall be carried out under a fully protective overhead and sidewall covering, with a constant temperature of between 50 to 80 F being maintained except during the curing cycle.

2.6 FABRICATION TOLERANCES

A. Fabricate units in accordance with MNL-116 and MNL-135 and as follows:
   1. Length: Plus or minus 1/8 inch for every 10 feet in length or 1/2 inch, whichever is greater.
   2. Width: Plus or minus 1/8 inch for items 48 inch or less; 1/4 inch for items 48 to 120 inches, and 1/2 inches maximum for items over 120 inches and more.
   3. Cross Sectional Dimensions: Plus or minus 1/8 inch for items 48 inch or less; 1/4 inch for items 48 to 120 inches, and 1/2 inches maximum for items over 120 inches and more.
   4. Cast-in Anchors and Inserts: Plus or minus 1 inch from centerline location indicated on shop drawings.
   5. Horizontal Alignment (Sweep): Plus or minus 1/3 inch for every 10 feet in length or 1/2 inch, whichever is greater.
   6. Vertical Alignment (End Squareness): Plus or minus 1/8 inch for every 12 inches in height or 1/4 inch, whichever is greater.
   7. Camber: Variation between units is plus or minus 1/4 inch for every 10 feet in length or 1/2 inch, whichever is greater.
   8. Blockouts: Plus or minus 1 (can this be less) inch from centerline location indicated on shop drawings.

2.7 CONCRETE MIXES

A. 28-day compressive strength: Minimum of 5,000 psi.
B. Use of calcium chloride, chloride ions or other salts is not permitted.

PART 3 - PRODUCTS

3.1 EXAMINATION

A. Verify site is free of obstructions and ready to receive the work. Obstructions include but are not limited to dewatering of footing trenches, jobsite snow removal, site debris, overhead obstructions, including power lines.
B. Verify access roads have been prepared to handle all weather conditions and are acceptable to precast concrete installer.
C. Do not begin the work of this section unless preparations by the site contractor are complete and the site contractor understands and agrees to maintain acceptable conditions until precast installation is complete. Beginning the work of this section is acceptance of existing conditions.
3.2 PREPARATION
A. Preparation: General Contractor (Buyer) shall be responsible for the following items:
   1. Removal of all obstructions including but not limited to power lines and wires that may be hazardous to precaster's personnel and other items required for precast installation.
   2. All-weather access roads for precaster's trucks and cranes. Refer to precaster's proposal/quotation for more defined access requirements.
   3. Grid locations, building corners, finish floor elevations, top of door elevations and other survey points/lines/elevations for accurate installation of precast units.
   4. True and level bearing surfaces on all field placed bearing walls and other field placed supporting units.
   5. Placement and accurate alignment of anchor bolts, plates, or dowels in column footings, grade beams, and other field placed supporting units.
   6. All shoring required for composite beams and slabs. Shoring shall have a minimum load factor of 1.5 x (dead load plus construction loads).
   7. Repair all concrete and bituminous surfaces damaged during precast installation. Examine surfaces with precaster before and after precast installation and coordinate efforts to minimize damage.

3.3 ERECTION
A. Precast Unit Curing Procedures: Contact precaster for other curing requirements.
B. Erection Shall Be Defined As:
   1. Placing, aligning, and leveling the precast units in final positions in the structure on the designated supporting surfaces.
   2. Connection of precast units to each other, or to supporting structural units as indicated on the shop drawings.
   3. Removal of lifting hooks, if necessary.
C. Field Welding: Complete field welding using qualified personnel, equipment, and welding materials that are compatible to the base material.
D. Grouting:
   1. Grout plank keyways and cores in accordance with precaster’s shop drawings.
   2. General Contractor Responsibility: General Contractor shall be responsible for providing “shelters/tarps” and “temp heat” for grouting when temperatures are below 40 degrees for a 24 hour period.

3.4 TOLERANCES
A. Erect precast units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 135. Position units so that dimensional errors do not accumulate and so joints remain aligned and uniform as erection progresses. Level out variations between adjacent units by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the Architect/Engineer.
B. In the event that precast units cannot be adjusted to conform to design or tolerance criteria, cease work and advise Architect. Execute modifications as directed by the Architect prior to resuming work.
3.5 FIELD REPAIR AND CLEANING OF PRECAST UNITS
   A. Repairs by Precast Erector: Repair chipping, spalling, cracking, and other damages to precast units after delivery to the jobsite. After installation and repairs are completed, all further damage is the responsibility of, and at the cost of, the General Contractor. Consult with precaster for repairs of structural precast units.
   B. Cleaning by General Contractor: Clean exposed surfaces that are soiled during shipping, installation, and remaining construction operations, prior to Substantial Completion. Clean in accordance with precast manufacturer’s recommendations.

3.6 INSPECTION AND ACCEPTANCE
   A. Final inspection and acceptance of erected precast/prestressed concrete shall be made by Architect/Engineer to verify conformance with plans and specifications.

3.7 PROTECTION
   A. General Contractor to protect precast units from remaining construction operations.

END OF SPECIFICATION
SECTION 04 05 11
MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Mortar for masonry.
   B. Grout for masonry.

1.2 RELATED REQUIREMENTS
   A. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.

1.3 REFERENCE STANDARDS
   A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International.

1.4 SUBMITTALS
   A. See Section 01 33 00 - Submittal procedures.
   B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

1.5 QUALITY ASSURANCE
   A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.7 FIELD CONDITIONS
   A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS
   A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
2.2 MATERIALS
   A. Preblended and prepackaged Dry Mortar and Grout: ASTM C 270, Type Indicated, Standard Gray Color Unless Indicated Otherwise.
      1. Masonry below grade and in contact with earth: Type M.
      2. Masonry above grade: Type S or N.
      3. Grout: 3,000 psi strength at 28 days; 8-10 inches slump, rodded or vibrated in place meeting the requirements of ASTM C 476.
      4. Product: Provide packaged dry pre-blended mortar and grout products by Spec Mix or approved equivalent.
   B. Water: Clean and potable.
   C. Bonding Agent: Latex type.

2.3 MORTAR MIXING
   A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
   B. Do not use anti-freeze compounds to lower the freezing point of mortar.
   C. If water is lost by evaporation, re-temper only within two hours of mixing.
   D. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Apply bonding agent to existing cementitious surfaces.
   B. Plug clean-out holes for grouted masonry with block masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION
   A. Install mortar and grout to requirements of section(s) in which masonry is specified.
   B. Work grout into masonry cores and cavities to eliminate voids.
   C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
   D. Do not displace reinforcement while placing grout.
   E. Remove excess mortar from grout spaces.

3.3 GROUTING
   A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.
   B. Low-Lift Grouting:
      1. Limit height of pours to 12 inches.
      2. Limit height of masonry to 16 inches above each pour.
3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.

4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   3. Place grout for spanning elements in single, continuous pour.

END OF SECTION 04 05 11
SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete masonry units.
   2. Decorative concrete masonry units.
   3. Face brick.
   4. Mortar and grout.
   5. Ties and anchors.
   6. Embedded flashing.
   7. Miscellaneous masonry accessories.
   8. Cavity-wall insulation.

B. Related Sections:
   1. Division 03 Section "Cast-in-Place Concrete" for installing dovetail slots for masonry anchors.
   2. Division 04 Section "Reinforced Unit Masonry" for reinforced unit masonry.
   3. Division 04 Section "Exterior Stone Cladding" for exterior stone.
   4. Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
   5. Division 07 Section "Air Barriers" for air barriers applied to unit masonry.
   6. Division 08 Sections for metal pan flashings at openings installed in conjunction with masonry.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells (Refer to Division 07 Section "Reinforced Unit Masonry."

1.3 PERFORMANCE REQUIREMENTS

A. Refer to Division 07 Section "Reinforced Unit Masonry."

1.4 SUBMITTALS

A. Bundled Submittal: Submit action submittals specified in this section simultaneously with action submittals specified the following sections for concurrent review:
   1. Division 04 Section "Reinforced Unit Masonry."
   2. Division 04 "Exterior Stone Cladding."

B. Product Data: For each type of product indicated.
UNIT MASONRY
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C. Shop Drawings: For the following:
   1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
   2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." (Concurrent submittal by other specification section.)
   3. Fabricated Flashing: Detail thru-wall flashings, corner units, end-dam units, Include details of junctures with window opening sill flashing drip pans and other special applications.

D. Samples for Verification: For each type and color of the following:
   1. Exposed CMUs.
   2. Face brick, in the form of straps of five or more bricks.
   3. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
   4. Thru-wall flashing, full size by 12 inches in length with termination bar, inside corner, outside corner and end dam.
   5. Accessories embedded in masonry.

E. Samples for Preconstruction and Construction Testing: Submit to Owner’s testing laboratory.

F. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

G. B3 MSBG Submittals:
   1. Product Data for Guideline M2D: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for Guideline M2E: For products that are manufactured within a radius of 250 miles from project site, or in the State of Minnesota. Include statement indicating costs for each product.

H. Material Certificates: Submit prior to masonry work beginning on the site, for each type and size of the following:
   1. Masonry units.
      a. Include data on material properties and material test reports substantiating compliance with requirements.
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
      c. For exposed brick, include test report for efflorescence according to ASTM C 67.
UNIT MASONRY

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d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing per ASTM C 67.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Joint reinforcement.
5. Anchors, ties, and metal accessories.

I. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Mix designs are to be signed by a Professional Engineer Qualified to practice in the State of Minnesota, and employed by a qualified independent laboratory.

J. Batch Record: for each bag of preblended dry mortar mix.

K. Qualification Data: For testing agency.

L. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Follow the most current publication of "Building Code Requirements and Specification for Masonry Structures" by the Masonry Standards Joint Committee (MSJC) as a minimum. The standards outlined in this Manual and the Facilities Design Standards, if more stringent, will prevail.

E. Contractor's Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing and mix designs indicated. An agency not hired by the Owner to perform as the Owner's Independent Testing Laboratory (OITL).

F. Preconstruction Testing Service: Owner will engage a qualified independent testing agency (OITL) to perform preconstruction testing indicated. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified
requirements shall be done at Contractor's expense. Refer to Preconstruction
Testing article in Part two of this section.

G. Sample Panels: Build sample panels to verify selections made under sample
submittals and to demonstrate aesthetic effects. Comply with requirements in
Division 01 Section "Quality Requirements" for mockups.
1. Build sample panels for each type of exposed unit masonry not included in
Mockups.
2. Where masonry is to match existing, erect panels adjacent and parallel to
existing surface.
3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
4. Protect approved sample panels from the elements with weather-resistant
membrane.
5. Approval of sample panels is for color, texture, and blending of masonry
units; relationship of mortar and sealant colors to masonry unit colors; tooling
of joints; aesthetic qualities of workmanship; and other material and
construction qualities specifically approved by Architect in writing.
   a. Approval of sample panels does not constitute approval of deviations
   from the Contract Documents contained in sample panels unless such
deviations are specifically approved by Architect in writing.

H. Mockups: Build mockups to verify selections made under sample submittals and to
demonstrate aesthetic effects and set quality standards for materials and
execution. The mock-up will be used to determine the workmanship standard for
installation of all components and shall be constructed for review as a part of the
Pre-Installation Meeting for masonry and thru-wall flashings. The concrete
foundation and block back-up shall be placed and cured prior to the meeting and
will also be used to evaluate chips and other aesthetic determinations. The
Contractor shall provide written notice when they are completely prepared for the
meeting. All re-observation and re-testing and associated costs which may be
required shall be the responsibility of the Contractor.
1. Build freestanding mockups of typical wall area as shown on Drawings.
2. Construct mockups on concrete slabs simulating the building brick ledges.
3. When mockups are not shown on the drawings: Build mockups for each type
of exposed unit masonry construction in sizes approximately 72 inches long
by 72 inches high by full thickness, including face and backup wythes and
accessories.
   a. Include concrete block back-up, wall ties, vertical rebar, grouting,
horizontal reinforcement, thru-wall flashing assemblies, weeps,
insulation, brick and stone.
   b. Include a sealant-filled joint at least 16 inches long in interior and
   exterior wyths of each exterior wall mockup.
   c. Include window opening in exterior wall mockup. Make opening
   approximately 12 inches wide by 16 inches high. Install lintel similar in
detail to building window lintels. Flash the lintel and install stainless
steel sill pan flashing.
   d. Include through-wall flashing installed for a 60-inch length at base of
   exterior wall mockup; with a 12-inch length of flashing left exposed to
   view (omit masonry above exposed 12 inches of flashing).
   e. Install air barrier on CMU back-up wall.
f. Include on interior face of mockup with CMU back-up wall, interior unit masonry wall mockup.
g. Include metal studs, sheathing, air barrier, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.

4. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.

5. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.

6. Protect accepted mockups from the elements with weather-resistant membrane.

7. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
   a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Preparation of brick prisms is to occur at the Owner’s Independent Testing Agency (OITL). The contractor is to travel to the lab and transport the required materials to the laboratory, where he will construct the prisms.

B. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day’s work. Cover partially completed masonry when construction is not in progress.
1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

C. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. The standards outlined in this Manual, if more stringent, will prevail.
   1. When daytime ambient temperatures are at or above 40F, but anticipated to drop below 40F overnight; cover newly construction masonry to maintain a minimum of 40F for a minimum of 48 hours after construction.
   2. Provide a heated enclosure when ambient temperatures are anticipated to be below 40F during batching of mortar, laying of new masonry units, tuck pointing mortar joints, and cleaning masonry.
   3. Maintain masonry materials, equipment, mortar batching area, and the newly completed masonry work above 40F prior to, during, and for 48 hours after completion of masonry work.
   4. Do not heat water or materials above 140F.
   5. Maintain the heat source on both sides of the masonry wall, interior and exterior, of the Work.
   6. Monitor the carbon monoxide levels at all times. Immediately correct the environment and heating equipment when levels become unacceptable.
   7. Conduct periodic safety checks of the heated enclosure and contents during non-work days, overnight hours, weekends, and holidays. Submit a weekly report with dates and times of safety checks, temperatures outside, temperatures inside the heated enclosure, and descriptions of the status of the enclosure and contents.
   8. Periodic safety checks must occur two times overnight; approximately 5-6 hours apart, after the end of a work day, and before a work day.
   9. Periodic safety checks during non-work days, weekends, and holidays must occur three times during the day; approximately four hours apart in the morning, at noon, and in the afternoon.
10. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

   1. When ambient temperatures exceed 90F, fog spray newly constructed masonry until damp, at least three times a day until masonry is three days old.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide square-edged units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.
   1. Unit Compressive Strength: Refer to Division 04 Section “Reinforced Unit Masonry.”
   2. Density Classification: Normal weight.
   3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
   4. Exposed Faces: Provide color and texture matching the range represented by Architect’s sample.

C. Decorative CMUs: ASTM C 90.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Amcon Block and Precast Burnished Concrete Masonry Units.
   2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
   3. Density Classification: Normal weight.
   4. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
   5. Pattern and Texture:
      a. Standard pattern, ground-face finish.
6. Color \([\text{BCMU-1]}\): As selected by Architect.
7. Color \([\text{BCMU-2]}\): As selected by Architect.
8. Additional Accepted Color \([\text{BCMU-1]}\): Anchor Block; As selected by Architect.
9. Additional Accepted Color \([\text{BCMU-2]}\): Anchor Block; As selected by Architect.
10. Acceptance of decorative CMUs will be based on sample panels displaying color uniformity acceptable to the Architect.
11. Aggregate highlighter: Seal ground finish units with factory installed aggregate highlighter.

2.3 MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
   a. Special shapes are indicated on the Drawings.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick \([\text{FC BRK-1]}\): Facing brick complying with ASTM C 216:
1. Manufacturer: Mutual Materials.
   b. Texture: Smooth Texture.
   c. Size: 3 inch utility.
   d. Grade: SW.
   e. Type: FBS
   f. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
   g. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
   i. Application: Use where brick is exposed unless otherwise indicated.

C. Face Brick \([\text{FC BRK-2]}\): Facing brick complying with ASTM C 216:
1. Manufacturer: Mutual Materials.
   b. Texture: Mission Texture.
c. Size: 3 inch utility.
d. Grade: SW.
e. Type: FBS
f. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
g. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
i. Application: Use where indicated.

2.5 STONE UNITS

A. Stone materials supplied by Division 04 Section “Exterior Stone Cladding.”

2.6 MORTAR AND GROUT MATERIALS

A. Grout materials: Refer to Division 04 Section “Reinforced Unit Masonry.”

B. Mortar Materials: Refer to Division 04 Section “Reinforced Unit Masonry.”

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
   1. Pigments shall not exceed 10 percent of portland cement by weight.

2.7 REINFORCEMENT

A. Steel Reinforcing Bars: Refer to Division 04 Section “Reinforced Unit Masonry.”

B. Masonry Joint Reinforcement, General: Refer to Division 04 Section “Reinforced Unit Masonry.”

2.8 TIES AND ANCHORS

A. General: Refer to Division 04 Section “Reinforced Unit Masonry.” For ties and anchors.

B. Brick Ties at flashings: Dur-O-Wall, Inc. Series 5213, Type 304 Stainless Steel

2.9 MISCELLANEOUS ANCHORS

A. Postinstalled Anchors: Refer to Division 03 Section “Post-Installed Anchors.”

2.10 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use one of the following unless otherwise indicated:
   1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
UNIT MASONRY

04 20 00 - 10

a. Products: Subject to compliance with requirements, provide one of the following:
   1) Advanced Building Products Inc.; Copper Sealtite 2000.
   2) York Manufacturing, Inc.; Multi-Flash 500.

B. Drip Tray at wall openings: 0.062" thick prefabricated Type 304 stainless steel drip tray at the sill of back-up walls at window openings.

C. Drip at thru-wall Flashings: 0.019" thick prefabricated Type 304 stainless steel drip with folded hem on front edge.

D. Termination bar: Stainless steel, Type 304, 1 inch by 1/8 inch, with anchors at 6 inches on center.

E. Sealants for Sheet Metal Flashings:
   1. Elastomeric Sealant: ASTM C 920, chemically curing silicone sealant; of type, grade, class, and use classifications recommended by the flashing manufacturer to seal joints in sheet metal flashing and trim and remain watertight, compatible with flashing, air barrier and sealant materials contacted.

F. Adhesives, Mastics, Primers, for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.11 MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from closed cell polyethylene.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products:
   1. Wicking Material: Using doubled-back absorbent rope, made from cotton, 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 24 inches in cavity with sufficient additional length to extend across brick or stone wyth and for tying to brick tie, or stone anchor. Nylon rope is not acceptable.
   2. Mesh Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
      a. Products: Subject to compliance with requirements, provide the following:
         1) Archovations, Inc. Polymer Mesh Weep Vents.
         2) Mortar Net; Weep Vents.
         3) Colors: As selected by Architect from Manufacturer’s full range of colors.

UNIT MASONRY

04 20 00 - 10
D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Advanced Building Products Inc.; Mortar Break II.
   b. Archovations, Inc.; CavClear Masonry Mat.
   c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
   d. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:
   a. Strips, full-depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.
   b. Strips, not less than 1-1/2 inches (38 mm) thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
   c. Sheets or strips full depth of cavity and installed to full height of cavity.

2.12 CAVITY-WALL INSULATION

A. Unfaced, Mineral-Wool Board Insulation [INSUL-1]: ASTM C 612; with maximum flame-spread and smoke-developed indexes of zero and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 4.5 lb/cu. ft., Types IA and IB, thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C) Tested to ASTM C 518.

2. Water absorption: 0.03% by volume, per ASTM C 1104.

3. Linear Shrinkage: <2% 1200º F (650º C), per ASTM C 356.

B. Insulation Type [INSUL-2]: Type IV, with an aged thermal resistance (R-value) for 1 inch (25 mm) thickness of 5.0 deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product, extruded with an integral skin, and complying with the following:

1. Compressive Strength: Minimum 25 psi (173 kPa), per ASTM D 1621.

2. Water Absorption: Maximum 0.1 percent, per ASTM C 272.

3. Density: Minimum 1.60 lbs./cu. Ft., per ASTM C 303.


5. Board Thickness: As indicated.

6. Basis of Design Products:
   a. Dow Chemical Company; Styrofoam SE.
   b. Owens-Corning Corp.; Foamular XPS 250.
   c. DiversiFoam Products; CertiFoam 25 SE.

C. Mechanical Fasteners: Manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application; and of the following description:

1. For attachment to steel studs from 0.033 to 0.112 inch (0.84 to 2.84 mm) in thickness, provide steel drill screws complying with ASTM C 954.

2. For attachment to light-gage steel framing members not less than 0.0179 inch (0.45 mm) in thickness, provide steel drill screws complying with ASTM C 1002.
3. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
4. For attachment, provide manufacturer's standard fasteners suitable for substrate.

2.13 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

2.14 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar.
2. Use portland cement-lime mortar.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix, ASTM C387. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site. Follow the manufacturer's written instructions for batching and mixing. The pre-bagged materials shall be delivered to the site in bags weighing 2,000 pounds or greater. The quantities of materials (cement, lime and sand) for each bag of pre-bagged material delivered and proposed to be used for the Project shall be verified by submitting the supplier batch record to the Structural Engineer, Architect, Owner's Consultant, OITL and Owner for review.

C. Mortar for Concrete Unit Masonry: See Division 04 Section “Reinforced Unit Masonry.”

D. Mortar for Brick Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For brick masonry exterior, above-grade, non-load-bearing walls and parapet walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
2. Average compressive strengths of mortars by property method at 28 days:
a. Type N: 750 psi. minimum, 1800 psi. maximum.

E. Pigmented Mortar:
   1. Provide a pigmented mortar color for each different type and color of brick.
   2. Pigments shall not exceed 10 percent of portland cement by weight.
   3. Mix to match Architect's samples.
   4. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Face brick.

F. Grout for Unit Masonry: Refer to Division 04 Section “Reinforced Unit masonry.”

2.15 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 45 33. Complete all preconstruction testing prior to start of masonry work on site.

B. Concrete Masonry: Refer to Division 04 Section “Reinforced Concrete Masonry.”

C. Mortar Mixes: Refer to Division 04 Section “Reinforced Concrete Masonry.”

D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength and for freeze/thaw.

E. Clay Masonry Assembly Test: For each type of unit provided, according to ASTM C1072 for flexural bond strength.

F. Summary of Preconstruction Testing:

<table>
<thead>
<tr>
<th>Description</th>
<th>Method of Test</th>
<th>Standard (Pass/Fail)</th>
<th>Frequency</th>
<th>Action Required (if failure occurs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical Test of Units Properties: A. All requirements of ASTM C216</td>
<td>ASTM C67 Cut Section</td>
<td>Meet all ASTM C216 requirements for Grade SW, Type FBS. Also review cut section for vitrification if in question for structures. Check Specification for required brick type.</td>
<td>Review previous test data from supplier and one set of brick units tested for each brick.</td>
<td>Do not accept brick.</td>
</tr>
<tr>
<td>B. Freeze/Thaw Tests</td>
<td>ASTM C67 Method</td>
<td>Brick shall pass ASTM C67 requirements after 50 cycles of freezing and thawing.</td>
<td>Review previous test data &amp; perform freeze/thaw testing for each brick type.</td>
<td>Do not accept brick.</td>
</tr>
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<td>----------------------</td>
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<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>

3. Test of Assemblages:

A. Flexural Bond Strength

| ASTM C1072 | As required by Structural Engineer. The Contractor shall mix mortar and cast test prisms in the testing facility where the prisms will be tested. | Five test prisms of 3 bricks each for each type of mortar. | Adjust mix design. |

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Protect the brick ledge flashing after completion by the waterproofing Subcontractor.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to nominal modular thickness shown unless otherwise indicated. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.
C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
   1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in 1/4 running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
1. Stack bond exposed masonry where indicated.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches (100-mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
   1. Install compressible filler in joint between top of partition and underside of structure above.
   2. Fasten partition top anchors to structure above and build into top of partition as indicated.
   3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Hollow CMUs: Refer to Division 04 Section “Reinforced Unit Masonry.”

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

E. Retemper mortar only twice within two hours after introduction of water. Mortar shall be placed within 2 ½ hours after initial mixing or rejected.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using the following method:
      a. Use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.
      b. Space joint reinforcement at 16 inches on center vertically.
      c. Space tie sections at 16 inches on center horizontally.
      d. Stagger ties in alternate courses.
   2. Two piece adjustable ties: Installed in horizontal mortar joints.
      a. Provide additional ties within 8 inches of openings and space not more than 16 inches apart around perimeter of openings.

B. Masonry Joint reinforcement for stack bonded masonry:
   1. Masonry Joint Reinforcement: Installed in each horizontal mortar joints at stack bonded masonry.

C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
D. Coordinate application of air barrier to face of backup wythe to comply with Division 07 Section "Fluid Applied Membrane Air Barriers."

E. Installing Mineral Wool Cavity-Wall Insulation: Install in horizontal strips between ties or anchors. Place insulation anchors spaced 16 inches o.c. horizontal, 16 inches o. c. vertical, attach with plastic caps designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

F. Installing rigid polystyrene cavity wall insulation: Install in below grade areas of cavity completely surrounded by masonry.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 16 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
   1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally.
3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:
   1. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:
   1. Build in compressible joint fillers where indicated.
   2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch (10 mm).
   1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.11 FLASHING, WEEP HOLES AND CAVITY DRAINAGE

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on continuous bed of mastic and cover flashing with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or mastic as recommended by flashing manufacturer.
   2. Continue through-wall flashing across masonry expansion joints.
   3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 12 inches (200 mm); with upper edge anchored with termination bar and embedded in air barrier membrane, see Division 07 Section “Fluid Applied Air Barriers”.

UNIT MASONRY
04 20 00 - 19
4. Flashing above doors, mechanical louvers, and windows (above and below) shall be seamless and end dammed.

5. Detail all thru-wall flashing to avoid contact with sealant.

6. Flashing above doors, mechanical louvers, and above and below windows shall be continuous pieces with no seams and include end dams at both ends. Install all other flashings in lengths as long as possible with as few laps as possible. Place vertical legs of approved copper thru-wall flashing on a continuous bed of mastic. Place termination bars in a full bed of mastic. Seal termination bars, flashing top edges and lap edges, laps, fasteners, additional and corner pieces, after installation with mastic or liquid-applied air barrier (consistent with the vertical leg material) before covering with mortar. Completely press flashings and termination bar into mastic or liquid-applied air barrier application.

7. Extend flashing the full length of lintels and shelf angles, a minimum of 4” beyond ends of lintels, and form end dams minimum 6” beyond opening. Extend copper thru-wall flashing ¼” out from exterior face of outer wythe of masonry with a ¼” stainless-steel drip edge, through the outer wythe, turned up a minimum of 12” along the face of the back-up wall with the vertical leg set in a full bed of mastic. Terminate thru-wall flashings against back-up wall with a stainless steel compression termination bar set in a full bed of flashing adhesive mastic. At heads and sills turn up ends not less than 2” to form a pan. Provide a 1” wide thin band (on concrete and masonry, ½” on steel) of mastic under the front edge of flashing to retard water from infiltrating under the flashing, if flashings were to be placed on these materials. An exception to using mastic under the front edge of flashing is if flashing is covered by a reglet and metal to protect from water infiltration under it. At end dams, provide vertical band of mastic against stone or brick to which flashing abuts. Place these thin bands slightly back from the front edge to not drip mastic on the brick face and press flashing into thin bands.

1. Install a continuous bead of lap sealant between the laminated copper sheet and stainless steel drip.

2. Install a continuous bead of lap sealant between the stainless steel drip and substrate.

3. For all flashings, provide a small piece of flashing set in and covered with bedding material at all inside and outside corners (including end dams) and all flashing folds to cover all cuts, folds (end) and corners in the flashings.

4. Overlap end joints of copper flashings not less than 6”; coat the contacting surfaces and seal lap with mastic. Provide 16” minimum overlaps for steps in flashings. Seal exposed edges with mastic. Copper flashings shall be continuous pieces above openings. Install all other flashings in lengths as long as possible with as few laps as possible. Use full height end dams where possible.

5. Install all thru-wall flashings and mastics as necessary to minimize any contact with sealant.

6. Install lap sealant on the backer from the top of the flashing to a minimum 2" below the veneer anchor.

7. At wall opening drip pans, provide wall flanges that extend beyond window opening jambs and terminate in alignment with and turn down 2 inches into sub-sill flashing at end dams. Seal into drip pan with mastic.

8. Separate metal flashings from other dissimilar metals with continuous application of mastic, or as recommended by flashing manufacturer.
9. Flashings shall be protected immediately following installation.

A. Drip Tray: Install drip tray in full and continuous contact with the top of the back-up wall to allow for transfer of window/curtain wall dead load. Integral to the drip tray provide a pre-formed down turned leg that functions as a continuous keeper strip for sub-sill flashing installed below window opening; a preformed upturned leg that functions as a continuous back dam; pre-formed end dams at each jamb; and wall flanges that extend beyond window opening jambs and terminate in alignment with sub-sill flashing end dams. Where window openings require multiple sections of drip tray, splice joints shall be made air and water tight. When sealants are used a splice joints, sealant shall be compatible and bond with sealant used for the primary sealant joint where window framing is installed. See Drawings for details.

B. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

C. Install wick weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
   1. Install weep holes at of 16” on center, using doubled-back 3/8-inch cotton rope wicks. Nylon rope is not acceptable. Rope weeps shall extend through brick and run a minimum of 16 inches horizontally in the cavity, extend up to and be tied to brick ties. Interlace successive rope wicks. Place weeps at all flashing end dams.
   2. Trim wicking material flush with outside face of wall after mortar has set.
   3. Use specified vent products to form vent holes where indicated.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.12 FIELD QUALITY CONTROL

A. Structural Testing and Special Inspection
   1. Structural Testing and Special Inspection shall be performed by qualified parties as specified herein, and in accordance with the provisions of Section 01 45 33.
   2. Refer to Division 04 Section “Reinforced Unit Masonry” for additional masonry testing and inspections.
   3. For items indicated below to be performed on a periodic basis, provide inspections at least once per 500 square feet.
   4. Personnel Qualifications
      a. Testing Technician: Technical I - NCMA Concrete Masonry Testing Technician (or equivalent), employed by a testing laboratory with C.C.R.L. certification at the National Bureau of Standards, under the direct supervision of a licensed civil/structural engineer. The licensed engineer shall review and approve all reports.
      b. Special Inspector - Structural I: ICBO certified masonry inspector, or a graduate civil/structural engineer or other personnel acceptable to the Structural Engineer of Record (SER) with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a licensed structural engineer, as defined in
Section 01 45 33. The licensed engineer shall review and approve all inspection reports

5. The Owner will provide the following tests:

a. Brick: All requirements of ASTM C216, Grade SW, Type FBS. according to ASTM C67. One set of 10 bricks for every 100,000 units or fraction thereof.

b. Test mortar for consistency, water content, mortar aggregate ratio, air content (for air-entrained mortars), and compressive strength, according to ASTM C780. Conduct One set of six (6) 2” x 4” cylinders (3 @ 7 days and 3 @ 28 days) for every 500 sq. ft. of wall area or floor level, whichever produces the most tests. For testing of ASTM C780, one set first week and one set every 2500 sq. ft. of wall area or floor level, whichever produces the most tests. Qualifications: Technical I.

c. Observe preparation of masonry wall prisms or selection of masonry units for strength tests and preparation of grout specimens and mortar specimens. Qualifications: Structural I.

d. At the beginning of masonry construction, observe mixing of preblended mortar, construction of mortar joints, and location of reinforcement and connectors. Qualifications: Structural I.

e. On a periodic basis, verify size and location of structural elements; type, size and location of anchors including anchors to structural members or other construction, size, and type of masonry joint reinforcing and hot and cold weather protection. Qualifications: Structural I.

a. On a periodic basis, verify correct installation of thru-wall flashings and wick weeps. Complete observation of through-wall flashing installation in new construction includes close coordination and scheduling of visits at key periods of time, such as: initial installation of each through-wall flashing material at the onset of installation, all installed through-wall flashing membrane and accessories at each through-wall flashing location prior to installing covering materials, and at complex detailing (i.e.; over parapets, step flashing)

b. Qualifications: Structural I.

B. Summary of Construction Testing

<table>
<thead>
<tr>
<th>Description</th>
<th>Method of Test</th>
<th>Standard (Pass/Fail)</th>
<th>Frequency</th>
<th>Action Required (if failure occurs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical Test of Units Properties</td>
<td>ASTM C67</td>
<td>All requirements of ASTM C216, Grade SW, Type FBS. Check Specification for the required brick type.</td>
<td>One set of 10 bricks for every 100,000 units or fraction thereof.</td>
<td>Increase sampling frequency for rejection. Notify A/E and Owner.</td>
</tr>
<tr>
<td>Description</td>
<td>Method of Test</td>
<td>Standard (Pass/Fail)</td>
<td>Frequency</td>
<td>Action Required (if failure occurs)</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>21. Mortar Compression Tests (Field Mortar) (consistency, water retention, mortar aggregate ratio, air content and compressive strength testing)</td>
<td>ASTM C780</td>
<td>Structural to specify compressive strength range required for field testing of each mortar type.</td>
<td>One set of six (6) 2” x 4” cylinders (3 @ 7 days and 3 @ 28 days) for every 500 sq. ft. of wall area or floor level, whichever produces the most tests. For testing of ASTM C780, one set first week and one set every 2500 sq. ft. of wall area or floor level, whichever produces the most tests.</td>
<td>OITL to interpret results and discuss with A/E. Increase testing frequency. A/E to provide further action as required.</td>
</tr>
<tr>
<td>2. Mortar Aggregate</td>
<td>ASTM C144, gradation only.</td>
<td>Meet gradation requirements of ASTM C144 and evaluate grain size to Pre-Construction test results.</td>
<td>One sample of material per delivery of sand.</td>
<td>Review test results with A/E if significant difference from Pre-Construction tests.</td>
</tr>
</tbody>
</table>
5. Test of Assemblages:
   A. Flexural Strength
   B. Water Permeance

<table>
<thead>
<tr>
<th>Test Method</th>
<th>ASTM</th>
<th>As required by structural engineer. Inspect masonry. If workmanship not acceptable, Contractor to build panel at Owner’s OITL for testing.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C1072</td>
<td>Test 5 prisms of 3 bricks for each type of mortar, twice during the first week of masonry construction and every 2,500 sq. ft. of wall area or floor level, which ever provides the most tests. Daily basis.</td>
</tr>
<tr>
<td></td>
<td>E514</td>
<td>Increase sample frequency and review data with structural engineer. Accept or reject portions of Work as compared to test panel.</td>
</tr>
</tbody>
</table>

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect’s approval of sample cleaning before proceeding with cleaning of masonry.
   3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
   7. Clean stone trim to comply with stone supplier’s written instructions.
E. Ground finish masonry units: Apply field coat of aggregate highlighter after final cleaning of prefaced masonry units.

3.14 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property according to Division 01 Section “Construction Waste Management and Disposal.”

END OF SECTION
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SECTION 04 27 31
REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Concrete Block.
B. Reinforcement and Anchorage.

1.2 RELATED REQUIREMENTS
A. Section 04 05 11 - Masonry Mortaring and Grouting.

1.3 REFERENCE STANDARDS
A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International.
B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
H. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc..

1.4 SUBMITTALS
A. See Section 01 33 00 - Submittal procedures.
B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

1.5 QUALITY ASSURANCE
A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
B. Fire Rated Assemblies: Conform to applicable code for UL Assembly No. and ratings as indicated on the drawings.
1.6 DELIVERY, STORAGE, AND HANDLING
   A. Deliver, handle, and store masonry units by means that will prevent mechanical
damage and contamination by other materials.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS
   A. Concrete Block: Comply with referenced standards and as follows:
      1. Size: Standard units with nominal face dimensions of 16 x 8 inches and
         nominal depths as indicated on the drawings for specific locations.
      2. Load-Bearing Units: ASTM C90, normal weight.
         a. Hollow block.
      3. Standard Face Units: Manufacturer's standard color and texture unless noted
         otherwise; suitable for specified finish where applicable.

2.2 MORTAR AND GROUT MATERIALS
   A. Mortar and grout: As specified in Section 04 05 11.

2.3 REINFORCEMENT AND ANCHORAGE
   A. All tie and support items of exterior masonry shall be hot dip galvanized.
   B. Manufacturers of Joint Reinforcement and Anchors:
      4. Substitutions: See Section 01 60 00 - Product Requirements.
   C. Reinforcing Steel: ASTM A615/A615M Grade 40 (280) deformed billet bars;
galvanized.
   D. Single Wythe Joint Reinforcement: Ladder type; ASTM A1064/A1064M steel wire,
mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483
   inch cross rods; width as required to provide not more than 1 inch and not less
   than 1/2 inch of mortar coverage on each exposure.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that field conditions are acceptable and are ready to receive masonry.
   B. Verify that related items provided under other sections are properly sized and
      located.
   C. Verify that built-in items are in proper location, and ready for roughing into
      masonry work.

3.2 PREPARATION
   A. Direct and coordinate placement of metal anchors supplied for installation under
      other sections.
B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS
A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.4 COURSING
A. Establish lines, levels, and coursing indicated. Protect from displacement.
B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.

3.5 PLACING AND BONDING
A. Lay hollow masonry units with face shell bedding on head and bed joints.
B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
C. Remove excess mortar and mortar smears as work progresses.
D. Interlock intersections and external corners.
E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
G. Isolate masonry partitions from vertical structural framing members with a control joint.

3.6 REINFORCEMENT AND ANCHORAGE - GENERAL
A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Place continuous joint reinforcement in first and second joint below top of walls.
D. Lap joint reinforcement ends minimum 6 inches.
E. Reinforce joint corners and intersections with strap anchors 16 inches on center.

3.7 LINTELS
A. Install loose steel lintels over openings.
B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. Openings to 42 inches: Place two, No. 3 reinforcing bars 1 inch from bottom web.
2. Openings from 42 inches to 78 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
3. Openings over 78 inches: Reinforce openings as detailed.
4. Do not splice reinforcing bars.
5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
6. Place and consolidate grout fill without displacing reinforcing.
7. Allow masonry lintels to attain specified strength before removing temporary supports.

C. Maintain minimum 8 inch bearing on each side of opening.

3.8 GROUTED COMPONENTS
A. Lap splices minimum 24 bar diameters.
B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
C. Place and consolidate grout fill without displacing reinforcing.
D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.9 BUILT-IN WORK
A. As work progresses, install built-in items shown on the drawings and other items to be built into the work and furnished under other sections.
B. Install built-in items plumb, level, and true to line.
C. Bed anchors of door frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 8 inches from framed openings.
D. Do not build into masonry construction organic materials that are subject to deterioration.

3.10 TOLERANCES
A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.11 CUTTING AND FITTING
A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
3.12 CLEANING
   A. Remove excess mortar and mortar droppings.
   B. Replace defective mortar. Match adjacent work.
   C. Clean soiled surfaces with cleaning solution.
      1. Soiled surfaces shall include all surfaces left exposed to view.
   D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION
   A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 00
SECTION 04 42 00
EXTERIOR STONE CLADDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Dimension stone panels set with individual anchors.
   2. Dimension stone panels mechanically anchored to CMU backup wall.
   3. Dimension stone trim units, including copings, sills and jambs.

B. Related Requirements:
   1. Section 03 30 00 "Cast-in-Place Concrete" for installing inserts and weld plates in concrete for anchoring dimension stone cladding.
   2. Section 04 20 00 "Unit Masonry" for installing inserts or grouted cores in unit masonry for anchoring dimension stone cladding.
   3. Section 07 92 00 "Joint Sealants" for sealing joints in dimension stone cladding system with elastomeric sealants.

1.2 DEFINITIONS

A. Definitions contained in ASTM C 119 apply to this Section.


1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. B3 MSBG Submittals:
   1. Product Data for Guideline M2E: For products that are manufactured within a radius of 250 miles from project site, or in the State of Minnesota. Include statement indicating costs for each product.

C. Shop Drawings: Show fabrication and installation details for dimension stone cladding assembly, including dimensions and profiles of stone units.
   1. Show locations and details of joints both within dimension stone cladding assembly and between dimension stone cladding assembly and other construction.
   2. Include details of mortar joints sealant joints.
   3. Show locations and details of anchors and backup structure.
   4. Show direction of veining, grain, or other directional pattern.
5. Include large-scale shaded elevations and details of decorative surfaces and inscriptions.

D. Samples for Initial Selection: For joint materials involving color selection.

E. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12 inches (300 mm) square.
   1. Sets shall consist of at least three Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged.

F. Colored Mortar Samples for Verification: For each color required. Make Samples using same sand and mortar ingredients to be used on Project.

G. Sealant Samples for Verification: For each type and color of joint sealant required.

H. Delegated-Design Submittal: For dimension stone cladding and anchors.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, Fabricator, professional engineer and testing agency.

B. Welding certificates.

C. Material Test Reports:
   1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
   2. For metal components, by a qualified testing agency, indicating chemical and physical properties of metal.
   3. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer complying with requirements in Section 07 92 00 "Joint Sealants" and indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

D. Preconstruction test reports.

E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate dimension stone cladding assemblies similar to that required for this Project and whose products have a record of successful in-service performance.
B. Installer Qualifications: A firm or individual experienced in installing dimension stone cladding assemblies similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.


E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups of typical exterior wall area as shown on Drawings not less than 72 inches (1800 mm) long by 48 inches (1200 mm) high.
      a. Include typical components, attachments to building structure, and methods of installation.
      b. Include window opening with stone returns.
      c. Include sealant-filled joint complying with requirements in Section 07 92 00 "Joint Sealants."
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Remove mockups when directed by Architect, or at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Stone Testing: Engage a qualified independent testing agency to perform preconstruction testing.
   1. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
   2. Physical Property Tests: For each stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
   3. Flexural Strength Tests: For stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C 880/C 880M, in both wet and dry conditions.
   4. Anchorage Tests: For each combination of stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C 1354/C 1354M.

B. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 07 92 00 "Joint Sealants" Samples of materials that will contact or affect joint sealants.

C. Preconstruction Field Testing of Sealants: Before installing joint sealants, field test their adhesion to joint substrates according to Section 07 92 00 "Joint Sealants."
1.8 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
   1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
   2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.

C. Deliver sealants to Project site in original unopened containers labeled with manufacturer’s name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

1.9 FIELD CONDITIONS

A. Protect dimension stone cladding during erection by doing the following:
   1. Cover tops of dimension stone cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches (600 mm) down both sides and hold securely in place.
   2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
   3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
   4. Protect sills, ledges, and projections from mortar and sealant droppings.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.


D. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F (5 deg C) or when joint substrates are wet.
1.10 COORDINATION

A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by dimension stone cladding Installer for anchoring, supporting, and flashing of dimension stone cladding assembly. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.

B. Time delivery and installation of dimension stone cladding to avoid extended on-site storage and to coordinate with work adjacent to dimension stone cladding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain stone, regardless of finish, from single quarry with resources to provide materials of consistent quality in appearance and physical properties.
   1. For stone types that include same list of varieties and sources, provide same variety from same source for each.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

C. Source Limitations for Other Materials: Obtain each type of stone accessory and other material from single manufacturer for each product.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design dimension stone cladding and anchors.

B. General: Design stone anchors andanchoring systems according to ASTM C 1242.
   1. Stone anchors shall withstand not less than two times the weight of the stone cladding in both compression and tension.

C. Structural Performance: Dimension stone cladding assembly shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Wind Loads: As indicated.
   2. Equipment Loads: Allow for loads due to window cleaning and maintenance equipment.

D. Seismic Performance: Dimension stone cladding assembly shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

F. Shrinkage and Creep: Allow for progressive vertical shortening of building frame equal to \(<\text{Insert value}\) in 10 feet (3 m).

G. Safety Factors for Stone: Design dimension stone cladding assembly to withstand loads indicated without exceeding stone's allowable working stress determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
2. Safety Factor for Concentrated Stresses: 10 for stone varieties other than granite.

H. Design stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:
1. For Cold-Formed Stainless Steel: ASCE 8, "Specification for the Design of Cold-Formed Stainless Steel Structural Members."
2. For Cast-in-Place and Postinstalled Fasteners in Concrete: One-fourth of tested capacity when installed in concrete with compressive strength indicated.
3. For Postinstalled Fasteners in Masonry: One-sixth of tested capacity when installed in masonry units indicated.

I. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's structural system. Concrete fabrication and erection tolerances are specified in Section 03 30 00 "Cast-in-Place Concrete." Structural-steel fabrication and erection tolerances are specified in Section 05 12 00 "Structural Steel Framing."

J. Provision for Deflection of Building Structure:
1. Deflection Due to Weight of Dimension Stone Cladding Assembly: Allow for \([1/4\text{-inch (6-mm)}] <\text{Insert dimension}\) vertical deflection in 20-foot (6-m) span of structural members supporting dimension stone cladding assembly.
2. Live Load Deflection: Allow for \([1/4\text{-inch (6-mm)}] <\text{Insert dimension}\) vertical deflection, in 20-foot (6-m) span of structural members supporting dimension stone cladding assembly, due to live loads imposed on building's structural frame after stone installation.

K. Corrosion and Staining Control: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Materials shall not stain exposed surfaces of stone and joint materials.

2.3 LIMESTONE

A. Material Standard: Comply with ASTM C 568.
1. Classification: II Medium Density, except as follows: absorption, 5 percent by weight maximum; density, 150 lb/cu. ft. (2400 kg/cu. m) minimum;
compressive strength, 8000 psi (55 MPa) minimum; and modulus of rupture 800 psi (5.5 MPa) minimum.

B. Regional Materials: Limestone shall be fabricated within 500 miles (800 km) of Project site from stone that has been extracted within 500 miles (800 km) of Project site.

C. Description: Minnesota Stone Dolomitic Limestone.

D. Varieties and Sources: Subject to compliance with requirements, provide one of the following:
   2. Coldspring

E. Textures:
   1. **STN-1**: Ground finish.
   2. **STN-2**: Tapestry finish.

F. Match Architect's samples for color, finish, bed, and other stone characteristics relating to aesthetic effects.

2.4 ANCHORS AND FASTENERS

A. Fabricate anchors, including shelf angles, from stainless steel, ASTM A 240/A 240M or ASTM A 666, Type 304; temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A 276, Type 304.

B. Cast-in-Place Concrete Inserts: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel, with capability to sustain, without failure, a load equal to 4 times the loads imposed as determined by testing per ASTM E 488, conducted by a qualified independent testing agency. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Postinstalled Anchor Bolts for Concrete and Masonry: torque-controlled expansion anchors or undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

D. Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers.
   1. For stainless steel, use annealed stainless-steel bolts, nuts, and washers; for bolts, ASTM F 593 (ASTM F 738M); and for nuts, ASTM F 594 (ASTM F 836M), Alloy Group 1 (A1).
E. Weld Plates for Installation in Concrete: Comply with Section 05 50 00 "Metal Fabrications."

2.5 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
   1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in stone masonry mortar.

D. Aggregate: ASTM C 144 and as follows:
   1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
   2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

F.

2.6 STONE ACCESSORIES

A. Setting Shims: Strips of resilient plastic, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.

B. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.

C. Concealed Sheet Metal Flashing: Fabricated from stainless steel in thicknesses indicated, but not less than 0.0156 inch (0.4 mm) thick, and complying with Section 07 62 00 "Sheet Metal Flashing and Trim."

D. Cementitious Dampproofing for Limestone: Cementitious formulation recommended by ILI and nonstaining to stone; compatible with joint sealants and noncorrosive to anchors and attachments.

E. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, of length required to extend from exterior face of stone to cavity behind, in color selected from manufacturer's standard.
F. Wicking Material: Absorbent rope, made from cotton, 1/4 to 3/8 inch (6 to 10 mm) in diameter, of length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity between wythes.

G. Sealants for Joints in Dimension Stone Cladding: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 07 92 00 "Joint Sealants" and do not stain stone:

H. Sealant for Filling Kerfs:
   1. Single-component, nonsag, neutral-curing, medium- to high-modulus silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry).

2.7 STONE FABRICATION

A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
   1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."

B. Control depth of stone and back check to maintain minimum clearance of 2 inches between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.

C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.

D. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.

E. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

F. Cut stone to produce uniform joints 3/8 inch (10 mm) wide and in locations indicated.

G. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.

H. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.
   1. Produce moldings and molded edges with machines that use abrasive shaping wheels made to reverse contour of molding shape.

I. Clean backs of stone to remove rust stains, iron particles, and stone dust.
J. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
   1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

2.8 MORTAR MIXES

A. General: Comply with referenced standards and with manufacturers’ written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
   1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
   2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.

B. Portland Cement-Lime Setting and Pointing Mortar: Comply with ASTM C 270, Proportion Specification, Type N.
   1. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform source quality-control testing.
   1. Retesting of materials that fail to meet specified requirements shall be done at Contractor’s expense.
   2. Furnish test specimens randomly selected from same blocks as actual materials proposed for incorporation into the Work.
   3. Flexural Strength Tests: ASTM C 880/C 880M, performed on specimens of same thickness, orientation of cut, and finish as installed stone. One set of test specimens is required to be tested for every 10,000 sq. ft. (1000 sq. m), but not fewer than two sets for each stone variety.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive dimension stone cladding and conditions under which dimension stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of dimension stone cladding.
3.2 SETTING DIMENSION STONE CLADDING, GENERAL

A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Coat limestone with dampproofing to extent indicated below:
   1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches (300 mm) above finish-grade elevations.
   2. Stone Extending Below Grade: Beds, joints, back surfaces, and face surfaces below grade.
   3. Allow dampproofing to cure before setting dampproofed stone. Do not damage or remove dampproofing while handling and setting stone.

C. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.
   1. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.

D. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.

E. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure dimension stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with uniform joints of widths indicated, and with edges and faces aligned according to established relationships and indicated tolerances.

F. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
   1. Keep expansion joints free of mortar and other rigid materials.

G. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water, to divert water to building exterior. Extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.

H. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not fill cavities with mortar or grout.
   1. Place weep holes in joints where moisture may accumulate, including at base of cavity walls and above shelf angles and flashing. Locate weep holes at intervals not exceeding 24 inches (600 mm). Use plastic weep hole/vents or wicking material.
2. Place vents in cavity walls at tops of cavities, below shelf angles and flashing, and at intervals not exceeding 20 feet (6 m) vertically. Locate vents in joints at intervals not exceeding 60 inches (1500 mm) horizontally. Use plastic weep hole/vents.

3.3 SETTING DIMENSION STONE CLADDING WITH MORTAR

A. Set dimension stone cladding with mortar and mechanical anchors unless otherwise indicated.

B. Set stone in full bed of mortar with head joints filled unless otherwise indicated.
   1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
   2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
   3. Support and brace projecting stones until wall above is in place and mortar has set.
   4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.

C. Tool joints with a round jointer having a diameter 1/8 inch (3 mm) larger than width of joint, when pointing mortar is thumbprint hard.

D. Set the following dimension stone cladding with unfilled head joints for installing joint sealants:
   1. Cornices.
   2. Copings.
   4. Belt and other projecting courses.

3.4 JOINT-SEALANT INSTALLATION

A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3.5 INSTALLATION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (12 mm in 12 m) or more. For external corners, corners and jambs within 20 feet (6 m) of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch in 40 feet (10 mm in 12 m) or more.

B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum.
C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (12 mm in 12 m) or more.

D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/4 inch (6 mm).

E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch (3 mm) or a quarter of nominal joint width, whichever is less. For joints within 60 inches (1500 mm) of each other, do not vary more than 1/8 inch (3 mm) or a quarter of nominal joint width, whichever is less from one to the other.

F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units.

3.6 ADJUSTING AND CLEANING

A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and dimension stone cladding that does not match approved samples and mockups. Damaged stone may be repaired if Architect approves methods and results.

B. Replace damaged or defective work in a manner that results in dimension stone cladding's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.

D. Final Cleaning: Clean dimension stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION
SECTION 05 12 00
STRUCTURALSTEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Structural steel framing members, support members, custom steel trusses, masonry support angles and all other structural metal items.
B. Grouting under base plates.

1.2 RELATED REQUIREMENTS
A. Section 05 21 00 - Steel Joist Framing.
B. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.
C. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.3 REFERENCE STANDARDS
A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc..
B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc..
C. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
M. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
1.4 SUBMITTALS

A. See Section 01 33 00 - Submittal procedures.

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Provide member and connection design and details not indicated within design documents. Indicate calculated and/or assumed design loads for member and connection design and detail.
   3. Indicate cambers and loads.
   4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

B. Fabricator: Company specializing in performing the work of this section with minimum five years of documented experience.

C. Welders: AWS Certified.

D. Erector: Company specializing in performing the work of this section with minimum five years of documented experience.

E. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located; include engineer's stamp for connections.

2.1 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.

D. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A galvanized to ASTM A 153/A 153M, Class C.

E. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, medium carbon, galvanized.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days. Provide Construction Grout manufactured by BASF Construction Chemicals.
2.2 FABRICATION
   A. Shop fabricate to greatest extent possible.
   B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
   C. Fabricate connections for bolt, nut, and washer connectors.

2.3 FINISH
   A. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted.
   B. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.
      1. Provide this finish at any supporting member of exterior veneer.

2.4 EXPANSION ANCHORS
   A. Approved Products: Red Head Concrete Anchoring Solutions: www.itwredhead.com.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION
   A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
   B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
   C. Field weld components indicated on shop drawings.
   D. Do not field cut or alter structural members without approval of Architect.
   E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
   F. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.
3.3 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
   B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL
   A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 33.
   B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 50 percent of bolts at each connection.
   C. Welded Connections: Visually inspect all field-welded connections and test at least 100 percent of welds using one of the following: (only for welds exceeding 5/16")
      1. Radiographic testing performed in accordance with ASTM E94.
      2. Ultrasonic testing performed in accordance with ASTM E164.
      3. Liquid penetrant inspection performed in accordance with ASTM E165.
      4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION 05 12 00
SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES
   A. Open web steel joists, with bridging, attached seats and anchors.
   B. Loose bearing members, such as plates or angles, and anchor bolts for site placement.
   C. Supplementary framing for roof openings greater than 18 inches.

1.2 RELATED REQUIREMENTS
   A. Section 05 12 00 - Structural Steel Framing: Superstructure framing.
   B. Section 05 31 00 - Steel Decking: Support framing for openings less than 18 inches in decking.
   C. Section 05 50 00 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.3 REFERENCE STANDARDS
   A. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
   F. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments.
   I. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
   J. SJI (SPEC) - Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders; Steel Joist Institute.
   K. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute.
   L. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings.
   M. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

1.4 SUBMITTALS
   A. See Section 01 33 00 - Submittal procedures.
B. Shop Drawings: Indicate location of all shop drilled holes (where applicable) and shop welded studs (where applicable) locations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.

1.5 QUALITY ASSURANCE
   A. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located; include engineer's stamp for connections.
   B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI Standard Specifications Load Tables and SJI Technical Digest No.9.
   C. Manufacturer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.
   D. Erector Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING
   A. Transport, handle, store, and protect products to SJI requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Steel Joists:
      2. Canam Group Inc: www.canam-steeljoists.ws
      4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 MATERIALS
   A. Open Web Joists: SJI Type K Joists:
      1. Minimum End Bearing on Steel Supports: Comply with referenced SJI standard.
      2. Minimum End Bearing on Concrete or Masonry Supports: Comply with referenced SJI standard.
      3. Finish: Shop primed.
   C. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A 36/A 36M.
   D. Welding Materials: AWS D1.1; type required for materials being welded.
   E. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.
2.3 FABRICATION
   A. Shop drill holes in chords for attachment to and attachment of related components.

2.4 FINISH
   A. Shop prime joists as specified.
   B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify existing conditions prior to beginning work.

3.2 ERECTION
   A. Erect joists with correct bearing on supports.
   B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
   C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.
   D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
   E. Coordinate placement of anchors in concrete construction for securing bearing plates and angles.
   F. After joist alignment and installation of framing, field weld joist seats to bearing plates.
   G. Install supplementary framing for roof openings greater than 18 inches.
   H. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
   I. Do not field cut or alter structural members without approval of joist manufacturer.
   J. After erection, prime welds, damaged shop primer, and surfaces not shop primed.

3.3 TOLERANCES
   A. Maximum Variation From Plumb: 1/4 inch.
   B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL
   A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 33.
   B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 50 percent of bolts at each connection.
C. Welded Connections: Visually inspect all field-welded connections and test at least 100 percent of welds using one of the following: (only for welds exceeding 5/16" thickness)
   1. Radiographic testing performed in accordance with ASTM E94.
   2. Ultrasonic testing performed in accordance with ASTM E164.
   3. Liquid penetrant inspection performed in accordance with ASTM E165.
   4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION 05 21 00
SECTION 05 31 00
STEEL DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Roof deck.
B. Supplementary framing for openings up to and including 18 inches.
C. Bearing plates and angles.

1.2 RELATED REQUIREMENTS
A. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches.
B. Section 05 21 00 - Steel Joist Framing: Support framing for openings larger than 18 inches.

1.3 REFERENCE STANDARDS
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
C. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
D. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society.
E. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute.

1.4 SUBMITTALS
A. See Section 01 33 00 - Submittal procedures.
B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

1.5 QUALITY ASSURANCE
A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located; include engineer's stamp for connections.
B. Installer Qualifications: Company specializing in performing the work of this Section with minimum five years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Cut plastic wrap to encourage ventilation.
B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS
A. Steel Deck:
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 STEEL DECK
A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
   1. Calculate to structural working stress design and structural properties specified.
B. Roof Deck: Non-composite type, fluted steel sheet:
   1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS), with G90/Z275 galvanized coating.
      a. Grade as required to meet performance criteria.
   3. Nominal Height: 1-1/2 inch.
   4. Profile: F or B
   5. Formed Sheet Width: 36 inch.
   7. End Joints: Lapped, welded or mechanically fastened.

2.3 ACCESSORY MATERIALS
A. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.
C. Fasteners: Galvanized hardened steel, self tapping.
D. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

2.4 FABRICATED DECK ACCESSORIES
A. Sheet Metal Deck Accessories: Metal closure strips and cover plates, 22 gage thick sheet steel; of profile and size as indicated; finished same as deck.

**PART 3 - EXECUTION**

3.1 EXAMINATION
A. Verify existing conditions prior to beginning work.
3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer’s instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4 inch bearing.

C. On steel supports provide minimum 1-1/2 inch bearing.

D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
   1. Welding: Use fusion welds through weld washers.

E. Clinch lock seam side laps.

F. At welded male/female side laps weld at 18 inches on center maximum.

G. Weld deck in accordance with AWS D1.3.

H. At deck openings from 6 inches to 18 inches in size, provide 2 x 2 x 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

I. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.

J. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION 05 31 00
SECTION 05 40 00
COLD-FORMED METAL FRAMING

1.1 SUMMARY
   A. Exterior soffit joist framing.

1.2 PERFORMANCE REQUIREMENTS
   A. Structural Performance:
      1. Dead Loads: As indicated.
      2. Live Loads: As indicated.
      3. Roof Loads: As indicated.
      5. Wind Loads: As indicated.
   B. Engineering design of cold-formed metal framing by Contractor.

1.3 QUALITY ASSURANCE
   A. Design Standard: AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.4 MATERIALS
   A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, G 90 galvanized.
      1. Minimum Steel Thickness: 0.0538 inch (1.37 mm).
   C. Framing Accessories: Supplementary framing bracing, bridging, and solid blocking web stiffeners gusset plates stud kickers and girts and joist hangers and end closures.
   D. Insulation for inaccessible voids.

1.5 INSTALLATION
   A. Fasten framing by screw fastening.
1. Joist Spacing: 16 inches (406 mm).

1.6 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION 05 40 00
SECTION 05 50 00
METAL FABRICATIONS

1.1 PRODUCTS

A. Materials: Steel plates, shapes, and bars Steel tubing Steel pipe Slotted channel framing.

B. Miscellaneous Framing and Supports: Galvanized where indicated.
   1. Steel framing and supports for ceiling-hung toilet compartments operable partitions countertops mechanical and electrical equipment applications where framing and supports are not specified in other Sections.
   2. Steel framing and supports for wood wall panels.

C. Loose bearing and leveling plates, galvanized.

D. Loose steel lintels, galvanized at exterior walls.

E. Steel weld plates and angles not specified in other Sections, for casting into concrete.
SECTION 05 51 00
METAL STAIRS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Stairs with concrete treads.
B. Structural steel stair framing and supports.
C. Handrails and guards.

1.2 REFERENCE STANDARDS
H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.
K. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
L. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings.
M. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

1.3 SUBMITTALS
A. See Section 01 33 00 - Submittal procedures.
B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Include the design engineer's stamp or seal on each sheet of shop drawings.
1.4 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer; include engineer's stamp.

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

PART 2 - PRODUCTS

2.1 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
   1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
   2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
   3. Dimensions: As indicated on drawings.
   4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
   5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
   6. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
   1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
      a. Welded Joints: Continuously welded and ground smooth and flush.
      b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
      c. Exposed Edges and Corners: Eased to small uniform radius.
      d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.2 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
   1. Concrete Depth: 1-1/2 inches, minimum.
   2. Tread Pan Material: Steel sheet.
3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
4. Concrete Reinforcement: None.
5. Concrete Finish: Steel troweled.

D. Risers: Same material and thickness as tread pans.
   1. Nosing Depth: Not more than 1-1/2 inch overhang.
   2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: Rolled steel channels.
   1. Stringer Depth: As indicated on drawings.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Similar construction, using corrugated steel decking, supported and reinforced as required to achieve design load capacity.

G. Railings: Steel pipe railings.
H. Finish: Shop- or factory-prime painted.

2.3 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
   1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.

B. Guards:
   1. Top Rails: Round pipe or tube rails unless otherwise indicated.
      a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
   2. Infill at Picket Railings: Vertical pickets.
      a. Horizontal Spacing: Maximum 4 inches on center.
      b. Material: Solid steel bar.
      c. Shape: Square.
      d. Size: 1/2 inch square.
      e. Top Mounting: Welded to underside of top rail.
      f. Bottom Mounting: Welded to top surface of stringer.
   3. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
      a. Outside Diameter: 1 inch.
      b. Material: Steel pipe or tube, round.
      c. Vertical Spacing: Maximum 48 inches on center.
      d. Jointing: Welded and ground smooth and flush.
   4. End and Intermediate Posts: Same material and size as top rails.
      a. Horizontal Spacing: As indicated on drawings.
      b. Mounting: Welded to top surface of stringer.

2.4 MATERIALS

A. Steel Sections: ASTM A 36/A 36M.
B. Steel Tubing: ASTM A500/A500M or ASTM A501 structural tubing, round and shapes as indicated.
C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
E. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

F. Concrete Fill: Type specified in Section 03 30 00.

G. Steel Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

H. Welding Materials: AWS D1.1; type required for materials being welded.

I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.5 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
   2. Number of Coats: One.
      a. Provide primer products indicated for surfaces to be primed and painted, Refer to Section 09 91 23 - Interior Painting.

2.6 EXPANSION ANCHORS

A. Approved Products: Red Head Concrete Anchoring Solutions: www.itwredhead.com.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1.
E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
F. Obtain approval prior to site cutting or creating adjustments not scheduled.
G. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 TOLERANCES
A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION 05 51 00
SECTION 05 73 13
GLAZED DECORATIVE METAL RAILINGS

1.1 SUMMARY
A. Post-supported railings with glass infill.

1.2 QUALITY ASSURANCE
A. Contractor to engineer railings to withstand structural loads.
B. Mockups for each form and finish of railing.

1.3 MATERIALS
A. Steel
B. Wood rails.

1.4 FABRICATION
A. Connections: Welded.
B. Changes in Direction of Members: by inserting prefabricated fittings.
C. Glass Infill Panels: Tempered glass.

1.5 FINISHES
A. Steel: Field painted
END OF SECTION
SECTION 061005
ROOF-RELATED ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Roof-related wood blocking
   2. Sheet metal angle/bent plate

B. Related Sections:
   1. Section 075100 - Built-Up Bituminous Roofing
   2. Section 076205 - Roof-Related Sheet Metal Flashings

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

B. Codes and Standards: In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect/Engineer, comply with the following:
   1. Product Use Manual of the Western Wood Products Association for selection and use of products included in that manual.

1.3 DELIVERY, STORAGE, AND HANDLING
A. Deliver materials to the site, insofar as practicable, in manufacturer's original containers and bearing the trademarks and names thereof. Grademark stamped on all standard yard dimension lumber or certified for compliance. Plywood grade stamped.

B. Carefully stack lumber and plywood to prevent warping. Keep dry.

1.4 PROJECT CONDITIONS
A. Existing Conditions: Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until given conditions have been corrected.

B. Environmental Requirements: Wind velocity and temperature limitations shall be based on Contractor's ability to apply materials in the specified manner.

C. Protection: Provide appropriate protection on roof-related traffic, staging, and storage areas. As a minimum, protection shall consist of 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the work.
PART 2 - PRODUCTS

2.1 LUMBER

A. Non-preservative treated, standard light framing grade, sound and thoroughly seasoned with less than 19 percent moisture content at the time of installation and at time roofing is installed.
   1. Douglas Fir
   2. Eastern Pine
   3. No. 3 Southern Pine
   4. No. 2 Western Hemlock
   5. Spruce-Pine-Fir

2.2 PLYWOOD

A. C-D Exposure 1 or better, APA Rated Sheathing, non-preservative treated, meeting U.S. Products Standard PS1 or Performance Standard PRP-108 for Soft Wood Plywood Construction and Industrial, with less than 19 percent moisture content at time of installation and at the time roofing is installed.

2.3 FASTENERS

A. Stainless steel fasteners required for fastening into existing treated wood.
B. Lag screws: Zinc or cadmium plated, 3/8" diameter with 1-1/2" penetration into blocking.
C. Lumber to lumber: Cement coated or annular thread nails with minimum 1-1/4" penetration into adjoining member.
D. Plywood to lumber:
   1. Nails: Ring shank or annular thread nails with minimum 1-1/4" penetration into adjoining member.
   2. Screws: Minimum #14 flat head countersunk wood screws, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
E. Lumber or plywood to concrete or masonry: Tapcon or Gripcon anchors, minimum 1/4" diameter with 1" penetration, minimum 300 lb. per anchor installed withdrawal resistance. Other corrosion resistant drilled-in type masonry anchors may be used if equivalent in pull-out strength.
F. Lumber or plywood to steel deck: Minimum #14 sheet metal screw, zinc or cadmium plated; through 5/8" diameter steel washers for lumber.
G. Sheet metal angle/bent plate to lumber: Minimum #14 flat head wood screws, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
H. Sheet metal angle/bent plate to steel deck: Self-drilling screw fastener, size 12 - 24 by 7/8, HWH Teks/4 manufactured by ITW Buildex

2.4 MISCELLANEOUS

A. Sheet metal angle/bent plate: 12-gauge galvanized iron, size as shown on the Drawings.
PART 3 - EXECUTION

3.1 PREPARATION
   A. Grout, shim, patch, or fill existing construction as necessary to properly install wood members.
   B. Perimeter wood blocking installation shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, September 2009.

3.2 WOOD BLOCKING
   A. Install in straight lines, level planes, and at proper elevation.
   B. Top surface of horizontal blocking is to match the surface elevation of the new roof insulation.
   C. Do not use warped wood members unless they can be fastened adequately to permanently hold them in their required alignment.
   D. When constructing wood curbs with multiple vertical blocking and plywood members, provide staggered joints for all layers and minimum 12" laps.
   E. Lumber or Plywood to Lumber:
      1. Maximum spacing of 12" on-center, staggered across face of piece and located within 3" of each end of piece. Maximum spacing of 6" on-center, 8' each way from outside corners for roof edge blocking.
      2. Heads shall be flush with wood surface and nail shall penetrate adjoining piece minimum 1-1/4 inch.
      3. Minimum 100 lb. per nail installed withdrawal resistance.
   F. Lumber or Plywood to Concrete or Masonry:
      1. Spacing as shown on Drawings or maximum 3' on-center when not specified, staggered. Maximum 18" on-center, 8' each way from outside corners for roof edge blocking.
      2. Countersink head flush with surface but no more than 1/3 the thickness of the fastened piece.
      3. Minimum 300 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1 inch.
   G. Lumber or Plywood to Steel Deck:
      1. Verify the presence of conduit below the steel deck prior to installation.
      2. Spacing as shown on the Drawings or maximum 18" on-center for screws when not specified, and staggered if lumber is more than 5" wide. Maximum 9" on-center, 8' each way from outside corners for roof edge blocking.
      3. Countersink head flush with surface but not more than 1/3 the thickness of the fastened piece.
      4. Minimum 150 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1-1/2 inches.
3.3 FIELD QUALITY CONTROL
   A. Construction Observation: The Owner may retain the services of an independent agency for testing and construction observation. Notify Owner’s construction observer whenever work is to be done in sufficient time to arrange observation and testing. The Contractor shall not commence Work until the Owner’s construction observer is present.
   B. Alignment and elevation of installed wood shall be checked by Contractor and may be checked by Architect/Engineer.
   C. Withdrawal tests of installed fasteners may be required if attachment is in question.

3.4 CLEANING
   A. Keep the premises in a neat, safe, and orderly condition, free from an accumulation of sawdust, cut ends, and debris at all times during execution of this Work.

END OF SECTION
SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

1.1 MATERIALS

A. Wood Products, General:
   1. Maximum Moisture Content of Lumber: 15 percent.

B. Wood-Preservative-Treated Materials:
   1. Preservative Treatment: AWPA U1; use Category UC2 except use Category UC3b for exterior construction and use Category UC4a for items in contact with the ground.
      a. Preservative Chemicals: Containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
   2. Application: Items indicated and the following:
      a. Items in contact with concrete or masonry.
      b. Framing less than 18 inches (460 mm) above ground in crawlspaces.

C. Fire-Retardant-Treated Materials:
   1. Interior Type A unless otherwise indicated.
   2. Application: Items indicated and the following:
      a. Plywood backing panels.
      b. Blocking.
      c. Furring.

D. Miscellaneous Lumber:
   1. Dimension Lumber: Construction or No. 2 grade spruce-pine-fir or hem-fir.
   2. Concealed Boards: 15 percent maximum moisture content.
      a. Hem-fir, Construction or No. 2 Common.
      b. Spruce-pine-fir, Construction or 2 Common.

E. Plywood Backing Panels: Exterior, AC, fire-retardant treated.

F. Fasteners: Hot-dip galvanized steel where exposed to weather, in ground contact, in contact with treated wood, or in area of high relative humidity.

G. Adhesives: Low VOC, comply with Indoor Air Quality portion of California Section 01350 Standard.
1.2 INSTALLATION

A. Furring to Receive Plywood or Hardboard Paneling: 1-by-3-inch nominal-size (19-by-63-mm actual-size) furring at 24 inches (610 mm) 600 mm o.c. unless otherwise indicated

END OF SECTION 06 10 53
SECTION 06 16 00
SHEATHING

1.1 MATERIALS

A. Wood Products, General:
   a. Plywood.
   2. Wood panel products comply with no added urea formaldehyde.

B. Fire-Retardant-Treated Plywood:
   1. Exterior Type, High Temperature (HT) for wall sheathing.
   2. Application: Treat the following:
      a. Wall sheathing.
      b. Subflooring and underlayment for raised platforms.

C. Wall Sheathing:
   1. Plywood: Exterior, Structural I, 1/2 inch (13 mm) thick.
   2. Glass-Mat Gypsum: Regular, 1/2 inch (13 mm) thick.

D. Fasteners: Hot-dip galvanized steel where exposed to weather, in ground contact, in contact with treated wood, or in area of high relative humidity.

1.2 INSTALLATION

A. Wood Structural Panel:
   1. Sheathing:
      a. Screw to cold-formed metal framing.

B. Gypsum Sheathing:
   1. Screw to cold-formed metal framing.
END OF SECTION 06 16 00
SECTION 06 40 23
INTERIOR ARCHITECTURAL WOODWORK

1.1 SUMMARY
A. Interior running trim.
B. Rails.
C. Built in Benches.
D. Display cases.
E. Display windows.
F. Wood cabinets.
G. Solid-surfacing-material countertops.
H. Wall shelves.
I. Wood ceiling and wall panels.

1.2 QUALITY ASSURANCE
A. Quality Standard: AWI, including installation.
B. Mockups for each form of construction and finish.

1.3 MATERIALS
A. Wood Species and Cut for Transparent Finish:
   1. **WD-1**: Rift Cut White Oak.
B. Wood Species for Opaque Finish: Any closed-grain hardwood.
C. Composite Wood Products: Made without urea formaldehyde.
D. Cabinet Hardware:
   1. Hinges: Butt, concealed, European type.
   3. Locks: Door and drawer.
   4. Exposed Hardware Finishes: Satin chromium plated or Satin stainless steel.
E. Interior Woodwork Grade: Premium.
F. Interior Standing and Running Trim for Transparent Finish:
   1. Chair rails [CR-1]: As indicated in the Interior Building Materials Legend.

G. Rails:

H. Display cases and display windows for Transparent Finish:
   1. Doors: Glass, sliding, top and bottom shoe.
      a. Lock: Permanently mounted in bottom shoe.
   2. Shelves: Tempered Glass.
      a. Standards and supports.
   3. Lights:

I. Wood Cabinets for Transparent Finish (Coffee Bar):
   1. AWI Type of Cabinet Construction: Flush overlay.
      a. Veneer Matching: Slip or book match veneer leaves as selected by the Architect and balance match within panel face.
   2. Cabinet Interior: Same species as exterior, may be one grade lower.

J. Solid-Surfacing-Material Countertops:
   1. See Section 12 32 16 “Manufactured Plastic-Laminate Casework.”

K. Built in Benches:

L. Wood Ceiling and Wall Panels: As indicated in the Interior Building Materials Legend.
   1. WDP-1:
   2. WDP-2: Wood Acoustical Panels - Wall / CEILING
   3. WDP-3: Wood Acoustical Panels - Wall / CEILING
   4. WD-2: wood slat ceiling system dark
   5. WD-3: wood slat ceiling system light.
   6. Acoustic insulation: Fiberglass duct liner insulation, 2 inch thickness, black faced.

1.4 INSTALLATION

A. Board Ceilings: Installed without end joints.
   1. Fastening: Suspended with concealed clips or anchors.
B. Shop Finishing:

1. Grade: Same grade as woodwork.
   b. Staining: Match Architect’s sample.

2. Extent: All woodwork shop finished.

END OF SECTION 06 40 23
SECTION 07 14 13

HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

B. Related Sections:
1. Division 07 Section “Building Insulation” for foundation insulation.
2. Division 33 Section “Subdrainage” for drain pipe and filter fabric.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.

C. Samples: For the following products in manufacturer's standard sizes unless otherwise indicated:
1. Flashing sheet.
2. Drainage panel.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and testing agency.
1. Provide documentation on manufacturer’s letterhead stating approval of Installer as required under Quality Assurance below.

B. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

C. Manufacturer's Review of Waterproofing System

D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
1. Certificate of Substrate Acceptance: Submit certificate from installer and manufacturer's representative stating that the substrate has been properly prepared and is acceptable for installation of self-adhering sheet waterproofing.
E. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm having a minimum of 5 years experience on projects of comparable size and scope that is approved or licensed by manufacturer for installation of waterproofing required for this Project and is eligible to receive special warranties specified.

B. Source Limitations: Obtain waterproofing materials sheet flashings protection course molded-sheet drainage panels from single source from single manufacturer.

C. Manufacturer's review: “Manufacturer’s Review of Waterproofing System” per MnSCU Design Standards, Section 07 13 00, Paragraph 1.4.5.
   1. Manufacturer's Review of Waterproofing System: Before delivering waterproofing materials to the Project site, submit a written statement signed by the Contractor, waterproofing Applicator and manufacturer's representative stating that the A/E's Project Drawings and Specifications have been reviewed by the manufacturer’s regional manager, and that the representative is in agreement that the selected materials and system for waterproofing are proper and adequate for the application shown. This submittal shall also to be submitted to the Owner.

D. Inspection and Testing:
   1. Full time inspection is required for Work specified in this Section. Cooperate with any inspection and testing firm engaged by the Owner to perform on-site inspection of the membrane waterproofing work. Comply with the inspector's request in connection with specific test samples, and provide any additional testing that may be requested to confirm that the Work complies with the requirements. The Contractor shall notify the Owner’s inspection and testing firm, A/E and Owner five (5) working days in advance of start of any waterproofing work to be performed on-site, and three (3) working day notice per inspection trip thereafter.
   2. To determine whether the substrates are dry, there shall be three tests performed and paid for by the Contractor and observed by the Owner’s inspection personnel. If test methods 1, 2 or 3 fail, then the application of waterproofing shall not proceed until the surface is dried and the test passes. Repeat all three tests after each substrate exposure to moisture such as rain, dew, mist, sleet, etc.
      a. Test 1 (moisture test): Install a 3' x 3' sheet of clear polyethylene over the substrate. Seal the sheet to the substrate by installing a continuous bead of water cut-off mastic (or other pre-approved material) under the sheet around all four edges and then duct tape all four edges as well. If moisture condenses on the underside of the sheet, or shows up in any other form after exactly three hours, then the test has failed and the substrate has too high a moisture content to receive the waterproofing. The substrate must be dried by increasing cure time or torch drying, or both, before repeating the test. Do not proceed to Test 2 until Test 1 passes. Completely remove test materials before proceeding with the waterproofing installation.
b. Test 2 (moisture test, hot fluid-applied rubberized asphalt only): Once Test 1 has passed, then proceed with Test 2 by applying surface conditioner and liquid membrane to a 2' x 2' area of substrate. The temperature of the liquid membrane and the "working in" of the liquid membrane at the test area shall match that of the final membrane installation as required by the manufacturer. If bubbles or blisters are apparent, or if the liquid membrane "tents up" and releases from the substrate when touched, then the test has failed and the substrate has too high a moisture content to receive the waterproofing.

c. Test 3 (adhesion test): Once Tests 1 and 2 have passed, then proceed with test three.

1) Hot fluid-applied rubberized asphalt: Install a 12" x 12" area of the following in ascending order: surface conditioner, 90 mils of liquid membrane, 12" x 14" sheet of elastomeric reinforcing fully bonded into the hot membrane. The temperature of the liquid membrane and the "working in" of the liquid membrane shall match that of the final membrane installation as required by the manufacturer. Once the liquid membrane has cured (minimum 10 minutes), test the adhesion to the substrate by pulling up on the non-bonded 2" strip of elastomeric reinforcing. If any area of the liquid membrane separates from the substrate instead of separating from itself or the reinforcing, then adhesion is inadequate and the test has failed.

2) All other waterproofing: Install a 12" x 12" area of the following in ascending order: surface conditioner, membrane waterproofing, 12" x 14" sheet of elastomeric reinforcing fully bonded into the membrane. The "working in" of the membrane shall match that of the final membrane installation as required by the manufacturer. Once the membrane has cured (minimum 10 minutes), test the adhesion to the substrate by pulling up on the non-bonded 2" strip of elastomeric reinforcing. If any area of the membrane separates from the substrate instead of separating from either itself or from the reinforcing, then adhesion is inadequate and the test has failed. If the membrane is of a non-curing variety, then a 10-minute wait is not necessary.

E. Mockups: Install waterproofing to 100 sq. ft. (9.3 sq. m) of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality.


2. If Architect determines mockups do not comply with requirements, reapply waterproofing and reinstall overlaying construction until mockups are approved.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.
1. Review waterproofing requirements including mockup, surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

2. Review methods and procedures related to work, including but not necessarily limited to, the following:
   a. Tour jobsite areas to be waterproofed. Review condition of substrate, drains, curbs, penetrations and other preparatory work.
   b. Review waterproofing requirements of the Contract Documents.
   c. Review required submittals, both completed and yet to be completed.
   d. Review and finalize construction schedule related to waterproofing work and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
   e. Review required inspection, testing, and certifying procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below 0 deg F (minus 18 deg C).
   1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.7 WARRANTY

A. Special Warranty: Manufacturer’s standard form in which manufacturer and Installer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
   1. Warranty insulation will retain 80 percent of original published thermal value.
   2. Failures include, but are not limited to:
      a. Water penetrating into the building or structure.
      b. Deteriorated or displaced waterproofing materials.
   3. Warranty Period: 15 years from date of Substantial Completion.

B. Contractor/Applicator Guarantee: Unqualified guarantee for a period of three (3) years on all materials, workmanship and water-tightness, signed by the
waterproofing Applicator and the Contractor on the complete waterproofing installation for the Project and that any defects in the installation because of materials or workmanship shall be properly corrected during the guarantee period at no cost to the Owner. Upon written notification within the guarantee period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.

C. Applicator Guarantee: Unqualified guarantee for a period of twelve (12) years from the expiration of the noted warranty in the above paragraph 1.9.2, on all materials, workmanship and water-tightness, signed by the waterproofing Applicator on the complete waterproofing installation for the Project and that any defects in the installation because of materials or workmanship shall be properly corrected during the guarantee period at no cost to the Owner. Upon written notification within the guarantee period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.

PART 2 - PRODUCTS

2.1 WATERPROOFING MEMBRANE

A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane [WP-1]: Single component; 100 percent solids; hot fluid-applied, fabric reinforced rubberized asphalt membrane averaging 3/16” (188 mils) thick, but never less than 1/8” (125 mils) thick, and not less than the thickness recommended by the Manufacturer.

1. Products: Subject to compliance with requirements, provide the following:

2.2 AUXILIARY MATERIALS

A. Primer: ASTM D 41, asphaltic primer.

B. Elastomeric Flashing Sheet: 60-mil- (1.3-mm-) thick, minimum, uncured sheet neoprene as follows:
   1. Tensile Strength: 1400 psi (9.6 MPa) minimum; ASTM D 412, Die C.
   2. Elongation: 300 percent minimum; ASTM D 412.
   3. Tear Resistance: 150 psi minimum; ASTM D 624, Die C.
   4. Brittleness: Does not break at minus 30 deg F (16 deg C); ASTM D 2137.

C. Surface Conditioner: American Hydrotech Pre-Mixed Surface Conditioner.

D. Flashing Sheet: American Hydrotech Flex-Flash UN 60 Mils.

E. Protection Board:
   1. American Hydrotech Hydroflex 10 (Horizontal Only)
   2. W. R. Meadows PC-2 Sealtight Protection Coarse (Vertical)

F. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum termination bars; approximately 1 by 1/8 inch (25 by 3 mm) thick; with splayed top to receive sealant bead; longest lengths available; with anchors.
G. Flashing Pipe and Vent Clamping Rings: Waterproofing membrane manufacturer approved, stainless steel adjustable wormgear pipe and vent clamping rings; size appropriate to installation.

H. Sealants and Accessories: Manufacturer's recommended sealants and accessories.

I. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.

J. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
   1. Thickness: 1/8 inch (3 mm), nominal.

K. Insulation: Foundation insulation as per the requirements of Division 07 Section “Building Insulation.”

2.3 MOLDED-SHEET DRAINAGE PANELS

A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve, laminated to one side with a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm/ft. (112 to 188 L/min. per m).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer, or 14 days, whichever is longer after forms have been stripped.”
   2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263. Perform Moisture Tests 1, 2, and 3 as required and described in the Quality Control Article.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare substrates according to manufacturer’s written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
   1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.

E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.
   1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
   2. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches (150 mm) on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch (3 mm) thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
   3. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches (150 mm) on each side of nonmoving joints and cracks not exceeding 1/8 inch (3 mm) thick, and beyond roof drains and penetrations.
      a. Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.

B. Construction Joints and Cracks:
   1. 1/16" to 1/4": Sandwich a strip of elastomeric flashing between two 1/8", 125 mil thick (minimum) applications of liquid membrane. Extend the first application of liquid membrane and the elastomeric flashing minimum 3" either side of the crack and extend the top application of liquid membrane 3" beyond the first two.
   2. Over 1/4" wide (excluding expansion joints): Notify the Architect and Owner's representative for inspection and direction.
   3. Inside/Outside corners: Follow same procedures as described above (paragraph B.1) while centering detail on the corner.
   4. Brick ledges and through-wall conditions: Embed a strip of elastomeric flashing into one 1/8", 125 mil thick (maximum) application of liquid membrane.
   5. Pipe penetrations: Over an 1/8", 125 mil thick (minimum) application of liquid membrane, embed elastomeric flashing. One flashing piece shall be around the pipe and flange to the wall, and the other piece shall be on the wall and flange to the pipe. Wrap base of pipe with elastomeric flashing to seal flange
from wall piece. Cover with another application of liquid membrane, 1/8”, 125 mil thick (minimum), extending 3” past elastomeric flashing.

C. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of 6 inches (150 mm) on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

3.4 FLASHING INSTALLATION

A. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.

B. Prime substrate with asphalt primer.

C. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.

D. Extend elastomeric flashing sheet up walls or parapets a minimum of 8 inches (200 mm) above plaza deck pavers and 6 inches (150 mm) onto deck to be waterproofed.

E. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

3.5 MEMBRANE APPLICATION

A. Apply primer, at a rate of 1 gal/ 300-600 sq. ft. with 100% coverage, over prepared substrate and allow to dry.

B. Heat and apply rubberized asphalt according to manufacturer's written instructions.  
1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.

C. Start application with manufacturer's authorized representative present.

D. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils (2.3 mm); embed reinforcing fabric, overlapping sheets 6 inches (150 mm); spread another 125-mil- (3.2-mm-) thick layer to provide a uniform, reinforced, seamless membrane 215 mils (5.5 mm) thick.

E. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

F. Cover waterproofing with protection course with overlapped joints before membrane is subject to backfilling.
3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate according to manufacturer’s written instructions. Use methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
   1. For vertical applications, install board insulation before installing drainage panels.

3.7 FIELD QUALITY CONTROL

A. Manufacturer’s Field Services: Arrange for waterproofing system manufacturer’s technical personnel to inspect work a minimum of 3 times during installation of system. Manufacturer’s representative’s inspection includes the following:
   1. Substrate and surface preparation.
   2. First application of waterproofing membrane, intermediate inspections as work progresses, and completed installation including membrane, flashings, protection, and drainage components.
   3. Submit written reports of each inspection.

B. Final Inspection: Arrange for manufacturer's representative to inspect completed waterproofing installation before covering with other construction and provide written report that installation complies with manufacturer’s written instructions.
   1. Remove and replace applications of waterproofing where inspection indicates that it does not comply with specified requirements.

3.8 CLEANING AND PROTECTION

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Protect installed board insulation from damage due to UV light, harmful weather exposures, physical abuse, and other causes.

C. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION
SECTION 07 18 00

TRAFFIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes traffic coatings for the following applications:
   1. Interior, pedestrian traffic.

B. Related Sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for concrete substrates.

1.2 ACTION SUBMITTALS

A. Product Data (PD): Submit copies of the manufacturer’s printed instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties; and printed instructions for installation of pedestrian traffic coatings, including procedures and materials for flashing, splicing, and bonding.

B. Shop Drawings (SD): Submit shop drawings to indicate tie-in details to existing substrates, termination and non-typical details; show changes from horizontal to vertical elevation, and inside and outside corner applications. Shop drawings shall include a pedestrian traffic coatings protection plan. Provide descriptions and drawings of materials and methods to protect pedestrian traffic coatings system from damage by subsequent construction activities.

C. Manufacturer’s Review of Pedestrian Traffic Coatings System (SR): Before delivering pedestrian traffic coatings materials to the Project site, submit the following:
   1. A written statement signed by the Contractor’s pedestrian traffic coatings Applicator and manufacturer’s representative stating that the A/E’s Drawings and Specifications have been reviewed, and that they are in agreement that the selected materials and system for pedestrian traffic coatings are proper and adequate for the application shown. Indicate by transmittal form that a copy of this statement has also been distributed to the Owner.
   2. A written approval of the condition(s) of the substrate(s) to proceed with the pedestrian traffic coatings, signed by the all of the following parties: manufacturer’s representative, installing Applicator, and general Contractor.
   3. Manufacturer’s Approval of Moisture Content/Test Results: The manufacturer shall test the moisture content of each floor location scheduled for coatings, immediately prior to waterproofing, and shall submit the written approval of the moisture content of each of the substrates to the A/E based on the attached test results. Tests shall be made no sooner than 28 days after the installation of new concrete substrate, and no sooner than 6 days after the installation of topping mortar. The moisture tests shall comply with ASTM D4263, "Standard Test Method for Indicating Moisture in Concrete by the
Plastic Sheet Method” or commonly referred to as the “Rubber Mat Moisture Test”. Additional testing may be conducted, if desired, by the manufacturer. The Owner’s representative(s) shall observe all moisture content testing, and the Contractor shall notify the Owner’s representative(s) at least 5 days in advance of any testing.

4. If any portion of the floors scheduled to be waterproofed become wet after the testing and approval performed per Paragraph 1.3C.3., but prior to waterproofing, then the moisture testing and approval procedures shall be repeated.

D. B3 MSBG Submittals:
1. Laboratory Test Reports for Guideline I2A: For traffic coatings, installed on the interior, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services’ “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”

E. Samples for Initial Selection: For each type of finish indicated.

F. Samples for Verification: For each type of traffic coating required, prepared on rigid backing and of same thickness and material indicated for the Work.
1. Provide stepped Samples on backing large enough to illustrate buildup of traffic coatings.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit a copy of the manufacturer’s approval latter of the Applicator and indicate by transmittal form that copies of the Project Specifications and application instructions have been distributed to the pedestrian traffic coatings Applicator.

B. Material Test Reports: For each traffic coating.

C. Material Certificates: For each traffic coating, signed by manufacturers.

D. Field quality-control test reports.

E. Maintenance Data: Submit maintenance manuals which identify substrates and type of pedestrian traffic coatings system applied and including recommendations for periodic inspections, cleaning, care, maintenance, and repair of the pedestrian traffic coatings system.

F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: The pedestrian traffic coatings work shall be performed by a single firm experienced and specialized in applying pedestrian traffic coatings, as shown and specified. The pedestrian traffic coatings installation firm shall be an approved and trained Applicator by the manufacturer. The field supervisor and the Project foreman for the pedestrian traffic coatings Applicator shall each have at
least 3 years approved experience with the application of this waterproofing product.

B. Source Limitation: Obtain pedestrian traffic coatings materials through one source from a single manufacturer.

C. Each floor surface shall be inspected after all floor preparation is completed. Written approval of the prepared floor surface, signed by the pedestrian traffic coatings manufacturer’s representative, the installing applicator, and the General Contractor, shall be submitted to and approved by the A/E prior to the pedestrian traffic coatings application.

D. Fire-Test-Response Characteristics: Provide traffic coating materials with the fire-test-response characteristics as determined by testing identical products per test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.

1. Flammability: UL 790 Class A.

E. Mockups: The General Contractor shall prepare a separate concrete slab 9 sq. ft. (.84 sq. m) in area, displaying a typical, slab-to-wall joint/curb transition. Cure mockup slab 28 days, for the mockup pedestrian traffic coatings application. Mechanically abrade the substrate, prime and apply the pedestrian traffic coatings system to the mockup deck to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality. If A/E determines mockups do not comply with requirements, reapply pedestrian traffic coatings until mockups are approved. Mockup slabs shall be stored in areas to receive pedestrian traffic coatings in preparation for mockup application, and shall be retained for reference during the pedestrian traffic coatings application.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. After completion of shop drawing review and upon completion of the 28 day cure of new concrete, 6 day cure of any mortar topping, and mechanical preparation (shotblasting) of the substrate, the pedestrian traffic coatings Applicator shall meet with the manufacturer’s representative, Contractor, A/E, and Owner’s representatives at the Project site to review the pedestrian traffic coatings procedures, acceptance of surfaces, minimum curing periods, forecasted weather conditions, special details and sheet flashings and coordination of other trades. The Contractor shall provide notice to attendees prior to convening the Pre-Installation Conference as specified in Section 01 31 00 – Project Management and Coordination. Review methods and procedures related to this coatings work, including, but not necessarily limited to the following:

   a. Tour job site areas to receive pedestrian traffic coatings. Inspect and discuss conditions of substrate(s), existing conditions, drains, curbs, penetrations and other preparatory work performed by other trades. Review the field conditions for each item of Paragraph 1.6C.

   b. Review required submittals, both completed and yet to be completed.

   c. Review the entire Specification, line item by line item.

   d. Review and finalize the Construction Schedule related to pedestrian traffic coatings work and verify availability of materials, Applicator’s
personnel, equipment and facilities needed to make progress and avoid delays.

e. Review required inspections and testing.

f. Review manufacturer’s guidelines with respect to weather conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in original, unopened containers of packaging clearly labeled with manufacturer's name, brand name and type, shelf life, date of manufacture and all identifying numbers.

B. Store all materials for waterproofing work in accordance with the manufacturer’s recommendations, as approved, and in accordance with the requirements herein specified. Store products away from sparks and open flames.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Remove all solvent soaked rags from the site or place them in proper containers to be removed from site at the end of each day.

E. Protect stored materials from direct sunlight.

1.6 PROJECT / SITE CONDITIONS

A. Environmental Requirements: Do not apply pedestrian traffic coatings materials if ambient, materials, and/or substrate temperatures are outside the range of ambient temperatures recommended by the manufacturer. Temperatures shall be rising and stay above the minimum for the following 48 hours. All surfaces to receive the pedestrian traffic coatings shall be free of water, dew, frost, snow and ice. Do not apply pedestrian traffic coatings when the surface temperature is below 40°F (4°C) or above 90°F (32°C). Do not apply when temperatures are less than 5°F (3°C) above dew point or when weather rain, snow, fog, or mist can directly interfere with the application and curing period. Do not apply pedestrian traffic coatings until substrates have a moisture content approved by the manufacturer immediately prior to application, and the written approvals have been received and approved by the A/E.

B. Moisture Testing: The condition of "dry" substrate for the start of pedestrian traffic coatings application shall be determined by the ASTM D4263 moisture test method per Paragraph 1.3C.3. The A/E or Owner’s representative shall be notified at least 5 days in advance of any moisture content testing to observe the testing, and shall be advised in writing of the results of the manufacturer’s moisture testing whenever a moisture test is completed and approved, prior to beginning pedestrian traffic coatings.

C. Inspect and identify existing substrate for conditions requiring special preparation:

2. Metal projections, pipe penetrations, and drain perimeters shall be prepared and primed per Paragraph 3.2B.1 and 3.3A.3.
3. Cracks less than 1/16” wide per Paragraph 3.2C.2.
4. Cracks between 1/16” and 1/8” wide per Paragraph 3.2C.3.
5. Cracks greater than 1/8” wide per Paragraph 3.2C.4.
7. Review defect projections such as fins, ridges, exposed aggregate, honeycombs, spalls, and granulations to be leveled and made smooth by grinding or by applying approved mortar toppings and their bonding agents.
8. At terminations of pedestrian traffic coatings on flat substrates, verify the location of the ¼”x ¼” keyways to terminate coating per Paragraph 3.2B.5.
9. At any existing polyurethane deck coatings being restored or tied into, manufacturer’s representative shall inspect the surface, determine compatibility, and recommend preparation of interface surface, including wirebrushing, grinding, sandblasting, solvent washing, and priming necessary.
10. Upon completion of all substrate preparation work, provide written approval of the substrate as required by Paragraph 1.3C.

D. Verify whether any fiber reinforcing is present in the concrete substrate. If so, any fiber projections shall be burned off the substrate surface with a weedburner flame immediately after abrasion of the concrete surface and just prior to coatings application.

E. Verify locations of temporary closures at all openings to prevent contamination of pedestrian traffic coatings before, after, and during application, and to coordinate ventilation of area from adjacent, occupied areas. Remove temporary enclosures at completion of coatings application.

F. Plan and install adequate ventilation for process of application and curing.

1.7 WARRANTY

A. Manufacturer’s and Applicator’s Joint Warranty: Submit to the A/E for transmittal to Owner, two (2) original copies of manufacturer’s standard warranty on all materials used on the Project for a period of five (5) years from the date of Substantial Completion.

B. Coatings Installation Warranty: Submit to the A/E for transmittal to the Owner two (2) original copies of a Coatings Installation Warranty. The Coatings Installation Warranty shall cover the complete pedestrian traffic coatings installation and any defects in the installation because of materials or workmanship, regardless of any previous inspections and approvals of the installation by the Owner’s representative, and shall be properly corrected during the warranty period at no cost to the A/E or the Owner. Upon written notification within the warranty period of any such defects, the necessary repairs and replacement shall be properly made at the convenience of the Owner.
PART 2 - PRODUCTS

2.1 PEDESTRIAN TRAFFIC COATING [TC-1]

A. Products: Subject to compliance with requirements, provide one of the following products:
   2. "Sonoguard Base Coat and Sonoguard Top Coat” by Sonneborn, Division of ChemRex, Inc.
      a. Color: As selected by Architect from manufacturer's full range.


C. Comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Material Compatibility: Provide primers, sealants, detail coat material, vertical application material, base coat material, top coat material, and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

E. Primer: Manufacturer’s standard factory formulated primer recommended for substrate and conditions indicated. Primer shall be applied to each substrate.
   1. Vulkem: Primers #171, #181, and #191
   2. Sonoguard: Primers #733, #770, and #772

F. Sealant: Sealant and primer proven by the manufacturer to be compatible with their deck coating. Two-part component polyurethane sealant and primer recommended by manufacturer for substrate and joint conditions indicated and for compatibility with waterproofing coatings; complying with ASTM C920. Type M, Class 25, Grade NS for sloping and vertical applications or Grade P for deck applications, and use T where subject to traffic or use NT elsewhere.
   1. Vulkem: Vulkem Two-Part; Tremco Dymeric and Primer #1, Primer #6, and 200 Cleaner.
   2. Sonoguard: Sonneborn NP2 and Primer #733.

G. Detail Coats: Single component, slightly thixotropic, aromatic liquid polyurethane coating for liquid applied flashings, particularly on vertical transitions or slopes.
   1. Vulkem 350 Base Coat: 30 wet mil thickness minimum; 35 wet mil max.
   2. Sonoguard Base Coat: 25 wet mil thickness minimum; 35 wet mil max.

H. Base Coat: Single component, slightly thixotropic, aromatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the Base Coat recommended by the manufacturer as follows:
   1. Vulkem 350 Base Coat: 30 wet mil thickness minimum; 35 wet mil max.
   2. Sonoguard Base Coat: 25 wet mil thickness minimum; 35 wet mil max.
I. Intermediate Coat: Single component, slightly thixotropic, aromatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the intermediate coat of “Base Coat” material as recommended by the manufacturer as follows: (Eliminate this step if waterproofing is used under ceramic floor tile)
   2. Sonoguard Base Coat as Intermediate Coat: 20 wet mil thickness minimum; 35 wet mil maximum.

J. Top Coat: Single component, aliphatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thickness of the topcoat recommended by the manufacturer as follows:
   1. Vulkem 351 Top Coat: 20 wet mil thickness minimum with aggregate; 35 wet mil maximum.
   2. Sonoguard Top Coat: 20 wet mil thickness minimum with aggregate; 35 wet mil maximum.

K. Vertical Coat Applications: Single component, aliphatic liquid polyurethane elastomeric waterproofing. Apply minimum wet mil thicknesses of the base coat and top coat recommended by the manufacturer as follows:
   2. Sonoguard Base Coat for Vertical Application: three layers of 10 wet mil thickness minimum; Sonoguard Top Coat: two layers of 10 wet mil maximum with aggregate.

L. Aggregate: Uniformly graded, washed silica sand composed of clean grit particles at least 6.5 on the MOH’s scale of hardness, 80% in the 25-40 mesh size and no more than 2% fines passing a 70 mesh screen. The aggregate shall contain no more than 0.5% iron oxide. Aggregate shall be approved in writing from manufacturer.
   1. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, by not less than 10 to 20 lb/100 sq. ft. (4 to 12kg/10sq. m.).
   2. Aggregate shall be applied to the wet Top Coat, and shall be backrolled into the coating.
   3. Contractor shall apply a sample area at the initial application for approval of the texture by the A/E and the Owner.

2.2 MISCELANEOUS MATERIALS:

A. Reinforcing Strip: Manufacturer’s recommended mesh reinforcement embedded in the Base Coat application. Sonoshield Reinforcing Fabric by Sonoguard.

B. Backer Rod: Non-oily, non-gassing, non-absorbent, non-staining open cell backer rod or other resilient material recommended by approved sealant manufacturer. Non-gassing, closed cell “Sof Rod” as manufactured by Nomaco, Inc. is approved for use. Polyethylene material is not permitted.

C. Sheet Flashing: Nonstaining.
   1. Minimum Thickness: 60 mils.
2. Material: Sheet material recommended in writing by traffic coating manufacturer.

D. Adhesive: Contact adhesive recommended in writing by traffic coating manufacturer.

E. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic coating manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

A. All Work performed under this Section shall be in accordance with the Specifications, Drawings, and the manufacturer's instructions and recommendations. In the event of a conflict, the stricter requirement shall prevail.

B. Prior to onset of coatings work, the pedestrian traffic coatings Applicator shall inspect the entire area to be coated for compliance with requirements and other conditions affecting performance.
   1. Verify that concrete has cured and aged for minimum of 28 days, and that mortar toppings have then cured and aged for minimum of 6 additional days, as recommended by the pedestrian traffic coatings manufacturer, prior to moisture content testing.
   2. Verify that substrate(s) are visibly dry and free of moisture. Test for capillary moisture in the substrate(s) using test submitted by manufacturer per paragraph
   3. The A/E shall provide approval of written copy of moisture test report before proceeding with coatings work.
   4. Inspect substrate for surface imperfections. Proceed with installation only after unsatisfactory conditions have been corrected.
   5. Provide letter of acceptance of the substrate to the A/E prior to beginning the work of this Specification per paragraph 1.3C.2.
   6. Provide temporary protection of existing conditions, work in progress and work in place as described in the shop drawing’s construction protection plan. Provide for adequate ventilation.
   7. Protect all finish surfaces from damage resulting from spillage, dripping, and dropping of materials. Prevent coating materials from entering or clogging drains and water conductors. Repair and restore or replace other Work, which is soiled or damaged in connection with performance of the coating work.
   8. If floor becomes wet after prior approvals to proceed, then repeat test procedures per paragraph 1.3C.3 before proceeding.

3.2 PREPARATION

A. Preparation of Concrete, Mortar Toppings, and Masonry Surfaces
   1. Coordinate with general Contractor prior to pouring the concrete or mortar topping substrate, provide reglet recesses in the concrete substrate in which to apply sealant coves at corner transitions, such as at slab intersections with
walls or around mechanical curb perimeters, so that the finish application is flush. Refer to Drawings.

2. Concrete and masonry surfaces on which pedestrian traffic coatings are to be applied shall have been air dried for a minimum of 28 days after forms have been stripped prior to any mortar topping installation. All mortar toppings shall wet cure for a minimum of 3 days and air dry for another minimum of 3 days before moisture content testing of the substrates for the pedestrian traffic coatings application. All surfaces shall be dry, clean and free of other foreign matter detrimental to performance.

3. Apply bonding agents and mortar toppings as required to infill cavities or provide slope to drain as indicated on the Drawings, after substrate is approved and surface prep is completed. When infilling large areas abutting vertical wall surfaces, tool the mortar topping with an edging tool or install form for a reglet recess to accommodate the perimeter sealant application.

4. Mechanically abrade the substrate surfaces in a uniform manner by shotblasting or other method recommended and approved by manufacturer.

5. Burn off any fiberglass fibers embedded in the concrete substrate using a weedburner.

6. Surface shall be free of spalling, voids, loose material and projections, with no course aggregate exposed. Remove all oil grease, dirt, dust and debris and other contaminants.

7. Mask off adjoining surfaces not receiving pedestrian traffic coatings to prevent spillage or over-application affecting other construction.

B. Preparation at Terminations and Penetrations:

1. Prepare vertical and horizontal surfaces at terminations and penetrations through pedestrian traffic coatings and at expansion joints, drains, and sleeves according to ASTM C898 and manufacturer’s written instructions. Wire brush and/or sandpaper all metal surfaces to be coated to a clean, shiny surface. Vacuum areas and wipe metal surfaces clean.

2. Prime substrate as instructed by pedestrian traffic coatings manufacturer.

3. Apply sealant infills and perimeter seals as recommended by the manufacturer. Provide sealant cants around penetrations and at inside corners of deck to wall butt joints when recommended by pedestrian traffic coatings manufacturer. Allow all sealant applications to cure a minimum of 16 hours

4. Prime and apply a Detail Coat of pedestrian traffic coating and embed a joint reinforcing strip in Detail Coat when recommended by the pedestrian traffic coating manufacturer, and extend Detail Coat for the full height of any vertical application (10 mil) . Allow Detail Coat to cure for 24 hours

5. At terminations of pedestrian traffic coatings areas on flat substrates, rout a ¼”x ¼” keyway straight across flat surface, in which to terminate coating.

C. Joint and Crack Treatment:

1. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C898 and the manufacturer’s written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.

2. Cracks less than 1/16” wide:
   a. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a
joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.

b. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.

3. Cracks between 1/16” and 1/8” wide:
   a. Prime, fill with sealant, and tool flush with putty knife. Allow sealant to cure a minimum of 16 hours.
   b. Prime and apply a Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil).
   c. Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer.
   d. Allow all Detail Coats to cure for minimum 24 hours.
   e. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.

4. Cracks greater than 1/8” wide in any length of the crack:
   a. Mechanically rout out joint to 3/8” wide and ½” deep, and vacuum clean the joint.
   b. Comply with ASTM C1193 for joint sealant installation.
   c. Prime substrate within joint.
   d. Apply bond breaker or non-gassing backer rod between sealant and bottom of joint.
   e. Apply sealant within joint, per manufacturer’s instructions, and tool flush at surface. Sealant shall cure for minimum 16 hours.
   f. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.
   g. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.

5. Cants at inside corners, curbs to floors, walls to floors, wall to wall:
   a. Sweep, vacuum and clean joints.
   b. Comply with ASTM C1193 for joint sealant installation.
   c. Prime substrate within joint.
   d. Apply bond breaker or non-gassing backer rod between sealant and bottom of joint.
   e. Apply sealant within joint, per manufacturer’s instructions, and tool flush at surface. Sealant shall cure for minimum 16 hours.
   f. Prime and apply Detail Coat a minimum of 6 inches (150 mm) wide, 3 inches (75 mm) along each side of joint or crack, and extend Detail Coat for the full height of any vertical application (10 mil). Embed a joint reinforcing strip in the wet Detail Coat if recommended by manufacturer. Allow all Detail Coats to cure for minimum 24 hours.
   g. Feather terminating edge of Detail Coat to avoid edges from showing through the finished coating.

6. Expansion joints: Do not apply pedestrian traffic coatings coats across true expansion joints. Terminate on each side and seal to expansion joint seal according to manufacturer’s recommendations for sealing expansion joints.
3.3 APPLICATION

A. Waterproof Top Coat Application:
1. Apply each top coat of waterproof coating according to ASTM C898 and manufacturer’s written instructions.
2. Start installing waterproof top coating in presence of manufacturer’s technical representative.
3. Apply primer over prepared substrate.
4. Mix materials and apply waterproofing top coat by roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
5. Apply Base Coat to obtain a seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness as noted in Paragraphs 2.2G.1 and 2.2G.2 above. Allow Base Coat to cure 24 hours. Check for surface tack.
6. Base Coat and Intermediate Coat shall each have a slight surface tack to aid in adhesion of the next coating. Coating shall not debond from premature curing. If the Base or Intermediate Coat has cured longer than 24 hours and has no tack, then the surface shall be cleaned with a cloth dampened with Xylene or Xylol, and then primed with waterproofing primer. DO NOT SATURATE THE WATERPROOF COATING SURFACES WITH SOLVENT.
7. Apply Intermediate Coat in seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness per Paragraphs 2.2H.1 and 2.2H.2. Allow Intermediate Coat to cure for 24 hours. Check for surface tack (see previous paragraph). (Eliminate this step if waterproofing is used under ceramic floor tile)
8. Apply initial Top Coat at vertical surfaces only per Paragraph 22J.1 and 2.2J.2 (10 mil).
9. Upon completion of previous Paragraph 3.3.8, apply Top Coat of waterproofing in seamless membrane free of entrapped gases, with a minimum/maximum wet film thickness per Paragraphs 2.2I.1 and 2.2I.2.
10. Immediately broadcast sand grit aggregate into the wet horizontal and vertical Top Coat at a rate to comply with 2.2K.1. Immediately back-roll the surface to fully coat and imbed aggregate particles as the coating is applied.
11. The A/E or the Owner shall view and approve the finish texture of the aggregate application after the first 100 square feet are applied, and shall compare to the mockup sample.
12. Apply all waterproofing coatings up vertical pipe penetrations and vertical wall surfaces at transitions to horizontal surfaces. Cove waterproof coating a minimum 6 inches up vertical surfaces. End waterproofing in a straight horizontal line.
13. Verify wet film thickness of waterproofing on each coat every 100 sq. ft..
14. Allow finished waterproofing application to cure 24 hours before allowing any traffic or work over its surface.

3.4 FIELD QUALITY CONTROL

A. Periodically check waterproofing layers for any indication of bubbling or trapped air or excess moisture during its application and cure. Any bubbling shall be corrected according to the manufacturer’s recommendations prior to any further application of coatings.
B. Flood Testing: To be performed at the Owner’s discretion. The Contractor shall construct all watertight dams and shall perform the flood testing. Flood test each deck area for leaks, according to recommendations in ASTM D5957, after completing waterproofing, but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water. The Contractor shall repair all damages, or replace damaged materials, as a result of flood testing failures or leakages, at no additional cost to the Owner.

1. Flood to an average depth of 2½ inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
2. Flood each area for 48 hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs according to the manufacturer’s instructions until waterproofing installation is watertight.

C. The Owner will engage an independent inspection consultant to perform construction observation during installation of all coatings work. The Consultant will observe conditions under which the coatings are installed, observe flood testing, if performed, and observe underside of decks and terminations for evidence of leaks during such flood testing. Notify the inspection consultant per requirements listed in paragraph 1.3C.3. at least 5 days prior to applications, and coordinate schedule.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 CURING PROTECTING AND CLEANING

A. Cure coatings according to manufacturer’s written recommendations, taking care to prevent contamination and damage during application stages and curing.

B. Protect coatings from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION
SECTION 07 21 00

THERMAL INSULATION

1.1 MATERIALS

A. Insulation:

1. Mineral fiber cavity insulation: See Section 04 20 00 “Unit Masonry assemblies.”
2. Extruded-Polystyrene Board: Type IV, 25 psi (173 kPa).
3. Unfaced Glass-Fiber Blanket: Type I.
4. Closed-Cell Spray Polyurethane Foam: Type II, minimum density of 1.5 lb/cu. ft. (24 kg/cu. m). (for crack sealing)

B. Vapor Retarders: Polyethylene.
END OF SECTION 07 21 00
SECTION 07 24 14

POLYMER-BASED DIRECT APPLIED EXTERIOR FINISH SYSTEM (DEFS)

1.1 SUMMARY
   A. Soffits.

1.2 QUALITY ASSURANCE
   A. Mockups for each form of construction and finish.

1.3 PERFORMANCE REQUIREMENTS
   A. DEFS Performance: ASTM E 2568.

1.4 MATERIALS
   A. Primer/sealer.
   B. Reinforcing Mesh: Alkali-resistant, glass-fiber mesh.
   C. Base coat.
   D. Finish-Coat Materials: Acrylic-based coating with enhanced mildew resistance.
   E. Trim accessories.

1.5 INSTALLATION
   A. Comply with ASTM C 1397, ASTM E 2511, and DEFS manufacturer's written instructions.

1.6 FIELD QUALITY CONTROL
   A. Special Inspections: Owner engaged.
      1. As stipulated in Ch. 17 of the IBC.
SECTION 07 27 20
AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes the following:
   1. Fluid-applied membrane air barrier, vapor retarding.
   2. Self-adhering, vapor-retarding, modified bituminous sheet air barriers.

B. Related Sections include the following:
   1. Division 01 Section "Allowances" for testing and inspecting allowances.
   2. Division 04 Section "Unit Masonry" for embedded flashings.
   3. Division 06 Section "Sheathing" for wall sheathing.
   4. Division 07 low-slope roofing Sections for roof air barriers.
   5. Division 07 Section "Thermal Insulation" for foam-plastic board insulation.
   6. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashings.
   7. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.

1.2 DEFINITIONS
A. ABAA: Air Barrier Association of America.

B. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PERFORMANCE REQUIREMENTS
A. General: Air barrier assembly shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier Assembly Air Leakage: Not to exceed 0.04 cfm x sq. ft. of surface area at 1.57 lbf/sq. ft.; ASTM E 2357.

1.4 ACTION SUBMITTALS
A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
B. Shop Drawings: Show locations and extent of air barriers. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   1. Include details of interfaces with other materials that form part of air barrier.
   2. Indicate each condition, product, and sequence of installation recommended by membrane manufacturer.
   3. Include details of mockups.

C. B3 MSBG Submittals:
   1. Laboratory Test Reports for Guideline I2A: For air barriers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

B. Qualification Data: For Applicator. Provide letter from membrane manufacturer indicating applicator is trained and approved by manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance and that is trained and authorized by membrane manufacturer and that is an ABAA-licensed contractor, employs certified and registered installers, and complies with ABAA's Quality Assurance Program.

B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly shown on Drawings and specified in Section 01 45 34 Performance Testing for Exterior Aluminum Wall and Window Systems, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane. Mockup will be tested in accordance with Section 01 45 35 Quality Control And Assurance of Air Barrier Systems.
   1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
   2. Include junction with roofing membrane, building corner condition, and foundation wall intersection.

C. Preinstallation Conference: Conduct conference at Project site.
1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions and membrane curing period, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
C. Store rolls according to manufacturer's written instructions.
D. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.9 WARRANTY

A. Material Warranty: Provide the manufacturer’s 5 year air barrier material warranty.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Synthetic Polymer Membrane:
      2) Henry Company; Air-Bloc 21FR (fire-rated 32 (waterborne).
      3) Rubber Polymer Corporation; Rub-R-Wall Airtight.
2. Physical and Performance Properties:
   a. Membrane Air Permeance: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Membrane Vapor Permeance: Not to exceed 0.1 perm; ASTM E 96.
2.2 SELF-ADHERING SHEET AIR BARRIER

A. [AB-2] Modified Bituminous Sheet (Non-Permeable Air Barrier): 40-mil- thick, self-adhering sheet consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick, polyethylene film with release liner on adhesive side and formulated for application with primer that complies with VOC limits of authorities having jurisdiction and project VOC requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:
   b. Henry Company; Blueskin SA.

3. Physical and Performance Properties:
   a. Membrane Air Permeance: Not to exceed 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
   e. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
   f. Puncture Resistance: 40 lbf minimum; ASTM E 154.
   g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
   h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

2.3 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of air barrier material, and with a VOC of less than 50 gm/L.

C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, crosslaminated polyethylene film with release liner backing.

D. Modified Bituminous Transition Strip: Vapor-retarding, 40-mil- thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.

E. Termination Mastic: Cold fluid-applied elastomeric liquid; trowel grade.

F. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

H. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

I. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

J. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

K. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

L. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
   1. Install modified bituminous strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

G. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENTS (FLUID APPLIED MEMBRANE)

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
   1. Prime substrate and apply a double thickness of modified bituminous transition strip, with the 3 inch wide first layer applied with adhesive against 6 inch wide second layer.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.4 INSTALLATION, GENERAL (FLUID APPLIED MEMBRANE)

A. Install fluid-applied membrane air barrier system in accordance with manufacturer’s instructions.

3.5 TRANSITION STRIP INSTALLATION (FLUID APPLIED MEMBRANE)

A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer’s written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.

AIR BARRIERS
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1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials as required to provide continuity of air barrier.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone-sealant extrusion so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
   1. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and membrane.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with termination bar and sealant.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic as required by membrane manufacturer.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.6 AIR BARRIER MEMBRANE INSTALLATION (FLUID APPLIED MEMBRANE)

A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
C. Apply primer to substrates that receive self-adhered at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
   1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
   1. Vapor-Retarding Membrane Air Barrier: 60-mil dry film thickness.

E. Apply strip and transition strip a minimum of 1 inch onto cured air membrane or strip and transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer’s written instructions.

F. Do not cover air barrier until it has been tested and inspected by Owner’s testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.7 INSTALLATION (MODIFIED BITUMINOUS SHEET MEMBRANE)

A. Install modified bituminous sheets according to air barrier manufacturer’s written instructions and according to recommendations in ASTM D 6135.
   1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air barrier sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

B. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
   1. Install modified bituminous strips centered over vertical inside corners. Install 3/4-inch fillets of termination mastic on horizontal inside corners.

C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.

D. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
   1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

E. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier sheets. Accurately align sheets and maintain a uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure airtight installation.
   1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
   2. Roll sheets firmly to enhance adhesion to substrate.
AIR BARRIERS
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F. Apply continuous modified bituminous sheets over modified bituminous strips bridging substrate cracks, construction, and contraction joints.

G. CMU: Install air barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air barrier sheet immediately below protruding masonry ties or joint reinforcement or ties and firmly adhere in place.
   1. Overlap horizontally adjacent sheets a minimum of 2 inches and roll seams.
   2. Apply overlapping sheets with bottom edge slit to fit around masonry reinforcing or ties. Roll firmly into place.
   3. Seal around masonry reinforcing or ties and penetrations with termination mastic.
   4. Continue the membrane into all openings in the wall, such as doors, windows, and terminate at points to maintain an airtight barrier that will not be visible from interior.

H. Seal top of through-wall flashings to air barrier with termination bar and sealant.

I. Seal exposed edges of sheets at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Install air barrier sheets and auxiliary materials to form a seal with adjacent construction and to maintain a continuous air barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
   2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.

K. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings using accessory materials as indicated and according to manufacturer's tested assembly.

L. Wall Openings: Prime concealed perimeter and extend transition strips at perimeter of opening to interior as indicated.

M. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

N. At end or each working day, seal top edge of membrane to substrate with termination mastic.

O. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

P. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air barrier sheet extending 6 inches beyond repaired areas in all directions.
Q. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

R. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Continuous structural support of air barrier system has been provided.
   3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
   4. Site conditions for application temperature and dryness of substrates have been maintained.
   5. Maximum exposure time of materials to UV deterioration has not been exceeded.
   6. Surfaces have been primed, if applicable.
   7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
   8. Termination mastic has been applied on cut edges.
   9. Strips and transition strips have been firmly adhered to substrate.
  10. Compatible materials have been used.
  11. Transitions at changes in direction and structural support at gaps have been provided.
  12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
  13. All penetrations have been sealed.

C. Remove and replace deficient air barrier components and retest as specified above.

3.9 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. When covering membrane, use covering approved by the membrane manufacturer. Remove and replace air barrier exposed for more than 90 days, or exposure period stated in Manufacturer's instructions if less than 90 days.
   2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.
B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION
SECTION 07 42 13

METAL WALL PANELS

1.1 SUMMARY

A. Factory-formed and field-assembled concealed-fastener, flat-seam metal wall panels.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: ASTM E 1592.
   1. Wind Loads: As indicated on the drawings.

1.3 QUALITY ASSURANCE

A. Mockups for each form of construction.

1.4 WARRANTY

A. Materials and Workmanship: Two years.
   B. Finish: 20 years.

1.5 MATERIALS

1. Wall panels:
   a. Prefinished Galvanized Steel Sheet, 0.028 inch thickness.
   b. Panels at grade to 8 foot height: Prefinished Galvanized Steel Sheet, 0.047 inch thickness
2. Trim: Prefinished Galvanized Steel Sheet, 0.028 inch thickness.
3. Interior soffit panels: Prefinished Galvanized Steel Sheet, 0.028 inch thickness.
4. Miscellaneous framing and supports:
   a. Proprietary Thermal Spacer stand-off system with galvanized steel Z channels.
      1) Cascadia Clip system.

1.6 PRODUCTS

A. Concealed-Fastener, Metal Wall Panels:
   1. Profile:
METAL WALL PANELS
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1.7 FIELD QUALITY CONTROL

A. Testing: By Manufacturer’s field service.

END OF SECTION 07 42 13
SECTION 075100
BUILT-UP BITUMINOUS ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Thermal barrier
   2. Vapor retarder
   3. Insulation
   4. Bituminous membrane roofing
   5. Roof drains and lead flashing for drains

B. Products Installed But Not Furnished Under This Section:
   1. Caps, sleeves, and umbrella hoods
   2. Scuppers and overflow scuppers

C. Related Sections:
   1. Section 061005 - Roof-Related Rough Carpentry
   2. Section 076205 - Roof-Related Sheet Metal Flashing

D. Summary of Roofing-Related Work - The Work includes, but is not limited to:
   1. Use of a fume elimination system is required. Set up and operate in accordance with manufacturer's recommendations.
   2. Install new non-treated roof-related wood blocking as indicated at the details.
   3. Mechanically fasten 5/8" thermal barrier and 1" rigid insulation to the steel deck, followed by a two-ply fiberglass felt vapor retarder in asphalt moppings, 1/4"/ft. tapered isocyanurate insulation in asphalt, and a top layer of 1" rigid insulation in asphalt.
   4. Install four plies of fiberglass felts in asphalt moppings with an asphalt flood coat and gravel surfacing. Install a two-ply base flashing system at all canted and vertical surfaces.
   5. Install color-coated galvanized iron sheet metal flashings at the details.
   6. Provide and install new roof drains. Coordinate work with mechanical and plumbing contractors.
   7. Provide membrane protection 12' wide adjacent to work areas.
   8. General Contractor shall protect the building and its contents on a daily basis, and provide and maintain temporary protection systems. An airtight/watertight condition must be provided on a daily basis. General Contractor shall provide protection against wind, moisture, vermin, etc. from entering the interior of the building. Suitable provision for drainage shall be included, no trapping or holding of water is allowed.

1.2 SUBMITTALS

A. Product Data:
   1. Thermal barrier
   2. Vapor retarder and membrane felts
   3. Insulation, each type
4. Base flashing, each type
5. Bituminous materials, each type
   a. Asphalt manufacturer shall identify softening point, minimum flashpoint, minimum finished blowing temperature, and equiviscous temperature (EVT) for each asphalt shipment.
6. Fasteners: Insulation fastener only
7. Miscellaneous:
   a. Concealed flashing, each type
   b. Uncured flashing, each type
c. Roof drain

B. Shop Drawings: Tapered insulation system

C. Samples:
   1. Bitumen, one quart
   2. Aggregate (25 lbs.)
   3. Aggregate weight tickets for each shipment to the site.

D. Warranty: Signed warranty forms (Close-out submittal).

E. Contractor's Qualifications: Roofing Contractor shall be prepared to submit the following within five (5) days of Owner's request:
   1. Detailed anticipated construction schedule and staffing plan.
   2. AIA Document A305, Contractor's Qualification Statement. Including written evidence of a satisfactory experience record with work of this type and scope; and, if requested by the Owner, can provide five references for projects of a size exceeding 75 percent of the area included in this Project that are at least five years old. These references shall include project schedules, including bid date, start and completion dates, Owner and/or Engineer contacts including names, addresses and telephone numbers, and the specific components existing and installed on each referenced project.

F. Written schedule of Contractor's plan to meet allotted working days specified herein.

1.3 QUALITY ASSURANCE
   A. Provide thermostatic controls and visual thermometer on bitumen kettle, maintain in working order, and keep calibrated.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Provide continuous protection of materials against wetting and moisture absorption.

1.5 PROJECT CONDITIONS
   A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until given conditions have been corrected.
   1. Existing construction may not be as shown on the Drawings and some modification of details may be required to accomplish the intent of the Documents. The details shown and the information provided have been taken from the original drawings for the building, but are not represented, or
guaranteed, by the Owner and Architect/Engineer as being accurate as to the actual as-built and present conditions.

2. Verify dimensions and construction conditions at the site and perform all work to complete the Project under this Contract, regardless of variations that may be found, without additional cost to the Owner.

3. All modifications or adjustments, are to be approved in advance by the Architect/Engineer.

B. Environmental Requirements:
   1. Wind velocity and temperature limitations shall be based on Contractor's ability to apply materials in the specified manner.
   2. No work permitted when ambient temperature is below 0 F, or wind chill factor is below -20 F.
   3. Special precautions are required when ambient temperature is below 40 F.

C. Protection:
   1. Provide protective material and methods as required to protect existing building and adjacent surfaces, features, and property.
   2. Contractor is responsible for water damage to existing insulation and building interior that may result from damage to existing materials, and for subsequent water damage due to inadequate repair work.
   3. Traffic on no-reroofing areas shall be kept to a minimum. Provide adequate protection of the roof membrane if traffic on such roof areas is necessary.
   4. Provide appropriate protection in roof-related traffic, staging, and storage areas. As a minimum, the protection shall consist of 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the Work.
   5. Install temporary insulation seal-offs at completion of each day's work and completely remove upon resumption of work.
   6. Install materials in manner that will prevent bitumen drippage.
   7. Place used asphalt mops in water and remove from the roof at the end of each day's work. Dispose of or store away from combustible materials.
   8. Coordinate application of membrane to protect underlying materials from wetting or other damage by the elements on a continuous basis.
   9. Completely install sheet metal sleeves, caps, or enclosures on a daily basis.

1.6 WARRANTY

A. Contractor's Warranty: Prior to acceptance of the Work, furnish written five (5) year warranty covering all roofing work specified herein, using the form at the end of this Section.

1.7 WORK SCHEDULE AND LIQUIDATED DAMAGES

A. Roof-Related Pre-Construction Conference (applies to work associated with roof-related Specification Sections 061005, 075100, and 076205):
   1. Prior to starting any work on the Contract, the Architect, Owner, Owner's representative, Owner's roofing observer, the General Contractor and the roofing subcontractor shall meet at the site to discuss procedures, schedules, review submittals, etc. for the Work. The roofing contractor's manpower
scheduler and foreman, who will be on the Project full-time directing the Work, and the roofing contractor's sheet metal foreman and other subcontractors' foremen, must attend this meeting. If the roofing contractor's foremen are not present at this scheduled meeting, the meeting will be canceled and rescheduled at roofing contractor's expense.

B. Schedule:

1. Crew size: Roof work shall be conducted by crews of no less than six (6) workers.

2. Sequencing:
   a. Roof-related work shall be constructed in segments of not less than one (1) full roof working day and a minimum of 40 hours per week. Contractors shall staff crew accordingly to accomplish roof-related work within the number of roof working days intended. General Contractor and roofing-related subcontractors shall coordinate and provide a written schedule on how they intend to meet working days allotted (see Submittals).
   b. Work shall be conducted between the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday of each week. Work on other than those hours or days specified, including legal holidays, school holidays, Saturdays and Sundays may be granted provided a request is made at least 48 hours in advance and that Contractor assumes all responsibility for safeguard of Owner's property.

3. Completion: Contractor shall complete all roof work within 44 roof working days. This applies to all roof-related work included in this Section and Sections 061005 and 076205.

C. Notification: At least 14 calendar days before beginning work covered by this Section (and associated roof-related Sections included herein) and a minimum of two business days prior to subsequent work, the roofing contractor shall inform the Architect/Engineer in writing of when work will be performed.

D. Definition: For the purpose of this Contract, a "roof working day" is defined as any date that roofing work is done or can be done on the Project as determined by the roofing construction observer. Nonworking days could result if bad weather arises. Documentation will be made by the Owner's roofing consultant each day on a daily field report as to whether the day is to be considered a roof working day or a non-roof working day.

E. Liquidated Damages: In accordance with the provisions as set forth in Article 8 of the General Conditions, the Contractor shall pay to the Owner as fixed, agreed, and liquidated damages for each roof working day of delay beyond the time of completion until the Work is completed or accepted, the sum of One Thousand No/100 Dollars ($1,000.00) per roof working day and the Contractor and his sureties shall be liable for the amount thereof. Liquidated damages will be enforced by a deduct supplemental agreement to the Contract.
PART 2 - PRODUCTS

2.1 THERMAL BARRIER

A. Non-structural glass mat faced, non-combustible, water-resistant treated gypsum core panel for use in commercial roof assemblies. Thickness shall be 5/8" thick, as shown on the Drawings.
   1. Georgia-Pacific DensDeck Prime
   2. USG Securock
   3. Membrane manufacturer-approved equal with capability to receive hot asphalt moppings.

2.2 VAPOR RETARDER AND MEMBRANE FELTS

A. Fiberglass felt:
   1. CertainTeed Flintglas Ply Sheet Type IV
   2. Firestone Ply IV
   3. GAF Gafglas Ply 4
   4. Johns Manville GlasPly IV
   5. Tamko Tam Ply IV

2.3 INSULATION

A. Isocyanurate: Closed-cell polyisocyanurate foam core with fiberglass facers both sides, meeting ASTM C1289, Type II, Class 1, Grade 2 (20 psi), dimensional stability of 2%, 24 hr minimum cure time plus an additional 24 hours per inch, and a maximum board thickness of 2 inches. Maximum 4' by 4' boards. All packages shall have RIC/TIMA label. Approved manufacturers are:
   1. Atlas
   2. CertainTeed
   3. Firestone
   4. GAF
   5. Johns Manville
   6. Hunter Panels

B. Rigid: Only perlite will be acceptable for contact with steel decks or within 2'-0" of heat stacks
      a. Johns Manville Fesco
      b. GAF EnergyGuard
   2. Wood fiberboard: ASTM C208, with surface treatment, maximum 4' by 4' boards, manufactured by:
      a. Firestone
      b. Huebert Fiberboard
      c. International Fibreboard
      d. International Bildrite
C. Tapered isocyanurate: Factory-fabricated isocyanurate insulation as described above, with slope as shown on the Drawings. Direction changes shall use mitered boards. Minimum 1" rigid insulation shall cover isocyanurate boards.

D. Tapered edge strip: Rigid wood fiberboard or perlite insulation with maximum 1/2 in./ft. slope, 1-1/2 in./ft. slope approved for use at seal-offs.

E. Batt: ASTM C665, Type I, preformed glass fiber batt

F. Polyethylene foam: Ethafoam M1 A/S, 2.3 psf closed-cell polyethylene foam manufactured by Dow Chemical Company.

G. Spray-applied polyurethane foam: Froth-Pak two-component polyurethane spray foam system, 1.75 pcf, manufactured by Dow Chemical Company, phone 800-800-FOAM.

2.4 BASE FLASHING

A. Asphalt-saturated organic felt: ASTM D226, Type I, No. 15

B. Exposed sheet: Granule surfaced, asphalt mopped modified bitumen, black granules
   1. CertainTeed Flintlastic GMS Premium
   2. Firestone SBS Premium
   3. GAF Ruberoid Mop Plus
   4. Johns Manville Dynalastic 250 or DynaFlex
   5. Tamko Awaplan Premium

2.5 BITUMINOUS MATERIALS

A. Asphalt primer: ASTM D41

B. Asphalt: ASTM D312, Type III

C. Plastic cement:
   1. Premium grade, asphalt base, asbestos-free, ASTM D4586. The following products are approved. No substitutions permitted.
      a. CertainTeed FlintPatch
      b. GAF LeakBuster Matrix 202 SBS Flashing Cement
      c. Karnak 19 AF
      d. Johns Manville Bestile Utility Cement
      e. Tremco ELS
   2. Non-premium grade, asphalt base, asbestos-free, ASTM D4586, Type I may be used only at seal-offs and temporary conditions.

2.6 ROOF DRAIN

A. Coated cast iron roof drain with bottom threaded or no-hub outlet, metal deck clamp, cast-iron dome, vandalproof secured. Pipe size to match existing. Provide special threaded rod to extend clamps, if necessary.
   1. Josam Series 21500
   2. Mifab Series R1200-JD-STR

B. Lead flashing: Fed. Spec. QQ-L-201F and Amendment 2, Grade B, 4 lb/sq.ft., 36" by 36" sheets.
2.7 FASTENERS

A. Thermal Barrier/Insulation to Steel Deck:
   1. Self-tapping #12 or #14 fluorocarbon coated screw with drill point, through minimum 6.5 sq. in. hot-dipped galvanized steel plate. Plates and screws must be clearly labeled from the same manufacturer and shall be intended to be used together.
   2. Install screws with manufacturer’s recommended screw guns and bit sizes.
   3. Minimum pull-out strength of 300 lb. per fastener.
   4. Minimum 3/4", maximum 1-1/4" penetration through flanges. Length to penetrate top of deck but not to extend below the bottom of the rib. Change screw length in tapered insulation sections to meet this criteria.
   5. Approved manufacturers are:
      a. CertainTeed
      b. Firestone
      c. Johns Manville
      d. OMG
      e. SFS Intec
      f. Tru-Fast

B. Base flashing system: Galvanized 1-1/4" barbed roofing nails through 1" metal discs into wood members; 1" length into vertical plywood blocking.

C. Scupper flanges to wood blocking: 1-3/4" galvanized roofing nails

D. Lag screws: Zinc or cadmium plated, 3/8" diameter with 1-1/2" penetration into blocking.

2.8 MISCELLANEOUS

A. Reinforcing fabric: ASTM D1668, Type I

B. Concealed flashing:
   2. Cured EPDM field sheet, 45 mil thick; manufactured by Carlisle, Firestone, or Johns Manville.
   3. Uncured EPDM: 60 mil thick; manufactured by Carlisle, Firestone, or Johns Manville.
   4. Adhesive: As recommended by flashing manufacturer.

C. Uncured flashing:
   1. Uncured EPDM: 60 mil thick; Sure-Seal Uncured Elastoform Flashing manufactured by Carlisle or Johns Manville.
   2. Uncured neoprene: 60 mil; Neoprene FormFlash manufactured by Firestone.
   3. Adhesive: As recommended by flashing manufacturer.

D. Aggregate: ASTM D1863

E. Vent pipe extensions:
   1. Polyvinyl chloride pipe: Equivalent diameter of vent pipe, ASTM D2665, Schedule 40
2. Hubless cast-iron soil pipe: CISPI 301, service weight; with joints conforming to CISPI 310
3. No-hub connectors: Neoprene pipe sleeves with stainless steel drawbands, ASTM C564
4. At laboratory vents, use appropriate glass and/or approved chemical resistant pipe to match existing.

F. Membrane protection:
   1. 45-mil EPDM membrane
   2. 1" extruded polystyrene insulation
   3. 3/4" plywood
   4. Sandbag ballast

**PART 3 - EXECUTION**

**3.1 PREPARATION**

A. Prior to mopping insulation or felts to new concrete deck, coordinate with Architect/Engineer for testing a section of the deck for dryness (i.e. no foaming of asphalt). When deck is sufficiently dry, as determined by Architect/Engineer, prime the concrete surface at the rate of 1 gal/100 sq.ft. and allow to dry.

B. Surfaces shall be free of all dirt, debris, loose materials, and free moisture in any form. Mechanically scrape exposed surface if necessary to remove projections.

C. Reset or replace existing fasteners for materials exposed but left in place that are loose, deformed, damaged, or corroded.

D. At all wall details and vertical transitions, and/or where indicated on the Drawings, prior to installation of wood blocking and vapor retarder, fully adhere one ply of uncured flashing to deck and wall. Lap onto deck a minimum of 6", and extend a minimum of 3" past height of new wood blocking, as shown on the Drawings. Fully cement minimum 3" laps.

E. Perimeter wood blocking installation shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, September 2009.

**3.2 THERMAL BARRIER**

A. Stagger panel end joint with respect to each other and all joints. Butt panel ends and edges.

B. Temporarily hold in place until first layer of insulation is installed over the thermal barrier and mechanically fastened to the deck.

**3.3 VAPOR RETARDER**

A. Install two plies of fiberglass felt in a continuous shingle sequence in asphalt mopings in a manner to prevent asphalt drippage. Glaze coat of installed felt plies required if subsequent roof system construction cannot be installed the same day, or as approved by Architect/Engineer. Phased vapor retarder construction (one ply plus one ply) will not be permitted.
B. If the vapor retarder is installed as a temporary membrane (i.e. not covered with insulation/membrane, herein indicated as the final roof system), special requirements will apply, including, but not limited to the following:

1. The specified uncured flashing at wall to deck conditions and all wood blocking (curbs, penetrations, parapets, etc.) shall be installed and covered with fully-adhered EPDM with sealed laps. Extend the two-ply vapor retarder a minimum of 16” up walls. The EPDM concealed flashing on the inside of perimeter walls shall overlap the two-ply vapor retarder a minimum of 3” and shall be securely fastened to prevent wind uplift. Install a glaze coat of asphalt over the two-ply vapor retarder.

2. Set roof drains at the elevation of the temporary membrane so drainage can be provided. At the time the final roof system is installed, the drains shall be reset to the correct higher elevation as shown on the Drawings.

3. The temporary membrane must be protected until the final roof system can be installed. Areas of material storage, high traffic volume, or concentrated work areas (mechanical, etc.) shall be protected with 1” insulation and 3/4” plywood ballasted with sandbags.

4. Contractor shall pay for an infrared scan of the temporary membrane if the final roof system is not installed within four weeks of the temporary membrane. The infrared scan will be completed prior to the installation of the final roof system (figure $1,500 for up to 200 squares, $2,500 for greater than 200 squares).

5. Contractor shall pay the roofing observation and testing firm directly for providing the infrared scan services.

6. Contractor shall pay for fees for roofing observation if the roof working days are extended as a result (figure $1,000/day).

C. Maximum moisture content of felts at the time of application shall be one percent of dry weight.

D. Squeegee or press felts into hot bitumen providing tight, smooth laminations without wrinkles, buckles, kinks, or fishmouths. Air void pockets as determined by test samples, shall not exceed 5% per interply mopping for individual sample and average of all samples shall be less than 3% per interply mopping.

E. Carry all plies up to the top of the wood cant, or as shown on the Drawings.

3.4 INSULATION

A. Mechanically fasten first layer of new insulation through the thermal barrier to steel deck using one fastener for every two sq.ft. in a pattern recommended by Factory Mutual. Use two fasteners minimum for partial boards. Verify the presence of conduit below the deck prior to fastener installation. Install screws with manufacturer's recommended screw guns and bit sizes with minimum 3/4", maximum 1-1/4" penetration below flange. Screws penetrating the rib shall be removed and a new screw installed.

B. Use full moppings of asphalt for application of each subsequent insulation layer.

C. Maximum moisture content of insulation at time of application shall be 4% of dry weight.

D. Place each insulation board while bitumen still tacky. Lay with edges in moderate contact but do not force into place.
E. Stagger joints of upper layer with joints of bottom layer and stagger short joints in each layer. Stagger joints a minimum of 25% of the board dimension. Fill insulation joint wider than 1/4" with insulation cut to fit.

F. Step-down or roll-down all insulation layers so that full embedment and a flat surface is obtained.

G. Extra care shall be required to properly cut and fit insulation boards to conform to changes in deck slope and other irregularities.

H. Install tapered insulation with primed side up or between layers of insulation as shown on Drawings. If tapered isocyanurate insulation is used, provide minimum 1" rigid insulation over isocyanurate.

I. Provide tapered edge strip and batt insulation at locations shown on the Drawings.

J. Top surface of insulation shall be smooth and continuous with the primed surface exposed to receive the new membrane.

### 3.5 MEMBRANE ROOFING

A. Installation of felt plies shall be in a continuous shingle sequence, such that there are no laps against the flow of water, after installation of insulation. Glaze coat of installed felt plies required if flood coat and gravel surfacing cannot be installed the same day, or as approved by the Architect/Engineer. Phased membrane construction will not be allowed.

B. Maximum moisture content of felts at time of application shall be one percent of dry weight.

C. Provide full, uniform mopings of asphalt for membrane construction so that felt shall not touch felt.

D. Squeegee or press felts into hot bitumen providing tight, smooth laminations without wrinkles, buckles, kinks, or fishmouths. Air void pockets, as determined by test samples, shall not exceed 5% per interply mopping for individual sample and average of all samples shall be less than 3% per interply mopping.

E. Carry felts to the top of the cant strip and cut off evenly.

F. Install two additional plies of fiberglass felt in full mopping of asphalt at sleeper curbs, pipe supports, and splashpans.

G. Install one additional felt ply under the membrane at access doors, ladders, hatches, etc.

H. Install one additional ply of fiberglass or organic felt in full mopping of asphalt in valleys of drain sumps.

I. Minimize traffic on recently installed membrane. Use sequencing and equipment that will prevent asphalt displacement.

J. The use of felt laying machines is prohibited.

K. Application of hot asphalt on any surface that causes foaming of the asphalt shall be cause for rejection of the roof area.

L. Prime both sides of metal flanges for flashing sleeves, set in a trowel coat of plastic cement, and strip in with two plies of fiberglass felts and hot bitumen mopings feathered onto flange and onto membrane.
M. Extend all vent stacks as necessary to maintain a minimum height of 12" above the completed membrane.

### 3.6 COMPOSITION BASE FLASHING SYSTEM

A. Install where roofing system joins vertical or canted surfaces on a daily basis or as approved by the Architect/Engineer.

B. Prime bare masonry surfaces to receive flashing.

C. Install felt in full mopping of asphalt, pressing in the felt to obtain full contact with bitumen.

D. Install base flashing membrane in a full mopping of asphalt with a minimum temperature of 400 F at application, by mopping surface to receive the membrane and back-mopping the membrane. Fully embed membrane into mopping so as not to create voids. Do not stretch membrane. Seal 4" end laps with plastic cement and reinforcing fabric.

E. Fasten top edge of base flashing at 8" on-center for wood and 12" on-center for masonry.

F. At wall details where indicated on Drawings, seal top of wood blocking by fully adhering one ply of uncured neoprene to neoprene sheet adhered to wall, lapping a minimum of 3", and extending down and lapping over top of base flashing.

G. Install concealed flashing sheets, as indicated, at locations shown on the Drawings immediately after the base flashing is completed. For EPDM, fully cement minimum 3" laps with adhesive and fully adhered EPDM to substrate. For self-adhering membrane, pull the release paper under the membrane and continue to peel it from the membrane. Press the membrane in place and roll seams firmly with hand roller. Laps shall be a minimum of 3 inches.

### 3.7 FLOOD COAT AND AGGREGATE SURFACING

A. Ensure that all roof surfaces are clean, dry, and free of loose gravel.

B. Pour flood coat uniformly over roof surface prior to installation of exposed sheet metal flashings.

C. Apply aggregate uniformly into hot bitumen with complete coverage, 400 lbs./100 sq. ft.

D. Double flood and gravel in a 10' by 10' area at exterior corners; below splashpans, pipe supports, and access ladders; and within 3' of roof hatches. Remove loose non-embedded aggregate, pour a uniform additional flood coat, and completely cover with aggregate, as described above.

### 3.8 BITUMEN

A. Maximum temperature in heating equipment:
   1. Do not heat asphalt to the minimum flashpoint.
   2. Do not exceed the minimum finished blowing temperature for more than a total of four hours for any batch or portion thereof.
   3. Remove from Project asphalt heated above these limits.
B. Temperatures at time and point of application:
   1. Asphalt shall be within 25°F of its equiviscous temperature when applied in the roof system.
   2. Bitumen not meeting this criterion shall be reheated or allowed to cool as required.
   3. Do not heat to the minimum flashpoint.
   4. Do not exceed the minimum finished blowing temperature for more than a total of four hours for any batch or portion thereof.
   5. Remove from Project bitumen heated above these limits.

C. Rate of bitumen application:
   1. Insulation: 30 lbs./100 sq. ft.
   2. Asphalt interply moppings: 27 lbs./100 sq. ft. with tolerance of plus and minus 15 percent.
   3. Glaze coat: 10 lbs./100 sq. ft.
   4. Asphalt flood coat: 60 lbs./100 sq. ft.

3.9 ROOF DRAINAGE

A. Roofing Contractor shall furnish and install roof drain bowl. Mechanical Contractor shall supply and install complete roof drain assembly below deck, connect drain leader to drain bowl, and insulate drain bowl and leader below deck.

B. Extend membrane and lead flashing into the drain bowl, and clamp.

C. Prime scupper flanges and lead flashing for drains. Set in trowel coat of plastic cement and strip in with two plies of fiberglass felt and hot bitumen moppings.

D. Complete and coordinate flashing of the drains and scuppers with construction so that roof drainage is fully functional at the end of each day's work.

E. Water shall not pond at any roof drain location for more than one hour. Contractor shall perform watertesting at all roof drain locations. If ponding water remains after one hour, correction shall be the Contractor's responsibility.

F. Temporarily protect drains. Sections of insulation board may be cut to fit into drain base to keep debris from falling into drain leaders. Remove temporary protection prior to precipitation.

3.10 FIELD QUALITY CONTROL

A. Construction Observation:
   1. The Owner will retain the services of an independent agency for full-time construction observation and testing of the Work included in this Section. Notify Owner's construction observer in sufficient time (minimum two business days) to arrange observation and testing whenever work is to be done. The Contractor shall not commence Work until the Owner's construction observer is present.

B. Testing Services Criteria:
   1. The Owner, Architect/Engineer, and/or Owner's Representative reserve the right to have tests made when deemed necessary.
2. Tests not specified as part of a trade section will be paid for by the Owner unless such tests reveal a failure of the Work to meet requirements of the Contract Documents.

3. Tests revealing a failure in the Work shall be paid for by the Contractor.

4. Tests shall be made in accordance with recognized standards by a competent, independent testing laboratory selected by the Owner, Architect/Engineer, and/or the Owner's Representative.

5. Materials found defective or not in conformance with the Contract Documents shall be promptly replaced or repaired at the expense of the Contractor.

6. Samples required for testing shall be furnished by the Contractor and selected as directed by the Architect/Engineer and/or Owner's representative.

7. The Contractor shall repair openings required for testing to the satisfaction of the Construction Observer.

C. Testing:

1. Bitumen:
   a. Samples of bitumen may be taken and tested for conformance to the specifications by the Architect/Engineer for each shipment delivered to the Project.
   b. Bitumen temperatures may be periodically checked at the discretion of the Architect/Engineer in the kettle and/or on the roof.

2. Membrane Samples:
   a. At the discretion of the Architect/Engineer, 4" x 36" test cuts taken perpendicular to the long dimension of felts may be required, a minimum one for each 5,000 sq.ft.
   b. Samples will be examined for quality of construction and compliance with roofing specifications based on an evaluation of entrapped moisture, felt on felt, quantity of air voids, and presence of harmful foreign materials. This evaluation will be based on the delamination of the felt plies (the Jennings Method for built-up membrane analysis).
   c. Remove test samples before application of the surface coating at locations selected by Architect/Engineer.
   d. Take additional samples as directed by Architect/Engineer when deficiencies are found.
   e. Repair of Built-Up Membrane Test Cut:
      (1) Immediately rebuild test area with cut felts of same type as roof system, set in plastic cement.
      (2) Cover repaired area with four layers of felts. Solid mop each layer into place in hot bitumen. Overlap cut area 3" on all sides with first layer. Lap each succeeding layer 3" on all sides over layer below.

3. Aggregate: Samples may be required if delivered material is in question.

4. Other Tests:
   a. Isocyanurate insulation will be observed, and may be tested, for conformance with ASTM D303 and C550 criteria.
   b. Field tests may be performed to evaluate moisture content of installed materials.
c. Withdrawal tests of installed fasteners may be required if attachment is in question.

d. Application of roof system will be checked by Contractor and may be checked by Architect/Engineer.

e. Contractor shall pay roofing observation and testing firm directly for providing an infrared scan following substantial completion, but prior to final completion (figure $1,500 for up to 200 squares, $2,500 for more than 200 squares).

3.11 CLEANING

A. Remove bitumen from surfaces not specified to receive bituminous materials; such as walls, walkways, metal flashing, etc.

B. Repair staining or damage caused by solvent or oil spills.

C. Finished gravel surface roof is to completely cover flood coat and have uniform appearance.

END OF SECTION
BUILT-UP BITUMINOUS ROOFING WARRANTY

Owner:

Street Address:

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
</table>

Project Name:

Project Address:

Date of Final Acceptance:

Roofing Installation Contractor:

Street Address:

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
</table>

Phone No. (___)

Fax No. (___)

Email:

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of Substantial Completion of the Work, maintain the roof membrane and flashing systems in a watertight condition and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes membrane or flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the roof in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until the necessary repair work has been done.

ROOFING INSTALLATION CONTRACTOR

Signature

Printed Name

Title

Date
SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:
   1. Copings.
   2. Metal flashings.
   3. Reglets.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 4 Section for through-wall flashing and other integral masonry flashing specified as part of masonry work.

1.2 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Section.

B. Product Data including manufacturer’s material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Copings: SPRI ES-1 tested for uplift.

1.4 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Endure best possible weather resistance, durability of Work, and protection of material and finishes.
1.5 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Document and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Document.

B. Special Project Warranty: Submit installer’s warranty signed by Installer, covering Work of this Section, including membrane underlayments, metal flashing, metal coping caps, fasteners, and panels, if any, for the following warranty period:

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METALS

A. Galvanized Steel Sheet: ASTM A 526, G 90 (ASTM A 526M, Z 275), commercial quality, or ASTM A 527, G 90 (ASTM A 527M, Z 275), lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mil phosphatized where indicated for painting; not less than 20 gauge thick, unless otherwise indicated.

B. Sheet metal shall be hot-dipped galvanized steel sheets conforming to ASTM: A653 using consultant approved manufacturer. Weight of galvanized coating shall be not less than 1.25 ounces per square foot, “commercial”, unless otherwise indicated, galvanized sheet metal shall not be lighter than 24=gauge (0.250 inch).

C. Accessories shall be zinc-coated.

D. Solder shall be pig-lead block tin (50-50) conforming to ASTM:B32.

E. Pre-coated metal shall be a minimum of 24 gauge commercial quality steel with a hot dipped, galvanized, primed fluoropolymer-type finish.

F. Exposed surfaces shall have a smooth type finish with color selected by the Owner from the manufacturer standard.

1. All exposed surfaces shall be protected with a strippable type plastic film to be removed after the installation at the fabricated metal.

2. Exposed fasteners shall have gasketed, pre-coated heads with matching color.

2.2 REGLETS

A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

B. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: ASTM:B32, Grand Sn50, used with rosin flux.

B. Stainless Steel Term Bar: 1/16” x 1 ½”, Type 30A, with predrilled holes 6” on center.

C. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened. Note: Term bar fasteners to be ¼” diameter by 1 ½” long, nylon fastener with stainless steel drive pin.

D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15 mil (0.4 mm) dry film thickness per coat.

E. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section “Joint Sealants:.

F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather resistant seaming and adhesive application of flashing sheet metal.

G. Paper Slip Sheet: 5 lb./square red rosin, sized building paper conforming to DS UU-B-790, Type I, Style 1b.


I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; no corrosive; size and thickness required for performance.

J. Roofing Cement: ASTM:D4586, Type I, asbestos free, asphalt based.

2.4 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA’s “Architectural Sheet Metal Manual” that apply to the design dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
C. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provision in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

F. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

G. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

H. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, no corrosive metal recommended by sheet metal manufacturer.

2.5 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight need to comply with performance requirements but not less than that listed below for each application and metal.

B. Scuppers: Fabricate form the following material:
   2. Scuppers to have face frames.

C. Copings: Fabricate from the following material:
   1. Pre-finished steel: 24 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer’s installation instructions, and SMACNA’s “Architectural Sheet Metal Manual”. Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints or intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Solder Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1 ½ inches, except where pretinned surface would show in finished Work.

E. Do not solder the following materials:

F. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

G. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

H. Use joint adhesive for nonmoving joints specified not to be soldered.

I. Seams: Fabricate nonmoving seams and horizontal seams at metal siding panels in sheet metal with flat-lock seams. Seal with elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

J. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

K. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
L. Install reglets to receive counterflashing according to the following requirements:
   1. Where reglets are shown in masonry, furnish reglets for installation under Division 4 Section "Unit Masonry:.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

3.4 WARRANTY

A. Refer to attached form:
SHEET METAL WARRANTY

Owner

Address

Project

Project Address

Project No.

Date of Final Acceptance

Sheet Metal Contractor

Address

Phone No.

General Contractor

This warranty stipulates that the above-named Contractor(s) shall, during a period of five (5) years from the date of final acceptance of the work, maintain the sheet metal flashing systems and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightening, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes membrane or flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the Contractor(s) shall inspect the sheet metal in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until necessary repair work has been completed.

SHEET METAL CONTRACTOR

Signed

Title

Date

GENERAL CONTRACTOR

Signed

Title

Date

END OF SECTION
SECTION 07 62 05
ROOF-RELATED SHEET METAL FLASHING

PART 1 - GENERAL

1.01 SUMMARY
   A. Section Includes:
      1. Sheet metal flashing
      2. Sealant
   B. Products Furnished But Not Installed Under This Section:
      1. Caps, sleeves, and umbrella hoods
      2. Scuppers and overflow scuppers
   C. Related Sections:
      1. Section 06 10 05 - Roof-Related Rough Carpentry
      2. Section 07 51 00 - Built-Up Bituminous Roofing

1.02 SUBMITTALS
   A. Product Data - Provide for the following specified products:
      1. Color-coated metal
      2. Sealant
   B. Shop Drawings: For all sheet metal including typical seaming and sheet metal to sheet metal connections.
   C. Test results: If Contractor proposes new cap flashing which deviates from the Project Drawings, proposed substitution must be in accordance with the design intent of the Project and test results must be submitted verifying compliance with IBC 2006 ANSI/SPRI ES-1.
   D. Samples:
      1. Sheet metal manufacturer's standard color chart.
      2. Sealant manufacturer's standard color chart.
   E. Warranty: Signed warranty forms (Close-out submittal).

1.03 QUALITY ASSURANCE
   A. Perimeter edge metal and parapet cap (coping) for low-slope roofs shall comply with IBC 2006 ANSI/SPRI ES-1.
   B. Factory shall have capability to show conformance with National Coil Coater's Association Technical Bulletins for factory color-coated steel.
   C. Manufacturer to provide factory applied protection for finished color-coated sheet metal by means of a strippable plastic film.
   D. Sheet metal items not specifically noted on the Drawings or in the specification shall be in accordance with recommendations of The Architectural Sheet Metal Manual published by Sheet Metal and Air-Conditioning Contractors National Association, Inc. (SMACNA).

1.04 DELIVERY, STORAGE, AND HANDLING
   A. Store flammable materials in conformance with fire codes and in a manner that will not create a potential fire hazard.
   B. Exercise care during fabrication and erection to avoid damage to the finished surface.
C. Store color-coated sheet metal in manner that will protect it from exposure to the sun up until the time of installation.

D. Store sheet metal components in a manner that will keep them clean and dry until installed.

1.05 PROJECT CONDITIONS

A. Protection:
   1. Prevent damage to new or existing materials, including protection from damage by ladders and other equipment. Potentially damaging materials such as metal scraps, acid flux, and other debris shall not be permitted to come into contact with the roof surface.
   2. Suitable fire extinguishing equipment shall be immediately available at all locations where soldering, welding, or cutting equipment is used.
   3. Maintain a fire watch wherever soldering, welding, or cutting is performed.

B. Construction Schedule: Install sheet metal as soon as possible after membrane work has been completed. Sheet metal work shall be fully complete by the given completion date.

1.06 WARRANTY

A. Provide a 20-year written manufacturer's warranty for color-coated sheet metal covering color fade, chalk, and film integrity.

B. Prior to acceptance of work, furnish written five (5) year warranty covering all sheet metal flashings specified herein using the form at the end of this Section.

1.07 ROOF RELATED WORK SCHEDULE AND LIQUIDATED DAMAGES

A. Refer to Sections 07 51 00 for requirements that also apply to this Section.

PART 2 - PRODUCTS

2.01 SHEET METAL

A. Color-coated steel: Kynar 500 fluoropolymer coating factory applied to 24-gauge galvanized steel, ASTM A653. Touch-up paint for color-coated sheet metal shall be color match as recommended and supplied by the sheet metal manufacturer.
   1. Color shall match existing from manufacturer's standard colors. Verify with Owner at the pre-construction conference.
   2. Acceptable materials:
      a. ColorKlad by Ryerson
      b. Pac-Clad by Petersen Aluminum Corporation
      c. Una-Clad by Firestone Metal Products
      d. Ultra-Clad by Coated Metals Group
      e. Carlisle Metal Products
      f. Berridge Manufacturing Company

B. Galvanized steel: ASTM A653, commercial quality, G90 coating designation.

2.02 FASTENERS

A. Fasteners shall be of same material as flashings on which they are used and shall be of type and size as shown on Drawings or specified herein unless noted otherwise. Exposed fasteners through sheet metal shall match new sheet metal color.
   1. Zinc or cadmium plated for galvanized steel
B. Fasteners exposed to the weather shall have EPDM washers under heads to ensure watertightness.
   1. EPDM bonded washers: Fabco Fastening System Weath-R-Seal Bonded Washers

C. Sheet metal to wood:
   1. Where exposed: No. 8 minimum size steel hex head screw, 1-1/2" long. Minimum 150 lbs. per screw installed withdrawal resistance.
   2. Where not exposed: Minimum #14 flat head wood screw.

D. Sheet metal to sheet metal: Self-tapping screws of 1/2" length and a minimum #3 diameter.

E. Sheet metal to concrete or masonry: Tapcon or Gripcon, specially threaded anchors, 1/4" minimum diameter, length to penetrate masonry minimum 1 inch. Minimum 300 lb. per anchor installed withdrawal resistance.

F. Keeper strips to wood:
   1. Nails: Ring shank nail, with minimum 3/16" diameter head, and minimum 1-1/4" penetration into wood.
   2. Screws: No. 8 minimum size steel hex head screw, minimum 3/4" penetration into wood. Minimum 150 lbs. per screw installed withdrawal resistance.

2.03 SEALANT

A. Elastomeric sealant: ASTM C920, Type M, Grade NS, Class 25, Use M, color selected and approved by Owner
   1. Sonneborn Sonolastic NP 2
   2. Tremco Dymeric 240FC

B. Primer: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer.

2.04 MISCELLANEOUS

A. Solder: ASTM B32, alloy grade Sn50 (50% tin, 50% lead) or Sn60 (60% tin, 40% lead). Use solder alloy grade which is appropriate for types of flux and heating ranges being used.

B. Soldering flux: Use least corrosive flux suitable for specific application. Use materials and methods to neutralize as recommended by the flux manufacturer and American Welding Society (AWS).
   1. Fed. Spec. 0-F-506C, Type I, Form A or B

C. Pad: 1/8" thick EPDM

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that surfaces to receive sheet metal are smooth, clean, and have no free water present in any form.

B. Verify that nailers to receive sheet metal are properly placed.

C. Verify shapes and dimension of surface to be covered before fabrication of sheet metal.

D. Cut, clean, and prime reglets to receive new reglet insert flashing.

3.02 FABRICATION AND INSTALLATION

A. Sheet metal installation shall as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, September 2000.

B. Shop fabricate all items requiring soldering or welding unless noted otherwise.
C. Re-coat soldered joints of color-coated sheet metal with material and in manner specified by manufacturer.

D. Sheet metal work shall be of material and gauge specified, and shaped to be installed in strict conformance with details on Drawings.

E. Plane surfaces shall be free from waves or buckles.

F. Turn back exposed metal edges into hemmed edge.

G. Use elastomeric sealant at reglets and scuppers as necessary to make a watertight installation including foam backer rod as necessary to make a good sealant joint.

H. Screw fasteners shall be turned into place rather than driven.

3.03 SOLDERING

A. Clean surfaces to be soldered, removing oils and foreign matter.

B. Pre-tin edges of sheet metal before soldering is begun.

C. Apply flux and begin soldering immediately.

D. Soldering shall be done slowly with well-heated soldering irons until the seams are thoroughly heated and the solder has been completely sweated through the full width of the seams.

E. Remove acid flux residue as recommended by the manufacturer. As a minimum, use a solution of washing soda in water.

3.04 CAP FLASHING, COUNTERFLASHING, WALL PANELS, AND KEEPER STRIPS

A. Provide preformed cap flashing with drive cleat joinery extending out two to four feet maximum in each direction at corners and intersections of new sheet metal cap flashings.

B. Space cap flashing sections so cover plate locations will be balanced between corners of roof edge.

C. Align cover plates for cap flashing and fascia flashing along roof edges.

D. Lap intersecting counterflashings, except fascia counterflashings, minimum 3", and securely fasten.

E. Sheet metal flashing (not including fascia flashing) exceeding 24" high shall be a vertical flat seam single-lock wall panel consisting of:
   1. Panels shall not exceed 16" in width unless noted otherwise.
   2. Fabricate and space seams accurately. Flat seams shall be, straight, and uniform. Bends shall be rounded and not sharp. Seam interlock shall be 3/4".
   3. Fasten sides of panels with cleats spaced 12" on-center and locked into panel seam. Fasten cleats to plywood with two annular thread nails, and to concrete with one flat or pan head masonry anchor. Install fastener 3/4" from end and turn end of cleat to cover fastener head.
   4. Fasten top edge of panel with a minimum of two screws through EPDM washers. Locate screws just below drip edge of overlying flashing.
   5. Fasten lower edge of panel with a continuous keeper strip.

F. Fasten at center of cover plates along inside face with screws through EPDM washers and field crimp inside edge over cap flashing. Nail fasten S-cleat cover plates at 6" on-center. No fasteners will be allowed in outside face of cover plate.

G. Screw fasten cap flashing on roof edges at 18" on-center. Screw fasten cap flashings (non-roof edge related) and counterflashings to wood blocking with screws through EPDM washers at 30" on-center.
H. For perimeter edge metal with 12” maximum width, fasten outer edge of cap flashing with continuous keeper strip fastened to blocking at 6” on-center. Do not field crimp cap flashing to keeper strip. For perimeter edge metal over 12” in width, fasten outer and inner edge of cap flashing with continuous keeper strip fastened to blocking. Crimp inside face of cap flashing to keeper strip only. When cap/fascia flashing is present, allow additional break in keeper strip to maintain plumb installation of cap/fascia flashing.

I. Fasten counterflashing corners with pop rivets or screws and seal with sealant.

3.05 FIELD QUALITY CONTROL

A. Alignment and elevation of installed sheet metal will be checked by Contractor and may be checked by Architect/Engineer.

B. Withdrawal tests of installed fasteners may be required if attachment is in question.

C. Construction Observation
   1. The Owner will retain the services of an independent agency for full-time construction observation and testing of the work included in this Section. Notify Owner's construction observer whenever work is to be done in sufficient time (two days minimum) to arrange observation. The Contractor shall not commence work until the Owner's construction observer is present.

D. Testing Services Criteria:
   1. The Owner, Architect/Engineer, and/or Owner's Representative reserve the right to have tests made when deemed necessary.
   2. Tests not specified as part of a trade section will be paid for by the Owner unless such tests reveal a failure of the Work to meet requirements of the Contract Documents.
   3. Tests revealing a failure in the Work shall be paid for by the Contractor.
   4. Tests shall be made in accordance with recognized standards by a competent, independent testing laboratory selected by the Owner, the Architect/Engineer, and/or the Owner's Representative.
   5. Materials found defective or not in conformance with the Contract Documents shall be promptly replaced or repaired at the expense of the Contractor.
   6. Samples required for testing shall be furnished by the Contractor and selected as directed by the Architect/Engineer and/or Owner's Representative.
   7. The Contractor shall repair openings required for testing to the satisfaction of the construction observer.

3.06 CLEANING

A. Clean surfaces of flux, scraps, dirt, and other blemishes immediately. Potentially damaging materials shall not contact the roof surface.

B. Remove strippable plastic film from color-coated sheet metal immediately after installation.

END OF SECTION
SHEET METAL WARRANTY

Owner:

Street Address:

City  State  Zip

Project Name:  Project No.

Project Address:

Date of Final Acceptance:

Sheet Metal Installation Contractor:

Street Address:

City  State  Zip

Phone No. (          )

Fax No. (          )

Email:

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of final acceptance of the Work, maintain the sheet metal flashing systems and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the sheet metal in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until necessary repair work has been completed.

SHEET METAL INSTALLATION CONTRACTOR

Signature

Printed Name

Title

Date
1.1 QUALITY ASSURANCE

A. Installer Qualifications: An FM Global-approved firestop contractor or a UL-qualified firestop contractor.

B. Fire-Test-Response Characteristics: UL.

1.2 PENETRATION FIRESTOPPING

A. Penetrations in Fire-Resistance-Rated Walls: F-ratings per ASTM E 814 or UL 1479.

B. Penetrations in Horizontal Assemblies: F- and T-ratings per ASTM E 814 or UL 1479:

C. Penetrations in Smoke Barriers: L-ratings per UL 1479.

D. W-Ratings: Per UL 1479.

1.3 INSTALLATION

A. Identification: Preprinted metal or plastic labels.

1.4 FIELD QUALITY CONTROL

A. Inspection of Installed Firestopping: By Owner-engaged agency according to ASTM E 2174.
END OF SECTION 07 84 13
SECTION 07 84 46
FIRE-RESISTIVE JOINT SYSTEMS

1.1 QUALITY ASSURANCE
A. Installer Qualifications: An FM Global-approved firestop contractor or a UL-qualified firestop contractor.
B. Fire-Test-Response Characteristics: UL.

1.2 FIRE-RESISTIVE JOINT SYSTEMS
A. Joints in or between Fire-Resistance-Rated Construction: ASTM E 1966 or UL 2079.
B. Joints at Exterior Curtain-Wall/Floor Intersections: ASTM E 119 or ASTM E 2307.

1.3 INSTALLATION
A. Identification: Preprinted metal or plastic labels.

1.4 FIELD QUALITY CONTROL
A. Inspection of Installed Firestopping: By Owner-engaged agency according to ASTM E 2393.
B. Head-of-Wall, Fire-Resistive Joint Systems:
   2. Assembly Rating: Match wall rating.
   3. Nominal Joint Width: As indicated.
   4. Movement Capabilities: Class I - 25 percent compression or extension.
C. Wall-to-Wall Fire-Resistive Joint Systems:
   2. Assembly Rating: Match wall rating.
   3. Movement Capabilities: Class I - 50% percent compression or extension.
D. Perimeter Joints; Joints at Exterior Wall/Floor Intersections:
   1. Fire-Resistance Rating: no fire rating.
   2. Joints with Smoke Barriers: Provide joint systems with ratings determined per UL 2079.
   3. Acoustic seal: System to provide acoustic seal.
END OF SECTION 07 84 46
SECTION 07 92 00

JOINT SEALANTS

1.1 PRECONSTRUCTION TESTING

A. Preconstruction compatibility and adhesion testing.
B. Preconstruction field-adhesion testing.

1.2 WARRANTY

A. Installer Warranty: Two years.
B. Special Manufacturer's Warranty: 20 years – silicone sealants.

1.3 MATERIALS

A. VOC Content of Interior Sealants:
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.
B. Stain Test: ASTM C 1248.
C. Suitability for Contact with Food: Comply with 21 CFR 177.2600, where applicable.

1.4 JOINT SEALANTS

A. Neutral-Curing Silicone Joint Sealant:
   1. Type: Single component or multicomponent.
   2. Grade: nonsag.
   3. Class: 100/50.
B. Mildew-Resistant Neutral-Curing Silicone Joint Sealant:
   1. Type: Single component.
   2. Grade: nonsag.
   3. Class: 50.
   4. Uses Related to Exposure: Traffic and nontraffic, for ceramic tile.
C. Urethane Joint Sealant:
1. Type: Multicomponent.
2. Grade: Non-sag.

D. Immerisible Urethane Joint Sealant:
1. Type: Single component or multicomponent.
2. Grade: Pourable.
4. Uses Related to Exposure: Traffic or immersible.

E. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex.

F. Acoustical Joint Sealant: Nonsag, paintable, nonstaining latex.

G. Joint-Sealant Backing: Bi-cellular Cylindrical or Bond-breaker tape.
1. “Sof Rod” as manufactured by Nomaco, Inc., a reticulated, closed cell, non-gassing backer rod.
2. ITP Ltd. Soft Type Backer Rod.

1.5 FIELD QUALITY CONTROL

A. Field-adhesion testing: By Owner-engaged agency

B. Concrete and masonry exterior joints scheduled to receive sealant are to be primed after other preparations are completed. The primer shall be as recommended by the manufacturer.

C. Sealant or primer shall not be applied when the air or substrate temperatures are 40 degrees F or below.

1.6 SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
2. Joint-Sealant Color: As selected form manufacturer’s full range.

B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
2. Joint-Sealant Color: As selected form manufacturer’s full range.

2. Joint-Sealant Color: As selected from manufacturer’s full range.

D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
   2. Joint-Sealant Color: As selected from manufacturer’s full range.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   2. Joint-Sealant Color: As selected from manufacturer’s full range.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
   2. Joint-Sealant Color: As selected from manufacturer’s full range.

G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
   2. Joint-Sealant Color: As selected from manufacturer’s full range.
SECTION 07 95 00

EXPANSION CONTROL

1.1 INTERIOR EXPANSION CONTROL SYSTEMS

A. Wall-to-Wall:
   1. Type: Preformed cellular foam, with colored silicone skin.

B. Floor to Floor:
   1. Type: Preformed elastomeric with aluminum frame.

1.2 EXTERIOR WALL EXPANSION CONTROL SYSTEMS

A. Wall-to-Wall:
   1. Type: Preformed cellular foam, with colored silicone skin.

1.3 ACCESSORIES

A. Moisture Barrier: Manufacturer's standard.
END OF SECTION 07 95 00
SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

1.1 SUMMARY
   A. Standard hollow metal doors and frames.

1.2 QUALITY ASSURANCE
   B. Fire-Rated Doors and Frames: Positive-pressure testing.

1.3 PRODUCTS
   A. Standard Hollow Metal Doors:
      1. Design: Flush panel.
         a. Level 3 and Physical Performance Level A (Extra Heavy Duty).
         b. Model: 2 (Seamless).
      4. Interior Doors: Cold-rolled steel sheet faces.
         a. Level 2 and Physical Performance Level B (Heavy Duty).
         b. Model: 2 (Seamless).
   B. Standard Hollow Metal Frames:
         a. Frames for Level 3 Steel Doors: 0.067-inch (1.7-mm) thick steel sheet.
      2. Interior Frames: Cold-rolled steel sheet; full profile welded.
         a. Frame Face Dimension: 1 ½ inch.
         b. Frames for Level 2 Steel Doors: 0.053-inch (1.3-mm) thick steel sheet.
         c. Frames for Wood Doors: 0.053-inch (1.3-mm) thick steel sheet.
         d. Frames for Borrowed Lights: 0.053-inch (1.3-mm) thick steel sheet.
   C. Hollow Metal Panels: Same materials, construction, and finish as adjoining hollow metal work.
D. Accessories:
   1. Moldings and stops for glazed lites.

E. Finishes: Factory priming for field painting.

1.4 INSTALLATION

A. Metal-Stud Partitions: Frames filled with insulation.

B. Concrete and Masonry Walls: Frames filled with grout.

END OF SECTION 08 11 13
SECTION 08 14 16

FLUSH WOOD DOORS

1.1 QUALITY ASSURANCE

A. Quality Standard: AWI.

B. Fire-Rated Wood Doors: Positive pressure testing.

1.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:
   1. Heavy Duty unless otherwise indicated.
   2. Extra Heavy Duty: Classrooms public toilets janitor's closets assembly spaces and where indicated.

1.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Premium, with Grade A faces.
   5. Assembly of Veneer Leaves on Door Faces: Balance match.
   6. Special Matching:
      a. Pair and set match.
      b. Room Match: Door faces of compatible color and grain within each room.
   7. Core: Particleboard.
   9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty and Heavy Duty.

1.4 LIGHT FRAMES

A. Light-Opening Frames:
   1. Wood beads.
   2. Metal for fire doors.
1.5 PRIMING/FINISHING

A. Factory Finishing: All doors.

B. Transparent Factory Finishes:
   1. Grade: Custom.
   2. Finish: Catalyzed polyurethane.
   4. Effect: Open-grain finish.

END OF SECTION 08 14 16
SECTION 08 31 13

ACCESS DOORS AND FRAMES

1.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Vertical Access Doors and Frames: NFPA 252 or UL 10B.

1.2 PRODUCTS

A. Flush access doors and frames for walls and ceilings.
   1. Flanges: Concealed.
B. Flush access doors and frames for masonry or tiled walls and ceilings.
   1. Flanges: Exposed.
   2. Material: Steel or Stainless steel where indicated.
C. Fire-rated, flush access doors and frames.
   1. Flanges: Concealed.
   3. Uninsulated.
D. Fire-rated, flush access doors and frames.
   1. Flanges: Exposed.
   3. Uninsulated.
   4. Material: Steel or Stainless steel where indicated.
E. Finishes:
   2. Stainless Steel: No. 4 finish.
SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Sections:
   1. Division 08 Section "Glazed Aluminum Curtain Walls" for curtain-wall systems
      that mechanically retain glazing on four sides.

1.2 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers
   Compliance Board’s "Americans with Disability Act (ADA) and Architectural Barriers
   Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the
   following performance requirements without exceeding performance criteria or
   failure due to defective manufacture, fabrication, installation, or other defects in
   construction:
   1. Movements of supporting structure indicated on Drawings including, but not
      limited to, story drift and deflection from uniformly distributed and
      concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by
         thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural
         movements.
      e. Loosening or weakening of fasteners, attachments, and other
         components.
      f. Sealant failure.
      g. Failure of operating units.

B. Preconstruction Testing: Manufacturer’s testing shall have been performed within
   the last five years on a representative entrance assembly of the type, size and
   model proposed for this Project.
C. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

D. Structural Loads:

E. Deflection of Framing Members:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m), 1 inch total maximum deflection, or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

F. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

G. Air Infiltration: Manufacturer’s testing shall be in accordance with ASTM Standards E283 for compliance with maximum permissible air infiltration rate of 1.25 cfm/sq. ft. when tested at a minimum pressure differential of 1.567 lbs/sq. ft. based on requirements of the Minnesota Energy Code

H. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
   2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
      b. Low Exterior Ambient-Air Temperature: Minus 30 deg F.
   3. Interior Ambient-Air Temperature: 70 deg F.
1.4 SUBMITTALS

A. Concurrent Submittals: Submit action submittals specified in this Section simultaneously with action submittals specified in Sections below for concurrent review:
   1. Division 08 Section “Glazed Aluminum Curtain Walls.”
   2. Division 08 Section “Door Hardware” For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
   3. Division 08 Section “Glazing.”

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
   1. Submit manufacturer’s specifications,
   2. Technical product data,
   3. Performance values,
   4. Standard details for the products specified and
   5. Manufacturer’s recommendation for installation
   6. Certification of the Installation Subcontractor

C. Shop Drawings (SD): Submit shop drawings prepared by the aluminum entrance manufacturer for each type of product. Include the following: 2.2.1. Indicate location of each door type, component dimensions and field verified openings. Continue the door numbering system established in the Architectural Drawings.
   1. Indicate location of each door type, component dimensions and field verified openings. Continue the door numbering system established in the Architectural Drawings.
   2. Elevations of each unit, drawn at 1/2” = 1’-0” scale. Indicate frame joinery.
   3. Full size section details of every typical member.
   4. Anchorage fastener type and location, straps/plates, and reinforcing steel as required by structural calculations.
   5. Glass and glazing.
   6. Perimeter sealants.
   7. Provide four final, complete, shop drawing sets to the A/E, Owner’s Representative, and Owner (2 copies) prior to the start of fabrication. These sets shall incorporate all review comments and notations from previous shop drawing submittals.

D. Test Reports: The Contractor shall submit test reports on each entrance type. Each report shall be complete, prepared by an independent testing laboratory certified by AAMA, and shall indicate that each entrance type has been tested in accordance with these Specifications and performance criteria established in this Section.

E. Structural Calculations: Delegated design submittal. Submit structural calculations, fabrication, assembly and anchorage details prepared by an independent structural engineer registered in the State of Minnesota, indicating adequacy of all installed materials, to meet the structural load requirements as required by the uniform load structural test and the uniform load deflection test.

F. B3 MSBG Submittals:
1. Laboratory Test Reports for Guideline I2A: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services’ "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Door manufacturer shall confirm that they have received approved hardware shop drawings and associated cut outs and templates for proper door preparation.

H. Manuals (O&M): Submit manufacturer’s operating and maintenance manuals for entrance hardware per requirements of Division 01 Section “Operation and Maintenance Data.”

I. Contract Close-Out Submittals: As-built set of shop drawings, prepared by the aluminum entrance manufacturer, showing the final configuration of the entrance installation per requirements of Division 01 Section “Project Record Documents.”

J. Samples for Verification: For each type of exposed finish required, in manufacturer’s standard sizes.

K. Qualification Data: For qualified Installer and testing agency.

L. Manufacturer’s certifications.

M. Welding certificates.

N. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

O. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative with a minimum of 5 years experience specializing in the proper installation of the Specified aluminum entrance assemblies, who is trained and approved for installation of units required for this Project.

A. Manufacturer's Certification: Manufacturers shall submit written certification that the Installation Subcontractors have been approved by them to install their products.

B. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

C. Manufacturer’s Certifications:
1. Manufacturers shall submit written certification that the Installation Subcontractors have been approved by them to install their products.
2. The aluminum entrance manufacturer shall certify in writing, separate from the all-inclusive warranty, that entrances meet or exceed specified criteria;
that component parts were properly designed and selected for locale and installation intended; that installation was made in accordance with manufacturer's instructions.

3. The aluminum entrance manufacturer shall certify in writing that the aluminum framed entrances and storefronts are fully compatible with the aluminum framed curtain walls specified in Division 08 Section “Aluminum Framed Curtain Walls.”

D. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

E. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

F. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.


H. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

A. The aluminum entrance manufacturer shall certify in writing, separate from the all-inclusive warranty, that entrances meet or exceed specified criteria; that component parts were properly designed and selected for locale and installation intended; that installation was made in accordance with manufacturer's instructions.

B. Provide written all-inclusive warranty to the Owner, executed by the General Contractor, the Installation Subcontractors and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units,
shall be free from defects in materials, workmanship and installation for a period of three (3) years from the date of Substantial Completion. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Contractor.

C. Provide written all-inclusive warranty to the Owner, executed by the Installation Subcontractor and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of seven (7) years from the expiration of noted warranty in the above paragraph. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Installation Subcontractor.

D. Warranties shall be dated on the date of Substantial Completion and notarized by a duly authorized Notary Public of the State of Minnesota.

1.8 MAINTENANCE SERVICE

A. Entrance Door Hardware:
1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner’s continued adjustment, maintenance, and removal and replacement of entrance door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers/Products: Subject to compliance with requirements, provide one of the following:
1. EFCO D618 Series.
2. Graham F-M Enterprises: CMS 60 Campus Door Series
3. Empirehouse: Varsity Door Series
4. Tru-Therm/Interclad: Endura II Series
5. US Aluminum: Duracraft 900 Door
6. W.L. Hall: Tubecraft 60M Series

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement:
   1. Steel, conforming to ASTM A36, hot-dipped galvanized in accordance with ASTM A123.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
   1. Finish: 2D (dull, cold rolled).
   2. Surface: Smooth, flat.
   3. Nonferrous, nonmagnetic stainless steel, Type 304

2.3 FRAMING SYSTEMS

A. Aluminum Entrance Frames
   1. Provide framing with 2” by depth indicated, extruded aluminum profiles. Frames shall be of thermal break construction EXCEPT jambs of doors and frames of interior entries and storefronts. Frames shall have a minimum wall thickness of 1/8” at hinge locations.
   2. Hinge jamb shall be reinforced by a hot-dipped galvanized 1-1/4” by 1-1/4” by 3/16” steel angle which runs continuously full height of the jamb and is mechanically fastened to the jamb. Hinges shall be anchored directly into steel reinforcing.
   3. Intermediate jamb frames shall be screwed to floor mounted hot-dipped galvanized steel support angles concealed within the frame.
   4. Frames shall be shop mortised and reinforced per hardware manufacturer’s templates for specified hardware items. Reinforcing shall be hot-dipped galvanized 3/16” thick steel.
   5. Weather-stripping shall be polypropylene pile inserted into extruded races in the door stops. Weather-stripping for exterior doors shall be continuous at head and jambs. Door bottoms shall be weather-stripped.
   6. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

B. Glazed Aluminum Curtain Wall Door Frame Inserts/Sub-Frames
   1. Provide extruded aluminum door frame inserts/sub-frame with applied extruded aluminum stop, approximately 7/8” x 4” deep. Hardware reinforcement on door frame inserts/sub-frames shall be completely concealed and fastened in-place without the method of attachment being visible. Hardware attachment to door frames inserts/sub-frames shall also be completely concealed. Weatherstripping shall be polypropylene pile insert. Insert into keyway grooves on the stops of the jambs and head sections of the frame. Coordinate door size, hardware locations and requirements with aluminum entrance shop drawings and the manufacturer.
   2. Internal Reinforcement at Door Frame Inserts/Sub-Frames: Door frame inserts/sub-frames shall be reinforced by a hot dipped galvanized 1-1/4” x 1/4” thick steel bar which runs continuously full height of the insert and is mechanically fastened to the insert. All fasteners, nuts and washers used to secure reinforcement shall be stainless steel.
3. Base of curtain wall jamb frames receiving door frame inserts/sub-frames shall be anchored to prevent movement.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from stainless steel.
   4. Frame Anchors: Anchors, heavy duty sleeve or expansion style, vibration resistant and removable, used to secure frame to concrete and grout filled concrete block shall be stainless steel. Type, size and spacing shall be per Project's structural requirements.
   5. Shims: PVC horseshoe shims in non-load bearing conditions and Korolath multipolymer plastic bearing shims per structural calculations and final shop drawing set. Horseshoe shaped Korolath shaped shims are not acceptable in dead load locations.

E. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

F. Sill Drip Tray: 0.062” thick prefabricated Type 304 stainless steel drip tray at the sill of back-up walls at window openings.

G. Framing System Gaskets and Field Applied Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
   1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
2.5 ENTRANCE DOOR SYSTEMS

A. Door Design: Wide stile; 6-inch nominal style width, rail widths as indicated on the Drawings.

B. Aluminum Entrance Doors
   1. Aluminum entrance doors shall be monumental quality, with seamless, hollow tube section stiles and rails not less than 2” deep and a minimum wall thickness of not less than 3/16”.
   2. Each corner of the door shall be factory welded inside the tubes allowing stiles and rails to be accurately fitted to flush hairline joints. Ends of rails shall be sealed prior to abutting stiles for a weathertight connection.
   3. Entrance doors shall be reinforced with a stainless steel tie rod of 3/8” diameter running full width of top and bottom rails and fixed with stainless steel nuts and lock washers against extruded aluminum lugs. Lock nuts shall be cadmium plated steel.
   4. Hinge stile shall be reinforced for door hinge anchorage with a hot-dipped galvanized, 1-1/4” by 1/4” thick steel bar, which runs continuously for full height and is mechanically fastened for the full height of stile. Hinges shall be anchored directly into steel reinforcing.
   5. Doors shall be shop mortised and reinforced per hardware manufacturer’s templates for specified hardware items such as pulls, exit devices, closers and overhead stops. Reinforcing shall be hot-dipped galvanized 3/16” thick steel.
   6. Door glazing channel shall be snapped in and be made non-removable from the exterior, without visible fasteners. Minimum wall thickness shall be 0.060”. Glazing channels shall be sized accordingly to accommodate 1” laminated insulating safety glass units and single pane glass units in thickness specified and where required. Glazing channels butting against door members and butt joints between glazing channel members shall be backsealed to prevent air and water intrusion to the interior. Allow glazing channel to weep infiltrating water to the exterior.
   7. Vision lights shall be glazed with a wet/dry glazing system using wet silicone sealant glazing at the exterior and dry gasket glazing at the interior.

C. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems and for sheet metal flashings, ASTM C 920, elastomeric urethane sealant as specified in Division 07 Section "Joint Sealants."
   1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.
2.7 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using pre-assembled frames, screw-spline system.

F. Entrance Doors: Reinforce hinge jamb for hardware anchorage with .250-inch steel bar full height of door. Reinforce doors with .375-inch minimum steel tie rods at top and bottom rails fixed with steel tension plates and lock nuts. Factory weld all four corners of the door in concealed locations.
   1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
   2. At exterior doors, provide weather sweeps with pile sweep strip applied to door bottoms.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

I. Sill Drip Tray Fabrication: Integral to the drip tray: provide a pre-formed down turned leg that functions as a continuous keeper strip for sub-sill flashing installed below window opening; a pre-formed upturned leg that functions as a continuous back dam; pre-formed end dams at each jamb. Wall flanges that extend beyond window opening jambs and terminate in alignment with sub-sill flashing end dams are provided by Division 04 Section “Unit Masonry.” Where window openings require multiple sections of drip tray, spice joints shall be made air and water tight.
with sealant compatible and bonding with sealant used for the primary sealant joint where entry storefront framing is installed.

2.8 ALUMINUM FINISHES

A. Exposed surfaces of all aluminum components and trim shall receive an anodized color finish conforming to the Aluminum Association Designation, A/Eural Class 1, AA-M1OC22 and the following:
   1. The anodic coating shall be continuous, fully sealed and free from powdery surfaces.
   2. Coating thickness shall be a minimum of 0.7 mils when tested in accordance with ASTM B244.

B. Anodic coating shall be: A44-Electrolytically Deposited Color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure nonmovement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
   6. Seal joints watertight unless otherwise indicated.
   7. The entrance Installation Subcontractor shall furnish and supply all isolation, caulking, and sealant materials required to caulk all joints between entrance frames and other construction to provide a completely thermal broke, weather-tight installation.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
   1. Thresholds shall be set in a full bed of sealant.

E. Sill Drip Tray: Drip tray shall be in full and continuous contact with the top of the back-up wall to allow for transfer of window/curtain wall dead load.
   1. Where window openings require multiple sections of drip tray, splice joints shall be made air and water tight. When sealants are used a splice joints, sealant shall be compatible and bond with sealant used for the primary sealant joint where window/curtain wall framing is installed.
   2. Coat vertical face of sub-sill flashing with sealant or mastic compatible with air-barrier membrane and with sealant used for primary sealant joints prior to setting drip tray. Attach drip tray to wall using ‘nail-in’ anchors spaced at 1'-0” on-center through pre-drilled holes in the down turned leg and in the wall flanges. Cap seal anchors and bottom edge of drip tray with sealant.
   3. Continuously apply sealant to the perimeter of the wall flange and remainder of drip tray where in contact with exposed concrete block or concrete surfaces. Sealant shall be compatible with sealant used for primary sealant joint where curtain wall framing is installed.

F. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
   1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
   2. Alignment:
      a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

END OF SECTION
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SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes conventionally glazed aluminum curtain walls installed as unitized assemblies.

B. Related Sections:
   1. Division 05 Section “Structural Steel Framing” for metal building columns concealed in curtain wall mullions.
   2. Division 08 Section "Aluminum Framed Entrances and Storefronts" for doors and frames installed within curtain wall systems.

1.2 PERFORMANCE REQUIREMENTS

A. Manufacturer’s testing shall have been performed within the last 5 years on a representative curtain wall assembly, identical in all appropriate respects to the type proposed for this Project.

B. Air Infiltration: Manufacturer’s testing shall be in accordance with ASTM E283 for compliance with maximum permissible air infiltration rate using the following criteria:
   1. Maximum rate of 0.06 cfm/sq.ft.
   2. All testing at a minimum of 6.24 lbs/sq.ft. pressure differential.

C. Water Resistance: Manufacturer’s testing shall be in accordance with ASTM E331 for water resistance with no leakage as defined by the following criteria: No water shall penetrate through the perimeter framing or primary sealant joint; be visible on interior surfaces; be visible on sub-sill flashing; pass beyond the vertical plane intersecting the innermost framing member; or be present within or enter the wall cavity during the water resistance test. All testing shall be done at a minimum of 12 lbs/sq.ft. differential pressure.

D. Uniform Load Deflection: Uniform load deflection test of the curtain wall system shall be conducted in accordance with ASTM E330. The deflection of any framing member in a direction normal to the plane of the wall when subjected to the calculated design wind pressure, at both a positive and negative load, shall not exceed L/175 of its clear span except for the following:
   1. When a plastered surface or drywall subjected to bending is affected, deflection shall not exceed L/360 of the span.
   2. When a framing member overhangs an anchor point, deflection shall be limited to 2L/175, where L is the length of the cantilevered member.
   3. At perimeter frames, deflection shall be limited to 1/2 the perimeter sealant joint width.
4. For spans greater than 13'-6" deflections at design wind pressure shall be limited to L/240 + 1/4", but not exceed a maximum deflection of 1".

E. Structural Loads:
   2. Radiation cover floor load: 100 psf.

F. Uniform Load Structural: Uniform load structural tests of the curtain wall system shall be conducted in accordance with ASTM E330. The curtain wall system shall be subjected to inward and outward acting uniform loads equal to 1.5 times the design wind pressure. After each specified loading, there shall be no: glass damage or breakage; damage to fasteners or anchors; malfunctioning of doors and operating hardware; or permanent deformation or set of any main framing member in excess of 0.2% of its span.

G. Dead Load: Under dead load, for horizontal framing members which support glass, deflection of those members in the direction parallel to the plane of the wall shall not exceed an amount which will reduce the glass bite below 75% of the design dimension, nor an amount which would infringe upon necessary glazing clearances below. Deflection shall also be limited in this direction to provide at least 1/8” minimum clearance between the member and the top of the fixed glazed panel, glass or other fixed part immediately below. The clearance between the frame member and an operable window or door below shall be at least 1/16”.

H. Framing: Framing members for each individual glass pane shall be designed so the deflection perpendicular to the glass plane shall not exceed 1/175 of the glass edge length or 3/4”, whichever is less, when subjected to loads specified in the current Minnesota State Building Code.

I. Radiation cover: Radiation covers shall be designed to support floor load with deflection not to exceed 1/175. Load to cause no permanent deflection.

J. Safety Railing:
   1. Lateral load: Capable of withstanding a horizontal load of 50 pounds plf (730 N/m) without contacting the glass.
   2. Vertical load: 100 plf. distributed, 200 lb. single point load.
   3. Loads are to cause no permanent deflection.

K. Condensation Resistance: When tested in accordance with AAMA 1503, the condensation resistance factor for each type of curtain wall shall be not less than the following minimum levels of thermal performance on unit size as required to produce representative areas of framing, vision glass and spandrel glass.
   1. Greater than or equal to 66 CRF for frame and greater than or equal to 60 CRF for glass.
   2. Except for size, test units shall contain the same assembly and weepholes as the specified curtain wall.
   3. Data from calculations, test results on units of different size or unrepresentative framing/glass proportions are not acceptable.

L. Thermal Transmittance:
1. When tested in accordance with AAMA 1503, thermal performance for each type of curtain wall shall not exceed a U-Value of .41 BTU/Hr/SqFt/degrees F.

2. Data from calculations, test results on units of different size or unrepresentative framing/glass proportions are not acceptable.

M. Thermal Movements: Provide glazed curtain wall systems, including anchorage, that accommodates thermal movements of curtain wall system and supporting elements when subjected to a temperature differential from -30 degrees F to +180 degrees F without buckling, damaging stresses on glazing, failure of sealant joints, overstressing of components, damaging loads on fasteners, noise or vibrations, and other detrimental effects.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Sealant Testing: Perform sealant manufacturer’s standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition.

1. Test a minimum five production-run samples each of metal, glazing, and other material.

2. Prepare samples using techniques and primers required for installed assemblies.

3. Perform tests under environmental conditions that duplicate those under which assemblies will be installed.

4. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.

B. Test Reports / Calculations: The Contractor shall submit test reports on each curtain wall type. Each report shall be complete, prepared by an independent testing laboratory certified by AAMA, and shall indicate that each curtain wall has been tested in accordance with these Specifications and performance criteria established in Part 1 of this Section.

1.4 SUBMITTALS

A. Concurrent Submittals: Submit action submittals specified in this Section simultaneously with action submittals specified in Sections below for concurrent review:

1. Division 08 Section “Aluminum Framed Entries and Storefronts.”

2. Division 08 Section “Door Hardware” For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

3. Division 08 Section “Glazing.”

B. Product Data (PD): Submit the manufacturer’s specifications, technical product data, performance values, standard details of the products specified and the manufacturer’s certification of the Installation Subcontractor and the manufacturer’s recommendation for installation.
C. Shop Drawings (SD): Submit shop drawings prepared by the curtain wall manufacturer for each type of product. Include the following:
   1. Indicate layout and location of each curtain wall and door type, component dimensions and field verified openings. Continue the curtain wall designation established in the Architectural Drawings.
   2. Elevations of each unit, drawn at 1/2” = 1'-0” scale. Indicate frame joinery.
   3. Full size section details of every composite member.
   4. Anchorage fastener types and locations, clips/straps/plates and reinforcing steel as required by structural calculations.
   5. Anodized finish.
   6. Installation and glazing instructions.
   7. Glass and glazing.
   8. Sealants, including those selected by the curtain wall manufacturer.
   9. Vapor containment systems, if applicable.
   10. Submit four final, complete, shop drawing sets to the A/E, the Owner’s Representative and the Owner (2 copies) prior to the start of fabrication. These final shop drawing sets shall incorporate all review comments and notations from previous shop drawing submittals.

D. B3 MSBG Submittals:
   1. Laboratory Test Reports for Guideline I2A: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Samples (S): Submit one curtain wall assembly sample showing typical joints, weep system, anchorage at corner section of typical curtain wall sill/jamb intersection. Samples shall be retained to verify installed units are in conformance with the Construction Documents and the approved final shop drawings.

F. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

G. Structural Calculations (SC): Delegated-Design Submittal. Submit structural calculations and anchorage details prepared by an independent structural engineer registered in the state of Minnesota, indicating adequacy of all installed materials, including glass and glazing, to meet the structural load requirements as required by the uniform load structural test and the uniform load deflection test and dead load and framing criteria.

H. Contract Close-Out Submittals: As-built set of shop drawings, prepared by the curtain wall manufacturer, showing the final configuration of the curtain wall installation per requirements of Division 1.

I. Thermal Modeling:
   1. Provide finite element computer thermal modeling using THERM 5.2 and WINDOW 5.2 software as developed by Lawrence Berkley National Laboratory. Include in analysis all principal members for sill, jamb, head and mullion conditions for vision lites and for spandrel panels, of each curtain wall system, including adjacent building substrates for masonry, precast...
concrete and metal panel wall conditions. Analysis is to be completed under the conditions listed below. The intent is to evaluate the window/wall assembly to determine if or where surface temperatures will drop below the dew point.


b. Interior dry bulb temperature: 72 degrees Fahrenheit (72°F).

c. Relative humidity: 20%.

d. Wind speed: 15 MPH.

J. Qualification Data: For qualified Installer and preconstruction testing agency.

K. Welding certificates.

L. Manufacturer’s Certifications.

M. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

N. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer’s Certification: The curtain wall Installation Subcontractor shall be a firm with a minimum of five years experience specializing in the proper installation of the specified aluminum curtain wall assembly.

B. Manufacturer’s Certification:
   1. Manufacturers shall submit written certification that the Installation Subcontractors have been approved by them to install their products.
   2. Curtain wall manufacturer shall certify in writing that completed curtain wall had been fabricated and shop assembled in manufacturer’s plant in accordance with specifications and final shop drawings or in manufacturer’s exclusively authorized fabrication shop in accordance with these specifications and final approved shop drawings.
   3. The curtain wall manufacturer shall certify in writing, separate from the all-inclusive warranty, that the curtain wall system meets or exceeds specified criteria; that component parts were properly designed and selected for locale and installation intended; that installation was made in accordance with the manufacturer’s instructions; that a vapor tight barrier has been installed preventing the formation of condensation; and that installation of aluminum doors is compatible with installation of curtain wall system.

C. Pre-Installation Conference: In accordance with requirements of Division 1 - Project Meetings, after shop drawing review and prior to curtain wall installation. All building facade work, including brick cleaning, and the roofing installation shall be completed prior to commencing the Conference. All curtain walls shall be on-site prior to commencing the Conference. The Contractor shall provide a minimum of 10 working days written notice to all required attendees to schedule the Conference and testing and to confirm that the curtain wall openings are complete and prepared for the trial curtain wall installation(s). The Contractor shall provide a minimum of 10 working days written notice for re-scheduled meetings and testing.
The Owner, the Contractor, the A/E, Installation Subcontractors, including key personnel responsible for installing the trial installation, curtain wall manufacturer’s representative and other representatives directly associated with performance of the Work shall be in attendance to review Specifications; final shop drawings; objectives of the Pre-Installation trial installation and testing; trial test procedures; schedule for curtain wall installation; and observe trial installation(s) and testing. Installation Subcontractor shall confirm that key personnel responsible for installing the trial installation will continue installing curtain wall during the remainder of the project. Trial installation and testing shall be completed and performed on each type of curtain wall unit, with the Owner retaining the right to randomly select units for installation.

D. Pre-Installation Conference trial installation and testing shall include:

1. The Contractor shall confirm that the trial installation(s) shall be complete in every detail, conforming to a final installation and shall serve as a test demonstration installation for the remaining Work. Curtain wall anchorage system, specified curtain wall components, glass and glazing, weeps, exterior perimeter sealant and primary sealant joint shall be included in the trial installation.

2. The Owner will engage an independent, AAMA accredited testing agency to field test the completed trial curtain wall installation(s) for compliance with specified performance criteria for air infiltration and water resistance. The trial installation testing shall be by AAMA and ASTM test standards and per additional requirements, definitions and criteria listed in field quality control testing in Part 3 of this section. If curtain wall assembly exceeds constructability limits for a Method B test chamber, the Owner retains the option to utilize AAMA 501 field test standards as tabulated and defined in field quality control testing in Part 3 of this section. Testing shall occur prior to interior finish work, including interior perimeter sealant joint, to allow visual access to areas being tested to check for water penetration.

3. The Contractor shall assist with the trial installation and testing procedures and otherwise cooperate with the College’s consultants and testing agency, including provide all necessary scaffolding, lifts, enclosures, temporary heat and other equipment and utilities, including 220V single phase power source for test blowers, to facilitate the trial installation and testing. The Owner retains the option to waive portions of testing as specified.

4. The remainder of the curtain wall installation shall not proceed until trial installations have passed project requirements. If failures develop under testing, reasons for failures shall be identified by the Contractor and failures shall be repaired and retested until the installation is completely free of defects. All retests shall be by the Owner’s testing agency. If failures develop under testing, the Contractor shall notify the Owner and the A/E as to when corrective work will be under taken and determinations will be made by them as to their presence for such Work. All re-observation, re-testing and associated costs shall be the responsibility of the Contractor and deducted from the Contract Sum by Change Order. No payments, partial or otherwise, will be made for the curtain wall products until the trail installations pass testing.

E. Preconstruction Testing Agency Qualifications: Qualified according to ISO/IEC 17025 and accredited by ICC-ES for preconstruction testing indicated.
F. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

G. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

H. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

I. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.
   2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

A. Provide copies of warranties as specified under provisions of Division 1.

B. Provide written all-inclusive warranty to the Owner, executed by the General Contractor, the Installation Subcontractors and the respective manufacturers of each product, that all parts of Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of three (3) years from the date of Substantial Completion. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Contractor.

C. Provide written all-inclusive warranty to the Owner, executed by the Installation Subcontractor and the respective manufacturers of each product, that all parts of
Work in this Section, including insulating glass units, shall be free from defects in materials, workmanship and installation for a period of seven (7) years from the expiration of noted warranty in the above paragraph. Should any defect develop during warranty period, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner. Cost of such Work shall be borne by the Installation Subcontractor.

1. Warranty shall be dated and notarized by a duly authorized Notary Public of the State of Minnesota.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide EFCO Series 5900 Curtain wall; 6 inch depth, or one of the following Manufacturers/products:
   1. EFCO Series 5900 Curtain wall.
   2. Graham F-M 2500 Series by F-M Enterprises (2½” Face) Pressure Wall System.
   4. Tru-Therm 25000 by Interclad (2½” Face) Pressure Wall System.
   5. Wausau Window and Wall Systems (2½” Face).
      a. Wausau 6250 Superwall.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
   4. Structural Profiles: ASTM B 308/B 308M.
   5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement:
   1. Steel, conforming to ASTM A36, hot-dipped galvanized in accordance with ASTM A A123.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
   1. Finish: 2D (dull, cold rolled).
   2. Surface: Smooth, flat.
   3. Nonferrous, nonmagnetic stainless steel, Type 304

D. Exterior and interior decorative perimeter sealant joints and other related curtain wall sealant work shall match products selected for use by the building sealant Subcontractor. Refer to Division 07 Section Joint Sealants.

E. Primary Sealant Joints and vapor containment assembly joints: See Division 07 Section “Joint Sealants.” Curtain wall manufacturer is responsible for selecting the
2.3 FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   2. Glazing System: Retained mechanically with gaskets on four sides.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.

D. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

E. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

F. Sill Liner Flashing: Self-Adhering, High-Temperature Sheet, Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

G. Framing Sealants: Manufacturer's standard sealants.

H. Safety Railing: Stainless steel tube, anchored to curtain wall mullions where indicated. Type: 304, Finish: #4 directional polish.

I. Interior mullion extension: Provide extended sill mullion where indicated.

J. Formed aluminum trim: 0.125 inch minimum thickness, finished to match curtain wall.
K. Aluminum spandrel back pans: 0.125 inch minimum thickness, finished in color as selected by the Architect.

L. Formed aluminum radiation covers: 0.125 inch minimum thickness, finished to match curtain wall. Perforations as indicated on the Drawings.

M. Deep aluminum trim snap-on covers: Provide where indicated (provide manufacturer’s standard aluminum trim snap-on covers where deep covers are not indicated.

2.4 GLAZING

A. Glazing: Comply with Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer. Comply with Division 08 Section "Glazing."
   1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 INSULATION

A. Foil-Faced, Mineral-Wool Board Insulation: ASTM C 612; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5, respectively, per ASTM E 84.
   1. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Underwriters Laboratories Listed.
   1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).

C. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
   2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.

D. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.
1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

2.6 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.7 FABRICATION

A. Fabrication shall not proceed until masonry details and field conditions have been verified and accepted by the curtain wall manufacturer, and the final review of shop drawings has been completed.

B. Curtain Wall:
   1. Fabricate framing members into unitized assemblies of the largest possible expanse, in curtain wall manufacturer’s plant. Provide basic rectangular units sized for ease of erection and transportation. Entire finishing, fabrication and assembly operations shall be produced by a single manufacturer of units identical to those specified.
   2. Systems using individual field fabricated, field assembled or installer fabricated assemblies are not acceptable.
   3. Provide grid frame curtain wall members and components with joints neatly made, free of burrs, and assembled using extruded screw spline frame joinery resulting in tight fitting hairline joints fastened or joined in the factory to develop full structural value of members and provide permanent air and water tight joints.
   4. Provide interlocking male/female type stack joints between adjacent grid frame members to allow for expansion and contraction of frame units. "Stick" system type one piece tubular members, which do not allow for expansion and contraction in members, shall not be acceptable.
   5. Interlocking joints shall be weatherstripped to provide an air and watertight seal.
   6. Conceal fasteners at vertical to horizontal framing connections.

C. Drainage System:
   1. Individual glass lites shall have pressure equalized weepage.
   2. Provide weep slots in pressure plates and weep slots in aluminum trim snap-on covers to drain any and all condensation or accumulating water within the system, to the exterior.

D. Curtain Wall and Components
   1. Curtain Wall Frame:
      a. Minimum principal curtain wall member wall thickness 1/8”.
      b. Exterior face sightlines shall be a minimum of 2”.
      c. Overall depth shall be as required by structural calculations and as shown on the Drawings.
      d. Provide extruded aluminum members with sharp, well defined corners, integral screw splines for frame joinery and flush sightlines.
GLAZED ALUMINUM CURTAIN WALLS

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e. Curtain wall framing shall fully capture each glass lite via pressure plate attachment, on all sides.

f. Curtain wall assemblies shall be field glazed.

g. Internal Structural Members and Reinforcement: Structural steel members and shapes to suit curtain wall framing, as required by structural calculations and as recommended and detailed by the curtain wall manufacturer, hot-dipped galvanized steel.

h. Provide internal reinforcement for handrail bracket attachment where indicated.

i. Provide internal reinforcement for safety rail attachment where indicated. See detail 1/A424.

2. Thermal-break:

a. Curtain wall assembly shall be thermally broken by manufacturer’s standard 3/8” thick isolator, sealing against air and water infiltration. Provide continuous, unbroken isolators in horizontal frame members.

b. Framing intersections shall be made air and water tight by installation of manufacturer’s standard zone dam members. Provide profile to ensure proper fit to molded corner of interior glazing gasket and to prevent gapping between frame members. Seal zone dam with manufacturer’s approved sealant.

3. Insulation at spandrels: Install curtain wall spandrel insulation after installing vapor containment assembly (back pan) at spandrel areas. Anchor securely in place and seal vapor retarder to curtain wall mullions.

4. Vapor Containment Assembly at Spandrel Panel:

a. Provide an 1/8” thick aluminum back pan vapor barrier with formed return legs on all four sides. Back seal corner joints at return legs to create an air and vapor tight seal.

b. Bent Aluminum Condensation Control Angle: Where a vapor containment assembly is installed, provide an 1/8” thick, 1” x 1-1/2” bent aluminum angle attached to curtain wall frame to direct condensation to weep holes in glazing pocket trim. Factory install, making joinery to curtain wall frame air and water tight.

5. Anchor Clips and Lateral Load Clips: Concealed stainless steel or steel, hot-dipped galvanized. Shape, size and spacing shall be per final shop drawings and submitted structural calculations. Anchor clips and lateral load clips shall not penetrate the primary sealant joint nor inhibit independent frame movement. Profile anchor clips and lateral load anchor clips at sill locations to avoid altering or contacting the stainless steel drip tray.

6. Formed Aluminum Sills:

a. Formed Aluminum Sills at Brick Cavity Walls:

1) Provide 1/8” thick formed aluminum sills in profile as shown on the Drawings. Slope sills to provide positive drainage to exterior. Furnish sills in one piece for full width of curtain wall openings when permissible.

2) Provide continuous end caps to facilitate sealant installation and backer rod placement. Back seal for an air and water tight closure.

3) Provide ¼” wide slotted weep holes in drip profile. Confirm spacing with the manufacturer. Install reticulated foam baffles over inner surface of weeps.

4) Provide 1/16” thick formed Type 304 stainless steel continuous keeper, with predrilled holes at 1’-0” on center. Diameter to
predrilled holes shall correspond to recommendations and specifications off the anchor manufacturer.

5) Anchors for keeper strip shall be similar to Powers Zamac Nailin with Type 304 stainless steel nail.

6) Provide splice joints and expansion joints where shown on the Drawings and final approved shop drawings. At splice and expansion joints, provide 1/16” thick, Type 304 stainless steel continuous backer plate formed to match the aluminum sill profile. Create a working sealant joint between sill sections and provide bond breaker tape where required.

7) Provide 11 gage stainless steel angle support brackets, 3” wide, to support formed aluminum sill. Spacing shall be per curtain wall manufacturer’ recommendations. Support brackets shall be secured to the brick wall at its base and screw fastened to the formed aluminum sill at its top edge.

b. Formed Aluminum Sills at Stone Sills:
   1) Formed aluminum sills shall be 1/8” thick in profile as shown on the Drawings. Slope sills to provide positive drainage to exterior.
   2) Provide splice joints and expansion joints where shown on the Drawings and final approve shop drawings. At splice and expansion joints, provide a 1/16” thick stainless steel continuous backer plate, formed to match the aluminum sill profile. Create a working sealant joint between sill sections and provide bond breaker tape where required.

c. Formed aluminum sills at interior:
   1) Formed aluminum sills shall be 0.090” thick in profile as shown on the Drawings.
   2) Provide splice joints and expansion joints where shown on the Drawings and final approve shop drawings. At splice and expansion joints, provide a 0.090” thick aluminum continuous backer plate, formed to match the aluminum sill profile.

7. Accessories:
   a. Shims: PVC horseshoe shims in non-bearing locations and Korolath multipolymer plastic bearing shims per structural calculations and final shop drawing set. Horseshoe shaped Korolath shaped shims are not acceptable in dead load locations.
   b. Curtain Wall Frame Anchorage Fasteners: Stainless Steel Anchors, heavy duty sleeve or expansion style, vibration resistant and removable, used to secure curtain wall and associated anchor clips and lateral load clips to concrete and grout-filled concrete block. Type, size and spacing shall be per structural calculations and final shop drawings.
   c. Bond Breaker Tape: As recommended by the curtain wall manufacturer.
   d. Dissimilar Metals: Dissimilar metals shall be separated to prevent galvanic action.

8. Glass and Glazing:
   a. Provide glazing according to the curtain wall and the glass manufacturer’s recommendation for sealants, glazing gaskets and tapes.
   b. Provide setting blocks and edge blocking in material, hardness and locations according to the curtain wall and the glass manufacturer’s recommendations.
c. Interior glazing gaskets corner butt joints shall be sealed per the curtain wall manufacturer’s installation instructions.

E. Form or extruded aluminum shapes before finishing.

F. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

G. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

H. Fabricate components that, when assembled, have the following characteristics:
   1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
   2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. Exposed surfaces of all aluminum components and trim shall receive an anodized color finish conforming to the Aluminum Association Designation, A/Eural Class 1, AA-M10C22 and the following:
   1. The anodic coating shall be continuous, fully sealed and free from powdery surfaces.
   2. Coating thickness shall be a minimum of 0.7 mils when tested in accordance with ASTM B244.

B. Anodic coating shall be: A44-Electrolytically Deposited Color.

PART 3 - EXECUTION

3.1 EXAMINATION

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

C. Construction at curtain wall openings and adjoining materials shall be verified as ready to receive the Work of this Section. Installation start-up indicates acceptance of conditions.

D. Each curtain wall opening shall be properly prepared and cleaned before installation of curtain wall system and trim. Confirm that areas shown to receive sealant joints have been cleaned according to sealant manufacturer’s instructions.

E. Wall conditions at sill, jamb, and head shall not short circuit thermal break in frame when installed.

3.2 INSTALLATION

A. The curtain wall shall be installed in accordance with approved manufacturer’s instructions.

B. Provide anchor clips, lateral load clips, anchorage fasteners, shims and internal reinforcement as shown on the shop drawings and structural calculations, to secure and properly support the curtain wall assembly to the wall surrounds. Account for differential movement between curtain wall frame and wall surrounds caused by but not limited to: calculated thermal expansion and contraction of curtain wall frame sections; building live and dead load movement; supporting structure movement such as story drift, column shortening, or long term creep; and lateral loads while maintaining perimeter expansion tolerances and independent frame movement as shown on the final approved shop drawings.

C. Install bond breaker tape and sealant, as recommended by the curtain wall manufacturer, such as at joint between interlocking mullions when required.

D. No bolts, screws, or other components, etc., shall impair independent frame movement.

E. No fasteners shall be permitted within the weep system.

F. The sill frame of curtain wall shall not project towards the exterior beyond the head frame.

G. Torque pressure plate screws to manufacturer’s standard compression value.

H. Prior to installing vapor containment assembly, continuously cap seal curtain wall frame joinery within the spandrel panel area to prevent vapor intrusion and bypass.

I. Vapor containment assembly installation shall provide a vapor tight barrier to prevent the formation of condensation. Vapor barrier shall not be punctured.

J. Anchor clips, lateral load clips and associated anchorage fasteners that penetrate the interior perimeter sealant joint shall be cap sealed to prevent air and vapor migration.
K. General:
   1. Do not install damaged components.
   2. Fit joints to produce hairline joints free of burrs and distortion.
   3. Rigidly secure nonmovement joints.
   4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   5. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
   6. Seal joints watertight unless otherwise indicated.

L. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

M. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

N. Install components plumb and true in alignment with established lines and grades.

O. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

P. Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).
   2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
      b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
      c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
4. **Location:** Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m); 1/2 inch (12.7 mm) over total length.

### 3.4 FIELD QUALITY CONTROL

A. The Contractor shall provide written notice to the appropriate firms and/or laboratories that the curtain wall installation is complete and ready for field quality control testing. The Contractor shall provide a minimum of 10 working days notice for both initial and re-scheduled testing.

B. The Owner will engage an independent, AAMA accredited testing agency to field test the completed curtain wall installation for compliance with specified performance criteria for air infiltration, water resistance. Testing for the completed curtain wall installation testing shall be by AAMA and ASTM test standards and per additional requirements, definitions and criteria listed I the field quality control testing below. If curtain wall assembly exceeds constructability limits for a Method B test chamber, the Owner retains option to utilize AAMA 501 field test standards as tabulated and defined below. Testing shall occur prior to interior finish work, including interior perimeter sealant joint, to allow visual access to areas being tested to check for water penetration. The Contractor shall assist with testing procedures and otherwise cooperate with the testing agency, including provide all scaffolding, lifts, enclosures, temporary heating and other equipment and utilities to facilitate testing. The Owner retains the option to waive portions of testing as specified. The Owner will randomly select curtain wall to be tested.

C. If failures develop under testing, reasons for the failure shall be identified by the Contractor and failures shall be repaired and retested until the installation is completely free of defects. If failures develop under testing, the Contractor shall notify the Owner and the A/E as to when corrective work will be undertaken and determinations will be made by them as to their required presence for such Work. All retests shall be by the Owner’s testing agency.

D. All re-observation, re-testing and associated costs shall be the responsibility of the Contractor and deducted from the Contract Sum by Change Order.

E. Field Quality Control Testing requirements are as follows:

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<thead>
<tr>
<th>Method of Testing</th>
<th>Pass/Fail Definitions</th>
<th>Frequency</th>
<th>Action required (If Failure)</th>
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<tbody>
<tr>
<td><strong>Air Leakage:</strong></td>
<td>Maximum allowable rate of air leakage shall not exceed 0.06 cfm/sq.ft. Minimum air</td>
<td>10% or a minimum of 3 curtain wall assemblies, whichever is greater.</td>
<td>For each failed test: 1. Identify reason for failure. 2. Repair failure and retest the installation unit until it is completely free of defects. 3. Test two additional curtain wall assemblies.</td>
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<td>leakage test per AAMA 503; including the adjacent wall substrate, exterior perimeter</td>
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### GLAZED ALUMINUM CURTAIN WALLS

#### F. Protection and Cleaning

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<td>1</td>
<td>Water Penetration: Conduct water penetration tests per AAMA 503; including the adjacent wall substrate, exterior perimeter sealant joint and the primary sealant joint. Test chamber shall be AAMA 502, Method B requirements and applied to the exterior of the wall except where the testing agency determines that an interior test chamber is required. No water shall: penetrate through the perimeter frame or primary sealant joint, be visible on interior surfaces, be visible on sub-sill flashing; pass beyond the plane parallel to the glazing (the vertical plane) intersecting the innermost projection of the curtain wall; or be present within or enter the wall cavity during the water penetration test. Minimum water penetration test pressure shall be 12 lbs/sq.ft.</td>
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<td>Owner Optional Field Tests: Owner optional field tests shall be per AAMA 501. Air leakage and water penetration tests shall be per AAMA 503 with an interior test chamber. In all cases, the test chamber shall be applied to the wall construction to create a pressure differential across the exterior face of the primary sealant joint. The perimeter sealant joint shall also be tested per AAMA 501.2 using a brass spray nozzle.</td>
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<td>GLAZED ALUMINUM CURTAIN WALLS 08 44 13 - 18</td>
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</table>
1. Completed systems shall be cleaned, inside and outside, promptly after erection of framing, glass and sealants. Remove excess sealants, dirt or other contaminants from aluminum, glass surfaces and wall surrounds.

2. Take protective measures to assure that the installation shall be without damage or deterioration at time of acceptance other than normal weathering. Should any defect develop prior to the Date of Substantial Completion of the Work, such defects shall, upon request, be repaired or replaced at no additional cost to the Owner.

END OF SECTION
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SECTION 08 51 13

ALUMINUM WINDOWS

1.1 SUMMARY

A. Interior Sliding Aluminum Windows.

1.2 QUALITY ASSURANCE

A. Mockups for each form of construction.

1.3 WARRANTY

A. Windows: 10 years from date of Substantial Completion.

B. Glazing Units: 10 years from date of Substantial Completion.

C. Aluminum Finish: 10 years from date of Substantial Completion.

1.4 WINDOW PERFORMANCE REQUIREMENTS

   1. Minimum Performance Class: AW.
   2. Minimum Performance Grade: 15.

B. Sound Transmission Class: 30 minimum.

1.5 ALUMINUM WINDOWS

A. Frames and Sashes: Nonthermal aluminum extrusions.

B. Glazing:
   2. Glazing System: Manufacturer's standard.

C. Aluminum Finish: Class I, color anodic.

1.6 FIELD QUALITY CONTROL

A. Testing: By Owner-engaged agency.

END OF SECTION
SECTION 08 71 00
DOOR HARDWARE

1.1 SUMMARY
A. Mechanical door hardware for swinging and sliding doors.
B. Cylinders for door hardware specified in other Sections.
C. Electrified door hardware.

1.2 WARRANTY
A. Materials and Workmanship: Three years.

1.3 MAINTENANCE SERVICE
A. Full-Maintenance Service: Six months.

1.4 PRODUCTS
A. Scheduled Door Hardware: Products scheduled in "Door Hardware Schedule".

1.5 FIELD QUALITY CONTROL
A. Independent Architectural Hardware Consultant: Contractor-engaged to perform inspections.
B. Occupancy Adjustment: After six months.

1.6 DOOR HARDWARE SCHEDULE
A. <Insert door hardware sets for each type of door opening; e.g., offices, entrances, etc.>.

END OF SECTION
SECTION 08 71 13

AUTOMATIC DOOR OPERATORS

1.1 SUMMARY
   A. Automatic operators for swinging doors.

1.2 QUALITY ASSURANCE

1.3 WARRANTY
   A. Materials and Workmanship: Two years.

1.4 MAINTENANCE SERVICE
   A. Full-Maintenance Service: 12 months.

1.5 PRODUCTS
   A. Low-Energy Door Operators: Surface mounted.
      1. Operation: Power opening and power-assisted spring closing.
      2. Operating System: Electromechanical, or Electrohydraulic.
      3. Microprocessor control unit.
   B. Activation and Safety Devices:
      1. Push-Plate Switch: Recess mounted, semiflush in wall.
   C. Accessories:
      1. Signage: Decals.

1.6 FIELD QUALITY CONTROL
   A. Inspection by Installer’s certified inspector.
END OF SECTION 08 71 13
SECTION 08 80 00

GLAZING

1.1 SUMMARY

A. Glazing required for the following:
   1. Windows.
   2. Doors.
   4. Storefront framing.
   5. Glazed entrances.
   6. Interior borrowed lites.

1.2 PERFORMANCE REQUIREMENTS

A. Engineering design of glass by Contractor.

1.3 QUALITY ASSURANCE

A. Mockups for aluminum-framed entrances and storefronts glazed aluminum curtain walls.

1.4 WARRANTY

A. Coated-Glass Products: Not less than 10 years.
B. Laminated Glass: Not less than 10 years.
C. Insulating Glass: Not less than 10 years.

1.5 MATERIALS

A. Glazing Gaskets: Dense compression and or Soft compression.
B. Silicone Glazing Sealants: Neutral curing, Class 50.
   1. VOC Content: Not more than 250 g/L.
D. Glazing Channels: Top and bottom for frameless glazing.
E. Glazing Film \[GF-1\]: 3M Fasara Decorative glass film.
1.6 **MONOLITHIC-GLASS TYPES**

A. **Glass Type GL-1**: Clear float glass.

B. **Glass Type GL-1L**: Clear laminated float glass.

C. **Glass Type GL-1T**: Clear fully tempered float glass.

D. **Glass Type GL-2**: Pyrolytic one-way mirrored glass.

E. **Glass Type GL-3**: Clear float glass with ceramic vision frit; simulated sandblast.

1.7 **INSULATING-GLASS TYPES**

A. **Glass Type GL-4**: Low-e-coated, clear insulating glass.
   2. Indoor Lite: Heat-strengthened float glass.
   3. Low e coating: PPG XL 70, second surface.
   5. COG U factor: 0.25.
   6. Shading coefficient: 0.37.
   7. Visible transmittance: 0.70%

B. **Glass Type GL-4L**: Low-e-coated, clear Laminated insulating glass.
   1. Outdoor Lite: Laminated float glass.
   2. Indoor Lite: Laminated float glass.
   3. Low e coating: PPG XL 70, second surface.
   5. COG U factor: 0.25.
   6. Shading coefficient: 0.37.
   7. Visible transmittance: 0.70%

C. **Glass Type GL-4T**: Low-e-coated, clear tempered insulating glass.
   1. Outdoor Lite: Fully Tempered float glass.
   2. Indoor Lite: Fully tempered float glass.
   3. Low e coating: PPG XL 70, second surface.
   5. COG U factor: 0.25.
   6. Shading coefficient: 0.37.
   7. Visible transmittance: 0.70%

D. **Glass Type GL-5**: Low-e-coated, clear insulating glass with ceramic vision frit.
   2. Indoor Lite: Heat-strengthened float glass.
   3. Low e coating: PPG XL 70, second surface.
   4. Ceramic vision frit: Second or third surface; Simulated sandblast.
5. Fill: Argon.
6. COG U factor: 0.25.

E. Glass Type **GL-5L**: Low-e-coated, clear Laminated insulating glass.
   1. Outdoor Lite: Laminated float glass.
   2. Indoor Lite: Laminated float glass.
   3. Low e coating: PPG XL 70, second surface.
   4. Ceramic vision frit: Second or third surface; Simulated sandblast.
   5. Fill: Argon.
   6. COG U factor: 0.25.

F. Glass Type **GL-5T**: Low-e-coated, clear tempered insulating glass.
   1. Outdoor Lite: Fully Tempered float glass.
   2. Indoor Lite: Fully tempered float glass.
   3. Low e coating: PPG XL 70, second surface.
   4. Ceramic vision frit: Second or third surface; Simulated sandblast.
   5. Fill: Argon.
   6. COG U factor: 0.25.

1.8 FIRE-PROTECTION-RATED GLAZING TYPES

A. Glass Type **GL-8**: 45-minute 60-minute 90-minute fire-rated glazing; laminated ceramic glazing, see opening schedule for ratings.

**END OF SECTION 08 80 00**
SECTION 08 90 00
LOUVERS AND VENTS

1.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Contractor to design louvers.

B. Wind Loads: Indicated on Drawings.

1.2 PRODUCTS

A. Fixed, Extruded-Aluminum Louvers:

   1. Horizontal, Continuous-Line, Storm-Blade Louver: 6 inches (150 mm) deep.

B. Louver Screens:

   1. Provided at each exterior louver.
   2. Screening Type: Bird screening.

C. Blank-Off Panels: Insulated.

D. Finishes:

   1. Aluminum: Anodized, Class 1,
      a. Color: Champagne.
END OF SECTION 08 90 00
SECTION 09 21 16.23

GYPSUM BOARD SHAFT WALL ASSEMBLIES

1.1 SUMMARY

A. Shaft-wall enclosures.

B. Chase enclosures.

1.2 MATERIALS

A. Panel Products:

1. Gypsum liner panels, Type X.
2. Gypsum board, Type X.

B. Non-Load-Bearing Steel Framing:

1. Framing Members: ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized, unless otherwise indicated.

C. Auxiliary Materials:

1. Trim accessories.
2. Gypsum board joint-reinforcing materials.
3. Steel drill screws.
4. Track fasteners.
5. Sound attenuation blankets.
6. Acoustical sealant.

1.3 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated.

B. STC Rating: 51, minimum.

C. Stud Depth: As indicated.

D. Runner Tracks: Manufacturer's standard J-profile track.

E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated.

F. Jamb Struts: Manufacturer's standard J-profile strut.
G. Room-Side Finish: Gypsum board.

H. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

END OF SECTION 09 21 16.23
SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

1.1 MATERIALS

A. Steel Framing for Framed Assemblies:
   1. Steel studs and runners, 20 gage.
   2. Dimpled steel studs and runners.
   3. Slip-Type Head Joints:
      a. Double runner.
   4. Flat strap and backing plate.
   5. Cold-rolled channel bridging.
   6. Hat-shaped, rigid furring channels.
   7. Resilient furring channels.
   8. Cold-rolled furring channels.

B. Suspension Systems:
   1. Wire hangers.
   2. Carrying channels.
   3. Furring channels.
END OF SECTION 09 22 16
1.1 SUMMARY

A. Portland cement plasterwork on metal lath.

1.2 MATERIALS

A. Metal Lath:
   1. Expanded-Metal Lath: Flat diamond mesh with hot-dip galvanized zinc coating.

B. Accessories:
   1. Metal Trim: Bead and joint trim.
      a. Zinc or Zinc-coated (galvanized) steel.

C. Fiber for base coat.

D. Bonding compound.

E. Plaster Mixes:
   1. Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats of three-coat plasterwork.
   2. Acrylic-Based Finish-Coat Mix: For acrylic-based coating finish.
END OF SECTION 09 24 00
SECTION 09 29 00

GYPSUM BOARD

1.1 QUALITY ASSURANCE

A. Mockups for the following:
   1. Levels of gypsum board finish for use in exposed locations.
   2. Texture finishes.

1.2 MATERIALS

A. Low Emitting Materials: Wall and ceiling assemblies comply Indoor Air Quality portion of the California Section 01350 standard.

B. Interior Gypsum Board:
   1. Gypsum board, Type X.

C. Specialty Gypsum Board:
   1. Glass-mat interior gypsum board.

D. Tile-Backing Panels:
   1. Glass-mat, water-resistant backing board.

E. Trim Accessories:
   1. Interior.

F. Auxiliary materials:
   1. Sound attenuation blankets.
END OF SECTION 09 29 00
SECTION 09 30 00

TILING

1.1 QUALITY ASSURANCE
A. Mockup for each type of floor tile installation.
B. Mockup for each type of wall tile installation.

1.2 TILE PRODUCTS
A. Tile Type [CT-1A – CT4A]: Tile X Design.
   1. Products: See the Interior Building Materials Legend.
B. Tile Type [CT-1B – CT4B]: Katlo.
   1. Products: See the Interior Building Materials Legend.
C. Tile Type [CT-1C – CT4C]: Rubble Tile.
   1. Products: See the Interior Building Materials Legend.
D. Tile Type [PCL-1 and PCLB-1]: Allowance for stair tile, as indicated in the Interior building Materials Legend.

1.3 ACCESSORY MATERIALS
A. Waterproofing and Crack Isolation Membrane: Fluid-applied membrane, throughout.
   1. Flood testing, observed by the Owner’s testing and inspection service.
B. Elastomeric Sealants: One-part, mildew-resistant silicone.
C. Metal edge strips.
D. Stone thresholds.

1.4 INTERIOR TILE INSTALLATION SCHEDULE
A. Interior Floors on Concrete:
   1. F113: Thin-set mortar.
      a. Tile Type: CT-1.
      b. Waterproofing Membrane: full area of installation.
d. Grout: Water-cleanable epoxy grout.

B. Interior Walls, Masonry or Concrete:

   a. Tile Type: CT-2, CT-3.
   c. Grout: Water-cleanable epoxy grout.

C. Interior Walls, Metal Studs or Furring:

1. W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board.
   a. Tile Type: CT-2, CT-3.
   c. Grout: Water-cleanable epoxy grout.

END OF SECTION 09 30 00
SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

1.1 SUMMARY
A. Acoustical panels and exposed suspension systems.

1.2 QUALITY ASSURANCE
B. Metal Suspension System Quality Standard: ASTM C 635.
C. Mockups for each form of construction.

1.3 MATERIALS
B. Metal Suspension Systems:
   1. Wire hangers, braces, and ties.
   2. Hold-down clips.
C. Metal Edge Moldings and Trim: Roll-formed sheet metal.

1.4 INSTALLATION

1.5 FIELD QUALITY CONTROL
A. Testing: By Owner-engaged agency to test acoustical panel ceiling hanger fasteners.
END OF SECTION 09 51 13
SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

1.1 PRODUCTS

A. Resilient Base:

2. Style: Cove, Straight at carpet.
3. Minimum Thickness: 0.125 inch (3.2 mm).
4. Height: 4 inches (102 mm).
5. Outside Corners: Preformed.
6. Inside Corners: Job formed.
7. [RB-1]: Coved
8. [RB-2]: Straight
9. Colors: As selected by architect.

B. Resilient Molding Accessory: Rubber.

1. Riser nosing for carpet, square nose.
2. Cap for cove resilient floor covering.
3. Carpet edge for glue-down applications.
4. Reducer strip for resilient floor covering.
5. Joiner for tile and carpet.
6. Transition strips.

C. Installation Materials:

1. Trowelable leveling and patching compounds.
2. Adhesives.
   a. VOC Content and Chemical Components: Complying with Indoor Air Quality portion of California Section 01350 standard
4. Metal edge strips.
5. Floor polish.
END OF SECTION 09 65 13
SECTION 09 65 43
LINOLEUM FLOORING

1.1 PRODUCTS

A. Flooring System: FloorScore compliance.

B. Linoleum Sheet Flooring: With backing.
   1. Thickness: 0.010 inch (2.5 mm).
   3. Integral-flash-cove-base accessories.
   4. Colors and patterns: [RF-1A - RF-3A]: Forbo, as indicated in the Interior Building Materials Legend.
   5. Colors and patterns: [RF-1B - RF-3B]: Johnsonite, as indicated in the Interior Building Materials Legend.
   6. Colors and patterns: [RF-1C - RF-3C]: Armstrong, as indicated in the Interior Building Materials Legend.

C. Installation Materials:
   1. Trowelable leveling and patching compounds.
   2. Adhesives: Low VOC.
   3. Floor polish.
END OF SECTION
SECTION 09 68 13

TILE CARPETING

1.1 QUALITY ASSURANCE
   A. Mockups for each type of carpet tile installation.

1.2 PERFORMANCE
   A. Carpet and Rug Institute Green Label Plus Certification for adhesives and carpet.

1.3 WARRANTY
   A. Carpet Tile Failure: 15 years.

1.4 PRODUCTS
   A. Carpet Tile [CPT-1A – CPT-8A]: Mohawk; As indicated in the Interior Building Materials Legend.
   B. Carpet Tile [CPT-1B – CPT-8B]: Shaw; As indicated in the Interior Building Materials Legend.
   C. Carpet Tile [CPT-1C – CPT-8C]: Interface; As indicated in the Interior Building Materials Legend.
   D. Carpet Tile: (Walk-off carpet) As selected by Architect.
   E. Installation Adhesive: Comply with Indoor Air Quality portion of California Section 01350 standard.
END OF SECTION 09 68 13
SECTION 09 72 00
WALL COVERINGS

1.1 QUALITY ASSURANCE
A. Mockups for each type of wall covering on each substrate required.

1.2 PERFORMANCE REQUIREMENTS
A. Low-emitting materials for LEED for Schools.

1.3 PRODUCTS
A. Textile Wall Covering [WC-1, WC-2]: As indicated in the Interior Building Materials Legend.
   1. Mildew resistant.
   2. Stain-resistant coating.
B. Adhesive: Low emitting for LEED for Schools.
C. Primer/sealer.
D. Wall liner.

END OF SECTION
SECTION 09 77 13

STRETCHED-FABRIC WALL SYSTEMS

1.1 MAINTENANCE MATERIAL SUBMITTALS

A. Fabric: 10 percent of amount installed, but no fewer than 10 yards (9 m) of each fabric.

B. Framing and Installation Items: 5 percent of amount installed, but no fewer than five full-length units, and unopened adhesives.

1.2 QUALITY ASSURANCE

A. Mockup of typical wall area.

1.3 WARRANTY

A. Materials and Workmanship: Five years.

1.4 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

1.5 STRETCHED-FABRIC WALL SYSTEMS

A. Stretched-Fabric Wall System [AWP-1]: Facing material stretched over a frame and core material.
   2. Core Materials: Glass-fiber board.
      a. Nominal Frame Thickness: 1 inch (25 mm).
      b. Blocking for thicker core.
   4. Reveals between Panels: None.
   7. Nominal Overall System Thickness: 2 inches (51 mm).

1.6 MATERIALS

A. Wood-Based Products: FSC certified.

B. Low-Emitting Materials: Composite wood materials made without urea formaldehyde and low-VOC installation adhesive.
STRETCHED-FABRIC WALL SYSTEMS

END OF SECTION
SECTION 09 91 13
EXTERIOR PAINTING

1.1 QUALITY ASSURANCE
A. Mockups for each color and finish.

1.2 EXTERIOR PAINTING SCHEDULE
A. Steel Substrates:
   1. Alkyd system.
B. Galvanized-Metal Substrates:
   1. Alkyd system.
END OF SECTION 09 91 13
1.1 QUALITY ASSURANCE
   A. Mockups for each color, substrate and finish.

1.2 PAINT, GENERAL
   A. VOC Content and Chemical Components: Complying with Indoor Air Quality portion of California Section 01350 standard.

1.3 INTERIOR PAINTING SCHEDULE
   A. CMU Substrates:
      1. Institutional low-odor/VOC latex system.
      2. Waterborne two component epoxy.
   B. Steel Substrates:
      1. Low VOC Alkyd system.
   C. Galvanized-Metal Substrates:
      1. Low VOC Alkyd system.
   D. Aluminum Substrates:
      1. Low VOC Alkyd system.
   E. Wood Substrates: Including wood-based panel products.
      1. Low VOC Alkyd system.
   F. Gypsum Board Substrates:
      1. Institutional low-odor/VOC latex system.
      2. Waterborne two component epoxy.
   G. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.
      1. Institutional low-odor/VOC latex system.
END OF SECTION 09 91 23
SECTION 10 11 00

VISUAL DISPLAY SURFACES

1.1 QUALITY ASSURANCE
   A. Mockups for each form of construction.
   B. Composite wood products made without urea formaldehyde.

1.2 WARRANTY
   A. Materials and Workmanship for Porcelain-Enamel Face Sheets: Life of building.

1.3 PRODUCTS
   A. Porcelain-Enamel Face Sheet: Enameling-grade steel.
   B. Markerboard Assemblies: Porcelain enamel.
   C. Glass Marker Boards [MKRBD-1]: Back painted glass, with marker tray, mounted on stand-offs.
   E. Tackboard Assemblies [TKBD-1]: Linoleum tack surface, aluminum frame.
   F. Visual Display Rails: Linoleum visual display surface.
   G. Sliding Visual Display Units:
      1. Horizontal-Sliding Units: Two track.
   H. Markerboard and Tackboard Accessories:
      1. Aluminum frames.
      4. Map rail with display rail.
   I. Aluminum Finishes: Class II, clear anodic.

1.4 FABRICATION
SECTION 10 21 13
TOILET COMPARTMENTS

1.1 SUMMARY
A. Solid-polymer toilet compartments configured as follows:
   1. Toilet-Enclosure Style: Overhead braced.
   2. Urinal-Screen Style: Wall hung, flat panel.

1.2 QUALITY ASSURANCE
A. Flame-Spread Index: 75 or less.

1.3 COMPONENTS
A. Solid-Polymer Units: High-density polyethylene (HDPE) or polypropylene (PP) panel material.
B. Door, Panel, and Pilaster Construction: No-sightline system.
C. Brackets (Fittings):
   1. Stirrup Type: Stainless steel.
   2. Full-Height (Continuous) Type at urinal screens: Stainless steel.
D. Hardware and Accessories: Stainless steel.
END OF SECTION 10 21 13
SECTION 10 22 00
GLAZED DEMOUNTABLE PARTITIONS AND DOORS

1.1 SUMMARY
A. Aluminum frames.
B. Glazed Aluminum Doors.

1.2 QUALITY ASSURANCE
A. Mockups for each type of partition.

1.3 PERFORMANCE REQUIREMENTS
A. Demountable partitions are to comply with the Indoor Air Quality portion of the California Section 01350 standard.
B. Flame-Spread Index: 25 or less.
C. Structural Performance:
   1. Lateral deflection not more than 1/240 of the overall span under uniformly distributed load of 5 lb/sq. ft. (24.4 kg/sq. m).

1.4 GLAZED DEMOUNTABLE PARTITION DOORS AND FRAMES
A. Unitized-Panel Demountable Partition doors and frames:
   1. Doors: 1-3/4-inch (45-mm) thick, aluminum framed, full glass.
      a. Sliding doors.
      b. Swing doors.
   2. Door Frames: Aluminum frames for 1-3/4-inch (45-mm) doors.
   3. Door Locking Cylinder: Specified in Division 08 Section “Door Hardware.”
   5. Glazing: Specified in Division 08 Section “Glazing.”

1.5 MANUFACTURER
A. DIRTT Environmental Solutions:
SECTION 10 22 26

OPERABLE PARTITIONS

1.1 SUMMARY
   A. Section Includes:
      1. Manually operated, individual acoustical panel partitions.

1.2 PERFORMANCE REQUIREMENTS

1.3 QUALITY ASSURANCE
   A. Flame-Spread Index: 26 to 75.

1.4 MATERIALS
   A. Frame: Steel.
   B. Face/Liner Sheets: Steel with gypsum board.

1.5 OPERABLE ACOUSTICAL PANELS
   A. Panel Width: Standard widths.
   B. STC: Not less than 52.
   C. Panel Weight: 10 lb/sq. ft. (50 kg/sq. m) maximum.
   D. Panel Thickness: Not less than 4 inches (102 mm).
   E. Hardware: Manufacturer's standard hinges.
   F. Finish Facing: Fabric wall covering.

1.6 ACCESSORIES
   A. Storage pocket door.
1.7 FIELD QUALITY CONTROL

A. Light-leakage test.

END OF SECTION 10 22 26
SECTION 10 26 00
WALL PROTECTION

1.1 WARRANTY
   A. Materials and Workmanship: Five years.

1.2 PRODUCTS
   A. Corner Guards [CG-1]:
      1. Surface-Mounted, Metal Type: Stainless steel, 3 ½ inch wings, 48 inches height.
   B. Chair Rails:
      1. See Running Trim, Section 06 40 23 “Interior Architectural Wood Work.”
END OF SECTION 10 26 00
SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

1.1 WARRANTY

A. Silver Spoilage for Mirrors: 15 years.

1.2 PRODUCTS

A. Public-Use Washroom Accessories:
   1. Toilet Tissue Dispenser: Owner supplied, contractor installed.
   3. Liquid-soap dispenser: Owner supplied, contractor installed.
   4. Contractor provided toilet accessories are indicated in the Interior Building Materials Legend.

B. Warm-air dryers.

C. Childcare Accessories:
   1. Diaper-changing station.

D. Custodial Accessories:
   1. Utility shelf.
   2. Mop and broom holder.
   4. Liquid-soap dispenser: Owner supplied, contractor installed.
END OF SECTION 10 28 00
1.1 PRODUCTS

A. Fire Protection Cabinet **FEC**:  
   1. Type: For fire extinguisher.  
   2. Construction: Nonrated.  
   4. Door Style: Vertical duo panel with frame.  
   5. Door Glazing: Tempered break glass.  
   6. Accessories: Door locks.  
   7. Material: Steel.  
   8. Finish: Primed for field paint.  
   9. Fire Extinguisher: 3-A:40-B:C, 5-lb

B. Fire Extinguisher **FE**: UL-rated 3-A:40-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.  
   1. Fire extinguisher wall brackets.
END OF SECTION 10 44 13
SECTION 10 51 13
METAL LOCKERS

1.1 PRODUCTS

A. Welded Corridor Lockers:
   1. Doors: 0.075-inch (1.90-mm) steel sheet.
      a. Type: Louvered vents at top and bottom.
   2. Tops, Bottoms, Sides, and Shelves: 0.060-inch (1.52-mm) steel sheet.
   3. Backs: 0.048-inch (1.21-mm) steel sheet.
   5. Door Handle and Latch: Recessed, single point.
   7. Accessories: continuous zee base continuous sloping tops recess trim filler panels and boxed end panels.

B. Locks: Combination padlock.
END OF SECTION
SECTION 11 73 10
MEDICAL HEADWALL SYSTEMS

1.1 SUMMARY

A. Plastic-laminate-faced headwalls of stock design.

1.2 SUBMITTALS

A. Sample: Full-size headwall unit.

1.3 MATERIALS

A. Materials:

1. Composite wood products and adhesives do not contain urea formaldehyde.
2. Plastic-Laminate
3. Steel, Cold rolled sheet.
4. Aluminum, extruded.
5. Metal Studs

1.4 PRODUCTS

A. Standard Patient Room Headwall: Modular Services Company; Profile unit semi-recessed, single sided 3-gas extended height, model 7111-IR.

1. Locations: Multi-Skills Lab, Adult Simulations.

2. Size: 12 ½ inch width, 3 ¼ inch depth, 86 inches height above floor, 1 inch extension from wall.

3. Raceway:
   a. Internal, connect to services overhead.
   b. At units with clerestory window above, connect horizontally below windows.

4. Services:
   a. Oxygen outlets: 1 simulated.
   b. Air outlets: 1.
   c. Vacuum outlets: 1.
   e. Simulated Code Blue: 1.
   f. Duplex receptacle for normal power: 2.
   g. Duplex receptacle for emergency power: 4.
   h. Data outlet: 1, cat 5.
i. Vertical equipment mounting track: 2.

j. Monitor: 1, with monitor mounting channel and monitor output.

k. Diagnostic Set: 1.

l. Thermometer: 1.

m. Oxygen Flowmeter: 1.


o. Sphygmomanometer: 1.

p. Track mounted swivel basket 10 inches by 10 inches by 4 inches.

q. Telephone outlet: 1.

5. Accessories:
   a. Provider Channel, 36 inch long.
      1) Glove box holder (holds 3 glove boxes).
      2) Supply clips 2.
      3) Sharps disposal box bracket 1.

B. Pediatrics Headwall: Modular Services Company; Profile unit semi-recessed, single sided 2-gas, short.

1. Locations: Pediatrics, Crib Location in Pediatrics is similar.

2. Size: 12 ½ inch width, 3 ¼ inch depth, 68 1/2 inches above floor, 1 inch extension from wall.

3. Raceway: internal connect to services from overhead.

4. Services:
   a. Oxygen outlets: 1 simulated.
   b. Vacuum outlets: 1.
   c. Duplex receptacle for normal power: 1.
   d. Duplex receptacle for emergency power: 2.
   e. Data outlet: 1, cat 5.
   f. Vertical equipment mounting track: 1.
   g. Monitor: 1, with monitor mounting channel and monitor output.
   h. Telephone outlet: 1.

C. Obstetrics Headwall: Modular Services Company; Profile unit semi-recessed, single sided 2-gas, short.

1. Location: Obstructs.

2. Size: 12 ½ inch width, 3 ¼ inch depth, 68 1/2 inches above floor, 1 inch extension from wall.

3. Raceway: internal connect to services from overhead.

4. Services:
   a. Oxygen outlets: 1 simulated.
   b. Duplex receptacle for normal power: 1.
   c. Data outlet: 1, cat 5.
   d. Vertical equipment mounting track: 2.
e. Monitor: 1, with monitor mounting channel and monitor output.
f. Diagnostic Set: 1.
g. Thermometer: 1.
h. Oxygen Flowmeter: 1.
i. Sphygmanometer: 1.
j. Telephone outlet: 1.

D. Small Wall Unit for Bassinet: Modular Services Company; Custom unit.

1. Locations: Bassinet in Obstetrics.
2. Size: 12 ½ inch width, 3 ¼ inch depth, 12 ½ inch height, 1 inch extension from wall.
3. Raceway: internal connect to services from overhead.
4. Services:
   a. Oxygen outlets: 1 simulated.
   b. Vacuum outlets: 1.
   e. Air outlets: 1.

E. Small Wall Unit for Warmer: Modular Services Company; Custom unit.

1. Locations: Warmer in Obstetrics.
2. Size: 12 ½ inch width, 3 ¼ inch depth, 12 ½ inch height, 1 inch extension from wall.
3. Raceway: internal connect to services from overhead.
4. Services:
   a. Oxygen outlets: 1 simulated.
   b. Vacuum outlets: 1 at bassinet location only.
END OF SECTION 11 73 10
1.1 SUMMARY

A. Dental Equipment:
   1. Dental Chairs:
   2. X ray cabinets:
END OF SECTION 10 44 13

DENTAL EQUIPMENT
11 74 00 - 2
SECTION 12 21 13

HORIZONTAL LOUVER BLINDS

1.1 QUALITY ASSURANCE

A. Mockups for each form of construction.

1.2 PRODUCTS

A. Horizontal Louver Blinds, Aluminum Slats:
   1. Slat Width: 1 inch (25 mm).
   3. Tilt: Full.
   4. Valance.
   5. Mounting: End.

B. Installation: Between (inside) jamb.

1.3 DEMONSTRATION

A. Factory-authorized service representative to provide training services for adjusting, operating, and maintaining motorized systems.
END OF SECTION
SECTION 12 22 16

CUBICAL CURTAINS AND TRACKS

1.1 SUMMARY

A. Cubicle curtain and track assemblies.

1.2 PRODUCTS

A. Cubical Curtain Track Assembly [CCT-1]:

1. Manufacturer and Product: One of the following:
   a. CS Group General Cubicle, Series 17000.
   b. Comparable product by In-Pro.

2. Description: Manufacturer’s heavy extruded aluminum allow 6063-T4, 1-3/8-inch by 3/4-inch slotted to receive roller carriers.
   a. Corner Bends: 18-inch radius fabricated in one continuous L-shape.
   b. Finish: Clear anodized aluminum.

3. Carriers: Manufacturer’s nylon axle with nylon wheels, complete with nickel-plated brass bead-chain and hook assembly.
END OF SECTION 12 22 00
SECTION 12 24 13
ROLLER WINDOW SHADES

1.1 QUALITY ASSURANCE
   B. Motorized Operators: UL listed.
   C. Comply with WCMA A 100.1.
   D. Mockups for each form of construction.

1.2 PRODUCTS
   A. Shade Band Material: Fiberglass and acrylic blend.
   B. Bottom Hem: Straight.
   C. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube.
   D. Top: Pocket-style headbox with bottom cover.
   E. Shade Type: Audiovisual light blocking.
   F. Shade Operation:
      2. Motorized operator, where indicated.
         a. Motor: 110 V, 60 Hz.
         b. Remote Controls: Rocker-style, group-control wall switch.
   G. Mounting: Recessed in ceiling pocket.
   H. Light seals: Side channels and sill angle.

1.3 INSTALLATION
   A. Factory-authorized representative to provide demonstration services for motorized operating system.

1.4 ROLLER SHADE SCHEDULE
   A. WT-1: Motorized; skylight shade + blackout
   B. WT-2: Manual; skylight shade + blackout
C. **WT-3**: Motorized; skylight shade only

D. **WT-4**: Manual: skylight shade only

**END OF SECTION 12 24 13**
SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

1.1 SUMMARY
A. Plastic-laminate-faced cabinets of stock design.
B. Plastic-laminate countertops.
C. Plastic-laminate wall shelving.

1.2 QUALITY ASSURANCE
A. Quality Standard: AWI, Custom.

1.3 WARRANTY
A. Materials and Workmanship: Five years.

1.4 MATERIALS
B. Core: MDF or Particle Board.

1.5 FABRICATION
A. Low-Emitting Materials: Adhesives and composite wood products contain no urea formaldehyde.
B. Plastic-Laminate-Faced Cabinet Construction:
   1. Interior: Plastic laminate.
   2. Drawers: Wood or plywood.
C. Plastic-Laminate-Faced Countertop Construction:
   1. Core: MDF or water-resistant particle board.
D. Hardware:
   3. Label holders.
   4. Drawer and door locks.
1.6 PLASTIC LAMINATE MATERIAL SCHEDULE

A. As indicated in the Interior Building Materials Legend.

END OF SECTION 12 32 00
SECTION 12 36 61

SIMULATED STONE COUNTERTOPS

1.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Front: Built up, straight, slightly eased edge.
B. Backsplash and Endsplash: Eased edge.
C. Countertops: 3/4-inch- (19-mm-) thick, solid surface material.
D. Fabrication: Provide integral sink bowls.

1.2 COUNTERTOP MATERIALS

A. No urea formaldehyde.
B. Low-emitting adhesives and composite wood materials.

1.3 SOLID-SURFACING SCHEDULE

A. **SSM-1A**: Solid Surface Countertop, as indicated in the Interior Building Materials Legend.
B. **SSM-2A**: Solid Surface Integral Bowl, as indicated in the Interior Building Materials Legend.
C. **SSM-3A**: Solid Surface Edge of Window opening, as indicated in the Interior Building Materials Legend.
SIMULATED STONE COUNTERTOPS
12 36 61 - 2
SECTION 14 24 00

HYDRAULIC ELEVATORS

1.1 SUMMARY
   A. Hydraulic patient care elevators.

1.2 QUALITY ASSURANCE
      1. Effective Peak Velocity Acceleration (Av): Less than 0.10 (seismic risk zones 0 and 1).

1.3 WARRANTY
   A. Elevator Work: One year.

1.4 MAINTENANCE SERVICE
   A. Full Maintenance Service: One year.

1.5 COMPONENTS
   A. Pump Units: Mounted on oil tank in steel enclosure.
      1. Motor: Wye-delta or solid-state starting.
   B. Hydraulic Fluid: Biodegradable and fire resistant.
   C. Signal Equipment:
      1. Car Control Stations: Recessed Swing-return type, one per car.
      2. Emergency communication system.
   D. Elevator Description:
      1. Cylinder Type: Conventional, or Hole less, beside the car.
      2. Rated Load: 4000 lb (1818 kg).
      3. Rated Speed: 100 fpm (0.51 m/s).
      4. Power: 480 volt 3 phase
      6. Auxiliary Operations:
a. Battery-powered lowering.
b. Automatic dispatching of loaded car.
c. Nuisance call cancel.

8. Inside Depth: 93 inches.
15. Floor: Prepared to receive porcelain tile.
16. Hoistway Entrances:
   a. Width: 42 inches (1067 mm).
   b. Height: 84 inches (2134 mm).
   c. Type: Single-speed center opening.
   d. Frames: Stainless steel.
   e. Doors: Stainless steel.


END OF SECTION 14 24 00