

BID OF \_\_\_\_\_

**2014**

**PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS**

**FOR**

**THERESA TERRACE NEIGHBORHOOD CENTER**

**CONTRACT NO. 7385**

**PROJECT NO. 53W1808**

**IN**

**MADISON, DANE COUNTY, WISCONSIN**

AWARDED BY THE COMMON COUNCIL  
MADISON, WISCONSIN ON \_\_\_\_\_

CITY ENGINEERING DIVISION  
1600 EMIL STREET  
MADISON, WISCONSIN 53713

<https://bidexpress.com/login>

**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

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This Proposal, and Agreement have  
been prepared by:

**CITY ENGINEERING DIVISION  
CITY OF MADISON  
MADISON, DANE COUNTY, WISCONSIN**



Robert F. Phillips, P.E., City Engineer

RFP: jw

# SECTION A: ADVERTISEMENT FOR BIDS AND INSTRUCTIONS TO BIDDERS

## REQUEST FOR BID FOR PUBLIC WORKS CONSTRUCTION CITY OF MADISON, WISCONSIN

### A BEST VALUE CONTRACTING MUNICIPALITY

PROJECT NAME:	THERESA TERRACE NEIGHBORHOOD CENTER
CONTRACT NO.:	7385
SBE GOAL	10%
BID BOND	5%
PRE BID MEETING (1:00 P.M.)	AUGUST 29, 2014
PREQUALIFICATION APPLICATION DUE (1:00 P.M)	AUGUST 29, 2014
BID SUBMISSION (1:00 P.M.)	SEPTEMBER 5, 2014
BID OPEN (1:30 P.M.)	SEPTEMBER 5, 2014
PUBLISHED IN WSJ	8/22/14 & 8/29/14

PRE BID MEETING: Representatives of the Affirmative Action Department will be present to discuss the Small Business Enterprise requirements at 1600 Emil Street, Madison Wisconsin.

PREQUALIFICATION APPLICATION: Forms are available on our website, [www.cityofmadison.com/business/pw/forms.cfm](http://www.cityofmadison.com/business/pw/forms.cfm). If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable.

BIDS TO BE SUBMITTED by hand to 1600 EMIL ST., MADISON, WI 53713 or online at [www.bidexpress.com](http://www.bidexpress.com).

THE BID OPENING is at 1600 EMIL ST., MADISON, WI 53713.

#### STANDARD SPECIFICATIONS

The City of Madison's Standard Specifications for Public Works Construction - 2014 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website, [www.cityofmadison.com/Business/PW/specs.cfm](http://www.cityofmadison.com/Business/PW/specs.cfm).

The Contractor shall review these Specifications prior to preparation of proposals for the work to be done under this contract, with specific attention to Article 102, "BIDDING REQUIREMENTS AND CONDITIONS" and Article 103, "AWARD AND EXECUTION OF THE CONTRACT." For the convenience of the bidder, below are highlights of three subsections of the specifications.

#### SECTION 102.1: PRE-QUALIFICATION OF BIDDERS

In accordance with Wisconsin State Statutes 66.0901 (2) and (3), all bidders must submit to the Board of Public Works proof of responsibility on forms furnished by the City. The City requires that all bidders be qualified on a biennial basis.

Bidders must present satisfactory evidence that they have been regularly engaged in the type of work specified herein and they are fully prepared with necessary capital, materials, machinery and supervisory personnel to conduct the work to be contracted for to the satisfaction of the City. All bidders must be pre-

qualified by the Board of Public Works for the type of construction on which they are bidding prior to the opening of the bid.

In accordance with Section 39.02(9)(a)l. of the General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms.

The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

#### SECTION 102.4 PROPOSAL

No bid will be accepted that does not contain an adequate or reasonable price for each and every item named in the Schedule of Unit Prices.

A lump sum bid for the work in accordance with the plans and specifications is required. The lump sum bid must be the same as the total amounts bid for the various items and it shall be inserted in the space provided.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of which such corporation was chartered. The required signatures shall in all cases appear in the space provided thereof on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address of the Contractor or submitted electronically through Bid Express ([www.bidexpress.com](http://www.bidexpress.com)). Proposals will be accepted at the location, the time and the date designated in the advertisement. Proposals received after the time and date designated will be returned to the bidder unopened.

The Bidder shall execute the Disclosure of Ownership form. REFER TO SECTION F.

#### SECTION 102.5: BID DEPOSIT (PROPOSAL GUARANTY)

All bids, sealed or electronic, must be accompanied with a Bid Bond equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

#### PREVAILING WAGE RATES

Prevailing Wage Rates may be required and are attached in Section J of the contract. See Special Provisions to determine applicability.

**Bidders for this Contract(s) must be Pre-Qualified for at least one of the following type(s) of construction denoted by an**

Building Demolition

- 101  Asbestos Removal
- 120  House Mover

- 110  Building Demolition

Street, Utility and Site Construction

- 201  Asphalt Paving
- 205  Blasting
- 210  Boring/Pipe Jacking
- 215  Concrete Paving
- 220  Con. Sidewalk/Curb & Gutter/Misc. Flat Work
- 221  Concrete Bases and Other Concrete Work
- 222  Concrete Removal
- 225  Dredging
- 230  Fencing
- 235  Fiber Optic Cable/Conduit Installation
- 240  Grading and Earthwork
- 241  Horizontal Saw Cutting of Sidewalk
- 242  Infrared Seamless Patching
- 245  Landscaping, Maintenance
- 250  Landscaping, Site and Street
- 251  Parking Ramp Maintenance
- 252  Pavement Marking
- 255  Pavement Sealcoating and Crack Sealing
- 260  Petroleum Above/Below Ground Storage Tank Removal/Installation
- 262  Playground Installer
- 265  Retaining Walls, Precast Modular Units

- 270  Retaining Walls, Reinforced Concrete
- 275  Sanitary, Storm Sewer and Water Main Construction
- 276  Sawcutting
- 280  Sewer Lateral Drain Cleaning/Internal TV Insp.
- 285  Sewer Lining
- 290  Sewer Pipe Bursting
- 295  Soil Borings
- 300  Soil Nailing
- 305  Storm & Sanitary Sewer Laterals & Water Svc.
- 310  Street Construction
- 315  Street Lighting
- 318  Tennis Court Resurfacing
- 320  Traffic Signals
- 325  Traffic Signing & Marking
- 332  Tree pruning/removal
- 333  Tree, pesticide treatment of
- 335  Trucking
- 340  Utility Transmission Lines including Natural Gas, Electrical & Communications
- 399  Other \_\_\_\_\_

Bridge Construction

- 501  Bridge Construction and/or Repair

Building Construction

- 401  Floor Covering (including carpet, ceramic tile installation, rubber, VCT)
- 402  Building Automation Systems
- 403  Concrete
- 404  Doors and Windows
- 405  Electrical - Power, Lighting & Communications
- 410  Elevator - Lifts
- 412  Fire Suppression
- 413  Furnishings - Furniture and Window Treatments
- 415  General Building Construction, Equal or Less than \$250,000
- 420  General Building Construction, \$250,000 to \$1,500,000
- 425  General Building Construction, Over \$1,500,000
- 428  Glass and/or Glazing
- 429  Hazardous Material Removal
- 430  Heating, Ventilating and Air Conditioning (HVAC)
- 433  Insulation - Thermal
- 435  Masonry/Tuck pointing

- 437  Metals
- 440  Painting and Wallcovering
- 445  Plumbing
- 450  Pump Repair
- 455  Pump Systems
- 460  Roofing and Moisture Protection
- 464  Tower Crane Operator
- 461  Solar Photovoltaic/Hot Water Systems
- 465  Soil/Groundwater Remediation
- 466  Warning Sirens
- 470  Water Supply Elevated Tanks
- 475  Water Supply Wells
- 480  Wood, Plastics & Composites - Structural & Architectural
- 499  Other \_\_\_\_\_

State of Wisconsin Certifications

- 1  Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.
- 2  Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.
- 3  Class 7 Blaster - Blasting Operations and Activities for structures greater than 15 ' in height, bridges, towers, and any of the objects or purposes listed as "Class 5 Blaster or Class 6 Blaster".
- 4  Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)
- 5  Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: [www.dhs.wisconsin.gov/Asbestos/Cert](http://www.dhs.wisconsin.gov/Asbestos/Cert). State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.
- 6  Certification number as a Certified Arborist or Certified Tree Worker as administered by the International Society of Arboriculture
- 7  Pesticide application (Certification for Commercial Applicator For Hire with the certification in the category of turf and landscape (3.0) and possess a current license issued by the DATCP)
- 8  State of Wisconsin Master Plumbers License.

## SECTION B: PROPOSAL

Please refer to the  
Bid Express Website  
at <https://bidexpress.com>  
look up contract number  
and go to  
Section B: Proposal Page

You can access all City of Madison bid solicitations for FREE at [www.bidexpress.com](http://www.bidexpress.com)

Click on the "Register for Free" button and follow the instructions to register your company and yourself. You will be asked for a payment subscription preference, since you may wish to bid online someday. Simply choose the method to pay on a 'per bid' basis. This requires no payment until / unless you actually bid online. You can also choose the monthly subscription plan at this time. You will, however, be asked to provide payment information. Remember, you can change your preference at anytime. You will then be able to complete your free registration and have full access to the site. Your free access does not require completion of the 'Digital ID' process, so you will have instant access for viewing and downloading. To be prepared in case you ever do wish to bid online, you may wish to establish your digital ID also, since you cannot bid without a Digital ID.

If you have any problems with the free registration process, you can call the bidexpress help team, toll free at 1-888-352-2439 (option 1, option1).

## **SECTION C: SMALL BUSINESS ENTERPRISE**

### **Instructions to Bidders City of Madison SBE Program Information**

#### **2 Small Business Enterprise (SBE) Program Information**

##### **2.1 Policy and Goal**

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The bidder acknowledges that its bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to the "ADVERTISEMENT FOR BIDS" for the goal for the utilization of SBEs on this project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this project. In the event that the bidder is unable to achieve the SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the bidder being deemed a non-responsible contractor ineligible for award of this contract.

A bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total base bid proposed by the Contractor. The total base bid price is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

## **2.2 Contract Compliance**

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

## 2.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 2.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at [www.cityofmadison.com/dcr/aaTBDir.cfm](http://www.cityofmadison.com/dcr/aaTBDir.cfm).

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 2.2 or you may access the Targeted Business Certification Application online at [www.cityofmadison.com/dcr/aaTBDir.cfm](http://www.cityofmadison.com/dcr/aaTBDir.cfm). Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this project.

## 2.4 Small Business Enterprise Compliance Report

### 2.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

- 2.4.1.1 Attendance at the pre-bid meeting.
- 2.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.
- 2.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.
- 2.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.
- 2.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.
- 2.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.
- 2.4.1.7 Providing SBEs with specific information regarding the work to be performed.
- 2.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.
- 2.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest bidder), although not necessarily low.
- 2.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.

### 2.4.2 Reporting SBE Utilization and Good Faith Efforts

The Small Business Enterprise Compliance Report is to be submitted by the bidder with the bid: This report is due by the specified bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below

shall be deemed non-responsible and the bidder ineligible for award of this contract.

2.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.1.1 **Cover Page**, Page C-6; and

2.4.2.1.2 **Summary Sheet**, C-7.

2.4.2.2 If the bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.2.1 **Cover Page**, Page C-6;

2.4.2.2.2 **Summary Sheet**, C-7; and

2.4.2.2.3 **SBE Contact Report**, C-8 and C-9. (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

## 2.5 Appeal Procedure

A bidder which does not achieve the established goal and is deemed non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may, within 72 hours of receiving such notification, appeal that decision to a special appeals committee composed of three (3) members of the Affirmative Action Commission, three (3) members of the Board of Public Works and a seventh member appointed by the Mayor. All appeals must be made in writing to the City Engineer and received within 72 hours of City of Madison's notice. Postmark not applicable.

## 2.6 SBE Requirements After Award of the Contract

The successful bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the project to ensure that the actual percentage commitment to SBE firms is carried out.

## **2.7 SBE Definition and Eligibility Guidelines**

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

- A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.
- B. A business that has averaged no more than \$4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of \$1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

**Small Business Enterprise Compliance Report**

**This information may be submitted electronically through  
Bid Express or submitted with bid in sealed envelope.**

**Cover Sheet**

Prime Bidder Information

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Fax Number: \_\_\_\_\_

Contact Person/Title: \_\_\_\_\_

Prime Bidder Certification

I, \_\_\_\_\_, \_\_\_\_\_ of  
Name Title

\_\_\_\_\_ certify that the information  
Company

contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.

\_\_\_\_\_  
Witness' Signature

\_\_\_\_\_  
Bidder's Signature

\_\_\_\_\_  
Date



**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

**Small Business Enterprise Compliance Report**

**SBE Contact Report**

Submit separate copy of this form for each SBE which you are not able to utilize towards meeting the SBE goal for this project. Attach separate sheets if necessary.

SBE Information

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Contact Person/Title: \_\_\_\_\_

1. Outline below all efforts to solicit a bid from the above SBE. Include date, means of contact, who from your company made this contact and the result.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Describe the information provided to the aforementioned SBE regarding the scope of work for which he/she was to provide a bid.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Is this the same scope of work on which the subcontractor you intend to utilize based his/her bid?

Yes     No

3. Did this SBE submit a bid?     Yes     No

4. Is the General Contractor pre-qualified to self-perform this category of work?

Yes     No

5. If you responded "Yes" to Question 3, please check the items below which apply and provide the requested detail. If you responded "No" to Question 3, please skip ahead to item 6 below.

The SBE listed above is unavailable for work on this project for the following reasons. Provide specific detail for this conclusion.

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The SBE listed above is unqualified for work on this project. Provide specific details for this conclusion.

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The SBE listed above provided a price that was unreasonable (i.e. more than 5% above the lowest bidder). Provide specific detail for this conclusion including the SBE's price and the price of the subcontractor you intend to utilize.

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A contract with the SBE listed above may constitute a breach of the bidder's collective bargaining agreements. Provide specific detail for this conclusion including, but not limited to, correspondence from the SBE indicating it will not sign a project labor agreement and/or correspondence from the applicable trade union indicating a project labor agreement will not be allowed at the time of project bidding.

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Other; please specify reason(s) other than listed above which made it impossible for you to utilize this SBE on this project.

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6. Describe any other good faith efforts:

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**SECTION D: SPECIAL PROVISIONS**  
**THERESA TERRACE NEIGHBORHOOD CENTER**  
**CONTRACT NO. 7385**

It is the intent of these Special Provisions to set forth the final contractual intent as to the matter involved and shall prevail over the Standard Specifications and plans whenever in conflict therewith. In order that comparisons between the Special Provisions can be readily made, the numbering system for the Special Provisions is equivalent to that of the Specifications.

Whenever in these Specifications the term "Standard Specifications" appears, it shall be taken to refer to the City of Madison Standard Specifications for Public Works Construction and Supplements thereto.

**SECTION 102.10: PREVAILING WAGE**

For this project, payment of prevailing wages (white sheet) shall be required unless the box indicating prevailing wages are not required is checked below.

Prevailing wages shall not be required when this box is checked.

If prevailing wages (white sheets) are required, the wages and benefits paid on the contract shall not be less than those specified in the Prevailing Wage Determination included with these contract documents for the following types of work:

- Building or Heavy Construction
- Sewer, Water, or Tunnel Construction
- Local Street or Miscellaneous Paving Construction
- Residential or Agricultural Construction

When two or more boxes are checked, certain workers may be paid different wages during the course of the contract, depending on the type of work performed at a given time. It is the responsibility of the Contractor to determine and apply the appropriate wage rate for the specific work assigned.

**SECTION 102.12: BEST VALUE CONTRACTING**

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than \$54,000 for a single trade contract; or equal to or greater than \$264,500 for a multi-trade contract pursuant to MGO 33.07(7).

**SECTION 103.2: AWARD OF CONTRACT**

This bid consists of a Base Bid and three (3) Alternate Bid items. The contractor must completely fill in the lumps sum for the Base Bid and the lumps sum for each of the three (3) Alternate Bid items.

The contract shall be awarded to the lowest bidding contractor in the following manner:

1. The City will establish a Construction Budget Dollar Value for the overall project.
2. The City will award the contract based on the sub totals of the Base Bid plus Alternate Bid one (1) and Alternate Bid two (2) until the sub total exceeds the predetermined Construction Budget Dollar Value.

The City shall have the right to proceed or not proceed with any alternate regardless of how the bid was awarded. The City shall have the right to reject all bids regardless of the value of the bids submitted.

## **SECTION 104: SCOPE OF WORK**

The project is for the construction of a new 1-story building, including site development work, for Theresa Terrace Neighborhood Center located at 1409-1411 Theresa Terrace in Madison, Wisconsin. The neighborhood center will have activity rooms, toilet rooms, an office, kitchen, and storage room spaces. The area of this building is around 1,773 square feet.

The intent of the plans and specifications is to provide for the construction, execution and completion of a complete work of improvements, which the contractor undertakes to do in full compliance with the plans, specifications, and contract.

The Contractor shall not scale drawings for exact dimensions.

Bidders are encouraged to visit the site prior to bidding, to become familiar with and verify existing job conditions.

Work shall comply with all applicable codes and regulations.

The work: shall be performed by tradesmen skilled in the area of work included in this contract; shall be of professional quality; and shall be completed according to the best practice of the trade.

Workers shall be knowledgeable with regard to products used and shall take appropriate precautions required to safeguard health and safety.

### General Considerations:

The Contractor shall supply portable toilet facilities for the construction workers as needed.

The Contractor shall supply temporary potable water for construction and other purposes until the permanent water supply system is accepted and in operation.

The Contractor shall provide temporary power to the new construction area. Portable generators shall be located to minimize impacts to adjacent neighbors, must comply with noise Ordinance requirements, and cannot be running prior to 7:00 am or after 7:00 pm.

Permanent electrical distribution system, wiring, fixtures, and outlets shall not be used for temporary light and power without the approval of the Architect.

The Contractor shall furnish lamps and extension cords as required for their work.

The Contractor shall provide and maintain temporary floor and equipment supports, ramps, bridges, etc., as required to permit full and safe use of building during construction and remove such temporary work as soon as possible.

All fabric or plastic films used for temporary enclosures shall be certified as conforming to the requirements of Test Method #2 contained in NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

For Bidding Purposes, questions pertaining to this project shall be directed to:

Peter Rott, A.I.A.  
Isthmus Architecture, Inc.  
613 Williamson Street, Suite 203  
Madison, Wisconsin 53703  
Phone: (608) 310-5362  
[rott@is-arch.com](mailto:rott@is-arch.com)

**OR**

James Whitney, A.I.A.  
City of Madison  
Dept. of Public Works, Engineering Division  
City-County Building, Room 115  
210 Martin Luther King Jr. Blvd.  
Madison, WI 53703  
(608) 266-4563  
[jwhitney@cityofmadison.com](mailto:jwhitney@cityofmadison.com)

The Bid Proposal is set up such that the building is bid lump sum as a complete unit including closely related items on the exterior perimeter of the building or attached to the building.

#### **105.12 COOPERATION BY CONTRACTOR**

The Contractor shall coordinate their work to allow access to other utility companies to install new facilities to serve the building and resolve any conflicts that may arise.

#### **105.13 ORDER OF COMPLETION**

The Contractor shall schedule a Preconstruction meeting with City staff at least 7 calendar days before starting construction. The Contractor shall provide a schedule for work with a detail of the order of completion.

#### **SECTION 106.1: SOURCE OF SUPPLY AND QUALITY**

Submit shop drawings and product data, drawings, manufacturer specifications, installation instructions, maintenance instructions and general recommendations to the Architect for review. Include data substantiating that materials comply with the specifications.

Submit additional information which may be required under separate sections of these specifications.

The Contractor shall review all submittals and shop drawings for conformity with the contract documents and shall stamp and note their review and approval by initialing document prior to submitting.

Materials and equipment for this project shall be from items specified or items approved as equal, in writing, by the Architect at least five (5) calendar days prior to bid receipt date.

Request for approval of materials or items of equipment as equal to that specified shall be submitted in writing from the Contractor accompanied by data adequate to establish such equality and by citation of at least two (2) situations where such materials and/or items of equipment have been successfully used including references. The Architect's decision as to quality or relative merit of item or substitution shall be final.

Deliver materials to job site and store in a safe area, out of the way of traffic and stored up off ground surface. Protect materials before, during and after delivery to job site. The contractor shall be responsible for damage to construction materials prior to final acceptance of completed contract.

#### **107.1 PUBLIC CONVENIENCE AND SAFETY**

Incidental to the Construction, the Contractor shall provide signage warning of the construction area and construction traffic from the work site.

## **108.2 PERMITS and LICENSING**

The Contractor shall obtain and pay for permits and private utility installation fees for this project unless otherwise provided. It is assumed these costs will include but may not be limited to: electric; telephone; and gas and water service / meter set.

The Contractor shall be responsible for compliance with all required permits including the City of Madison Erosion Control permit and the Wisconsin Department of Natural Resources WRAPP Storm Water NOI permit.

The Contractor shall be responsible for any fines issued due to non-compliance with the project permits.

## **SECTION 109.2: PROSECUTION OF THE WORK**

Construction work must begin within seven (7) calendar days after the date appearing on the mailed notice to do so and shall be carried on at a rate so as to secure full completion within **165 calendar days**, the rate of progress and the time of completion being essential conditions of the Agreement. The fixed, agreed upon, liquidated damages for failure to complete all work within the Contract Time, shall be calculated in accordance with ARTICLE 109 of the Standard Specifications.

The project will have three bid alternates.

Bid Alternate No. 1 shall include special glazing where indicated on the drawings, window schedule, and as specified in Section 08-88-53 – Security Glazing.

Bid Alternate No. 2 shall include resilient sheet flooring as specified in Section 09-65-16 – Resilient Sheet Flooring.

Bid Alternate No. 3 shall include welded wire fences and gates as specified in Section 32-31-16 – Welded Wire Fences and Gates.



# THERESA TERRACE NEIGHBORHOOD CENTER

CITY OF MADISON CONTRACT: 7385

## PROJECT SPECIFICATIONS

06/11/2014

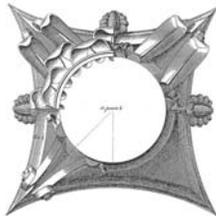
**Prepared by**

**Isthmus Architecture, Inc.**

613 Williamson Street, Suite 203

Madison, WI 53703

(608) 294-0206



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\*\*\*

1 SECTION 01 23 00

2 ALTERNATES

3 PART 1 - GENERAL

4 1.1 SUMMARY

- 5 A. Section includes administrative and procedural requirements for alternates.

6 1.2 DEFINITIONS

- 7 A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined  
8 in the bidding requirements that may be added to or deducted from the base bid amount if  
9 Owner decides to accept a corresponding change either in the amount of construction to be  
10 completed or in the products, materials, equipment, systems, or installation methods described  
11 in the Contract Documents.

- 12 1. Alternates described in this Section are part of the Work only if enumerated in the  
13 Agreement.  
14 2. The cost or credit for each alternate is the net addition to or deduction from the Contract  
15 Sum to incorporate alternate into the Work. No other adjustments are made to the  
16 Contract Sum.

17 1.3 PROCEDURES

- 18 A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work  
19 of the alternate into Project.

- 20 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar  
21 items incidental to or required for a complete installation whether or not indicated as part  
22 of alternate.

- 23 B. Notification: Immediately following award of the Contract, notify each party involved, in  
24 writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or  
25 deferred for later consideration. Include a complete description of negotiated revisions to  
26 alternates.

- 27 C. Execute accepted alternates under the same conditions as other work of the Contract.

- 28 D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections  
29 referenced in schedule contain requirements for materials necessary to achieve the work  
30 described under each alternate.

1 PART 2 - PRODUCTS (Not Used)

2 PART 3 - EXECUTION

3 3.1 SCHEDULE OF ALTERNATES

4 A. Alternate No. 1.

- 5 1. Base Bid: Glazing as specified in Section 08 80 00 – Glazing.
- 6 2. Alternate: Specialty glazing where indicated on drawings, window schedule, and as
- 7 specified in Section 08 88 53 - Security Glazing.
- 8

9 B. Alternate No. 2.

- 10 1. Base Bid: Base Bid: Resilient Floor Tile as specified in Section 09 65 19 - Resilient Floor
- 11 Tile.
- 12 2. Alternate: Resilient Sheet Flooring as specified in Section 09 65 16 - Resilient Sheet
- 13 Flooring.

14 C. Alternate No. 3.

- 15 1. Base Bid: Base Bid: Ornamental Fence and Gates as specified in Section 32 31 15 -
- 16 Ornamental Fence.
- 17 2. Alternate: Welded Wire Fences and Gates as specified in Section 32 31 16 - Welded
- 18 Wire Fences and Gates.

19

20 END OF SECTION

21 \*\*\*



1 PART 2 - PRODUCTS

2 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

3 A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance  
4 data and materials, listing items and their location to facilitate ready access to desired  
5 information. Include a section in the directory for each of the following:

- 6 1. List of documents.
- 7 2. List of systems.
- 8 3. List of equipment.
- 9 4. Table of contents.

10 B. List of Systems and Subsystems: List systems alphabetically. Include references to operation  
11 and maintenance manuals that contain information about each system.

12 C. List of Equipment: List equipment for each system, organized alphabetically by system. For  
13 pieces of equipment not part of system, list alphabetically in separate list.

14 D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance  
15 manual.

16 E. Identification: In the documentation directory and in each operation and maintenance manual,  
17 identify each system, subsystem, and piece of equipment with same designation used in the  
18 Contract Documents. If no designation exists, assign a designation according to  
19 ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building  
20 Systems."

21 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

22 A. Organization: Unless otherwise indicated, organize each manual into a separate section for each  
23 system and subsystem, and a separate section for each piece of equipment not part of a system.  
24 Each manual shall contain the following materials, in the order listed:

- 25 1. Title page.
- 26 2. Table of contents.
- 27 3. Manual contents.

28 B. Title Page: Include the following information:

- 29 1. Subject matter included in manual.
- 30 2. Name and address of Project.
- 31 3. Name and address of Owner.
- 32 4. Date of submittal.
- 33 5. Name and contact information for Contractor.
- 34 6. Name and contact information for Construction Manager.
- 35 7. Name and contact information for Architect.
- 36 8. Name and contact information for Commissioning Authority.

- 1 9. Names and contact information for major consultants to the Architect that designed the
- 2 systems contained in the manuals.
- 3 10. Cross-reference to related systems in other operation and maintenance manuals.
- 4 C. Table of Contents: List each product included in manual, identified by product name, indexed to
- 5 the content of the volume, and cross-referenced to Specification Section number in Project
- 6 Manual.
- 7 1. If operation or maintenance documentation requires more than one volume to
- 8 accommodate data, include comprehensive table of contents for all volumes in each
- 9 volume of the set.
- 10 D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by
- 11 system, subsystem, and equipment. If possible, assemble instructions for subsystems,
- 12 equipment, and components of one system into a single binder.
- 13 E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic
- 14 PDF file for each manual type required.
- 15 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where
- 16 scanning of paper documents is required, configure scanned file for minimum readable
- 17 file size.
- 18 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file
- 19 names. Name document files to correspond to system, subsystem, and equipment names
- 20 used in manual directory and table of contents. Group documents for each system and
- 21 subsystem into individual composite bookmarked files, then create composite manual, so
- 22 that resulting bookmarks reflect the system, subsystem, and equipment names in a readily
- 23 navigated file tree. Configure electronic manual to display bookmark panel on opening
- 24 file.

## 25 2.3 EMERGENCY MANUALS

- 26 A. Content: Organize manual into a separate section for each of the following:
- 27 1. Type of emergency.
- 28 2. Emergency instructions.
- 29 3. Emergency procedures.
- 30 B. Type of Emergency: Where applicable for each type of emergency indicated below, include
- 31 instructions and procedures for each system, subsystem, piece of equipment, and component:
- 32 1. Fire.
- 33 2. Flood.
- 34 3. Gas leak.
- 35 4. Water leak.
- 36 5. Power failure.
- 37 6. Water outage.
- 38 7. System, subsystem, or equipment failure.
- 39 8. Chemical release or spill.

- 1 C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages,  
2 and similar codes and signals. Include responsibilities of Owner's operating personnel for  
3 notification of Installer, supplier, and manufacturer to maintain warranties.
  
- 4 D. Emergency Procedures: Include the following, as applicable:
  - 5 1. Instructions on stopping.
  - 6 2. Shutdown instructions for each type of emergency.
  - 7 3. Operating instructions for conditions outside normal operating limits.
  - 8 4. Required sequences for electric or electronic systems.
  - 9 5. Special operating instructions and procedures.

10 2.4 OPERATION MANUALS

- 11 A. Content: In addition to requirements in this Section, include operation data required in  
12 individual Specification Sections and the following information:
  - 13 1. System, subsystem, and equipment descriptions. Use designations for systems and  
14 equipment indicated on Contract Documents.
  - 15 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 16 3. Operating standards.
  - 17 4. Operating procedures.
  - 18 5. Operating logs.
  - 19 6. Wiring diagrams.
  - 20 7. Control diagrams.
  - 21 8. Piped system diagrams.
  - 22 9. Precautions against improper use.
  - 23 10. License requirements including inspection and renewal dates.
  
- 24 B. Descriptions: Include the following:
  - 25 1. Product name and model number. Use designations for products indicated on Contract  
26 Documents.
  - 27 2. Manufacturer's name.
  - 28 3. Equipment identification with serial number of each component.
  - 29 4. Equipment function.
  - 30 5. Operating characteristics.
  - 31 6. Limiting conditions.
  - 32 7. Performance curves.
  - 33 8. Engineering data and tests.
  - 34 9. Complete nomenclature and number of replacement parts.
  
- 35 C. Operating Procedures: Include the following, as applicable:
  - 36 1. Startup procedures.
  - 37 2. Equipment or system break-in procedures.
  - 38 3. Routine and normal operating instructions.
  - 39 4. Regulation and control procedures.
  - 40 5. Instructions on stopping.
  - 41 6. Normal shutdown instructions.

- 1 7. Seasonal and weekend operating instructions.
- 2 8. Required sequences for electric or electronic systems.
- 3 9. Special operating instructions and procedures.

4 D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as  
5 installed.

6 E. Piped Systems: Diagram piping as installed, and identify color-coding where required for  
7 identification.

## 8 2.5 PRODUCT MAINTENANCE MANUALS

9 A. Content: Organize manual into a separate section for each product, material, and finish. Include  
10 source information, product information, maintenance procedures, repair materials and sources,  
11 and warranties and bonds, as described below.

12 B. Source Information: List each product included in manual, identified by product name and  
13 arranged to match manual's table of contents. For each product, list name, address, and  
14 telephone number of Installer or supplier and maintenance service agent, and cross-reference  
15 Specification Section number and title in Project Manual and drawing or schedule designation  
16 or identifier where applicable.

17 C. Product Information: Include the following, as applicable:

- 18 1. Product name and model number.
- 19 2. Manufacturer's name.
- 20 3. Color, pattern, and texture.
- 21 4. Material and chemical composition.
- 22 5. Reordering information for specially manufactured products.

23 D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

- 24 1. Inspection procedures.
- 25 2. Types of cleaning agents to be used and methods of cleaning.
- 26 3. List of cleaning agents and methods of cleaning detrimental to product.
- 27 4. Schedule for routine cleaning and maintenance.
- 28 5. Repair instructions.

29 E. Repair Materials and Sources: Include lists of materials and local sources of materials and  
30 related services.

31 F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and  
32 conditions that would affect validity of warranties or bonds.

- 33 1. Include procedures to follow and required notifications for warranty claims.

## 34 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

35 A. Content: For each system, subsystem, and piece of equipment not part of a system, include  
36 source information, manufacturers' maintenance documentation, maintenance procedures,

- 1 maintenance and service schedules, spare parts list and source information, maintenance service  
2 contracts, and warranty and bond information, as described below.
- 3 B. Source Information: List each system, subsystem, and piece of equipment included in manual,  
4 identified by product name and arranged to match manual's table of contents. For each product,  
5 list name, address, and telephone number of Installer or supplier and maintenance service agent,  
6 and cross-reference Specification Section number and title in Project Manual and drawing or  
7 schedule designation or identifier where applicable.
- 8 C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation  
9 including the following information for each component part or piece of equipment:
- 10 1. Standard maintenance instructions and bulletins.  
11 2. Drawings, diagrams, and instructions required for maintenance, including disassembly  
12 and component removal, replacement, and assembly.  
13 3. Identification and nomenclature of parts and components.  
14 4. List of items recommended to be stocked as spare parts.
- 15 D. Maintenance Procedures: Include the following information and items that detail essential  
16 maintenance procedures:
- 17 1. Test and inspection instructions.  
18 2. Troubleshooting guide.  
19 3. Precautions against improper maintenance.  
20 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.  
21 5. Aligning, adjusting, and checking instructions.  
22 6. Demonstration and training video recording, if available.
- 23 E. Maintenance and Service Schedules: Include service and lubrication requirements, list of  
24 required lubricants for equipment, and separate schedules for preventive and routine  
25 maintenance and service with standard time allotment.
- 26 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly,  
27 quarterly, semiannual, and annual frequencies.  
28 2. Maintenance and Service Record: Include manufacturers' forms for recording  
29 maintenance.
- 30 F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with  
31 parts identified and cross-referenced to manufacturers' maintenance documentation and local  
32 sources of maintenance materials and related services.
- 33 G. Maintenance Service Contracts: Include copies of maintenance agreements with name and  
34 telephone number of service agent.
- 35 H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and  
36 conditions that would affect validity of warranties or bonds.
- 37 1. Include procedures to follow and required notifications for warranty claims.

1 PART 3 - EXECUTION

2 3.1 MANUAL PREPARATION

3 A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides  
4 an organized reference to emergency, operation, and maintenance manuals.

5 B. Emergency Manual: Assemble a complete set of emergency information indicating procedures  
6 for use by emergency personnel and by Owner's operating personnel for types of emergencies  
7 indicated.

8 C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and  
9 maintenance of each product, material, and finish incorporated into the Work.

10 D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance  
11 data indicating operation and maintenance of each system, subsystem, and piece of equipment  
12 not part of a system.

- 13 1. Engage a factory-authorized service representative to assemble and prepare information  
14 for each system, subsystem, and piece of equipment not part of a system.  
15 2. Prepare a separate manual for each system and subsystem, in the form of an instructional  
16 manual for use by Owner's operating personnel.

17 E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only  
18 sheets pertinent to product or component installed. Mark each sheet to identify each product or  
19 component incorporated into the Work. If data include more than one item in a tabular format,  
20 identify each item using appropriate references from the Contract Documents. Identify data  
21 applicable to the Work and delete references to information not applicable.

- 22 1. Prepare supplementary text if manufacturers' standard printed data are not available and  
23 where the information is necessary for proper operation and maintenance of equipment or  
24 systems.

25 F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the  
26 relationship of component parts of equipment and systems and to illustrate control sequence and  
27 flow diagrams. Coordinate these drawings with information contained in record Drawings to  
28 ensure correct illustration of completed installation.

- 29 1. Do not use original project record documents as part of operation and maintenance  
30 manuals.

31 END OF SECTION  
32



1 1.4 ADMINISTRATIVE REQUIREMENTS

2 A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that  
3 are the responsibility of the Contractor, that depend on product selection or product qualities, or  
4 that depend on Contractor's procedures until the USGBC has made its determination on the  
5 project's LEED certification application. Document responses as informational submittals.

6 1.5 ACTION SUBMITTALS

7 A. General: Submit additional LEED submittals required by other Specification Sections.

8 B. LEED Documentation Submittals:

- 9 1. Credit MR 2: Comply with Section 017419 "Construction Waste Management and  
10 Disposal."
- 11 2. Credit MR 3.1: Receipts for salvaged and refurbished materials used for Project,  
12 indicating sources and costs for salvaged and refurbished materials.
- 13 3. Credit MR 4: Product data and certification letter from product manufacturers indicating  
14 percentages by weight of post-consumer and pre-consumer recycled content for products  
15 having recycled content. Include statement indicating material costs for each product  
16 having recycled content.
- 17 4. Credit MR 5: Product data indicating location of material manufacturer for regionally  
18 manufactured materials. Include statement indicating cost for each regionally  
19 manufactured material.
  - 20 a. Include statement indicating distance from manufacturer to Project for each  
21 regionally manufactured material.
  - 22 b. Include statement indicating location of and distance from Project to point of  
23 extraction, harvest, or recovery for each raw material used in regionally extracted  
24 and manufactured materials.
- 25 5. Credit MR 7: Product data and chain-of-custody certificates for products containing  
26 certified wood. Include statement indicating cost for each certified wood product.
- 27 6. Credit IEQ 3.1:
  - 28 a. Product data for temporary filtration media.
  - 29 b. Product data for filtration media used during occupancy.
  - 30 c. Construction Documentation: Six photographs at three different times during the  
31 construction period, along with a brief description of the SMACNA approach  
32 employed, documenting implementation of the indoor-air-quality management  
33 measures, such as protection of ducts and on-site stored or installed absorptive  
34 materials.
- 35 7. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing  
36 system indicating VOC content of each product used.
- 37 8. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing  
38 system indicating VOC content of each product used.
- 39 9. Credit IEQ 4.4: Product data for products containing composite wood or agrifiber  
40 products or wood glues indicating that they do not contain urea-formaldehyde resin.

1 PART 2 - PRODUCTS

2 2.1 MATERIALS, GENERAL

3 A. Provide products and procedures necessary to obtain LEED credits required in this Section.  
4 Although other Sections may specify some requirements that contribute to LEED credits, the  
5 Contractor shall determine additional materials and procedures necessary to obtain LEED  
6 credits indicated.

7 2.2 RECYCLED CONTENT OF MATERIALS

8 A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled  
9 content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 10  
10 percent of cost of materials used for Project.

- 11 1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content  
12 of an item shall be determined by dividing weight of post-consumer recycled content plus  
13 one-half of pre-consumer recycled content in the item by total weight of the item and  
14 multiplying by cost of the item.  
15 2. Do not include plumbing, mechanical and electrical components, and specialty items  
16 such as elevators and equipment in the calculation.

17 2.3 REGIONAL MATERIALS

18 A. Credit MR 5, Option 2: Not less than 10 percent of materials (by cost) shall be regionally  
19 extracted and manufactured materials.

20 2.4 CERTIFIED WOOD

21 A. Credit MR 7: Not less than 50 percent (by cost) of wood-based materials shall be produced from  
22 wood obtained from forests certified by an FSC-accredited certification body to comply with  
23 FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- 24 1. Wood-based materials include, but are not limited to, the following materials when made  
25 from wood, engineered wood products, or wood-based panel products:  
26 a. Finish carpentry.  
27 b. Architectural woodwork.  
28 c. Wood cabinets.  
29 d. Furniture.

30 2.5 LOW-EMITTING MATERIALS

31 A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and  
32 sealants shall comply with the following VOC content limits when calculated according to  
33 40 CFR 59, Subpart D (EPA Method 24):

- 34 1. Wood Glues: 30 g/L.

- 1           2.     Metal-to-Metal Adhesives: 30 g/L.
- 2           3.     Adhesives for Porous Materials (Except Wood): 50 g/L.
- 3           4.     Subfloor Adhesives: 50 g/L.
- 4           5.     Plastic Foam Adhesives: 50 g/L.
- 5           6.     Carpet Adhesives: 50 g/L.
- 6           7.     Carpet Pad Adhesives: 50 g/L.
- 7           8.     VCT and Asphalt Tile Adhesives: 50 g/L.
- 8           9.     Cove Base Adhesives: 50 g/L.
- 9           10.    Gypsum Board and Panel Adhesives: 50 g/L.
- 10          11.    Rubber Floor Adhesives: 60 g/L.
- 11          12.    Ceramic Tile Adhesives: 65 g/L.
- 12          13.    Fiberglass Adhesives: 80 g/L.
- 13          14.    Contact Adhesive: 80 g/L.
- 14          15.    Plastic Cement Welding Compounds: 250 g/L.
- 15          16.    ABS Welding Compounds: 325 g/L.
- 16          17.    CPVC Welding Compounds: 490 g/L.
- 17          18.    PVC Welding Compounds: 510 g/L.
- 18          19.    Adhesive Primer for Plastic: 550 g/L.
- 19          20.    Sheet-Applied Rubber Lining Adhesive: 850 g/L.
- 20          21.    Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
- 21          22.    Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
- 22          23.    Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
- 23          24.    Other Adhesives: 250 g/L.
- 24          25.    Architectural Sealants: 250 g/L.
- 25          26.    Nonmembrane Roof Sealants: 300 g/L.
- 26          27.    Single-Ply Roof Membrane Sealants: 450 g/L.
- 27          28.    Other Sealants: 420 g/L.
- 28          29.    Sealant Primers for Nonporous Substrates: 250 g/L.
- 29          30.    Sealant Primers for Porous Substrates: 775 g/L.
- 30          31.    Modified Bituminous Sealant Primers: 500 g/L.
- 31          32.    Other Sealant Primers: 750 g/L.
  
- 32         B.     Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and
   
33            coatings shall comply with the following VOC content limits when calculated according to
   
34            40 CFR 59, Subpart D (EPA Method 24):
   
  
  
35            1.     Flat Paints and Coatings: VOC not more than 50 g/L.
   
36            2.     Nonflat Paints and Coatings: VOC not more than 150 g/L.
   
37            3.     Dry-Fog Coatings: VOC not more than 400 g/L.
   
38            4.     Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
   
39            5.     Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than
   
40            250 g/L.
   
41            6.     Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
   
42            7.     Pretreatment Wash Primers: VOC not more than 420 g/L.
   
43            8.     Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
   
44            9.     Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
   
45            10.    Floor Coatings: VOC not more than 100 g/L.
   
46            11.    Shellacs, Clear: VOC not more than 730 g/L.
   
47            12.    Shellacs, Pigmented: VOC not more than 550 g/L.
   
48            13.    Stains: VOC not more than 250 g/L.

1 C. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-  
2 formaldehyde resin.

3 PART 3 - EXECUTION

4 3.1 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

5 A. Credit IEQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings  
6 under Construction."

- 7 1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during  
8 construction period as specified in Section 015000 "Temporary Facilities and Controls,"  
9 install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet  
10 for the air-handling system used during construction.  
11 2. Replace all air filters immediately prior to occupancy.

12 END OF SECTION



- 28 B. Properties immediately adjacent to demolition area will be occupied. Conduct building  
29 demolition so operations of occupied buildings will not be disrupted.
- 30 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent  
31 occupied buildings.  
32 2. Maintain access to existing walkways, exits, and other facilities used by occupants of  
33 adjacent buildings.
- 34 a. Do not close or obstruct walkways, exits, or other facilities used by occupants of  
35 adjacent buildings without written permission from authorities having jurisdiction.
- 36 C. Owner assumes no responsibility for buildings and structures to be demolished.
- 37 1. Conditions existing at time of inspection for bidding purpose will be maintained by  
38 Owner as far as practical.
- 39 D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the  
40 Work.
- 41 1. *Hazardous materials will be removed by Owner before start of the Work.*  
42 2. *If materials suspected of containing hazardous materials are encountered, do not disturb;  
43 immediately notify Architect and Owner. Hazardous materials will be removed by Owner  
44 under a separate contract.*
- 45 E. On-site storage or sale of removed items or materials is not permitted.
- 46 F. Arrange demolition schedule so as not to interfere with operations of adjacent occupied  
47 buildings.

48 PART 2 - PRODUCTS[ (Not Used)]

49 2.1 SOIL MATERIALS

- 50 A. Satisfactory Soils: Comply with requirements in Section 31 20 00 "Earth Moving."

51 PART 3 - EXECUTION

52 3.1 EXAMINATION

- 53 A. Verify that utilities have been disconnected and capped before starting demolition operations.
- 54 B. Inventory and record the condition of items to be removed and salvaged.
- 55 C. Perform an engineering survey of condition of building to determine whether removing any  
56 element might result in structural deficiency or unplanned collapse of any portion of structure or  
57 adjacent structures during building demolition operations.

58 3.2 PREPARATION

- 59 A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and  
60 regulations of authorities having jurisdiction before starting demolition.
- 61 B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving  
62 buildings and structures to be demolished.
- 63 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
  - 64 2. Arrange to shut off indicated utilities with utility companies.
  - 65 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied  
66 buildings, then provide temporary utilities that bypass buildings and structures to be  
67 demolished and that maintain continuity of service to other buildings and structures.
  - 68 4. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or  
69 plug and seal remaining portion of pipe or conduit after bypassing according to  
70 requirements of authorities having jurisdiction.
  - 71 5. Do not start demolition work until utility disconnecting and sealing have been completed.
- 72 C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural  
73 support to preserve stability and prevent unexpected movement or collapse of construction  
74 being demolished.

75 3.3 PROTECTION

- 76 A. Existing Facilities: Protect adjacent walkways, building entries, and other building facilities  
77 during demolition operations. Maintain exits from existing buildings.
- 78 B. Existing Utilities: Maintain utility services to remain and protect from damage during  
79 demolition operations. Do not interrupt existing utilities serving adjacent occupied or operating  
80 facilities unless authorized in writing by Owner and authorities having jurisdiction.
- 81 C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and  
82 covered passageways, where required by authorities having jurisdiction.
- 83 1. Protect adjacent buildings and facilities from damage due to demolition activities.
  - 84 2. Protect existing building foundation to be re-used.
  - 85 3. Provide temporary barricades and other protection required to prevent injury to people  
86 and damage to adjacent buildings.
  - 87 4. Protect walls and other adjacent exterior construction that are to remain and that are  
88 exposed to building demolition operations.
  - 89 5. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and  
90 dirt migration to occupied portions of adjacent buildings.
- 91 D. Remove temporary barriers and protections where hazards no longer exist. Where open  
92 excavations or other hazardous conditions remain, leave temporary barriers and protections in  
93 place.

94 3.4 DEMOLITION

95 A. General: Demolish indicated buildings and noted site improvements completely. Use methods  
96 required to complete the Work within limitations of governing regulations.

97 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain  
98 portable fire-suppression devices during flame-cutting operations.

99 2. Maintain adequate ventilation when using cutting torches.

100 3. Locate building demolition equipment and remove debris and materials so as not to  
101 impose excessive loads on supporting walls, floors, or framing.

102 B. Site Access and Temporary Controls: Conduct building demolition and debris-removal  
103 operations to ensure minimum interference with roads, streets, walks, walkways, and other  
104 adjacent occupied and used facilities.

105 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used  
106 facilities without permission from Owner and authorities having jurisdiction. Provide  
107 alternate routes around closed or obstructed traffic ways if required by authorities having  
108 jurisdiction.

109 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with  
110 governing environmental-protection regulations.

111 C. Explosives: Use of explosives is not permitted.

112 D. Proceed with demolition of structural framing members systematically, from higher to lower  
113 level. Complete building demolition operations above each floor or tier before disturbing  
114 supporting members on the next lower level.

115 E. Salvage foundation walls and other below-grade construction within footprint of new  
116 construction.

117 F. Existing Utilities: Terminate existing utilities and below-grade utility structures within 5 feet  
118 (1.5 m) outside footprint indicated for new construction.

119 G. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building  
120 demolition operations according to backfill requirements in Section 31 20 00 "Earth Moving."

121 H. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free  
122 from irregular surface changes. Provide a smooth transition between adjacent existing grades  
123 and new grades.

124 I. Promptly repair damage to adjacent buildings caused by demolition operations.

125 3.5 RECYCLE RE-USE PLAN

126 A. The recycling and reuse plan shall be as follows:  
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128 1) **Contractor and Deconstruction Manager** shall meet with Habitat for Humanity  
129 ReStore (608-712-0737) to identify items such as wood flooring, cabinets or other  
130 materials that the ReStore can remove for resale.

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Contractor will submit a written list of salvageable materials that ReStore can take, include the list to the Architect, Owner and City Recycle Coordinator prior. If there are no reusable items, a written statement will be submitted verifying this.

- If contractor plans to deconstruct building to remove for reuse as many items as possible for later use of resale, Contractor will include a written list of those items as part of the plan.

2) **Appliance Recycling;** Appliances, HVAC equipment and water heaters will be recycled per law. Appliances containing CFC's will be recycled once a licensed contractor has removed the CFC's.

The recycling plan shall include proposal for appliance recycling and CFC recovery if needed.

3) **Mercury Recovery/Recycling;** The plan shall include a plan for handling all mercury thermostats and fluorescent light bulbs and/or tubes. These items are banned from the landfill by federal regulations.

4) **Mixed Loads of Construction and Demolition Debris:** The plan will clearly describe the amount and types of mixed debris to be removed per law.

5) **Concrete/Asphalt Recycling;** The south driveway and part of the concrete foundation will be demolished.

Asphalt and concrete recyclers: Wingra Stone (608-271-5555), Speedway Sand and Gravel (836-1071), Mandt Sandfill (608-835-3630) or Northwestern Stone (608-836-1701).

Asphalt Recyclers: DRS (836-6667) and Payne and Dolan (845-8900).

6) **Metal Recycling;** The recycling plan shall divert as much metal as possible from the landfill. Metal includes all ductwork, rain gutters and downspouts, siding, storm windows and doors.

Recyclers: Contact Alter Recycling (608-241-1517), Resource Solutions (608-244-5451) or All Metal Recycling (608-255-0960)

7) **Shingle Recycling;** Shingles shall be recycled.

Recyclers: Contact , Royal Container & Recycling Service (608-221-1919), or Dane County Transfer Station (608-838-9555)

8) **Clean Wood;** All clean wood shall be recycled.

Recyclers: Royal Container & Recycling Service (608-221-1919); City of Madison Transfer Station (608-266-4911), Dane County Transfer Station (608-838-9555)

9) **Compliance Report:**

Contractor shall submit, within 60 days of the completion of the demolition project, a compliance report including information on the material that was reused and the volume of material that was recycled and landfilled. Substantiating documentation on

182 where recycled material was sent will be included in the form of sending copies or  
183 receipts and/or weight tickets.

184 3.6 CLEANING

185 A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-  
186 approved landfill acceptable to authorities having jurisdiction.

187 B. Do not burn demolished materials.

188 C. Clean adjacent structures and improvements of dust, dirt, and debris caused by building  
189 demolition operations. Return adjacent areas to condition existing before building demolition  
190 operations began.

191 **END OF SECTION**



- 30 1.4 QUALITY ASSURANCE
- 31 A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete  
32 products and that complies with ASTM C 94/C 94M requirements for production facilities and  
33 equipment.
- 34 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete  
35 Production Facilities."
- 36 B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077  
37 and ASTM E 329 for testing indicated.
- 38 C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M,  
39 "Structural Welding Code - Reinforcing Steel."
- 40 D. ACI Publications: Comply with the following unless modified by requirements in the Contract  
41 Documents:
- 42 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.  
43 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- 44 E. Concrete Testing Service: Engage a qualified independent testing agency to perform material  
45 evaluation tests and to design concrete mixtures.

46 PART 2 - PRODUCTS

47 2.1 FORM-FACING MATERIALS

- 48 A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and  
49 smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- 50 B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material.  
51 Provide lumber dressed on at least two edges and one side for tight fit.

52 2.2 STEEL REINFORCEMENT

- 53 A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of  
54 preconsumer recycled content not less than 25 percent.
- 55 B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- 56 1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I zinc coated after  
57 fabrication and bending.
- 58 2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2  
59 percent damaged coating in each 12-inch (300-mm) bar length.
- 60 C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-  
61 drawn steel wire into flat sheets.

- 62 D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- 63 E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening  
64 reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel  
65 wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

## 66 2.3 CONCRETE MATERIALS

- 67 A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and  
68 source, throughout Project:

- 69 1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:
- 70 a. Fly Ash: ASTM C 618, Class F.
- 71 b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

- 72 B. Normal-Weight Aggregates: ASTM C 33, graded.

- 73 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
- 74 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- 75 C. Water: ASTM C 94/C 94M and potable.

## 76 2.4 ADMIXTURES

- 77 A. Air-Entraining Admixture: ASTM C 260.

- 78 B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with  
79 other admixtures and that will not contribute water-soluble chloride ions exceeding those  
80 permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium  
81 chloride.

- 82 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- 83 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
- 84 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- 85 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- 86 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
- 87 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 88 2.5 WATERSTOPS

- 89 A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding  
90 in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections,  
91 and directional changes.

- 92 2.6 VAPOR RETARDERS
- 93 A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive  
94 or pressure-sensitive tape.
- 95 B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm)  
96 thick.
- 97 2.7 CURING MATERIALS
- 98 A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application  
99 to fresh concrete.
- 100 B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing  
101 approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- 102 C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- 103 D. Water: Potable.
- 104 E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B,  
105 dissipating.
- 106 F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B,  
107 nondissipating, certified by curing compound manufacturer to not interfere with bonding of  
108 floor covering.
- 109 G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315,  
110 Type 1, Class A.
- 111 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or  
112 less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 113 H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315,  
114 Type 1, Class A.
- 115 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or  
116 less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 117 2.8 RELATED MATERIALS
- 118 A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- 119 2.9 CONCRETE MIXTURES
- 120 A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of  
121 laboratory trial mixture or field test data, or both, according to ACI 301.

- 122 B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica  
123 fume as needed to reduce the total amount of portland cement, which would otherwise be used,  
124 by not less than 40 percent.
- 125 C. Admixtures: Use admixtures according to manufacturer's written instructions.
- 126 D. Proportion normal-weight concrete mixture as follows:
- 127 1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
  - 128 2. Maximum Water-Cementitious Materials Ratio: 0.50.
  - 129 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
  - 130 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-  
131 mm) nominal maximum aggregate size.
  - 132 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm)  
133 nominal maximum aggregate size.
  - 134 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- 135 E. Proportion structural lightweight concrete mixture as follows:
- 136 1. Minimum Compressive Strength: [**5000 psi (34.5 MPa)**] [**4500 psi (31 MPa)**] [**4000 psi**  
137 **(27.6 MPa)**] [**3500 psi (24.1 MPa)**] [**3000 psi (20.7 MPa)**] <Insert strength> at 28  
138 days.
  - 139 2. Calculated Equilibrium Unit Weight: [**115 lb/cu. ft. (1842 kg/cu. m)**] [**110 lb/cu. ft.**  
140 **(1762 kg/cu. m)**] [**105 lb/cu. ft. (1682 kg/cu. m)**], plus or minus 3 lb/cu. ft. (48.1 kg/cu.  
141 m) as determined by ASTM C 567.
  - 142 3. Slump Limit: [**4 inches (100 mm)**] [**5 inches (125 mm)**], plus or minus 1 inch (25 mm).
  - 143 4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum  
144 aggregate size greater than **3/8 inch (10 mm)**.
  - 145 5. Air Content: 7 percent, plus or minus 2 percent at point of delivery for nominal maximum  
146 aggregate size **3/8 inch (10 mm)** or less.
  - 147 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
  - 148 7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's  
149 recommended rate, but not less than [**1.0 lb/cu. yd. (0.60 kg/cu. m)**] [**1.5 lb/cu. yd. (0.90**  
150 **kg/cu. m)**] <Insert dosage>.

## 151 2.10 FABRICATING REINFORCEMENT

- 152 A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 153 2.11 CONCRETE MIXING

- 154 A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to  
155 ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
- 156 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and  
157 delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32  
158 deg C), reduce mixing and delivery time to 60 minutes.

159 PART 3 - EXECUTION

160 3.1 FORMWORK

- 161 A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical,  
162 lateral, static, and dynamic loads, and construction loads that might be applied, until structure  
163 can support such loads.
- 164 B. Construct formwork so concrete members and structures are of size, shape, alignment,  
165 elevation, and position indicated, within tolerance limits of ACI 117.
- 166 C. Do not chamfer exterior corners and edges of permanently exposed concrete.

167 3.2 EMBEDDED ITEMS

- 168 A. Place and secure anchorage devices and other embedded items required for adjoining work that  
169 is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams,  
170 instructions, and directions furnished with items to be embedded.

171 3.3 VAPOR RETARDERS

- 172 A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to  
173 ASTM E 1643 and manufacturer's written instructions.
- 174 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

175 3.4 STEEL REINFORCEMENT

- 176 A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- 177 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before  
178 placing concrete.

179 3.5 JOINTS

- 180 A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- 181 B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations  
182 indicated or as approved by Architect.
- 183 C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning  
184 concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-  
185 fourth of concrete thickness as follows:
- 186 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing  
187 each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints  
188 after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

189 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof  
190 abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete  
191 when cutting action will not tear, abrade, or otherwise damage surface and before  
192 concrete develops random contraction cracks.

193 D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab  
194 junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and  
195 other locations, as indicated.

196 E. Waterstops: Install in construction joints and at other joints indicated according to  
197 manufacturer's written instructions.

### 198 3.6 CONCRETE PLACEMENT

199 A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded  
200 items is complete and that required inspections have been performed.

201 B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new  
202 concrete will be placed on concrete that has hardened enough to cause seams or planes of  
203 weakness. If a section cannot be placed continuously, provide construction joints as indicated.  
204 Deposit concrete to avoid segregation.

205 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

206 C. Cold-Weather Placement: Comply with ACI 306.1.

207 D. Hot-Weather Placement: Comply with ACI 301.

### 208 3.7 FINISHING FORMED SURFACES

209 A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in  
210 an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and  
211 defects. Remove fins and other projections that exceed specified limits on formed-surface  
212 irregularities.

213 1. Apply to concrete surfaces exposed to public view.

214 B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces  
215 adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent  
216 formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent  
217 unformed surfaces unless otherwise indicated.

### 218 3.8 FINISHING FLOORS AND SLABS

219 A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and  
220 finishing operations for concrete surfaces. Do not wet concrete surfaces.

221 B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by  
222 hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of

223 trowel marks and uniform in texture and appearance. Grind smooth any surface defects that  
224 would telegraph through applied coatings or floor coverings.

- 225 1. Apply a trowel finish to surfaces to be covered with resilient flooring and carpet.
- 226 2. Finish and measure surface so gap at any point between concrete surface and an  
227 unlevelled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and  
228 placed anywhere on the surface does not exceed 1/4 inch (6 mm).

229 C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere  
230 as indicated.

### 231 3.9 CONCRETE PROTECTING AND CURING

232 A. General: Protect freshly placed concrete from premature drying and excessive cold or hot  
233 temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather  
234 protection during curing.

235 B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or  
236 windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and  
237 during finishing operations. Apply according to manufacturer's written instructions after  
238 placing, screeding, and bull floating or darbying concrete, but before float finishing.

239 C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

- 240 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
- 241 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover  
242 for curing concrete, placed in widest practicable width, with sides and ends lapped at  
243 least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less  
244 than seven days. Immediately repair any holes or tears during curing period using cover  
245 material and waterproof tape.
- 246 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller  
247 according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall  
248 within three hours after initial application. Maintain continuity of coating and repair  
249 damage during curing period.
- 250 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a  
251 continuous operation by power spray or roller according to manufacturer's written  
252 instructions. Recoat areas subjected to heavy rainfall within three hours after initial  
253 application. Repeat process 24 hours later and apply a second coat. Maintain continuity  
254 of coating and repair damage during curing period.

### 255 3.10 CONCRETE SURFACE REPAIRS

256 A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and  
257 replace concrete that cannot be repaired and patched to Architect's approval.

258 3.11 FIELD QUALITY CONTROL

259 A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform  
260 field tests and inspections and prepare test reports.

261 **END OF SECTION**



30 or by freezing conditions. Comply with cold-weather construction requirements contained in  
31 ACI 530.1/ASCE 6/TMS 602.

32 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40  
33 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than  
34 seven days after completing cleaning.

35 B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in  
36 ACI 530.1/ASCE 6/TMS 602.

## 37 PART 2 - PRODUCTS

### 38 2.1 MASONRY UNITS, GENERAL

39 A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to  
40 contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units  
41 where such defects will be exposed in the completed Work.

### 42 2.2 BRICK

43 A. Regional Materials: Brick shall be manufactured within 500 miles (800 km) of Project site from  
44 materials that have been extracted, harvested, or recovered, as well as manufactured, within 500  
45 miles (800 km) of Project site.

46 General: Provide shapes indicated and as follows.

47 1. For ends of sills and caps and for similar applications that would otherwise expose  
48 unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces  
49 finished.

50 2. Provide special shapes for applications where shapes produced by sawing would result in  
51 sawed surfaces being exposed to view.

52 B. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with  
53 ASTM C 652, Class H40V void areas between 25 and 40 percent of gross cross-sectional area).

54 1. Products: Basis of Design - Subject to compliance with requirements, provide Sioux City  
55 Brick, Coppertone, Smooth or a comparable match from one of the following:

56 a. Blenden Brick company

57 b. Glen Gery Brick

58 c. Endicott Brick

59 2. Type: FBX.

60 3. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when  
61 tested per ASTM C 67.

62 4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated  
63 "not effloresced."

64 5. Surface Coating: Brick with colors or textures produced by application of coatings shall  
65 withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable  
66 difference in the applied finish when viewed from 10 feet (3 m).

67 6. Size (Actual Dimensions): 3-1/2 inches (89 mm) wide by 2-1/4 inches (57 mm) high by  
68 7-1/2 inches (190 mm) long.

69 2.3 MORTAR MATERIALS

70 A. Regional Materials: Aggregate for mortar, cement, and lime shall be extracted, harvested, or  
71 recovered, as well as manufactured, within 500 miles (800 km) of Project site.

72 B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather  
73 construction. Provide natural color or white cement as required to produce mortar color  
74 indicated.

75 C. Hydrated Lime: ASTM C 207, Type S.

76 D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing  
77 no other ingredients.

78 E. Masonry Cement: ASTM C 91.

79 1. Products: Subject to compliance with requirements, provide one of the following:

- 80 a. Cemex S.A.B. de C.V; Brikset Type N.
- 81 b. Holcim (US) Inc; Mortamix Masonry Cement.
- 82 c. Lafarge North America Inc; Lafarge Masonry Cement.
- 83 d. Lehigh Cement Company; Lehigh Masonry Cement.

84 F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use  
85 in mortar mixes and complying with ASTM C 979. Use only pigments with a record of  
86 satisfactory performance in masonry mortar.

87 1. Products: Subject to compliance with requirements, provide one of the following:

- 88 a. Davis Colors; True Tone Mortar Colors.
- 89 b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
- 90 c. Solomon Colors, Inc; SGS Mortar Colors.

91 G. Aggregate for Mortar: ASTM C 144.

92 1. White-Mortar Aggregates: Natural white sand or crushed white stone.

93 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce  
94 required mortar color.

95 H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with  
96 ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar  
97 of composition indicated.

98 1. Products: Subject to compliance with requirements, provide one of the following:

- 99 a. Euclid Chemical Company (The); Accelguard 80.
- 100 b. Grace Construction Products; W.R. Grace & Co. -- Conn; Morset.
- 101 c. Sonneborn Products; Trimix-NCA.

102 2.4 REINFORCEMENT

103 A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

104 B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors:  
105 Single 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized, carbon-steel continuous wire.

106 2.5 TIES AND ANCHORS

107 A. Materials: Provide ties and anchors specified in this article that are made from materials that  
108 comply with the following unless otherwise indicated:

- 109 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with  
110 ASTM A 153/A 153M, Class B-2 coating.  
111 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel,  
112 with ASTM A 153/A 153M, Class B coating.

113 B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through  
114 veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90  
115 degrees and extend 2 inches (50 mm) parallel to face of veneer.

116 C. Adjustable Masonry-Veneer Anchors:

117 1. General: Provide anchors that allow vertical adjustment but resist tension and  
118 compression forces perpendicular to plane of wall, for attachment over sheathing to wood  
119 or metal studs, and as follows:

120 a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N)  
121 load in both tension and compression without deforming or developing play in  
122 excess of 0.05 inch (1.3 mm).

123 2. Contractor's Option: Unless otherwise indicated, provide any of the following types of  
124 anchors:

125 3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal  
126 anchor section.

127 a. Products: Subject to compliance with requirements, provide one of the following:

128 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 210 with D/A 700-  
129 708.

130 2) Heckmann Building Products, Inc; 315-D with 316.

131 3) Hohmann & Barnard, Inc; DW-10.

132 4) Wire-Bond; 1004, Type III.

133 b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom,  
134 having slotted holes for inserting wire tie.

135 c. Anchor Section: Corrosion-resistant, self-drilling, eye-screw designed to receive  
136 wire tie. Eye-screw has spacer that seats directly against framing and is same  
137 thickness as sheathing and has gasketed, washer head that covers hole in sheathing.

138 d. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-  
139 (1.90-mm-) thick, steel sheet, galvanized after fabrication.

140 e. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-  
141 inch- (4.76-mm-) diameter, hot-dip galvanized steel wire.

142 4. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured  
143 with hex washer head and neoprene or EPDM washer, and with organic polymer coating  
144 with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

145 5. Stainless-Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex  
146 washer head and neoprene or EPDM washer.

## 147 2.6 EMBEDDED FLASHING MATERIALS

148 A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal  
149 Manual" and as follows:

150 1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into  
151 wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and  
152 hemmed.

153 2. Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into  
154 wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself  
155 for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining  
156 sealant backer rod.

157 B. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal  
158 Flashing and Trim."

159 C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products  
160 or products recommended by flashing manufacturer for bonding flashing sheets to each other  
161 and to substrates.

## 162 2.7 MISCELLANEOUS MASONRY ACCESSORIES

163 A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1;  
164 compressible up to 35 percent; formulated from neoprene, urethane or PVC.

165 B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226,  
166 Type I (No. 15 asphalt felt).

167 C. Weep/Vent Products: Use[ **one of**] the following unless otherwise indicated:

168 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant  
169 polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm)  
170 less than depth of outer wythe, in color selected from manufacturer's standard.

171 a. Products: Subject to compliance with requirements, provide one of the following:

172 1) Advanced Building Products Inc; Mortar Maze weep vent.

173 2) BLOK-LOK Limited; Cell-Vent.

174 3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.

175 D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade  
176 within the wall cavity.

- 177 1. Products: Subject to compliance with requirements, provide one of the following:  
178 a. Advanced Building Products Inc; Mortar Break.  
179 b. CavClear/Archovations, Inc; Stone Mat.  
180 c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.  
181 d. Mortar Net USA, Ltd; Mortar Net.

182 2.8 MASONRY CLEANERS

183 A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing  
184 mortar/grout stains, efflorescence, and other new construction stains from new masonry without  
185 discoloring or damaging masonry surfaces. Use product expressly approved for intended use by  
186 cleaner manufacturer and manufacturer of masonry units being cleaned.

- 187 1. Manufacturers: Subject to compliance with requirements, provide products by one of the  
188 following:  
189 a. Diedrich Technologies, Inc.  
190 b. EaCo Chem, Inc.  
191 c. PROSOCO, Inc.

192 2.9 MORTAR MIXES

193 A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators,  
194 retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise  
195 indicated.

- 196 1. Do not use calcium chloride in mortar.  
197 2. Use portland cement-lime masonry cement mortar.  
198 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to  
199 view, regardless of weather conditions, to ensure that mortar color is consistent.

200 B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix.  
201 Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients  
202 before delivering to Project site.

203 C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type  
204 N unless another type is indicated.

205 D. Pigmented Mortar: Use colored cement product. Do not add pigments to colored cement  
206 products.

- 207 1. Pigments shall not exceed 10 percent of portland cement by weight.  
208 2. Pigments shall not exceed 5 percent of masonry cement by weight.  
209 3. Application: Use pigmented mortar for exposed mortar joints.

210 PART 3 - EXECUTION

211 3.1 INSTALLATION, GENERAL

212 A. Use full-size units without cutting if possible. If cutting is required to provide a continuous  
213 pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp,  
214 unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut  
215 units with cut surfaces and, where possible, cut edges concealed.

216 B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and  
217 textures.

218 C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30  
219 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are  
220 damp but not wet at time of laying.

221 3.2 TOLERANCES

222 A. Dimensions and Locations of Elements:

- 223 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12  
224 mm) or minus 1/4 inch (6 mm).
- 225 2. For location of elements in plan do not vary from that indicated by more than plus or  
226 minus 1/2 inch (12 mm).
- 227 3. For location of elements in elevation do not vary from that indicated by more than plus or  
228 minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

229 B. Lines and Levels:

- 230 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4  
231 inch in 10 feet (6 mm in 3 m).
- 232 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary  
233 from level by more than 1/4 inch in 20 feet.
- 234 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6  
235 mm in 3 m).
- 236 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and  
237 expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3  
238 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- 239 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in  
240 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

241 C. Joints:

- 242 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch  
243 (3 mm), with a maximum thickness limited to 1/2 inch (12 mm); do not vary from bed-  
244 joint thickness of adjacent courses by more than 1/8 inch (3 mm).
- 245 2. For exposed head joints, do not vary from thickness indicated by more than plus or minus  
246 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more  
247 than 1/8 inch (3 mm).

248 3.3 LAYING MASONRY WALLS

249 A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint  
250 thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.  
251 Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at  
252 other locations.

253 B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in  
254 running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face  
255 dimensions at corners or jambs.

256 C. Built-in Work: As construction progresses, build in items specified in this and other Sections.  
257 Fill in solidly with masonry around built-in items.

258 D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

259 3.4 MORTAR BEDDING AND JOINTING

260 A. Lay hollow brick as follows:

- 261 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.  
262 2. With entire units, including areas under cells, fully bedded in mortar at starting course on  
263 footings.

264 B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient  
265 mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head  
266 joints.

267 C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint  
268 thickness unless otherwise indicated.

269 3.5 ANCHORING MASONRY VENEERS

270 A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the  
271 following requirements:

- 272 1. Locate anchor sections to allow maximum vertical differential movement of ties up and  
273 down.  
274 2. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 24  
275 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 3.5 sq. ft. (0.33 sq.  
276 m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at  
277 intervals, not exceeding 36 inches (914 mm), around perimeter.

278 3.6 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

279 A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges,  
280 other obstructions to downward flow of water in wall.

281 B. Install flashing as follows unless otherwise indicated:

- 282 1. Prepare masonry surfaces so they are smooth and free from projections that could  
 283 puncture flashing. Where flashing is within mortar joint, place through-wall flashing on  
 284 sloping bed of mortar and cover with mortar. Before covering with mortar, seal  
 285 penetrations in flashing with adhesive, sealant, or tape as recommended by flashing  
 286 manufacturer.
- 287 2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into  
 288 masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and  
 289 turn up not less than 2 inches (50 mm) to form end dams.
- 290 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible  
 291 flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to  
 292 top of metal drip edge.
- 293 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop  
 294 flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible  
 295 flashing to top of metal flashing termination.
- 296 C. Install weep holes in head joints in exterior wythes of first course of masonry immediately  
 297 above embedded flashing and as follows:
- 298 1. Use specified weep/vent products to form weep holes.  
 299 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- 300 D. Place cavity drainage material in cavities to comply with configuration requirements for cavity  
 301 drainage material in "Miscellaneous Masonry Accessories" Article.
- 302 E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent  
 303 products to form vents.
- 304 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install  
 305 through-wall flashing and weep holes above horizontal blocking.

306 3.7 FIELD QUALITY CONTROL

- 307 A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections  
 308 and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to  
 309 perform tests and inspections. Retesting of materials that fail to meet specified requirements  
 310 shall be done at Contractor's expense.
- 311 B. Inspections: Level 1 special inspections according to the "International Building Code."
- 312 1. Begin masonry construction only after inspectors have verified proportions of site-  
 313 prepared mortar.
- 314 C. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to  
 315 ASTM C 780.

316 3.8 CLEANING

317 A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar  
318 fins and smears before tooling joints.

319 B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

- 320 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for  
321 comparison purposes
- 322 2. Protect adjacent surfaces from contact with cleaner.
- 323 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by  
324 rinsing surfaces thoroughly with clear water.
- 325 4. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical  
326 Notes 20."
- 327 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's  
328 written instructions.
- 329 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to  
330 type of stain on exposed surfaces.

331 3.9 MASONRY WASTE DISPOSAL

332 A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-  
333 contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill  
334 material as fill is placed.

- 335 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

336 B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as  
337 described above, and other masonry waste, and legally dispose of off Owner's property.

338 **END OF SECTION**



31 or by freezing conditions. Comply with cold-weather construction requirements contained in  
32 ACI 530.1/ASCE 6/TMS 602.

33 B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in  
34 ACI 530.1/ASCE 6/TMS 602.

## 35 PART 2 - PRODUCTS

### 36 2.1 MASONRY UNITS, GENERAL

37 A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to  
38 contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units  
39 where such defects will be exposed in the completed Work.

40 B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-  
41 resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent  
42 masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 43 2.2 CONCRETE MASONRY UNITS

44 A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site  
45 from aggregates and cement that have been extracted, harvested, or recovered, as well as  
46 manufactured, within 500 miles (800 km) of Project site.

47 B. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints,  
48 headers, bonding, and other special conditions.

49 C. CMUs: ASTM C 90.

50 1. Unit Compressive Strength: Provide units with minimum average net-area compressive  
51 strength of 2150 psi (14.8 MPa).

52 2. Density Classification: Normal weight.  
53

### 54 2.3 MORTAR AND GROUT MATERIALS

55 A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted,  
56 harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

57 B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather  
58 construction. Provide natural color or white cement as required to produce mortar color  
59 indicated.

60 C. Hydrated Lime: ASTM C 207, Type S.

61 D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing  
62 no other ingredients.

- 63 E. Masonry Cement: ASTM C 91.
- 64 1. Products: Subject to compliance with requirements, provide one of the following:
- 65 a. Capital Materials Corporation; Flamingo Color Masonry Cement.
- 66 b. Cemex S.A.B. de C.V.; Brikset Type N.
- 67 c. Holcim (US) Inc.; Mortamix Masonry Cement.
- 68 d. Lafarge North America Inc.; Lafarge Masonry Cement.
- 69 e. Lehigh Cement Company; Lehigh Masonry Cement.
- 70 F. Mortar Cement: ASTM C 1329.
- 71 1. Products: Subject to compliance with requirements, provide the following:
- 72 a. Lafarge North America Inc.; Lafarge Mortar Cement.
- 73 G. Aggregate for Mortar: ASTM C 144.
- 74 1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing
- 75 the No. 16 (1.18-mm) sieve.
- 76 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
- 77 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce
- 78 required mortar color.
- 79 H. Aggregate for Grout: ASTM C 404.
- 80 I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with
- 81 ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar
- 82 of composition indicated.
- 83 1. Products: Subject to compliance with requirements, provide one of the following:
- 84 a. Euclid Chemical Company (The); Accelguard 80.
- 85 b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
- 86 c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- 87 J. Water: Potable.
- 88 2.4 REINFORCEMENT
- 89 A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60
- 90 (Grade 420).

91 2.5 MORTAR AND GROUT MIXES

92 A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators,  
93 retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise  
94 indicated.

- 95 1. Do not use calcium chloride in mortar or grout.  
96 2. Use portland cement-lime mortar.  
97 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to  
98 view, regardless of weather conditions, to ensure that mortar color is consistent.

99 B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix.  
100 Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients  
101 before delivering to Project site.

102 C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the  
103 following types of mortar for applications stated unless another type is indicated.

- 104 1. For masonry below grade or in contact with earth, use Type M.  
105 2. For reinforced masonry, use Type S.

106 D. Grout for Unit Masonry: Comply with ASTM C 476.

- 107 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will  
108 comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces  
109 and pour height.  
110 2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day  
111 compressive strength indicated, but not less than 2000 psi (14 MPa).  
112 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to  
113 ASTM C 143/C 143M.

114 PART 3 - EXECUTION

115 3.1 TOLERANCES

116 A. Dimensions and Locations of Elements:

- 117 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12  
118 mm) or minus 1/4 inch (6 mm).  
119 2. For location of elements in plan do not vary from that indicated by more than plus or  
120 minus 1/2 inch (12 mm).  
121 3. For location of elements in elevation do not vary from that indicated by more than plus or  
122 minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

123 3.2 MORTAR BEDDING AND JOINTING

124 A. Lay hollow CMUs as follows:

- 125 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
- 126 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
- 127 3. With webs fully bedded in mortar in grouted masonry, including starting course on
- 128 footings.
- 129 4. With entire units, including areas under cells, fully bedded in mortar at starting course on
- 130 footings where cells are not grouted.

131 B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient  
132 mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head  
133 joints.

134 C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint  
135 thickness unless otherwise indicated.

136 D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than  
137 paint) unless otherwise indicated.

138 3.3 MASONRY JOINT REINFORCEMENT

139 A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8  
140 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a  
141 minimum of 6 inches (150 mm).

- 142 1. Space reinforcement not more than 16 inches (406 mm) o.c.
- 143 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls.

144 B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

145 C. Provide continuity at wall intersections by using prefabricated T-shaped units.

146 D. Provide continuity at corners by using prefabricated L-shaped units.

147 3.4 FIELD QUALITY CONTROL

148 A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections  
149 and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to  
150 perform tests and inspections. Retesting of materials that fail to meet specified requirements  
151 shall be done at Contractor's expense.

152 B. Testing Prior to Construction: One set of tests.

153 C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion  
154 thereof.

155 D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for  
156 compressive strength.

157 E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to  
158 ASTM C 780.

159 F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780.

160 G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

161 3.5 REPAIRING, POINTING, AND CLEANING

162 A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar  
163 fins and smears before tooling joints.

164 B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

165 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for  
166 comparison purposes.

167 2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to  
168 type of stain on exposed surfaces.

169 3.6 MASONRY WASTE DISPOSAL

170 A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-  
171 contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill  
172 material as fill is placed.

173 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

174 2. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill,  
175 as described above, and other masonry waste, and legally dispose of off Owner's  
176 property.

177 **END OF SECTION**



1 around stacks and under temporary coverings including polyethylene and similar material.

## 3 PROJECT CONDITIONS

4 Coordination: Fit protection work to existing conditions; scribe and cope as required for accurate fit around  
5 moldings, cornices and coves. Correlate location of furring, nailers, blocking, grounds and similar supports  
6 to allow attachment of other protection work.

## 8 P A R T 2 – M A T E R I A L S

### 10 LUMBER

11 All lumber and plywood shall be fire retardant treated in accordance with AWWA Standard C-20,  
12 Interior type A for lumber and AWWA Standard C-27 Interior type A for plywood. In addition, conform  
13 to ASTM E-84, NFPA A-255 and UL-723 for Class A flamespread.

14  
15 Provide softwood lumber for framing and support including studs, blocking and framing.

16  
17 Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber  
18 Standard" and with applicable grading rules of inspection agencies certified by the American Lumber  
19 Standards Committee's (ALSC) Board of Review.

20  
21 Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing  
22 compliance with grading rule requirements.

23  
24 Fabricate lumber from dimension lumber in shapes and sizes indicated or as necessary to provide  
25 finished product drawn.

26  
27 Moisture Content: Maximum 19%.

28  
29 Grade: "Standard" grade, light framing; No. 3 common (WWPA).

### 31 PLYWOOD/OSB

32 Plywood: Provide plywood complying with American Plywood Association grading for the following:

33  
34 Classification: Exposure 1 and exterior where required

35  
36 Thickness: as detailed

37  
38 Grade: Fire Treated OSB where detailed on drawings.

### 40 INSULATION

41 Rigid Insulation for use in Vertical application only: Provide rigid cellular, thermal, molded, polystyrene  
42 insulation board complying with the following:

43  
44 ASTM C578, Type IV, 1.6 lb/cf minimum density.

45  
46 Compressive Strength: ASTM D1621, minimum 25 psi.

47  
48 Manufacturers: Amoco Foam Products, Co.; Dow Chemical U.S.A.; UC Industries; or approved  
49 equal.

50  
51 Thickness: ½" and 1" as needed to achieve required protection.

52  
53 Fasteners: Provide size and type appropriate for installation. Where exposed to weather or high relative  
54 humidity, provide fasteners either with hot-dip zinc coating per ASTM A153 or AISI Type 304, stainless

1 steel.

2

3

Nails, wire, brads and staples: FS-FFN-105.

4

5

Wood Screws: ANSI B18.6.1.

6

7

Lag Bolts: ANSI B18.2.1.

8

9

Bolts: ASTM A307, Grade A.

10

11

Nuts and Washers: ASTM A563.

12

13

14

15

### PART 3 - EXECUTION

16

17

#### GENERAL

18

Discard lumber with defects which might impair quality of work, and pieces which are too small to use in fabricating work with minimum number of joints.

19

20

21

Set carpentry work to required levels and lines, with members plumb and true to line cut and fitted.

22

23

24

#### CLEANUP AND REPAIR

25

Repair of Finish Work: Wherever any material, finish, or equipment, is damaged, the repair or replacement shall be accomplished by the trade skilled in that particular work, performed at Owner's approval of remedial procedures, and the cost shall be charged to the party responsible for the damage.

26

27

28

29

### END OF SECTION

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1 SECTION 06 17 53

2 SHOP-FABRICATED WOOD TRUSSES

3 PART 1 - GENERAL

4 1.1 SUMMARY

5 A. Section Includes:

- 6 1. Wood roof trusses.
- 7 2. Wood girder trusses.
- 8 3. Wood truss bracing.
- 9 4. Metal truss accessories.

10 1.2 SUBMITTALS

11 A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

12 B. Shop Drawings: Show fabrication and installation details for trusses.

- 13 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss
- 14 required.
- 15 2. Indicate sizes, stress grades, and species of lumber.
- 16 3. Indicate locations of permanent bracing required to prevent buckling of individual truss
- 17 members due to design loads.
- 18 4. Indicate locations, sizes, and materials for permanent bracing required to prevent
- 19 buckling of individual truss members due to design loads.
- 20 5. Indicate type, size, material, finish, design values, orientation, and location of metal
- 21 connector plates.
- 22 6. Show splice details and bearing details.

23 C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with

24 performance requirements and design criteria, including analysis data signed and sealed by the

25 qualified professional engineer responsible for their preparation.

26 D. Product certificates.

27 E. Evaluation Reports: For the following, from ICC-ES:

- 28 1. Metal-plate connectors.
- 29 2. Metal truss accessories.

30 1.3 QUALITY ASSURANCE

31 A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI

32 and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

- 1 1. Manufacturer's responsibilities include providing professional engineering services  
2 needed to assume engineering responsibility.
- 3 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive  
4 engineering analysis by a qualified professional engineer.

5 1.4 DELIVERY, STORAGE, AND HANDLING

- 6 A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component  
7 Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing  
8 Metal Plate Connected Wood Trusses."

9 PART 2 - PRODUCTS

10 2.1 PERFORMANCE REQUIREMENTS

- 11 A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000  
12 "Quality Requirements," to design metal-plate-connected wood trusses.
- 13 B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding  
14 design loads within limits and under conditions indicated. Comply with requirements in TPI 1  
15 unless more stringent requirements are specified below.

16 2.2 DIMENSION LUMBER

- 17 A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is  
18 indicated, provide lumber that complies with the applicable rules of any rules writing agency  
19 certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the  
20 ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 21 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- 22 B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous  
23 lumber in Section 061000 "Rough Carpentry."

24 2.3 METAL CONNECTOR PLATES

- 25 A. Manufacturers: Subject to compliance with requirements, provide products by one of the  
26 following:
  - 27 1. Alpine Engineered Products, Inc.; an ITW company.
  - 28 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
  - 29 3. CompuTrus, Inc.
  - 30 4. Eagle Metal Products.
  - 31 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
  - 32 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
  - 33 7. Robbins Engineering, Inc.
  - 34 8. Truswal Systems Corporation; an ITW company.

- 1 B. General: Fabricate connector plates to comply with TPI 1.
- 2 C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength  
3 low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS  
4 Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

5 2.4 FASTENERS

- 6 A. General: Provide fasteners of size and type indicated that comply with requirements specified in  
7 this article for material and manufacture.
- 8 1. Provide fasteners for use with metal framing anchors that comply with written  
9 recommendations of metal framing manufacturer.
- 10 2. Where trusses are exposed to weather, in ground contact, made from pressure-  
11 preservative treated wood, or in area of high relative humidity, provide fasteners with  
12 hot-dip zinc coating complying with ASTM A 153/A 153M.
- 13 B. Nails, Brads, and Staples: ASTM F 1667.

14 2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- 15 A. Manufacturers: Subject to compliance with requirements, provide products by one of the  
16 following:
- 17 1. Cleveland Steel Specialty Co.  
18 2. KC Metals Products, Inc.  
19 3. Phoenix Metal Products, Inc.  
20 4. Simpson Strong-Tie Co., Inc.  
21 5. USP Structural Connectors.
- 22 B. Allowable Design Loads: Provide products with allowable design loads, as published by  
23 manufacturer, that meet or exceed those indicated of products of manufacturers listed.  
24 Manufacturer's published values shall be determined from empirical data or by rational  
25 engineering analysis and demonstrated by comprehensive testing performed by a qualified  
26 independent testing agency.
- 27 C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with  
28 ASTM A 653/A 653M, G60 (Z180) coating designation.

29 2.6 FABRICATION

- 30 A. Assemble truss members in design configuration indicated; use jigs or other means to ensure  
31 uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in  
32 TPI 1. Position members to produce design camber indicated.
- 33 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- 34 B. Connect truss members by metal connector plates located and securely embedded  
35 simultaneously in both sides of wood members by air or hydraulic press.

1 PART 3 - EXECUTION

2 3.1 INSTALLATION

3 A. Install wood trusses only after supporting construction is in place and is braced and secured.

4 B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

5 C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required,  
6 exercising care not to damage truss members or joints by out-of-plane bending or other causes.

7 D. Install and brace trusses according to TPI recommendations and as indicated.

8 E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as  
9 applicable. Install fasteners through each fastener hole in metal framing anchors according to  
10 manufacturer's fastening schedules and written instructions.

11 F. Securely connect each truss ply required for forming built-up girder trusses.

12 G. Install and fasten permanent bracing during truss erection and before construction loads are  
13 applied. Anchor ends of permanent bracing where terminating at walls or beams.

14 1. Install bracing to comply with Section 061000 "Rough Carpentry."

15 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord  
16 floor trusses at centers indicated.

17 H. Install wood trusses within installation tolerances in TPI 1.

18 I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

19 J. Replace wood trusses that are damaged or do not meet requirements.

20 END OF SECTION

21 \*\*\*



1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

3 A. Manufacturers: Subject to compliance with requirements, provide products by one of the  
4 following:

5 1. Glass-Fiber Insulation:

- 6 a. CertainTeed Corporation.
- 7 b. Johns Manville Corporation.
- 8 c. Owens Corning.
- 9

10 2. Foam-Plastic Board Insulation

- 11 a. DiversiFoam Products.
- 12 b. Dow Chemical Company.
- 13 c. Owens Corning.

14 2.2 INSULATING MATERIALS

15 1. Batt Insulation: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the  
16 following:

17 Thermal Resistance: R-38 in Attic / Truss space.

18 Facing: Faced on one side with asphalt treated mesh reinforced Kraft paper.

19  
20 2. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated  
21 below, with maximum flame-spread and smoke-developed indexes of 75 and 450,  
22 respectively. Type X, 1.30 lb/cu. ft. (21 kg/cu. m). For below grade walls. Type VI, 1.80  
23 lb/cu. ft. (29 kg/cu. m). For under slab.  
24

25 2.3 VAPOR RETARDERS

26 A. Available Products: Subject to compliance with requirements, products that may be  
27 incorporated into the Work include, but are not limited to, the following:

28 B. Products: Subject to compliance with requirements, provide one of the following:

29 1. Polyethylene Vapor Retarders:

- 30 a. Raven Industries, Inc.; DURA-SKRIM 6WW.
- 31 b. Reef Industries, Inc.; Griffolyn T-65.

32 C. Polyethylene Vapor Retarder: ASTM D 4397, 6 mils thick, with maximum permeance rating of  
33 0.13 perm .

- 1 D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder  
2 manufacturer for sealing joints and penetrations in vapor retarder.

3 PART 3 - EXECUTION

4 3.1 EXAMINATION

- 5 A. Examine substrates and conditions, with Installer present, for compliance with requirements for  
6 Sections in which substrates and related work are specified and other conditions affecting  
7 performance.

- 8 B. Proceed with installation only after unsatisfactory conditions have been corrected.

9 3.2 PREPARATION

- 10 A. Clean substrates of substances harmful to insulations or vapor retarders, including removing  
11 projections capable of puncturing vapor retarders or of interfering with insulation attachment.

- 12 B. Close off openings in cavities receiving poured-in-place insulation to prevent escape of  
13 insulation. Provide bronze or stainless-steel screens (inside) where openings must be  
14 maintained for drainage or ventilation.

15 3.3 INSTALLATION, GENERAL

- 16 A. Comply with insulation manufacturer's written instructions applicable to products and  
17 application indicated.

- 18 B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any  
19 time to ice and snow.

- 20 C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit  
21 tightly around obstructions and fill voids with insulation. Remove projections that interfere  
22 with placement.

- 23 D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls,  
24 coordinate location of piping to ensure that it is placed on warm side of insulation and insulation  
25 encapsulates piping.

- 26 E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are  
27 otherwise shown or required to make up total thickness.

28 3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- 29 A. Apply insulation units to substrates by method indicated, complying with manufacturer's written  
30 instructions.

- 31 B. Install blankets in wall cavities:

- 1 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more  
2 than one length is required to fill cavity, provide lengths that will produce a snug fit  
3 between ends.
  - 4 2. Place blankets in cavities formed by framing members to produce a friction fit between  
5 edges of insulation and adjoining framing members.
  - 6 3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced  
7 blankets mechanically and support faced blankets by taping stapling flanges to flanges of  
8 metal studs.  
9
- 10 C. Install blankets in attic according to the following requirements.
- 11 1. Lay blankets parallel to attic trusses.
  - 12 2. Fit blankets tightly together to form a continuous coverage with no voids.
  - 13 3. Where required lay blankets over ductwork, junction boxes, exhaust fans and other  
14 appurtenances to provide continuous coverage. Verify that all appurtenances covered  
15 with insulation are rated for this application.
- 16 D. Blankets are not to be installed in existing walls where existing plaster and lath or exposed brick  
17 are not being removed.

### 18 3.5 INSTALLATION OF VAPOR RETARDERS

- 19 A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission.  
20 Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to  
21 cover miscellaneous voids in insulated substrates, including those filled with loose-fiber  
22 insulation.
- 23 B. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to  
24 vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with  
25 vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- 26 C. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as  
27 recommended by vapor-retarder manufacturer.
- 28 D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor  
29 retarders with vapor-retarder tape to create an airtight seal between penetrating objects and  
30 vapor retarder.
- 31 E. Repair any tears or punctures in vapor retarders immediately before concealment by other work.  
32 Cover with vapor-retarder tape or another layer of vapor retarder.

### 33 3.6 PROTECTION

- 34 A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures,  
35 physical abuse, and other causes. Provide temporary coverings or enclosures where insulation

1 is subject to abuse and cannot be concealed and protected by permanent construction  
2 immediately after installation.

3 **END OF SECTION**

4 \*\*\*



1 B. Samples: For each type of exposed finish required.

2 1.4 QUALITY ASSURANCE

3 A. Installer Qualifications: Fabricator of sheet metal roofing.

4 B. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: An authorized representative of  
5 roll-formed sheet metal roofing manufacturer for fabrication and installation of units required  
6 for this Project.

7 C. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual."  
8 Conform to dimensions and profiles shown unless more stringent requirements are indicated.

9 1. Preinstallation Conference: Conduct conference at Project site.

10 1.5 DELIVERY, STORAGE, AND HANDLING

11 A. Deliver components, and other sheet metal roofing materials so as not to be damaged or  
12 deformed. Package sheet metal roofing materials for protection during transportation and  
13 handling.

14 B. Unload, store, and erect sheet metal roofing materials in a manner to prevent bending, warping,  
15 twisting, and surface damage.

16 C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated  
17 covering. Store sheet metal roofing materials to ensure dryness. Do not store sheet metal  
18 roofing materials in contact with other materials that might cause staining, denting, or other  
19 surface damage.

20 D. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high  
21 humidity, except to extent necessary for period of sheet metal roofing installation.

22 1.6 COORDINATION

23 A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are  
24 specified in Division 7 Section "Roof Accessories."

25 B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of  
26 parapets, walls, and other adjoining work to provide a leakproof, secure, and non-corrosive  
27 installation.

28 1.7 WARRANTY

29 A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to  
30 repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-  
31 applied finishes within specified warranty period.

32 1. Finish Warranty Period: 10 years from date of Substantial Completion.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

3 A. In other Part 2 articles where titles below introduce lists, the following requirements apply for  
4 product selection:

- 5 1. Available Products: Subject to compliance with requirements, products that may be  
6 incorporated into the Work include, but are not limited to, the products specified.  
7 2. Products: Subject to compliance with requirements, provide one of the products  
8 specified.  
9 3. Available Manufacturers: Subject to compliance with requirements, manufacturers  
10 offering products that may be incorporated into the Work include, but are not limited to,  
11 the manufacturers specified.  
12 4. Manufacturers: Subject to compliance with requirements, provide products by the  
13 manufacturers specified.

14 2.2 ROOFING SHEET METALS

15 A. Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process to comply with  
16 ASTM A 755/A 755M.

- 17 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, coating designation;  
18 structural quality.  
19 2. Surface: Smooth, flat finish.  
20 3. Thickness: 0.0217 inch , unless otherwise indicated.

21 a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed  
22 metal surfaces to comply with coating and resin manufacturers' written  
23 instructions.

24 4. Manufacturers:

- 25 a. Berridge Manufacturing Company.  
26 b. Fabral Manufacturing Company  
27 c. Pac-Clad, Petersen Aluminum Company

28 B. Self-Adhering, Polyethylene-Faced Sheet: ASTM D 1970, 40 mils thick minimum, consisting  
29 of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified  
30 asphalt adhesive, with release-paper backing; cold applied.

31 1. Products:

- 32 a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start  
33 "A."  
34 b. Grace, W. R. & Co.; Grace Ice and Water Shield.  
35 c. Johns Manville International, Inc.; Roof Defender.

36 C. Slip Sheet: Building paper, minimum 5 lb/100 sq. ft., rosin sized.

37 D. Finish/Color: As selected by Architect from manufacturers' standard selections.

1 2.3 ACCESSORIES

2 A. Sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures,  
3 clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and  
4 finish of sheet metal roofing, unless otherwise indicated.

5 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal  
6 roofing.

7 2. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand  
8 negative-load requirements.

9 3. Cleats: Mechanically seamed cleats formed from the following material:

10 a. Metallic-Coated Steel Roofing: 0.0250-inch- thick, stainless-steel or nylon-coated  
11 aluminum sheet.

12 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from  
13 material recommended by manufacturer.

14 5. Closures: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or  
15 closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or  
16 premolded to match sheet metal roofing profile. Provide closure strips where indicated or  
17 necessary to ensure weathertight construction.

18 B. Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel  
19 sheet. Provide flashing and trim as required to seal against weather and to provide finished  
20 appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed  
21 openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as  
22 adjacent sheet metal roofing.

23 C. Scuppers: Formed from 0.0179-inch- thick, zinc-coated (galvanized) steel sheet or aluminum-  
24 zinc alloy-coated steel sheet prepainted with coil coating; complete with formed elbows and  
25 offsets. Finish to match sheet metal roofing.

26 D. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

27 2.4 EQUIPMENT

28 A. Portable Roll-Forming Equipment: Manufacturer's standard UL-certified equipment capable of  
29 forming sheet metal roofing in profiles indicated.

30 2.5 FABRICATION

31 A. General: Custom fabricate sheet metal roofing to comply with details shown and  
32 recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design,  
33 dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of  
34 installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest  
35 extent possible.

36 B. General: Fabricate roll-formed sheet metal roofing panels to comply with details shown and  
37 roll-formed sheet metal roofing manufacturer's written instructions.

38 C. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent  
39 leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit

- 1 substrates without excessive oil canning, buckling, and tool marks, true to line and levels  
2 indicated, and with exposed edges folded back to form hems.
- 3 D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot  
4 be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm)  
5 deep, filled with sealant (concealed within joints).
- 6 E. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce  
7 weathertight seams, form metal to provide for proper installation of elastomeric sealant, in  
8 compliance with SMACNA standards.
- 9 F. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic  
10 action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt  
11 underlayment to each contact surface, or by other permanent separation as recommended by  
12 manufacturers of dissimilar metals or by fabricator.
- 13 G. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations  
14 in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and  
15 other characteristics of item indicated. Obtain field measurements for accurate fit before shop  
16 fabrication.

## 17 2.6 FINISHES, GENERAL

- 18 A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for  
19 recommendations for applying and designating finishes.
- 20 B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a  
21 strippable, temporary protective covering before shipping.
- 22 C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are  
23 acceptable if they are within one-half of the range of approved Samples. Noticeable variations  
24 in the same piece are not acceptable. Variations in appearance of other components are  
25 acceptable if they are within the range of approved Samples and are assembled or installed to  
26 minimize contrast.
- 27 D. Zinc-Tin Alloy-Coated Steel Sheet Finishes: Zinc-tin alloy-coated steel manufacturer's standard  
28 modified linseed oil paint in an aliphatic solvent primer and finish coat.

## 29 PART 3 - EXECUTION

### 30 3.1 EXAMINATION

- 31 1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or  
32 blocking and that installation is within flatness tolerances.
- 33 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely  
34 anchored, and that provision has been made for scuppers, flashings, and penetrations  
35 through sheet metal roofing.
- 36 B. Examine roughing-in for components and systems penetrating sheet metal roofing to verify  
37 actual locations of penetrations relative to seam locations of sheet metal roofing before sheet  
38 metal roofing installation.

1 C. Proceed with installation only after unsatisfactory conditions have been corrected.

2 3.2 PREPARATION

3 A. Zinc-Tin Alloy-Coated Steel Roofing: Before installation, paint underside of zinc-tin alloy-  
4 coated steel as follows. Comply with manufacturer's written instructions.

- 5 1. Roofing with Slopes 3:12 and Steeper: Prime with zinc-tin alloy-coated steel primer,  
6 applied at a dry film thickness of not less than 2.5 mils (0.06 mm), or with mill-applied  
7 shop coat.
- 8 2. Roofing with Slopes Less Than 3:12: Prime with zinc-tin alloy-coated steel primer,  
9 applied at a dry film thickness of not less than 2.5 mils (0.06 mm).

10 3.3 UNDERLAYMENT INSTALLATION

11 A. Felt Underlayment: Install felt underlayment and building-paper slip sheet on roof sheathing  
12 under sheet metal roofing. Use adhesive for temporary anchorage, where possible, to minimize  
13 use of mechanical fasteners under sheet metal roofing. Apply at necessary locations, in shingle  
14 fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

15 B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on  
16 roof sheathing under sheet metal roofing. Apply primer if required by underlayment  
17 manufacturer. Comply with temperature restrictions of underlayment manufacturer for  
18 installation; use primer rather than nails for installing underlayment at low temperatures. Apply  
19 over entire roof, in shingle fashion to shed water, with end laps of not less than 6 inches  
20 staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend  
21 underlayment into scuppers. Roll laps with roller. Cover underlayment within 14 days.

22 C. Apply slip sheet over underlayment before installing sheet metal roofing.

23 3.4 INSTALLATION, GENERAL

24 A. General: Install sheet metal roofing perpendicular to purlins or supports. Anchor sheet metal  
25 roofing and other components of the Work securely in place, with provisions for thermal and  
26 structural movement. Install fasteners, solder, welding rods, protective coatings, separators,  
27 sealants, and other miscellaneous items as required for a complete roofing system and as  
28 recommended by fabricator for sheet metal roofing.

- 29 1. Field cutting of sheet metal roofing by torch is not permitted.
- 30 2. Rigidly fasten eave end of sheet metal roofing and allow ridge end free movement due to  
31 thermal expansion and contraction. Pre-drill roofing.
- 32 3. Provide metal closures at each side of ridge and hip caps.
- 33 4. Flash and seal sheet metal roofing with weather closures at eaves, rakes, and at perimeter  
34 of all openings. Fasten with self-tapping screws.
- 35 5. Locate and space fastenings in uniform vertical and horizontal alignment.
- 36 6. Locate roofing splices over, but not attached to, structural supports. Stagger roofing  
37 splices and end laps to avoid a four-panel lap splice condition.
- 38 7. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the  
39 material.

40 B. Fasteners: Use fasteners of sizes that will not penetrate completely through substrate.

- 1           1.     Steel Roofing: Use stainless-steel fasteners.
- 2           C.     Metal Protection: Where dissimilar metals will contact each other or corrosive substrates,  
3           protect against galvanic action by painting contact surfaces with bituminous coating, by  
4           applying rubberized-asphalt underlayment to each contact surface, or by other permanent  
5           separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar  
6           metals.
- 7           D.     Conceal fasteners and expansion provisions where possible in exposed work and locate to  
8           minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight  
9           installation.
- 10          E.     Fascia: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping  
11          screws. Flash and seal sheet metal roofing with weather closures where fasciae meet soffits,  
12          along lower panel edges, and at perimeter of all openings.
- 13          3.5       CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION
- 14          A.     Fabricate and install work with lines and corners of exposed units true and accurate. Form  
15          exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering  
16          temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of  
17          solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed  
18          edges, unless otherwise indicated.
- 19               1.     Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners  
20               to prevent rotation.
- 21               2.     Nail cleats not more than 12 inches o.c. Bend tabs over nails.
- 22          B.     Seal joints as shown and as required for leakproof construction. Provide low-slope transverse  
23          seams using cleats where backup of moisture may occur.
- 24          C.     Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Prein edges  
25          of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show  
26          in finished Work.
- 27               1.     Do not use torches for soldering. Heat surfaces to receive solder and flow solder into  
28               joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- 29               2.     Do not use torches for soldering. Heat surfaces to receive solder and flow solder into  
30               joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- 31          D.     Flat-Seam Roofing: Attach flat-seam metal pans to substrate with cleats, starting at eave and  
32          working upward toward ridge. After pans are in place, mallet seams and apply sealant.
- 33          E.     Standing-Seam Roofing: Attach standing-seam metal pans to substrate with cleats, double-  
34          nailed at 12 inches o.c. Install pans reaching from eave to ridge before moving to adjacent pans.  
35          Lock each pan to pan below with transverse seam. Before pans are locked, apply continuous  
36          bead of sealant to top flange of lower pan. Crimp standing seams by folding over twice so cleat  
37          and pan edges are completely engaged.
- 38               1.     Leave seams upright after crimping at ridges and hips.
- 39               2.     Splay upturned edges of pans away from base of wood battens to provide expansion  
40               capability.
- 41               3.     Close batten ends with metal closure. Fold together with pan edges and end of batten  
              cap.

1 3.6 ON-SITE, ROLL-FORMED SHEET METAL ROOFING INSTALLATION

2 A. General: Install on-site, roll-formed sheet metal roofing to comply with sheet metal roofing  
3 manufacturer's written instructions for UL wind-uplift class indicated. Provide sheet metal  
4 roofing of full length from eave to ridge unless otherwise restricted by shipping limitations.

5 B. Standing-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed  
6 clips at each standing-seam joint at location, spacing, and with fasteners recommended by  
7 manufacturer.

- 8 1. Install clips to supports with self-tapping fasteners.  
9 2. Install pressure plates at locations indicated in manufacturer's written installation  
10 instructions.  
11 3. Before panels are joined, apply continuous bead of sealant to top flange of lower panel.  
12 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool  
13 so cleat, sheet metal roofing, and field-applied sealant are completely engaged.

14 3.7 ACCESSORY INSTALLATION

15 A. General: Install accessories with positive anchorage to building and weathertight mounting and  
16 provide for thermal expansion. Coordinate installation with flashings and other components.

- 17 1. Install components required for a complete sheet metal roofing assembly including trim,  
18 copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips,  
19 and similar items.

20 B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation  
21 instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners  
22 where possible, and set units true to line and level as indicated. Install work with laps, joints,  
23 and seams that will be permanently watertight and weather resistant.

- 24 1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool  
25 marks and that is true to line and levels indicated, with exposed edges folded back to  
26 form hems. Install sheet metal flashing and trim to fit substrates and to result in  
27 waterproof and weather-resistant performance.  
28 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.  
29 Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches  
30 of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be  
31 used or would not be sufficiently weather resistant and waterproof, form expansion joints  
32 of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant  
33 (concealed within joints).

34 C. Rainchains: Join to scuppers. Provide fasteners designed to hold rainchains securely 2 inch  
35 min. away from walls; locate fasteners at top and bottom.

- 36 1. Tie rainchains to underground drainage system indicated.

37 D. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases  
38 where they meet sheet metal roofing.

39 3.8 CLEANING AND PROTECTION

40 A. Clean and neutralize flux materials. Clean off excess solder and sealants.

1 B. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is  
2 installed. On completion of sheet metal roofing installation, clean finished surfaces, including  
3 removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a  
4 clean condition during construction.

5 C. Replace panels that have been damaged or have deteriorated beyond successful repair by finish  
6 touchup or similar minor repair procedures.

7 **END OF SECTION**





1 PART 2 - PRODUCTS

2 2.1 FIBER-CEMENT VERTICAL PANEL SIDING SYSTEM

3 A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested  
4 according to ASTM E 136; with a flame-spread index of 25 or less when tested according to  
5 ASTM E 84. Accommodate 1/2" gap between panels.

6 1. Manufacturers: Subject to compliance with requirements, provide products by one of the  
7 following manufacturers:

- 8 a. CertainTeed Corporation.  
9 b. GAF Materials Corporation.  
10 c. James Hardie Building Products, Inc.  
11 d. Nichiha Fiber Cement.

12 B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by  
13 a qualified testing agency acceptable to authorities having jurisdiction.

14 C. Nominal Thickness: Not less than 5/16 inch (8 mm).

15 D. Panel Texture: 48-inch- (1200-mm-) wide sheets with smooth texture.

16 E. Finish: Factory-applied, baked on finish. Color to be selected from manufacturer's standard  
17 range.

18 2.2 ACCESSORIES

19 A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps,  
20 and other items as recommended by siding manufacturer for building configuration.

21 B. Flashing: Provide aluminum flashing at window and door heads.

22 C. Fasteners:

- 23 1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a  
24 minimum of 1 inch (25 mm) into substrate.  
25 2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a  
26 minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.  
27 3. For fastening fiber cement, use hot-dip galvanized fasteners.

28 D. Continuous Soffit Vents: Aluminum, hat-channel shape.

- 29 1. Net-Free Area: 4 sq. in./linear ft. (280 sq. cm/m).  
30 2. Finish: Mill finish.

1 PART 3 - EXECUTION

2 3.1 INSTALLATION

3 A. General: Comply with manufacturer's written installation instructions applicable to products and  
4 applications indicated unless more stringent requirements apply.

5 1. Install fasteners no more than 24 inches (600 mm) o.c.

6 2. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a  
7 weathertight installation.

8 3.2 ADJUSTING AND CLEANING

9 A. Remove damaged, improperly installed, or otherwise defective materials and replace with new  
10 materials complying with specified requirements.

11 B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean  
12 condition during construction.

13 **END OF SECTION**

1 SECTION 07 62 00

2 SHEET METAL FLASHING AND TRIM

3 PART 1 - GENERAL

4 1.1 SUMMARY

5 A. Section Includes:

- 6 1. Formed roof-drainage sheet metal fabrications.  
7 2. Formed low-slope roof sheet metal fabrications.  
8 3. Formed wall sheet metal fabrications.

9 1.2 PREINSTALLATION MEETINGS

- 10 A. Preinstallation Conference: Conduct conference at Project site.

11 1.3 SUBMITTALS

12 A. Product Data: For each type of product.

- 13 1. Product Data for Credit MR 4: For products having recycled content, documentation  
14 indicating percentages by weight of postconsumer and preconsumer recycled content.  
15 Include statement indicating cost for each product having recycled content.

16 B. Shop Drawings: For sheet metal flashing and trim.

- 17 1. Include plans, elevations, sections, and attachment details.  
18 2. Distinguish between shop- and field-assembled work.  
19 3. Include identification of finish for each item.  
20 4. Include pattern of seams and details of termination points, expansion joints and  
21 expansion-joint covers, direction of expansion, roof-penetration flashing, and connections  
22 to adjoining work.

23 C. Samples: For each exposed product and for each color and texture specified.

24 D. Product certificates.

25 E. Product test reports.

26 F. Sample warranty.

27 G. Maintenance data.

1 1.4 QUALITY ASSURANCE

2 A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing  
3 and trim similar to that required for this Project and whose products have a record of successful  
4 in-service performance.

5 1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able  
6 to fabricate required details as tested and approved.

7 B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate  
8 aesthetic effects and to set quality standards for fabrication and installation.

9 1. Build mockup of typical roof edge, including gutter, fascia trim and apron flashing.

10 1.5 WARRANTY

11 A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal  
12 flashing and trim that shows evidence of deterioration of factory-applied finishes within  
13 specified warranty period.

14 1. Finish Warranty Period: 20 years from date of Substantial Completion.

15 PART 2 - PRODUCTS

16 2.1 PERFORMANCE REQUIREMENTS

17 A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural  
18 movement, thermally induced movement, and exposure to weather without failure due to  
19 defective manufacture, fabrication, installation, or other defects in construction. Completed  
20 sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

21 B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet  
22 Metal Manual" requirements for dimensions and profiles shown unless more stringent  
23 requirements are indicated.

24 C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to  
25 SPRI ES-1 and capable of resisting the following design pressure:

26 1. Design Pressure: Indicated on Drawings.

27 D. Thermal Movements: Allow for thermal movements from ambient and surface temperature  
28 changes.

29 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material  
30 surfaces.

1 2.2 SHEET METALS

2 A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying  
3 strippable, temporary protective film before shipping.

4 B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to  
5 ASTM A 653/A 653M, G90 (Z275) coating designation, Class AZ50 (Class AZM150) coating  
6 designation, Grade 40 (Grade 275)]; prepainted by coil-coating process to comply with  
7 ASTM A 755/A 755M.

8 1. Surface: Manufacturer's standard clear acrylic coating on both sides.

9 2. Exposed Coil-Coated Finish:

10 a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less  
11 than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply  
12 coating to exposed metal surfaces to comply with coating and resin manufacturers'  
13 written instructions.

14 b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less  
15 than 70 percent PVDF resin by weight in both color coat and clear topcoat.  
16 Prepare, pretreat, and apply coating to exposed metal surfaces to comply with  
17 coating and resin manufacturers' written instructions.

18 c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel  
19 topcoat; with dry film thickness of not less than 0.2 mil (0.005 mm) for primer and  
20 0.8 mil (0.02 mm) for topcoat.

21 3. Color: As selected by Architect from manufacturer's full range.

22 2.3 UNDERLAYMENT MATERIALS

23 A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

24 B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene,  
25 synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over  
26 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for  
27 Type I and Type II felts.

28 1. Products: Subject to compliance with requirements, provide one of the following:

29 a. Atlas Roofing Corporation; Summit.

30 b. Engineered Coated Products; Nova-Seal II.

31 c. Kirsch Building Products, LLC; [Sharkskin Comp] [Sharkskin Ultra].

32 d. SDP Advanced Polymer Products Inc; Palisade.

33 C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a  
34 slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or  
35 SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand  
36 high metal temperatures beneath metal roofing. Provide primer according to written  
37 recommendations of underlayment manufacturer.

38 1. Products: Subject to compliance with requirements, provide one of the following:

- 1 a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
- 2 b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; [Grace Ice and
- 3 Water Shield HT] [Ultra].
- 4 c. Henry Company; Blueskin PE200 HT.
- 5 d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
- 6 e. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
- 7 f. SDP Advanced Polymer Products Inc; Palisade SA-HT.
- 8 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
- 9 3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29
- 10 deg C) or lower.
- 11 D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.
- 12 2.4 MISCELLANEOUS MATERIALS
- 13 A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other
- 14 miscellaneous items as required for complete sheet metal flashing and trim installation and as
- 15 recommended by manufacturer of primary sheet metal or manufactured item unless otherwise
- 16 indicated.
- 17 B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and
- 18 bolts, and other suitable fasteners designed to withstand design loads and recommended by
- 19 manufacturer of primary sheet metal or manufactured item.
- 20 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
- 21 a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or
- 22 factory-applied coating. Provide metal-backed EPDM or PVC sealing washers
- 23 under heads of exposed fasteners bearing on weather side of metal.
- 24 b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal
- 25 being fastened.
- 26 c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching
- 27 internal gutter width.
- 28 2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless
- 29 steel.
- 30 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- 31 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- 32 5. Fasteners for Zinc-Coated (Galvanized), Aluminum-Zinc Alloy-Coated Steel Sheet:
- 33 Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M
- 34 or ASTM F 2329.
- 35 C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape
- 36 with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2**
- 37 **inch (13 mm)** wide and **1/8 inch (3 mm)** thick.

- 1 D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade,  
2 class, and use classifications required to seal joints in sheet metal flashing and trim and remain  
3 watertight.
- 4 E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant;  
5 polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited  
6 movement.
- 7 F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound,  
8 recommended by aluminum manufacturer for exterior nonmoving joints, including riveted  
9 joints.
- 10 G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- 11 H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

12 2.5 FABRICATION, GENERAL

- 13 A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and  
14 recommendations in cited sheet metal standard that apply to design, dimensions, geometry,  
15 metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and  
16 trim in shop to greatest extent possible.
- 17 1. Obtain field measurements for accurate fit before shop fabrication.  
18 2. Form sheet metal flashing and trim to fit substrates without excessive oil canning,  
19 buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded  
20 back to form hems.  
21 3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners  
22 on faces exposed to view.
- 23 B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
- 24 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm)  
25 deep, filled with butyl sealant concealed within joints.  
26 2. Use lapped expansion joints only where indicated on Drawings.
- 27 C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide  
28 for proper installation of elastomeric sealant according to cited sheet metal standard.
- 29 D. Fabricate cleats and attachment devices from same material as accessory being anchored or  
30 from compatible, noncorrosive metal.
- 31 E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard  
32 for application, but not less than thickness of metal being secured.
- 33 F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams,  
34 and solder.

- 1 G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric  
2 sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints  
3 where necessary for strength.
- 4 H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal  
5 with epoxy seam sealer. Rivet joints where necessary for strength.

6 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- 7 A. Hanging Gutters: Fabricate to rectangular cross section required, complete with end pieces,  
8 outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long  
9 sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same  
10 metal as gutters, of size recommended by cited sheet metal standard but with thickness not less  
11 than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter  
12 accessories from same metal as gutters.
- 13 B. Downspouts: Fabricate rectangular open-face downspouts to dimensions indicated, complete  
14 with mitered elbows. Furnish with metal hangers from same material as downspouts and  
15 anchors.
- 16 1. Hanger Style: roof hung.  
17 2. Fabricate from the following materials:  
18 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.  
19 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- 20 C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of  
21 dimensions and shape required, complete with outlet tubes. Fabricate from the following  
22 materials:  
23 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.  
24 2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- 25 D. Splash Pans: Fabricate to dimensions and shape required and from the following materials:  
26 1. Stainless Steel: 0.019 inch (0.48 mm) thick.

27 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- 28 A. Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not  
29 exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover  
30 plates.
- 31 1. Fabricate from the Following Materials:  
32 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.  
33 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- 34 B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following  
35 materials:  
36 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.  
37 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

- 1 C. Counterflashing and Flashing Receivers: Fabricate from the following materials:
- 2 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- 3 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- 4 D. Roof-Penetration Flashing: Fabricate from the following materials:
- 5 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- 6 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

## 7 2.8 WALL SHEET METAL FABRICATIONS

- 8 A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long,  
9 but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate  
10 discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of  
11 wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following  
12 materials:
- 13 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- 14 B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to  
15 extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-  
16 mm-) high, end dams. Fabricate from the following materials:
- 17 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- 18 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- 19 C. Wall Expansion-Joint Cover: Fabricate from the following materials:
- 20 a. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- 21 b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.

## 22 PART 3 - EXECUTION

### 23 3.1 UNDERLAYMENT INSTALLATION

- 24 A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of  
25 mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed  
26 water, with lapped joints of not less than 2 inches (50 mm).
- 27 B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to  
28 manufacturers' written instructions, and using adhesive where possible to minimize use of  
29 mechanical fasteners under sheet metal.
- 30 C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free.  
31 Prime substrate if recommended by underlayment manufacturer. Comply with temperature  
32 restrictions of underlayment manufacturer for installation; use primer for installing  
33 underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not  
34 less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges  
35 not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within  
36 14 days.

1 3.2 INSTALLATION, GENERAL

2 A. General: Anchor sheet metal flashing and trim and other components of the Work securely in  
3 place, with provisions for thermal and structural movement. Use fasteners, solder, protective  
4 coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal  
5 flashing and trim system.

- 6 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat  
7 seams with minimum exposure of solder, welds, and sealant.
- 8 2. Install sheet metal flashing and trim to fit substrates and to result in watertight  
9 performance. Verify shapes and dimensions of surfaces to be covered before fabricating  
10 sheet metal.
- 11 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two  
12 fasteners. Bend tabs over fasteners.
- 13 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of  
14 buckling and tool marks.
- 15 5. Torch cutting of sheet metal flashing and trim is not permitted.

16 B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-  
17 treated wood or other corrosive substrates, protect against galvanic action or corrosion by  
18 painting contact surfaces with bituminous coating or by other permanent separation as  
19 recommended by sheet metal manufacturer or cited sheet metal standard.

- 20 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and  
21 trim with bituminous coating where flashing and trim contact wood, ferrous metal, or  
22 cementitious construction.
- 23 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or  
24 wood substrates, install underlayment and cover with slip sheet.

25 C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space  
26 movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of  
27 corner or intersection.

- 28 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm)  
29 deep, filled with sealant concealed within joints.
- 30 2. Use lapped expansion joints only where indicated on Drawings.

31 D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4  
32 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

33 E. Conceal fasteners and expansion provisions where possible in exposed work and locate to  
34 minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight  
35 installation.

36 F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply  
37 with requirements in Section 07 92 00 "Joint Sealants."

38 G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

1 3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

2 A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system  
3 according to cited sheet metal standard unless otherwise indicated. Coordinate installation of  
4 roof perimeter flashing with installation of roof-drainage system.

5 B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant.  
6 Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in  
7 position. Provide end closures and seal watertight with sealant. Slope to downspouts.

8 1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet  
9 (15.24 m) apart. Install expansion-joint caps.

10 C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with  
11 fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and  
12 at approximately 60 inches (1500 mm) o.c.

13 D. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of  
14 1 inch (25 mm) below gutter discharge.

15 E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration  
16 indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

17 3.4 ROOF FLASHING INSTALLATION

18 A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet  
19 metal manufacturer's written installation instructions, and cited sheet metal standard. Provide  
20 concealed fasteners where possible, and set units true to line, levels, and slopes. Install work  
21 with laps, joints, and seams that are permanently watertight and weather resistant.

22 B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations  
23 in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge  
24 flashing with continuous cleat anchored to substrate.

25 C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited  
26 sheet metal standard unless otherwise indicated.

27 D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top  
28 edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base  
29 flashing. Install stainless-steel draw band and tighten.

30 E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.  
31 Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend  
32 counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4  
33 inches (100 mm).

34 F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation  
35 of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes  
36 that penetrate roof.

1 3.5 WALL FLASHING INSTALLATION

2 A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture  
3 according to cited sheet metal standard unless otherwise indicated. Coordinate installation of  
4 wall flashing with installation of wall-opening components such as windows, doors, and  
5 louvers.

6 B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar  
7 flashings to extend 4 inches (100 mm) beyond wall openings.

8 3.6 CLEANING AND PROTECTION

9 A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and  
10 weathering.

11 B. Clean and neutralize flux materials. Clean off excess solder.

12 C. Clean off excess sealants.

13 D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim  
14 are installed unless otherwise indicated in manufacturer's written installation instructions.

15 END OF SECTION



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## PART 2 - PRODUCTS

### GENERAL

Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Sealants shall be non-staining and non-tack type.

Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

### INTERIOR SEALANTS

Sealant Standard: Provide premium grade, high performance, moisture cured, one component, polyurethane base, non-sag sealant suitable for horizontal and vertical applications which complies with ASTM C 920 requirements, Type s, Grade NS, Class 25.

Subject to compliance with requirements, provide product by one of the following unless noted otherwise:

"Vulkem 116"; Mameco International, Inc.

"Sikaflex-1a"; Sika Corp.

"Dymonic"; Tremco Co.

### ACCESSORIES

General: Provide sealant backings of material and type which are non-staining, and compatible with joint substrates, sealants, primers and other joint fillers and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing, closed-cell plastic foam nonabsorbent to water and gas. Manufacturer's recommended size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Rod shall be at least one-third (1/3) larger diameter than width of joint.

Dow: "Ethafoam"

Williams: "Expand-O-Foam"

Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

Primer: Provide colorless type made or recommended by sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

Masking Tape: Provide non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

1 Joint Fillers for Concrete Surfaces: Self-Expanding Cork of preformed strips complying with ASTM D  
2 1752 for Type III.

3  
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5  
6 PART 3 - EXECUTION

7  
8 EXAMINATION

9 Examine the areas and conditions under which work of this Section will be performed for compliance  
10 with requirements for joint configuration, installation tolerances or other conditions affecting joint  
11 performance. Notify Architect immediately of conditions detrimental to timely and proper completion of  
12 the work. Do not proceed with installation of sealant until unsatisfactory conditions have been corrected.

13  
14 PREPARATION

15 Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with  
16 recommendations of joint sealer manufacturers and the following requirements:

17  
18 Remove all foreign material from joint substrates which could interfere with adhesion of sealants  
19 including existing sealant at wood windows and stone sills and opening jambs; dust; paint; oil  
20 grease; waterproofing and repellants; water; surface dirt.

21  
22 Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate  
23 surfaces to produce a clean, sound substrate capable of developing optimum bond with joint  
24 sealers.

25  
26 Remove loose particles remaining from above cleaning operations by vacuuming or blowing out  
27 joints with oil-free compressed air.

28  
29 Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous  
30 surfaces by chemical cleaners or other means which are not harmful to substrates or leave  
31 residues capable of interfering with adhesion of joint sealers.

32  
33 Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer  
34 manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to  
35 comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond,  
36 do not allow spillage or migration onto adjoining surfaces.

37  
38 Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces  
39 which otherwise would be permanently stained or damaged by such contact or by cleaning methods  
40 required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

41 INSTALLATION

42 General: Comply with joint sealer manufacturers' printed installation instructions applicable to products  
43 and applications indicated, except where more stringent requirements apply.

44  
45 Prime all surfaces prior to application of sealants. Allow proper drying period.

46  
47 Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

48  
49 Install joint fillers of type indicated to provide support of sealants during application and at  
50 position required to produce the cross-sectional shapes and depths of installed sealants relative to  
51 joint widths which allow optimum sealant movement capability.

1  
2 Do not leave gaps between ends of joint fillers

3  
4 Do not stretch, twist, puncture, or tear joint fillers

5  
6 Remove absorbent joint fillers which have become wet prior to sealant application and  
7 replace with dry material.

8  
9 Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints  
10 where adhesion of sealant to surfaces at back of joints would result in sealant failure.

11  
12 **Installation of Sealants:**

13 Install sealants by proven techniques that result in sealants directly contacting and fully wetting  
14 joint substrates, completely filling recesses provided for each joint configuration, and providing  
15 uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant  
16 movement capability.

17  
18 Apply sealants with gun having proper nozzle size

19  
20 Depth of sealant at center of cross-section shall be uniform and of approximately 1/2 (no less than  
21 1/3) the width of the joint up a maximum depth of 3/8 inch. Depth at bond interface shall be  
22 uniform and with a depth of no less than equal to the joint width.

23  
24 **Tooling of Sealants:**

25 Immediately after sealant application and prior to time skinning or curing begins, tool sealants to  
26 form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure  
27 contact and adhesion of sealant with sides of joint.

28  
29 Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor  
30 sealants or adjacent surfaces or are not approved by sealant manufacturer.

31  
32 Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.  
33 Use masking tape to protect adjacent surfaces of recessed tooled joints.

34  
35 Finished joints shall be neatly pointed and finished with a beading tool. All excess materials shall  
36 be removed and surface left neat, smooth and clean.

37  
38 **CLEANING AND PROTECTION**

39 Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with  
40 cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

41  
42 Protect joint sealers during and after curing period from contact with contaminating substances or from  
43 damage resulting from construction operations or other causes so that they are without deterioration or  
44 damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs,  
45 cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials  
46 to produce joint sealer installations with repaired areas indistinguishable from original work.

47  
48 Adjacent surfaces shall be clean and free of stains.

49  
50  
51 **END OF SECTION**

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- 29 B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided  
30 refinshed items are equal in all respects to new work and acceptable to Architect; otherwise,  
31 remove and replace damaged items as directed.
- 32 C. Store doors and frames at building site inside under cover. Place units on minimum 4-inches  
33 high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create  
34 humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately.  
35 Provide 1/4-inch spaces between doors to promote air circulation.

36 PART 2 - PRODUCTS

37 2.1 ACCEPTABLE MANUFACTURERS

- 38 A. Manufacturer: Subject to compliance with requirements, provide standard steel doors and  
39 frames by one of the following:
- 40 1. Ceco Corp.
  - 41 2. Curries Company.
  - 42 3. Kewanee Corp.
  - 43 4. Steelcraft Manufacturing Co.

44 2.2 MATERIALS

- 45 A. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366.
- 46 B. Supports and Anchors: Fabricate of not less than 16-gage sheet steel; galvanized after  
47 fabrication in compliance with ASTM A 153, Class B.
- 48 C. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into  
49 exterior walls, hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable.
- 50 D. Shop Applied Primer: Rust-inhibitive enamel or paint, applied by either air-drying or baking,  
51 suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and  
52 Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

53 2.3 DOORS

- 54 A. Fabricate steel doors to be rigid, neat in appearance and free from defects, warp or buckle. Fit  
55 and assemble units in factory. Comply with ANSI/SDI-100 requirements.
- 56 B. Provide flush steel doors 1-3/4 inches thick, seamless hollow construction. Bevel vertical edges  
57 1/8 inches in 2 inches.
- 58 1. Fabricate of two stretcher-leveled sheets, minimum 18 gage.
  - 59 2. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed  
60 faces or stile edges in accordance with ANSI/SDI 100 Grade II, heavy-duty, Model 3 or  
61 4.
  - 62 3. Internal Construction: Manufacturer's standard honeycomb, polyurethane, polystyrene,  
63 unitized steel grid, vertical steel stiffeners, or rigid mineral fiber core with internal sound  
64 deadener on inside of face sheets where appropriate in accordance with SDI standards.

- 65 4. Reinforce tops and bottoms of doors with 18 gage horizontal steel channels, welded  
66 continuously to outer sheets.  
67 5. Clearances: Not more than 1/16 inch at jambs and heads except between non-fire-rated  
68 pairs of doors not more than 1/4 inch. Not more than 1/2 inch at bottom.

69 C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and  
70 Frames."

## 71 2.4 FRAMES

72 A. Provide metal frames for doors as shown on drawings and schedules.

73 B. Knock-down frames are not acceptable.

74 C. Fabricate steel frame units to be rigid, neat in appearance and free from defects, warp or buckle  
75 and with all fastenings concealed. Fit and assemble units in factory. Comply with  
76 ANSI/SDI-100 requirements.

77 D. Fabricate frames of minimum 16-gage cold-rolled steel for openings up to 4'-0" wide and 14-  
78 gage for openings over 4'-0" wide.

79 E. Fabricate frames of full-welded unit construction, mitered corners, reinforced and continuously  
80 welded for full depth and width of frame.

81 F. Head Reinforcing:

82 1. Leave vertical mullions open at top for grouting.

83 2. For frames over 4'-0" wide, provide continuous steel channel or angle stiffener, 12 gage  
84 minimum, for full width of opening and welded to back of frame at head.

85 G. Jamb Anchors: Minimum 18 galvanized sheet steel, adjustable, flat, corrugated or perforated, T-  
86 shaped to suit frame size. Leg shall be 2 inches wide min. by 10 inches long. Minimum of three  
87 per jamb, to be equally spaced.

88 H. Spreader Bars: Provide removable spreader bars across bottom of all frames, tack welded to  
89 jambs and mullions.

## 90 2.5 HARDWARE PREPARATION

91 A. Prepare doors and frames to receive concealed hardware in accordance with final Door  
92 Hardware Schedule and templates provided by hardware supplier. Comply with applicable  
93 requirements of ANSI A115 Series Specifications for door and frame preparation for hardware.

94 B. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for  
95 surface-applied hardware may be done at project site.

96 C. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with  
97 "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames,"  
98 published by Door and Hardware Institute.

- 99 D. Steel plate reinforcement for finish hardware shall comply with the following minimum  
100 requirements:  
101 1. Hinges: 7 gage thick by 1-1/2 inches wide by 6 inches longer than hinge. Secure with no  
102 less than six spot welds.  
103 2. Strikes, Flush Bolts, and Closers: 12 gage.  
104 3. Surface-Mounted Hold Open Arms and Panic Devices: 12 gage.  
105 4. All other surface mounted hardware: 16 gage.

106 2.6 FINISHING

- 107 A. Shop Priming: Clean, treat, and prime paint exposed surfaces of steel door and frame units,  
108 including galvanized surfaces.  
109 1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before  
110 application of paint.  
111 2. Apply pretreatment to cleaned metal surfaces using cold phosphate solution (SSPC-PT2),  
112 hot phosphate solution (SSPC-PT4) or basic zinc chromate-vinyl butryl solution (SSPC-  
113 PT3).  
114 3. Apply shop coat of prime paint of even consistency to provide a uniformly finished  
115 surface ready to receive finish paint of no less than 7 mils dry film thickness.

116 PART 3 - EXECUTION

117 3.1 INSTALLATION

- 118 A. General: Install standard steel doors, frames, and accessories in accordance with final shop  
119 drawings, manufacturer's data, and in accordance with SDI or HMMA requirements.
- 120 B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For  
121 Steel Frames," or NFPA 80 at fire-rated openings unless otherwise indicated.  
122 1. Except for frames located at existing concrete or masonry installations, place frames prior  
123 to construction of enclosing walls and ceilings. Set frames accurately in position,  
124 plumbed, aligned, and braced securely until permanent anchors are set. After wall  
125 construction is completed, remove temporary braces and spreaders leaving surfaces  
126 smooth and undamaged.  
127 2. In masonry construction, locate 3 wall anchors per jamb adjacent to hinge location on  
128 hinge jamb and at corresponding heights on strike jamb.  
129 3. At existing concrete or masonry construction, provide 3 completed opening anchors per  
130 jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike  
131 jamb, set frames and secure to adjacent construction with bolts and masonry anchorage  
132 devices.
- 133 C. Door Installation: Fit hollow metal doors accurately in frames, with the following clearances:  
134 1. Jambs and Head: 3/32 inch.  
135 2. Meeting edges, pairs of doors: 1/8 inch.  
136 3. Bottom: 3/8 inch with no threshold, 1/8 inch with threshold.  
137 4. Install fire-rated doors with clearances as specified in NFPA Standard No. 80.

138 3.2 ADJUST AND CLEAN

139 A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of  
140 prime coat and apply touch-up of compatible air-drying primer.

141 B. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and  
142 frames undamaged and in complete and proper operating condition.

143 **END OF SECTION**









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**SECTION 08 41 13**

**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Applicable provisions of Division 01 shall govern work under this Section.

**1.3 RELATED SECTIONS**

Section 07 21 00 "Thermal Insulation" for insulation materials field installed with aluminum-framed systems.

Section 07 92 00 "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.

Section 08 71 00 "Door Hardware" for hardware to the extent not specified in this Section.

**1.2 PERFORMANCE REQUIREMENTS**

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

Structural loads.

Thermal movements.

Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.

Dimensional tolerances of building frame and other adjacent construction.

- B. Failure includes the following:

Deflection exceeding specified limits.

Thermal stresses transferred to building structure.

Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.

Noise or vibration created by wind and thermal and structural movements.

Loosening or weakening of fasteners, attachments, and other components.

Sealant failure.

Failure of operating units to function properly.

- C. Deflection Normal to Wall Plane: Limited to ¼ inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to ¾ inch, whichever is less.

- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.

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.

Test Durations: As required by design wind velocity but not less than 10 seconds.

In windborne-debris regions of hurricane-prone areas, authorities having jurisdiction may require debris-impact and cyclic-pressure testing for glazed assemblies. See "Wind Loads" Ar-

1 ticle in the Evaluations and verify requirements of authorities having jurisdiction before re-  
2 taining paragraph below.

- 3
- 4 E. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- 5
- 6 F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed  
7 glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to  
8 ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.
- 9
- 10 G. For water-penetration test, static-air-pressure difference of 20 percent of wind-load design pres-  
11 sure provides satisfactory performance in most parts of the U.S. Locations where high winds and  
12 heavy rains frequently occur simultaneously require higher test-pressure differences. Lower test-  
13 pressure differences are acceptable for some locations.
- 14
- 15 H. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence  
16 water penetration through fixed glazing and framing areas when tested according to ASTM E 331  
17 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure,  
18 but not less than 6.24 lbf/sq. ft.
- 19
- 20 I. Maximum Water Leakage: According to AAMA 501.1 No uncontrolled water penetrating sys-  
21 tems or appearing on systems' normally exposed interior surfaces from sources other than con-  
22 densation.
- 23
- 24 J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing ar-  
25 eas having condensation-resistance factor (CRF) of not less than 53 when tested according to  
26 AAMA 1503.
- 27
- 28 K. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and fram-  
29 ing areas having average U-factor of not more than 0.69 Btu/sq. ft. x h x deg F when tested ac-  
30 cording to AAMA 1503.

#### 31 32 1.4 SUBMITTALS

- 33
- 34 A. Product Data: Include construction details, material descriptions, dimensions of individual com-  
35 ponents and profiles, and finishes for each type of product indicated.
- 36
- 37 B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and  
38 attachments to other work. Include hardware schedule and indicate operating hardware types,  
39 functions, quantities, and locations. Include list of existing components to be re-used.
- 40
- 41 C. Samples for Verification: For each type of exposed finish required, in actual sizes.
- 42
- 43 D. Qualification Data: For Installer.
- 44
- 45 E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified test-  
46 ing agency, for aluminum-framed systems.
- 47
- 48 F. Field quality-control test and inspection reports.
- 49
- 50 G. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- 51
- 52 H. Warranties: Special warranties specified in this Section.

1  
2 1.5 QUALITY ASSURANCE  
3

- 4 A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of  
5 this Section and who is acceptable to manufacturer.  
6  
7 B. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop  
8 Drawings based on testing and engineering analysis of manufacturer's standard units in assem-  
9 blies similar to those indicated for this Project and submission of reports of tests performed on  
10 manufacturer's standard assemblies.  
11  
12 C. Product Options: Information on Drawings and in Specifications establishes requirements for  
13 systems' aesthetic effects and performance characteristics. Performance characteristics are indi-  
14 cated by criteria subject to verification by one or more methods including preconstruction testing,  
15 field testing, and in-service performance.  
16  
17 D. Accessible Entrances: Comply with the U.S. Architectural & Transportation Barriers Compli-  
18 ance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings  
19 and Facilities (ADAAG)."  
20

21 1.6 PROJECT CONDITIONS  
22

- 23 A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems  
24 by field measurements before fabrication and indicate measurements on Shop Drawings.  
25  
26 B. Coordinate construction to ensure that actual dimensions correspond to established dimensions.  
27

28 1.7 WARRANTY  
29

- 30 A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of  
31 aluminum-framed systems that do not comply with requirements or that deteriorate as defined in  
32 this Section within specified warranty period.  
33  
34 B. Failures include, but are not limited to, the following:  
35 Structural failures including, but not limited to, excessive deflection.  
36 Noise or vibration caused by thermal movements.  
37 Water leakage through fixed glazing and framing areas.  
38 Failure of operating components to function properly.  
39  
40 C. Warranty Period: Two years from date of Substantial Completion.  
41

42 PART 2 – PRODUCTS  
43

44 2.1 MANUFACTURERS  
45

- 46 A. Manufacturers: Subject to compliance with requirements, provide products by one of the follow-  
47 ing:  
48 Basis-of-Design Product: Kawneer Standard Entrances 500 Wide Stile. Subject to compliance  
49 with requirements, provide all components by one of the following:  
50 Arch Aluminum & Glass Co., Inc.  
51 CMI Architectural Products, Inc.  
52 Commercial Architectural Products, Inc.

1 Kawneer.  
2 Tubelite Inc.

3  
4 2.2 MATERIALS

5  
6 A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicat-  
7 ed.

8  
9 B. Sheet and Plate: ASTM B 209.

10  
11 C. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

12  
13 2.3 FRAMING SYSTEMS

14  
15 A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness  
16 required and reinforced as required to support imposed loads.

17  
18 B. Construction: Framing members are composite assemblies of two separate extruded-aluminum  
19 components permanently bonded by an elastomeric material of low thermal conductance.

20  
21 C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with  
22 nonstaining, nonferrous shims for aligning system components.

23  
24 D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-  
25 bleeding fasteners and accessories compatible with adjacent materials.  
26 Where fasteners are subject to loosening or turning out from thermal and structural movements,  
27 wind loads, or vibration, use self-locking devices.

28  
29 E. Reinforce members as required to receive fastener threads.

30  
31 F. Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing com-  
32 patible with adjacent materials. Form exposed flashing from sheet aluminum finished to match  
33 framing and of sufficient thickness to maintain a flat appearance without visible deflection.

34  
35 G. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer  
36 for joint type.

37  
38 2.4 GLAZING SYSTEMS

39  
40 A. Glazing: As specified in Section 08 80 00 "Glass and Glazing."

41  
42 B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded,  
43 that maintain uniform pressure and watertight seal.

44  
45 C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

46  
47 D. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neu-  
48 tral-curing silicone formulation compatible with structural sealant and other system components  
49 with which it comes in contact; and recommended by structural- and weatherseal-sealant and  
50 aluminum-framed system manufacturers for this use.

51  
52 E. Color: As selected by architect.

1  
2 2.5 DOORS

3  
4 A. Accessible Doors: Glazed doors, for smooth swing operation, smooth surfaced for width of door  
5 in area within 10 inches above floor or ground plane.

6  
7 B. Door Construction: 1 3/4" thick, extruded-aluminum tubular rail and stile members. Mechanically  
8 fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incor-  
9 porate concealed tie rods.

10  
11 C. Door Design: Per drawings.

12  
13 D. Glazing Stops and Gaskets: Square beveled, extruded-aluminum stops and preformed gaskets.

14  
15 E. Door Hardware: As specified in Division 8 Section "Door Hardware."

16  
17 2.6 ACCESSORY MATERIALS

18  
19 A. Insulating Materials: As specified in Division 7 Section "Building Insulation."

20  
21 B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Divi-  
22 sion 7 Section "Joint Sealants."

23  
24 C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 require-  
25 ments except containing no asbestos, formulated for 30-mil thickness per coat.

26  
27 2.7 FABRICATION

28  
29 A. Form aluminum shapes before finishing.

30  
31 B. Framing Members, General: Fabricate components that, when assembled, have the following  
32 characteristics:

33 Profiles which are sharp, straight, and free of defects or deformations.

34 Accurately fitted joints with ends coped or mitered.

35  
36 Means to drain water passing joints, condensation occurring within framing members, and mois-  
37 ture migrating within the system to exterior.

38  
39 Physical and thermal isolation of glazing from framing members.

40  
41 Accommodations for thermal and mechanical movements of glazing and framing to maintain re-  
42 quired glazing edge clearances.

43  
44 Fasteners, anchors, and connection devices that are concealed from view to greatest extent possi-  
45 ble.

46  
47 Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

48  
49 C. Door Frames: Reinforce as required to support loads imposed by door operation and for in-  
50 stalling hardware.

51  
52 D. Exterior Doors:

1 Reinforce doors as required for installing hardware.

2  
3 Provide sliding weather stripping retained in adjustable strip mortised into door edge.

4  
5 Provide weather sweeps applied to door bottoms.

6  
7 Provide compression weather stripping at fixed stops.

8  
9 E. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap  
10 for factory-installed hardware before applying finishes.

11  
12 F. After fabrication, clearly mark components to identify their locations in Project according to Shop  
13 Drawings.

## 14 15 2.8 ALUMINUM FINISHES

16  
17 A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Prod-  
18 ucts" for recommendations for applying and designating finishes.

19  
20 B. Finish designations prefixed by AA comply with the system established by the Aluminum Asso-  
21 ciation for designating aluminum finishes.

22  
23 C. Basis of Design: Kawneer no. 17. Class I, Clear Anodic Finish: AA-M12C22A44 (Mechanical  
24 Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating:  
25 Architectural Class I, clear coating 0.010 mm or thicker) complying with AAMA 611.

## 26 27 PART 3 – EXECUTION

### 28 29 3.1 EXAMINATION

30  
31 A. Examine areas, with Installer present, for compliance with requirements for installation tolerances  
32 and other conditions affecting performance of work.

33  
34 B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 35 36 3.2 INSTALLATION

#### 37 38 A. General:

39 Comply with manufacturer's written instructions.

40 Do not install damaged components.

41 Fit joints to produce hairline joints free of burrs and distortion.

42 Rigidly secure non-movement joints.

43 Install anchors with separators and isolators to prevent metal corrosion and electrolytic dete-  
44 rioration.

45 Seal joints watertight, unless otherwise indicated.

#### 46 47 B. Metal Protection:

48 Where aluminum will contact dissimilar metals, protect against galvanic action by painting  
49 contact surfaces with primer or by applying sealant or tape or installing nonconductive spac-  
50 ers as recommended by manufacturer for this purpose.

51 Where aluminum will contact concrete or masonry, protect against corrosion by painting con-  
52 tact surfaces with bituminous paint.

1 Install components to drain water passing joints, condensation occurring within framing  
2 members, and moisture migrating within the system to exterior.  
3 Coordinate first paragraph below with manufacturers' recommendations.  
4 Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section  
5 "Joint Sealants" and to produce weathertight installation.  
6 Install components plumb and true in alignment with established lines and grades, without  
7 warp or rack.  
8 Install glazing as specified in Division 8 Section "Glazing."  
9

10 C. Exterior Entrances: Install to produce smooth operation and tight fit at contact points, tight fit at  
11 weather stripping and weathertight closure.  
12

13 D. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufactur-  
14 ers' written instructions using concealed fasteners to greatest extent possible.  
15

16 E. Install insulation materials as specified in Division 7 Section "Building Insulation."  
17

18 F. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce  
19 weathertight installation.  
20

21 G. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum  
22 tolerances:

23 Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4  
24 inch over total length.

25 Alignment:

26 Where surfaces abut in line, limit offset from true alignment to 1/16 inch.

27 Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.  
28

29 H. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.  
30

### 31 3.3 FIELD QUALITY CONTROL 32

33 A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field  
34 tests and inspections and prepare test reports.  
35

36 B. Testing Services: Testing and inspecting of representative areas to determine compliance of in-  
37 stalled systems with specified requirements shall take place as and in successive stages as re-  
38 quired.  
39

40 C. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory  
41 testing under Part 1 "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. of  
42 fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure differ-  
43 ence of 1.57 lbf/sq. ft.  
44

45 D. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform stat-  
46 ic-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory  
47 testing under Part 1 "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft. and  
48 shall not evidence water penetration.  
49

50 E. Water Spray Test: Before installation of interior finishes has begun, a minimum area shall be  
51 tested according to AAMA 501.2 and shall not evidence water penetration.  
52

1 F. Repair or remove work where test results and inspections indicate that it does not comply with  
2 specified requirements.

3  
4 G. Additional testing and inspecting, at Contractor's expense, will be performed to determine com-  
5 pliance of replaced or additional work with specified requirements.

6  
7 3.4 ADJUSTING

8  
9 A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers'  
10 written instructions.

11  
12 B. For designated universally accessible doors, adjust closers to provide a 3-second closer sweep pe-  
13 riod for doors to move from a 70-degree open position to 3 inches from the latch measured to the  
14 leading door edge.

15  
16 **END OF SECTION**  
17



1 At a conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware  
2 parts, support arms or actuating mechanisms, nor any other damage which would cause the  
3 window to be inoperable.

4  
5 F. Condensation Resistance Test (CRF)

6  
7 With window sash and ventilators closed and locked, test unit in accordance with AAMA 1502.7

8  
9 Condensation Resistance Factor (CRF) shall be not less than 58.

10  
11 G. Thermal Transmittance Test (Conductive U-value)

12  
13 With window sash and ventilators closed and locked, test unit in accordance with AAMA  
14 1503.1

15  
16 Conductive thermal transmittance (u-value) shall be not more than .49 BTU/hr/sf/F°.

17  
18 H. Unless otherwise specified, windows tested for condensation resistance and thermal transmit-  
19 tance shall be glazed with no more than two lites of clear annealed glass. Sealed insulating  
20 glass shall be of standard construction.

21  
22 1.4 SUBMITTALS

23  
24 A. Product Data: Include construction details, material descriptions, dimensions of individual  
25 components and profiles, and finishes for each type of product indicated.

26  
27 B. Shop Drawings: Include typical unit elevations, full or half-scaled detail sections and typical  
28 installation details. Include type of glazing, screening, and window finish.

29  
30 C. Finish Samples: Two samples of each required finish, on an extruded shape of aluminum  
31 sheet.

32  
33 D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified  
34 testing agency, for aluminum-framed systems.

35  
36 E. Field quality-control test and inspection reports.

37  
38 F. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

39  
40 G. Warranties: Special warranties specified in this Section.

41  
42 1.5 QUALITY ASSURANCE

43  
44 A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for instal-  
45 lation of units required for this Project.

46  
47 B. Provide test reports from AAMA accredited laboratories certifying the performance as speci-  
48 fied in Performance Requirements.

- 1 C. Test reports shall be accompanied by the window manufacturer's letter of certification stating  
2 that the tested window meets or exceeds the referenced criteria for the appropriate  
3 ANSA/AAMA 101-97 window types.  
4
- 5 D. Glass: Windows tested shall be glazed with glass of thickness and configuration equivalent to  
6 glass required for this project.  
7
- 8 E. Field verify all window opening sizes.  
9

## 10 1.6 PROJECT CONDITIONS

- 11 A. Field Measurements: Verify actual sizes of all openings before fabrication and indicate  
12 measurements on Shop Drawings.  
13

## 14 1.7 WARRANTY

- 15 A. General Warranty: The special warranty specified in this Article shall not deprive the Owner  
16 of other rights the Owner may have under other provisions of the contract documents and shall  
17 be in addition to and run concurrent with, other warranties made by the Contractor under re-  
18 quirements of the Contract Documents.  
19
- 20 B. Special Warranty: The responsible contractor shall assume full responsibility and warrant for  
21 one year the satisfactory performance of the total window installation which includes that of  
22 the windows, hardware, glass (including insulated units), glazing, anchorage and setting sys-  
23 tem, sealing, flashing, etc. as it relates to air, water and structural adequacy as called for in the  
24 specifications and approved shop drawings. Any deficiencies due to such elements not meet-  
25 ing the specifications shall be corrected by the responsible contractor at his expense during the  
26 warranty period.  
27
- 28 C. Manufacturer Warranty: Manufacturer's standard form in which manufacturer agrees to repair  
29 or replace components of aluminum windows that do not comply with requirements or that de-  
30 teriorate as defined in this Section within specified warranty period.  
31
- 32 D. Window Installation:  
33
  - 34 1. Ten year warranty on material and workmanship.  
35
  - 36 2. Five year warranty on weather tightness of installation: air, water, and structural adequa-  
37 cy of units, and sealants within installation.  
38
  - 39 3. Factory Glazing: ten year on thermal and physical integrity of insulated glass units and  
40 performance of total glazing system under normal usage.  
41

## 42 PART 2 – MATERIALS

### 43 2.1 PRODUCTS MANUFACTURERS

- 44 A. Manufacturers: Subject to compliance with requirements, provide products by one of the fol-  
45 lowing:  
46

1. Custom Window.
2. TRACO Window Company, (TR3100 Series - Basis of Design)
3. Wausau Window & Wall Systems.

## 2.2 MATERIALS

A. Aluminum: Extrude aluminum shall be 6063-T5 alloy and temper.

B. Hardware:

Locking Handles shall be sweep type.

E. Hardware of appropriate size and capacity to hold the sash stationary at any open position shall be used for the weights of sash to be counterbalanced. Hardware shall be installed and securely attached in the plant of the window manufacturer using manufacturer's recommended installation procedures. Hardware shall be easily accessible when in the window and shall be replaceable in the field.

F. Windows Types:

1. Casement, operable: TRACO TR-3100, 3-1/4" Overlap Outswing with Screen.

G. Weatherstrip shall conform to AAMA 701.2

H. Glazing: All units shall be factory glazed and as specified in 08 80 00.

I. Thermal Barrier:

J. Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier, located between exterior materials and window members exposed on interior side, in a manner that eliminates direct metal-to-metal contact. Thermal barrier material shall be poured-in-place two part polyurethane.

K. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.

L. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.

M. Specified hardware shall not bridge the thermal barrier. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash. Minimum thermal separation: 1/4".

## 2.3 FABRICATION

A. General

1. Masonry opening sizes shall be verified in field.

2. Aluminum frame and sash extrusion shall have a nominal wall thickness of .078".

1 3. Mechanical fasteners, welded components and hardware items shall not bridge thermal  
2 barriers. Thermal barriers shall align at all frame and sash corners.

3  
4 4. Depth of frame and sash combined shall not be less than 4-5/8".

5  
6 B. Frame and Panning

7  
8 1. Frame components shall be mitered or butt jointed, as appropriate to the type of construc-  
9 tion required. All joints shall be welded or incorporate mechanical fasteners.

10  
11 2. Panning for replacement window units shall be as approved by architect and historic re-  
12 view agencies.

13  
14 C. Sash

15  
16 1. All sash extrusions shall be tubular.

17  
18 2. Each corner shall be mitered, reinforced with an extruded aluminum corner key, hydrau-  
19 lically crimped, and "cold welded" with epoxy adhesive.

20  
21 3. Each sash shall have two rows of Monsanto Santoprene weatherstripping installed in spe-  
22 cially designed dovetail grooves in all four sides of the sash extrusion.

23  
24 D. Glazing

25  
26 1. Glazed units are to be glazed with glazing tape and extruded aluminum glazing beads.  
27 Exterior silicone cap bead shall be applied at all perimeter edges.

28  
29  
30 E. Finish

31  
32 1. Exterior Colors:

33  
34 a. Color: TRACO Fashion Gray

35  
36 2. Interior Color:

37  
38 a. Color: TRACO Fashion Gray.

39  
40 PART 3 – EXECUTION

41  
42 3.1 EXAMINATION

43  
44 A. Examine areas, with Installer present, for compliance with requirements for installation tol-  
45 erances and other conditions affecting performance of work.

46  
47 B. Verify that openings are dimensionally within allowable tolerances, plumb, level, and con-  
48 tain solid anchoring surfaces and are in accordance with approved shop drawings.

49  
50 C. Proceed with installation only after unsatisfactory conditions have been corrected.

1 3.2 INSTALLATION

2  
3 A. General:

- 4 1. Use only skilled tradesman with work done in accordance with approved shop drawings  
5 and specifications.  
6  
7 2. Comply with manufacturer's written instructions.  
8  
9 3. Provide blocking and rough framing as necessary.  
10  
11 4. Do not install damaged components.  
12  
13 5. Fit joints to produce hairline joints free of burrs and distortion.  
14  
15 6. Rigidly secure non-movement joints.  
16  
17 7. Where aluminum comes into direct contact with steel, masonry concrete, or non-  
18 compatible materials, separate by bituminous paint, zinc chromate primer or suitable in-  
19 sulating materials.  
20  
21 8. Install anchors with separators and isolators to prevent metal corrosion and electrolytic  
22 deterioration.  
23  
24 9. Furnish and apply sealants to provide a weathertight installation at all joints and intersec-  
25 tions and at opening perimeters. Wipe off excess material and leave all exposed surfaces  
26 and joints clean and smooth.  
27

28 3.4 ADJUSTING, CLEANING, AND PROTECTION

- 29  
30 A. Upon completion of window installation, windows shall be inspected, adjusted, put into  
31 working order, clean, free of labels, and dirt.  
32  
33 B. Keep site clean and free from accumulation of rubbish.  
34

35 3.5 SCHEDULE

- 36  
37 a. Refer to schedule on drawings.  
38  
39

40 **END OF SECTION**

1 SECTION 08 71 00

2 DOOR HARDWARE

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

- 5 A. Applicable provisions of Division 1 govern work of the Section.

6 1.2 SUMMARY

- 7 A. Work of this Section includes

- 8 1. Hinges.  
9 2. Cylinders and keys.  
10 3. Locksets.  
11 4. Lever Handles.  
12 5. Closers.  
13 6. Flush and Surface bolts.  
14 7. Door Stops.  
15 8. Thresholds and Door Weather Strips.  
16 9. Kickplates.  
17 10. Deadbolts.  
18 11. Push Plates.  
19 12. Pull Plates.  
20 13. Coat Hooks.

- 21 B. Related Sections:

- 22 1. Section 08 11 03 "Hollow Metal Doors and Frames".

23 1.3 SUBMITTALS

- 24 A. Product data including manufacturers' technical product data for each item of door hardware,  
25 installation instructions, maintenance of operating parts and finish, and other information  
26 necessary to show compliance with requirements.

- 27 B. Final hardware schedule coordinated with Architect's schedule and related work to ensure  
28 proper size, thickness, function, and finish of door hardware. Determine hand from plans.

- 29 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into  
30 "hardware sets" indicating complete designations of every item required for each door or  
31 opening. Coordinate with Architect's Door and Hardware schedule in the documents.  
32 Include the following information:  
33 a. Type, style, function, size, and finish of each hardware item.  
34 b. Name and manufacturer of each item.  
35 c. Fastenings and other pertinent information.  
36 d. Location of each hardware set cross referenced to Drawings and Schedule.

- 1 e. Mounting locations for hardware.
- 2 2. Submittal Sequence: Submit initial draft of final schedule along with essential product  
3 data in order to facilitate the fabrication of other work that is critical in the Project  
4 construction schedule. Submit final schedule after samples, product data, coordination  
5 with shop drawings of other work, delivery schedules, and similar information has been  
6 completed and accepted.  
7
- 8 C. Templates for doors, frames, and other work specified to be factory prepared for the installation  
9 of door hardware. Check shop drawings of work of other appropriate Sections to confirm that  
10 adequate provisions are made for locating and installing door hardware to comply with  
11 indicated requirements.
- 12 1.4 QUALITY ASSURANCE
- 13 A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers,  
14 etc.) from a single manufacturer.
- 15 B. Supplier Qualifications: A recognized architectural door hardware supplier, with a record of  
16 successful in-service performance for supplying door hardware similar in quantity, type, and  
17 quality to that indicated for this Project and that employs an experienced architectural hardware  
18 consultant (AHC) who is available to Owner, Architect, and Contractor for consultation.
- 19 1.5 DELIVERY, HANDLING AND STORAGE
- 20 A. Tag each item or package separately with identification related to final hardware schedule, and  
21 include basic installation instructions with each item or package.
- 22 B. Packaging of door hardware is responsibility of supplier. As material is received by hardware  
23 supplier from various manufacturers, sort and repackage in containers clearly marked with  
24 appropriate hardware set number to match set numbers of approved hardware schedule. Two or  
25 more identical sets may be packed in same container.
- 26 C. Inventory door hardware jointly with representatives of hardware supplier and hardware  
27 installer until each is satisfied that count is correct.
- 28 D. A. Deliver individually packaged door hardware items promptly to place of installation.
- 29 E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control  
30 handling and installation of hardware items that are not immediately replaceable so that  
31 completion of the Work will not be delayed by hardware losses both before and after  
32 installation.
- 33 F. Keys shall be delivered directly to the designated Owner Project Representative in packaging  
34 separate from other hardware. Obtain receipt and confirmation of delivery in writing with  
35 copies to be delivered to Architect and Owner's Construction Representative.

1 1.6 MAINTENANCE

2 A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and  
3 maintenance instructions as needed for Owner's continued adjustment, maintenance, removal  
4 and replacement of door hardware.

5 1.7 WARRANTY

6 A. Manufacturer's written guarantee for periods of time as follows beginning from date of  
7 substantial completion.

- 8 1. Closers: Ten years.
  - 9 2. Lacquer finishes: Two years.
  - 10 3. Polyurethane finishes: Five years.
  - 11 4. All other hardware: One year.
- 12  
13

14 PART 2 - PRODUCTS

15 2.1 MANUFACTURERS

16 A. Manufacturers: Subject to compliance with Owner's requirements, provide products by the  
17 following:

- 18 1. Hinges: Hager, IVES, McKinney.
- 19 2. Cylinders and keys: Schlage.
- 20 3. Locksets: Schlage, Rocky Mountain Hardware, Yale Commercial Locks.
- 21 4. Lever Handles: Schlage, Rocky Mountain Hardware.
- 22 5. Closers: Yale Security, LCN, Corbin Russwin.
- 23 6. Door Stops: Hager, Ives, Crown City Hardware.
- 24 7. Thresholds and Door Weather Strips: Reese, Hager, Pemko.
- 25 8. Kickplates: Hager, Rocky Mountain Hardware, Crown City Hardware.
- 26 9. Push Plates: Rocky Mountain Hardware, Hager, Crown City Hardware.
- 27 10. Pull Plates: Rocky Mountain Hardware, Crown City Hardware, Sun Valley Bronze.
- 28 11. Coat Hooks: Rocky Mountain Hardware, Crown City Hardware, Samuel Heath
- 29 Architectural Hardware.

30 2.2 SCHEDULED HARDWARE

31 A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each  
32 type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section.  
33 Products are identified by using hardware designation numbers of the following:

- 34 1. Manufacturer's Product Designations: The product designation and name of the  
35 manufacturer are listed for each hardware type required for the purpose of establishing  
36 Owner's requirements. Provide the product designated or, where specific product is not  
37 designated, the product of the manufacturer(s) that complies with requirements.

1 2.3 MATERIALS AND FABRICATION

- 2 A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name  
3 or trade name displayed in a visible location (omit removable nameplates) except in conjunction  
4 with required fire-rated labels and as otherwise acceptable to Architect.  
5 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- 6 B. Fasteners: Provide hardware manufactured to conform to published templates, generally  
7 prepared for machine screw installation. Do not provide hardware that has been prepared for  
8 self-tapping sheet metal screws, except as specifically indicated.
- 9 C. Furnish screws for installation with each hardware item. Provide slotted-head screws sized as  
10 appropriate for each item or to match sizes on existing hardware. Finish exposed (exposed  
11 under any condition) screws to match hardware finish or, if exposed in surfaces of other work,  
12 to match finish of other work as closely as possible.
- 13 D. Provide concealed fasteners for hardware units that are exposed when door is closed unless  
14 units of type specified are not available with concealed fasteners. Do not use thru-bolts for  
15 installation where bolt head or nut on opposite face is exposed in other work unless their use is  
16 the only means of reinforcing the work adequately to fasten the hardware securely. Where  
17 thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use  
18 hex screw fasteners.  
19

20 2.4 HINGES

- 21 A. Hinges:  
22 1. H-1  
23 a. Location: Doors DNB01, DNB02, DNB03.  
24 b. Basis-of-Design Manufacturer: Hager.  
25 c. Item Designation: BB1168-Steel.  
26 d. Description: Full Mortise Ball Bearing Hinge with steel base Metal.  
27 e. Size: 4-1/2 x 4-1/2.  
28 f. 5 Knuckle.  
29 g. Finish: US26.
- 30 B. Templates: Provide template-produced units only.
- 31 C. Screws: Provide Phillips flat-head screws complying with the following requirements:  
32 1. For metal doors and frames install machine screws into drilled and tapped holes.  
33 2. For wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.  
34 3. Finish screw heads to match surface of hinges or pivots.
- 35 D. Hinge Pins: Non-removable with tips as indicated in 2.4-A and matching plug, finished to  
36 match leaves.
- 37 E. Number of Hinges:  
38 1. Provide Three hinges for doors up to 60 inches in height, three hinges per door leaf for  
39 doors over 60 inches up to 90 inches in height and one additional hinge for each 30 inches  
40 of additional height.

1 2.5 LOCK SETS

2 A. Types

3 1. **LS-1**

- 4
- 5 a. Basis-of-Design Manufacturer: Schlage.
  - 6 b. Item Designation: S-Series.
  - 7 c. Design: Jupiter (JUP).
  - 8 d. Finish: US26 or 626 (satin chrome).
  - 9 e. Function: 551PD Privacy Lock.

10 2. **LS-2**

- 11 a. Basis-of-Design Manufacturer: Rocky Mountain Hardware.
- 12 b. Item Designation: E308/E308.
- 13 c. Design: Stepped.
- 14 d. Lever: L140 Harrington.
- 15 e. Finish: Satin Chrome.
- 16 f. Function: Office, Storage

17 3. **LS-3**

- 18 a. Basis-of-Design Manufacturer: Rocky Mountain Hardware.
- 19 b. Item Designation: E308/E308.
- 20 c. Design: Stepped.
- 21 d. Lever: L140 Harrington.
- 22 e. Finish: Satin Chrome.
- 23 f. Function: Entrance / keyed deadbolt.

24

25 4. **LS-4**

- 26
- 27 a. Basis-of-Design Manufacturer: Schlage.
- 28 b. Item Designation: S-Series.
- 29 c. Design: Jupiter (JUP).
- 30 d. Finish: US26 or 626 (satin chrome).
- 31 e. Function: 551PD Egress only push bar.
- 32

33 B. Strikes: Provide manufacturer's standard wrought box strike for each lockset with curved lip  
34 extended to protect frame, finished to match hardware set, unless otherwise indicated.

- 35 1. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by  
36 manufacturer.
- 37 2. Provide extra long strike lips for locks used on frames with applied wood casing trim.
- 38 3. Provide recess type top strikes for bolts locking into head frames, unless otherwise  
39 indicated.
- 40 4. Provide dust-proof strikes for foot bolts, except where special threshold construction  
41 provides nonrecessed strike for bolt.
- 42 5. Provide roller type strikes where recommended by manufacturer of the latch and lock  
43 units.

44 C. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors and 3/4-inch  
45 minimum throw of latch for single doors.

- 1 2.6 KEYING
- 2 A. Existing System: Grand master key the locks to the Owner's existing system, with a new  
3 masterkey for the Project.
- 4 B. Provide betting chart directly from factory to Approved City of Racine Locksmith.
- 5 C. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide  
6 individual change key for each lock that is not designated to be keyed alike with a group of  
7 related locks.
- 8 1. Permanently inscribe one side of each key with number of lock that identifies cylinder  
9 manufacturer's key symbol, and notation, "City of Racine. Unlawful to Duplicate."  
10 Second side of key to be left blank.
- 11 D. Key Material: Provide keys of nickel silver only.
- 12 E. Key Quantity: Furnish 3 change keys for each lock.
- 13 1. Furnish one extra blank for each lock.
- 14 2. Deliver keys to Owner.
- 15 2.7 CLOSERS
- 16 A. Types:
- 17 1. **CL-2**
- 18 a. Location: exterior doors.
- 19 b. Basis-of-Design Manufacturer: Yale Security Inc.
- 20 c. Item Designation: PA3301.
- 21 d. Finish: 689 (aluminum).
- 22 B. Provide one closer for each door, two closers for pairs of doors.
- 23 C. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's  
24 recommendations for size of door control unit depending on size of door, exposure to weather,  
25 and anticipated frequency of use.
- 26 D. Key valve type, rack and pinion construction, back check and two-speed closing adjustment.
- 27 E. Provide all special arms and brackets to suit installation.
- 28 2.8 DOOR STOPS
- 29 A. Provide one stop per door where scheduled and two for pairs of doors. Mount at height on  
30 adjacent wall to strike against furthest protruding object on moving door
- 31 B. Types:
- 32 1. **ST-1**
- 33 a. Location: DE102a, DE102c, DE102d.
- 34 b. Basis-of-Design Manufacturer: Hager.
- 35 c. Item Designation: 243F.
- 36 d. Description: Door Stop Floor Mounted.

1 e. Finish: US10B.

2 2.9 KICKPLATES

3 A. Types

4 1. **K-1**

5 a. Location: Push side of Doors DE100a, DE102b, DE102c, DE102d, DE102e,  
6 DE103.

7 b. Basis-of-Design Manufacturer: Rocky Mountain Hardware.

8 c. Item Designation: KP 834.

9 d. Description: 8"x 34" Kick plate.

10 e. Finish: Satin Chrome.

11 2. **K-2**

12 a. Location: Push side of Doors DNB01, DNB02, DNB03.

13 b. Basis-of-Design Manufacturer: Hager.

14 c. Item Designation: 223S-8"x34".

15 d. Description: 8"x34" Kick plate .662-gauge with Stainless Steel Base metal.

16 e. Finish: US26 (satin stainless steel).

17 2.10 PULL AND PLATES

18 A. Types:

19 1. **PL-1**

20 a. Location: Doors DE102b, DE102e.

21 b. Basis-of-Design Manufacturer: Rocky Mountain Hardware.

22 c. Item Designation: G301/E357.

23 d. Size: Exterior: 2-3/4"x20", Interior 2-1/2"x13".

24 e. Design: Stepped.

25 f. Pull: G607.

26 g. Lever: L151 Harrington (large).

27 h. Finish: Satin Chrome.

28 i. Function: Active Entry set.

29 2. **PL-2**

30 a. Location: Doors DE102c, DE102d.

31 b. Basis-of-Design Manufacturer: Rocky Mountain Hardware.

32 c. Item Designation: G304/E356.

33 d. Size: Exterior: 2-3/4"x20", Interior 2-1/2"x13".

34 e. Design: Stepped.

35 f. Pull: G607.

36 g. Lever: L151 Harrington (large).

37 h. Finish: Satin Chrome.

38 i. Function: Dummy Entry set.

39 3. **PL-3**

40 a. Location: Doors DE100a.

41 b. Basis-of-Design Manufacturer: Rocky Mountain Hardware.

42 c. Item Designation: E358/E357.

43 d. Size: Exterior: 2-1/2"x13", Interior 2-1/2"x13".

44 e. Design: Stepped.

45 f. Lever: L151 Harrington (large).

- 1 g. Finish: Satin Chrome.
- 2 h. Function: Entry set.

3 2.11 FLUSH AND SURFACE BOLTS

4 A. Types:

5 1. **FB-1**

- 6 a. Location: Doors DE102c, DE102d.
- 7 b. Basis-of-Design Manufacturer: H.B. Ives & Co.
- 8 c. Item Designation: 262.
- 9 d. Description: 3/4" x 6" x 1 11/32" flush bolt. Use item #DP2 dust proof strike with
- 10 flush bolt.
- 11 e. Finish: Satin Chrome.

12 2.12 THRESHOLDS AND WEATHERSTRIPS

13 A. Types:

14 1. **T-1**

- 15 a. Location: Exterior doors.
- 16 b. Basis-of-Design Manufacturer: Reese.
- 17 c. Item Designation: 5475A.
- 18 d. Description: 7-1/8" Threshold.
- 19 e. Finish: Alum.

20 2. **DS-1**

- 21 a. Location: Exterior doors.
- 22 b. Basis-of-Design Manufacturer: Pemko Assa Abloy.
- 23 c. Item Designation: 216BV.
- 24 d. Description: Door Sweep.
- 25 e. Finish: Alum.

26 3. **JW-1**

- 27 a. Location: Exterior doors.
- 28 b. Basis-of-Design Manufacturer: Reese.
- 29 c. Item Designation: 128CP.
- 30 d. Description: Jamb Weather Strip.
- 31 e. Finish: Alum.

32 2.13 COATHOOKS

33 A. Types:

34 1. **CH-1**

- 35 a. Location: Toilet rooms, see drawings.
- 36 b. Basis-of-Design Manufacturer: Rocky Mountain Hardware.
- 37 c. Item Designation: CH2.
- 38 d. Description: 2 prong coat hook.
- 39 e. Finish: Satin Chrome.

- 1 2.14 FINISHES
- 2 A. Finishes as indicated above for specified hardware. Sample to be approved by Architect.
- 3 B. All Hardware shall be factory finished in color to match samples.
- 4 C. Provide quality of finish, including thickness of plating or coating (if any), composition,  
5 hardness, and other qualities complying with manufacturer's standards, but in no case less than  
6 specified by referenced standards for the applicable units of hardware. \*\*No Brushed Finishing  
7 Applications will be accepted\*\*
- 8 D. Provide protective transparent, dull finish polyester or other approved coating on all exposed  
9 hardware surfaces to protect hardware for minimum of two years.

10 PART 3 - EXECUTION

11 3.1 INSTALLATION  
12

- 13 A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware  
14 for Standard Steel Doors and Frames" by the Door and Hardware Institute , except as  
15 specifically indicated otherwise or as otherwise directed by Architect.
- 16 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames"  
17 by the Door and Hardware Institute.
- 18 B. Install each hardware item in compliance with the manufacturer's instructions and  
19 recommendations. Where cutting and fitting is required to install hardware onto or into surfaces  
20 that are later to be painted or finished in another way, coordinate removal, storage, and  
21 reinstallation or application of surface protection with finishing work specified in the Division 9  
22 Sections. Do not install surface-mounted items until finishes have been completed on the  
23 substrates involved.
- 24 C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment  
25 substrate as necessary for proper installation and operation.
- 26 D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space  
27 fasteners and anchors in accordance with industry standards.

28 3.2 FINAL ADJUSTING AND CHECKING

- 29 A. Adjust and check each operating item of hardware and each door to ensure proper operation or  
30 function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or  
31 as intended for the application made.
- 32 1. Where door hardware is installed more than one month prior to acceptance or occupancy  
33 of a space or area, return to the installation during the week prior to acceptance or  
34 occupancy and make final check and adjustment of all hardware items in such space or  
35 area. Clean operating items as necessary to restore proper function and finish of hardware  
36 and doors. Adjust door control devices to compensate for final operation of heating and  
37 ventilating equipment.

- 1 B. Any hardware item or unit proving to be defective as to material, construction or finish during  
2 final inspection by Architect or during warranty period shall be replaced in it's entirety by the  
3 Contractor at own expense.
- 4 C. Clean adjacent surfaces soiled by hardware installation.
- 5 D. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and  
6 hardware finishes.

7 3.3 HARDWARE SCHEDULE

- 8 A. Refer to Drawings and Schedule.

9 END OF SECTION

1 **SECTION 08 83 00**

2 **MIRRORS**

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

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

7 1.2 SUMMARY

- 8 A. Section includes the following types of silvered flat glass mirrors:  
9 1. Metal-framed tempered glass mirrors.

10 1.3 SUBMITTALS

- 11 A. Product Data: For each type of product.

- 12 1. Mirrors. Include description of materials and process used to produce each type of  
13 silvered flat glass mirror specified that indicates sources of glass, glass coating  
14 components, edge sealer, and quality-control provisions.

- 15 B. LEED Submittals:

- 16 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed  
17 statement of VOC content.  
18 2. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that  
19 products comply with the testing and product requirements of the California Department  
20 of Public Health's (formerly, the California Department of Health Services') "Standard  
21 Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from  
22 Indoor Sources Using Environmental Chambers."

- 23 C. Qualification Data: For Installer.

- 24 D. Product Certificates: For each type of mirror and mirror mastic.

- 25 E. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was  
26 tested for compatibility and adhesion with mirror backing and substrates on which mirrors are  
27 installed.

- 28 F. Maintenance Data: For mirrors to include in maintenance manuals.

1 1.4 QUALITY ASSURANCE

2 A. Installer Qualifications: A qualified installer who employs glass installers for this Project who  
3 are certified under the National Glass Association's Certified Glass Installer Program.

4 1.5 DELIVERY, STORAGE, AND HANDLING

5 A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent  
6 damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or  
7 other causes.

8 B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling  
9 mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass  
10 surfaces and applied coatings. Store indoors.

11 1.6 FIELD CONDITIONS

12 A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity  
13 conditions are maintained at levels indicated for final occupancy.

14 1.7 WARRANTY

15 A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified  
16 warranty period. Deterioration of mirrors is defined as defects developed from normal use that  
17 are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to  
18 manufacturer's written instructions. Defects include discoloration, black spots, and clouding of  
19 the silver film.

20 1. Warranty Period: Five years from date of Substantial Completion.

21 PART 2 - PRODUCTS

22 2.1 METAL-FRAMED TEMPERED GLASS MIRRORS

23 A. Mirrors, General: ASTM C 1503. Frame, Stainless steel.  
24

25 B. Laminated Mirrors: ASTM C 1172, Type II.

26 C. Manufacturers: Subject to compliance with requirements, provide products by one of the  
27 following:

- 28 1. Bradley Company.  
29 2. Bobrick Corp.

30 D. Mirror Sizes:

- 31 1. 18"W x 30"H (locate centered over wall hung lavatory)

1 2.2 MISCELLANEOUS MATERIALS

2 A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or  
3 minus 5.

4 B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for  
5 use in protecting against silver deterioration at mirrored glass edges.

6 C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting  
7 mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating  
8 and substrates on which mirrors will be installed.

9 D. Manufacturers: Subject to compliance with requirements, provide products by one of the  
10 following:

- 11 a. Franklin International.
- 12 b. Laurence, C. R. Co., Inc.
- 13 c. Liquid Nails Adhesive.
- 14 d. Palmer Products Corporation.
- 15 e. Royal Adhesives & Sealants, LLC.

16 2. Adhesive shall have a VOC content of 70 g/L or less.

17 2.3 MIRROR HARDWARE

18 A. Steel Hardware: Formed-steel shapes for rectangular mirrors.

19 1. Profile: Manufacturer's Standard.

20 B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in  
21 finished color and texture where fasteners are exposed.

22 C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide  
23 toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized  
24 anchors and inserts for applications on inside face of exterior walls and where indicated.

25 2.4 FABRICATION

26 A. Fabricate mirrors in the shop to greatest extent possible.

27 B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and  
28 size cutouts so they fit closely around penetrations in mirrors.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Examine substrates, over which mirrors are to be mounted, with Installer present, for  
4 compliance with installation tolerances, substrate preparation, and other conditions affecting  
5 performance of the Work.
- 6 B. Verify compatibility with and suitability of substrates, including compatibility of existing  
7 finishes or primers with mirror mastic.
- 8 C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces  
9 are dry.

10 3.2 PREPARATION

- 11 A. Comply with mastic manufacturer's written installation instructions for preparation of  
12 substrates, including coating substrates with mastic manufacturer's special bond coating where  
13 applicable.

14 3.3 INSTALLATION

- 15 A. General: Install mirrors to comply with mirror manufacturer's written instructions and with  
16 referenced GANA publications. Mount mirrors accurately in place in a manner that avoids  
17 distorting reflected images.
- 18 B. Provide a minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface  
19 for air circulation between back of mirrors and face of mounting surface.
- 20 C. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting  
21 surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install  
22 fasteners so heads do not impose point loads on backs of mirrors.
- 23 1. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling  
24 of mirror edges. Locate clips so they are symmetrically placed and evenly spaced.
- 25 2. Install mastic as follows:
- 26 a. Apply barrier coat to mirror backing where approved in writing by manufacturers  
27 of mirrors and backing material.
- 28 b. Apply mastic to comply with mastic manufacturer's written instructions for  
29 coverage and to allow air circulation between back of mirrors and face of  
30 mounting surface.
- 31 c. After mastic is applied, align mirrors and press into place while maintaining a  
32 minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting  
33 surface.

1 3.4 CLEANING AND PROTECTION

2 A. Protect mirrors from breakage and contaminating substances resulting from construction  
3 operations.

4 B. Do not permit edges of mirrors to be exposed to standing water.

5 C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from  
6 condensation or other sources for continuous periods of time.

7 D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections  
8 that establish date of Substantial Completion. Clean mirrors as recommended in writing by  
9 mirror manufacturer.

10 END OF SECTION 08 83 00

1 SECTION 08 80 00

2 GLASS AND GLAZING

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

- 5 A. Applicable provisions of Division 1 govern work of the Section.

6 1.2 SUMMARY

- 7 A. Work of this Section includes new and replacement single-glazing for wood windows and  
8 transoms, including new storm windows.

- 9 B. Related Work.

- 10 1. Section 08 59 20 "Historic Treatment of Wood Windows".

11 1.3 SYSTEM DESCRIPTION

- 12 A. Provide replacement and new glass and glazing that has been produced, fabricated and installed  
13 to withstand normal thermal movement, wind loading and impact loading (where applicable)  
14 per ASTM specifications, without failure including loss or breakage of glass, failure of sealants  
15 to remain watertight and airtight, deterioration of glass and glazing materials and other defects  
16 in the work.

17 1.4 SUBMITTALS

- 18 A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated  
19 glass product required, including installation and maintenance instructions.

- 20 B. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer  
21 indicating that wood, glass and glazing materials have been tested for compatibility and  
22 adhesion and are found to be acceptable.

23 1.5 QUALITY ASSURANCE

- 24 A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association  
25 (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements  
26 are indicated. Refer to those publications for definitions of glass and glazing terms not  
27 otherwise defined in this section or other referenced standards.

- 28 B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having  
29 jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing  
30 requirements of 16 CFR Part 1201 for category II materials. Subject to compliance with

1 requirements, provide safety glass permanently marked with certification label of Safety  
2 Glazing Certification Council (SGCC).

3 1.6 DELIVERY, STORAGE, AND HANDLING

4 A. Protect glass and glazing materials during delivery, storage and handling to comply with  
5 manufacturer's directions and as required to prevent edge damage to glass, and damage to glass  
6 and glazing materials from effects of moisture including condensation, of temperature changes,  
7 of direct exposure to sun, and from other causes.

8 1.7 PROJECT CONDITIONS

9 A. Environmental Conditions: Do not proceed with glazing when ambient and substrate  
10 temperature conditions are outside the limits permitted by glazing material manufacturer or  
11 when joint substrates are wet due to rain, frost, condensation or other causes.

12 1.8 WARRANTY

13 A. Warranty Period: Manufacturer's written standard but not less than 10 years after date of  
14 substantial completion.

15 B. Glazing compound/sealant shall be guaranteed by manufacturer and contractor not to wrinkle,  
16 run, bleed or attract dirt after application. Material shall not require painting to protect it from  
17 deteriorating or drying out.

18 PART 2 - PRODUCTS

19 2.1 TYPES AND MANUFACTURERS

20 A. Window Glass: Insulated Double-Glass Lites:

21 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed  
22 to resist thermal stresses induced by differential shading of individual glass lites and to  
23 comply with glass design requirements specified in Part 1 "Performance Requirements"  
24 Article.

25 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.

26 3. Provide Kind UV (clear uv film) glass lites in all storm window units.

27 4. Spacer Specifications: Manufacturer's standard spacer material and construction.

28 5. Spacer Specifications: Manufacturer's standard spacer material and construction  
29 complying with the following requirements:

30 a. Spacer Material: Aluminum with bronze, color anodic finish.

31 b. Desiccant: Molecular sieve or silica gel, or blend of both.

32 c. Corner Construction: Manufacturer's standard corner construction.

33 B. Glass Manufacturers:

- 1 1. Pilkington.
- 2 2. Cardinal CG.
- 3 3. PPG Industries.

4 2.2 GLASS PRODUCTS, GENERAL

- 5 A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036
- 6 requirements, including those indicated by reference to type, class, quality, and, if applicable,
- 7 form, finish, mesh and pattern.
- 8 B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048
- 9 requirements, including those indicated by reference to kind, condition, type, quality, class, and,
- 10 if applicable, form, finish, and pattern.
- 11 C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and
- 12 tolerances complying with recommendations of glass manufacturer. Provide thicknesses
- 13 indicated or, if not otherwise indicated, as recommended by glass manufacturer for application
- 14 indicated.

15 2.3 PRIMARY GLASS PRODUCTS

- 16 A. Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

17 2.4 HEAT-TREATED GLASS PRODUCTS

- 18 A. Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent
- 19 glass, flat), Class 1 (clear), Quality q3 (glazing select), kind FT (fully tempered).

20 2.5 UV FILTERING GLASS PRODUCTS

- 21 A. Coated-Float Glass. Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).

22 2.6 MISCELLANEOUS GLAZING MATERIALS

- 23 A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in
- 24 installation.
- 25 B. Cleaners, Primers and Sealers: Type recommended by sealant manufacturer.

26 PART 3 - EXECUTION

27 3.1 EXAMINATION

- 28 A. Inspect conditions for glazing work for compliance with required installation tolerances,
- 29 including those for size, squareness, offsets at corners; existence of minimum required face or

1 edge clearances; and for effective sealing of joinery. Notify Architect of conditions detrimental  
2 to performance of glazing work. Do not proceed until unsatisfactory conditions have been  
3 corrected.

4 3.2 PREPARATION

5 A. Clean glazing channels and other framing members to receive glass, immediately before  
6 glazing. Remove coatings that are not firmly bonded to substrates.

7 3.3 GLAZING, GENERAL

8 A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of  
9 sealants and other glazing materials, except where more stringent requirements are indicated,  
10 including those of referenced glazing standards.

11 B. Existing glazing channel dimensions are intended to provide for necessary bite on glass,  
12 minimum edge and face clearances, and adequate sealant thicknesses, with reasonable  
13 tolerances. Field verify and adjust as required by job conditions at time of installation.

14 C. Protect glass from edge damage during handling and installation; Remove from project and  
15 dispose of glass units with edge damage or other imperfections of kind that, when installed,  
16 weakens glass and impairs performance and appearance.

17 D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by  
18 preconstruction sealant-substrate testing.

19 1. Protect glass from breakage immediately upon installation by use of crossed streamers  
20 attached to framing and held away from glass. Do not apply markers to surfaces of glass.  
21 Remove nonpermanent labels and clean surfaces.

22 2. Protect glass from contact with contaminating substances resulting from construction  
23 operations. If, despite such protection, contaminating substances do come into contact  
24 with glass, remove immediately by method recommended by glass manufacturer.

25 3. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in  
26 other ways during construction period, including natural causes, accidents and vandalism.

27 4. Wash glass on both faces prior to date scheduled for inspections intended to establish  
28 date of substantial completion in each area of project. Wash glass by method  
29 recommended by glass manufacturer.

30 END OF SECTION

31 \*\*\*



1 F. Product Test Reports: For each type of glazing sealant, for tests performed by a qualified testing  
2 agency.

3 1. Provide test reports based on testing current sealant formulations within previous 36-  
4 month period.

5 1.6 QUALITY ASSURANCE

6 A. Manufacturer Qualifications for Insulating Security Glazing Units with Sputter-Coated, Low-E  
7 Coatings: A qualified insulating glazing manufacturer who is approved and certified by coated-  
8 glass manufacturer.

9 B. Installer Qualifications: A qualified installer who employs glazing installers for this Project who  
10 are certified under the National Glass Association Glazier Certification Program.

11 C. Sealant Testing Agency Qualifications: Qualified according to ASTM C 1021 for testing  
12 indicated.

13 1.7 PRECONSTRUCTION TESTING

14 A. Preconstruction Adhesion and Compatibility Testing: Test each security glazing type, tape  
15 sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and  
16 compatibility with elastomeric glazing sealants.

17 1. Testing will not be required if data based on previous testing of current sealant products  
18 and glazing materials match those submitted.

19 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation  
20 techniques are required to obtain rapid, optimum adhesion of glazing sealants to security  
21 glazing, tape sealants, gaskets, and glazing channel substrates.

22 1.8 DELIVERY, STORAGE, AND HANDLING

23 A. Protect security glazing and glazing materials according to manufacturer's written instructions.  
24 Prevent damage from condensation, temperature changes, direct exposure to sun, or other  
25 causes.

26 B. Comply with insulating security glazing and with air-gap security glazing manufacturers'  
27 written recommendations for venting and sealing units to avoid hermetic seal ruptures due to  
28 altitude change.

29 1.9 FIELD CONDITIONS

30 A. Environmental Limitations: Do not proceed with glazing when ambient and substrate  
31 temperature conditions are outside limits permitted by glazing material manufacturers and when  
32 glazing channel substrates are wet from rain, frost, condensation, or other causes.

33 1. Do not install glazing sealants when ambient and substrate temperature conditions are  
34 outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1 1.10 WARRANTY

2 A. Manufacturer's Special Warranty on Insulating Security Glazing: Manufacturer agrees to  
3 replace insulating security glazing that deteriorates within specified warranty period.  
4 Deterioration of insulating security glazing is defined as defects in individual lites developed  
5 from normal use or failure of hermetic seal under normal use. Deterioration does not include  
6 defects in individual lites or failure of hermetic seal that is attributed to glass breakage or to  
7 maintaining and cleaning insulating security glazing contrary to manufacturer's written  
8 instructions.

- 9 1. Defects in coated-glass lites include peeling, cracking, and other indications of  
10 deterioration in coating.  
11 2. Defects in laminated-glass lites include edge separation, delamination materially  
12 obstructing vision through glass, and blemishes exceeding those allowed by referenced  
13 laminated-glass standard.  
14 3. Defects in glass-clad polycarbonate lites include edge separation, delamination materially  
15 obstructing vision through glazing, blemishes exceeding those allowed by referenced  
16 glass-clad polycarbonate standard, yellowing, and loss of light transmission.  
17 4. Evidence of hermetic seal failure is the obstruction of vision by dust, moisture, or film on  
18 interior surfaces of glazing.  
19 5. Warranty Period: 10 years from date of Substantial Completion.

20 PART 2 - PRODUCTS

21 2.1 MANUFACTURERS

22 A. Source Limitations for Security Glazing: Obtain security glazing from single source from single  
23 manufacturer using the same types of lites, plies, interlayers, and spacers for each security  
24 glazing type indicated.

25 B. Source Limitations for Glazing Sealants and Gaskets: Obtain from single source from single  
26 manufacturer for each product and installation method.

27 2.2 PERFORMANCE REQUIREMENTS

28 A. General:

- 29 1. Installed security glazing shall withstand normal thermal movement and wind and impact  
30 loads (where applicable) without failure, including loss or breakage attributable to the  
31 following: defective manufacture, fabrication, or installation; failure of sealants or  
32 gaskets to remain watertight and airtight; deterioration of glazing; or other defects in  
33 construction.  
34 2. Installed security glazing shall withstand security-related loads and forces without  
35 damage to the glazing beyond that allowed by referenced standards.

36 B. Structural Performance: Glazing shall withstand the following design loads within limits and  
37 under conditions indicated.

- 1 1. Design Procedure for Glass: ASTM E 1300 and ICC's International Building Code.
- 2 2. Design Wind Pressures: As indicated on Drawings.
- 3 3. Design Wind Pressures: Determine design wind pressures applicable to Project according
- 4 to ASCE/SEI 7, based on heights above grade indicated on Drawings.
  
- 5 C. Thermal Movements: Allow for thermal movements from ambient and surface temperature
- 6 changes acting on glazing framing members and glazing components.
  
- 7 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material
- 8 surfaces.
  
- 9 D. Windborne-Debris-Impact Resistance: Exterior glazing shall conform to basic-protection testing
- 10 requirements in ASTM E 1996 for Wind Zone 1 when tested according to ASTM E 1886. Test
- 11 specimens shall be no smaller in width and length than glazing indicated for use on the Project
- 12 and shall be installed in same manner as glazing indicated for use on the Project.
  
- 13 E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with
- 14 16 CFR 1201, Category II.
  
- 15 2.3 SECURITY GLAZING, GENERAL
  
- 16 A. Glazing Publications: Comply with published recommendations of security glazing and glazing
- 17 material manufacturers and organizations below unless more stringent requirements are
- 18 indicated. Refer to these publications for glazing terms not otherwise defined in this Section or
- 19 in referenced standards.
  
- 20 1. GANA Publications: "Laminated Glazing Reference Manual."
- 21 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing
- 22 Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
  
- 23 B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with
- 24 certification label of manufacturer. Label shall indicate manufacturer's name, type of glazing,
- 25 glass thickness, and safety glazing standard with which glazing complies.
  
- 26 C. Insulating Glazing Certification Program: Permanently marked either on spacers or on at least
- 27 one component lite of units with appropriate certification label of the Insulating Glass
- 28 Certification Council.
  
- 29 D. Fire-Test-Response Characteristics of Polycarbonate Sheets: As determined by testing
- 30 polycarbonate sheets identical to those used in security glazing products by a qualified testing
- 31 agency acceptable to authorities having jurisdiction.
  
- 32 1. Self-ignition temperature of 650 deg F (343 deg C) or more when tested according to
- 33 ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
- 34 2. Smoke-Developed Index of 450 or less when tested according to ASTM E 84, or smoke
- 35 density of 75 or less when tested according to ASTM D 2843 on plastic sheets in
- 36 thicknesses indicated for the Work.
- 37 3. Burning extent of 1 inch (25 mm) or less when tested according to ASTM D 635 at a
- 38 nominal thickness of 0.060 inch (1.52 mm) or thickness indicated for the Work.

- 1 E. Thermal and Optical Performance Properties: Provide security glazing with performance  
2 properties specified, as indicated in manufacturer's published test data, based on construction  
3 products indicated and on procedures indicated below:
- 4 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's  
5 WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 6 2. Solar-Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values,  
7 according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 8 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

9 2.4 GLASS PRODUCTS

10 A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear).

11 B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear).

- 12 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion  
13 parallel to bottom edge of glass as installed unless otherwise indicated.
- 14 2. For heat-strengthened float glass, comply with requirements for Kind HS.
- 15 3. For fully tempered float glass, comply with requirements for Kind FT.
- 16 4. For uncoated glass, comply with requirements for Condition A.
- 17 5. For coated vision glass, comply with requirements for Condition C (other coated glass).

18 2.5 LAMINATED GLASS

19 A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to  
20 bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

- 21 1. Interlayer Thickness: Provide thickness not less than that indicated and as needed to  
22 comply with requirements.
- 23 2. Interlayer Color: Clear unless otherwise indicated.

24 2.6 GLAZING SEALANTS

25 A. General:

- 26 1. Compatibility: Provide glazing sealants that are compatible with one another and with  
27 other materials they contact, including security glazing, seals of insulating security  
28 glazing and air-gap security glazing, and glazing channel substrates, under conditions of  
29 service and application, as demonstrated by sealant manufacturer based on testing and  
30 field experience.
- 31 2. Suitability: Comply with sealant and security glazing manufacturers' written instructions  
32 for selecting glazing sealants suitable for applications indicated and for conditions  
33 existing at time of installation.
- 34 3. Field-applied sealants shall have a VOC content of 250 g/L or less.
- 35 4. Sealants shall comply with the testing and product requirements of the California  
36 Department of Health Services' "Standard Method for the Testing and Evaluation of

1 Volatile Organic Emissions from Indoor Sources Using Small-Scale Environmental  
2 Chambers."

3 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full  
4 range.

5 B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S,  
6 Grade NS, Class 100/50, Use NT.

7 1. Products: Subject to compliance with requirements, provide one of the following  
8 products that may be incorporated into the Work:

9 a. Dow Corning Corporation; 790.

10 b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.

11 c. May National Associates, Inc.; Bondaflex Sil 290.

12 d. Pecora Corporation; 890NST.

13 e. Sika Corporation U.S.; Sikasil WS-290.

14 f. Tremco Incorporated; Spectrem 1.

## 15 2.7 GLAZING TAPES

16 A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric  
17 tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer  
18 rod as recommended in writing by tape and security glazing manufacturers for application  
19 indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

20 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous  
21 pressure.

22 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous  
23 pressure.

24 B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive  
25 on both surfaces; and complying with AAMA 800 for the following types:

26 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

27 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with  
28 a full bead of liquid sealant.

## 29 2.8 MISCELLANEOUS GLAZING MATERIALS

30 A. General: Provide products of material, size, and shape complying with referenced glazing  
31 standard, requirements of manufacturers of security glazing and other glazing materials for  
32 application indicated, and with a proven record of compatibility with surfaces contacted in  
33 installation.

34 B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

35 C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or  
36 minus 5.

- 1 D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing  
2 manufacturer to maintain security glazing lites in place for installation indicated.
- 3 E. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral  
4 movement (side walking).
- 5 F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and  
6 density to control glazing sealant depth and otherwise produce optimum glazing sealant  
7 performance.

8 2.9 FABRICATION OF SECURITY GLAZING

- 9 A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and  
10 face clearances, edge and surface conditions, and bite complying with written instructions of  
11 product manufacturer and referenced glazing publications, to comply with system performance  
12 requirements.
- 13 B. Grind smooth and polish exposed security glazing edges and corners.

14 PART 3 - EXECUTION

15 3.1 EXAMINATION

- 16 A. Examine framing for security glazing, with Installer present, for compliance with the following:
  - 17 1. Manufacturing and installation tolerances, including those for size, squareness, and  
18 offsets at corners.
  - 19 2. Presence and functioning of weep system.
  - 20 3. Minimum required face or edge clearances.
  - 21 4. Minimum required bite.
  - 22 5. Effective sealing between joints of framing members.
- 23 B. Proceed with installation only after unsatisfactory conditions have been corrected.

24 3.2 PREPARATION

- 25 A. Clean glazing channels and other framing members receiving security glazing immediately  
26 before glazing. Remove coatings not firmly bonded to substrates.
- 27 B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so  
28 that exterior and interior surfaces are readily identifiable. Do not use materials that will leave  
29 visible marks in the completed work.

1 3.3 GLAZING, GENERAL

- 2 A. Comply with combined written instructions of manufacturers of security glazing, sealants,  
3 gaskets, and other glazing materials unless more stringent requirements are indicated, including  
4 those in referenced glazing publications.
- 5 B. Protect edges of security glazing from damage during handling and installation. Remove  
6 damaged security glazing from Project site and legally dispose of off Project site. Damaged  
7 security glazing includes units with edge or face damage or other imperfections that, when  
8 installed, could weaken security glazing and impair performance and appearance.
- 9 C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by  
10 preconstruction testing.
- 11 D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing  
12 publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of  
13 compatible sealant suitable for heel bead.
- 14 E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.
- 15 F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches  
16 (1270 mm).
- 17 1. Locate spacers directly opposite each other on both inside and outside faces of security  
18 glazing. Install correct size and spacing to preserve required face clearances unless  
19 gaskets and glazing tapes are used that have demonstrated ability to maintain required  
20 face clearances and to comply with performance requirements.
- 21 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glazing lites and use thickness  
22 equal to sealant width. With glazing tape, use thickness slightly less than final  
23 compressed thickness of tape.
- 24 G. Provide edge blocking where indicated or needed to prevent security glazing from moving  
25 sideways in glazing channel, as recommended in writing by security glazing manufacturer and  
26 according to requirements in referenced glazing publications.
- 27 H. Set security glazing in each series with uniform pattern, draw, bow, and similar characteristics.
- 28 I. Set coated security glazing with proper orientation so that coatings and films face exterior or  
29 interior as specified.
- 30 J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket  
31 on opposite side, provide adequate anchorage so gasket cannot walk out when installation is  
32 subjected to movement.
- 33 K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by  
34 gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with  
35 sealant recommended by gasket manufacturer.

1 3.4 CLEANING AND PROTECTION

2 A. Immediately after installation remove nonpermanent labels and clean surfaces.

3 B. Protect security glazing from contact with contaminating substances resulting from construction  
4 operations, including weld splatter. Examine glass surfaces adjacent to or below exterior  
5 concrete and other masonry surfaces at frequent intervals during construction, but not less than  
6 once a month, for buildup of dirt, scum, alkaline deposits, or stains.

7 1. If, despite such protection, contaminating substances do come into contact with security  
8 glazing, remove substances immediately as recommended in writing by security glazing  
9 manufacturer. Remove and replace security glazing that cannot be cleaned without  
10 damage.

11 C. Wash security glazing on both exposed surfaces in each area of Project not more than four days  
12 before date scheduled for inspections that establish date of Substantial Completion. Wash  
13 security glazing as recommended in writing by security glazing manufacturer.

14 3.5 INSULATING SECURITY GLAZING SCHEDULE

15 A. Security Glazing: Low-e-coated, clear insulating security glazing. Outdoor lite is made of  
16 monolithic glass and indoor lite is made of glass-clad polycarbonate.

17 1. Products: Basis of Design - provide Global Security Glazing; Secur-Tem® 3 or a  
18 comparable product from one of the following manufacturers:

19 a. Total Security Solutions

20 b. U.S. Armor LLC

21 2. Detention Security Grade: UL Level 1.

22 3. Overall Unit Thickness: 1 ¼”.

23 4. Outdoor Lite: Heat-strengthened float glass.

24 5. Indoor Lite: Glass-clad polycarbonate.

25 a. Outer Ply: 1/8-inch heat-strengthened float glass.

26 b. Multiple Core:

27 1) Outer Core Ply: 0.090 Polyvinyl Butyral (pvb).

28 2) Inner Core Ply: 0.090 Polyvinyl Butyral (pvb).

29 c. Inner Ply: 1/8-inch heat-strengthened float glass.

30 6. Interspace Content: Argon.

31 7. Glass Tint Color: Blue-green.

32 8. Tinted Glass Location: Outer lite.

33 9. Low-E Coating: Pyrolytic on second surface.

34 10. Overall Visible Light Transmittance: 0.83 minimum.

35 11. U-Value: 1.00.

36



1 **SECTION 09 29 00**

2 **GYPSUM BOARD**

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

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

7 1.2 SUMMARY

8 A. Section Includes:

- 9 1. Interior gypsum board.  
10 2. Tile backing panels.  
11 3. Texture finishes.

12 B. Related Requirements:

- 13 1. Section 06 10 00 "Rough Framing" for framing that support gypsum board panels.

14 1.3 SUBMITTALS

- 15 A. Product Data: For each type of product.

16 1.4 QUALITY ASSURANCE

- 17 A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9  
18 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and  
19 execution.

20 1. Install mockups for the following:

- 21 a. Each level of gypsum board finish indicated for use in exposed locations.  
22 b. Each texture finish indicated.

- 23 2. Apply or install final decoration indicated, including painting, on exposed surfaces for  
24 review of mockups.

- 25 3. Simulate finished lighting conditions for review of mockups.

- 26 4. Subject to compliance with requirements, approved mockups may become part of the  
27 completed Work if undisturbed at time of Substantial Completion.

1 1.5 DELIVERY, STORAGE AND HANDLING

2 A. Store materials inside under cover and keep them dry and protected against weather,  
3 condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack  
4 panels flat and supported on risers on a flat platform to prevent sagging.

5 1.6 FIELD CONDITIONS

6 A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board  
7 manufacturer's written recommendations, whichever are more stringent.

8 B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

9 C. Do not install panels that are wet, those that are moisture damaged, and those that are mold  
10 damaged.

11 1. Indications that panels are wet or moisture damaged include, but are not limited to,  
12 discoloration, sagging, or irregular shape.

13 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or  
14 splotchy surface contamination and discoloration.

15 PART 2 - PRODUCTS

16 2.1 PERFORMANCE REQUIREMENTS

17 A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and  
18 construction identical to those tested in assembly indicated according to ASTM E 119 by an  
19 independent testing agency.

20 B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical  
21 to those tested in assembly indicated according to ASTM E 90 and classified according to  
22 ASTM E 413 by an independent testing agency.

23 C. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction  
24 identical to those tested in assembly and complying with the testing and product requirements of  
25 the California Department of Health Services' "Standard Practice for the Testing of Volatile  
26 Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

27 2.2 GYPSUM BOARD, GENERAL

28 A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of  
29 preconsumer recycled content not less than 5 percent.

30 B. Size: Provide maximum lengths and widths available that will minimize joints in each area and  
31 that correspond with support system indicated.

1 2.3 INTERIOR GYPSUM BOARD

2 A. Manufacturers: Subject to compliance with requirements, provide products by the following :

- 3 1. American Gypsum.
- 4 2. CertainTeed Corp.
- 5 3. Georgia-Pacific Gypsum LLC.
- 6 4. USG Corporation.

7 B. Gypsum Wallboard: ASTM C 1396/C 1396M.

- 8 1. Thickness: 1/2 inch (12.7 mm).

9 C. Gypsum Board, Type X: ASTM C 1396/C 1396M.

- 10 1. Thickness: 5/8 inch (15.9 mm).

11 2.4 INTERIOR WAINSCOT PANELS

12 A. Manufacturers: Subject to compliance with requirements, provide products by the following :

- 13 1. Liquid Diamond
- 14 2. Marlite
- 15 3. CSM Products

16 B. Sanitary FRP wall panel: ASTM C 1396/C 1396M.

- 17 1. Thickness: 3/16 inch.

18 2.5 TRIM ACCESSORIES

19 A. Interior Trim: ASTM C 1047.

- 20 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced
- 21 galvanized steel sheet.
- 22 2. Shapes:
  - 23 a. Cornerbead.
  - 24 b. Bullnose bead.
  - 25 c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - 26 d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - 27 e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - 28 f. Expansion (control) joint.
  - 29 g. Curved-Edge Cornerbead: With notched or flexible flanges.
- 30
- 31 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials
- 32 specified.

1 2.6 JOINT TREATMENT MATERIALS

2 A. General: Comply with ASTM C 475/C 475M.

3 B. Joint Tape:

4 1. Interior Gypsum Board: Paper.

5 2. Tile Backing Panels: As recommended by panel manufacturer.

6 C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible  
7 with other compounds applied on previous or for successive coats.

8 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

9 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and  
10 trim flanges, use setting-type taping compound.

11 a. Use setting-type compound for installing paper-faced metal trim accessories.

12 3. Fill Coat: For second coat, use setting-type, sandable topping compound.

13 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

14 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

15 D. Joint Compound for Tile Backing Panels:

16 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel  
17 manufacturer.

18 2. Cementitious Backer Units: As recommended by backer unit manufacturer.

19 3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-  
20 type, sandable topping compound.

21 2.7 AUXILIARY MATERIALS

22 A. General: Provide auxiliary materials that comply with referenced installation standards and  
23 manufacturer's written recommendations.

24 B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum  
25 panels to continuous substrate.

26 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated  
27 according to 40 CFR 59, Subpart D (EPA Method 24).

28 2. Laminating adhesive shall comply with the testing and product requirements of the  
29 California Department of Health Services' "Standard Practice for the Testing of Volatile  
30 Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

31 C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

32 1. Use screws complying with ASTM C 954 for fastening panels to steel members from  
33 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

34 2. For fastening cementitious backer units, use screws of type and size recommended by  
35 panel manufacturer.

- 1 D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing)  
2 produced by combining thermosetting resins with mineral fibers manufactured from glass, slag  
3 wool, or rock wool.
- 4 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.  
5 2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of  
6 preconsumer recycled content not less than 5 percent.

7 2.8 TEXTURE FINISHES

- 8 A. Primer: As recommended by textured finish manufacturer.
- 9 B. Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-  
10 spread and smoke-developed indexes of not more than 25 when tested according to  
11 ASTM E 84.
- 12 1. Products: Subject to compliance with requirements, provide one of the following:
- 13 a. Georgia-Pacific Gypsum LLC; ToughRock Ceiling Textures/Polystyrene.  
14 b. National Gypsum Company; ProForm Perfect Spray.  
15 c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.
- 16 2. Texture: Orange Peel.

17 PART 3 - EXECUTION

18 3.1 EXAMINATION

- 19 A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer  
20 present, for compliance with requirements and other conditions affecting performance.
- 21 B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold  
22 damaged.
- 23 C. Proceed with installation only after unsatisfactory conditions have been corrected.

24 3.2 APPLYING AND FINISHING PANELS, GENERAL

- 25 A. Comply with ASTM C 840.
- 26 B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid  
27 abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels  
28 not less than one framing member.
- 29 C. Install panels with face side out. Butt panels together for a light contact at edges and ends with  
30 not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

- 1 D. Locate edge and end joints over supports, except in ceiling applications where intermediate  
2 supports or gypsum board back-blocking is provided behind end joints. Do not place tapered  
3 edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not  
4 make joints other than control joints at corners of framed openings.
- 5 E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- 6 F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings,  
7 etc.), except in chases braced internally.
- 8 G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural  
9 abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these  
10 locations and trim edges with edge trim where edges of panels are exposed. Seal joints between  
11 edges and abutting structural surfaces with acoustical sealant.
- 12 H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to  
13 open (unsupported) edges of stud flanges first.
- 14 I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings  
15 and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both  
16 faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with  
17 manufacturer's written recommendations for locating edge trim and closing off sound-flanking  
18 paths around or through assemblies, including sealing partitions above acoustical ceilings.
- 19 J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily  
20 installed after panels have been installed on one side.

### 21 3.3 APPLYING INTERIOR GYPSUM BOARD

- 22 A. Install interior gypsum board where required to replace existing, to new frame construction  
23 indicated on the Drawings.
- 24 B. Single-Layer Application:
- 25 1. On ceilings, apply gypsum panels before wall/partition board application to greatest  
26 extent possible and at right angles to framing unless otherwise indicated.
- 27 2. On partitions/walls, apply gypsum panels to match existing unless otherwise indicated or  
28 required by fire-resistance-rated assembly, and minimize end joints.
- 29 a. Stagger abutting end joints not less than one framing member in alternate courses  
30 of panels.
- 31 b. At stairwells and other high walls, install panels horizontally unless otherwise  
32 indicated or required by fire-resistance-rated assembly.
- 33 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end  
34 joints. Locate edge joints over furring members.
- 35 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- 36 C. Curved Surfaces:

- 1 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible,  
2 across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves  
3 and tangent to them.
- 4 2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm)  
5 o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with  
6 screws spaced 12 inches (300 mm) o.c.

#### 7 3.4 INSTALLING TRIM ACCESSORIES

- 8 A. General: For trim with back flanges intended for fasteners, attach to framing with same  
9 fasteners used for panels. Otherwise, attach trim according to manufacturer's written  
10 instructions.
- 11 B. Control Joints: Install control joints according to ASTM C 840 and in specific locations  
12 approved by Architect for visual effect.
- 13 C. Interior Trim: Install in the following locations:
  - 14 1. Cornerbead: Use at outside corners.
  - 15 2. Curved-Edge Cornerbead: Use at curved openings.

#### 16 3.5 FINISHING GYPSUM BOARD

- 17 A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations,  
18 fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for  
19 decoration. Promptly remove residual joint compound from adjacent surfaces.
- 20 B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- 21 C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not  
22 intended to receive tape.
- 23 D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

#### 24 3.6 APPLYING TEXTURE FINISHES

- 25 A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces  
26 receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- 27 B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a  
28 uniform texture matching approved mockup and free of starved spots or other evidence of thin  
29 application or of application patterns.
- 30 C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture  
31 finish by covering them with masking agents, polyethylene film, or other means. If, despite  
32 these precautions, texture finishes contact these surfaces, immediately remove droppings and  
33 overspray to prevent damage according to texture-finish manufacturer's written  
34 recommendations.

1 3.7 PROTECTION

2 A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other  
3 non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall  
4 application.

5 B. Protect installed products from damage from weather, condensation, direct sunlight,  
6 construction, and other causes during remainder of the construction period.

7 C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

8 1. Indications that panels are wet or moisture damaged include, but are not limited to,  
9 discoloration, sagging, or irregular shape.

10 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or  
11 splotchy surface contamination and discoloration.

12 **END OF SECTION**

13 \*\*\*



1 Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and  
2 weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient  
3 temperature and humidity conditions are maintained at the levels indicated for Project when occupied for  
4 its intended use.

#### 6 COORDINATION

7 Coordinate layout and installation of acoustical panels and suspension system with other construction that  
8 penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression  
9 system, and partition assemblies.

#### 11 EXTRA MATERIALS

12 Furnish extra materials described below that match products installed and that are packaged with  
13 protective covering for storage and identified with labels describing contents.

14 Acoustical Ceiling Panels: Full-size panels equal to 10.0 percent of quantity installed.

## 18 PART 2 - PRODUCTS

### 21 ACOUSTICAL PANELS, GENERAL

22 Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that  
23 comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light  
24 reflectance's, unless otherwise indicated.

26 Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

27 Where appearance characteristics of acoustical panels are indicated by referencing pattern  
28 designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide  
29 products selected by Architect from each manufacturer's full range that comply with requirements  
30 indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

### 32 ACT-1: FIBERGLASS ACOUSTICAL PANELS

33 Basis-of-Design Product: The design for acoustical ceiling panels is based on "FROST" panels by USG.  
34 Subject to compliance with requirements, provide the named product or a comparable product by the  
35 following:

36 USG Interiors.

37 Certainteed.

38 Classification: Provide panels complying with ASTM E 1264 for Type XII, Form 1; anti-mold/mildew  
39 and bacteria fiberglass substrate.

#### 41 Panel Characteristics:

42 Pattern: FROST.

43 Color: White.

44 LR: 0.83.

45 NRC: 0.70.

46 Edge Detail: Square lay-in.

47 Dimensions: 24 by 24 by 15/16 inches thick.

1 Recycled Content: 40 percent.

2  
3 METAL SUSPENSION SYSTEMS, GENERAL

4 Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension sys-  
5 tems of types, structural classifications, and finishes indicated that comply with applicable requirements  
6 in ASTM C 635.

7  
8 Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and  
9 Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's  
10 standard factory-applied finish for type of system indicated.

11  
12 Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct  
13 Hung," unless otherwise indicated. Comply with seismic design requirements.

14  
15 Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching  
16 hangers of type indicated and with capability to sustain, without failure, a load equal to five times that  
17 imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applica-  
18 ble.

19  
20 Type: Post installed bonded anchors.

21  
22 Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5  
23 (0.005 mm) for Class SC 1 service condition.

24  
25 Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

26  
27 Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

28  
29 Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct  
30 Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter  
31 wire.

32  
33 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

34 Products for Room B12N: Subject to compliance with requirements, provide one of the following:

35  
36 Armstrong World Industries, Inc.

37  
38 BPB USA

39  
40 Chicago Metallic Corporation

41  
42 Ecophon CertainTeed, Inc.

43  
44 USG Interiors, Inc.

45  
46  
47 Narrow-Face, Single-Web, Extruded-Aluminum Suspension System: Main and cross runners formed  
48 from extruded aluminum to produce structural members with 9/16-inch- (15-mm-) wide faces.

1 Structural Classification: Intermediate

2  
3 Face Design: Screw-slot profile.

4  
5 Face Finish: Satin anodized per AA-M12C22A31 and AAMA 611

6  
7 Reveal Finish: Match face finish

8  
9 **ACOUSTICAL SEALANT**

10 Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable,  
11 nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound  
12 transmission through perimeter joints and openings in building construction as demonstrated by testing  
13 representative assemblies according to ASTM E 90.

14  
15  
16 **PART 3 - EXECUTION**

17  
18 **EXAMINATION**

19 Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings  
20 attach or abut, with Installer present, for compliance with requirements specified in this and other  
21 Sections that affect ceiling installation and anchorage and with requirements for installation tolerances  
22 and other conditions affecting performance of acoustical panel ceilings.

23  
24 Proceed with installation only after unsatisfactory conditions have been corrected.

25  
26 **INSTALLATION**

27 General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements  
28 indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

29  
30 Install acoustical panels with undamaged edges and fit accurately into suspension system runners and  
31 edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

32 For square-edged panels, install panels with edges fully hidden from view by flanges of  
33 suspension system runners and moldings.

34  
35 Paint cut edges of panel remaining exposed after installation; match color of exposed panel  
36 surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

37  
38 Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-  
39 rated assembly.

40  
41 General: Suspend ceiling hangers from building's structural members and as follows:

42 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum  
43 that are not part of supporting structure or of ceiling suspension system

44  
45 Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing,  
46 countersplaying, or other equally effective means.

1 Where width of ducts and other construction within ceiling plenum produces hanger spacings that inter-  
2 fere with location of hangers at spacings required to support standard suspension system members, install  
3 supplemental suspension members and hangers in form of trapezes or equivalent devices.  
4

5 Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight  
6 turns.

7 Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and  
8 appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated  
9 temperatures.

10  
11 Fasten hangers to post installed mechanical or adhesive anchors  
12

13 Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hang-  
14 ers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each  
15 member.  
16

17 Size supplemental suspension members and hangers to support ceiling loads within performance limits  
18 established by referenced standards and publications  
19

20 Install suspension system runners so they are square and securely interlocked with one another. Remove  
21 and replace dented, bent, or kinked members.  
22

23 Arrange directionally patterned acoustical panels as follows:  
24

25       Install panels with pattern running in one direction parallel to long axis of space.  
26

27 For square-edged panels, install panels with edges fully hidden from view by flanges of suspension sys-  
28 tem runners and moldings.  
29

30 Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated as-  
31 ssembly.  
32

32 Insert requirements for semi-concealed system (splined joints, etc.) if any  
33

#### 34 CLEANING

35 Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension  
36 system members. Comply with manufacturer's written instructions for cleaning and touchup of minor  
37 finish damage.  
38

39 Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently  
40 eliminate evidence of damage.  
41

42 **END OF SECTION**

43 \*\*\*



1 B. Low-Emitting Materials: Flooring system shall comply with the testing and product  
2 requirements of the California Department of Public Health's "Standard Method for the Testing  
3 and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using  
4 Environmental Chambers."

5 2.2 THERMOPLASTIC-RUBBER BASE

6 A. Manufacturers: Subject to compliance with requirements, provide products by one of the  
7 following:

- 8 1. Johnsonite; A Tarkett Company.
- 9 2. Mondo Rubber International, Inc.
- 10 3. Nora Systems, Inc.
- 11 4. Roppe Corporation, USA.

12 B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

- 13 1. Group: I (solid, homogeneous).
- 14 2. Style and Location: Straight.

15 C. Thickness: 0.125 inch (3.2 mm).

16 D. Height: 4 inches (102 mm).

17 E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.

18 F. Outside Corners: Job formed.

19 G. Inside Corners: Job formed.

20 H. Colors: To Be Selected From Manufacturers' Standard Selections.

21 2.3 RUBBER MOLDING ACCESSORY

22 1. Manufacturers: Provide products by the same manufacturer as rubber base.

23 B. Description: Rubber cap for cove carpet, cap for cove resilient flooring, carpet edge for glue-  
24 down applications, reducer strip for resilient flooring.

25 C. Profile and Dimensions: As indicated on drawings.

26 D. Locations: Document existing and match.

27 E. Colors and Patterns: Match base color.

28 2.4 INSTALLATION MATERIALS

29 A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or  
30 blended hydraulic-cement-based formulation provided or approved by resilient-product  
31 manufacturer for applications indicated.

- 1 B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient  
2 products and substrate conditions indicated.
- 3 1. Adhesives shall have a VOC content of 50 g/L or less.  
4 2. Adhesives shall comply with the testing and product requirements of the California  
5 Department of Public Health's "Standard Method for the Testing and Evaluation of  
6 Volatile Organic Chemical Emissions from Indoor Sources Using Environmental  
7 Chambers."
- 8 C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread  
9 manufacturer to fill nosing substrates that do not conform to tread contours.
- 10 D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-  
11 tread manufacturer.

12 PART 3 - EXECUTION

13 3.1 PREPARATION

- 14 A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of  
15 resilient products.
- 16 B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to  
17 ASTM F 710.
- 18 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.  
19 2. Remove substrate coatings and other substances that are incompatible with adhesives and  
20 that contain soap, wax, oil, or silicone, using mechanical methods recommended by  
21 manufacturer. Do not use solvents.
- 22 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed  
23 with installation only after substrate alkalinity falls within range on pH scale  
24 recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
- 25 4. Moisture Testing: Proceed with installation only after substrates pass testing according to  
26 manufacturer's written recommendations, but not less stringent than the following:
- 27 a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with  
28 installation only after substrates have maximum moisture-vapor-emission rate of 3  
29 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- 30 b. Perform relative humidity test using in situ probes according to ASTM F 2170.  
31 Proceed with installation only after substrates have maximum 75 percent relative  
32 humidity level.
- 33 C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching  
34 compound; remove bumps and ridges to produce a uniform and smooth substrate.
- 35 D. Do not install resilient products until they are the same temperature as the space where they are  
36 to be installed.

1 E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient  
2 products.

### 3 3.2 RESILIENT BASE INSTALLATION

4 A. Comply with manufacturer's written instructions for installing resilient base.

5 B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other  
6 permanent fixtures in rooms and areas where base is required.

7 C. Install resilient base in lengths as long as practical without gaps at seams and with tops of  
8 adjacent pieces aligned.

9 D. Tightly adhere resilient base to substrate throughout length of each piece, with base in  
10 continuous contact with horizontal and vertical substrates.

11 E. Do not stretch resilient base during installation.

12 F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient  
13 base with manufacturer's recommended adhesive filler material.

14 G. Preformed Corners: Install preformed corners before installing straight pieces.

15 H. Job-Formed Corners:

16 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns  
17 not less than 6 inches in length.

18 a. Form without producing discoloration (whitening) at bends.

19 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns  
20 not less than 3 inches in length.

21 a. Miter corners to minimize open joints.

22 3. Stairs: Miter base running continuous at stairs to match existing details.

### 23 3.3 RESILIENT ACCESSORY INSTALLATION

24 A. Comply with manufacturer's written instructions for installing resilient accessories.

25 B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates  
26 throughout length of each piece. Install reducer strips at edges of floor covering that would  
27 otherwise be exposed.

### 28 3.4 CLEANING AND PROTECTION

29 A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

- 1 B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads
- 2 before applying liquid floor polish.
- 3 1. Apply one coat.
- 4 C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

5 **END OF SECTION**



1 and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using  
2 Environmental Chambers."

3 2.2 UNBACKED LINOLEUM SHEET FLOORING

4 A. Products: Subject to compliance with requirements, provide one of the following:

- 5 1. Armstrong World Industries, Inc
- 6 2. Forbo Industries, Inc; Marmoleum Real. Basis of Design.
- 7 3. Johnsonite; A Tarkett Company
- 8 4. Mannington Mills, Inc

9 B. Product Standard: ASTM F 1913.

10 C. Thickness: 1/10 inch (2.5 mm).

11 D. Wearing Surface: Natural.

12 E. Sheet Width: As standard with manufacturer.

13 F. Colors and Patterns: Two colors as selected by Architect from manufacturer's standard.

14 2.3 INSTALLATION MATERIALS

15 A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or  
16 blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring  
17 manufacturer for applications indicated.

18 B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit  
19 resilient sheet flooring and substrate conditions indicated.

- 20 1. Adhesives shall have a VOC content of 50 g/L or less.
- 21 2. Adhesives shall comply with the testing and product requirements of the California  
22 Department of Public Health's "Standard Method for the Testing and Evaluation of  
23 Volatile Organic Chemical Emissions from Indoor Sources Using Environmental  
24 Chambers."

25 C. Seamless-Installation Accessories:

26 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

27 a. Color: Match flooring color.

28 2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

29 a. Bonding compound shall have a VOC content of 510 g/L or less.

30 b. Bonding compound shall comply with the testing and product requirements of the  
31 California Department of Public Health's "Standard Method for the Testing and  
32 Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using  
33 Environmental Chambers."

1 D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet  
2 flooring manufacturer.

### 3 PART 3 - EXECUTION

#### 4 3.1 PREPARATION

5 A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to  
6 ensure adhesion of resilient sheet flooring.

7 B. Concrete Substrates: Prepare according to ASTM F 710.

8 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

9 2. Remove substrate coatings and other substances that are incompatible with adhesives and  
10 that contain soap, wax, oil, or silicone, using mechanical methods recommended by  
11 resilient sheet flooring manufacturer. Do not use solvents.

12 3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring  
13 manufacturer. Proceed with installation only after substrate alkalinity falls within range  
14 on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9  
15 pH.

16 C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching  
17 compound; remove bumps and ridges to produce a uniform and smooth substrate.

18 D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to  
19 be installed.

20 E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient  
21 sheet flooring.

#### 22 3.2 RESILIENT SHEET FLOORING INSTALLATION

23 A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

24 B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

25 C. Lay out resilient sheet flooring as follows:

26 1. Maintain uniformity of flooring direction.

27 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6  
28 inches (152 mm) away from parallel joints in flooring substrates.

29 3. Match edges of flooring for color shading at seams.

30 4. Avoid cross seams.

31 D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent  
32 fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

33 E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

- 1 F. Maintain reference markers, holes, and openings that are in place or marked for future cutting  
2 by repeating on resilient sheet flooring as marked on substrates. Use chalk or other  
3 nonpermanent marking device.
- 4 G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in  
5 installation areas. Maintain overall continuity of color and pattern between pieces of flooring  
6 installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut  
7 covers and to cover perimeters.
- 8 H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate  
9 to produce a completed installation without open cracks, voids, raising and puckering at joints,  
10 telegraphing of adhesive spreader marks, and other surface imperfections.
- 11 I. Seamless Installation:
- 12 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with  
13 welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and  
14 finish seams to produce surfaces flush with adjoining flooring surfaces.
- 15 2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to  
16 permanently fuse sections into a seamless flooring. Prepare seams and apply compound  
17 to produce tightly fitted seams without gaps, overlays, or excess bonding compound on  
18 flooring surfaces.

19 3.3 CLEANING AND PROTECTION

- 20 A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet  
21 flooring.
- 22 B. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying  
23 liquid floor polish.
- 24 C. Cover resilient sheet flooring until Substantial Completion.

25 **END OF SECTION**

1 SECTION 09 65 19

2 RESILIENT TILE FLOORING

3 PART 1 - GENERAL

4 1.1 SUMMARY

- 5 A. Section Includes:  
6 1. Vinyl composition floor tile.

7 1.2 SUBMITTALS

- 8 A. Product Data: For each type of product.

- 9 1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including  
10 printed statement of VOC content.

- 11 B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns,  
12 doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 13 1. Show details of special patterns.

- 14 C. Samples: Full-size units of each color and pattern of floor tile required.

- 15 D. Maintenance data.

16 PART 2 - PRODUCTS

17 2.1 PERFORMANCE REQUIREMENTS

- 18 A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical  
19 products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

- 20 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

- 21 B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore  
22 certification.

- 23 C. Low-Emitting Materials: Flooring system shall comply with the testing and product  
24 requirements of the California Department of Public Health's "Standard Method for the Testing  
25 and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using  
26 Environmental Chambers."

1 2.2 VINYL COMPOSITION FLOOR TILE

2 A. Products: Subject to compliance with requirements, **provide one of the following:**

- 3 1. Armstrong World Industries, Inc; Standard Execelon.
- 4 2. Mohawk, Congoleum; Commercial.
- 5 3. Tarkett, Johnsonite; Azrock Collection.

6 B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

7 C. Wearing Surface: Smooth.

8 D. Thickness: 0.125 inch (3.2 mm).

9 E. Size: 12 by 12 inches (305 by 305 mm).

10 F. Colors and Patterns: As selected by Architect from base range of standard colors.

11 2.3 INSTALLATION MATERIALS

12 A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or  
13 blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer  
14 for applications indicated.

15 B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit  
16 floor tile and substrate conditions indicated.

17 1. Adhesives shall comply with the following limits for VOC content:

- 18 a. Vinyl Composition Tile Adhesives: 50 g/L or less.
- 19 b. Rubber Floor Adhesives: 60 g/L or less.

20 2. Adhesives shall comply with the testing and product requirements of the California  
21 Department of Public Health's "Standard Method for the Testing and Evaluation of  
22 Volatile Organic Chemical Emissions from Indoor Sources Using Environmental  
23 Chambers."

24 C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile  
25 manufacturer.

26 PART 3 - EXECUTION

27 3.1 PREPARATION

28 A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion  
29 of resilient products.

30 B. Concrete Substrates: Prepare according to ASTM F 710.

31 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

- 1           2.    Remove substrate coatings and other substances that are incompatible with adhesives and  
2           that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor  
3           tile manufacturer. Do not use solvents.
- 4           3.    Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer.  
5           Proceed with installation only after substrate alkalinity falls within range on pH scale  
6           recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
- 7           4.    Moisture Testing: Proceed with installation only after substrates pass testing according to  
8           floor tile manufacturer's written recommendations, but not less stringent than the  
9           following:
- 10           a.    Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with  
11           installation only after substrates have maximum moisture-vapor-emission rate of 3  
12           lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- 13           b.    Perform relative humidity test using in situ probes according to ASTM F 2170.  
14           Proceed with installation only after substrates have a maximum 75 percent relative  
15           humidity level.
- 16           C.    Access Flooring Panels: Remove protective film of oil or other coating using method  
17           recommended by access flooring manufacturer.
- 18           D.    Fill cracks, holes, and depressions in substrates with trowelable leveling and patching  
19           compound; remove bumps and ridges to produce a uniform and smooth substrate.
- 20           E.    Do not install floor tiles until they are the same temperature as the space where they are to be  
21           installed.
- 22           F.    Immediately before installation, sweep and vacuum clean substrates to be covered by resilient  
23           floor tile.

## 24   3.2    FLOOR TILE INSTALLATION

- 25           A.    Comply with manufacturer's written instructions for installing floor tile.
- 26           B.    Lay out floor tiles from center marks established with principal walls, discounting minor  
27           offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using  
28           cut widths that equal less than one-half tile at perimeter.
- 29           1.    Lay tiles square with room axis.
- 30           C.    Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as  
31           manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed  
32           tiles.
- 33           1.    Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- 34           D.    Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent  
35           fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- 36           E.    Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles  
37           to center of door openings.

- 1 F. Maintain reference markers, holes, and openings that are in place or marked for future cutting  
2 by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking  
3 device.
- 4 G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers,  
5 and similar items in finished floor areas. Maintain overall continuity of color and pattern  
6 between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to  
7 substrates that abut covers and to cover perimeters.
- 8 H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to  
9 produce a completed installation without open cracks, voids, raising and puckering at joints,  
10 telegraphing of adhesive spreader marks, and other surface imperfections.

11 3.3 CLEANING AND PROTECTION

- 12 A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- 13 B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying  
14 liquid floor polish.
- 15 1. Apply two coat(s).
- 16 C. Cover floor tile until Substantial Completion.

17 END OF SECTION

18 \*\*\*



1 Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification  
2 Manual" for products and paint systems indicated for new work and "MPI Maintenance Repainting Man-  
3 ual" for products and paint systems indicated for repainting work.  
4  
5

#### 6 DELIVERY, STORAGE, AND HANDLING

7 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures  
8 continuously maintained at not less than 45 deg F (7 deg C).  
9

10 Maintain containers in clean condition, free of foreign materials and residue.  
11

12 Remove rags and waste from storage areas daily.  
13

14 If necessary, add special requirements for fire protection, heating, ventilation, and other conditions for  
15 storage areas on-site.  
16

#### 17 PROJECT CONDITIONS

18 Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between  
19 50 and 95 deg F (10 and 35 deg C).  
20

21 Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at tempera-  
22 tures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.  
23

#### 24 EXTRA MATERIALS

25 Furnish extra materials described below that are from same production run (batch mix) as materials ap-  
26 plied and that are packaged for storage and identified with labels describing contents.  
27

28 Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color ap-  
29 plied.  
30

## 31 P A R T 2 – M A T E R I A L S

### 32 PAINT, GENERAL

33 Material Compatibility:  
34  
35

36 Provide materials for use within each paint system that are compatible with one another and sub-  
37 strates indicated, under conditions of service and application as demonstrated by manufacturer, based  
38 on testing and field experience.  
39

40 For each coat in a paint system, provide products recommended in writing by manufacturers of top-  
41 coat for use in paint system and on substrate indicated.  
42

43 Colors: As selected by Architect from manufacturer's full range.  
44

### 45 METAL PRIMERS

46 Exterior Alkyd Metal Primer: MPI #79.

47 VOC Content: E Range of E1.  
48

49 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

50 Benjamin Moore Paint

51 Chemcoat Paint

- 1 Columbia Paint & Coatings.
- 2 Kwal-Howells Paint.
- 3 Rodda Paint Co.
- 4 Sherwin Williams

5  
6 EXTERIOR ALKYD PAINTS  
7 Exterior Alkyd: MPI #94.  
8 VOC Content: E Range of E1  
9

10 Manufacturers: Subject to compliance with requirements, provide products by one of the following:  
11 Benjamin Moore Paint  
12 Columbia Paint & Coatings.  
13 Sherwin Williams  
14

### 15 PART 3 – EXECUTION

#### 16 EXAMINATION

17 Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

18  
19 Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.  
20

21 Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.  
22 Beginning coating application constitutes Contractor's acceptance of substrates and conditions.  
23

#### 24 PREPARATION

25 Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" and "MPI Maintenance Repainting Manual" applicable to substrates and paint systems indicated.  
26

27 Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.  
28

29 After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed.  
30

31 Remove surface-applied protection if any.  
32

33 Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.  
34

35 Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.  
36

37 Coordination of shop-applied prime coats with topcoats is critical.  
38

39 Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51

1 Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by  
2 paint manufacturer.

3  
4 **APPLICATION**

5 Apply paints according to manufacturer's written instructions.  
6 Use applicators and techniques suited for paint and substrate indicated.

7  
8 Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint  
9 surfaces behind permanently fixed items with prime coat only.

10  
11 If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uni-  
12 form paint finish, color, and appearance.

13  
14 Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller  
15 tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

16  
17 **CLEANING AND PROTECTION**

18 At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project  
19 site.

20  
21 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scrap-  
22 ing, or other methods. Do not scratch or damage adjacent finished surfaces.

23  
24 Protect work of other trades against damage from paint application. Correct damage to work of other  
25 trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an un-  
26 damaged condition.

27  
28 At completion of construction activities of other trades, touch up and restore damaged or defaced painted  
29 surfaces.

30  
31 **EXTERIOR PAINTING SCHEDULE**

32  
33 Alkyd Over Alkyd Primer System: MPI EXT 5.1D, Metal Fabrications.

34 Prime Coat: Exterior alkyd metal primer.

35 Intermediate Coat: Exterior alkyd matching topcoat.

36 Topcoat: Exterior alkyd semi-gloss  
37

38  
39 **END OF SECTION**

40  
41 \*\*\*



1 Coordination of Work: Review other sections in which primers are provided to ensure compatibility of  
2 the total systems for various substrates. On request, furnish information on characteristics of finish mate-  
3 rials to ensure use of compatible primers.  
4

5 Material Quality: Provide the named manufacturer's best quality trade sale paint material of the various  
6 coating types specified. Paint material containers not displaying manufacturer's product identification  
7 will not be acceptable.

8 Federal Specifications establish a minimum quality level for paint materials, except where other  
9 product identification is used. Provide written certification from the manufacturer that materials  
10 provided meet or exceed these criteria.

#### 11 Contractor Qualifications:

12 Contractor shall be a specialist in providing new paint finishes required herein and have at least ten  
13 years of documented experience in providing work of this type and size on at least three similar  
14 projects within the last 5 years.  
15

16 Staff assigned to project shall have documented experience in work of this type of no less than ten  
17 years and three similar projects in last five years for persons applying final coats.

18 Submit a minimum of three full written copies of the qualifications and references with bid. In-  
19 clude qualifications of company and specific individuals to be assigned to the project. Clearly in-  
20 dicate and describe individual experience and proposed responsibilities for this project.

21 Subcontractors shall be specialists in the type of work proposed and have a minimum of ten years  
22 documented experience in providing work of that type and size on at least three similar projects  
23 within the last five years. Submit detailed qualifications with the bid.  
24

#### 25 DELIVERY, STORAGE, AND HANDLING

26 Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing  
27 manufacturer's name and label and the following information:

28 Product name, or title of material.

29 Product description (generic classification or binder type).

30 Federal Specification number, if applicable.

31 Manufacturer's stock number, and date of manufacture.

32 Contents by volume, for pigment and vehicle constituents.

33 Thinning instructions.

34 Application instructions.

35 Color name and number.  
36

37 Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures  
38 continuously maintained at not less than 45 deg F (7 deg C).  
39

40 Maintain containers in clean condition, free of foreign materials and residue.  
41

42 Remove rags and waste from storage areas daily.  
43

44 If necessary, add special requirements for fire protection, heating, ventilation, and other conditions for  
45 storage areas on-site.  
46  
47

1 PROJECT CONDITIONS

2 Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between  
3 50 and 95 deg F (10 and 35 deg C).

4  
5 Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3  
6 deg C) above the dew point; or to damp or wet surfaces.

7  
8  
9  
10 EXTRA MATERIALS

11 Furnish extra materials described below that are from same production run (batch mix) as materials ap-  
12 plied and that are packaged for storage and identified with labels describing contents.

13  
14 Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color ap-  
15 plied.

16  
17  
18 PART 2 – PRODUCTS

19  
20 MANUFACTURERS

21 Manufacturer: The basis of design are paint products of Pratt and Lambert (P&L). Other acceptable man-  
22 ufactures are:

- 23 Benjamin Moore & Co.
- 24 The Sherwin-Williams Company.

25  
26 MATERIALS

27 Primer: P&L Suprime "12"; FS TT-S-179B.

28  
29 Paint finish coating for all surfaces: P&L Aqua Satin; FS TT-P-1511B and Accolade Interior Semi-  
30 gloss.

31  
32 Paint for areas requiring high gloss finish: P&L Acrylic Accolade High Gloss.

33  
34 Other Materials: Solvents, adhesives, surfactants shall be as determined by contractor and approved by  
35 DSF Project Representative.

36  
37 SUPPORT EQUIPMENT

38 Provide, as necessary, all scaffolding, ladders and lifts required to access areas requiring decorative paint-  
39 ing.

40  
41 Coordinate erection and maintenance of equipment with work of the Lead Contractor and all other trades  
42 to ensure smooth operation for all trades.

43  
44 Selection and use of scaffolding, ladders and lifts shall be done so as to create no hazards for any workers,  
45 other trades and no damage to any surfaces or materials in the building.

46  
47 Close communication is essential to the proper and timely completion of the requirements of this section.  
48 Before the start of work of this section, contractor shall equip lead worker of this section with a cell phone  
49 to be active and always carried when on-site for the duration of the project. Cell phone number shall be  
50 provided to the DFD Project Representative.



1 Prime

2 Paint

3  
4 Paint Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's  
5 directions.

6 Maintain containers used in mixing and application of paint in a clean condition, free of foreign mate-  
7 rials and residue.

8 Stir material before application to produce a mixture of uniform density; stir as required during appli-  
9 cation. Do not stir surface film into material. Remove film and, if necessary, strain material before  
10 using.

11 Use only thinners approved by the paint manufacturer, and only within recommended limits.

12 In the event multiple containers of the same color are to be used in the same room, materials will be  
13 "boxed" in order to provide an even colored surface.

14  
15 APPLICATION

16 Apply paint in accordance with manufacturer's directions. Use brush and roller applicators and tech-  
17 niques best suited for substrate and type of material being applied. No pads or spraying are allowed ex-  
18 cept where noted and approved.

19 Technique shall be defined as the method in which the applicator is used.

20 Finish coats of paint applied to cove moldings, egg and dart decoration, dentils, column capitals, fan  
21 lights and door pediments may be spray painted.

22  
23 Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to for-  
24 mation of a durable paint film.

25 Paint colors, surface treatments, and finishes are to match original work.

26 Apply paint evenly with brush or roller as appropriate. Brush out corners and crevices to avoid build-  
27 up. Drips, streaks, runs, brush or roller marks and visible lines of stops and starts are not acceptable.

28 Apply additional coats when undercoats, stains, or other conditions show through final coat of paint  
29 until paint film is of uniform finish, color, and appearance. Give special attention to ensure that sur-  
30 faces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness  
31 equivalent to that of flat surfaces.

32  
33 Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spread-  
34 ing rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

35  
36 Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the  
37 manufacturer to material that is required to be painted or finished and has not been prime coated by oth-  
38 ers. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat  
39 appears, to assure a finish coat with no burn through or other defects due to insufficient sealing. Tinting of  
40 primers is acceptable with manufacture's recommendation.

41  
42 Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish,  
43 color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness,  
44 or other surface imperfections will not be acceptable.

45  
46 Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint  
47 work not in compliance with specified requirements.

1 **CLEANING AND PROTECTION**

2 Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from  
3 Project site.

4  
5 After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scrap-  
6 ing, or other methods. Do not scratch or damage adjacent finished surfaces.

7 Protect work of other trades against damage from paint application. Correct damage to work of other  
8 trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an un-  
9 damaged condition.

10  
11 Provide “Wet Paint” signs to protect newly painted finishes. Remove protection of other work after com-  
12 pletion of painting operations.

13  
14 At completion of construction activities of other trades, touch up and restore damaged or defaced painted  
15 surfaces.

16  
17 **COMPLETION**

18 Key staff of the decorative contractor shall remain on the project until substantial completion and until all  
19 required submittals, samples, materials and documentation are turned over the DSF Project Representa-  
20 tive and are acceptable.

21  
22 **INTERIOR PAINTING SCHEDULE**

23 Refer to paint schedule in drawings for location of colors.

24  
25 **Wood Substrates:**

26 Latex Over Alkyd Primer System: MPI INT 6.3U.

27 Prime Coat: Interior alkyd primer/sealer.

28 Intermediate Coat: Interior latex matching topcoat.

29 Topcoat: Interior latex semigloss

30  
31 **Gypsum Board Substrates:**

32 Latex Over Alkyd Primer System: MPI INT 9.2K.

33 Prime Coat: Interior alkyd primer/sealer.

34 Intermediate Coat: Interior latex matching topcoat.

35 Topcoat: Interior latex satin

36  
37 **Metal Substrates:**

38 Latex Over Alkyd Primer System: MPI INT 9.2K.

39 Prime Coat: Interior alkyd primer/sealer.

40 Intermediate Coat: Interior latex matching topcoat.

41 Topcoat: Interior latex satin

42

43

**END OF SECTION**

44

45

\*\*\*



1  
2 Fire-Test-Response Characteristics: Provide impact-resistant, plastic wall-protection units with surface-  
3 burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or  
4 UL 723 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.  
5

#### 6 DELIVERY, STORAGE, AND HANDLING

7 Store impact-resistant wall-protection units in original undamaged packages and containers inside well-  
8 ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

9 Maintain room temperature within storage area at not less than 70 deg F during the period plastic  
10 materials are stored.

11 Keep plastic sheet material out of direct sunlight.

12 Store plastic wall-protection components for a minimum of 72 hours, or until plastic material  
13 attains a minimum room temperature of 70 deg F.

14 Store corner-guard covers in a vertical position.  
15

#### 16 PROJECT CONDITIONS

17 Environmental Limitations: Do not deliver or install impact-resistant wall-protection units until building  
18 is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and main-  
19 taining temperature at 70 deg F for not less than 72 hours before beginning installation and for the re-  
20 mainder of the construction period.  
21

22 Field Measurements: Verify actual locations of walls, columns, and other construction contiguous with  
23 impact-resistant wall-protection units by field measurements before fabrication and indicate measure-  
24 ments on Shop Drawings.  
25

#### 26 WARRANTY

27 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace com-  
28 ponents of impact-resistant wall-protection units that fail in materials or workmanship within specified  
29 warranty period.

30 Failures include, but are not limited to, the following:

31 Structural failures.

32 Deterioration of plastic and other materials beyond normal use.

33 Warranty Period: Five years from date of Substantial Completion.  
34  
35

## 36 PART 2 - PRODUCTS

37

#### 38 MANUFACTURERS

39 In other Part 2 articles where titles below introduce lists, the following requirements apply to product se-  
40 lection:

41 Basis-of-Design Product: The design for each impact-resistant wall-protection unit is based on  
42 the product named. Subject to compliance with requirements, provide either the named product  
43 or a comparable product by one of the other manufacturers specified.  
44

#### 45 MATERIALS

46 Vinyl: Surface burning characteristics, as determined by UL-723 (ASTM E-84).  
47

48 Vinyl: manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact  
49 modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).  
50

1 Stainless-Steel Sheet: ASTM A 240/A 240M.

2

3 Adhesive: Type recommended by manufacturer for use with material being adhered to substrate indicat-  
4 ed.

5

6

#### 7 CORNER GUARDS

8 Provide the product from one of the following:

9 Construction Specialties, Inc.

10 IPC, Division of InPro Corp.

11 Pawling Corporation

12

13 Surface-Mounted Corner Guards: Fabricated from 1-piece with formed edges; with 90-degree turn to  
14 match wall condition.

15 Material: Vinyl.

16 Thickness: Minimum 0.0625 inch.

17 Finish: To be selected.

18 Color: To be selected.

19 Height: 5 ft.

20 Wing Size: Nominal 3-1/2 by 3-1/2 inches.

21 Corner Radius: 1/8 inch.

22 Mounting: Construction adhesive per manufacturer.

23

#### 24 FABRICATION

25 Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimen-  
26 sions, and member sizes, including thicknesses of components.

27

28 Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble on-  
29 ly as necessary for shipping and handling.

30

31 Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of  
32 wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to  
33 produce flush, smooth, and rigid hairline joints.

34

35

### 36 PART 3 - EXECUTION

37

#### 38 EXAMINATION

39 Examine substrates and wall areas, with Installer present, for compliance with requirements for installa-  
40 tion tolerances and other conditions affecting performance of work.

41 Examine walls to which impact-resistant wall protection will be attached for blocking, grounds,  
42 and other solid backing that have been installed in the locations required for secure attachment of  
43 support fasteners.

44 For impact-resistant wall-protection units attached with adhesive, verify compatibility with and  
45 suitability of substrates, including compatibility with existing finishes or primers.

46 Proceed with installation only after unsatisfactory conditions have been corrected.

47

#### 48 PREPARATION

1 Complete finishing operations, including painting, before installing impact-resistant wall-protection sys-  
2 tem components.

3  
4 Before installation, clean substrate to remove dust, debris, and loose particles.

5  
6 **INSTALLATION**

7 General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions.  
8 Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished  
9 Work.

10 Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

11  
12 Provide anchoring devices to withstand imposed loads.

13  
14 Adjust end caps as required to ensure tight seams.

15  
16  
17  
18 **CLEANING**

19 Immediately after completion of installation, clean plastic covers and accessories using a standard, am-  
20 monia-based, household cleaning agent.

21  
22 Remove excess adhesive using methods and materials recommended in writing by manufacturer.

23  
24 **END OF SECTION**  
25 \*\*\*



- 1           2.    Model: B-2892.
- 2           3.    Double-roll dispenser with cover.
- 3           4.    Mounting: Surface mounted.
  
- 4           C.    Paper Towel Dispenser/Waste:
- 5           1.    Manufacturer: Bobrick.
- 6           2.    Model: B-43944.
- 7           3.    Mounting: Recessed.
- 8           4.    Material and Finish: Stainless steel, No. 4 finish (satin).
- 9           5.    Lockset: Tumbler type.
- 10          6.    Refill Indicators: Pierced slots at sides or front.
  
- 11          D.    Liquid-Soap Dispenser (Manual):
- 12          1.    Manufacturer: Bobrick.
- 13          2.    Model: B-4112.
- 14          3.    Mounting: Vertically oriented, surface mounted.
- 15          4.    Lockset: Tumbler type.
- 16          5.    Refill Indicator: Window type.
  
- 17          E.    Vertical Grab Bar:
- 18          1.    Manufacturer: Bobrick.
- 19          2.    Model: B-5806 x 18.
- 20          3.    Mounting: Flanges with concealed fasteners.
- 21          4.    Material: Stainless steel, 0.05 inch (1.3 mm) thick.
- 22                a.    Finish: Smooth, No. 4 finish (satin).
- 23          5.    Outside Diameter: 1-1/2 inches (38 mm).
- 24          6.    Configuration and Length: Straight, 18 inches.
  
- 25          F.    Back and Side Grab Bar Combo:
- 26          1.    Manufacturer: Bobrick.
- 27          2.    Model: B-6897
- 28          3.    Mounting: Flanges with concealed fasteners.
- 29          4.    Material: Stainless steel, 0.05 inch (1.3 mm) thick.
- 30                a.    Finish: Smooth, No. 4 finish (satin).
- 31          5.    Outside Diameter: 1-1/2 inches (38 mm).
- 32          6.    Configuration and Length: L shape, 42" x 54" inches.
- 33          7.    Lockset: Tumbler type with separate lock and key for coin box.
  
- 34          G.    Sanitary-Napkin Disposal Receptacle:
- 35          1.    Manufacturer: Bobrick.
- 36          2.    Model: B-4354.
- 37          3.    Mounting: Surface mounted.





- 1 C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and ANSI  
2 A117.1-2003 with code provisions as adopted by authorities having jurisdiction.
- 3 1. Interior Code Signage: Provide signage as required by accessibility regulations and  
4 requirements of authorities having jurisdiction. These include, but are not limited to, the  
5 following:  
6 a. Fire Doors  
7 b. Room Capacity  
8 c. Occupant Capacity  
9 d. Signs for Accessible Spaces

10 1.5 PROJECT CONDITIONS

- 11 A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which  
12 they are installed, verify dimensions by field measurement before fabrication and indicate  
13 measurements on Shop Drawings.

14 1.6 COORDINATION

- 15 A. For signs supported by or anchored to permanent construction, advise installers of anchorage  
16 devices about specific requirements for placement of anchorage devices and similar items to be  
17 used for attaching signs.
- 18 1. For signs supported by or anchored to permanent construction, furnish templates for  
19 installation of anchorage devices.

20 PART 2 - PRODUCTS

21 2.1 MANUFACTURERS

- 22 A. In other Part 2 articles where titles below introduce lists, the following requirements apply for  
23 product selection:  
24 1. Manufacturers: Subject to compliance with requirements, provide products by the  
25 manufacturers specified.

26 2.2 PANEL SIGNS

- 27 A. General: Provide panel signs that comply with requirements indicated for materials,  
28 thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- 29 1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions  
30 within tolerance of plus or minus 1/16 inch measured diagonally.
- 31 B. Manufacturers:  
32 1. INPRO Corporation – Basis of Design  
33 2. ASI Sign Systems, Inc.  
34 3. Best Manufacturing Co.

- 1 C. Interior Grade Photopolymer Laminate Panels: Provide photopolymer panels composed of  
2 .032” thick moisture resistant, non-glare nylon photopolymer bonded to .080” thick PETG and  
3 .029 thick laminate base. Overall panel thickness shall be .125”. Maximum panel size shall be  
4 18”x24”.
- 5 D. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to  
6 comply with the following requirements:
- 7 1. Edge Condition: Square cut.  
8 2. Corner Condition: Rounded to radius indicated.
- 9 E. Laminated Panels: Permanently laminate face panels to backing sheets of material; use  
10 manufacturer's standard process.
- 11 F. Graphic Content and Style: Provide sign copy that complies with requirements indicated in the  
12 Sign Schedule for size, style, spacing, content, mounting height and location, material, finishes,  
13 and colors of signage.
- 14 1. Background color: noted below.  
15 2. Text color: noted below.
- 16 G. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with  
17 ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2  
18 braille. Produce precisely formed characters with square cut edges free from burrs and cut  
19 marks.
- 20 1. Panel Material: Photopolymer.  
21 2. Raised-Copy Thickness: Not less than 1/32 inch.

## 22 2.3 PANEL SIGN TYPES

- 23 A. Room Signs: Phoenix sign collection.
- 24 1. Material: Photopolymer. Background Color: Cabernet.  
25 2. Copy: Tactile and braille.  
26 3. Character Style: Helvetica.  
27 4. Text: As indicated in the Sign Schedule. Text Color: Silver.  
28 5. Message: Fixed.  
29 6. Sizes:
- 30 a. Sign: 6”x 6” minimum.
- 31 7. Mounting: Center on each door to rooms at 50” A.F.F.
- 32 B. Occupancy Signs: Phoenix sign collection.
- 33 1. Material: Photopolymer. Background Color: Cabernet.  
34 2. Copy: Raised.  
35 3. Character Style: Helvetica.  
36 4. Text: Maximum occupancy load: As indicated in the Sign Schedule. Text Color: Silver.  
37 5. Message: Fixed.  
38 6. Sizes:

- 1 a. Sign: 6"x6" minimum.
- 2 b. Character: Minimum 1/2-inch- high characters.
- 3 7. Mounting: 50" A.F.F. beside each door to corridor.
- 4 C. Toilet Room Signs: Phoenix sign collection.
- 5 1. Material: Photopolymer. Background Color: Cabernet.
- 6 2. Copy: Tactile and Braille.
- 7 3. Character Style: Helvetica.
- 8 4. Text: According to requirements in the ADA or of authorities having jurisdiction,
- 9 whichever are more stringent. Text Color: Silver.
- 10 5. Message: Fixed.
- 11 6. Sizes:
- 12 a. Sign: 6"x 6" minimum.
- 13 b. Character: Minimum 1-inch- high characters.
- 14 7. Mounting: 50" A.F.F. beside door to toilet.
- 15 D. Symbols of Accessibility: Provide 6-inch- high symbol fabricated from opaque non-reflective
- 16 vinyl film, 0.0035-inch - nominal thickness, with pressure-sensitive adhesive backing suitable
- 17 for both exterior and interior applications. Phoenix sign collection.
- 18 1. Material: Photopolymer. Background Color: Cabernet.
- 19 2. Copy: Raised.
- 20 3. Character Style: Helvetica.
- 21 4. Graphics/Text: as indicated in sign schedule.
- 22 5. Message: Fixed.
- 23 6. Sizes:
- 24 a. Sign: 8"x6" minimum.
- 25 b. Character: size characters to meet ADA regulations. Text Color: Silver.
- 26 7. Schedule: Refer to Drawing SGN1.
- 27 8. Mounting: 50" A.F.F. beside each toilet room door.
- 28 E. Emergency Signs: Phoenix sign collection.
- 29 1. Material: Photopolymer. Background Color: Cabernet.
- 30 2. Copy: Tactile and Braille.
- 31 3. Character Style: Helvetica.
- 32 4. Text: According to requirements in the ADA or of authorities having jurisdiction,
- 33 whichever are more stringent.
- 34 5. Message: Fixed.
- 35 6. Sizes:
- 36 a. Sign: 6"x6" minimum.
- 37 b. Character: Minimum 1-inch- high characters. Text Color: Silver.
- 38 7. Schedule: Provide one sign per activity room near emergency exit.

1 8. Mounting: 50" A.F.F.

2 2.4 CAST LETTERS

3 A. General: Provide exterior building signage that comply with requirements indicated for  
4 materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

5 B. Manufacturers:

- 6 1. Genesis
- 7 2. Metallic Arts
- 8 3. Matthews International

9 C. Building Signage:

- 10 1. Material: Aluminum, solid cast, clear anodized.
- 11 2. Copy: Tactile.
- 12 3. Character Style: Futura Medium.
- 13 4. Message: Fixed, Name of Building / Refer to drawings.
- 14 5. Sizes:
  - 15 a. Mounting: Free standing, offset from building, base mounted.
  - 16 b. Character: Minimum 8-inch high characters.
- 17 6. Mounting: Refer to drawings.

18 2.5 ACCESSORIES

19 A. Mounting Methods: Use concealed fasteners fabricated from materials that are not corrosive to  
20 sign material and mounting surface.

21 B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for  
22 exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or  
23 lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set  
24 into concrete or masonry work.

25 2.6 FINISHES, GENERAL

26 A. Protect mechanical finishes on exposed surfaces from damage by applying strippable,  
27 temporary protective covering before shipping.

28 B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are  
29 acceptable if they are within one-half of range of approved Samples. Noticeable variations in  
30 same piece are not acceptable. Variations in appearance of other components are acceptable if  
31 they are within range of approved Samples and are assembled or installed to minimize contrast.

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Examine substrates, areas, and conditions, with Installer present, for compliance with  
4 requirements for installation tolerances and other conditions affecting performance of work.
- 5 B. Verify that items provided under other sections of Work are sized and located to accommodate  
6 signs.
- 7 C. Examine supporting members to ensure that surfaces are at elevations indicated or required to  
8 comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- 9 D. Proceed with installation only after unsatisfactory conditions have been corrected.

10 3.2 INSTALLATION

- 11 A. General: Locate signs and accessories where indicated, using mounting methods of types  
12 described and in compliance with manufacturer's written instructions.
- 13 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion  
14 and other defects in appearance.
- 15 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable.  
16 Where not indicated or possible, such as double doors, install signs on nearest adjacent  
17 walls. Locate to allow approach within 3 inches of sign without encountering protruding  
18 objects or standing within swing of door.
- 19 B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
- 20 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous  
21 surfaces. Do not use this method for vinyl-covered or rough surfaces.
- 22 2. Magnetic Tape: Use magnetic tape to mount signs to smooth, nonporous surfaces.
- 23 3. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by  
24 sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use  
25 double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign  
26 in place until adhesive has fully cured.

27 3.3 CLEANING AND PROTECTION

- 28 A. After installation, clean soiled sign surfaces according to manufacturer's written instructions.  
29 Protect signs from damage until acceptance by Owner.

30 **END OF SECTION**

31



1 1.6 ENVIRONMENTAL REQUIREMENTS

- 2 A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher  
3 ingredients.

4 PART 2 - PRODUCTS

5 2.1 MANUFACTURERS

- 6 A. Fire Extinguishers and Accessories: Provide products by one of the following:  
7 1. Potter Roemer - Basis of Design  
8 2. JL Industries  
9 3. Amerex Corporation

10 2.2 FIRE EXTINGUISHERS

- 11 A. Model # 3005  
12 B. Quantity: refer to Drawings.

13 2.3 FIRE EXTINGUISHER CABINETS

- 14 A. 1700 SERIES, with flat (clear) glass in door. White paint finish.  
15 B. Quantity: refer to Drawings.

16 PART 3 - EXECUTION

17 3.1 EXAMINATION

- 18 A. Examine fire extinguishers for proper charging and tagging.  
19 1. Remove and replace damaged, defective, or undercharged units.

20 3.2 INSTALLATION

- 21 A. Install cabinet in wall as recommended by manufacturer. Secure extinguisher in cabinet.  
22 1. General: Fasten mounting brackets, square and plumb.

23 END OF SECTION

24





1 Range Hood  
2 Provide product from one of the following manufacturers:  
3 Amana  
4 Hotpoint  
5 Whirlpool  
6

7 Product Description – 30” ducted with 220 CFM blower, white.  
8

9 FINISHES, GENERAL

10 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommenda-  
11 tions for applying and designating finishes.

12  
13 Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protec-  
14 tive covering before shipping.

15  
16 Color-Coated Finish: Provide appliances with manufacturer's standard white finish complying with man-  
17 ufacturer's written instructions for surface preparation including pretreatment, application, baking, color,  
18 gloss, and minimum dry film thickness for painted finishes.  
19  
20  
21  
22

23 PART III - EXECUTION  
24

25 EXAMINATION

26 Examine conditions, with Installer present, for compliance with requirements for installation tolerances  
27 and other conditions affecting performance of work.  
28

29 Proceed with installation only after unsatisfactory conditions have been corrected.  
30

31 INSTALLATION, GENERAL

32 General: Comply with manufacturer's written instructions.

33 Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasten-  
34 ers. Verify that clearances are adequate for proper functioning and rough openings are completely con-  
35 cealed.  
36

37 CLEANING AND PROTECTION

38 Test each item of residential appliances to verify proper operation. Make necessary adjustments.

39 Verify that accessories required have been furnished and installed.  
40

41 Remove packing material from residential appliances and leave units in clean condition, ready for opera-  
42 tion.  
43

44 END OF SECTION

45 \*\*\*



1 Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to oth-  
2 er work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, methods of join-  
3 ing countertops, and cutouts for plumbing fixtures.

4  
5 Samples for Verification:

6 Door front with opaque finish, for each type

7  
8 Plastic laminate for countertops, 1 ½ x 3 ¾ inch sample chips; full range of manufacturers selection

9  
10 Exposed hardware, for each type of item

11  
12 Product Certificates: Signed by manufacturers of casework certifying that products furnished comply  
13 with requirements.

## 14 **QUALITY ASSURANCE**

15  
16 Source Limitations for Cabinets: Obtain cabinets through one source from a single manufacturer.

17  
18 Product Options: Drawings indicate size, configurations, and finish material of cabinets by referencing  
19 designated manufacturer's catalog numbers. Other manufacturers' cabinets of similar sizes and door and  
20 drawer configurations, same finish material, and complying with the Specifications may be considered.  
21 Refer to Division 1 Section "Product Requirements."

22  
23 Quality Standards: Unless otherwise indicated, comply with the following standards:

24 Cabinets: KCMA A161.1.

25  
26 KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semi-exposed  
27 location of each unit and showing compliance with the above standard.

## 28 **PROJECT CONDITIONS**

29  
30 Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is  
31 complete, and HVAC system is operating and maintaining temperature and relative humidity at occupan-  
32 cy levels during the remainder of the construction period.

33  
34 Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions  
35 for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to  
36 established dimensions. Provide fillers and scribes to allow for trimming and fitting.

37  
38 Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of  
39 existing construction by field measurements before fabrication and indicate measurements on Shop Draw-  
40 ings. Provide fillers and scribes to allow for trimming and fitting.

41  
42 Field Measurements for Countertops: Verify dimensions of countertops by field measurements after base  
43 cabinets are installed but before countertop fabrication is complete.

## 44 **COORDINATION**

45  
46 Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.

47  
48 Coordinate locations of utilities that will penetrate countertops or backsplashes.

## 49 **PART 2 - PRODUCTS**

### 50 **CABINET MATERIALS, GENERAL**

1 Certified Wood Materials: Provide cabinets made from wood and wood-based materials that are pro-  
2 duced from wood obtained from forests certified by an FSC-accredited certification body to comply with  
3 FSC 1.2, "Principles and Criteria."  
4

5 Adhesives: Do not use adhesives that contain urea formaldehyde.  
6

7 Hardwood Lumber: Kiln dried to 7 percent moisture content.  
8

9 Softwood Lumber: Kiln dried to 10 percent moisture content.  
10

11 Hardwood Plywood: HPVA HP-1  
12

13 Particleboard: ANSI A208.1, Grade M-2,  
14

15 Medium-Density Fiberboard: ANSI A208.2, Grade MD  
16

17 Exposed Materials:  
18

19 Exposed Wood Species: Birch  
20

21 Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are  
22 noticeably dissimilar in color, grain, figure, or natural character markings.  
23

24 Staining and Finish: As selected by Architect from manufacturer's full range.  
25

26 Solid Wood: Clear hardwood lumber of species indicated, free of defects.  
27

28 Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C  
29 backs of same species as faces.  
30

31 Edge band exposed edges with minimum 1/8-inch- (3-mm-) thick, solid-wood edging of same species  
32 as face veneer.  
33

34 Semi-exposed Materials: Unless otherwise indicated, provide the following:  
35

36 Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as ex-  
37 posed surfaces  
38

39 Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects af-  
40 fecting strength or utility; particleboard; medium-density fiberboard; or hardboard.  
41

## 42 **CABINET HARDWARE**

43 General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and  
44 finish as selected by Architect from manufacturer's full range.  
45

46 Pulls: Surface-mounted decorative pulls  
47

48 Hinges: Concealed European-style self-closing hinges.  
49

50 Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when  
51 drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9,  
Type B05011 or B05091.

1 **COUNTERTOP MATERIALS**

2 Plastic Laminate Material: melamine-impregnated decorative surface papers combined with phenolic  
3 treated craft paper, general purpose 10/HGS.  
4

5 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

6 Avonite, Inc.

7 Formica Corp.

8 Nevamar Company, LLC.

9 Wilsonart International.

10  
11 Colors and Patterns: As selected by Architect from manufacturer's full range.  
12

13 **CABINETS**

14 Products: Subject to compliance with requirements, cabinets that may be incorporated into the Work in-  
15 clude, but are not limited to, the following:  
16

17 Wood Harbor

18 Kitchen Craft

19 Holiday Kitchens

20 Ultracraft  
21

22 Face Style: Reveal overlay; door and drawer faces partially cover cabinet fronts.  
23

24 Cabinet Style: Face Frame  
25

26 Door and Drawer Fronts: Solid-wood stiles and rails, 5/8 inch (16 mm) thick, with 3/4-inch- (19-mm-)  
27 thick, solid-wood center panels.  
28

29 Face Frames: 3/4-by-1-5/8-inch (19-by-41-mm) solid wood with glued mortise and tenon or doweled  
30 joints.  
31

32 Exposed Cabinet End Finish: Wood veneer  
33

34 Cabinet End Construction: 5/8-inch- (16-mm-) thick plywood.  
35

36 Cabinet Tops and Bottoms: 5/8-inch- (16-mm-) thick particleboard or 1/2-inch- (12.7-mm-) thick ply-  
37 wood, fully supported by and secured in rabbets in end panels, front frame (if any), and back rail.  
38

39 Back, Top, and Bottom Rails: 3/4-by-2-1/2-inch (19-by-63-mm) solid wood, interlocking with end pan-  
40 els and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with  
41 mechanical fasteners.  
42

43 Wall-Hung-Unit Back Panels: 3/16-inch- (4.8-mm-) thick plywood fastened to rear edge of end panels  
44 and to top and bottom rails.  
45

46 Base-Unit Back Panels: 1/8-inch- (3.2-mm-) thick hardboard fastened to rear edge of end panels and to  
47 top and bottom rails.  
48

49 Front Frame Drawer Rails: 3/4-by-1-1/4-inch (19-by-32-mm) solid wood mortised and fastened into face  
50 frame.  
51

1 Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

2  
3 Join subfronts, backs, and sides with glued dovetail joints.

4  
5 Subfronts, Backs, and Sides: 1/2-inch- (12.7-mm-) thick solid wood.

6  
7 Bottoms: 1/4-inch- (6.4-mm-) thick plywood.

8  
9 Shelves: 3/4-inch- (19-mm-) thick particleboard or 5/8-inch- (16-mm-) thick plywood.

10  
11 Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect  
12 tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with  
13 mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.

14  
15 Factory Finishing: Finish cabinets at factory. Defer only final touchup until after installation.

### 16 17 **PLASTIC LAMINATE COUNTERTOPS**

18 Configuration: Provide countertops with the following front and backsplash style:

19  
20 Front: slightly eased at top

21 Backsplash: Straight

22 End Splash: Matching backsplash

23  
24 Countertops: 3/4-inch- (19-mm-) thick, solid-surfacing material with front edge built up with same mate-  
25 rial.

26  
27 Backsplashes: [3/4-inch- (19-mm-)] thick, solid-surfacing material.

28 Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes, unless otherwise in-  
29 dicated. Comply with solid-surfacing-material manufacturer's written instructions for adhesives, sealers,  
30 fabrication, and finishing.

31  
32 Fabricate with loose backsplashes for field assembly.

## 33 34 **PART 3 - EXECUTION**

### 35 36 **INSTALLATION**

37 Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabi-  
38 nets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and mold-  
39 ings in finish to match cabinet face.

40  
41 Install cabinets without distortion so doors and drawers fit openings and are aligned. Complete installa-  
42 tion of hardware and accessories as indicated.

43  
44 Install cabinets and countertop level and plumb to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).  
45 Fasten cabinets to adjacent units and to backing.

46  
47 Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches (600 mm)  
48 o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, block-  
49 ing, or hanging strips.

1 Fasten solid-surfacing-material countertops by screwing through corner blocks of base units into under-  
2 side of countertop. Align adjacent surfaces, and form seams to comply with manufacturer's written in-  
3 structions using adhesive in color to match countertop. Carefully dress joints smooth, remove surface  
4 scratches, and clean entire surface.

5  
6 Install backsplashes and end splashes to comply with material manufacturer's written instructions for  
7 adhesives, sealers, fabrication, and finishing.

8  
9 Seal edges of cutouts by saturating with varnish.

#### 10 11 **ADJUSTING AND CLEANING**

12 Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly with-  
13 out warp or bind. Lubricate operating hardware as recommended by manufacturer.

14  
15 Clean casework on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore  
16 damaged or soiled areas.

17  
18  
19 **END OF SECTION**

20  
21 \*\*\*







1 1.2 RELATED WORK

2 A. This section applies to all Division 22 00 00 sections of plumbing.

4 1.3 REFERENCE

5 A. Applicable provisions of Division 1 govern work under this section.

6 1.4 STANDARDS

7 A. Abbreviations of standards organizations referenced in this and other sections are as  
8 follows:

- 9 1. ABMA American Boiler Manufacturers Association
- 10 2. ACPA American Concrete Pipe Association
- 11 3. AGA American Gas Association
- 12 4. AMCA Air Movement and Control Association
- 13 5. ANSI American National Standards Institute
- 14 6. ARI Air Conditioning and Refrigeration Institute
- 15 7. ASME American Society of Mechanical Engineers
- 16 8. ASPE American society of Plumbing Engineers
- 17 9. ASSE American Society of Sanitary Engineering
- 18 10. ASTM American Society for Testing and Materials
- 19 11. AWWA American Water Works Association
- 20 12. AWS American Welding Society
- 21 13. CISPI Cast Iron Soil Pipe Institute
- 22 14. CGA Compressed Gas Association
- 23 15. CS Commercial Standards, Products Standards Sections, Office of Eng.  
24 Standards Service, NBS
- 25 16. EPA Environmental Protection Agency
- 26 17. FS Federal Specifications, Superintendent of Documents, U.S. Government  
27 Printing Office
- 28 18. GAMA Gas Appliance Manufacturers Association
- 29 19. IAPMO International Association of Plumbing & Mechanical Officials
- 30 20. IEEE Institute of Electrical and Electronics Engineers
- 31 21. ISA Instrument Society of America
- 32 22. MCA Mechanical Contractors Association
- 33 23. MICA Midwest Insulation Contractors Association
- 34 24. MSS Manufacturer's Standardization Society of the Valve & Fitting Industry,  
35 Inc.
- 36 25. NBS National Bureau of Standards
- 37 26. NEC National Electric Code
- 38 27. NEMA National Electrical Manufacturers Association
- 39 28. NFPA National Fire Protection Association
- 40 29. NSF National Sanitation Foundation
- 41 30. PDI Plumbing and Drainage Institute
- 42 31. SMACNA Sheet Metal and Air Conditioning Contractors' National Association.  
43 Inc.
- 44 32. STI Steel Tank Institute
- 45 33. UL Underwriters Laboratories Inc.

46 B. Standards referenced in this section:

- 1           1.       ACI 614        Recommended Practice for Measuring, Mixing and Placing of
- 2                    Concrete
- 3           2.       ASTM D1557 Standard Test Method for Moisture-Density Relations of Soils
- 4           3.       ASTM E814   Standard Test Method for Fire Tests of Through-Penetration Fire
- 5                    Stops
- 6           4.       ASTM E84     Standard Test Method for Surface Burning Characteristics of
- 7                    Building Materials
- 8           5.       D.O.T.        Standard Specifications for Road and Bridge Construction, State
- 9                    of Wisconsin, Dept. of Transportation
- 10          6.       UL1479        Fire Tests of Through-Penetration Firestops
- 11          7.       UL723        Surface Burning Characteristics of Building Materials

12   1.5    QUALITY ASSURANCE

- 13       A.     Substitution of Materials: Refer to Section GC - General Conditions of the Contract,
- 14            Equals and Substitutions.
- 15       B.     All products and materials used are to be new, undamaged, clean and in good condition.
- 16            Existing products and materials are not to be reused unless specifically indicated.
- 17       C.     The use of a manufacturer's name, model, or catalog number, as scheduled or specified,
- 18            is for the purpose of establishing the standard of quality and general configuration.
- 19            Where equipment or accessories are used which differ in arrangement, configuration,
- 20            dimensions, ratings, or engineering parameters from those indicated on the contract
- 21            documents, the contractor is responsible for all costs involved in integrating the
- 22            equipment or accessories into the system and for obtaining the performance from the
- 23            system into which these items are placed. Said costs may include, but are not limited to,
- 24            modifications for:
  - 25            1.       Structural loading
  - 26            2.       Size
  - 27            3.       Maintenance accessibility
  - 28            4.       Electrical or plumbing connections
  - 29            5.       Finish
  - 30            6.       Performance and efficiency
  - 31            7.       Warranty
  - 32            8.       Changes found necessary during the testing, adjusting, and balancing phase of
  - 33                    the project

34   1.6    CONTINUITY OF EXISTING SERVICES

- 35       A.     Do not interrupt or change existing services without prior written approval from the
- 36            Owner's Project Representative. When interruption is required, coordinate scheduling of
- 37            down-time with the Owner to minimize disruption to his activities. Unless specifically
- 38            stated, all work involved in interrupting or changing existing services is to be done
- 39            during normal working hours.

40   1.7    PROTECTION OF FINISHED SURFACES

- 41       A.     Refer to Division 1, General Requirements, Protection of Finished Construction.

42   1.8    SLEEVES AND OPENINGS

- 43       A.     Refer to Division 1, General Requirements, Sleeves and Openings.

44   1.9    SEALING AND FIRESTOPPING

1 A. Sealing and firestopping of sleeves/openings between piping, etc. and the sleeve or  
2 structural opening shall be the responsibility of the contractor whose work penetrates the  
3 opening. The contractor responsible shall hire individuals skilled in such work to do the  
4 sealing and fireproofing. These individuals hired shall normally and routinely be  
5 employed in the sealing and fireproofing occupation.

6 1.10 CODES

7 A. Comply with requirements of Wisconsin Administrative Code.

8 1.11 CERTIFICATES AND INSPECTIONS

9 A. Refer also to the General Conditions of the Contract, Permits, Regulations, Utilities and  
10 Taxes.

11 B. Obtain and pay for all required State installation inspections except those provided by the  
12 Architect/Engineer. Deliver originals of these certificates to the Owner's Project  
13 Representative. Include copies of the certificates in the Operating and Maintenance  
14 Instructions.

15 1.12 SUBMITTALS

16 A. Refer to the General Conditions of the Contract, Submittals.

17 B. Not more than two weeks after award of contract but before any shop drawings are  
18 submitted, contractor to submit the following plumbing system data sheet. List piping  
19 material type for each piping service on the project, ASTM number, schedule or pressure  
20 class, joint type, manufacturer and model number where appropriate. List valves and  
21 specialties for each piping service, fixture and equipment with manufacturer and model  
22 number. The approved plumbing system data sheet(s) will be made available to the DSF  
23 Project Representative for their use on this project.

24 C. PLUMBING SYSTEM DATA SHEET

25 Item Pipe Service/Sizes Manufacturer/Model No. Remarks

26 Pipe

27 Fittings

28 Unions

29 Valves:

30 Ball

31 Butterfly

32 Balancing

33 Check

34 Gate

35 Curb Stop

36 Other

37 Pipe Specialties:

38 Thermometers

39 Press Gauges

40 Strainers

41 Building Penetrations

42 Hangers & Supports

43 Insulation

44 Plbg. Specialties:

45 Floor Drains

46 Cleanouts

- 1 Water Hammer Arrestors  
2 Backflow Preventers  
3 Wall Hydrants  
4 Hose Bibbs  
5 Manhole Castings  
6 Plbg. Fixtures  
7 Plbg. Equipment
- 8 D. Shop drawing submittals are to be bound, labeled, contain the project manual cover page  
9 and a material index list page showing item designation, manufacturer and additional  
10 items supplied with the installation. Submit for all equipment and systems as indicated in  
11 the respective specification sections, marking each submittal with that specification  
12 section number. Mark general catalog sheets and drawings to indicate specific items  
13 being submitted and proper identification of equipment by name and/or number, as  
14 indicated in the contract documents. Include wiring diagrams of electrically powered  
15 equipment.
- 16 E. Submit sufficient quantities of data sheets and shop drawings to allow the following  
17 distribution:
- 18 1. Operating and Maintenance Manuals 2 copies  
19 2. Architect/Engineer 1 copy
- 20 1.13 OPERATING AND MAINTENANCE INSTRUCTIONS
- 21 A. Refer to Division 1, General Requirements, Operating and Maintenance Manuals and  
22 Instructions.
- 23 B. Assemble material in three-ring or post binders, using an index at the front of each  
24 volume and tabs for each system or type of equipment. In addition to the data indicated  
25 in the General Conditions of the Contract, include the following information:
- 26 1. Copies of all approved shop drawings.  
27 2. Manufacturer's wiring diagrams for electrically powered equipment  
28 3. Records of tests performed to certify compliance with system requirements  
29 4. Certificates of inspection by regulatory agencies  
30 5. Parts lists for fixtures, equipment, valves and specialties.  
31 6. Manufacturers installation, operation and maintenance recommendations for  
32 fixtures, equipment, valves and specialties.  
33 7. Valve schedules  
34 8. Lubrication instructions, including list/frequency of lubrication  
35 9. Warranties  
36 10. Additional information as indicated in the technical specification sections
- 37 1.14 TRAINING OF OWNER PERSONNEL
- 38 A. Instruct user agency personnel in the proper operation and maintenance of systems and  
39 equipment provided as part of this project. Include not less than 4 hours of instruction,  
40 using the Operating and Maintenance manuals during this instruction. Demonstrate  
41 startup, operation and shutdown procedures for all equipment. All training to be during  
42 normal working hours. Videotape all instructions and provide Owner with copy.
- 43 1.15 TV SURVEY
- 44 A. Plumbing Contractor shall inspect and survey the existing underground sanitary building  
45 drain within the construction limits, prior to the start of the new work. The survey shall

1 be documented by the use of a video camera and sound probe and should extend 75 feet  
2 downstream of the point of connection. Plumbing Contractor shall review the video tape  
3 with the owner and provide two copies of the tape for his records. The actual  
4 underground building drain location shall be documented on a set of record drawings for  
5 the owner's use. Plumbing Contractor shall verify drain inverts and sizing prior to  
6 connection of the new branches to the existing drain. Any piping defects shall be reported  
7 to the Architect for review. Allow time for review and comment prior to installation.

#### 8 1.16 RECORD DRAWINGS

- 9 A. Refer to Division 1, General Requirements, Record Drawings. In addition, submit all  
10 record drawings in AutoCAD v. 2000 electronic format and one hard copy for engineer's  
11 review. Contractor to include all addendums, RFIs, construction bulletins, and any  
12 modifications made in the field. Contractor to make revisions to Record Documents  
13 based on Engineer's comments and resubmit electronic files and hard copies in  
14 accordance with the General Requirements.

### 15 16 17 PART 2 - PRODUCTS

#### 18 2.1 ACCESS PANELS AND DOORS

- 19 A. Verify that the following products are specified in the sections indicated. Coordinate the  
20 location of all access panels and doors with the Architect. Where special products are  
21 required to provide access, the products should be specified in the General Contractor  
22 portion of the specifications and installed by him. Where the exact number and size of  
23 panels/doors cannot be established, consider obtaining unit prices; refer to Instructions to  
24 Bidders.

#### 25 B. Lay-in Ceilings:

- 26 1. Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided  
27 under Section 09500 are sufficient; no additional access provisions are required  
28 unless specifically indicated.

#### 29 C. Plaster/Drywall Walls and Ceilings:

- 30 1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated  
31 steel for general applications, stainless steel for use in toilets, showers, and  
32 similar wet areas, concealed hinges, screwdriver operated cam latch for general  
33 applications, key lock for use in public or secured areas, UL listed for use in fire  
34 rated partitions if required by the application. Use the largest size access opening  
35 possible, consistent with the space and the item needing service; minimum size is  
36 12" by 12".

#### 37 2.2 IDENTIFICATION

#### 38 A. Stencils:

- 39 1. Not less than 1 inch high letters/numbers for marking pipe and equipment.

#### 40 B. Engraved Name Plates:

- 41 1. White letters on a black background, 1/16 inch thick plastic laminate, beveled  
42 edges, screw mounting, Setonply Style 2060, W.H. Brady, MSI, or engineer  
43 approved equal or equal by W. H. Brady.

#### 44 C. SNAP-AROUND PIPE MARKERS:

- 1                    1.        One-piece, preformed, vinyl construction, snap-around or strap-around pipe  
 2                    markers with applicable labeling and flow direction arrows, 3/4" min. size for  
 3                    lettering. Provide nylon ties on each end of pipe markers. Seton Setmark, W.H.  
 4                    Brady, MSI, or engineer approved equal.
- 5                    D.        Valve Tags:
- 6                    1.        Round brass tags with 1/2 inch numbers, 1/4 inch system identification  
 7                    abbreviation, 1-1/4 inch minimum diameter, with brass jack chains, brass "S"  
 8                    hooks around the valve stem, available from Seton, or W. H. Brady, MSI or  
 9                    engineer approved equal.
- 10                  E.        Underground Warning Tape:
- 11                  1.        Detectable underground warning tape, 5.0 mil overall thickness, 6" width, .0035"  
 12                  thick aluminum foil core with polyethylene jacket bonded to both sides. Color  
 13                  code tape and print caution along with name of buried service in bold letters on  
 14                  face of tape. Seton, W.H. Brady, MSI, or engineer approved equal.
- 15                  F.        Underground Tracer Wire:
- 16                  1.        All underground non-metallic sewers/mains and water services/mains shall be  
 17                  provided with tracer wire installations. Tracer wire installations shall conform  
 18                  with Section 182.0715(2r) of Wisconsin Statutes and prevailing Department of  
 19                  Commerce Chapter 84 requirements. Tracer wire shall be continuous solid  
 20                  copper or steel plastic coated with split bolt or compression-type connectors.

21    2.3    **BEDDING AND BACKFILL**

- 22                  A.        Bedding up to a point 12" inches above the top of the pipe shall be thoroughly compacted  
 23                  sand or crushed stone chips meeting the following gradations:
- |    |                     |                          |                           |                          |
|----|---------------------|--------------------------|---------------------------|--------------------------|
| 24 | Gradation for       |                          | Gradation for Crushed     |                          |
| 25 | <u>Bedding Sand</u> |                          | <u>Stone Chip Bedding</u> |                          |
| 26 | <u>Sieve Size</u>   | <u>% Passing (by Wt)</u> | <u>Sieve Size</u>         | <u>% Passing (by Wt)</u> |
| 27 | 1 inch              | 100                      | 1/2 inch                  | 100                      |
| 28 | No. 16              | 45 - 80                  | No. 4                     | 75 - 100                 |
| 29 | No. 200             | 2 - 10                   | No. 100                   | 10 - 25                  |
- 30                  B.        Backfill above the bedding in lawn areas shall be thoroughly compacted excavated  
 31                  material free of large stones, organic, perishable, and frozen materials.
- 32                  C.        Backfill above the bedding under existing and future utilities, paving, sidewalks, curbs,  
 33                  roads and buildings shall be granular materials, pit run sand, gravel, or crushed stone, free  
 34                  from large stones, organic, perishable, and frozen materials.

35    2.4    **SEALING AND FIRESTOPPING**

- 36                  A.        **FIRE AND/OR SMOKE RATED PENETRATIONS:**
- 37                  1.        Whenever possible, avoid penetrations of fire and smoke rated partitions. When  
 38                  they cannot be avoided, verify that sufficient space is available for the  
 39                  penetration to be effectively fire and smoke stopped.
- 40                  2.        Manufacturers: 3M, Hilti, Tremco, or engineer approved equal.
- 41                  3.        All firestopping systems shall be provided by the same manufacturer.

- 1 4. Fire stop systems shall be UL listed or tested by an independent testing  
2 laboratory approved by the Department of Commerce.
- 3 5. Submittals: Contractor shall submit product data for each firestop system.  
4 Submittals shall include product characteristics, performance and limitation  
5 criteria, test data, MSDS sheets, installation details and procedures for each  
6 method of installation applicable to this project. For non-standard conditions  
7 where no UL tested system exists, submit manufacturer's drawings for UL system  
8 with known performance for which an engineering judgment can be based upon.
- 9 6. The contractor will be responsible for selecting the appropriate UL tested fire  
10 stop system for each application required on the project and will submit this to  
11 the A/E for review. Each firestop manufacturer has specific details for different  
12 applications they have tested. The specification has been written this way  
13 because the A/E cannot anticipate what manufacturer or system the contractor is  
14 basing their bid on. Therefore, do not show any firestopping details on the  
15 drawings.
- 16 7. Use a product that has a rating not less than the rating of the wall or floor being  
17 penetrated. Reference architectural drawings for identification of fire and/or  
18 smoke rated walls and floors.
- 19 8. Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop  
20 collars, firestop blocks, firestop mortar or a combination of these products to  
21 provide a UL listed system for each application required for this project. Provide  
22 mineral wool backing where specified in manufacturer's application detail.
- 23 B. NON-RATED PENETRATIONS:
- 24 1. Select from the following paragraphs as appropriate to the project; not all are  
25 needed on every project.
- 26 2. At pipe penetrations of non-rated interior partitions, floors and exterior walls, use  
27 urethane caulk in annular space between pipe insulation and sleeve. For non-  
28 rated drywall, plaster or wood partitions where sleeve is not required use  
29 urethane caulk in annular space between pipe insulation and wall material

30  
31

## 32 PART 3 - EXECUTION

### 33 3.1 DEMOLITION

- 34 A. Perform all demolition as indicated on the drawings to accomplish new work. Where  
35 demolition work is to be performed adjacent to existing work that remains in an occupied  
36 area, construct temporary dust partition to minimize the amount of contamination of the  
37 occupied space. Where pipe is removed and not reconnected with new work, cap ends of  
38 existing services as if they were new work. Coordinate work with the Owner to minimize  
39 disruption to the existing building occupants.
- 40 B. All pipe, fixtures, equipment, wiring and associated conduit, insulation and similar items  
41 demolished, abandoned, or deactivated are to be removed from the site by the Contractor  
42 except as specifically noted otherwise. All designated equipment is to be turned over to  
43 the user agency for their use at a place and time so designated. Maintain the condition of  
44 material and/or equipment that is indicated to be reused equal to that existing before work  
45 began.

1 C. Where demolition work is extensive or complex, separate details or drawings are required  
2 [rather than notes on the construction drawings] to accurately illustrate the extent of the  
3 work. Reproduction of photographs on the demolition drawings may be appropriate. Do  
4 not specify demolition work "as required" - it does not give the Contractor sufficient  
5 information for proper bid preparation. Identify each piece of equipment that is to be  
6 given to the user agency.

7 3.2 EXCAVATION AND BACKFILL

8 A. Perform all excavation and backfill work necessary to accomplish indicated plumbing  
9 systems installation. Excavate to bottom of pipe and structure bedding, 4" in stable soils,  
10 6" in rock or wet trenches and 8" in unstable soil. Finish bottoms of excavations to true,  
11 level surface.

12 B. Tunnel or remove sidewalk and curb in areas of excavation to the nearest joint. Remove  
13 pavements, curbs and gutters to neat and straight lines to the limits of removal. Make  
14 sawcut lines parallel to existing joints, or parallel or perpendicular to pavement edges to  
15 form a neat patch. Carefully remove remaining pavement within the sawcut area. Leave  
16 existing base materials between the area disturbed by the work and the sawcut line  
17 undisturbed by the sawcutting, pavement removal, or pavement replacement processes.

18 C. Strip topsoil from area to be excavated, free from subsoil and debris, and store for later  
19 respreading.

20 D. At no time place excavated materials where they will impede surface drainage unless  
21 such drainage is being safely rerouted away from the excavation.

22 E. Excavate whatever materials are encountered as required to place at the elevations shown,  
23 all pipe, manholes, and other work. Remove debris and rubbish from excavations before  
24 placing bedding and backfill material.

25 F. Remove surplus excavated materials from site.

26 G. Verify the locations of any water, drainage, gas, sewer, electric, telephone or steam lines  
27 which may be encountered in the excavation. Underpin and support all lines. Cut off  
28 service connections encountered which are to be removed at the limits of the excavation  
29 and cap.

30 H. Provide and maintain all fencing, barricades, signs, warning lights, and/or other  
31 equipment necessary to keep all excavation pits and trenches and the entire subgrade area  
32 safe under all circumstances and at all times. No excavation shall be left unattended  
33 without adequate protection.

34 I. Elevations shown on the plans are subject to such revisions as may be necessary to fit  
35 field conditions. No adjustment in compensation will be made for adjustments up to two  
36 (2) feet above or below the grades indicated on the plans.

37 J. Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete  
38 and insure there is no disturbance of bearing soil.

39 K. Bed pipe up to a point 12" above the top of the pipe. Take care during bedding,  
40 compaction and backfill not to disturb or damage piping.

41 L. Mechanically compact bedding and backfill to prevent settlement. The initial compacted  
42 lift to not exceed 24" compacted to 95% density per Modified Proctor Test (ASTM D-  
43 1557). Subsequent lifts under pavements, curbs, walks and structures are not to exceed  
44 12" and be compacted to 95% density per Modified Proctor Test. In all other areas where

1 construction above the excavation is not anticipated within 2 years, mechanically  
2 compact backfill in lifts not exceeding 24" to 90% density per Modified Proctor Test.  
3 Route the equipment over each lift of the material so that the compaction equipment  
4 contacts all areas of the surface of the lift.

5 3.3 SHEETING, SHORING AND BRACING

6 A. Provide shoring, sheet piling and bracing in conformance with the Wisconsin  
7 Administrative Code to prevent earth from caving or washing into the excavation. Shore  
8 and underpin to properly support adjacent or adjoining structures. Abandon in place  
9 shoring, sheet piling and underpinning below the top of the pipe, or, if approved in  
10 advance by the engineer, maintained in place until other permanent support approved by  
11 the engineer is provided.

12 3.4 DEWATERING

13 A. Provide, operate and maintain all pumps and other equipment necessary to drain and keep  
14 all excavation pits, trenches and the entire subgrade area free from water under all  
15 circumstances. Obtain general permit from the Wisconsin Department of Natural  
16 Resources district office for discharge of construction dewatering effluent. Obtain well  
17 permit from the Wisconsin Department of Natural Resources district office for  
18 dewatering wells discharging more than 70 GPM. Comply with permit requirements.

19 3.5 ROCK EXCAVATION

20 A. Remove rock encountered in the excavation to a minimum dimension of six (6) inches  
21 outside the pipe. Rock excavation includes all hard, solid rock in ledges, bedded deposits  
22 and unstratified masses, all natural conglomerate deposits so firmly cemented as to  
23 present all the characteristics of solid rock; which material is so hard or so firmly  
24 cemented that in the opinion of the Engineer it is not practical to excavate and remove  
25 same with a power shovel except after thorough and continuous drilling and blasting.  
26 Rock excavation includes rock boulders of 1/2 cubic yard or more in volume.

27 B. Rock excavation will be computed on the basis of the depth of rock removed and a trench  
28 width two (2) feet larger than the outside diameter of the pipe where one (1) pipe is laid  
29 in the trench and three (3) feet larger than the combined outside diameter where two (2)  
30 pipes are laid in the trench. Include 6" pipe and structure bedding in rock excavation.  
31 Include rock excavation shown on the plans in the Base Bid.

32 3.6 SURFACE RESTORATION

33 A. Completely restore the surface of all disturbed areas to a like condition of the surface  
34 prior to the work. Level off all waste disposal areas and clean up all areas used for the  
35 storage of materials or the temporary deposit of excavated earth. Remove all surplus  
36 material, tools and equipment.

37 B. Lawns: Topsoil with 4" of clean, friable, fertile topsoil conforming to D.O.T. Section  
38 625, free from debris, lumps, rocks, roots, plants and seeds. Grade surfaces to match  
39 adjacent elevations. Rake smooth, free of lumps and debris. Sod with good quality  
40 nursery sod conforming to D.O.T. Section 631, be uniform, dense, free from weeds and  
41 consist of approximately 60% Kentucky blue grass and the balance perennial rye, fescue  
42 and white clover. Place sod with joints staggered and abutting. Maintain lawn areas for  
43 one month after installation. Contractor (user agency) will be responsible for necessary  
44 watering and mowing. Do necessary weeding, repair, reseeding or resodding until  
45 uniform catch is obtained.

- 1 C. If seeding is used in lieu of sod, insert the following: Fertilize topsoiled areas with  
2 fertilizer conforming to D
- 3 D. Curb and Gutter: Concrete curb and gutter conforming to city requirements and D.O.T.  
4 Section 601, Type D or L.
- 5 E. Sidewalk and Walkways: Non-reinforced concrete conforming to D.O.T. Section 602,  
6 thickness to match existing, cross slope of one-fourth inch per foot, scored into squares  
7 approximately equal to width.
- 8 F. Bituminous Concrete Pavements: 4" thick crushed stone base course conforming to  
9 D.O.T. Section 304 (excluding 304.2.4) and two pass bituminous concrete pavement  
10 conforming to D.O.T. Section 407, first course 1-1/2" binder, second course 1-1/2"  
11 surface.

12 3.7 CONCRETE WORK

- 13 A. Provide cast in place concrete for equipment pads, manhole bases and thrust blocks.  
14 Concrete to be 3,000 psi at 28 days, 3/4 inch aggregate, five bags cement, three inch  
15 slump, air entraining admixture. The ACI 614 Recommended Practice for Measuring,  
16 Mixing and Placing of Concrete shall constitute the execution requirements.
- 17 B. Concrete work will require editing for each project. In general, concrete work should be  
18 performed by Division 3 to reduce cost and trade jurisdiction conflicts. Some projects  
19 may have interior concrete work which is more appropriately performed by Plumbing  
20 Contractor.
- 21 C. Coordinate the quantity and location of cast-in-place concrete work with the architectural  
22 drawings. This includes equipment pads, piping and equipment supports, raised floor  
23 pipe penetrations in wet areas, concrete floor or wall replacement and similar work.
- 24 D. Exterior plumbing related concrete work not normally shown on architectural drawings  
25 should be left as the responsibility of the plumbing Contractor.

26 3.8 CUTTING AND PATCHING

- 27 A. Refer to Division 1, General Requirements, Cutting and Patching.

28 3.9 BUILDING ACCESS

- 29 A. Arrange for the necessary openings in the building to allow for admittance or removal of  
30 all apparatus. When the building access was not previously arranged and must be  
31 provided by this contractor, restore any opening to its original condition after the  
32 apparatus has been brought into the building.

33 3.10 EQUIPMENT ACCESS

- 34 A. Install all piping, conduit, and accessories to permit access to equipment for maintenance.  
35 Coordinate the exact location of wall and ceiling access panels and doors with the  
36 General Contractor, making sure that access is available for all equipment and specialties.  
37 Where access is required in plaster walls or ceilings, furnish the access doors to the  
38 General Contractor.

39 3.11 COORDINATION

- 40 A. Coordinate all work with other contractors prior to installation. Any work that is not  
41 coordinated and that interferes with other contractor's work shall be removed or relocated  
42 at the installing contractor's expense.

1 B. Verify that all devices are compatible for the type of construction and surfaces on which  
2 they will be used.

3 3.12 IDENTIFICATION

4 A. Identify equipment in mechanical equipment rooms by stenciling equipment number and  
5 service with one coat of black enamel against a light background or white enamel against  
6 a dark background. Use a primer where necessary for proper paint adhesion.

7 B. Where stenciling is not appropriate for equipment identification, engraved name plates  
8 may be used.

9 C. Identify interior piping not less than once every 30 feet, not less than once in each room,  
10 adjacent to each access door or panel, and on both side of the partition where accessible  
11 piping passes through walls or floors. Place flow directional arrows at each pipe  
12 identification location. Use one coat of black enamel against a light background or white  
13 enamel against a dark background.

14 D. Identify all exterior buried piping for entire length with underground warning tape except  
15 for sewer piping which is routed in straight lines between manholes or cleanouts. Place  
16 tape 6"-12" below finished grade along entire length of pipe. Extend tape to surface at  
17 building entrances, meters, hydrants and valves. Where existing underground warning  
18 tape is broken during excavation, replace with new tape identifying appropriate service  
19 and securely spliced to ends of existing tape.

20 E. Identify valves with brass tags bearing a system identification and a valve sequence  
21 number. Identify medical gas and vacuum valves with brass tags and wall or cabinet  
22 mounted color coded engraved nameplate with the following "(Type of Gas) Shutoff  
23 Valve for (Location or Zone)". Valve tags are not required at a terminal device unless the  
24 valves are greater than ten feet from the device, located in another room or not visible  
25 from device. Provide a typewritten valve schedule and pipe identification schedule  
26 indicating the valve number and the equipment or areas supplied by each valve and the  
27 symbols used for pipe identification; locate schedules in mechanical room and in each  
28 Operating and Maintenance manual. Schedule in mechanical room to be framed under  
29 clear plastic.

30 3.13 LUBRICATION

31 A. Lubricate all bearings with lubricant as recommended by the manufacturer before the  
32 equipment is operated for any reason. Once the equipment has been run, maintain  
33 lubrication in accordance with the manufacturer's instructions until the work is accepted  
34 by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include  
35 this information in the Operating and Maintenance Manuals at the completion of the  
36 project.

37 3.14 SLEEVES

38 A. Provide galvanized sheet metal sleeves for pipe penetrations through interior and exterior  
39 walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match  
40 adjacent wall construction and finish. Grout area around sleeve in masonry construction.  
41 In finished spaces where pipe penetration through wall is exposed to view, sheet metal  
42 sleeve shall be installed flush with face of wall. In existing poured concrete walls where  
43 penetration is core drilled, pipe sleeve is not required.

- 1 B. Pipe sleeves are not required in interior non-rated drywall, plaster or wood partitions and  
 2 sleeves are not required in existing poured concrete walls where penetrations are core  
 3 drilled.
- 4 C. Pipe sleeves in new poured concrete construction shall be schedule 40 galvanized steel  
 5 pipe (sized to allow insulated pipe to run through sleeve), cast in place.
- 6 D. In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 1  
 7 inch above the adjacent finished floor. In existing floor penetrations, core drill sleeve  
 8 opening large enough to insert schedule 40 galvanized steel pipe sleeve and grout area  
 9 around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve  
 10 is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve  
 11 that will transfer weight to existing floor structure.
- 12 E. For floor penetrations through existing floors in mechanical and wet locations listed  
 13 below, core drill opening and provide 1-1/2" x 1-1/2" x 1/8" galvanized steel angles  
 14 fastened to floor surrounding the penetration or group of penetrations to prevent water  
 15 from entering the penetration. Provide urethane caulk between angles and floor and  
 16 fasten angles to floor a minimum of 8" on center. Seal corners water tight with urethane  
 17 caulk. Or, core drill sleeve openings large enough to insert schedule 40 galvanized steel  
 18 pipe sleeve and grout area around sleeve with hydraulic setting non-shrink grout/cement.
- 19 F. For pipe penetrations through existing floors in food service areas, core drill sleeve  
 20 opening large enough to insert schedule 40 galvanized steel pipe sleeve and grout area  
 21 around sleeve with hydraulic setting non-shrink grout/cement. Size sleeve to allow  
 22 insulated pipe to pass through sleeve and paint the sleeve.
- 23 G. For pipe penetrations through beams insert a schedule 80 steel pipe sleeve to provide a  
 24 backing for sealant or firestopping.
- 25 H. Pipe sleeves are not required in cored floor pipe penetrations through existing floors that  
 26 are not located in mechanical rooms, food service areas or wet locations listed above.

27

28 3.15 SEALING AND FIRESTOPPING

- 29 A. FIRE AND/OR SMOKE RATED PENETRATIONS:
- 30 1. Install approved product in accordance with the manufacturer's instructions  
 31 where a pipe penetrates a fire/smoke rated surface. When pipe is insulated, use a  
 32 product which maintains the integrity of the insulation and vapor barrier.
- 33 2. Where firestop mortar is used to infill large fire-rated floor openings that could  
 34 be required to support weight, provide permanent structural forming. Firestop  
 35 mortar alone is not adequate to support substantial weight.
- 36 B. NON-RATED PARTITIONS:
- 37 1. Select from the following paragraphs as appropriate to the project; not all are  
 38 needed on every project.
- 39 2. At all interior partitions and exterior walls, pipe penetrations are required to be  
 40 sealed. Apply sealant to both sides of the penetration in such a manner that the  
 41 annular space between the pipe sleeve or cored opening and the pipe or insulation  
 42 is completely blocked.

43



1 **SECTION 22 05 13**  
2 **COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT**  
3

4 **PART 1 - GENERAL**

5 1.1 SCOPE

6 A. This section includes requirements for single and three phase motors that are  
7 used with equipment specified in other sections. Included are the following  
8 topics:

9 B. PART 1 - GENERAL

- 10 1. Scope  
11 2. Related Work  
12 3. Reference  
13 4. Reference Standards  
14 5. Shop Drawings  
15 6. Operating and Maintenance Instructions  
16 7. Electrical Coordination  
17 8. Product Criteria

18 C. PART 2 - PRODUCTS

- 19 1. Single Phase, Single Speed Motors

20 D. PART 3 - EXECUTION

- 21 1. Installation

22 1.2 RELATED WORK

23 A. Section 22 42 00 - Commercial Plumbing Fixtures.

24 B. Section 22 30 00 - Plumbing Equipment for equipment requiring motors.

25 C. Division 26 - Electrical - Electrical for power wiring, starters, and other electrical  
26 devices

27 1.3 REFERENCE

28 A. Applicable provisions of Division 1 govern work under this section.

29 1.4 REFERENCE STANDARDS

30 A. ANSI/IEEE 112 Test Procedure for Polyphase Induction Motors and  
31 Generators

32 B. ANSI/NEMA MG-1 Motors and Generators

33 C. ANSI/NFPA 70 National Electrical Code

34 1.5 SHOP DRAWINGS

35 A. Include with the equipment which the motor drives the following motor  
36 information: motor manufacturer, voltage, phase, hertz, rpm, full load efficiency,  
37 full load power factor, service factor, NEMA design designation, insulation class,  
38 and frame type.

39 1.6 OPERATING AND MAINTENANCE INSTRUCTIONS

1 A. Include manufacturer's instructions in the manuals with the specific equipment to  
2 which they apply.

3 1.7 ELECTRICAL COORDINATION

4 A. All relays, wire, conduit, pushbuttons, pilot lights, and other devices required for  
5 the control of motors or electrical equipment are furnished by the Electrical  
6 Contractor, except as specifically noted elsewhere in this division of  
7 specifications.

8 B. Electrical drawings and/or specifications show number and horsepower rating of  
9 all motors furnished by this Contractor. Should any change in size, horsepower  
10 rating or means of control be made to any motor or other electrical equipment  
11 after contracts are awarded, Contractor is to immediately notify the Electrical  
12 Contractor of this change and pay any costs due to this change.

13 C. Electrical Contractor will provide all power wiring and the Plumbing Contractor  
14 shall provide all control wiring. Control wiring shall conform to Division 16  
15 requirements for Control Wiring.

16 D. Furnish wiring diagrams to Electrical Contractor for all equipment and devices  
17 furnished by this Contractor and indicated to be wired by the Electrical  
18 Contractor.

19 E. The A/E must coordinate specified voltages with the Electrical Consultant for the  
20 project. The Electrical Contractor will provide all power wiring and the Plumbing  
21 Contractor will provide all control wiring. Control wiring shall conform to  
22 Division 26 requirements for Control Wiring.

23 1.8 PRODUCT CRITERIA

24 A. Motors to conform to all applicable requirements of NEMA, IEEE, ANSI, and  
25 NEC standards and shall be listed by U.L. for the service specified.

26 B. Select motors for conditions in which they will be required to perform; i.e.,  
27 general purpose, splashproof, explosion proof, standard duty, high torque or any  
28 other special type as required by the equipment or motor manufacturer's  
29 recommendations.

30 C. Furnish motors for starting in accordance with utility requirements and  
31 compatible with starters as specified.

32

33 PART 2 - PRODUCTS

34 2.1 SINGLE PHASE, SINGLE SPEED MOTORS

35 A. Use NEMA rated 115 volt, single phase, 60 hertz motors for all motors 1/3 HP  
36 and smaller.

37 B. Use permanent split capacitor or capacitor start, induction run motors equipped  
38 with permanently lubricated and sealed ball or sleeve bearings and Class A  
39 insulation. Service factor to be not less than 1.35.

40

41 PART 3 - EXECUTION

42 3.1 INSTALLATION

- 1           A.     Mount motors on a rigid base designed to accept a motor, using shims if required  
2                     under each mounting foot to get a secure installation.
- 3           B.     Lubricate all motors requiring lubrication. Record lubrication material used and  
4                     the frequency of use. Include this in the maintenance manuals.

5

6

END OF SECTION

7

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1  
2  
3  
4 **SECTION 22 05 14**  
**PLUMBING SPECIALTIES**

5 PART 1 - GENERAL

6 1.1 SCOPE

7 A. This section includes specifications for floor drains, roof drains, cleanouts,  
8 backflow preventers, water hammer arrestors and other miscellaneous plumbing  
specialties.

9 B. PART 1 - GENERAL

- 10 1. Scope  
11 2. Related Documents  
12 3. Reference  
13 4. Reference Standards  
14 5. Quality Assurance  
15 6. Shop Drawings

16 C. PART 2 - PRODUCTS

- 17 1. Floor Drains  
18 2. Cleanouts  
19 3. Water Hammer Arrestors  
20 4. Backflow Preventers  
21 5. Wall Hydrants  
22 6. Hose Bibbs  
23 7. Safings  
24 8. Vent Flashings  
25 9. Water Meter

26 D. PART 3 - EXECUTION

- 27 1. Installation

28 1.2 RELATED DOCUMENTS

- 29 A. Section 22 11 00 - Facility Water Distribution  
30 B. Section 22 13 00 - Facility Sanitary Sewerage  
31 C. Section 22 14 00 - Facility Storm Drainage  
32 D. Section 22 05 23 - General-Duty Valves for Plumbing Piping

33 1.3 REFERENCE

- 34 A. Applicable provisions of Division 1 shall govern work under this section.

35 1.4 REFERENCE STANDARDS

- 36 A. ANSI A112.21.1 - Floor Drains.  
37 B. ANSI A112.26.1/PDI WH-201 - Water Hammer Arrestors.  
38 C. ASSE 1001 - Pipe Applied Atmospheric Type Vacuum Breakers.  
39 D. ASSE 1010 - Water Hammer Arrestors.  
40 E. ASSE 1011 - Hose Connection Vacuum Breakers.

- 1 F. ASSE 1012 - Backflow Preventers with Intermediate Atmospheric Vent.
- 2 G. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.
- 3 H. ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining, Anti-Backflow
- 4 Type.

5 1.5 QUALITY ASSURANCE

- 6 A. Substitution of Materials: Refer to Section GC - General Conditions of the
- 7 Contract, Equals and Substitutions.
- 8 B. Plumbing products requiring approval by the State of Wisconsin Dept. of
- 9 Commerce must be approved or have pending approval at the time of shop
- 10 drawing submission.

11 1.6 SHOP DRAWINGS

- 12 1.7 Include data concerning dimensions, capacities, materials of construction, ratings,
- 13 certifications, weights, manufacturer's installation requirements, manufacturer's
- 14 performance limitations, and appropriate identification.

15

16

17

**PART 2 - PRODUCTS**

18 2.1 FLOOR DRAINS

- 19 A. Manufacturer: Smith, Sioux Chief, Watts, Zurn, or engineer approved equal.
- 20 B. FD 1: 3" min. ( 2" min. for single shower drains ) enameled cast iron two piece
- 21 body with double drainage flange, weep holes, reversible clamping adjustable
- 22 collar, adjustable 6" min. round polished nickel bronze strainer with threaded
- 23 collar, bottom outlet. Zurn ZN-415.
- 24 C. FD-2: 4" enameled heavy duty cast iron two piece body with double drainage
- 25 flange, weep holes, heavy duty adjustable 9" round coated cast iron tractor grate
- 26 strainer, with sediment bucket, bottom outlet. Zurn Z-556-Y

27 2.2 CLEANOUTS

- 28 A. Manufacturer: Smith, Sioux Chief, Watts, Zurn, or engineer approved equal.
- 29 B. INTERIOR CONCRETE FLOOR AREAS: Enameled cast iron body with round
- 30 or square adjustable scoriated polished nickel bronze cover, tapered threaded
- 31 ABS closure plug. Zurn ZN-1400- / ZN-1400-T.
- 32 C. INTERIOR CERAMIC TILE FLOOR AREAS: Enameled cast iron body with
- 33 square adjustable scoriated nickel bronze cover, tapered threaded ABS closure
- 34 plug. Zurn ZN-1400-T.
- 35 D. INTERIOR VINYL TILE FLOOR AREAS: Enameled cast iron body with round
- 36 adjustable scoriated nickel bronze cover, tapered threaded ABS closure plug.
- 37 Zurn ZN-1400.
- 38 E. INTERIOR CARPETED FLOOR AREAS: Enameled cast iron body with round
- 39 adjustable scoriated nickel bronze cover and secured carpet marker, tapered
- 40 threaded ABS closure plug. Zurn Z-1400-CM.

- 1 F. INTERIOR FINISHED WALL AREAS: Line type cleanout tee with tapered  
2 threaded ABS cleanout plug, round polished stainless steel access cover secured  
3 with machine screw. Zurn Z-1446- (Note: Screw shall not pass  
4 completely through the ABS plug, trim screw as necessary )
- 5 G. INTERIOR EXPOSED VERTICAL STACKS: Line type cleanout tee with  
6 tapered threaded ABS closure plug. Zurn Z-1445.
- 7 H. INTERIOR HORIZONTAL LINES: Cast iron hub with tapped ferrule and  
8 tapered threaded ABS or PVC closure plug, or no-hub coupling and blind plug.
- 9 I. EXTERIOR PAVED AREAS: Cast iron hub or plug with tapered threaded ABS  
10 or PVC closure plug, cast iron frost sleeve and cover set in 24" square by 4" min.  
11 thick reinforced concrete pad top or surrounding pavement, crowned for  
12 drainage. Neenah R-1976 with non-ferrous securing screw.
- 13 J. EXTERIOR UNPAVED AREAS: Cast iron hub or plug with tapered threaded  
14 ABS or PVC closure plug, cast iron or PVC frost sleeve and cover set in 24"  
15 square by 4" min. thick reinforced concrete pad top. Neenah R-1976 with non-  
16 ferrous securing screw.
- 17 2.3 WATER HAMMER ARRESTORS
- 18 A. Manufacturer: PPP Industries, Sioux Chief, Watts, or engineer approved equal.
- 19 B. ANSI A112.26.1, ASSE 1010; sized in accordance with PDI WH-201,  
20 precharged piston type constructed of hard drawn Type K copper, threaded brass  
21 adapter, brass piston with o-ring seals, FDA approved silicone lubricant, suitable  
22 for operation in temperature range 35 to 150 degrees F, maximum 250 psig  
23 working pressure, 1500 psig surge pressure. Watts series 15.
- 24 2.4 BACKFLOW PREVENTERS
- 25 A. Manufacturers: Beeco, Conbraco, Febco, Watts, or engineer approved equal.
- 26 B. HOSE CONNECTION VACUUM BREAKERS: ASSE 1011, brass or bronze  
27 construction, EPDM diaphragm and seat, rated for 125 psig and 180°F. Watts 8  
28 (interior application).
- 29 2.5 WALL HYDRANTS
- 30 A. Manufacturer: Smith, Watts, Woodford, Zurn, or engineer approved equal.
- 31 B. WH-1: Freezeproof automatic draining wall hydrant with exposed chrome plated  
32 bronze wall plate, 3/4" inlet, 3/4" hose thread ASSE 1019-93 backflow preventer  
33 outlet, copper or bronze casing, loose key operator. Woodford model 65 series
- 34 2.6 HOSE BIBBS
- 35 A. HB-1: Bronze or brass construction hose faucet/valve, cast iron handwheel,  
36 replaceable disc, hose thread spout, with ASSE 1011 backflow preventer outlet,  
37 3/4" size. Watts model SC-8-3.
- 38 2.7 VENT FLASHINGS
- 39 A. Manufacturers: F.J. Moore Manufacturing Co. or engineer approved equal.
- 40 B. Flashing boot of material compatible with roofing membrane with base flange for  
41 adhering to membrane and stainless steel drawband for securing to vent pipe.

1 2.8 WATER METER

2 *A. Provide instructions as to who is providing the water meter and who is*  
3 *installing it.*

4

5 PART 3 - EXECUTION

6 3.1 INSTALLATION

7 A. Coordinate location and setting of plumbing specialties with adjacent  
8 construction. Install in accordance with manufacturers recommendations.

9 B. Set floor drains and cleanouts level and plumb adjusted to finished floor  
10 elevation, roof elevation or finished wall location. Locate where serviceable.  
11 Allow minimum of 18" clearance around cleanouts for rodding. Lubricate  
12 threaded cleanout plugs with graphite and oil, teflon tape or waterproof grease.  
13 Provide deep seal traps on floor drains.

14 C. Install water hammer arrestors where indicated and at quick closing valve  
15 installations.

16 D. Install backflow preventers in accordance with Wis. Dept. of Commerce  
17 requirements maintaining minimum clearance distances for servicing and testing.  
18 Provide indirect waste piping with air gap installation from relief opening to  
19 above hub drain or floor drain.

20 E. Mount wall hydrants recessed in exterior wall construction with valve plug  
21 extended beyond interior side of building insulation. Slope to drain to exterior.  
22 Install so discharge is 18" above finished grade. Set wall box in grout or caulk  
23 and fill exterior wall penetration with insulation.

24 F. Mount hose bibbs securely fastened to wall where indicated. Provide water  
25 hammer arrestor in line to hose bibb.

26 G. Flash vent penetrations through roof. Turn down top of lead flashings into vent  
27 pipe. Tighten drawband of membrane boot to vent pipe. Adhere base flashing to  
28 deck or membrane. Provide waterproof patch around penetration on existing  
29 roofs.

30

31 END OF SECTION

32

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33

1  
2  
3  
4 **SECTION 22 05 15**  
**PIPING SPECIALTIES**

5 PART 1 - GENERAL

6 1.1 SCOPE

7 A. This section contains specifications for plumbing piping specialties for all piping  
8 systems. Included are the following topics:

9 B. PART 1 - GENERAL

- 10 1. Scope  
11 2. Related Work  
12 3. Reference  
13 4. Reference Standards  
14 5. Quality Assurance  
15 6. Shop Drawings  
16 7. Design Criteria

17 C. PART 2 - PRODUCTS

- 18 1. Thermometers  
19 2. Thermometer Sockets  
20 3. Pressure Gauges  
21 4. Strainers

22 D. PART 3 - EXECUTION

- 23 1. Thermometers  
24 2. Thermometer Sockets  
25 3. Pressure Gauges  
26 4. Strainers

27 1.2 RELATED WORK

- 28 A. Section 22 11 00 - Facility Water Distribution  
29 B. Section 22 13 00 - Facility Sanitary Sewerage  
30 C. Section 22 14 00 - Facility Storm Drainage  
31 D. Section 22 05 23 - General-Duty Valves for Plumbing Piping  
32 E. Section 22 07 00 - Plumbing Insulation  
33 F. Section 22 30 00 - Plumbing Equipment

34 1.3 REFERENCE

- 35 A. Applicable provisions of Division 1 govern work under this section.

36 1.4 REFERENCE STANDARDS

- 37 A. ASTM B650 Electrodeposited Engineering Chromium Coatings on Ferrous  
38 Substrates

39 1.5 QUALITY ASSURANCE

- 40 A. Substitution of Materials: Refer to Section GC – General Conditions of the  
Contract, Equals and Substitutions.

1 1.6 SHOP DRAWINGS  
2 A. Required for all items in this section. Include materials of construction,  
3 dimensional data, ratings/capacities/ranges, approvals, test data, pressure drop  
4 data where appropriate, and identification as referenced in this section and/or on  
5 the drawings.

6 1.7 DESIGN CRITERIA  
7 A. All piping specialties are to be rated for the highest pressures and temperatures in  
8 the respective system in accordance with ANSI B31, but not less than 125 psig  
9 unless specifically indicated otherwise.

10

11 PART 2 - PRODUCTS

12 2.1 THERMOMETERS

13 A. Ametek/U. S. Gauge, Ashcroft, H. O. Terrice, Wika, or engineer approved equal.  
14 B. Stem Type: Cast aluminum case, nine inch scale, clear acrylic window.  
15 adjustable angle brass stem with stem of sufficient length so the end of the stem  
16 is near the middle of a pipe without reducing the thickness of any insulation, red  
17 indicating fluid, black lettering against a white background, with scale ranges as  
18 follows:

19	Service	Hot Water
20	Scale Range, °F	30 - 180
21	Increment, °F	2

22 2.2 THERMOMETER SOCKETS

23 A. Brass with threaded connections suitable for thermometer stems and temperature  
24 control sensing elements in pipeline. Furnish with extension necks for insulated  
25 piping systems.

26 2.3 PRESSURE GAUGES

27 A. Ametek/U. S. Gauge, Ashcroft, H. O. Terrice, Wika, or engineer approved equal.  
28 B. Cast aluminum case of not less than 4.5 inches in diameter, double strength glass  
29 window, black lettering on a white background, phosphor bronze bourdon tube  
30 with bronze bushings, recalibration from the front of the dial, 99% accuracy over  
31 the middle half of the scale, 98.5% accuracy over the remainder of the scale, with  
32 scale range as follows:

33	Service	Hot Water	Cold Water	Compressed Air
34	Scale Range, psig	0-100	0-100	0-200
35	Increment, psig	2	2	2

36 C. Pressure Snubbers: Bronze construction, 300 psig working pressure, 1/4" size.

37 D. Gauge Valves: Use ball valves as specified in Section 22 05 23 - General-Duty  
38 Valves for Plumbing Piping.

39 2.4 STRAINERS

40 A. Armstrong, Sarco, Watts, or engineer approved equal.

- 1 B. Y type; cast bronze body, ASTM B62; 20 mesh stainless steel screens; bolted or  
2 threaded screen retainer tapped for a blowoff valve; sweat, threaded or flanged  
3 body rated at not less than 150 psi WOG.
- 4 C. Y type; cast iron body, ASTM A126; 20 mesh stainless steel screens; bolted or  
5 threaded screen retainer tapped for a blowoff valve; threaded or flanged ends;  
6 rated at not less than 150 psi WOG.

7  
8

9 PART 3 - EXECUTION

10 3.1 THERMOMETERS

- 11 A. Stem Type: Install in piping systems as indicated on the drawings and/or details  
12 using a separable socket in each location.

13 3.2 THERMOMETER SOCKETS

- 14 A. Install at each point where a thermometer or temperature control sensing element  
15 is located in a pipeline.

16 3.3 PRESSURE GAUGES

- 17 A. Install in locations where indicated on the drawings and/or details, with scale  
18 range appropriate to the system operating pressures.
- 19 B. Pressure Snubbers: Install in gauge piping for all gauges used on water services.
- 20 C. Gauge Valves: Install at each gauge location as close to the main as possible and  
21 at each location where a gauge tapping is indicated.

22 3.4 STRAINERS

- 23 A. Install all strainers where indicated allowing sufficient space for the screens to be  
24 removed. Install a ball valve in the tapped screen retainer.

25  
26  
27  
28

END OF SECTION

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1 **SECTION 22 05 23**

2 **GENERAL DUTY VALVES FOR PLUMBING PIPING**

3  
4 **PART 1 - GENERAL**

5 1.1 SCOPE

6 A. This section includes valve specifications for all Plumbing systems except where  
7 indicated under Related Work. Included are the following topics:

8 B. PART 1 - GENERAL

- 9 1. Scope  
10 2. Related Work  
11 3. Reference  
12 4. Quality Assurance  
13 5. Submittals  
14 6. Design Criteria

15 C. PART 2 - PRODUCTS

- 16 1. Water System Valves  
17 a. Ball Valves  
18 b. Butterfly Valves  
19 c. Swing Check Valves  
20 d. Spring Loaded Check Valves  
21 e. Balance Valves  
22 f. Drain Valves  
23 2. Specialty Valves and Valve Accessories  
24 a. Gauge Valves  
25 b. Water Pressure Reducing Valves  
26 c. Safety Relief Valves

27 3. PART 3 - EXECUTION

- 28 a. General  
29 b. Shut-off Valves  
30 c. Balancing Valves  
31 d. Drain Valves  
32 e. Spring Loaded Check Valves  
33 f. Swing Check Valves  
34 g. Pressure Reducing Valves  
35 h. Safety Relief Valves

36 1.2 RELATED WORK

37 A. Section 22 05 14 - Plumbing Specialties

38 B. Section 22 30 00 - Plumbing Equipment

39 1.3 REFERENCE

40 A. Applicable provisions of Division 1 govern work under this section.

41 1.4 QUALITY ASSURANCE

- 1 A. Substitution of Materials: Refer to Section GC - General Conditions of the  
2 Contract, Equals and Substitutions.

3  
4  
5 1.5 SUBMITTALS

- 6 A. Schedule of all valves indicating type of service, dimensions, materials of  
7 construction, and pressure/temperature ratings for all valves to be used on the  
8 project. Temperature ratings specified are for continuous operation.

9 1.6 DESIGN CRITERIA

- 10 A. ANSI Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water  
11 Supply Systems.  
12 B. ASSE 1003 - Water Pressure Reducing Valves for Domestic Water Supply  
13 Systems.  
14 C. Where valve types (ball, butterfly, etc.) are specified for individual plumbing  
15 services (i.e. domestic water, gas, etc.), each valve type shall be of the same  
16 manufacturer unless prior written approval is obtained from the Owner.  
17 D. Valves to be line size unless specifically noted otherwise.

18  
19 PART 2 - PRODUCTS

20 2.1 WATER SYSTEM VALVES

- 21 A. All water system valves to be rated at not less than 125 water working pressure at  
22 240 degrees F unless noted otherwise. All valves shall contain less than 15%  
23 zinc.

24 B. BALL VALVES:

- 25 1. 3" and smaller: Two piece bronze body; sweat or threaded ends,  
26 stainless steel ball and stem; glass filled teflon seat; teflon packing and  
27 threaded packing nut; blowout-proof stem; 600 psig WOG. Provide  
28 valve stem extensions for valves installed in all piping with insulation.  
29 Apollo 70-240, Milwaukee BA150S, Nibco S-580-70-66, Watts B6001-  
30 SS, or engineer approved equal.

31 C. BUTTERFLY VALVES:

- 32 1. 2-1/2" and larger: Cast or ductile iron body; stainless steel shaft; bronze,  
33 copper or teflon bushings; EPDM resilient seat; EPDM seals; bronze,  
34 aluminum-bronze, EPDM encapsulated ductile iron or stainless steel  
35 disc. 200 psig WOG through 12", 150 psig WOG through 24". Valve  
36 assembly to be bubble tight to 175 psig with no downstream flange/pipe  
37 attached. Use tapped lug type valves with stud bolts or cap screws, or  
38 grooved end connection valves, permitting removal of downstream  
39 piping while using the valve for system shutoff. Apollo, Kitz,  
40 Milwaukee M or C Series, Nibco LD2000/LC2860, Watts BF-03, or  
41 engineer approved equal.

- 1                   2.       Provide 10 position locking lever handle actuators for valves 6" and  
2                   smaller. Provide worm gear operators with external position indication  
3                   for valves 8" and larger.
- 4           D.       GATE VALVES:
- 5                   1.       2" and smaller: Bronze body, bronze trim, soldered ends, solid wedge,  
6                   rising stem, union bonnet, malleable iron hand wheel, suitable for 300 psi  
7                   WOG. Apollo, Kitz, Milwaukee, Nibco S134, Watts, or engineer  
8                   approved equal.
- 9                   2.       2-1/2" and larger: Iron body, bronze trim, bolted bonnet, O.S. & Y.,  
10                  solid wedge, flanged, suitable for 200 psi WOG. Apollo, Kitz,  
11                  Milwaukee F2885, Nibco F617-O, Watts, or engineer approved equal.
- 12       E.       SWING CHECK VALVES:
- 13                  1.       3" and smaller: Bronze body, sweat ends, Y-pattern, regrindable bronze  
14                  seat, renewable bronze disc, Class 125, suitable for installation in a  
15                  horizontal or vertical line with flow upward. Apollo, Kitz, Milwaukee,  
16                  Nibco, Watts, or engineer approved equal.
- 17                  2.       4" and larger: Cast iron body, flanged ends, bronze trim, bolted cap,  
18                  renewable bronze seat and disc, Class 125, non-asbestos gasket, suitable  
19                  for installation in a horizontal or vertical line with flow upward. Apollo,  
20                  Kitz, Milwaukee, Nibco, Watts or engineered approved equal.
- 21       F.       SPRING LOADED CHECK VALVES:
- 22                  1.       2" and smaller: Bronze body, sweat or threaded ends, bronze trim,  
23                  stainless steel spring, stainless steel center guide pin, Class 125, teflon  
24                  seat unless only bronze available. Apollo, Kitz, Milwaukee, Nibco  
25                  S480Y, Watts, or engineer approved equal.
- 26                  2.       2-1/2" and larger: Cast or ductile iron body, wafer or globe type, bronze  
27                  trim, bronze or EPDM seat, stainless steel spring, stainless steel stem if  
28                  stem is required, Class 125. Apollo, Kitz, Milwaukee 1800 series, Nibco  
29                  W910 or F910, Watts, or engineer approved equal .
- 30       G.       BALANCE VALVES:
- 31                  1.       2" and smaller: Two or three piece bronze body ball valve, sweat or  
32                  threaded ends, chrome plated brass ball, glass filled teflon seat, threaded  
33                  packing nut, with adjustable memory stop position indicator and  
34                  extended handle stem, suitable for 400 psig water working pressure at  
35                  240 degrees F. Watts B-6000/B-6001 BS, Apollo, Kitz, Milwaukee, or  
36                  Nibco, or engineer approved equal.
- 37       H.       DRAIN VALVES:
- 38                  1.       3/4 inch ball valve with integral threaded hose adapter, sweat or threaded  
39                  inlet connections, with threaded cap and chain on hose threads, Watts B-  
40                  6000-CC/B-6001-CC series, Apollo, Kitz, Milwaukee, Nibco, or  
41                  engineer approved equal.
- 42   2.2   SPECIALTY VALVES AND VALVE ACCESSORIES
- 43       A.       GAUGE VALVES:

- 1           1.     Use 1/4" ball valves. Needle valves and gauge cocks will not be  
2           accepted.
- 3           B.     WATER PRESSURE REDUCING VALVES:
- 4           1.     Bronze body, diaphragm operated, with an integral thermal expansion  
5           bypass valve, inlet union, stainless steel strainer, renewable monel or  
6           stainless steel seat and adjustable reduced pressure range, 300 psig at 160  
7           degrees F. Pre-set for the scheduled pressure. A. W. Cash, Conbraco,  
8           Watts, Wilkins, or engineer approved equal.
- 9           C.     SAFETY RELIEF VALVES:
- 10          1.     Bronze body, temperature and pressure actuated, stainless steel stem and  
11          spring, thermostat with non-metallic coating, test lever, suitable for 125  
12          psig water working pressure at 240 degrees F, sized for full BTUH input  
13          and operating pressure of equipment, with valve capacity on metal label.  
14          For equipment less than or equal to 200,000 BTUH input, provide AGA,  
15          UL or ASME listed and labeled valve. Provide ASME listed and labeled  
16          valve for larger equipment. Bell & Gossett, A. W. Cash, Conbraco,  
17          Watts, Wilkins. Temperature and pressure relief valve shall be sized per  
18          AGA rating for BTUH input, Re: COMM 82.40(5)(d).

19

20 **PART 3 - EXECUTION**

21 3.1 GENERAL

- 22          A.     Properly align piping before installation of valves. Install and test valves in strict  
23          accordance with valve manufacturer's installation recommendations. Do not  
24          support weight of piping system on valve ends.
- 25          B.     Mount valves in locations which allow access for operation, servicing and  
26          replacement.
- 27          C.     Provide valve handle extensions for all valves installed in insulated piping.
- 28          D.     Install all valves with the stem in the upright or horizontal position. If possible,  
29          install butterfly valves with the stem in the horizontal position. Valves installed  
30          with the stems down will not be accepted.
- 31          E.     Prior to flushing of piping systems, place all valves in the full-open position.

32 3.2 SHUT-OFF VALVES

- 33          A.     Install shut-off valves at each piece of equipment, at each branch take-off from  
34          mains for isolation or repair and elsewhere as indicated.

35 3.3 BALANCING VALVES

- 36          A.     Install where indicated on the drawings and details for balancing of flow in  
37          pumped hot water recirculation piping systems.
- 38          B.     Upon project completion, adjust each valve and set position stop. Balance system  
39          to minimum flow in return piping branches needed to maintain even supply water  
40          temperature throughout building.

41 3.4 DRAIN VALVES

1 A. Provide drain valves for complete drainage of all systems. Locations of drain  
2 valves include low points of piping systems, downstream of riser isolation  
3 valves, equipment locations specified or detailed, other locations required for  
4 drainage of systems and elsewhere as indicated.

5 3.5 SPRING LOADED CHECK VALVES

6 A. Install a spring loaded check valve in each circulating pump discharge line, each  
7 clearwater sump pump discharge line and elsewhere as indicated.

8 3.6 SWING CHECK VALVES

9 A. Install swing check valves in recirculation branch lines and elsewhere as  
10 indicated. Provide weighted swing check valves at sanitary sump pump  
11 discharges.

12 3.7 PRESSURE REDUCING VALVES

13 A. Provide ball valve and strainer at inlet and ball valve at outlet. Install pressure  
14 gauges to indicate inlet and outlet pressure at each pressure reducing valve.

15 3.8 SAFETY RELIEF VALVES

16 A. Install relief valves on all pressure vessels and elsewhere as indicated. Inlet and  
17 outlet piping connecting to valves must be the same size as valve connections or  
18 larger. Pipe discharge to drain where indicated or to floor.

19

20

END OF SECTION

1 **SECTION 22 05 29**

2 **HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

3  
4 **PART 1 - GENERAL**

5 1.1 SCOPE

6 A. This section includes specifications for supports of all plumbing equipment and  
7 materials as well as piping system anchors. Included are the following topics:

8 B. PART 1 - GENERAL

- 9 1. Scope  
10 2. Related Work  
11 3. Reference  
12 4. Reference Standards  
13 5. Quality Assurance  
14 6. Description  
15 7. Shop Drawings  
16 8. Design Criteria

17 C. PART 2 - PRODUCTS

- 18 1. Manufacturers  
19 2. Structural Supports  
20 3. Pipe Hangers and Supports  
21 4. Beam Clamps  
22 5. Concrete Inserts  
23 6. Anchors  
24 7. Equipment Stands  
25 8. Corrosive Atmosphere Coatings

26 D. PART 3 - EXECUTION

- 27 1. Installation  
28 2. Hanger and Support Spacing  
29 3. Vertical Support  
30 4. Concrete Inserts  
31 5. Anchors

32 1.2 RELATED WORK

- 33 A. Section 03 - Concrete formwork and cast-in-place concrete for equipment pads.  
34 B. Section 22 07 00 - Plumbing Insulation for insulation protection at support  
35 devices.

36 1.3 REFERENCE

- 37 A. Applicable provisions of Division 1 govern work under this section.

38 1.4 REFERENCE STANDARDS

- 39 A. MSS SP-58  
40 B. MSS SP-69

41 1.5 QUALITY ASSURANCE

1 A. Substitution of Materials: Refer to Section GC - General Conditions of the  
2 Contract, Equals and Substitutions.

3

4 1.6 DESCRIPTION

5 A. Provide all supporting devices as required for the installation of mechanical  
6 equipment and materials. All supports and installation procedures are to conform  
7 to the latest requirements of the ANSI Code for building piping.

8 B. Do not hang any mechanical item directly from a metal deck or run piping so its  
9 rests on the bottom chord of any truss or joist.

10 C. Fasteners depending on soft lead for holding power or requiring powder  
11 actuation will not be accepted.

12 D. Support apparatus and material under all conditions of operation, variations in  
13 installed and operating weight of equipment and piping, to prevent excess stress,  
14 and allow for proper expansion and contraction.

15 E. Protect insulation at all hanger points; see Related Work above.

16 1.7 SHOP DRAWINGS

17 A. Schedule of all hanger and support devices indicating attachment methods and  
18 type of device for each pipe size and type of service.

19 1.8 DESIGN CRITERIA

20 A. Materials and application of pipe hangers and supports shall be in accordance  
21 with MSS Standard Practice SP-58 and SP-69 unless noted otherwise.

22 B. Piping connected to pumps, compressors, or other rotating or reciprocating  
23 equipment is to have vibration isolation supports for a distance of one hundred  
24 pipe diameters or three supports away from the equipment, whichever is greater.  
25 Standard pipe hangers/supports as specified in this section are required beyond  
26 the 100 pipe diameter/3 support distance.

27

28 PART 2 - PRODUCTS

29 2.1 MANUFACTURERS

30 A. Anvil, Cooper B-Line, Pate, or engineer approved equal.

31 2.2 STRUCTURAL SUPPORTS

32 A. Provide all supporting steel required for the installation of mechanical equipment  
33 and materials, including angles, channels, beams, etc. to suspended or floor  
34 supported tanks and equipment. All of this steel may not be specifically  
35 indicated on the drawings.

36 2.3 PIPE HANGERS AND SUPPORTS

37 A. HANGERS FOR PIPE SIZES 1/2" THROUGH 2":

38 1. Carbon steel, adjustable swivel ring. Cooper B-Line B3170NF, Anvil 69  
39 or 70.

- 1                    2.        Carbon steel, adjustable clevis, standard. Cooper B-Line B3100, Anvil  
2                    260.
- 3                    B.        HANGERS FOR PIPE SIZES 2" AND LARGER:
- 4                    1.        Carbon steel, adjustable clevis, standard. Cooper B-Line B3100, Anvil  
5                    260.
- 6                    C.        MULTIPLE OR TRAPEZE HANGERS:
- 7                    1.        Steel channels with welded spacers and hanger rods.
- 8                    D.        WALL SUPPORT:
- 9                    1.        Carbon steel welded bracket with hanger. Cooper B-Line 3068 Series,  
10                    Anvil 194 Series.
- 11                    2.        Perforated, epoxy painted finish, 16-12 gauge, min., steel channels  
12                    securely anchored to wall structure, with interlocking, split-type, bolt  
13                    secured, galvanized pipe/tubing clamps. Cooper B-Line type S channel  
14                    with B-2000 series clamps, Anvil type PS 200 H with PS 1200 clamps.  
15                    When copper piping is being supported, provide flexible  
16                    elastomeric/thermoplastic isolation cushion material to completely  
17                    encircle the piping and avoid contact with the channel or clamp, equal to  
18                    Cooper B-Line B1999 Vibra Cushion or provide manufacturers clamp  
19                    and cushion assemblies, Cooper B-Line BVT series, Anvil PS 1400  
20                    series.
- 21                    E.        VERTICAL SUPPORT:
- 22                    1.        Carbon steel riser clamp. Cooper B-Line B3373, Anvil 261 for above  
23                    floor use.
- 24                    F.        FLOOR SUPPORT:
- 25                    1.        Carbon steel pipe saddle, stand and bolted floor flange. Cooper B-Line  
26                    B3088T/B3093.
- 27                    G.        COPPER PIPE SUPPORTS:
- 28                    1.        All supports, fasteners, clamps, etc. directly connected to copper piping  
29                    shall be copper plated or polyvinylchloride coated. Where steel channels  
30                    are used, provide isolation collar between supports/clamps/fasteners and  
31                    copper piping.
- 32                    H.        PIPE HANGER RODS
- 33                    1.        STEEL HANGER RODS:
- 34                    a.        Threaded both ends, threaded one end, or continuous threaded,  
35                    complete with adjusting and lock nuts.
- 36                    b.        Size rods for individual hangers and trapeze support as indicated  
37                    in the following schedule.
- 38                    c.        Total weight of equipment, including valves, fittings, pipe, pipe  
39                    content, and insulation, are not to exceed the limits indicated.
- 40                                       Maximum Load (Lbs.)                    Rod Diameter  
41                                       (650°F Maximum Temp.)                    (inches)

1	610	3/8
2	1130	1/2
3	1810	5/8
4	2710	3/4
5	3770	7/8
6	4960	1
7	8000	1-1/4

8 I. BEAM CLAMPS

- 9 1. MSS SP-69 Types 19 & 23 malleable black iron clamp for attachment to  
10 beam flange to 0.62 inches thick with a retaining ring and threaded rod of  
11 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup point  
12 set screw. Cooper B-Line B3036L/B3034, Anvil 86/92.
- 13 2. MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie  
14 rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter.  
15 Cooper B-Line B3054, Anvil 228.

16 J. CONCRETE INSERTS

- 17 1. DRILLED FASTENERS:
- 18 a. Carbon steel expansion anchors, vibration resistant, with ASTM  
19 B633 zinc plating. Use drill bit of same manufacturer as anchor.  
20 Hilti, Rawl, Redhead, or engineer approved equal.

21 2.4 ANCHORS

- 22 A. Use welding steel shapes, plates, and bars to secure piping to the structure.

23 2.5 EQUIPMENT STANDS

- 24 A. Use structural steel members welded to and supported by pipe supports. Clean,  
25 prime and coat with three coat rust inhibiting alkyd paint or one coat epoxy  
26 mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

27 2.6 CORROSIVE ATMOSPHERE COATINGS

- 28 A. Factory coat supports and anchors used in corrosive atmospheres with hot dip  
29 galvanizing after fabrication, ASTM A123, 1.5 ounces/square foot of surface  
30 each side. Mechanical galvanize threaded products, ASTM B695 Class 50, 2.0  
31 mil coating. Field cuts and damaged finishes to be field covered with zinc rich  
32 paint of comparable thickness to factory coating.

- 33 B. Corrosive atmospheres include the following locations:

- 34 1. Exterior locations  
35

36 PART 3 - EXECUTION

37 3.1 INSTALLATION

- 38 A. Size, apply and install supports and anchors in compliance with manufacturers  
39 recommendations.
- 40 B. Install supports to provide for free expansion of the piping system. Support all  
41 piping from the structure using concrete inserts, beam clamps, ceiling plates, wall

- 1 brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the  
 2 structure and test to demonstrate the adequacy of the fastening.
- 3 C. Coordinate hanger and support installation to properly group piping of all trades.
- 4 D. Where piping can be conveniently grouped to allow the use of trapeze type  
 5 supports, use standard structural shapes or continuous insert channels for the  
 6 supporting steel. Where continuous insert channels are used, pipe supporting  
 7 devices made specifically for use with the channels may be substituted for the  
 8 specified supporting devices provided that similar types are used and all data is  
 9 submitted for prior approval.
- 10 E. Size and install hangers and supports, except for riser clamps, for installation on  
 11 the exterior of piping insulation. Where a vapor barrier is not required, hangers  
 12 may be installed either on the exterior of pipe insulation or directly on piping.
- 13 F. Perform welding in accordance with standards of the American Welding Society.

14 3.2 HANGER AND SUPPORT SPACING

- 15 A. Install hangers to provide minimum 1/2 inch space between finished covering  
 16 and adjacent work.
- 17 B. Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or  
 18 similar piping specialty item.
- 19 C. Use hangers with 1-1/2 inch minimum vertical adjustment.
- 20 D. Where several pipes can be installed in parallel and at the same elevation,  
 21 provide multiple or trapeze hangers.
- 22 E. Support riser piping independently of connected horizontal piping.
- 23 F. Adjust hangers to obtain the slope specified in the piping section of these  
 24 specifications.
- 25 G. Space hangers for pipe as follows:

Pipe Material	Pipe Size	Max. Horiz. Spacing	Max. Vert. Spacing
Cast Iron	2" and larger	5'-0"	15'-0"
Copper	1/2" through 3/4"	5'-0"	10'-0"
Copper	1" through 1-1/4"	6'-0"	10'-0"
Copper	1-1/2" through 2-1/2"	8'-0"	10'-0"
Copper	3"	10'-0"	10'-0"
Copper	4" and larger	12'-0"	10'-0"
Steel	1/2" through 1-1/4"	7'-0"	15'-0"
Steel	1-1/2" through 6"	10'-0"	15'-0"
Steel	8" through 12"	14'-0"	20'-0"
Steel	14" and over	20'-0"	20'-0"

37 3.3 VERTICAL SUPPORT

- 38 A. Support vertical piping with clamps secured to the piping and resting on the  
 39 building structure.

1 3.4 CONCRETE INSERTS

2 A. Select size based on the manufacturer's stated load capacity and weight of  
3 material that will be supported. Use inserts for suspending hangers from  
4 reinforced concrete slabs and sides of reinforced concrete beams. Provide  
5 hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch  
6 size. Where concrete slabs form finished ceiling, provide inserts that are flush  
7 with the slab surface.

8 3.5 ANCHORS

9 A. Install where indicated on the drawings and details. Where not specifically  
10 indicated, install anchors at ends of principal pipe runs and at intermediate points  
11 in pipe runs between expansion loops. Make provisions for preset of anchors as  
12 required to accommodate both expansion and contraction of piping.

13

14

END OF SECTION

15



- 1 E. ASTM C240 Cellular Glass Insulation Block
- 2 F. ASTM C302 Density of Preformed Pipe Insulation
- 3 G. ASTM C303 Density of Preformed Block Insulation
- 4 H. ASTM C449 Mineral Fiber Hydraulic Setting Thermal Insulation Cement
- 5 I. ASTM C518 Heat Flux and Thermal Transmission Properties
- 6 J. ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation
- 7 K. ASTM C534 Preformed Flexible Elastomeric Thermal Insulation
- 8 L. ASTM C547 Mineral Fiber Preformed Pipe Insulation
- 9 M. ASTM C552 Cellular Glass Block and Pipe Thermal Insulation
- 10 N. ASTM C553 Mineral Fiber Blanket and Felt Insulation
- 11 O. ASTM C578 Preformed, Block Type Cellular Polystyrene Thermal Insulation
- 12 P. ASTM C591 Preformed Rigid Cellular Polyurethane Thermal Insulation
- 13 Q. ASTM C610 Expanded Perlite Block and Thermal Pipe Insulation
- 14 R. ASTM C612 Mineral Fiber Block and Board Thermal Insulation
- 15 S. ASTM C921 Properties of Jacketing Materials for Thermal Insulation
- 16 T. ASTM C1136 Flexible Low Permeance Vapor Retarders for Thermal Insulation
- 17 U. ASTM E84 Surface Burning Characteristics of Building Materials
- 18 V. MICA National Commercial & Industrial Insulation Standards
- 19 W. NFPA 225 Surface Burning Characteristics of Building Materials
- 20 X. UL 723 Surface Burning Characteristics of Building Materials

21 1.5 QUALITY ASSURANCE

- 22 A. Substitution of Materials: Refer to Section GC - General Conditions of the
- 23 Contract, Equals and Substitutions.
- 24 B. Label all insulating products delivered to the construction site with the
- 25 manufacturer's name and description of materials.

26 1.6 DESCRIPTION

- 27 A. Furnish and install all insulating materials and accessories as specified or as
- 28 required for a complete installation. The following types of insulation are
- 29 specified in this section:
- 30 B. Pipe Insulation
- 31 C. Equipment Insulation
- 32 D. Install all insulation in accordance with the latest edition of MICA (Midwest
- 33 Insulation Contractors Association) Standard and manufacturer's installation
- 34 instructions. Exceptions to these standards will only be accepted where
- 35 specifically modified in these specifications, or where prior written approval has
- 36 been obtained from the Project Representative.

37 1.7 DEFINITIONS

1 A. Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels  
2 and crawl spaces. All other areas, including walk-through tunnels, shall be  
3 considered as exposed.

4 1.8 SHOP DRAWINGS

5 A. Submit a schedule of all insulating materials to be used on the project, including  
6 adhesives, fastening methods, fitting materials along with material safety data  
7 sheets and intended use of each material. Include manufacturer's technical data  
8 sheets indicating density, thermal characteristics, jacket type, and manufacturer's  
9 installation instructions.

10

11

12 PART 2 - PRODUCTS

13 2.1 MATERIALS

14 A. Materials or accessories containing asbestos will not be accepted.

15 B. Use composite insulation systems (insulation, jackets, sealants, mastics, and  
16 adhesives) that have a flame spread rating of 25 or less and smoke developed  
17 rating of 50 or less, with the following exceptions:

18 1. Insulation which is not located in an air plenum may have a flame spread  
19 rating not over 25 and a smoke developed rating no higher than 50.

20 2.2 INSULATION AND JACKETS

21 A. Manufacturers: Armstrong, Certainteed Manson, Knauf, Owens-Corning,  
22 Rubatex, Johns-Mansville, or engineer approved equal.

23 B. Insulating materials shall be fire retardant, moisture and mildew resistant, and  
24 vermin proof. Insulation shall be suitable to receive jackets, adhesives and  
25 coatings as indicated.

26 C. RIGID FIBERGLASS INSULATION:

27 1. Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity  
28 of not more than 0.23 at 75 degrees F, minimum compressive strength of  
29 25 PSF at 10% deformation, rated for service to 450 degrees F.

30 2. White kraft reinforced foil vapor barrier all service jacket, factory  
31 applied to insulation with a self-sealing pressure sensitive adhesive lap,  
32 maximum permeance of .02 perms and minimum beach puncture  
33 resistance of 50 units.

34 D. SEMI-RIGID FIBERGLASS INSULATION:

35 1. Minimum nominal density of 3 lbs. per cu. ft., thermal conductivity of  
36 not more than 0.28 at 75 degrees F, minimum compressive strength of  
37 125 PSF at 10% deformation, rated for service to 450 degrees F.  
38 Insulation fibers perpendicular to jacket and scored for wrapping  
39 cylindrical surfaces.

40 2. White kraft reinforced foil vapor barrier all service jacket, factory  
41 applied to insulation with a maximum permeance of .02 perms and  
42 minimum beach puncture resistance of 50 units.

- 1 E. ELASTOMERIC INSULATION:
- 2 1. Flexible closed cell, minimum nominal density of 5.5 lbs. per cu. ft.,  
3 thermal conductivity of not more than 0.27 at 75 degrees F, minimum  
4 compressive strength of 4.5 psi at 25% deformation, maximum water  
5 vapor transmission of 0.17 perm inch, maximum water absorption of 6%  
6 by weight, rated for service range of -20 degrees F to 220 degrees F on  
7 piping and 180 degrees F where adhered to equipment.
- 8 F. FIREPROOFING INSULATION:
- 9 1. Mineral fiber with nominal density of 8 lbs. per cu. ft., flame spread  
10 index of 15, fuel contribution index of 0, and smoke developed index of  
11 0, thermal conductivity of not more than 0.23 at 75 degrees F.
- 12 G. Jacket material shall be the same as jacket for adjacent insulation.
- 13 H. PVC FITTING COVERS AND JACKETS:
- 14 1. White PVC film, gloss finish one side, semi-gloss other side, FS LP-  
15 535D, Composition A, Type II, Grade GU. Ultraviolet inhibited  
16 indoor/outdoor grade to be used where exposed to high humidity,  
17 ultraviolet radiation, in kitchens or food processing areas or installed  
18 outdoors. Jacket thickness to be .02 inch (20 mil). Zeston 2000 or  
19 engineer approved equal.
- 20 I. METAL JACKETS:
- 21 1. .016 inch thick aluminum or .010 inch thick stainless steel with safety  
22 edge.
- 23 J. INSULATION INSERTS AND PIPE SHIELDS
- 24 1. Manufacturers: B-Line, Pipe Shields, Value Engineered Products, or  
25 engineer approved equal.
- 26 2. Construct inserts with calcium silicate, minimum 140 psi compressive  
27 strength. Piping 12" and larger, supplement with high density 600 psi  
28 structural calcium silicate insert. Provide galvanized steel shield. Insert  
29 and shield to be minimum 180 degree coverage on bottom of supported  
30 piping and full 360 degree coverage on clamped piping. On roller  
31 mounted piping and piping designed to slide on support, provide  
32 additional load distribution steel plate.
- 33 3. Where contractor proposes shop/site fabricated inserts and shields,  
34 submit schedule of materials, thicknesses, gauges and lengths for each  
35 pipe size to demonstrate equivalency to pre-engineered, pre-  
36 manufactured product described above. On low temperature systems,  
37 extruded polystyrene may be substituted for calcium silicate provided  
38 insert and shield length and gauge are increased to compensate for lower  
39 insulation compressive strength.
- 40 4. Precompressed 20# density molded fiberglass blocks, Hamfab or equal,  
41 of same thickness as adjacent insulation may be substituted for calcium  
42 silicate inserts with one 1" x 6" block for piping through 2-1/2" and three  
43 1" x 6" blocks for piping through 4". Submit shield schedule to

1 demonstrate equivalency to pre-engineered/pre-manufactured product  
2 described above.

3 5. Wood blocks will not be accepted.

4 2.3 ACCESSORIES

5 A. All products shall be compatible with surfaces and materials on which they are  
6 applied, and be suitable for use at operating temperatures of the systems to which  
7 they are applied.

8 B. Adhesives, sealants, and protective finishes shall be as recommended by  
9 insulation manufacturer for applications specified.

10 C. Insulation bands to be 3/4 inch wide, constructed of aluminum or stainless steel.  
11 Minimum thickness to be .015 inch for aluminum and .010 inch for stainless  
12 steel.

13 D. Tack fasteners to be stainless steel ring grooved shank tacks.

14 E. Staples to be clinch style.

15 F. Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.

16 G. Finishing cement to be ASTM C449.

17 H. Fibrous glass or canvas fabric reinforcing shall have a minimum untreated weight  
18 of 6 oz./sq. yd.

19 I. Bedding compounds to be non-shrinking and permanently flexible.

20 J. Vapor barrier coatings to be non-flammable, fire resistant, polymeric resin.

21 K. Fungicidal water base coating (Foster 40-20 or equal) to be compatible with  
22 vapor barrier coating.

23

24 PART 3 - EXECUTION

25 3.1 INSTALLATION

26 A. Install insulation, jackets and accessories in accordance with manufacturers  
27 instructions and under ambient temperatures and conditions recommended by  
28 manufacturer. Surfaces to be insulated must be clean and dry.

29 B. Do not insulate systems or equipment which are specified to be pressure tested or  
30 inspected, until testing, inspection and any necessary repairs have been  
31 successfully completed.

32 C. Install insulation with smooth and even surfaces. Poorly fitted joints or use of  
33 filler in voids will not be accepted. Cover and seal exposed fiberglass insulation  
34 when insulation is terminated, no raw fiberglass insulation is allowed. Provide  
35 neat and coated terminations at all nameplates, uninsulated fittings, or at other  
36 locations where insulation terminates. Install with longitudinal joints facing wall  
37 or ceiling.

38 D. Seal off raw ends of insulation and butt joints with vapor barrier mastic at  
39 intervals of not more than 20 feet on piping requiring a vapor barrier.

40 E. Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2  
41 inches.

- 1 F. Use full-length material (as delivered from manufacturer) wherever possible.  
2 Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be  
3 accepted.
- 4 G. Insulation shall be continuous through sleeves and openings. Vapor barriers shall  
5 be maintained continuous through all penetrations.
- 6 H. Provide a complete vapor barrier for insulation on the following systems:  
7 1. Cold water (potable and non-potable)  
8 2. Storm Water  
9 3. Equipment piping with a surface temperature below 65 degrees F

10 3.2 PIPING, VALVE, AND FITTING INSULATION

11 A. GENERAL:

- 12 1. Install insulation with butt joints and longitudinal seams closed tightly.  
13 Provide minimum 2" lap on jacket seams and 2" tape on butt joints,  
14 firmly cemented with lap adhesive. Additionally secure with staples  
15 along seams and butt joints. Coat staples with vapor barrier mastic on  
16 systems requiring vapor barrier.
- 17 2. Water supply piping insulation shall be continuous throughout the  
18 building and installed adjacent to and within building walls to a point  
19 directly behind the fixture that is being supplied.
- 20 3. Install insulation continuous through pipe hangers and supports with  
21 hangers and supports on the exterior of insulation. Where a vapor barrier  
22 is not required, hangers and supports may be attached directly to piping  
23 with insulation completely covering hanger or support and jacket sealed  
24 at support rod penetration. Where riser clamps are required to be attached  
25 directly to piping requiring vapor barrier, extend insulation and vapor  
26 barrier jacketing/coating around riser clamp.

27 B. INSULATION INSERTS AND PIPE SHIELDS:

- 28 1. Provide insulation inserts and pipe shields at all hanger and support  
29 locations. Inserts may be omitted on 3/4" and smaller copper piping  
30 provided 12" long 22 gauge pipe shields are used.

31 C. FITTINGS AND VALVES:

- 32 1. Fittings, valves, unions, flanges, couplings and specialties may be  
33 insulated with factory molded or built up insulation of the same thickness  
34 as adjoining insulation. Cover insulation with fabric reinforcing and  
35 mastic or where temperatures do not exceed 150 degrees, PVC fitting  
36 covers. Secure PVC fitting covers with tack fasteners and 1-1/2" band of  
37 mastic over ends, throat, seams or penetrations. On systems requiring  
38 vapor barrier, use vapor barrier mastic.

39 D. ELASTOMERIC:

- 40 1. Where practical, slip insulation on piping during pipe installation when  
41 pipe ends are open. Miter cut fittings allowing sufficient length to  
42 prevent stretching. Completely seal seams and joints for vapor tight  
43 installation. Apply full bed of adhesive to both surfaces.

1 E. PIPE INSULATION SCHEDULE:

2 1. Provide insulation on new and existing remodeled piping as indicated in  
3 the following schedule:

Service	Insulation Types	Insulation Thickness by Pipe Size				
		1" and smaller	1-1/4" to 2"	2-1/2" to 4"	5" to 6"	8" and larger
Hot Water Supply	Rigid Fiberglass	1"	1"	1.5"	1.5"	1.5"
Hot Water Circulating	Rigid Fiberglass	1"	1"	1.5"		
Cold Water Non-Potable	Rigid Fiberglass	0.5"	0.5"	1"	1"	1"
Cold Water Non-Potable	Rigid Fiberglass*	0.5"	0.5"	1"		
Hot Water Horizontal Storm Piping and 4'-0" of vertical piping thereafter,	Rigid Fiberglass	0.5"	0.5"	0.5"	0.5"	1"
Roof Drain bodies	Rigid Fiberglass	0.5"	0.5"	0.5"	0.5"	1"
Copper and steel Embedded in masonry Walls	Elastomeric	0.5"	0.5"	0.5"	0.5"	0.5"

25 = Elastomeric types are acceptable

26 F. The following piping and fittings are not to be insulated:

- 27
- 28 1. Chrome plated exposed supplies and stops (except where specifically  
29 noted).
  - 30 2. Water hammer arrestors.
  - 31 3. Piping unions and flanges for systems not requiring a vapor barrier.

32 3.3 EQUIPMENT INSULATION

33 A. Do not insulate over equipment access manholes, fittings, nameplates or ASME  
34 stamps. Bevel and seal insulation at these locations.

35 B. SEMI-RIGID FIBERGLASS:

- 36 1. Apply insulation to equipment shells using weld pins, bonding adhesive,  
37 banded and wired in place. Fill all joints, seams and depressions with  
38 insulating cement to a smooth, even surface. Cover with reinforcing  
39 fabric and 2 coats of mastic. . Use vapor barrier mastic on systems  
40 requiring a vapor barrier.

41 C. ELASTOMERIC/POLYOLEFIN:

- 42 1. Apply full cover coat of adhesive to surface to be insulated, insulation  
43 and edge butt joints. Place insulation with edge joints firmly butted  
44 pressing to surface for full adhesion. Seal seams and joints vapor tight.



1 **SECTION 22 11 00**

2 **FACILITY WATER DISTRIBUTION**

3  
4 **PART 1 - GENERAL**

5 1.1 SCOPE

6 A. This section contains specifications for plumbing pipe and pipe fittings for this  
7 project. Included are the following topics:

8 B. PART 1 - GENERAL

- 9 1. Scope  
10 2. Related Work  
11 3. Reference  
12 4. Reference Standards  
13 5. Shop Drawings  
14 6. Quality Assurance  
15 7. Delivery, Storage, and Handling  
16 8. Design Criteria  
17 9. Welder Qualifications

18 C. PART 2 - PRODUCTS

- 19 1. Domestic Water  
20 2. Dielectric Unions and Flanges  
21 3. Unions and Flanges  
22 4. Mechanical Grooved Pipe Connections

23 D. PART 3 - EXECUTION

- 24 1. General  
25 2. Preparation  
26 3. Erection  
27 4. Copper Pipe Joints  
28 5. Mechanical Grooved Pipe Connections  
29 6. Mechanically Formed Tee Fittings  
30 7. Domestic Water  
31 8. Underground Pipe Wrap  
32 9. Dielectric Unions and Flanges  
33 10. Unions and Flanges  
34 11. Piping System Leak Tests

35 1.2 RELATED WORK

36 A. 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment

37 B. 22 05 14 - Plumbing Specialties

38 1.3 REFERENCE

39 A. Applicable provisions of Division 1 govern work under this section.

40 1.4 REFERENCE STANDARDS

41 A. ANSI A21.4

- 1 B. ANSI A21.11
- 2 C. ANSI A21.51
- 3 D. ANSI B16.3 Malleable Iron Threaded Fittings
- 4 E. ANSI B16.4 Cast Iron Threaded Fittings
- 5 F. ANSI B16.5 Pipe Flanges and Flanged Fittings
- 6 G. ANSI B16.22 Wrought Copper and Wrought Copper Alloy Solder Joint
- 7 Pressure Fittings
- 8 H. ANSI B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint
- 9 Drainage Fittings - DWV
- 10 I. ASTM A105 Forgings, Carbon Steel, for Piping Components
- 11 J. ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- 12 K. ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for
- 13 Moderate and Elevated Temperatures
- 14 L. ASTM B32 Solder Metal
- 15 M. ASTM B88 Seamless Copper Water Tube
- 16 N. ASTM B280 Seamless Copper Tube for Air Conditioning and Refrigeration
- 17 Field Service
- 18 O. ASTM B813 Liquid and Paste Fluxes for Soldering Applications of Copper
- 19 and Copper Alloy Tube
- 20 P. AWS A5.8 Brazing Filler Metal
- 21 Q. AWWA C104 Cement Mortar Lining for Ductile Iron Pipe and Fittings for
- 22 Water
- 23 R. AWWA C105 Polyethylene Encasement for Ductile Iron Piping for Water
- 24 S. AWWA C110 Ductile Iron and Gray Iron Fittings, 3 In. Through 48 In., for
- 25 Water and Other Liquids
- 26 T. AWWA C111 Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure
- 27 Pipe and Fittings
- 28 U. AWWA C151 Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-
- 29 Lined Molds for Water or Other Liquids
- 30 V. AWWA C153 Ductile Iron Compact Fittings, 3 In. Through 48 In., for Water
- 31 and Other Liquids
- 32 W. AWWA C600 Installation of Ductile Iron Water Mains and Their
- 33 Appurtenances
- 34 X. AWWA C651 Disinfecting Water Mains
- 35 1.5 SHOP DRAWINGS
- 36 A. Schedule from the contractor indicating the ASTM, AWWA specification
- 37 number of the pipe being proposed along with its type and grade if known at the
- 38 time of submittal, and sufficient information to indicate the type and rating of
- 39 fittings for each service.

1 B. Statement from manufacturer on his letterhead that pipe furnished meets the  
2 ASTM, AWWA specification contained in this section.

3 1.6 QUALITY ASSURANCE

4 A. Substitution of Materials: Refer to Section GC - General Conditions of the  
5 Contract, Equals and Substitutions.

6 B. Order all copper, cast iron, steel, PVC and polyethylene pipe with each length  
7 marked with the name or trademark of the manufacturer and type of pipe; with  
8 each shipping unit marked with the purchase order number, metal or alloy  
9 designation, temper, size, and name of supplier.

10 C. Any installed material not meeting the specification requirements must be  
11 replaced with material that meets these specifications without additional cost to  
12 the State.

13 1.7 DELIVERY, STORAGE, AND HANDLING

14 A. Promptly inspect shipments to insure that the material is undamaged and  
15 complies with specifications.

16 B. Cover pipe to prevent corrosion or deterioration while allowing sufficient  
17 ventilation to avoid condensation. Do not store materials directly on grade.  
18 Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are  
19 provided or specified, take precautions so the caps remain in place. Protect  
20 fittings, flanges, and unions by storage inside or by durable, waterproof, above  
21 ground packaging.

22 C. Offsite storage agreements will not relieve the contractor from using proper  
23 storage techniques.

24 D. Storage and protection methods must allow inspection to verify products.

25 1.8 DESIGN CRITERIA

26 A. Use only new material, free of defects, rust and scale, and meeting the latest  
27 revision of ASTM, AWWA or CISPI specifications as listed in this specification.

28 B. Construct all piping for the highest pressures and temperatures in the respective  
29 system.

30 C. Non-metallic piping will be acceptable only for the services indicated. It will not  
31 be acceptable in ventilation plenum spaces, including plenum ceilings.

32 D. Where weld fittings or mechanical grooved fittings are used, use only long radius  
33 elbows having a centerline radius of 1.5 pipe diameters.

34 E. Where ASTM A53 type F pipe is specified, grade A type E or S, or grade B type  
35 E or S may be substituted at Contractor's option. Where the grade or type is not  
36 specified, Contractor may choose from those commercially available.

37 F. Where ASTM B88, type L H (drawn) temper copper tubing is specified, ASTM  
38 B88, type K H (drawn) temper copper tubing may be substituted at Contractor's  
39 option.

40 PART 2 - PRODUCTS

41 2.1 DOMESTIC WATER

- 1           A.     **ABOVE GROUND:**
- 2           1.     Type L copper water tube, H (drawn) temper, ASTM B88; wrought
- 3           copper pressure fittings, ANSI B16.22; lead free (<.2%) solder, ASTM
- 4           B32; flux, ASTM B813; copper phosphorous brazing alloy, AWS A5.8
- 5           BCuP. Copper mechanical grooved fittings and couplings on roll
- 6           grooved pipe may be used in lieu of soldered fittings.
- 7           2.     Ductile iron pipe, thickness Class 53, AWWA C151/C115; with standard
- 8           thickness cement mortar lining, AWWA C104; ductile iron mechanical
- 9           grooved cement mortar lined fittings and couplings on cut grooved pipe,
- 10          Class 350 12" and below, Class 250 above 12", AWWA C606; ductile
- 11          iron or gray iron flanged cement mortar lined fittings, Class 250,
- 12          AWWA C110; rubber gasket joints with non-toxic gasket lubricant,
- 13          AWWA C111.
- 14
- 15
- 16          B.     **BELOW GROUND 2-1/2" AND SMALLER:**
- 17          1.     Type K copper water tube, O (annealed) temper, ASTM B88; with cast
- 18          copper pressure fittings, ANSI B16.18; wrought copper pressure fittings,
- 19          ANSI B16.22; lead free (<.2%) solder, ASTM B32; flux, ASTM B813;
- 20          or cast copper flared pressure fittings, ANSI B16.26.
- 21          C.     **BELOW GROUND 3" AND LARGER:**
- 22          1.     Ductile iron pipe, mechanical or push on joint, thickness Class 52,
- 23          AWWA C151; with standard thickness cement mortar lining, AWWA
- 24          C104; ductile iron or gray iron mechanical joint cement mortar lined
- 25          fittings, Class 250, AWWA C110; ductile iron mechanical joint compact
- 26          fittings, Class 350, AWWA C153; rubber gasket joints with non-toxic
- 27          gasket lubricant, AWWA C111. Provide 8 mil tube or sheet polyethylene
- 28          encasement of iron pipe and pipe fittings, AWWA C105.
- 29    2.2    **DIELECTRIC UNIONS AND FLANGES**
- 30          A.     Watts Regulator Company, Lochinvar, Wilkins or EPCO Sales, Inc., dielectric
- 31          unions 2" and smaller; dielectric flanges 2" and larger; with iron female pipe
- 32          thread to copper solder joint or brass female pipe thread end connections, non-
- 33          asbestos gaskets, having a pressure rating of not less than 175 psig at 180
- 34          degrees.
- 35    2.3    **UNIONS AND FLANGES**
- 36          A.     Unions, flanges and gasket materials to have a pressure rating of not less than
- 37          150 psig at 180 degrees. Gasket material for flanges and flanged fittings shall be
- 38          teflon type. Treated paper gaskets are not acceptable.
- 39          B.     **2" AND SMALLER STEEL:**
- 40          1.     ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use
- 41          black malleable iron on black steel piping and galvanized malleable iron
- 42          on galvanized steel piping.
- 43          C.     **2" AND SMALLER COPPER:**

- 1                   1.       ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast
- 2                   bronze flanges.
- 3           D.       2-1/2" AND LARGER STEEL:
- 4                   1.       ASTM A181 or A105, grade 1 hot forged steel flanges of threaded,
- 5                   welding neck, or slip-on pattern on black steel and threaded only on
- 6                   galvanized steel. Use raised face flanges ANSI B16.5 for mating with
- 7                   other raised face flanges or equipment with flat ring or full face gaskets.
- 8                   Use ANSI B16.1 flat face flanges with full face teflon gaskets for mating
- 9                   with other flat face flanges on equipment. Gaskets shall be teflon type.
- 10           E.       2-1/2" AND LARGER COPPER:
- 11                   1.       ANSI B15.24 Class 150 cast bronze flanges with full face teflon gaskets.

12   2.4   MECHANICAL GROOVED PIPE CONNECTIONS

- 13           A.       Mechanical grooved pipe couplings and fittings, ASTM F1476, as manufactured
- 14                   by Victaulic, Gruvlok or Gustin-Bacon may be used with cut groove galvanized
- 15                   steel pipe, cut groove ductile iron pipe or roll groove copper pipe where noted.
- 16                   Mechanical grooved components and assemblies to be rated for minimum 250 psi
- 17                   working pressure.
- 18           B.       All mechanical grooved pipe material including gaskets, couplings, fittings and
- 19                   flange adapters to be from the same manufacturer.
- 20           C.       Couplings to be malleable iron, ASTM A47, or ductile iron ASTM A536 with
- 21                   painted finish. Reducing couplings are not acceptable.
- 22           D.       Fittings used on galvanized steel pipe to be malleable iron, ASTM A47, or
- 23                   ductile iron A536, with galvanized finish, ASTM A153. Fittings used on ductile
- 24                   iron pipe to be cement mortar lined ductile iron with coal tar coating, ASTM
- 25                   A536; conforming to requirements of AWWA C110/C153 and AWWA C606.
- 26                   Fittings used on copper pipe to be copper.
- 27           E.       Gaskets to be EPDM, ASTM D2000. Gaskets for hot water systems and dry pipe
- 28                   systems to be flush seal design. Heat treated carbon steel oval neck track bolts
- 29                   and nuts, ASTM A183, with zinc electroplated finish ASTM B633.
- 30           F.       Flange adapters to be ductile iron, ASTM A536; except at lug type butterfly
- 31                   valves where standard threaded flanges shall be used.

32

33   PART 3 - EXECUTION

34   3.1   GENERAL

- 35           A.       Install pipe and fittings in accordance with reference standards, manufacturers
- 36                   recommendations and recognized industry practices.

37   3.2   PREPARATION

- 38           A.       Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt
- 39                   from interior and exterior of each section of pipe and fitting prior to assembly.

40   3.3   ERECTION

- 1           A.     Install all piping parallel to building walls and ceilings and at heights which do
- 2                     not obstruct any portion of a window, doorway, stairway, or passageway. Where
- 3                     interferences develop in the field, offset or reroute piping as required to clear
- 4                     such interferences. Coordinate locations of plumbing piping with piping,
- 5                     ductwork, conduit and equipment of other trades to allow sufficient clearances.
- 6                     In all cases, consult drawings for exact location of pipe spaces, ceiling heights,
- 7                     door and window openings, or other architectural details before installing piping.
- 8           B.     Where copper piping is embedded in masonry, provide protective sleeve
- 9                     covering of elastomeric pipe insulation.
- 10          C.     Install underground warning tape 6"-12" below finished grade above all exterior
- 11                     below ground piping. Where existing underground warning tape is encountered,
- 12                     repair and replace.
- 13          D.     Maintain piping in clean condition internally during construction.
- 14          E.     Provide clearance for installation of insulation, access to valves and piping
- 15                     specialties.
- 16          F.     Provide anchors, expansion joints, swing joints and/or expansion loops so that
- 17                     piping may expand and contract without damage to itself, equipment, or building.
- 18          G.     Do not route piping through transformer vaults or above transformers,
- 19                     panelboards, or switchboards, including the required service space for this
- 20                     equipment, unless the piping is serving this equipment
- 21          H.     Install all valves and piping specialties, including items furnished by others, as
- 22                     specified and/or detailed. Provide access to valves and specialties for
- 23                     maintenance. Make connections to all equipment, fixtures and systems installed
- 24                     by others where same requires the piping services indicated in this section.

25

26   3.4    **COPPER PIPE JOINTS**

- 27           A.     Remove all slivers and burrs remaining from the cutting operation by reaming
- 28                     and filing both pipe surfaces. Clean fitting and tube with metal brush, emery
- 29                     cloth or sandpaper. Remove residue from the cleaning operation, apply flux and
- 30                     assemble joint to socket stop. Apply flame to fitting until solder melts when
- 31                     placed at joint. Remove flame and feed solder into joint until full penetration of
- 32                     cup and ring of solder appears. Wipe excess solder and flux from joint.

33   3.5    **MECHANICAL GROOVED PIPE CONNECTIONS**

- 34           A.     Use pipe factory grooved in accordance with the coupling manufacturer's
- 35                     specifications or field grooved pipe in accordance with the same specifications
- 36                     using specially designed tools specially designed for the application. Lubricate
- 37                     pipe and coupling gasket, align pipe, and secure joint in accordance with the
- 38                     coupling manufacturer's specifications.

39   3.6    **MECHANICALLY FORMED TEE FITTINGS**

- 40           A.     The use of mechanically formed tee fittings is not permitted on this project.

41   3.7    **DOMESTIC WATER**

- 1 A. Maintain piping system in clean condition during installation. Remove dirt and  
2 debris from assembly of piping as work progresses. Cap open pipe ends where  
3 left unattended or subject to contamination.
- 4 B. Install exterior water piping below predicted frost level in accordance with  
5 COMM Table 82.30-6, but in no case less than 6' bury depth to top of pipe.  
6 Maintain minimum of 8' horizontal distance between 2-1/2" and larger water  
7 piping and sanitary sewer piping. Maintain minimum of 30" horizontal and 12"  
8 vertical distance, water on top, between 2" and smaller water piping and sanitary  
9 sewer piping. Where water piping crosses a sanitary sewer, provide minimum  
10 18" vertical clearance and waterproof PVC water pipe sleeve (reference sanitary  
11 sewer materials) sealed at both ends for distance of 10' from sewer in both  
12 directions.
- 13 C. Provide thrust restraints for 3" and larger exterior water piping joints, hydrants,  
14 caps, plugs, fittings and bends of 22-1/2 degrees or more. Field apply continuous  
15 anti-corrosion coating to rodded restraint components. Protect mechanical joints,  
16 nuts and bolts from concrete cover. Cover with 8 mil sheet or tube polyethylene  
17 material sleeve.
- 18 D. Install interior water piping with drain valves where indicated and at low points  
19 of system to allow complete drainage. Install shutoff valves where indicated and  
20 at the base of risers to allow isolation of portions of system for repair. Do not  
21 install water piping within exterior walls.
- 22 E. Prior to use, isolate and fill system with potable water. Allow to stand 24 hours.  
23 Flush each outlet proceeding from the service entrance to the furthest outlet for  
24 minimum of 1 minute and until water appears clear. Fill system with a solution of  
25 water and chlorine containing at least 50 parts per million of chlorine and allow  
26 to stand for 24 hours. Alternately a solution containing at least 200 parts per  
27 million of chlorine may be used and allowed to stand for 3 hours. Flush system  
28 with potable water until chlorine concentration is no higher than source water  
29 level.
- 30 F. Wait 24 hours after final flushing. Take samples of water for lab testing. The  
31 number and location of samples shall be representative of the system size and  
32 configuration and are subject to approval by Engineer. Test shall show the  
33 absence of coliform bacteria. If test fails, repeat disinfection and testing  
34 procedures until no coliform bacteria are detected. Submit test report indicating  
35 date and time of test along with test results.

36 3.8 UNDERGROUND PIPE WRAP

- 37 A. Use for steel piping encased in concrete or underground which is not in a  
38 conduit. Remove all dirt and other foreign material from exterior of pipe. Apply  
39 primer as recommended by the manufacturer. Use a spiral wrap process for  
40 applying tape to the pipe. Repair any breaks in the tape coating caused by the  
41 installation process.

42 3.9 DIELECTRIC UNIONS AND FLANGES

- 43 A. Install dielectric unions or flanges at each point where a copper-to-steel pipe  
44 connection is required in domestic water systems.

45 3.10 UNIONS AND FLANGES

1 A. Install a union or flange at each connection to each piece of equipment and at  
 2 other items which may require removal for maintenance, repair, or replacement.  
 3 Where a valve is located at a piece of equipment, locate the flange or union  
 4 connection on the equipment side of the valve. Concealed unions or flanges are  
 5 not acceptable.

6 3.11 PIPING SYSTEM LEAK TESTS

7 A. Isolate or remove components from system which are not rated for test pressure.  
 8 Test piping in sections or entire system as required by sequence of construction.  
 9 Do not insulate or conceal pipe until it has been successfully tested.

10 B. If required for the additional pressure load under test, provide temporary  
 11 restraints at fittings or expansion joints. Backfill underground water mains prior  
 12 to testing with the exception of thrust restrained valves which may be exposed to  
 13 isolate potential leaks.

14 C. For hydrostatic tests, use clean water and remove all air from the piping being  
 15 tested by means of air vents or loosening of flanges/unions. Measure and record  
 16 test pressure at the high point in the system.

17 D. Inspect system for leaks. Where leaks occur, repair the area with new materials  
 18 and repeat the test; caulking will not be acceptable.

19 E. Entire test must be witnessed by the Division's representative. All pressure tests  
 20 are to be documented on forms to be provided to the contractor.

21		Test	Final Test	
22	<u>System</u>	<u>Medium</u>	<u>Pressure</u>	
23	<u>Duration</u>			
24	*Below Ground Domestic Water	Water	200 psig	2 hr
25	Above Ground Domestic Water	Water	100 psig	8 hr
26	Above Ground Non-potable Water	Water	100 psig	8 hr
27	Below Ground Non-potable Water	Water	100 psig	8 hr

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**END OF SECTION**

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**SECTION 22 13 00**

**FACILITY SANITARY SEWERAGE**

**PART 1 - GENERAL**

**1.1 SCOPE**

A. This section contains specifications for plumbing pipe and pipe fittings for this project. Included are the following topics:

B. **PART 1 - GENERAL**

- 1. Scope
- 2. Related Work
- 3. Reference
- 4. Reference Standards
- 5. Shop Drawings
- 6. Quality Assurance
- 7. Delivery, Storage, and Handling
- 8. Design Criteria
- 9. Welder Qualifications

C. **PART 2 - PRODUCTS**

- 1. Sanitary Waste and Vent
- 2. Acid Waste and Vent

D. **PART 3 - EXECUTION**

- 1. General
- 2. Preparation
- 3. Erection
- 4. Copper Pipe Joints
- 5. Threaded Pipe Joints
- 6. Mechanical Hubless Pipe Connections
- 7. Mechanical Joint Pipe Connections
- 8. Push-On Gasketed Pipe Connections
- 9. Mechanical Grooved Pipe Connections
- 10. Mechanically Formed Tee Fittings
- 11. Sanitary Waste and Vent
- 12. Piping System Leak Tests

**1.2 RELATED WORK**

- A. 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
- B. 22 05 14 - Plumbing Specialties

**1.3 REFERENCE**

A. Applicable provisions of Division 1 govern work under this section.

**1.4 REFERENCE STANDARDS**

- A. ANSI A21.4
- B. ANSI A21.11

- 1 C. ANSI A21.51
- 2 D. ANSI B16.3 Malleable Iron Threaded Fittings
- 3 E. ANSI B16.4 Cast Iron Threaded Fittings
- 4 F. ANSI B16.5 Pipe Flanges and Flanged Fittings
- 5 G. ANSI B16.22 Wrought Copper and Wrought Copper Alloy Solder Joint
- 6 Pressure Fittings
- 7 H. ANSI B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint
- 8 Drainage Fittings - DWV
- 9 I. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and
- 10 Seamless
- 11 J. ASTM A74 Standard Specifications for Hub and Spigot Cast Iron Soil Pipe
- 12 and Fittings
- 13 K. ASTM A105 Forgings, Carbon Steel, for Piping Components
- 14 L. ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- 15 M. ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for
- 16 Moderate and Elevated Temperatures
- 17 N. ASTM A861 High Silicon Iron Pipe and Fittings
- 18 O. ASTM A888 Standard Specifications for Hubless Cast Iron Soil Pipe and
- 19 Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
- 20 (Latest Edition)
- 21 P. ASTM B32 Solder Metal
- 22 Q. ASTM B306 Copper Drainage Tube (DWV)
- 23 R. ASTM B813 Liquid and Paste Fluxes for Soldering Applications of Copper
- 24 and Copper Alloy Tube
- 25 S. ASTM C76 Reinforced Concrete Culvert, Storm Drain and Sanitary Pipe
- 26 T. ASTM C564 Standard Specifications for Rubber Gaskets for Cast Iron Soil
- 27 Pipe and Fittings
- 28 U. ASTM C1540 Standard Specification For Heavy Duty Shielded Couplings
- 29 Joining Hubless Cast Iron Soil Pipe And Fittings
- 30 V. AWS A5.8 Brazing Filler Metal
- 31 W. CISPI 301 Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm
- 32 Drain, Waste and Vent Piping Applications (Latest Edition)

33 1.5 SHOP DRAWINGS

- 34 A. Schedule from the contractor indicating the ASTM, or CISPI specification
- 35 number of the pipe being proposed along with its type and grade if known at the
- 36 time of submittal, and sufficient information to indicate the type and rating of
- 37 fittings for each service.
- 38 B. Statement from manufacturer on his letterhead that pipe furnished meets the
- 39 ASTM, or CISPI specification contained in this section.

1 1.6 QUALITY ASSURANCE

- 2 A. Substitution of Materials: Refer to Section GC - General Conditions of the  
3 Contract, Equals and Substitutions.
- 4 B. Order all copper, cast iron, and steel pipe with each length marked with the name  
5 or trademark of the manufacturer and type of pipe; with each shipping unit  
6 marked with the purchase order number, metal or alloy designation, temper, size,  
7 and name of supplier.
- 8 C. Any installed material not meeting the specification requirements must be  
9 replaced with material that meets these specifications without additional cost to  
10 the State.

11 1.7 DELIVERY, STORAGE, AND HANDLING

- 12 A. Promptly inspect shipments to insure that the material is undamaged and  
13 complies with specifications.
- 14 B. Cover pipe to prevent corrosion or deterioration while allowing sufficient  
15 ventilation to avoid condensation. Do not store materials directly on grade.  
16 Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are  
17 provided or specified, take precautions so the caps remain in place. Protect  
18 fittings, flanges, and unions by storage inside or by durable, waterproof, above  
19 ground packaging.
- 20 C. Offsite storage agreements will not relieve the contractor from using proper  
21 storage techniques.
- 22 D. Storage and protection methods must allow inspection to verify products.

23 1.8 DESIGN CRITERIA

- 24 A. Use only new material, free of defects, rust and scale, and meeting the latest  
25 revision of ASTM, or CISPI specifications as listed in this specification.
- 26 B. Construct all piping for the highest pressures and temperatures in the respective  
27 system.
- 28 C. Non-metallic piping will be acceptable only for the services indicated. It will not  
29 be acceptable in ventilation plenum spaces, including plenum ceilings.
- 30 D. Where weld fittings or mechanical grooved fittings are used, use only long radius  
31 elbows having a centerline radius of 1.5 pipe diameters.
- 32 E. Where ASTM A53 type F pipe is specified, grade A type E or S, or grade B type  
33 E or S may be substituted at Contractor's option. Where the grade or type is not  
34 specified, Contractor may choose from those commercially available.
- 35 F. Where ASTM B88, type L H (drawn) temper copper tubing is specified, ASTM  
36 B88, type K H (drawn) temper copper tubing may be substituted at Contractor's  
37 option.

38 PART 2 - PRODUCTS

39 2.1 SANITARY WASTE AND VENT

- 40 A. INTERIOR ABOVE GROUND:

- 1           1.       PVC soil pipe and fittings, Schedule 40 ASTM D1784; joints shall
- 2                       conform to the requirements of ASTM Standard C-1540. PVC and
- 3                       COVC Pipe and fittings shall be be manufactured Charlotte,
- 4                       Harvel/Fischer or Harrison.
- 5       B.       INTERIOR BELOW GROUND:
- 6           1.       Cast iron soil pipe and fittings, hub and spigot, service weight, CISPI
- 7                       Standard 301, ASTM A888, and ASTM A74, with neoprene rubber
- 8                       compression gaskets, ASTM C564 and CISPI HSN 85. Pipe and fittings
- 9                       shall be marked with the collective trademark of the Cast Iron Pipe
- 10                      Institute and be manufactured by AB&I, Charlotte, or Tyler.
- 11       C.       EXTERIOR BELOW GROUND 10" AND SMALLER:
- 12           1.       Non-reinforced concrete sewer, storm drain and culvert pipe, Class III,
- 13                       ASTM C14; rubber gasket joints, ASTM C443; bell and spigot ends with
- 14                       opposing shoulder or confined O-ring seal configuration, ASTM C302.
- 15       D.       EXTERIOR BELOW GROUND 15" AND SMALLER:
- 16           1.       Cast iron soil pipe and fittings, CISPI *Standard* 301, ASTM A888, and
- 17                       ASTM A74; with neoprene rubber compression gaskets, ASTM C564
- 18                       and CISPI HSN 85. Pipe and fittings shall be marked with the collective
- 19                       trademark of the Cast Iron Pipe Institute and be manufactured by AB&I,
- 20                       Charlotte, or Tyler.

21

22 PART 3 - EXECUTION

23 3.1 GENERAL

- 24       A.       Install pipe and fittings in accordance with reference standards, manufacturers
- 25                       recommendations and recognized industry practices.

26 3.2 PREPARATION

- 27       A.       Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt
- 28                       from interior and exterior of each section of pipe and fitting prior to assembly.

29 3.3 ERECTION

- 30       A.       Install all piping parallel to building walls and ceilings and at heights which do
- 31                       not obstruct any portion of a window, doorway, stairway, or passageway. Where
- 32                       interferences develop in the field, offset or reroute piping as required to clear
- 33                       such interferences. Coordinate locations of plumbing piping with piping,
- 34                       ductwork, conduit and equipment of other trades to allow sufficient clearances.
- 35                       In all cases, consult drawings for exact location of pipe spaces, ceiling heights,
- 36                       door and window openings, or other architectural details before installing piping.
- 37       B.       Where copper or steel piping is embedded in masonry, provide protective sleeve
- 38                       covering of elastomeric pipe insulation.
- 39       C.       Install underground warning tape 6"-12" below finished grade above all exterior
- 40                       below ground piping. Where existing underground warning tape is encountered,
- 41                       repair and replace.
- 42       D.       Maintain piping in clean condition internally during construction.

- 1 E. Provide clearance for installation of insulation, access to valves and piping  
2 specialties.
- 3 F. Provide anchors, expansion joints, swing joints and/or expansion loops so that  
4 piping may expand and contract without damage to itself, equipment, or building.
- 5 G. Do not route piping through transformer vaults or above transformers,  
6 panelboards, or switchboards, including the required service space for this  
7 equipment, unless the piping is serving this equipment
- 8 H. Install all valves and piping specialties, including items furnished by others, as  
9 specified and/or detailed. Provide access to valves and specialties for  
10 maintenance. Make connections to all equipment, fixtures and systems installed  
11 by others where same requires the piping services indicated in this section.
- 12 3.4 COPPER PIPE JOINTS
- 13 A. Remove all slivers and burrs remaining from the cutting operation by reaming  
14 and filing both pipe surfaces. Clean fitting and tube with metal brush, emery  
15 cloth or sandpaper. Remove residue from the cleaning operation, apply flux and  
16 assemble joint to socket stop. Apply flame to fitting until solder melts when  
17 placed at joint. Remove flame and feed solder into joint until full penetration of  
18 cup and ring of solder appears. Wipe excess solder and flux from joint.
- 19 3.5 THREADED PIPE JOINTS
- 20 A. Use a thread lubricant or teflon tape when making joints; no hard setting pipe  
21 thread cement or caulking will be allowed.
- 22 3.6 MECHANICAL HUBLESS PIPE CONNECTIONS
- 23 A. Place the gasket on the end of one pipe or fitting and the clamp assembly on the  
24 end of the other pipe or fitting. Firmly seat the pipe or fitting ends against the  
25 integrally molded shoulder inside the neoprene gasket. Slide the clamp assembly  
26 into position over the gasket. Tighten fasteners to manufacturers recommended  
27 torque.
- 28 3.7 MECHANICAL JOINT PIPE CONNECTIONS
- 29 A. Comply with AWWA C600/C605 installation requirements. Clean pipe end and  
30 socket. Clean and lubricate pipe end, socket and gasket with soapy water or  
31 gasket lubricant. Place gland and gasket, properly oriented, on pipe end. Insert  
32 pipe end fully into socket and press gasket evenly into recess keeping joint  
33 straight. Press gland evenly against gasket, insert bolts and hand tighten nuts.  
34 Make joint deflection prior to tightening bolts. Evenly tighten bolts in sequence  
35 to recommended torque.
- 36 3.8 PUSH-ON GASKETED PIPE CONNECTIONS
- 37 A. Clean pipe end, bell, gasket seat and gasket of dirt or debris. Coat end of pipe and  
38 gasket with gasket lubricant. Insure pipe is supported off the ground so lubricant  
39 does not pick up dirt. Push spigot end into gasket bell with levered pipe joining  
40 tool recommended by pipe manufacturer. Large diameter exterior mains may be  
41 joined by pushing end of pipe section with backhoe against wood blocking over  
42 pipe end. Insert to fully seated position or to reference mark on pipe.
- 43 3.9 MECHANICAL GROOVED PIPE CONNECTIONS

1 A. Use pipe factory grooved in accordance with the coupling manufacturer's  
 2 specifications or field grooved pipe in accordance with the same specifications  
 3 using specially designed tools specially designed for the application. Lubricate  
 4 pipe and coupling gasket, align pipe, and secure joint in accordance with the  
 5 coupling manufacturer's specifications.

6 3.10 MECHANICALLY FORMED TEE FITTINGS

7 A. The use of mechanically formed tee fittings is not permitted on this project.

8 3.11 SANITARY WASTE AND VENT

9 A. Verify existing invert elevations and building elevations prior to installation.  
 10 Install exterior piping pitched to drain at indicated elevations and slope. Install  
 11 interior piping pitched to drain at minimum slope of 1/4" per foot where possible  
 12 and in no case less than 1/8" per foot for piping 3" and larger.

13 B. Install exterior piping below predicted frost level and not less than 5' bury depth  
 14 to top of pipe wherever possible. Where piping is located above predicted frost  
 15 level, provide frost protection in accordance with COMM 82.30(11)(c).

16 C. Flush piping inlets (floor drains, hub drains, mop basins, fixtures, etc.) with high  
 17 flow of water at completion of project to demonstrate full flow capacity. Remove  
 18 blockages and make necessary repairs where flow is found to be impeded.

19 3.12 PIPING SYSTEM LEAK TESTS

20 A. Isolate or remove components from system which are not rated for test pressure.  
 21 Test piping in sections or entire system as required by sequence of construction.  
 22 Do not insulate or conceal pipe until it has been successfully tested.

23 B. If required for the additional pressure load under test, provide temporary  
 24 restraints at fittings or expansion joints.

25 C. For hydrostatic tests, use clean water and remove all air from the piping being  
 26 tested by means of air vents or loosening of flanges/unions. Measure and record  
 27 test pressure at the high point in the system.

28 D. Inspect system for leaks. Where leaks occur, repair the area with new materials  
 29 and repeat the test; caulking will not be acceptable.

30 E. Entire test must be witnessed by the Division's representative. All pressure tests  
 31 are to be documented on forms by contractor.

<u>System</u>	<u>Test Medium</u>	<u>Final Test Pressure</u>	<u>Duration</u>
Sanitary Waste and Vent	Water	10' water	2 hr

36 END OF SECTION

1	<u>System</u>	<u>Medium</u>	<u>Pressure</u>	
2	<u>Duration</u>			
3	Sanitary Waste and Vent	Water	10' water	2 hr
4				
5		END OF SECTION		



1 requirements, manufacturer's installation requirements, manufacturer's  
2 performance limitations, and appropriate identification.

3  
4 PART 2 - PRODUCTS

5 2.1 WATER HEATERS

6 A. ELECTRIC WATER HEATER

- 7 1. Manufacturers: A.O. Smith, American, Bradford White, Lochinvar,  
8 Rheem, Ruud, State, or engineer approved equal.
- 9 2. Type: Electric storage domestic water heater. Design to be UL listed with  
10 3 year commercial use tank warranty and 1 year parts warranty.
- |    |             |                        |                  |
|----|-------------|------------------------|------------------|
| 11 | Efficiency: | 20 gallons and <12 kW  | 0.94 Min. Energy |
| 12 | Factor      |                        |                  |
| 13 |             | >30 gallons and <12 kW | 0.93 Min. Energy |
| 14 |             | Factor                 |                  |
- 15 3. Tank: Steel glass lined tank rated for 150 psig complete with removable  
16 magnesium anode rod, plastic diffuser type dip tube, inlet and outlet heat  
17 trap fittings, minimum R-20 polyurethane foam insulation, painted steel  
18 jacket, drain valve and temperature and pressure relief valve sized per  
19 CSA rating.
- 20 4. Elements: Dual 4500 watt heating elements to be replaceable threaded  
21 low watt density incoloy sheath with adjustable thermostat control,  
22 energy cutoff and wired for non-simultaneous operation.

23 2.2 WATER SOFTENERS

- 24 A. Manufacturers: Amtrol, Capital, Custom Care, Hellenbrand, Water Right, or  
25 engineer approved equal.
- 26 B. Tanks: Fiberglass reinforced mineral tank constructed of molded high density  
27 polyethylene inner shell reinforced by exterior fiberglass winding and epoxy  
28 resin. NSF approved and rated for 150 psig. Mount slotted or lateral hub PVC  
29 distributor in tank with underbedding gravel.
- 30 C. Mineral: High capacity ion exchange mineral, FDA approved, Sybron/Ionac,  
31 Rohm & Haas, Resintech or Puralite. Uniform beads rated for removal of 30,000  
32 grains of hardness as calcium carbonate when regenerated with 15 lbs. of salt.  
33 Design for minimum 50% resin bed freeboard.
- 34 D. Valve: Top mount brass valve with motor drive, hydraulically balanced piston,  
35 seal and spacers, adjustable brine flow control, backwash flow control, adjustable  
36 capacity and regeneration settings. Provide bypass ball valve arrangement.
- 37 E. Controls: Factory wired and tested controls with transformer and labeled terminal  
38 block for single (**twin, twin alternating, triplex alternating**) consisting of the  
39 following:
- 40 1. Electronic Meter and 480 Microprocessor with LED Display for Delayed  
41 Regeneration.

- 1 F. Brine Tank: High density polyethylene brine tank with high salt platform, PVC  
 2 brine measuring and float valve, PVC injector. Contractor to provide initial salt  
 3 fill.
- 4 G. Ratings: Maximum 10 MG/L hardness leakage, 110°F maximum operating  
 5 temperature, 30-100 psig operating pressure, 120/60/1 electrical.
- 6 H. Accessories: Flexible braided stainless steel pipe connectors for tanks over  
 7 24" in diameter.
- 8 1. Inlet and outlet sampling valves, inlet and outlet pressure gauges with  
 9 shutoff valve.
- 10 2. Resin defoulant system with chemical metering pump, tubing and 4  
 11 month supply of
- 12 3. chemical cleaner for iron and bacteria fouling.

13 2.3 SUMPS

- 14 A. Fiberglass sump basin constructed of 25-30% fiberglass and 70-75% polyester  
 15 resin with no fillers; minimum design safety factor of four; complete with tapped  
 16 top flange; side hub fittings; bolted galvanized steel or aluminum gasketed cover  
 17 with inspection access plate, access plate with discharge pipe flange for each  
 18 pump and control and vent flange where required. Minimum sump wall thickness  
 19 as follows:

	Wall Thickness (Inches)						
Diameter	24	30	36	42	48	60	72
Max. 10' Depth	3/16	1/4	1/4	1/4	5/16	5/16	3/8
Max. 15' Depth	1/4	5/16	5/16	5/16	3/8	3/8	7/16
Max. 20' Depth	5/16	5/16	3/8	3/8	7/16	1/2	1/2

- 25 B. Precast reinforced concrete manhole sections, ASTM C478. Construct base of 6"  
 26 thick precast reinforced concrete or 8" thick cast in place concrete. Construct top  
 27 of precast reinforced concrete or 6" thick reinforced concrete slab. Seal between  
 28 sections with rubber ring gaskets, ASTM C443, or plastic preformed gasket  
 29 material. Seal pipe penetrations with flexible watertight rubber gasketed seals.  
 30 Provide bolted galvanized steel or aluminum gasketed cover with inspection  
 31 access plate, access plate with discharge pipe flange for each pump and control  
 32 and vent flange where required.

33 2.4 PUMPS

34 A. SUMP PUMPS/SEWAGE EJECTORS

- 35 1. Manufacturer: Hydromatic, Weil, Zoeller, or engineer approved equal.
- 36 2. Type: Submersible pumps constructed of epoxy coated cast iron shell,  
 37 cast iron volute, two vane enclosed non-clog cast iron, bronze or  
 38 thermoplastic impeller, stainless steel shaft, stainless steel fasteners,  
 39 upper and lower ball bearings, oil lubricated or factory sealed grease  
 40 lubricated, and ceramic mechanical seal.
- 41 3. Motor: Hermetically sealed, capacitor start, with built-in thermal  
 42 overload protection sized for non-overloading over the entire pump  
 43 curve.





- 1 d. Type: Two Piece.
- 2 e. Style: Trip lever.
- 3 f. Height: Comfort Height.
- 4 g. Rim Contour: Elongated.
- 5 h. Water Consumption: 1.6 gal. per flush.
- 6 i. Spud Size and Location: NPS 1-1/2 (DN 40); top.
- 7
- 8 3. Toilet Seat Model Number: K-4650-0.
- 9 4. Support:
  - 10 a. Standard: ASME A112.6.1M.
  - 11 b. Description: Waste-fitting assembly as required to match drainage piping material
  - 12 and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware
  - 13 matching fixture.
  - 14 c. Water-Closet Mounting Height: Standard, Handicapped/elderly.

## 15 PART 3 - EXECUTION

### 16 3.1 EXAMINATION

- 17 A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify
- 18 actual locations of piping connections before water-closet installation.
- 19 B. Examine walls and floors for suitable conditions where water closets will be installed.
- 20 C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 21 3.2 INSTALLATION

- 22 A. Water-Closet Installation:
  - 23 1. Install level and plumb according to roughing-in drawings.
  - 24 2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to
  - 25 piping or building substrate.
  - 26 B. Install toilet seats and trip levers on water closets.
  - 27 C. Wall Flange and Escutcheon Installation:
    - 28 1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished
    - 29 locations and within cabinets and millwork.
    - 30 2. Install deep-pattern escutcheons if required to conceal protruding fittings.
  - 31 D. Joint Sealing:
    - 32 1. Seal joints between water closets and walls and floors using sanitary-type, one-part,
    - 33 mildew-resistant silicone sealant.
    - 34 2. Match sealant color to water-closet color.
    - 35 3. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

1 3.3 CONNECTIONS

2 A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings  
3 required to match water closets.

4 B. Where installing piping adjacent to water closets, allow space for service and maintenance.

5 3.4 ADJUSTING

6 A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water  
7 closets, fittings, and controls.

8 3.5 CLEANING AND PROTECTION

9 A. Clean water closets and fittings with manufacturers' recommended cleaning methods and  
10 materials.

11 B. Install protective covering for installed water closets and fittings.

12 C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

13 **END OF SECTION**

14 \*\*\*

1 **SECTION 22 42 16**

2 **COMMERCIAL LAVATORIES**

3 **PART 1 - GENERAL**

4 1.1 **SUMMARY**

5 A. Section Includes:

- 6 1. Lavatories.  
7 2. Faucets.

8 1.2 **SUBMITTALS**

9 A. Product Data: For each type of product.

10 B. LEED Submittals:

- 11 1. Product Data for Prerequisite WE 1: Documentation indicating flow and water  
12 consumption requirements.  
13 2. Product Data for Prerequisite WE 1: Documentation indicating flow and water  
14 consumption requirements.  
15 3. Product Data for Prerequisite WE 1 and Credit WE 2: Documentation indicating flow and  
16 water consumption requirements.

17 C. Operation and Maintenance Data: For lavatories and faucets to include in operation and  
18 maintenance manuals.

19 **PART 2 - PRODUCTS**

20 2.1 **VITREOUS-CHINA, WALL-MOUNTED LAVATORIES**

21 A. Lavatory: Vitreous china, wall mounted, with back.

- 22 1. Product: Subject to compliance with requirements, provide products by one of the  
23 following:  
24 a. Kohler (Basis of Design)  
25 b. American Standard America.  
26 c. Crane Plumbing, L.L.C.
- 27 2. Fixture: Kohler; SOHO, K-2053-0
- 28 a. Standard: ASME A112.19.2/CSA B45.1.  
29 b. Type: For wall hanging.  
30 c. Nominal Size: 20 by 18 inches.  
31 d. Faucet-Hole Punching: Three holes, 2-inch (51-mm) centers.  
32 e. Faucet-Hole Location: Top.  
33 f. Color: White.  
34 g. Mounting Material: Chair carrier.

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3. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.

2.2 MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: ADA Compliant Manual-type, single-control mixing, commercial, solid-brass valve.
  - 1. Product: Subject to compliance with requirements, provide products by one of the following:
    - a. Kohler (Basis of Design)
    - b. American Standard America.
    - c. Grohe America, Inc.
    - d. Speakman Company.
  - 2. Standard: ASME A112.18.1/CSA B125.1. Kohler; July K-98146-4-CP.
  - 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
  - 4. Body Type: Centerset.
  - 5. Body Material: Commercial, solid brass.
  - 6. Finish: Polished chrome plate.
  - 7. Maximum Flow Rate: 1.5 gpm (1.5 L/min.).
  - 8. Mounting Type: Deck, concealed.
  - 9. Valve Handle(s): Single lever.
  - 10. Spout: Rigid type.
  - 11. Spout Outlet: Aerator.
  - 12. Operation: Compression, manual.
  - 13. Drain: Not part of faucet.

2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
  - 1. NPS 3/8 (DN 10).
  - 2. Chrome-plated, soft-copper flexible tube riser.

1 2.4 WASTE FITTINGS

2 A. Standard: ASME A112.18.2/CSA B125.2.

3 B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.

4 C. Trap:

5 1. Size: NPS 1-1/2 by NPS 1-1/4 (DN 40 by DN 32).

6 2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-  
7 (0.83-mm-) thick brass tube to wall; and chrome-plated, brass or steel wall flange.

8 3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-)  
9 thick stainless-steel tube to wall; and stainless-steel wall flange.

10 PART 3 - EXECUTION

11 3.1 EXAMINATION

12 A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify  
13 actual locations of piping connections before lavatory installation.

14 B. Examine counters and walls for suitable conditions where lavatories will be installed.

15 C. Proceed with installation only after unsatisfactory conditions have been corrected.

16 3.2 INSTALLATION

17 A. Install lavatories level and plumb according to roughing-in drawings.

18 B. Install supports, affixed to building substrate, for wall-mounted lavatories.

19 C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people  
20 with disabilities or the elderly, according to ICC/ANSI A117.1.

21 D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.  
22 Use deep-pattern escutcheons if required to conceal protruding fittings.

23 E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-  
24 resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements  
25 specified in Section 07 92 00 "Joint Sealants."

26 F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of  
27 accessible lavatories.

28 3.3 CONNECTIONS

29 A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent  
30 piping. Use size fittings required to match fixtures.

31 B. Comply with water piping requirements.

1 C. Comply with soil and waste piping requirements.

2 3.4 ADJUSTING

3 A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories,  
4 fittings, and controls.

5 B. Adjust water pressure at faucets to produce proper flow.

6 3.5 CLEANING AND PROTECTION

7 A. After completing installation of lavatories, inspect and repair damaged finishes.

8 B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods  
9 and materials.

10 C. Provide protective covering for installed lavatories and fittings.

11 D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

12 **END OF SECTION**

13 \*\*\*



1 2.2 SINK FAUCETS

2 A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health  
3 Effects," for faucet-spout materials that will be in contact with potable water.

4 B. Sink Faucets: Manual type, two-lever-handle mixing valve.

5 1. Commercial, Solid-Brass Faucets:

6 a. Manufacturers: Subject to compliance with requirements, provide products by one  
7 of the following:

8 1) American Standard America.

9 2) Chicago Faucets.

10 3) Kohler Co.

11 4) Moen Incorporated.

12 5) Speakman Company.

13 2. Standard: ASME A112.18.1/CSA B125.1.

14 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies  
15 and fixture hole punchings; coordinate outlet with spout and sink receptor.

16 4. Body Type: Widespread.

17 5. Body Material: Copper or brass underbody.

18 6. Finish: Polished chrome plate.

19 2.3 SUPPLY FITTINGS

20 A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health  
21 Effects," for supply-fitting materials that will be in contact with potable water.

22 B. Standard: ASME A112.18.1/CSA B125.1.

23 C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply  
24 piping size. Include chrome-plated brass or stainless-steel wall flange.

25 D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet  
26 connection matching supply piping.

27 E. Operation: Loose key.

28 F. Risers:

29 1. NPS 3/8 (DN 10)

30 2.4 WASTE FITTINGS

31 A. Standard: ASME A112.18.2/CSA B125.2.

32 B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

33 C. Trap:

34 1. Size: NPS 1-1/2 (DN 40).

- 1           2.    Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-
- 2                   (0.83-mm-) thick brass tube to wall; and chrome-plated brass or steel wall flange.
- 3           3.    Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-)
- 4                   thick stainless-steel tube to wall; and stainless-steel wall flange.

## 5   PART 3 - EXECUTION

### 6   3.1    EXAMINATION

- 7        A.    Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify
- 8                   actual locations of piping connections before sink installation.
- 9        B.    Examine walls and floors for suitable conditions where sinks will be installed.
- 10       C.    Proceed with installation only after unsatisfactory conditions have been corrected.

### 11   3.2    INSTALLATION

- 12       A.    Install sinks level and plumb according to roughing-in drawings.
- 13       B.    Set floor-mounted sinks in leveling bed of cement grout.
- 14       C.    Install water-supply piping with stop on each supply to each sink faucet.
  - 15           1.    Exception: Use ball or gate valves if supply stops are not specified with sink. Comply
  - 16                   with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing
  - 17                   Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."
  - 18           2.    Install stops in locations where they can be easily reached for operation.
- 19       D.    Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
- 20                   Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with
- 21                   escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- 22       E.    Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-
- 23                   resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements
- 24                   specified in Section 079200 "Joint Sealants."
- 25       F.    Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of
- 26                   accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

### 27   3.3    CONNECTIONS

- 28       A.    Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping.
- 29                   Use size fittings required to match fixtures.
- 30       B.    Comply with water piping requirements.
- 31       C.    Comply with soil and waste piping requirements.-

1 3.4 ADJUSTING

2 A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and  
3 controls.

4 B. Adjust water pressure at faucets to produce proper flow.

5 3.5 CLEANING AND PROTECTION

6 A. After completing installation of sinks, inspect and repair damaged finishes.

7 B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and  
8 materials.

9 C. Provide protective covering for installed sinks and fittings.

10 D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

11 **END OF SECTION**

12 \*\*\*

1 **SECTION 23 05 00**  
2 **COMMON WORK RESULTS FOR HVAC**

3 **PART 1 GENERAL**

4 1.1 SCOPE

5 A. This section includes information common to two or more technical specification  
6 sections or items that are of a general nature, not conveniently fitting into other  
7 technical sections. Included are the following topics:

8 B. PART 1 - GENERAL

- 9 1. Scope
- 10 2. Related Work
- 11 3. Reference
- 12 4. Reference Standards
- 13 5. Quality Assurance
- 14 6. Continuity of Existing Services
- 15 7. Protection of Finished Surfaces
- 16 8. Sleeves and Openings
- 17 9. Sealing and Firestopping
- 18 10. Equipment Furnished By Others
- 19 11. Provisions for Future
- 20 12. Submittals
- 21 13. Operating and Maintenance Data
- 22 14. Off Site Storage
- 23 15. Request and Certification for Payment
- 24 16. Certificates and Inspections
- 25 17. Operating and Maintenance Instructions
- 26 18. Training of Owner Personnel
- 27 19. Record Drawings

28 C. PART 2 - PRODUCTS

- 29 1. Access Panels and Doors
- 30 2. Sealing and Firestopping

31 D. PART 3 - EXECUTION

- 32 1. Cutting and Patching
- 33 2. Building Access
- 34 3. Equipment Access
- 35 4. Coordination
- 36 5. Identification
- 37 6. Lubrication
- 38 7. Sleeves
- 39 8. Sealing and Firestopping

40 1.2 RELATED WORK

- 41 A. Section 23 05 13 - Common Motor Requirements for HVAC.
- 42 B. Section 23 33 00 - Air Duct Accessories.

43 1.3 REFERENCE

- 44 A. Applicable provisions of Division 1 govern work under this section.

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1.4 REFERENCE STANDARDS

- A. Abbreviations of standards organizations referenced in other sections are as follows:
- 1. AABC Associated Air Balance Council
  - 2. ABMA American Boiler Manufacturers Association
  - 3. ADC Air Diffusion Council
  - 4. AGA American Gas Association
  - 5. AMCA Air Movement and Control Association
  - 6. ANSI American National Standards Institute
  - 7. ARI Air-Conditioning and Refrigeration Institute
  - 8. ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
  - 9. ASME American Society of Mechanical Engineers
  - 10. ASTM American Society for Testing and Materials
  - 11. AWWA American Water Works Association
  - 12. AWS American Welding Society
  - 13. CGA Compressed Gas Association
  - 14. CTI Cooling Tower Institute
  - 15. EPA Environmental Protection Agency
  - 16. GAMA Gas Appliance Manufacturers Association
  - 17. IEEE Institute of Electrical and Electronics Engineers
  - 18. ISA Instrument Society of America
  - 19. MCA Mechanical Contractors Association
  - 20. MICA Midwest Insulation Contractors Association
  - 21. MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
  - 22. NBS National Bureau of Standards
  - 23. NEBB National Environmental Balancing Bureau
  - 24. NEC National Electric Code
  - 25. NEMA National Electrical Manufacturers Association
  - 26. NFPA National Fire Protection Association
  - 27. SMACNA Sheet Metal and Air Conditioning Contractors' National Association, Inc.
  - 28. UL Underwriters Laboratories Inc.
  - 29. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
  - 30. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
  - 31. UL1479 Fire Tests of Through-Penetration Firestops
  - 32. UL723 Surface Burning Characteristics of Building Materials

1.5 QUALITY ASSURANCE

- A. Refer to Division 1, General Conditions, Equals and Substitutions.
- B. The use of a manufacturer's name, model, or catalog number, as scheduled or specified, is for the purpose of establishing the standard of quality and general configuration. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all

- 1 costs involved in integrating the equipment or accessories into the system and for  
2 obtaining the performance from the system into which these items are placed.  
3 Said costs may include, but are not limited to, modifications for:
- 4 a) Structural loading.
  - 5 b) Size.
  - 6 c) Maintenance accessibility.
  - 7 d) Electrical or plumbing connections.
  - 8 e) Finish.
  - 9 f) Performance and efficiency.
  - 10 g) Warranty.
  - 11 h) Changes found necessary during the testing, adjusting, and  
12 balancing phase of the project.
- 13 1.6 CONTINUITY OF EXISTING SERVICES
- 14 A. Do not interrupt or change existing services without prior written approval from  
15 the Project Representative. When interruption is required, coordinate the  
16 down-time with the Owner to minimize disruption to their activities. Unless  
17 specifically stated, all work involved in interrupting or changing existing services  
18 is to be done during normal working hours.
- 19 1.7 PROTECTION OF FINISHED SURFACES
- 20 A. Refer to Division 1, General Requirements, Protection of Finished Surfaces.
  - 21 B. Furnish one can of touch-up paint for each different color factory finish which is  
22 to be the final finished surface of the product. Deliver touch-up paint with other  
23 "loose and detachable parts" as covered in the General Requirements.
- 24 1.8 SLEEVES AND OPENINGS
- 25 A. Refer to Division 1, General Requirements, Sleeves and Openings.
- 26 1.9 SEALING AND FIRESTOPPING
- 27 A. Sealing and firestopping of sleeves/openings between ductwork, piping, etc. and  
28 the sleeve, structural or partition opening shall be the responsibility of the  
29 contractor whose work penetrates the opening. The contractor responsible shall  
30 hire individuals skilled in such work to do the sealing and fireproofing. These  
31 individuals hired shall normally and routinely be employed in the sealing and  
32 fireproofing occupation.
- 33 1.10 EQUIPMENT FURNISHED BY OTHERS
- 34 A. None
- 35 1.11 PROVISIONS FOR FUTURE
- 36 A. None
- 37 1.12 SUBMITTALS
- 38 A. Submit for all equipment and systems as indicated in the respective specification  
39 sections, marking each submittal with that specification section number. Mark  
40 general catalog sheets and drawings to indicate specific items being submitted  
41 and proper identification of equipment by name and/or number, as indicated in  
42 the contract documents.

- 1 B. Before submitting electrically powered equipment, verify that the electrical
- 2 power and control requirements for the equipment are in agreement with the
- 3 motor starter schedule on the electrical drawings. Include a statement on the
- 4 shop drawing transmittal to the architect/engineer that the equipment submitted
- 5 and the motor starter schedule are in agreement or indicate any discrepancies.
- 6 C. Include wiring diagrams of electrically powered equipment.
- 7 D. Submit sufficient quantities of shop drawings to allow the following distribution:
- 8 1. Operating and Maintenance Manuals 2 copies
- 9 2. Testing, Adjusting and Balancing Contractor 1 copy
- 10 3. A/E 1 copy

11 1.13 OPERATION AND MAINTENANCE DATA

- 12 A. All operations and maintenance data shall comply with the submission and
- 13 content requirements specified under section GENERAL REQUIREMENTS.

14 1.14 OFF SITE STORAGE

- 15 A. Prior approval by the project representative and the A/E will be needed.
- 16 B. Generally, ductwork, metal for making ductwork, duct lining, sleeves, pipe/pipe
- 17 fittings and similar rough-in material will not be accepted for off site storage.
- 18 For material that can be stored off site, no material will be accepted for off site
- 19 storage unless shop drawings for that material have been approved.

20 1.15 REQUEST AND CERTIFICATION FOR PAYMENT

- 21 A. Within 10 days after Notice to Proceed, the successful bidder will submit to the
- 22 Project Representative in a form prescribed below and by the General Conditions
- 23 of the Contract - Scheduling and Coordination of Work, Reports, Records and
- 24 Data, Payments to Contractor, a cost breakdown of the proposed values for work
- 25 performed which, if approved by the owner's representative, will become the
- 26 basis for construction progress and monthly payments. The cost breakdown
- 27 items shall reflect actual work progress stages as closely as feasible.
- 28 B. In addition, if payment is requested for approved off-site stored material, then
- 29 that material shall be listed as a line item in the request and certification for
- 30 payment cost breakdown.

31 1.16 CERTIFICATES AND INSPECTIONS

- 32 A. Refer also to Division 1, General Conditions, Permits, Regulations, Utilities and
- 33 Taxes.
- 34 B. Obtain and pay for all required State installation inspections except those
- 35 provided by the Architect/Engineer in accordance with WI Administrative Code.
- 36 Deliver originals of these certificates to the A/E. Include copies of the
- 37 certificates in the Operating and Maintenance Instructions.

38 1.17 OPERATING AND MAINTENANCE INSTRUCTIONS

- 39 A. Refer to Division 1, General Requirements, Operating and Maintenance
- 40 Instructions.

- 1 B. Assemble material in binders, using an index at the front of each volume and tabs  
2 for each system or type of equipment. In addition to the data indicated in the  
3 General Requirements, include the following information:
- 4 1. Copies of all approved shop drawings.
  - 5 2. Manufacturer's wiring diagrams for electrically powered equipment
  - 6 3. Records of tests performed to certify compliance with system  
7 requirements
  - 8 4. Certificates of inspection by regulatory agencies
  - 9 5. Temperature control record drawings and control sequences
  - 10 6. Parts lists for manufactured equipment
  - 11 7. Lubrication instructions, including list/frequency of lubrication done  
12 during construction
  - 13 8. Warranties
  - 14 9. Additional information as indicated in the technical specification sections

15 1.18 TRAINING OF OWNER PERSONNEL

- 16 A. Instruct the Owner's personnel in the proper operation and maintenance of  
17 systems and equipment provided as part of this project; video tape all training  
18 sessions. Include not less than \_\_1\_\_ hours of instruction, using the Operating  
19 and Maintenance manuals during this instruction. Demonstrate startup and  
20 shutdown procedures for all equipment. All training to be during normal  
21 working hours.

22 1.19 RECORD DRAWINGS

23 Refer to Division 1, General Requirements, Record Drawings.

- 24 A. Refer to Division 1, General Requirements, Record Drawings. In addition,  
25 submit all record drawings in AutoCAD v. 2000 electronic format and one hard  
26 copy for engineer's review. Contractor to include all addendums, RFIs,  
27 construction bulletins, and any modifications made in the field. Contractor to  
28 make revisions to Record Documents based on Engineer's comments and  
29 resubmit electronic files and hard copies in accordance with the General  
30 Requirements.
- 31 B. In addition to the data indicated in the General Requirements, maintain  
32 temperature control record drawings on originals prepared by the installing  
33 contractor/subcontractor. Include copies of these record drawings with the  
34 Operating and Maintenance Manuals.

PART 2 PRODUCTS

36 2.1 ACCESS PANELS AND DOORS

- 37 A. LAY-IN CEILINGS:
- 38 1. Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration  
39 provided under Section 09500 are sufficient; no additional access  
40 provisions are required unless specifically indicated.
- 41 B. CONCEALED SPLINE CEILINGS:
- 42 1. Removable sections of ceiling tile held in position with metal slats or  
43 tabs compatible with the ceiling system used will be provided under  
44 Section 09500.
- 45 C. METAL PAN CEILINGS:

- 1           1.       Removable sections of ceiling tile held in position by a pressure fit will  
2           be provided under Section 09500.

3           D.       PLASTER WALLS AND CEILINGS:

- 4           1.       16 gauge frame with not less than a 20 gauge hinged door panel, prime  
5           coated steel for general applications, stainless steel for use in toilets,  
6           showers, and similar wet areas, concealed hinges, screwdriver operated  
7           cam latch for general applications, key lock for use in public areas, UL  
8           listed for use in fire rated partitions if required by the application. Use  
9           the largest size access opening possible, consistent with the space and the  
10          equipment needing service; minimum size is 12" by 12".

11       2.2    SEALING AND FIRESTOPPING

12          A.       FIRE AND/OR SMOKE RATED PENETRATIONS:

13           1.       Manufacturers:

- 14           a)       3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or approved  
15           equal.  
16           b)       All firestopping systems shall be provided by the same  
17           manufacturer.

18           2.       Submittals:

- 19           a)       Contractor shall submit product data for each firestop system.  
20           Submittals shall include product characteristics, performance and  
21           limitation criteria, test data, MSDS sheets, installation details and  
22           procedures for each method of installation applicable to this  
23           project. For non-standard conditions where no UL tested system  
24           exists, submit manufacturer's drawings for UL system with  
25           known performance for which an engineering judgment can be  
26           based upon.

27           3.       Product:

- 28           a)       Fire stop systems shall be UL listed or tested by an independent  
29           testing laboratory approved by the Department of Commerce.  
30           b)       Use a product that has a rating not less than the rating of the wall  
31           or floor being penetrated. Reference architectural drawings for  
32           identification of fire and/or smoke rated walls and floors.  
33           c)       Contractor shall use firestop putty, caulk sealant, intumescent  
34           wrapstrips, intumescent firestop collars, firestop blocks, firestop  
35           mortar or a combination of these products to provide a UL listed  
36           system for each application required for this project. Provide  
37           mineral wool backing where specified in manufacturer's  
38           application detail.

39          B.       NON-RATED PENETRATIONS:

40           1.       Duct Penetrations:

- 41           a)       Annular space between duct (with or without insulation) and the  
42           non-rated partition or floor opening shall not be larger than 2".  
43           Where existing openings have an annular space larger than 2",  
44           the space shall be patched to match existing construction to  
45           within 2" around the duct.

1                   2.       Where shown or specified, pack annular space with fiberglass batt  
2                   insulation or mineral wool insulation.     Provide 4" sheet metal  
3                   escutcheon around duct on both sides of partition or floor to cover  
4                   annular space.

5

6     PART 3 EXECUTION

7     3.1     CUTTING AND PATCHING

8             A.       Refer to Division 1, General Requirements, Cutting and Patching.

9     3.2     BUILDING ACCESS

10            A.       Arrange for the necessary openings in the building to allow for admittance of all  
11            apparatus. When the building access was not previously arranged and must be  
12            provided by this contractor, restore any opening to its original condition after the  
13            apparatus has been brought into the building.

14    3.3     EQUIPMENT ACCESS

15            A.       Install all ductwork, and accessories to permit access to equipment for  
16            maintenance and service. Coordinate the exact location of wall and ceiling  
17            access panels and doors with the General Contractor, making sure that access is  
18            available for all equipment and specialties. Access doors in general construction  
19            are to be furnished by the Mechanical Contractor and installed by the General  
20            Contractor.

21    3.4     COORDINATION

22            A.       Verify that all devices are compatible for the surfaces on which they will be used.  
23            This includes, but is not limited to, diffusers, register, grilles, and recessed or  
24            semi-recessed heating and/or cooling terminal units installed in/on architectural  
25            surfaces.

26            B.       Coordinate all work with other contractors prior to installation. Any installed  
27            work that is not coordinated and that interferes with other contractor's work shall  
28            be removed or relocated at the installing contractor's expense.

29    3.5     IDENTIFICATION

30            A.       Identify equipment in mechanical equipment rooms by stenciling equipment  
31            number and service with one coat of black enamel against a light background or  
32            white enamel against a dark background. Use a primer where necessary for  
33            proper paint adhesion. Do not label equipment such electric wall heaters in  
34            occupied spaces.

35    3.6     LUBRICATION

36            A.       Lubricate all bearings with lubricant as recommended by the manufacturer before  
37            the equipment is operated for any reason. Once the equipment has been run,  
38            maintain lubrication in accordance with the manufacturer's instructions until the  
39            work is accepted by the owner's representative. Maintain a log of all lubricants  
40            used and frequency of lubrication; include this information in the Operating and  
41            Maintenance Manuals at the completion of the project.

42    3.7     DUCT SLEEVES:

43            1.       Duct sleeves are not required in non-rated partitions or floors.



**SECTION 23 05 93**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL**

**1.1 SCOPE**

A. This section includes air testing, adjusting and balancing for the entire project. Included are the following topics:

B. PART 1 - GENERAL

1. Scope
2. Qualifications
3. Reference
4. Reference Standards
5. Description
6. Quality Assurance
7. Pre-Installation Meeting and Scheduling
8. Pre-Balance Conference
9. Submittals

C. PART 2 - PRODUCTS

1. Instrumentation

D. PART 3 - EXECUTION

1. Preliminary Procedures
2. Existing Equipment
3. Performing Testing, Adjusting and Balancing
4. Deficiencies

**1.2 QUALIFICATIONS**

A. The Mechanical Contractor may not complete TAB work; rather the Mechanical Contractor must hire and pay for an independent TAB Contractor for all TAB work.

B. TAB Contractor must have been regularly employed in the TAB field for a minimum of 5 years and demonstrate that they are completely familiar with the referenced standards in this section.

**1.3 REFERENCE**

A. Applicable provisions of the General Conditions, Supplementary General Conditions and General Requirements in Division 1 govern work under this section.

**1.4 REFERENCE STANDARDS**

A. AABC National Standards for Total System Balance, Sixth Edition, 2002.

B. ASHRAE ASHRAE Handbook, 2007 HVAC Applications, Chapter 37, Testing Adjusting and Balancing.

C. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, Seventh Edition, 2005.

**1.5 DESCRIPTION**

A. The Contractor will separately contract with an independent test and balance agency to perform all testing, adjusting, and balancing of air and hydronic systems required for this project. Work related to the testing, adjusting, and balancing that must be

- 1 performed by the installing mechanical contractor is specified in other section of these  
2 specifications.
- 3 B. Provide total mechanical systems testing, adjusting and balancing. Requirements  
4 include the balance of air distribution, adjustment of new and existing systems and  
5 equipment to provide design requirements indicated on the drawings, electrical  
6 measurement and verification of performance of all mechanical equipment, all in  
7 accordance with standards published by AABC or NEBB.
- 8 C. Test, adjust and balance all air and hydronic systems so that each room, piece of  
9 equipment or terminal device meets the design requirements indicated on the drawings  
10 and in the specifications.
- 11 D. Accomplish testing, adjusting and balancing work in a timely manner that allows  
12 partial occupancy of major buildings, occupancy of one building when the project  
13 involves many buildings, and completion of the entire project in the time stated in the  
14 Instruction to Bidders and in accordance with the completion schedule established for  
15 this project.
- 16 E. Verify that provisions are being made to accomplish the specified testing, adjusting  
17 and balancing work. If problems are found, handle as specified in Part 3 under  
18 Deficiencies.

19 1.6 QUALITY ASSURANCE

- 20 A. An independent Firm specializing in the Testing and Balancing of HVAC systems for  
21 a minimum of 3 years. A Firm not engaged in the commerce of furnishing or  
22 providing equipment or material generally related to HVAC work other than that  
23 specifically related to installing Testing and Balancing components necessary for  
24 work in this section such as, but not limited to sheaves, pulleys, and balancing  
25 dampers.
- 26 B. A certified member of AABC or certified by NEBB in the specific area of work  
27 performed. Maintain certification for the entire duration of the project. If certification  
28 of firm or any staff performing work is terminated or expires during the duration of  
29 the project, contact the A/E immediately.
- 30 C. Technicians on this project must have satisfactorily completed work on a minimum of  
31 (3) three projects of at least 50% in size, and of similar complexity.
- 32 D. Submit Qualifications of firm and project staff to A/E upon requested.

33 1.7 SUBMITTALS

- 34 A. See also Related Work in this section.
- 35 B. Submit testing, adjusting and balancing reports bearing the seal and signature of the  
36 NEBB or AABC Certified Test and Balance Supervisor. The reports certify that the  
37 systems have been tested, adjusted and balanced in accordance with the referenced  
38 standards; are an accurate representation of how the systems have been installed and  
39 are operating; and are an accurate record of all final quantities measured to establish  
40 normal operating values of the systems.
- 41 C. Submit eight (8) complete sets of reports. If information is incomplete or further  
42 testing, adjusting and balancing is deemed necessary, resubmit seven (7) final  
43 complete sets.
- 44 D. Bind report forms in three-ring binders or portfolio binders. Label edge or front with  
45 label identifying project name, project number and descriptive title of contents.

1 Divide the contents of the report into the below listed divisions, separated by divider  
2 tabs:

- 3 1. General Information
- 4 2. Summary
- 5 3. Air Systems

6 E. Provide the following minimum information, forms and data:

- 7 1. General Information: Inside cover sheet identifying Test and Balance Agency,  
8 Contractor, Architect, Engineer, Project Name and Project Number. Include  
9 addresses, contact names and telephone numbers. Also include a certification  
10 sheet containing the seal and signature of the Test and Balance Supervisor.
- 11 2. Summary: Provide summary sheet describing mechanical system  
12 deficiencies. Describe objectionable noise or drafts found during testing,  
13 adjusting and balancing. Provide recommendations for correcting  
14 unsatisfactory performances and indicate whether modifications required are  
15 within the scope of the contract, are design related or installation related. List  
16 instrumentation used during testing, adjusting and balancing procedures.
- 17 3. The remainder of the report to contain the appropriate standard NEBB or  
18 AABC forms for each respective item and system. Fill out forms completely.  
19 Where information cannot be obtained or is not applicable indicate same.

## 20 PART 2 PRODUCTS

### 21 2.1 INSTRUMENTATION

- 22 A. Provide all required instrumentation to obtain proper measurements. Application of  
23 instruments and accuracy of instruments and measurements to be in accordance with  
24 the requirements of NEBB or AABC Standards and instrument manufacturer's  
25 specifications.
- 26 B. All instruments used for measurements shall be accurate, and calibration histories for  
27 each instrument to be available for examination by the A/E upon request. Calibration  
28 and maintenance of all instruments to be in accordance with the requirements of  
29 NEBB or AABC Standards

## 30 PART 3 EXECUTION

### 31 3.1 PRELIMINARY PROCEDURES

- 32 A. Review preconstruction meeting report, applicable construction bulletins, applicable  
33 change orders and approved shop drawings of equipment, outlets/inlets and  
34 temperature controls.
- 35 B. Check filters for cleanliness, dampers and valves for correct positioning, equipment  
36 for proper rotation and belt tension, temperature controls for completion of installation  
37 and hydronic systems for proper charge and purging of air.
- 38 C. Notify the A/E's Project Representative on a daily basis during balancing. Identify  
39 deficiencies preventing completion of testing, adjusting and balancing procedures. Do  
40 not proceed until systems are fully operational with all components necessary for  
41 complete testing, adjusting and balancing. Installing Contractors are required to  
42 provide personnel to check and verify system completion, readiness for balancing and  
43 assist Balancing Agency in providing specified system performance.

### 44 3.2 EXISTING EQUIPMENT

- 1 A. Trane XV90 furnace.
- 2 3.3 PERFORMING TESTING, ADJUSTING AND BALANCING
- 3 A. Perform testing, adjusting and balancing procedures on each system identified, in  
4 accordance with the detailed procedures outlined in the referenced standards except as  
5 may be modified below.
- 6 B. Unless specifically instructed in writing, all work in this specification section is to be  
7 performed during the normal workday.
- 8 C. In areas containing ceilings, remove ceiling tile to accomplish balancing work; replace  
9 tile when work is complete and provide new tile for any tile that are damaged by this  
10 procedure. If the ceiling construction is such that access panels are required for the  
11 work of this section and the panels have not been provided, inform the owner's project  
12 representative.
- 13 D. Cut insulation, ductwork for installation of test probes to the minimum extent  
14 necessary for adequate performance of procedures. Patch using materials identical to  
15 those removed, maintaining vapor barrier integrity and pressure rating of systems.
- 16 E. In air systems employing filters, blank off sufficient filter area to simulate a pressure  
17 drop that is midway between that of a clean filter and that of a dirty filter.
- 18 F. Measure and record system measurements at the fan to determine total flow. Adjust  
19 equipment as required to yield specified total flow at terminals. Proceed taking  
20 measurements in mains and branches as required for final terminal balancing.  
21 Perform terminal balancing to specified flows balancing branch dampers, deflectors,  
22 extractors and valves prior to adjustment of terminals.
- 23 G. Measure and record static air pressure conditions across fans, coils and filters.  
24 Indicate in report if cooling coil measurements were made on a wet or dry coil and if  
25 filter measurements were made on a clean or dirty filter. Spot check static air pressure  
26 conditions directly ahead of terminal units.
- 27 H. Adjust outside air, and return air dampers for design conditions at both the minimum  
28 and maximum settings and record both sets of data.
- 29 I. Adjust register, grille and diffuser vanes and accessories to achieve proper air  
30 distribution patterns and uniform space temperatures free from objectionable noise  
31 and drafts within the capabilities of the installed system.
- 32 J. Provide fan and motor drive sheave adjustments necessary to obtain design  
33 performance. Provide drive changes specifically noted on drawings, if any. If work  
34 of this section indicates that any drive or motor is inadequate for the application,  
35 advise the owner's project representative by giving the representative properly sized  
36 motor/drive information (in accordance with manufacturers original service factor and  
37 installed motor horsepower requirements); Confirm that any changes will keep the  
38 duct system within its design limitations with respect to speed of the device and  
39 pressure classification of the distribution system. Required motor/drive changes not  
40 specifically noted on drawings or in specifications will be considered an extra cost and  
41 will require an itemized cost breakdown submitted to owner's project representative.  
42 Prior authorization is needed before this work is started.
- 43 K. Final air system measurements to be within the following range of specified cfm:
- |   |            |
|---|------------|
| 44 Fans                                 | 0% to +10% |
| 45 Supply grilles, registers, diffusers | 0% to +10% |



**SECTION 23 31 00**  
**HVAC DUCTS and CASINGS**

- 1  
2
- 3    1.1    PART 1 - GENERAL
- 4            A.     SCOPE
- 5            B.     This section includes specifications for all duct systems used on this project.  
6                 Included are the following topics:
- 7            C.     PART 1 - GENERAL
- 8                 1.     Scope
- 9                 2.     Related Work
- 10                3.     Reference
- 11                4.     Reference Standards
- 12                5.     Quality Assurance
- 13                6.     Shop Drawings
- 14                7.     Design Criteria
- 15                8.     Delivery, Storage and Handling
- 16            D.     PART 2 - PRODUCTS
- 17                1.     General
- 18                2.     Ductwork Pressure Class
- 19                3.     Materials
- 20                4.     Low Pressure Ductwork (Maximum 2 inch pressure class)
- 21                5.     Duct Sealant
- 22            E.     PART 3 - EXECUTION
- 23                1.     Installation
- 24                2.     Low Pressure Duct (Maximum 2 inch pressure class)
- 25                3.     Cleaning
- 26    1.2    REFERENCE
- 27            A.     Applicable provisions of Division 1 govern work under this Section.
- 28    1.3    REFERENCE STANDARDS
- 29            A.     ASTM A90    Test Method for Weight of Coating on Zinc-Coated  
30                 (Galvanized) Iron or Steel Articles
- 31            B.     ASTM A623   Standard Specification for Steel Sheet, Zinc-Coated  
32                 (Galvanized) by the Hot-Dip Process
- 33            C.     ASTM A527   Specification for General Requirements for Steel Sheet, Zinc-  
34                 Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
- 35            D.     ASTM 924    Standard Specification for General Requirements for Sheet  
36                 Steel, Metallic-coated by the Hot-dip Method
- 37            E.     ASTM E 84    Test Method for Surface Burning Characteristics of Building  
38                 Materials
- 39            F.     NFPA 90A   Standard for the Installation of Air Conditioning and  
40                 Ventilating Systems
- 41            G.     UL 181    Standard for Safety for Factory Made Air Ducts and Air Connectors.
- 42    1.4    QUALITY ASSURANCE
- 43            A.     Refer to Division 1, General Conditions, Equals and Substitutions.
- 44    1.5    SHOP DRAWINGS

- 1 A. Refer to Division 1, General Conditions, Submittals.
- 2 B. Include manufacturer's data and/or Contractor data for the following:
  - 3 1. Fabrication and installation drawings.
  - 4 2. Schedule of duct systems including material of construction, gauge,  
5 pressure class, system class, method of reinforcement, joint  
6 construction, fitting construction, and support methods, all with  
7 details as appropriate.
  - 8 3. Duct sealant and gasket material.
  - 9 4. Duct liner including data on thermal conductivity, air friction  
10 correction factor, and limitation on temperature and velocity.

11 1.6 DESIGN CRITERIA

- 12 A. Construct all ductwork to be free from vibration, chatter, objectionable  
13 pulsations and leakage under specified operating conditions.
- 14 B. Use material, weight, thickness, gauge, construction and installation methods  
15 as outlined in the following SMACNA publications, unless noted otherwise:
  - 16 1. HVAC Duct Construction Standards, Metal and Flexible, 2<sup>nd</sup> Edition,  
17 1995
  - 18 2. HVAC Air Duct Leakage Test Manual, 1<sup>st</sup> Edition, 1985
  - 19 3. HVAC Systems - Duct Design, 3<sup>rd</sup> Edition, 1990
  - 20 4. Rectangular Industrial Duct Construction Standard, 1<sup>st</sup> Edition, 1980
  - 21 5. Round Industrial Duct Construction Standards, 2<sup>nd</sup> Edition, 1999
  - 22 6. Thermoplastic Duct (PVC) Construction Manual, 2<sup>nd</sup> Edition, 1995
  - 23 7. Round Industrial Duct Construction Standards, 2<sup>nd</sup> Edition, 1999
  - 24 8. Rectangular Industrial Duct Construction Standards, 1<sup>st</sup> Edition, 1980
- 25 C. Use products which conform to NFPA 90A, possessing a flame spread rating  
26 of not over 25 and a smoke developed rating no higher than 50.

27 1.7 DELIVERY, STORAGE AND HANDLING

- 28 A. Promptly inspect shipments to ensure that Ductwork is undamaged and  
29 complies with the specification.
- 30 B. Protect Ductwork against damage.
- 31 C. Protect Ductwork by storing inside or by durable, waterproof, above ground  
32 packaging. Do not store material on grade. Protect Ductwork from dirt, dust,  
33 construction debris and foreign material. Where end caps/package are  
34 provided, take precautions so caps/package remain in place and free from  
35 damage.

36 PART 2 - PRODUCTS

37 2.1 GENERAL

- 38 A. All sheet metal used for construction of duct shall be 24 gauge or heavier  
39 except for round and spiral ductwork and spiral duct take-offs 12" and below  
40 may be 26 gauge where allowed in SMACNA HVAC Duct Construction  
41 Standards, Metal and Flexible, 2<sup>nd</sup> Edition, 1995.
- 42 B. Duct sizes indicated on plans are net inside dimensions; where duct liner is  
43 specified, dimensions are net, inside of liner.

44 2.2 DUCTWORK PRESSURE CLASS

1 A. Minimum acceptable duct pressure class, for all ductwork except transfer  
2 ductwork, is 2 inch W.G. positive or negative, depending on the application.  
3 Transfer ductwork minimum acceptable duct pressure class is 1 inch W.G.  
4 positive or negative, depending on the application. Duct system pressure  
5 classes not indicated on the drawings to be as follows:

6 Supply duct \_\_\_\_\_ 2 in. pressure class

7 Exhaust ducts \_\_\_\_\_ 2 in. pressure class

## 8 2.3 MATERIALS

### 9 A. GALVANIZED STEEL SHEET:

10 1. Use ASTM A 653 galvanized steel sheet of lock forming quality.  
11 Galvanized coating to be 1.25 ounces per square foot, both sides of  
12 sheet, G90 in accordance with ASTM A90. Provide "Paint Grip"  
13 finish for ductwork that will be painted.

## 14 2.4 LOW PRESSURE DUCTWORK (Maximum 2 inch pressure class)

15 A. Construct so that all interior surfaces are smooth. Use slip and drive or  
16 flanged and bolted construction when fabricating rectangular ductwork. Use  
17 spiral lock seam construction when fabricating round spiral ductwork. Sheet  
18 metal screws may be used on duct hangers, transverse joints and other  
19 SMACNA approved locations if the screw does not extend more than 1/2 inch  
20 into the duct.

21 B. Use elbows and tees with a center line radius to width or diameter ratio of 1.5  
22 wherever space permits.

23 C. Provide expanded take-offs or 45 degree entry fittings for branch duct  
24 connections with branch ductwork airflow velocities greater than 700 fpm.  
25 Square edge 90-degree take-off fittings or straight taps will not be accepted.

26 D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever  
27 possible. Divergence upstream of equipment shall not exceed 30 degrees;  
28 convergence downstream shall not exceed 45 degrees.

## 29 2.5 DUCT SEALANT

30 A. Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal  
31 & Seal, Lockformer cold sealant, Mon-Eco Industries, United Sheet Metal, or  
32 approved equal. Silicone sealants are not allowed in any type of ductwork  
33 installation.

34 B. Install sealants in strict accordance with manufacturer's recommendations,  
35 paying special attention to temperature limitations. Allow sealant to fully  
36 cure before pressure testing of ductwork, or before startup of air handling  
37 systems.

## 38 PART 3 - EXECUTION

### 39 3.1 INSTALLATION

40 A. Verify dimensions at the site, making field measurements and drawings  
41 necessary for fabrication and erection. Check plans showing work of other  
42 trades and consult with Architect in the event of any interference.

- 1 B. Make allowances for beams, pipes or other obstructions in building  
2 construction and for work of other contractors.
- 3 C. Install duct to pitch toward outside air intakes and drain to outside of building.  
4 Solder or seal seams to form watertight joints.
- 5 D. Install all motor operated dampers and connect to or install all equipment  
6 furnished by others. Blank off all unused portions of louvers, as indicated on  
7 the drawings, with 1-1/2 inch board insulation with galvanized sheet metal  
8 backing on both sides.
- 9 E. Locate ducts with sufficient space around equipment to allow normal  
10 operating and maintenance activities.
- 11 F. Provide adequate access to ductwork for cleaning purposes.
- 12 G. Provide temporary capping of ductwork openings to prevent entry of dirt, dust  
13 and foreign material.
- 14 H. Protect diffusers, registers and grilles with plastic wrap or some other  
15 approved form of protection to maintain dirt and dust free and to prevent  
16 entry of dirt, dust and foreign material into the Ductwork.
- 17 I. During construction provide temporary closures of metal or taped  
18 polyethylene on open ductwork to prevent construction dust from entering  
19 ductwork system.

20 3.2 LOW PRESSURE DUCT (Maximum 2 inch pressure class)

- 21 A. Seal all duct, with the exception of transfer ducts, in accordance with  
22 SMACNA seal class "A"; all seams, joints, and penetrations shall be sealed.
- 23 B. Install a manual balancing damper in each branch duct and for each diffuser  
24 or grille.
- 25 C. Hangers must be wrapped around bottom edge of duct and securely fastened  
26 to duct with sheetmetal screws or pop rivets.

27 3.3 CLEANING

- 28 A. Remove all dirt and foreign matter from the entire duct system and clean  
29 diffusers, registers, grilles and the inside of air-handling units before  
30 operating fans.

31 **END OF SECTION**



- 1 A. Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.
- 2 B. Dampers must be constructed in accordance with SMACNA Fig. 2-12, Fig. 2-13,
- 3 and notes relating to these figures, except as modified below.
- 4 C. Reinforce all blades to prevent vibration, flutter, or other noise. Provide
- 5 operators with locking devices and damper position indicators for each damper.

6 2.2 FIRE DAMPERS

- 7 A. Manufacturers: Air Balance, Advanced Air, American Warming and Ventilating,
- 8 Greenheck, Phillips-Aire, Prefco, Ruskin, Safe-Air or approved equal.
- 9 B. DYNAMIC FIRE DAMPERS
- 10 1. Dynamic fire damper assemblies must be UL 555 (6<sup>th</sup> edition) listed and
- 11 labeled for dynamic applications (where air systems operate during a
- 12 fire) and meet requirements of NFPA 90A. Dampers must be type B
- 13 curtain type with curtain 100% out of air stream. Dampers larger than
- 14 30" by 30" or with velocity rating requirements of 3000 fpm or higher,
- 15 may be multiblade type with blades located in the airstream. Velocity
- 16 ratings and static pressure ratings as indicated on the drawings. Damper
- 17 fire rating to be compatible with the rating of the building assembly in
- 18 which the damper is used.

19 2.3 CONTROL DAMPERS

- 20 A. Provide control dampers shown on the plans and as required to perform the
- 21 specified functions. Dampers shall be rated for velocities that will be
- 22 encountered at maximum system design and rated for pressure equal or greater
- 23 than the ductwork pressure class as specified in Section 23 31 00 of the ductwork
- 24 where the damper is installed.
- 25 B. Use only factory fabricated dampers with mechanically captured replaceable
- 26 resilient blade seals, stainless steel jamb seals and with entire assembly suitable
- 27 for the maximum temperature and air velocities encountered in the system.
- 28 C. Dampers in galvanized ductwork shall be constructed of galvanized steel and/or
- 29 aluminum.
- 30 D. All dampers, unless otherwise specified, to be rated at a minimum of 180° F
- 31 working temperature.
- 32 E. Leakage rate dampers for differential pressures that they will encounter at
- 33 maximum system design pressures.
- 34 F. Steel framed dampers: Nailor models 2010 & 2020; Greenheck models VCD-33
- 35 & VCD-42; Johnson Controls model V-1330; Ruskin Models CD60 & CD40;
- 36 other approved equal.
- 37 G. Dampers for applications other than fume exhaust to have frames of not less than
- 38 16 gauge galvanized steel or 12 gauge extruded aluminum. Blades to be two-ply
- 39 steel airfoil of not less than 2 x 20 gauge galvanized steel (14 gauge equivalent)
- 40 or extruded aluminum airfoil, with stainless steel, acetal, Celcon, bronze, or
- 41 nylon bearings. Maximum allowable blade width is 8 inches. Use plated steel
- 42 linkage hardware.

- 1 H. Jack shafts shall be extended outside of the ductwork for external actuator  
2 mounting. Provide bearings on the point of exit for support of damper shafts to  
3 prevent wear on the shaft and the ductwork.
- 4 I. Size operators for smooth and positive operation of devices served, and with  
5 sufficient torque capacity to provide tight shutoff against system temperatures  
6 and pressure encountered. For two-position electric actuation use 24 VAC for  
7 DDC controlled actuators, 120 VAC actuators may be used for hardwire  
8 interlocking.
- 9 J. All power required for electric actuation shall be provided by this contractor.
- 10 K. Provide operators with linkages and brackets for mounting on device served.

11 2.4 ACCESS DOORS

- 12 A. Access door to be designed and constructed for the pressure class of the duct in  
13 which the door is to be installed. Doors in exposed areas shall be hinged type  
14 with cam sash lock. Hinges shall be steel full length continuous piano type.  
15 Doors in concealed spaces may be secured in place with cam sash latches. For  
16 both hinged and non hinged doors provide sufficient number of camp sash  
17 latches to provide air tight seal when door is closed. Do not use hinged doors in  
18 concealed spaces if this will restrict access. Use minimum 1" deep 24 gauge  
19 galvanized steel double wall access doors with minimum 24 gauge galvanized  
20 steel frames. For non-galvanized ductwork, use minimum 1" deep double wall  
21 access door with frame that shall use materials of construction identical to  
22 adjacent ductwork. Provide double neoprene gasket that shall provide seals from  
23 the frame to the door and frame to the duct. When access doors are installed in  
24 insulated ductwork or equipment provide insulated doors with insulation  
25 equivalent to what is provided for adjacent ductwork or equipment. Access  
26 doors constructed with sheet metal screw fasteners will not be accepted.
- 27 B. Use insulated, 1-1/2 hour UL 1978 listed and labeled access doors in kitchen  
28 exhaust ducts.

29 2.5 LOUVERS

- 30 A. Manufacturers: Airolite K6776, Industrial Louvers 658, American Warming and  
31 Ventilating LE-31, or Construction Specialties 6177, or approved equal.
- 32 B. Similar to Airolite Type K6776, extruded aluminum alloy not less than 12 gauge  
33 (.081" thick), 6063 series frame and blades, all-welded assembly, 35 degree or 45  
34 degree blades with water baffle, 6 inches thick. Provide with bird screen of 1/2" x  
35 1/2" mesh aluminum in 12 gauge aluminum frame and an aluminum sill. Locate  
36 the bird screen inside of the louver unless noted otherwise.
- 37 C. Louver to bear the AMCA certified ratings seal for both air performance and  
38 water penetration, having a free area not less than 50% based on a 48" x 48"  
39 section, a water penetration less than 0.1 oz/square foot under AMCA test at  
40 1000 feet per minute, and an intake pressure drop less than 0.20 inches of water  
41 at 1000 feet per minute.
- 42 D. Finish to be anodized or Kynar 500 in a custom color to be selected by the  
43 Architect. Furnish sufficient paint in the same color as the louver to paint the  
44 outer surface of panels over unused portions of louvers and to paint the interior  
45 portion of ductwork visible through the louvers.

1 **PART 3 - EXECUTION**

2 3.1 **MANUAL VOLUME DAMPERS**

- 3 A. Install manual volume dampers in each branch duct and for each grille, register,  
4 or diffuser as far away from the outlet as possible while still maintaining  
5 accessibility to the damper. Install so there is no flutter or vibration of the  
6 damper blade(s).

7 3.2 **FIRE DAMPERS**

- 8 A. Install dampers in strict accordance with manufacturer's installation instructions.  
9 Install damper sleeves with retaining angles on both sides of rated partition.  
10 Connections of ductwork to fire damper assemblies to be as specified on the  
11 installation instructions. Where it is necessary to set dampers out from the rated  
12 wall, install a sleeve extension encased in two hour rated fire proofing insulation.  
13 Install an access door at each fire damper, located to permit resetting the damper  
14 replacing the fusible link.
- 15 B. Manually test each fire damper for proper operation by removing the fusible link.  
16 Repair or replace any fire damper that does not close completely. Re-install  
17 fusible link after test.

18 3.3 **CONTROL DAMPERS**

- 19 A. Install dampers in locations indicated on the drawings, as detailed, and according  
20 to the manufacturer's instructions. Install blank-off plates or transitions where  
21 required for proper mixing of airstreams in mixing plenums. Provide adequate  
22 operating clearance and access to the operator. Install an access door adjacent to  
23 each control damper for inspection and maintenance.

24 3.4 **ACCESS DOORS**

- 25 A. Install access doors where specified, indicated on the drawings, and in locations  
26 where maintenance, service, cleaning or inspection is required. Examples  
27 include, but are not limited to motorized dampers, fire and smoke dampers, and  
28 control devices needing periodic maintenance..
- 29 B. Size and numbers of duct access doors to be sufficient to perform the intended  
30 service. Minimum access door size shall be 8 x 8 inch size for hand access, 18 x  
31 18 inch size for shoulder access, or other size as indicated. Install access doors  
32 on both inlet and outlet sides of duct mounted coils.

33 3.5 **LOUVERS**

- 34 A. Furnish louvers to the General Contractor for mounting in exterior walls.  
35 Connect outside air intake duct to the louver, sealing all connections air and  
36 water tight.
- 37 B. Provide bird screen on inside of active louver area where none is provided with  
38 louvers. Where louvers are equipped with inside birdscreen, remove screen at all  
39 locations where duct connections are not made.

40 **END OF SECTION**

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**SECTION 23 82 00**  
**HEATING AND COOLING TERMINAL UNITS**

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PART 1 - GENERAL

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1.1 SCOPE

A. This section includes specification for heating and cooling terminal equipment using water and/or steam as the source. Included are the following topics:

B. PART 1 - GENERAL

1. Scope
2. Reference
3. Reference Standards
4. Quality Assurance
5. Shop Drawings
6. Operation and Maintenance Data
7. Design Criteria

C. PART 2 - PRODUCTS

1. Electric Heaters

D. PART 3 - EXECUTION

1. Installation
2. Electric Heaters

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1.2 REFERENCE

A. Applicable provisions of Section 23 02 00 Common Work Results for HVAC, and Division 1 govern work under this Section.

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1.3 REFERENCE STANDARDS

- A. ARI 210 Standard for Unitary Air-Conditioning Equipment
- B. ARI 410 Standard for Forced-Circulation Air-Cooling and Air-Heating Coils
- C. CS 140

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1.4 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, ratings, weights, wiring diagrams, and appropriate identification for all equipment in this section. Include color selection chart where applicable.

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1.5 DESIGN CRITERIA

A. Applicable Codes, Guidelines and Standards.

1. The mechanical systems will be designed in accordance with the following codes, guidelines, and standards:
  - a) Wisconsin Administrative Code including the following:
    - (1) Comm 63 - Energy Conservation
    - (2) Comm 64 - Heating, Ventilating and Air Conditioning
  - b) International Code Council
  - c) ASHRAE

B. Outdoor Design Conditions:

1. Summer:

- 1 a) Dry-Bulb Temperature = 89°F per Comm 63
- 2 b) Wet-Bulb Temperature = 77°F per Comm 63
- 3 2. Winter:
- 4 a) Dry-Bulb Temperature = -10°F per Comm 63
- 5 C. Indoor Design Conditions:
- 6 1. Activity Spaces:
- 7 a) Summer = 75°F
- 8 b) Winter = 70°F
- 9 2. Toilet Room:
- 10 a) Summer = Uncontrolled, cooling air will be
- 11 transferred into the room from the adjacent space.
- 12 b) Winter = 70°F
- 13 3. Mechanical Room, and Storage:
- 14 a) Summer = 75°F
- 15 b) Winter = 70°F
- 16 D. Ventilation Rates:
- 17 1. The exhaust rates will be as follows:
- 18 a) Toilet Rooms:
- 19 (1) 75 CFM per toilet fixture.
- 20 b) Storage Room:
- 21 (1) 50 CFM for general ventilation.
- 22 2. Outdoor air rates will be as follows:
- 23 a) 125 CFM make up air
- 24 1.6 Systems Descriptions:
- 25 A. Heating System:
- 26 1. Gas fired furnace for space heating.
- 27 2. Electric wall heater in toilet room to provide space heating.
- 28 B. Cooling Systems:
- 29 1. Split mechanical cooling system for space cooling.
- 30 C. Humidification/Dehumidification:
- 31 1. None will be provided.
- 32 D. Ventilation Systems:
- 33 1. Outside air will be ducted directly into the return duct of the furnace.
- 34 E. Control System:
- 35 1. Individual spaces will not be zoned for independent control. The airflow
- 36 rate to each space will be balanced to a predetermined level and will
- 37 remain constant. The exception will be the toilet room which will have
- 38 its own electric heating.
- 39 2. Electric with time clock for day/night scheduling.
- 40 3. During unoccupied times as determined by the time clock, the exhaust
- 41 fan will be de-energized, and the outside air duct will be shut to conserve
- 42 energy.
- 43 F. Electrical Equipment and heaters shall be UL listed for the service specified.
- 44 G. Electrical components and work must be in accordances with National Electrical
- 45 Code.

46

47 PART 2 - PRODUCTS

48 2.1 ELECTRIC HEATERS

- 1 A. Manufacturers: Berko, Chromalox, Markel, Trane, or approved equal.
- 2 B. Use corrosion resistant heating elements, designed and spaced for even
- 3 distribution of air across the heating element, and installed to prevent noise of
- 4 expansion and contraction.
- 5 C. Provide units with necessary overheat protection, reset devices, air flow interlock
- 6 switch, contactors, transformers, local non-fused disconnect switch that is
- 7 prewired, and other controls as may be required by codes.
- 8 D. Fan powered units must be provided with thermostat and controls to maintain fan
- 9 operation until residual heat in the heating elements has been dissipated. The
- 10 fans and motors shall be balanced and mounted for vibration free operation.
- 11 E. Construct cabinets of 20 gauge steel, furnished exposed cabinets with a baked
- 12 enamel finish in one of the manufacturer's standard colors, selected by Architect.
- 13

14 **PART 3 - EXECUTION**

15 **3.1 INSTALLATION**

- 16 A. Install units in accordance with manufacturer's installation instructions.
- 17 B. Coordinate location of units with other trades to assure correct recess size for
- 18 recessed units.
- 19 C. After installation, provide protective covers to prevent accumulation of dirt on
- 20 units during balance of construction.

21 **3.2 ELECTRIC HEATERS**

- 22 A. Install units where indicated on the drawings and details. Where heaters are
- 23 indicated to be installed in ductwork, provide manufacturers recommended
- 24 upstream and downstream ductwork to prevent overheating problems.
- 25 B. Electric heaters located in toilet and shower rooms must be installed at least 6"
- 26 above the finished floor.
- 27 C. Units will be wired by the Electrical Contractor.

28 **END OF SECTION**

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**SECTION 26 00 00  
ELECTRICAL WORK**

**1. GENERAL REQUIREMENTS**

- A. Applicable requirements of conditions of Contract and of Sections listed under General Requirements apply to work specified in this Section.
- B. The electrical contractor shall provide design-build services in accordance with the specifications, drawings and the Owner's and Architect's direction. The design shall be completed by a registered engineer in the State of Wisconsin. The documents indicate the minimum requirements for installation; the contractor shall verify exact quantities and size requirements and ratings of equipment as appropriate.

**2. SCOPE OF THE WORK**

- 1. General Requirements
- 2. Scope of the Work
- 3. General Provisions
- 4. Materials and Equipment
- 5. Raceway System
- 6. Wiring Requirements
- 7. Distribution System
- 8. Wiring Devices
- 9. Lighting Fixtures and Lamps
- 10. Motor Wiring and Controls
- 11. Communication Systems

**3. GENERAL PROVISIONS**

- A. General:
  - 1. The Electrical Contractor (EC) shall provide materials, equipment, supervision and labor sufficient to insure performance and completion of his work in accordance with construction schedule.
  - 2. Materials and equipment shall be ordered promptly after award. EC shall monitor orders and expedite deliveries to insure receipt in accordance with construction schedule.
  - 3. Definitions:
    - a. EC: Electrical Contractor
    - b. A/E: Architect and/or Engineer
    - c. Provide: Furnish, install, wire and connect complete by EC.
  - 4. The EC shall visit the site of construction to familiarize himself with existing conditions so as to become fully informed as to extent and character of the work and its relationship to work of other trades and existing facilities.
- B. Government Agency Requirements:

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1. EC shall familiarize himself with all such requirements and shall process all materials.
2. Permits, Licenses and Inspection Fees: The EC shall prepare and submit applications and submittals required, obtain necessary permits and certificates of compliance and approvals required and shall deliver these to the A/E paying all necessary fees.
3. Standards and Codes: All work shall be performed in strict conformity with all applicable laws, ordinances and codes including, but not limited to, International Building Code; National Electrical Code and OSHA. The EC shall be held to complete work necessary and to provide all equipment required to comply with the foregoing without extra compensation.
4. All equipment shall be UL listed, except for equipment for which UL has not an established test standard. In these instances, the A/E shall be advised to render a judgment accordingly.

C. Cleaning:

1. The EC shall clean all equipment surfaces, interior and exterior of panels and pull boxes, etc., and remove all rubbish and debris resulting from the work.
2. Where painted surfaces of equipment have been abused, removed or rusted during construction, the EC shall replace or paint same to match original factory or surrounding finish as approved by the engineer.

D. Dimensions and Definite Locations: Any drawings depicting electrical work are diagrammatic and show approximate locations of some electrical equipment; exact locations of equipment shall be established in the field and shall be satisfactory to the A/E.

E. Indexing:

1. All electrical apparatus including power sources, operable devices, controls and other items established elsewhere in these specifications shall be identified with Dymo, Brady or Avery labels describing usage, voltage and equipment.
2. Provide engraved bakelite nameplates with 1/2" letters identifying each branch circuit distribution panel mounted on exterior of panel above panel door. Engraved nameplates shall be fastened with screws. Adhesive type nameplates are not allowed without specific prior approval.
3. Provide each branch circuit distribution panel with a typewritten circuit directory mounted on inside of panel door.
4. Handwritten labeling is not acceptable.

F. Final Acceptance Requirements:

1. The EC shall conduct operating check and proof tests to confirm installation and suitability of work.
2. Final Submittals: Upon substantial completion of the work, the EC shall submit to the A/E test data and certificates of final inspection and approval as issued by local inspection authority or affidavit attesting to compliance with applicable codes.
3. Operation and Maintenance Manuals: The contractor shall provide two (2) copies of operation and maintenance manuals in a binder. The manuals shall be

1 separated into the following sections: Electrical contractor name, address and  
2 phone number; Cut sheets of all equipment furnished; Warranty information;  
3 Description of function, normal operating characteristics and limitations,  
4 performance curves, engineering data and tests, and complete nomenclature and  
5 commercial numbers of replacement parts; Manufacturer's printed operating  
6 procedures to include start-up, break-in, and routine and normal operating  
7 instructions; regulation, control, stopping, shutdown, and emergency instructions;  
8 and summer and winter operating instructions; Maintenance procedures for  
9 routine preventative maintenance and troubleshooting; disassembly, repair, and  
10 reassembly; aligning and adjusting instructions.

11 4. Demonstration: Prior to final acceptance and upon receipt of final submittals, the  
12 EC shall demonstrate that the electrical installation fulfills all requirements of the  
13 contract documents and that work is free from physical and electrical defects.  
14 The contractor shall provide Owner's personnel 4 hours training on each system  
15 installed.

16 5. Prepare record documents (AutoCad 2010 compatible) in accordance with the  
17 requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the  
18 requirements specified in Division 1, indicate installed conditions for:

- 19 a. Major raceway systems, size and location, for both exterior and interior;  
20 locations of control devices; distribution and branch electrical circuitry;  
21 and fuse and circuit breaker size and arrangements.
- 22 b. Equipment locations (exposed and concealed), dimensioned from  
23 prominent building lines.
- 24 c. Approved substitutions, Contract Modifications, and actual equipment and  
25 materials installed.

26  
27  
28 G. Warranty: The EC in full knowledge of requirements of the contract documents relative  
29 to electrical work guarantees that the electrical installation has been done in full accord  
30 with same. Additionally, the EC shall warrant and maintain, remedy and/or replace at his  
31 expense any work or materials, which may become defective within one year from date  
32 of substantial completion provided such defects are not due to "Acts of God" or abuse-  
33 misuse by agents of Owner.

34  
35 H. Bid Proposal

- 36  
37 1. Provide 100 percent complete and operational electrical systems and subsystems  
38 as specified herein and as shown on the drawings. Electrical systems shall  
39 include all materials, labor, taxes, mark-ups, overhead, profit, equipment,  
40 accessories and incidentals. All materials shall be new and not discontinued.
- 41 2. The drawings and specifications are schematic and scope in nature. All required  
42 light fixtures, devices, conduit, wiring, supports, etc., shall be included in the base  
43 bid to accommodate actual field conditions. Final locations of all electrical work  
44 shall be coordinated during the contractor design process, in the field and installed  
45 where directed by the Architect. The Contractor shall follow the intent of the  
46 plans and specifications when bidding and completing the design of the required  
47 building electrical systems.
- 48 3. When conflicting statements or conflicting information in bidding documents  
49 occurs, the bidder shall base his bid on the conflict, which results in the highest  
50 cost.

4. No additional compensation will be due the Electrical Contractor for failure to include all necessary work and related cost after bid submission.
5. All necessary demolition work shall be included in bid.

I. Coordination

1. Coordination Meetings: Attend weekly coordination meetings with the construction manager and all other trades for the purpose of coordinating the locations of all fire protection, plumbing, HVAC and electrical work for the entire project. The goal of these meetings is to avoid conflicts between trades in the field.
2. Conflicts Between Trades: Resolve all conflicts between trades at no additional cost to the owner or architect.
3. Ceiling Heights: Maintain all ceiling heights indicated on the architectural drawings. Ceiling heights will not be lowered to accommodate installation of fire protection, HVAC or electrical work. Install all work so that there is at least 8 inches clearance above the ceiling grid, in all areas, to facilitate installation of light fixtures. If installed work does not comply with the ceiling height requirements stated above, then the contractor shall remove and re-install work to comply with the stated requirements above at no additional cost to the owner or architect.
4. Ceiling Priority: Lighting fixture locations take priority over diffuser and sprinkler head locations.
5. Utility Coordination: Coordinate telephone service with appropriate utility. Provide all necessary application submittals to utility. Utility charges will be paid separately by Owner.

J. Sleeves, Openings and Anchors:

1. The EC shall make provisions for openings, holes and clearance through walls, floors and partitions, and the entire work to be carried out without superfluous cutting.
2. Subsequently, holes or openings required shall be rotary drilled or core drilled only by the EC and only with specific approval of the A/E.
3. All oversized openings shall be caulked and sealed by the EC.
4. Provide anchors, inserts and supports suitable for application as required to accommodate materials and equipment.

K. Cutting and Patching:

1. The EC shall do all necessary cutting and coring but only after obtaining approval from the A/E as to the location and size of openings and the proper method and materials for patching.
2. Cutting, coring, channeling, etc., shall be held to a minimum. All patching shall be done by the EC in a manner suitable to the A/E. The EC may utilize the General Contractor for cutting, patching and refinishing, but the cost of same shall be borne by the EC.

**4. MATERIALS AND EQUIPMENT**

A. General:

- 1
- 2
- 3 1. Unless otherwise stipulated in the specifications or noted on the drawings, all
- 4 materials and equipment incorporated in the work shall be new and unused, and
- 5 in complete accordance with the specification requirements.
- 6 2. Materials and equipment by manufacturers other than those specifically named
- 7 will be considered if such substitute items are equal in quality, in accordance
- 8 with general requirements applicable thereto, and are otherwise similar in
- 9 composition, dimension, construction, capacity, finish and performance.

10 B. Shop Drawings and Maintenance Manuals:

- 11
- 12 1. Furnish a minimum of 7 copies of shop drawings for approval. Shop drawings of
- 13 ALL equipment, devices and electrical materials shall be submitted TOGETHER
- 14 in a bound folder or binder with an index sheet describing contents contained
- 15 therein.
- 16 2. All shop drawings when submitted shall bear the contractor's name, date and
- 17 approval. Shop drawings will not be reviewed by the A/E if this requirement is
- 18 not met.
- 19 3. Shop drawing review consists of all necessary calculations, plans and material
- 20 proposed for inclusion into the project.
- 21 4. The EC is allowed up to two (2) submittals for approval. Additional reviews will
- 22 require the EC to reimburse the engineer for additional time and material
- 23 necessary to review and process additional shop drawings. The contractor shall
- 24 include a \$500 check with each additional submittal set of documents, before
- 25 review for approval of materials will be conducted.
- 26

27 C. Rough-in

- 28
- 29 1. Verify final locations for rough-ins with field measurements and with the requirements
- 30 of the actual equipment to be connected. The Contractor shall verify locations of
- 31 outlets and equipment with the Architect and Owner in regard to actual location(s) and
- 32 installation consistency prior to completion of rough-in.
- 33 2. Refer to equipment specifications in Divisions 2 through 23 for rough-in requirements.
- 34 3. Mount devices at the following mounting heights (to bottom), unless otherwise noted:
- 35

<b>Description</b>	<b>Height</b>
36 Receptacles	16" AFF(48" AFF in mech/elec/janitor/toilet rooms)
37 Switches	48" AFF

38

39

40 D. ELECTRICAL INSTALLATIONS

41

- 42 1. General: Sequence, coordinate, and integrate the various elements of electrical
- 43 systems, materials, and equipment. Comply with the following requirements:
- 44
- 45 a. Coordinate electrical systems, equipment, and materials installation with other
- 46 building components, including transferring of "overlay" plans to verify
- 47 clearances, etc.
- 48 b. Verify all dimensions by field measurements.
- 49 c. Arrange for chases, slots, and openings in other building components during
- 50 progress of construction, to allow for electrical installations.

- d. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed. All pipes passing through cast-in-place concrete walls and floors shall be sleeved.
- e. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
- f. Where mounting heights are not identified, install systems, materials, and equipment to provide the maximum headroom possible.
- g. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- h. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
- i. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
- j. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- k. Units concealed behind finished surfaces shall be installed behind an access panel or door as required.
- l. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

**5. RACEWAY SYSTEM**

**A. General:**

- 1. Provide raceway system for electrical wiring as required providing circuiting arrangements as described in the specifications.
- 2. Size all components in accordance with the Code.
- 3. A ground wire shall be included in each and every conduit for feeder and branch circuits.
- 4. Raceway shall generally be concealed whenever possible.
- 5. MC cable is allowed when installing in existing walls and perpendicular to floor joists (through holes above bottom of joist) only.

**B. Conduit:**

- 1. EMT shall be used in interior walls and above ceilings for branch circuits and communications system.
- 2. GRC shall be used for all feeders, and exterior and exposed locations.
- 3. Underground and underslab conduits shall be schedule 40 PVC. Exterior conduits shall be a minimum of 1" diameter.

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4. Flexible metal conduit as approved and required by Code. Employ liquid-tight with ground wire for final connections to motors, vibrating equipment, etc. Employ Greenfield for final connections to recessed lighting fixtures, etc.
  5. Conduit shall not be parallel to hot-water pipes, flues and high temperature piping or ducts and shall cross same with 6-inch clearance and shall not be routed over high temperature equipment such that it will be in the path of hot-air currents.
  6. Conduit passing between areas of different temperatures shall be sealed with duxseal at outlet box at point of penetration on the “warmer” side. Conduit and sleeve penetrations through floors shall be sealed by the EC with Fire Foam CTC PR-855.
  7. Support of Conduit and Conductors:
    - a. All conduits shall be securely fastened to structural parts of the construction in a manner acceptable to the A/E.
    - b. Supporting devices shall be specifically designed for the application and the anticipated load. Perforated hanger iron and tie wire are not acceptable.
    - c. Conduit shall be supported with hot-dip galvanized channel and swivel threaded rod hangers and heavy duty pipe straps, clamps, clips and fasteners as manufactured by Unistrut, Bee-Line or Kindorf.
  8. Provide “fish” wire in all empty conduits.
  9. Provide expansion fittings in conduits from below grade to structures.
- C. Couplings, Connectors and Fittings:
1. Couplings, connectors and fittings shall be standard devices to properly attach conduit to conduit, to outlet boxes, panel enclosures, junction boxes, etc. Such devices shall be threaded, all-steel, rain-tight and concrete type, specifically designed for the application, and bearing the UL label.
  2. All GRC fittings shall be threaded type.
  3. All connectors shall have insulated throats. Connectors for use with flexible metal conduit shall be threaded type.
  4. EMT fittings shall be compression type.
  5. Indentation type and push-on type fittings are not acceptable for rigid steel, EMT or flexible metal conduits. Fittings with die-cast bodies, wholly or partially, are not acceptable.
  6. Provide bushings on ends of all communications conduits.
- D. Outlet Boxes:
1. Provide outlet boxes as required to accommodate device indicated by symbol on the drawings, sizes in accordance with Code, except that the following requirements shall be considered minimum.
  2. All outlet boxes shall be 4” square, galvanized or sherardized, set parallel to construction, independently attached to same and adjusted to set level with finished surfaces. Thru-wall or back-to-back outlets are not allowed. Flush type boxes shall be 1-1/2” deep.
  3. Ceiling boxes shall be 4” octagon by 2-1/8” deep and shall be supported with approved type box support channels.

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4. Raised covers with square corners and internally turned device hole plate continuous from end to end for mounting wiring devices shall be furnished for all flush mounted wall boxes. Flush wall outlet boxes shall include grounding terminal and must set flush with finished wall to establish ground continuity.

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E. Wireways:

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1. Provide with hinged covers.
  2. Provide with manufacturer's standard enamel paint finish.
  3. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.

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15

**6. WIRING REQUIREMENTS**

16

A. General:

- 17  
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20
1. Provide feeders, branch circuit and control wiring required to complete scheme of lighting, power and switch control as required.
  2. Provide conduit, outlet boxes and wiring accordingly.

21  
22  
23

B. Conductor: All conductor shall be UL listed, copper, suitable for the duty or application and subject to the following:

- 24  
25  
26  
27
1. Delivered to the jobsite in the original cartons.
  2. No. 8 and larger stranded.
  3. No. 12 minimum for power circuits.

28  
29

C. Application:

- 30  
31  
32  
33
1. Branch Circuits: Type THHN/THWN, copper conductor, in raceway.
  2. Control Circuits: Type THHN/THWN, copper conductor, in raceway.
  3. Exterior Circuits: Type XHHW, copper conductor, in raceway.

34  
35

D. Solderless Connectors:

- 36  
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38  
39  
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41  
42  
43  
44
1. Joints, taps and splices in conductor No. 10 and smaller shall be made with spring and compression type solderless connectors with plastic cover of type and size by approved manufacturer.
  2. Joints, taps and splices in conductor No. 8 and larger shall be taped with vinyl providing insulation not less than that of the conductor and, in any case, not less than two half-lapped layers each.
  3. Splices in exterior locations shall use silicon filled connectors or submersion rated connectors as appropriate based on conductor size.

45  
46

E. Circuiting: Devices and equipment shall be circuited as follows:

- 47  
48  
49  
50
1. No more than 6 general area receptacles per circuit. Receptacles in each room shall not share its circuit with receptacles or equipment in another room.
  2. Minimum wire size: #12 AWG interior; #10 AWG exterior. Verify wire size based on voltage drop calculations.

3. Provide individual dedicated circuits to pieces of equipment (i.e. mechanical equipment). The contractor shall verify exact power requirements. See plumbing and mechanical specifications for quantity and type of equipment.
4. Provide one GFCI type duplex receptacle in toilet room, 48" AFF on new wall.
5. Room 102: Remove existing plugmold and replace with new plugmold along entire perimeter. Plugmold to be equal to Wiremold 2400 (24S) series with GB wiring configuration, in-line duplex receptacles 24" on-center. Provide three (3) floor boxes in room per plan. The floor boxes shall be one-gang equal to Wiremold 880W series with brass cover, duplex receptacle/cover plate.
6. Room 100: Remove existing plugmold on north and west walls and replace with new plugmold. Plugmold to be equal to Wiremold 2400 (24S) series with GB wiring configuration, in-line duplex receptacles 24" on-center. Provide two duplex receptacles in new south wall.
7. Room 101: Remove existing quadplex receptacle (below window) and provide new two-channel surface raceway on the west, south and east walls. The raceway shall be equal to Wiremold 2400D series with a duplex receptacle installed every 6' max. (2 receptacles per wall section) using a downward device bracket and a downward decorative bracket. Install a dual communications faceplate with downward device cover within 6" of a receptacle where shown on the plans. Provide two duplex receptacles in new north wall. Refer to communications section.
8. Provide a duplex receptacle with adjacent communications outlet located per the plan in the basement.

## 7. ELECTRIC DISTRIBUTION EQUIPMENT

### A. Distribution Equipment:

1. Existing electrical distribution equipment/service to remain – consisting of a 200A, 120/240V meter pedestal/service, 200A Cutler-Hammer main panel (load center) on first floor (rm. 100) and 100A Cutler-Hammer panel in basement. Provide new continuous green insulated grounding conductor from main panel to water meter along with appropriate jumper around meter.
2. Provide new cover/door on existing 200A first floor electrical panel.
3. Provide a Surge Protective Device (SPD) adjacent to main 200A panel.
4. All disconnects shall be heavy-duty type. Fuses shall be Bussman LPN-RK. Provide (1) spare fuse for each type/rating.

### B. Branch Circuits and Switch Control: 115 volt branch circuit homeruns in excess of 100' in length, use No. 10 wire minimum.

### C. Grounding:

1. Metallic raceway system shall be grounded as required by the Code, so that grounds will be electrically continuous from the service entrance conduit to all outlet boxes.
2. Motors shall be grounded with a separate green ground conductor routed via flexible metal conduit.
3. Provide grounding of service equipment, etc. per NEC 250.

### D. Surge Protective Device:

- 1
- 2
- 3 1. The SPD shall be connected to a 30A/2P circuit breaker in the panelboard.  
4 Connect with #10 wire for each phase, neutral and ground in 1" conduit -  
5 minimize length of conductors.
- 6 2. The SPD shall have replaceable modules, indicator lights for UL protection,  
7 reduced protection and fault conditions, and surge counter.
- 8 3. The rating shall be 80ka peak surge current per phase.
- 9 4. The TVSS shall be in a NEMA 1 surface mounted enclosure.

## 10 **8. WIRING DEVICES**

- 11
- 12 A. Provide wiring devices as further described herein.
- 13
- 14 1. Wiring devices shall be specification grade with color to be verified by the  
15 architect.
- 16 2. All devices shall be wrapped with two layers of electrical tape around the body to  
17 cover screws prior to installing in box.
- 18 3. Local Switches: Hard use specification grade 20 amp, 120-277 volt, single pole,  
19 three-way and four-way type as required.
- 20 4. Receptacles: In general, hard use specification 20 amp, 125 volt duplex.
- 21 5. All connections to wiring devices must be made by the binding screws only.
- 22
- 23 B. Furnish combination, multi-gang and special plates as required. Provide #302 stainless  
24 steel coverplates.
- 25

## 26 **9. LIGHTING FIXTURES AND LAMPS**

- 27
- 28 A. Provide lighting fixtures complete with initial fill of lamps:
- 29
- 30 1. As called for on the reflected ceiling plan.
- 31 2. In quantities and/or row lengths as required.
- 32 3. Plans shall be scaled for this purpose.
- 33 4. Ballasts for fluorescent fixtures to bear UL, ETC and CBM label; shall be  
34 thermally protected type conforming to Class P, UL type, low energy, full light  
35 output. Provide cold weather ballasts in unheated areas.
- 36 5. Ballasts shall be guaranteed by the EC for a period of two years from date of  
37 manufacture. Warranty to include ballasts replacement and jobsite replacement  
38 costs.
- 39 6. Lamps: Fluorescent lamps shall be equal to Philips Advantage T8 High Lumen  
40 Output (835) or Amalgam, 4-Pin compact (835). Metal halide lamps shall be  
41 equal to Philips MasterColor Ceramic Metal Halide.
- 42
- 43 B. The EC shall check the Room Finish Schedule on the plans for ceiling construction in  
44 each area. In each case, provide all necessary accessories required to install lighting  
45 fixtures. Lighting fixtures shall be supported from structural parts of the building using  
46 approved supporting devices.
- 47
- 48 C. The basic catalog number only is indicated. The EC shall furnish complete lighting  
49 fixtures in quantities, and/or row lengths as shown on the plans, including plaster frames,  
50 ends, or caps, couplings suspension assemblies, mounting brackets and all auxiliary  
51 accessories as required.

- 1  
2 D. Refer to schedules for particular description of fixture nomenclature and associated  
3 ceiling type and suspension system.  
4  
5 E. Recessed fixtures shall be served via Greenfield with a separate green ground wire and  
6 solidly grounded at either end and shall include thermal protection in accordance with  
7 local and State codes.  
8  
9 F. Recessed fixtures installed in insulated ceilings shall have an enclosure fabricated to  
10 maintain clearance between fixture and insulating material as required.  
11  
12 G. All linear fluorescent lights shall utilize T8 lamps with 10% max. THD electronic, instant  
13 start ballasts. All PL downlights to be 4-pin with 10% max. THD electronic ballast.  
14  
15 H. Lighting Control.  
16  
17 1. Existing light switches for museum and offices spaces to remain, except that  
18 switch that controls incandescent light on soffit shall be removed and blanked off.  
19 2. Provide a switch for the toilet room.  
20 3. Provide a timer switch near the top of the new interior stairs to the basement and  
21 at the outside stair entry to a timer and wire appropriately to control new lights in  
22 basement/stair. Timer switches shall be equal to Watt Stopper TS-400 digital time  
23 switch.  
24 4. A photocell shall be installed (north wall/soffit of attic floor in an inconspicuous  
25 location as approved by the architect) and wired to control new soffit lights. A  
26 bypass switch (three position, center off, maintained contact, SPDT) shall be  
27 wired and located adjacent to main 200A electrical panel with identification that  
28 indicates "soffit lights"; and "on", "auto" and "off" switch positions.  
29 5. Occupancy sensors, equal to Watt Stopper UT-355 series ceiling mounted  
30 ultrasonic line voltage type, shall be used in toilet room, museum and museum  
31 office spaces. Wire sensors ahead of appropriate existing switches.  
32  
33 I. Lighting Layout.  
34  
35 1. See architectural reflected ceiling plan for interior and exterior layouts.  
36 2. Provide new light fixtures in basement consisting of Lithonia LB232MVOLT to  
37 provide 30FC maintained for workroom. The lamps in the workroom fixtures  
38 shall include a 20year rated clear UV sleeve equal to Encapsulite #SO48C20T8).  
39 3. The contractor shall determine and provide required LED exit signage (equal to  
40 Lithonia LESBZ1G120/277ELNSD series) and interior mounted concealed egress  
41 lighting (equal to Concealite F5000 series with self diagnostics depending on  
42 capacity needs where needed to power exterior remote lights; Lightarms  
43 EL650D/MH20-M12 for exterior locations; Lithonia #ELM2DLSD in basement)  
44 as required by code and inspector.  
45

## 46 10. MOTOR WIRING AND CONTROLS

- 47  
48 A. General:  
49  
50 1. Applicable to motors furnished under General Construction and Mechanical  
51 trades.

- 1                   2.       Individual starters and controls shall be provided by the contractor furnishing the  
2                   driven equipment, except where the drawings specifically indicate starters and  
3                   controls to be provided by EC.  
4                   3.       The EC shall erect all starters and provide adequate means of support as dictated  
5                   by field conditions.  
6  
7                   B.       The EC shall extend motor circuit from starter to motor terminal box by making final  
8                   connections in each instance with liquid tight flexible metal conduit with separate green  
9                   grounding conductor extending from motor terminal box to motor. A motor terminal box  
10                  shall be provided adjacent to or on each motor.  
11  
12                 C.       The EC shall do all line wiring 120 volts or greater unless otherwise indicated. Control  
13                   wiring less than 120 volts and temperature control wiring shall be done by the  
14                   Mechanical trade involved.  
15  
16                 D.       Provide a horsepower rated fusible (or non-fusible) switch at motors as required by Code.  
17                   For fused switches, provide fusetrons in ratings compatible with motor. Include 3 spare  
18                   fuses.  
19

20 **11.    COMMUNICATION SYSTEMS**

21  
22               A.       General:

- 23  
24                   1.       Provide a completely installed and tested telephone and data system. An  
25                   experienced and trained telecommunications installer shall furnish and install all  
26                   materials. All components and wiring shall be tested.  
27                   2.       Provide a 4'x4'x3/4" painted plywood backboard in basement with a ground bus  
28                   and #6 grounding conductor to nearest electrical panel ground bus.  
29                   3.       Provide a quadplex receptacle with integral surge suppression at the backboard on  
30                   a dedicated circuit.  
31                   4.       Provide a wall mounted 12-port data patch panel equal to Panduit CWPP12WBL  
32                   populated with Cat. 6 RJ45 jacks as needed.  
33                   5.       Provide a 110 Cat. 3 punchdown block for telephone cables.  
34                   6.       Provide Cat. 3 wiring for telephone outlets and Cat. 6 wiring for data outlets.  
35                   7.       Provide labeling on all jacks, cables, punchdown block and patch panel.  
36                   8.       Refer to other sections for locations of communications outlets.  
37                   9.       Coordinate with location of equipment with Owner and incoming  
38                   telecommunications utility.  
39                   10.      Provide conduit and box for exposed outlet locations (i.e. basement). The conduit  
40                   shall be extended to ceiling with a bushing.  
41

42               B.       Wireless door chime system.

- 43  
44                   1.       Provide an infrared sensor located at each exterior door (on interior) that will  
45                   detect entry and activate a chime located in the basement.  
46  
47  
48

END OF SECTION



- 1           5.    Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data  
2           required in "Action Submittals" Article in Section 233713 "Diffusers, Registers, and  
3           Grilles."
- 4           6.    Sound Performance Data: For air-handling lighting fixtures. Indicate sound power level  
5           and sound transmission class in test reports certified according to standards specified in  
6           Section 233713 "Diffusers, Registers, and Grilles."
- 7           7.    Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
- 8           8.    Photometric data and adjustment factors based on laboratory tests, complying with  
9           IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture  
10          type. The adjustment factors shall be for lamps, ballasts, and accessories identical to  
11          those indicated for the lighting fixture as applied in this Project.
  
- 12          a.    Testing Agency Certified Data: For indicated fixtures, photometric data shall be  
13          certified by a qualified independent testing agency. Photometric data for remaining  
14          fixtures shall be certified by manufacturer.
- 15          b.    Manufacturer Certified Data: Photometric data shall be certified by a  
16          manufacturer's laboratory with a current accreditation under the National  
17          Voluntary Laboratory Accreditation Program for Energy Efficient Lighting  
18          Products.
  
- 19    B.    Installation instructions.
  
- 20    C.    Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the  
21          following items are shown and coordinated with each other, using input from installers of the  
22          items involved:
  - 23           1.    Lighting fixtures.
  - 24           2.    Suspended ceiling components.
  - 25           3.    Partitions and millwork that penetrate the ceiling or extends to within 12 inches (305  
26           mm) of the plane of the luminaires.
  - 27           4.    Ceiling-mounted projectors.
  - 28           5.    Structural members to which suspension systems for lighting fixtures will be attached.
  - 29           6.    Other items in finished ceiling including the following:
    - 30               a.    Air outlets and inlets.
    - 31               b.    Speakers.
    - 32               c.    Sprinklers.
    - 33               d.    Smoke and fire detectors.
    - 34               e.    Occupancy sensors.
    - 35               f.    Access panels.
  - 36           7.    Perimeter moldings.
  
- 37    D.    Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
  
- 38    E.    Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from  
39          manufacturer.
  
- 40    F.    Field quality-control reports.
  
- 41    G.    Warranty: Sample of special warranty.

1 H. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency,  
2 operation, and maintenance manuals.

3 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

4 1.5 MAINTENANCE MATERIAL SUBMITTALS

5 A. Furnish extra materials that match products installed and that are packaged with protective  
6 covering for storage and identified with labels describing contents.

7 1. Lamps: One of each type and rating installed. Furnish at least one of each type.

8 2. Plastic Diffusers and Lenses: One of each type and rating installed. Furnish at least one of  
9 each type.

10 3. Fluorescent-fixture-mounted, emergency battery pack: One for every emergency lighting  
11 unit.

12 4. Ballasts: One of each type and rating installed. Furnish at least one of each type.

13 5. Globes and Guards: One of each type and rating installed. Furnish at least one of each  
14 type.

15 1.6 QUALITY ASSURANCE

16 A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers'  
17 laboratories that are accredited under the National Volunteer Laboratory Accreditation Program  
18 for Energy Efficient Lighting Products.

19 B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent  
20 agency, with the experience and capability to conduct the testing indicated, that is an NRTL as  
21 defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing  
22 & Calculation Guides.

23 C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by  
24 a qualified testing agency, and marked for intended location and application.

25 D. Comply with NFPA 70.

26 E. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for  
27 indicated class and division of hazard by FM Global.

28 1.7 COORDINATION

29 A. Coordinate layout and installation of lighting fixtures and suspension system with other  
30 construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-  
31 suppression system, and partition assemblies.

32 1.8 WARRANTY

33 A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which  
34 manufacturer of battery-powered emergency lighting unit agrees to repair or replace

1 components of rechargeable batteries that fail in materials or workmanship within specified  
2 warranty period.

3 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of  
4 Substantial Completion. Full warranty shall apply for first year, and prorated warranty for  
5 the remaining nine years.

6 2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign  
7 Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for  
8 first year, and prorated warranty for the remaining six years.

## 9 PART 2 - PRODUCTS

### 10 2.1 MANUFACTURERS

11 A. Products: Subject to compliance with requirements, provide specific product indicated on  
12 Drawings or a comparable product by another manufacturer.

### 13 2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

14 A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

15 B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to  
16 NEMA LE 5A.

17 C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to  
18 NEMA LE 5 and NEMA LE 5A as applicable.

19 D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.

20 E. Metal Parts: Free of burrs and sharp corners and edges.

21 F. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent  
22 warping and sagging.

23 G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under  
24 operating conditions, and designed to permit relamping without use of tools. Designed to  
25 prevent doors, frames, lenses, diffusers, and other components from falling accidentally during  
26 relamping and when secured in operating position.

27 H. Diffusers and Globes:

28 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to  
29 yellowing and other changes due to aging, exposure to heat, and UV radiation.

30 a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise  
31 indicated.

32 b. UV stabilized.

33 2. Glass: Annealed crystal glass unless otherwise indicated.

- 1 I. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts.  
2 Labels shall be located where they will be readily visible to service personnel, but not seen from  
3 normal viewing angles when lamps are in place.
- 4 1. Label shall include the following lamp and ballast characteristics:
- 5 a. "USE ONLY" and include specific lamp type.  
6 b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad,  
7 triple, etc.), base type, and nominal wattage for fluorescent and compact  
8 fluorescent luminaires.  
9 c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for  
10 HID luminaires.  
11 d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact  
12 fluorescent luminaires.  
13 e. ANSI ballast type (M98, M57, etc.) for HID luminaires.  
14 f. CCT and CRI for all luminaires.
- 15 J. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic  
16 interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each  
17 ballast indicated to require a filter.
- 18 K. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat  
19 extraction and for attaching an air-diffuser-boot assembly specified in Section 233713  
20 "Diffusers, Registers, and Grilles."
- 21 1. Air-Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.  
22 2. Heat-Removal Units: Air path leads through lamp cavity.  
23 3. Combination Heat-Removal and Air-Supply Unit: Heat is removed through lamp cavity  
24 at both ends of the fixture door with air supply same as for air-supply units.  
25 4. Dampers: Operable from outside fixture for control of return-air volume.  
26 5. Static Fixture: Air-supply slots are blanked off, and fixture appearance matches active  
27 units.

## 28 2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- 29 A. General Requirements for Electronic Ballasts:
- 30 1. Comply with UL 935 and with ANSI C82.11.  
31 2. Designed for type and quantity of lamps served.  
32 3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level  
33 control is indicated.  
34 4. Sound Rating: Class A except Class B for T12/HO and T12/Slimline lamp ballasts.  
35 5. Total Harmonic Distortion Rating: Less than 10 percent.  
36 6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.  
37 7. Operating Frequency: 42 kHz or higher.  
38 8. Lamp Current Crest Factor: 1.7 or less.  
39 9. BF: 0.88 or higher.  
40 10. Power Factor: 0.95 or higher.  
41 11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall  
42 be connected to maintain full light output on surviving lamps if one or more lamps fail.

- 1 B. luminaires controlled by occupancy sensors shall have programmed-start ballasts.
- 2 C. Electronic Programmed-Start Ballasts for T5, T8 Lamps: Comply with ANSI C82.11 and the  
3 following:
- 4 1. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.  
5 2. Automatic lamp starting after lamp replacement.
- 6 D. Electromagnetic Ballasts: Comply with ANSI C82.1; energy saving, high-power factor, Class P,  
7 and having automatic-reset thermal protection.
- 8 1. Ballast Manufacturer Certification: Indicated by label.
- 9 E. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and  
10 bundled extension wiring to suit final installation conditions without modification or rewiring in  
11 the field.
- 12 F. Ballasts for Low Electromagnetic-Interference Environments: Comply with 47 CFR 18, Ch. 1,  
13 Subpart C, for limitations on electromagnetic and radio-frequency interference for consumer  
14 equipment.
- 15 G. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.
- 16 1. Operating Modes: Ballast circuit and leads provide for remote control of the light output  
17 of the associated lamp between high- and low-level and off.
- 18 a. High-Level Operation: 100 percent of rated lamp lumens.  
19 b. Low-Level Operation: 30 percent of rated lamp lumens.
- 20 2. Ballast shall provide equal current to each lamp in each operating mode.  
21 3. Compatibility: Certified by manufacturer for use with specific bi-level control system and  
22 lamp type indicated.
- 23 H. Ballasts for Tri-Level Controlled Lighting Fixtures: Electronic type.
- 24 1. Operating Modes: Ballast circuit and leads provide for remote control of the light output  
25 of the associated lamp between high- and low-level and off.
- 26 a. High-Level Operation: 100 percent of rated lamp lumens.  
27 b. Low-Level Operation: 30 and 50 percent of rated lamp lumens.
- 28 2. Ballast shall provide equal current to each lamp in each operating mode.  
29 3. Compatibility: Certified by manufacturer for use with specific tri-level control system  
30 and lamp type indicated.
- 31 2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS
- 32 A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with  
33 ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for  
34 full light output unless dimmer or bi-level control is indicated:

- 1 1. Lamp end-of-life detection and shutdown circuit.
- 2 2. Automatic lamp starting after lamp replacement.
- 3 3. Sound Rating: Class A.
- 4 4. Total Harmonic Distortion Rating: Less than 20 percent.
- 5 5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
- 6 6. Operating Frequency: 20 kHz or higher.
- 7 7. Lamp Current Crest Factor: 1.7 or less.
- 8 8. BF: 0.95 or higher unless otherwise indicated.
- 9 9. Power Factor: 0.95, except fixtures designated as "Residential" may use low-power-
- 10 factor electronic ballasts or higher.
- 11 10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on
- 12 electromagnetic and radio-frequency interference for nonconsumer equipment.

## 13 2.5 EMERGENCY FLUORESCENT POWER UNIT

- 14 A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting
- 15 fixture body and compatible with ballast. Comply with UL 924.
  - 16 1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of
  - 17 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched
  - 18 circuit to fixture ballast.
  - 19 2. Nightlight Connection: Operate one fluorescent lamp continuously.
  - 20 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or
  - 21 entering ceiling space.
    - 22 a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power
    - 23 and demonstrates unit operability.
    - 24 b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle
    - 25 charge; bright glow indicates charging at end of discharge cycle.
  - 26 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  - 27 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer
  - 28 relay.
  - 29 6. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates
  - 30 coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit
  - 31 triggers simulation of loss of its normal power supply, providing visual confirmation of
  - 32 either proper or failed emergency response.
  - 33 7. Integral Self-Test: Factory-installed electronic device automatically initiates code-
  - 34 required test of unit emergency operation at required intervals. Test failure is annunciated
  - 35 by an integral audible alarm and a flashing red LED.

## 36 2.6 EXIT SIGNS

- 37 A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility,
- 38 luminance, and lettering size, comply with authorities having jurisdiction.
- 39 B. Internally Lighted Signs:

- 1 1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp  
2 life.  
3 2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.  
4 3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained  
5 power pack.
- 6 a. Battery: Sealed, maintenance-free, nickel-cadmium type.  
7 b. Charger: Fully automatic, solid-state type with sealed transfer relay.  
8 c. Operation: Relay automatically energizes lamp from battery when circuit voltage  
9 drops to 80 percent of nominal voltage or below. When normal voltage is restored,  
10 relay disconnects lamps from battery, and battery is automatically recharged and  
11 floated on charger.  
12 d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal  
13 power and demonstrates unit operability.  
14 e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle  
15 charge; bright glow indicates charging at end of discharge cycle.  
16 f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit  
17 initiates coded infrared signal. Signal reception by factory-installed infrared  
18 receiver in tested unit triggers simulation of loss of its normal power supply,  
19 providing visual confirmation of either proper or failed emergency response.  
20 g. Integral Self-Test: Factory-installed electronic device automatically initiates code-  
21 required test of unit emergency operation at required intervals. Test failure is  
22 announced by an integral audible alarm and a flashing red LED.
- 23 4. Master/Remote Sign Configurations:
- 24 a. Master Unit: Comply with requirements above for self-powered exit signs, and  
25 provide additional capacity in [**LED power supply**] [**ballast**] [**battery**] for power  
26 connection to remote unit.  
27 b. Remote Unit: Comply with requirements above for self-powered exit signs, except  
28 omit power supply, battery, and test features. Arrange to receive full power  
29 requirements from master unit. Connect for testing concurrently with master unit  
30 as a unified system.
- 31 C. Self-Luminous Signs: Powered by tritium gas, with universal bracket for flush-ceiling, wall, or  
32 end mounting. Signs shall be guaranteed by manufacturer to maintain the minimum brightness  
33 requirements in UL 924 for [**10**] [**15**] [**20**] years.
- 34 D. Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and  
35 release the stored energy when the light is removed. Provide with universal bracket for flush-  
36 ceiling, wall, or end mounting.
- 37 2.7 EMERGENCY LIGHTING UNITS
- 38 A. General Requirements for Emergency Lighting Units: Self-contained units complying with  
39 UL 924.
- 40 1. Battery: Sealed, maintenance-free, lead-acid type.  
41 2. Charger: Fully automatic, solid-state type with sealed transfer relay.

- 1           3.    Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to  
2           80 percent of nominal voltage or below. Lamp automatically disconnects from battery  
3           when voltage approaches deep-discharge level. When normal voltage is restored, relay  
4           disconnects lamps from battery, and battery is automatically recharged and floated on  
5           charger.
- 6           4.    Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and  
7           demonstrates unit operability.
- 8           5.    LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge;  
9           bright glow indicates charging at end of discharge cycle.
- 10          6.    Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
- 11          7.    Integral Time-Delay Relay: Holds unit on for fixed interval of [15] <Insert period>  
12          minutes when power is restored after an outage.
- 13          8.    Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates  
14          coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit  
15          triggers simulation of loss of its normal power supply, providing visual confirmation of  
16          either proper or failed emergency response.
- 17          9.    Integral Self-Test: Factory-installed electronic device automatically initiates code-  
18          required test of unit emergency operation at required intervals. Test failure is annunciated  
19          by an integral audible alarm and a flashing red LED.

## 20   2.8    FLUORESCENT LAMPS

- 21          A.    T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches (1220 mm), 2800  
22          initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life  
23          20,000 hours unless otherwise indicated.
- 24          B.    T5 rapid-start lamps, rated 28 W maximum, nominal length of 45.2 inches (1150 mm), 2900  
25          initial lumens (minimum), CRI 85 (minimum), color temperature 3000 K, and average rated life  
26          of 20,000 hours unless otherwise indicated.

## 27   2.9    LIGHTING FIXTURE SUPPORT COMPONENTS

- 28          A.    Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and  
29          angle-iron supports and nonmetallic channel and angle supports.
- 30          B.    Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount  
31          a single fixture. Finish same as fixture.
- 32          C.    Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- 33          D.    Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless  
34          steel, 12 gage (2.68 mm).
- 35          E.    Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- 36          F.    Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with  
37          threaded attachment, cord, and locking-type plug.

1 PART 3 - EXECUTION

2 3.1 INSTALLATION

3 A. Lighting fixtures:

- 4 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.  
5 2. Install lamps in each luminaire.

6 B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires  
7 for temporary lighting, install and energize the minimum number of luminaires necessary.  
8 When construction is sufficiently complete, remove the temporary luminaires, disassemble,  
9 clean thoroughly, install new lamps, and reinstall.

10 C. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that  
11 recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance  
12 between ballast and luminaire.

13 D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

- 14 1. Install ceiling support system rods or wires, independent of the ceiling suspension  
15 devices, for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture  
16 corners.  
17 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each  
18 fixture corner with clips that are UL listed for the application.  
19 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or  
20 center in acoustical panel, and support fixtures independently with at least two 3/4-inch  
21 (20-mm) metal channels spanning and secured to ceiling tees.  
22 4. Install at least one independent support rod or wire from structure to a tab on lighting  
23 fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor  
24 of 3.

25 E. Suspended Lighting Fixture Support:

- 26 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.  
27 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.  
28 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for  
29 suspension for each unit length of fixture chassis, including one at each end.  
30 4. Do not use grid as support for pendant luminaires. Connect support wires or rods to  
31 building structure.

32 F. Connect wiring, Low-Voltage Electrical Power Conductors and Cables.

33 3.2 IDENTIFICATION

34 A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply  
35 with requirements.

1 3.3 FIELD QUALITY CONTROL

2 A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify  
3 transfer from normal power to battery and retransfer to normal.

4 B. Verify that self-luminous exit signs are installed according to their listing and the requirements  
5 in NFPA 101.

6 C. Prepare a written report of tests, inspections, observations, and verifications indicating and  
7 interpreting results. If adjustments are made to lighting system, retest to demonstrate  
8 compliance with standards.

9 3.4 STARTUP SERVICE

10 A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by  
11 Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least  
12 100 hours at full voltage.

13 3.5 LUMINAIRE SCHEDULE

14 A. Refer to Drawings.

15 3.6 ADJUSTING

16 A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion,  
17 provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions.  
18 Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.  
19 Some of this work may be required after dark.

20 **END OF SECTION**

21 \*\*\*



- 1 B. Camera Licensing:
- 2 1. 1 per camera
- 3 2. 1 per active user
- 4 3. 1 remote 25 camera Archive

5 PART 3 - EXECUTION

6 3.1 EXAMINATION

- 7 A. Verify existing conditions before starting work.
- 8 B. Verify exact location of accessories for installation.

9 3.2 INSTALLATION

- 10 A. Install accessories in accordance with manufacturers' instructions.
- 11 B. Install plumb and level, securely and rigidly anchored to substrate.
- 12 C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on
- 13 drawings

14 3.3 CABLE TESTING

- 15 A. Perform an acceptance test of all installed cabling for system. Submit to Architect and Owner.
- 16 Test all cabling for open circuit, ground fault, or line to line shorts. Cabling found defective
- 17 during testing shall be replaced at no cost to Owner.

18 END OF SECTION 28 30 00

19

1 **SECTION 31 20 00**

2 **EARTH MOVING**

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

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

7 1.2 SUMMARY

8 A. Section Includes:

- 9 1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses and plants.  
10 2. Excavating and backfilling for buildings and structures.  
11 3. Drainage course for concrete slabs-on-grade.  
12 4. Subbase course for concrete walks pavements.  
13 5. Subbase course and base course for asphalt paving.  
14 6. Subsurface drainage backfill for walls and trenches.  
15 7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

16 1.3 QUALITY ASSURANCE

- 17 A. Preexcavation Conference: Conduct conference at Project site.

18 1.4 PROJECT CONDITIONS

- 19 A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied  
20 or used facilities during earth moving operations.

- 21 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities  
22 without permission from Owner and authorities having jurisdiction.  
23 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or  
24 authorities having jurisdiction.

- 25 B. Utility Locator Service: Notify utility locator service for area where Project is located before  
26 beginning earth moving operations.

1 PART 2 - PRODUCTS

2 2.1 SOIL MATERIALS

- 3 A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not  
4 available from excavations.
- 5 B. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed  
6 stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch  
7 (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- 8 C. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed  
9 stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch  
10 (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- 11 D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed  
12 stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch  
13 (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- 14 E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed  
15 stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch  
16 (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- 17 F. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel;  
18 ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-  
19 mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- 20 G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and  
21 natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-  
22 inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- 23 H. Sand: ASTM C 33; fine aggregate.
- 24 I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

25 2.2 ACCESSORIES

- 26 A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for  
27 marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm)  
28 thick, continuously inscribed with a description of the utility; colored as follows:
- 29 1. Red: Electric.  
30 2. Yellow: Gas.  
31 3. Orange: Telephone and other communications.  
32 4. Blue: Water systems.  
33 5. Green: Sewer systems.

1 PART 3 - EXECUTION

2 3.1 PREPARATION

- 3 A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by  
4 settlement, lateral movement, undermining, washout, and other hazards created by earth moving  
5 operations.
- 6 B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- 7 C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary  
8 protection before placing subsequent materials.

9 3.2 EXCAVATION, GENERAL

- 10 A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface  
11 and subsurface conditions encountered. Unclassified excavated materials may include rock, soil  
12 materials, and obstructions. No changes in the Contract Sum or the Contract Time will be  
13 authorized for rock excavation or removal of obstructions.
- 14 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials  
15 and rock, replace with satisfactory soil materials.
- 16 2. Remove rock to lines and grades indicated to permit installation of permanent  
17 construction without exceeding the following dimensions:
- 18 a. 24 inches (600 mm) outside of concrete forms other than at footings.
- 19 b. 12 inches (300 mm) outside of concrete forms at footings.
- 20 c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast  
21 against grade.
- 22 d. Outside dimensions of concrete walls indicated to be cast against rock without  
23 forms or exterior waterproofing treatments.
- 24 e. 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
- 25 f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm)  
26 wider than pipe or 42 inches (1065 mm) wide.
- 27 B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be  
28 classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned  
29 by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices  
30 included in the Contract Documents. Changes in the Contract Time may be authorized for rock  
31 excavation.
- 32 1. Earth excavation includes excavating pavements and obstructions visible on surface;  
33 underground structures, utilities, and other items indicated to be removed; together with  
34 soil, boulders, and other materials not classified as rock or unauthorized excavation.

1 3.3 EXCAVATION FOR STRUCTURES

2 A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25  
3 mm). If applicable, extend excavations a sufficient distance from structures for placing and  
4 removing concrete formwork, for installing services and other construction, and for inspections.

5 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation.  
6 Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms  
7 to required lines and grades to leave solid base to receive other work.

8 2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile  
9 cap before piles are placed. After piles have been driven, remove loose and displaced  
10 material. Excavate to final grade, leaving solid base to receive concrete pile caps.

11 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility  
12 Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or  
13 minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing  
14 surfaces.

15 3.4 EXCAVATION FOR WALKS AND PAVEMENTS

16 A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and  
17 subgrades.

18 3.5 EXCAVATION FOR UTILITY TRENCHES

19 A. Excavate trenches to indicated gradients, lines, depths, and elevations.

20 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below  
21 frost line.

22 B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or  
23 conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than  
24 top of pipe or conduit unless otherwise indicated.

25 1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

26 C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of  
27 pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of  
28 pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp  
29 objects along trench subgrade.

30 1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate  
31 trench bottoms and support pipe and conduit on an undisturbed subgrade.

32 2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of  
33 trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions  
34 with tamped sand backfill.

35 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support  
36 conduit on an undisturbed subgrade.

37 4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other  
38 unyielding bearing material to allow for bedding course.

1 D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit  
2 elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

3 1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other  
4 unyielding bearing material to allow for bedding course.

### 5 3.6 SUBGRADE INSPECTION

6 A. Notify Architect when excavations have reached required subgrade.

7 B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with  
8 compacted backfill or fill material as directed.

9 C. Authorized additional excavation and replacement material will be paid for according to  
10 Contract provisions.

11 D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or  
12 construction activities, as directed by Architect, without additional compensation.

### 13 3.7 UNAUTHORIZED EXCAVATION

14 A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation  
15 of concrete foundation or footing to excavation bottom, without altering top elevation. Lean  
16 concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when  
17 approved by Architect.

18 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by  
19 Architect.

### 20 3.8 STORAGE OF SOIL MATERIALS

21 A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing.  
22 Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

23 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of  
24 remaining trees.

### 25 3.9 BACKFILL

26 A. Place and compact backfill in excavations promptly, but not before completing the following:

27 1. Construction below finish grade including, where applicable, subdrainage, dampproofing,  
28 waterproofing, and perimeter insulation.

29 2. Surveying locations of underground utilities for Record Documents.

30 3. Testing and inspecting underground utilities.

31 4. Removing concrete formwork.

32 5. Removing trash and debris.

33 6. Removing temporary shoring and bracing, and sheeting.

- 1           7.     Installing permanent or temporary horizontal bracing on horizontally supported walls.
- 2        B.     Place backfill on subgrades free of mud, frost, snow, or ice.
- 3    3.10    UTILITY TRENCH BACKFILL
- 4        A.     Place backfill on subgrades free of mud, frost, snow, or ice.
- 5        B.     Place and compact bedding course on trench bottoms and where indicated. Shape bedding  
6           course to provide continuous support for bells, joints, and barrels of pipes and for joints,  
7           fittings, and bodies of conduits.
- 8        C.     Backfill voids with satisfactory soil while removing shoring and bracing.
- 9        D.     Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a  
10           height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities  
11           testing.
- 12       E.     Place and compact final backfill of satisfactory soil to final subgrade elevation.
- 13       F.     Controlled Low-Strength Material: Place final backfill of controlled low-strength material to  
14           final subgrade elevation.
- 15       G.     Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6  
16           inches (150 mm) below subgrade under pavements and slabs.
- 17    3.11    SOIL FILL
- 18        A.     Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill  
19           material will bond with existing material.
- 20        B.     Place and compact fill material in layers to required elevations as follows:
- 21           1.     Under grass and planted areas, use satisfactory soil material.
- 22           2.     Under walks and pavements, use satisfactory soil material.
- 23           3.     Under steps and ramps, use engineered fill.
- 24           4.     Under building slabs, use engineered fill.
- 25           5.     Under footings and foundations, use engineered fill.
- 26        C.     Place soil fill on subgrades free of mud, frost, snow, or ice.
- 27    3.12    SOIL MOISTURE CONTROL
- 28        A.     Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before  
29           compaction to within 2 percent of optimum moisture content.
- 30           1.     Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain  
31           frost or ice.

- 1           2.    Remove and replace, or scarify and air dry, otherwise satisfactory soil material that  
2                    exceeds optimum moisture content by 2 percent and is too wet to compact to specified  
3                    dry unit weight.

4    3.13    COMPACTION OF SOIL BACKFILLS AND FILLS

5           A.    Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material  
6                    compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose  
7                    depth for material compacted by hand-operated tampers.

8           B.    Place backfill and fill soil materials evenly on all sides of structures to required elevations, and  
9                    uniformly along the full length of each structure.

10          C.    Compact soil materials to not less than the following percentages of maximum dry unit weight  
11                    according to ASTM D 698.

12   3.14    GRADING

13          A.    General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply  
14                    with compaction requirements and grade to cross sections, lines, and elevations indicated.

- 15           1.    Provide a smooth transition between adjacent existing grades and new grades.  
16           2.    Cut out soft spots, fill low spots, and trim high spots to comply with required surface  
17                    tolerances.

18          B.    Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding.  
19                    Finish subgrades to required elevations within the following tolerances:

- 20           1.    Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).  
21           2.    Walks: Plus or minus 1 inch (25 mm).  
22           3.    Pavements: Plus or minus 1/2 inch (13 mm).

23          C.    Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested  
24                    with a 10-foot (3-m) straightedge.

25   3.15    SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

26          A.    Place subbase course on subgrades free of mud, frost, snow, or ice.

27          B.    On prepared subgrade, place subbase course under pavements and walks as follows:

- 28           1.    Install separation geotextile on prepared subgrade according to manufacturer's written  
29                    instructions, overlapping sides and ends.  
30           2.    Place base course material over subbase course under hot-mix asphalt pavement.  
31           3.    Shape subbase course to required crown elevations and cross-slope grades.  
32           4.    Place subbase course 6 inches (150 mm) or less in compacted thickness in a single layer.  
33           5.    Place subbase course and base course that exceeds 6 inches (150 mm) in compacted  
34                    thickness in layers of equal thickness, with no compacted layer more than 6 inches (150  
35                    mm) thick or less than 3 inches (75 mm) thick.

1           6.     Compact subbase course and base course at optimum moisture content to required grades,  
2           lines, cross sections, and thickness to not less than 95 percent of maximum dry unit  
3           weight according to ASTM D 698.

4    3.16     DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

5           A.     Place drainage course on subgrades free of mud, frost, snow, or ice.

6           B.     On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-  
7           on-grade as follows:

8           1.     Install subdrainage geotextile on prepared subgrade according to manufacturer's written  
9           instructions, overlapping sides and ends.

10          2.     Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.

11          3.     Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of  
12          equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than  
13          3 inches (75 mm) thick.

14          4.     Compact each layer of drainage course to required cross sections and thicknesses to not  
15          less than 95 percent of maximum dry unit weight according to ASTM D 698.

16   3.17     FIELD QUALITY CONTROL

17          A.     Special Inspections: Owner will engage a qualified special inspector to perform the following  
18          special inspections:

19          1.     Determine prior to placement of fill that site has been prepared in compliance with  
20          requirements.

21          2.     Determine that fill material and maximum lift thickness comply with requirements.

22          3.     Determine, at the required frequency, that in-place density of compacted fill complies  
23          with requirements.

24          B.     Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to  
25          perform tests and inspections.

26          C.     Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with  
27          subsequent earth moving only after test results for previously completed work comply with  
28          requirements.

29          D.     Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed  
30          to verify design bearing capacities. Subsequent verification and approval of other footing  
31          subgrades may be based on a visual comparison of subgrade with tested subgrade when  
32          approved by Architect.

33   3.18     PROTECTION

34          A.     Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep  
35          free of trash and debris.

1 B. Repair and reestablish grades to specified tolerances where completed or partially completed  
2 surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent  
3 construction operations or weather conditions.

4 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and  
5 recompact.

6 C. Where settling occurs before Project correction period elapses, remove finished surfacing,  
7 backfill with additional soil material, compact, and reconstruct surfacing.

8 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work,  
9 and eliminate evidence of restoration to greatest extent possible.

10 3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

11 A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and  
12 debris, and legally dispose of them off Owner's property.

13 B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or  
14 spread soil as directed by Architect.

15 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally  
16 dispose of them off Owner's property.

17 **END OF SECTION**

18 \*\*\*

1 SECTION 32 31 15

2 ORNAMENTAL FENCE

3 PART 1 - GENERAL

4 1.1 RELATED DOCUMENTS

- 5 A. Drawings and general provisions of the Contract, including General and Supplementary  
6 Conditions and Division 1 Specification Sections, apply to this Section.

7 1.2 SUMMARY

- 8 A. This Section includes the following:

- 9 1. Extruded Aluminum Ornamental Fence: Commercial Quality

10 1.3 SUBMITTALS

- 11 A. Product Data: Include construction details, material descriptions, dimensions of individual  
12 components and profiles, and finishes for chain-link fences and gates.

- 13 1. Fence and posts, rails, and fittings.

- 14 B. Shop Drawings: Show locations of fences, gates, posts, rails, details of post connections to the  
15 existing terrazzo floor, gate swing, or other operation, hardware, and accessories. Indicate  
16 materials, dimensions, sizes, weights, and finishes of components. Include plans, gate  
17 elevations, sections, details of post anchorage, attachment, bracing, and other required  
18 installation and operational clearances.

- 19  
20 C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors  
21 available for components with factory-applied color finishes.

22 1.4 QUALITY ASSURANCE

- 23 A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in  
24 Division 1 Section "Project Management and Coordination."

25 1.5 PROJECT CONDITIONS

- 26 A. Field Measurements: Verify layout information for fence and gate shown on Drawings in  
27 relation to property survey and existing structures. Verify dimensions by field measurements.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURERS

3 A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering  
4 products that may be incorporated into the Work include, but are not limited to, the following:

5 B. Manufacturers:

6 1. Basis-of-Design Product - : Extruded Aluminum Fences and Gates:

7 a. Superior Aluminum Products, Inc.; 555 E. Main St., P.O. Box 430, Russia, OH  
8 45363. Tel.: 938-526-4065/ email: [superioralum@wesnet.com](mailto:superioralum@wesnet.com)

9 2. Subject to Compliance with Contract Documents, additional manufacturers may submit  
10 for approval:

11 a. Alumina Railing Products, Inc.

12 b. Ametco Manufacturing Corporation

13 2.2 FENCE AND GATE MATERIALS

14 A. Superior Aluminum Products 700 series

15 B. Posts: 4" square, min .075 wall thickness; Height: 6'-0" nominal.

16 C. Rail and Picket style: Series 700, with 3" picket centers. Height: 6'-0" nominal, Length: as  
17 specified on drawings and verified in the field

18 D. Post Finials: Flat.

19 2.3 FITTINGS

20 A. General: Comply with ASTM F 626.

21 2.4 ANCHORAGE

22 A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive,  
23 nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by  
24 manufacturer, for exterior applications.

25 B. Flanged post base plates with 4 holes for surface mounting posts where indicated

26 C. Masonry wall anchors: galvanized steel, min. 2" long; expansion type anchors.

27 D. Wall brackets: fabricate to dimensions indicated on drawings and as specified in section 05500.  
28 Paint to match fence

29 E. Bolts: Carriage style through bolts, steel, paint to match fence/ gate

1 2.5 POLYMER FINISHES

2 A. Supplemental Color Coating: provide fence components with polymer coating.

3

4 B. Aluminum Framing and Fittings: Comply with ASTM F 626 and ASTM F 1043 for polymer  
5 coating applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces.

6 1. Polymer Coating: Not less than 2.5-mil- (0.0635-mm-) thick polyester finish.

7 2. Or equal finish as approved by architect

8 C. Color: Black, complying with ASTM F 934.

9 PART 3 - EXECUTION

10 3.1 EXAMINATION

11 A. Examine all wall and floor materials for secure anchorage to all existing building components.

12 3.2 PREPARATION

13 A. Locate fence and floor anchorage locations on existing building components

14 3.3 INSTALLATION, GENERAL

15 A. Install fencing to comply with ASTM F 567 and more stringent requirements specified.

16 1. Install fencing on established boundary lines inside property line.

17 3.4 FENCE INSTALLATION

18 A. Post Setting: Set posts with into concrete footings.

19 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in  
20 position during setting.

21 2. Set all posts to dimensions indicated on drawings  
22

23 B. Top Rail: Install maintaining plumb position and alignment of fencing. Rail dimensions shall  
24 be cut to lengths reflective of post spacing

25 C. Bottom Rails: Install, spanning between posts. Rail dimensions shall be cut to lengths reflective  
26 of post spacing.

1 D. Accessories: Shop or field apply accessories indicated on drawings and within this  
2 specification.

3 END OF SECTION

4 \*\*\*



1 2.2 SWING GATES

2 A. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes 1-1/2 by 1-1/2  
3 inches (38 by 38 mm) formed from 0.108-inch (2.74-mm) nominal-thickness, metallic-coated  
4 steel sheet or formed from 0.105-inch (2.66-mm) nominal-thickness steel sheet and hot-dip  
5 galvanized after fabrication.

6 B. Infill: Welded-wire fence fabric matching adjacent fence.

7 C. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each  
8 gate leaf more than 5 feet (1.52 m) wide.

9 D. Metallic-Coated-Steel Finish: Galvanized finish.

10 2.3 FENCE AND GATE MATERIALS

11 A. Metallic-Coated-Steel Wire: Welded-wire fence fabric, hot-dip galvanized after fabrication.  
12 Weight of zinc coating shall be not less than 1.0 oz./sq. ft. (305 g/sq. m).

13 B. Uncoated Steel Sheet: Hot-rolled steel sheet, ASTM A 1011/A 1011M, Structural Steel,  
14 Grade 45 (Grade 310).

15 C. Metallic-Coated Steel Sheet: Galvanized-steel sheet or aluminum-zinc, alloy-coated steel sheet.

16 D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50 (Grade 340), with  
17 G90 (Z275) coating.

18 E. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip  
19 galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to  
20 comply with ASTM A 153/A 153M.

21 2.4 COATING MATERIALS

22 A. Epoxy Primer for Galvanized Steel: Epoxy primer recommended in writing by topcoat  
23 manufacturer.

24 1. Products: Subject to compliance with requirements. Refer to 09 90 13 - Exterior  
25 Painting for specifications.

26 2.5 MISCELLANEOUS MATERIALS

27 A. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in  
28 Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000  
29 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size.

30 2.6 METALLIC-COATED-STEEL FINISHES

31 A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas, and repair  
32 galvanizing to comply with ASTM A 780/A 780M.

- 1 B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and  
2 other contaminants. After cleaning, apply a zinc-phosphate conversion coating suited to the  
3 organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas,  
4 and repair galvanizing to comply with ASTM A 780/A 780M.
- 5 C. Powder Coating: Epoxy prime coat and TGIC polyester topcoat, with a minimum dry film  
6 thickness of 2 mils (0.05 mm) for topcoat and a total dry film thickness of 4 mils (0.10 mm).
- 7 1. Color and Gloss: As selected by Architect from manufacturer's full range.  
8 2. Comply with surface finish testing requirements in ASTM F 2408.
- 9 D. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and  
10 polyurethane topcoat to prepared surfaces. Apply at spreading rates recommended by coating  
11 manufacturer.
- 12 1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat  
13 work that does not comply with specified requirements.

## 14 PART 3 - EXECUTION

### 15 3.1 FENCE INSTALLATION

- 16 A. Install fences according to manufacturer's written instructions.
- 17 B. Install fences by setting posts as indicated and fastening infill panels to posts. Peen threads of  
18 bolts after assembly to prevent removal.
- 19 C. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes  
20 to a diameter of not less than 4 times post size and a depth of not less than 24 inches (600 mm)  
21 plus 3 inches (75 mm) for each foot (300 mm) or fraction of a foot (300 mm) that fence height  
22 exceeds 4 feet (1.2 m).
- 23 D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

### 24 3.2 GATE INSTALLATION

- 25 A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full  
26 opening without interference. Attach hardware using tamper-resistant or concealed means.  
27 Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and  
28 lubricate where necessary.

29 **END OF SECTION**

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**SECTION 32 92 19  
SEEDING**

**PART 1 - G E N E R A L**

**SCOPE**

The work under this section shall consist of providing all work, materials, labor, equipment and supervision necessary to complete seeding, mulching and maintenance as indicated on the drawings. Included are the following topics:

**PART 1 - GENERAL**

- Scope
- Related Work
- Submittals
- Delivery, Storage and Handling
- Planting Season
- Guarantee

**PART 2 - MATERIALS**

- Grass Seed Mix
- Water
- Mulch

**PART 3 - EXECUTION**

- Preparation
- Sowing
- Mulching
- Cleaning and Repair
- Maintenance Watering
- Mowing

**SUBMITTALS**

Provide seed samples and data showing seed mix composition and a guarantee of germination.

Provide seed mixture.

Provide information on method of sowing seed.

**DELIVERY, STORAGE AND HANDLING**

Seed shall be delivered to the site in its original, unopened container, labeled as to weight, analysis, and manufacturer. Store any seed delivered prior to use in a manner safe from damage from heat, moisture, rodents, or other causes. Any seed damaged after acceptance shall be replaced by the Contractor.

**PLANTING SEASON**

The regular seeding season is considered April 1-June 15 and September 1-October 15.

**GUARANTEE**

Guarantee the germination of seed installed during the regular seeding season.

**PART 2 - PRODUCTS**

**GRASS SEED MIX**

Seed Mix No. 40, as defined in Section 630.2.1.5.1.1.2 of Standard Specifications for Highway Construction.

1 Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed  
2 Technology; Rules for Testing Seeds" for purity and germination tolerances.

3  
4 Full Sun:

5 70 percent Kentucky Bluegrass (Poa pratensis), a minimum of three cultivars  
6 15 percent Perennial Ryegrass (Lolium perenne)  
7 15 percent Fine Fescue (Fescue variety).

8  
9 WATER

10 Water free of wastewater effluent or other hazardous chemicals.

11  
12 MULCH

13 Clean straw or hay that is well-seasoned, and free of rot, mildew and the seeds of noxious weeds.  
14  
15  
16  
17

18  
19 PART 3 - EXECUTION

20  
21 PREPARATION

22 Prepare area in accordance with Section 32 91 19 – Soil Preparation.

23 No seeding shall occur on frozen ground or at temperatures lower than 32° F (0° C).  
24  
25  
26

27  
28 SOWING

29 Sow seed using either Method A or Method B as defined in Section 630.3.3 of Standard  
30 Specifications for Highway Construction. Unless otherwise noted, sow seed at a rate of 2# (dry  
31 seed weight)/1000 square feet.  
32  
33

34 MULCHING

35 Place and anchor mulch using the methods outlined in Section 627.3 of Standard Specifications  
36 for Highway Construction.  
37  
38

39 CLEANING AND REPAIR

40 Waste and excess material from the seeding operation shall be promptly removed. Adjacent  
41 paved areas are to be cleaned, and any damage to existing adjacent turf areas shall be repaired.  
42  
43  
44

45 MAINTENANCE WATERING

46 Seeded areas are to be watered daily to maintain adequate surface soil moisture for proper seed  
47 germination. Watering shall continue for not less than 30 days following seeding. Thereafter,  
48 apply 1/2" (1.3 cm) of water twice weekly until final acceptance.  
49  
50

51 MOWING

52 Cool season grasses, such as bluegrass, tall fescue, perennial ryegrass, etc. shall be mown to a  
53 height of 2-1/2" (6.4 cm) in spring and fall, and no less than 3" (7.6 cm) from June through  
54 September. These heights are to be maintained through repeat mowings as needed until final  
55 acceptance.  
56  
57

58 No more than 40% of grass leaf shall be removed during any single mowing operation.  
59 The mowing operation is to include trimming around obstacles and the raking of excess grass  
60 clippings. Weed eaters shall not be used around trees.  
61

62 END OF SECTION

63 \*\*\*

1 SECTION 32 93 00

2 PLANTS

3 PART 1 - GENERAL

4 1.1 SUMMARY

5 A. Section Includes:

- 6 1. Plants.  
7 2. Tree-watering devices.  
8 3. Landscape edgings.

9 1.2 PREINSTALLATION MEETINGS

- 10 A. Preinstallation Conference: Conduct conference at Project site.

11 1.3 SUBMITTALS

- 12 A. Product Data: For each type of product.

- 13 B. Samples of each type of mulch.

- 14 C. Product certificates.

- 15 D. Sample warranty.

- 16 E. Maintenance Data: Recommended procedures to be established by Owner for maintenance of  
17 plants during a calendar year.

18 1.4 QUALITY ASSURANCE

- 19 A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor  
20 on Project site when work is in progress.

- 21 1. Pesticide Applicator: State licensed, commercial.

- 22 B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable  
23 requirements in ANSI Z60.1.

24 1.5 DELIVERY, STORAGE, AND HANDLING

- 25 A. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-  
26 root stock, pack root system in wet straw, hay, or other suitable material to keep root system

1 moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool  
2 and protected from sun and wind at all times.

3 B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from  
4 sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not  
5 bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide  
6 protective covering of plants during shipping and delivery. Do not drop plants during delivery  
7 and handling.

8 C. Handle planting stock by root ball.

9 D. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

10 E. Deliver plants after preparations for planting have been completed, and install immediately. If  
11 planting is delayed more than six hours after delivery, set plants and trees in their appropriate  
12 aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep  
13 roots moist.

## 14 1.6 WARRANTY

15 A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in  
16 materials, workmanship, or growth within specified warranty period.

17 1. Failures include, but are not limited to, the following:

- 18 a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of  
19 adequate maintenance, or neglect by Owner.
- 20 b. Structural failures including plantings falling or blowing over.

21 2. Warranty Periods: From date of planting completion.

- 22 a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
- 23 b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
- 24 c. Annuals: Three months.

## 25 PART 2 - PRODUCTS

### 26 2.1 PLANT MATERIAL

27 A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form,  
28 shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated  
29 on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by  
30 transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock,  
31 densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots,  
32 sun scald, injuries, abrasions, and disfigurement.

33 B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which  
34 begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

1 C. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or  
2 listed, with well-established root systems reaching to sides of the container to maintain a firm  
3 ball, but not with excessive root growth encircling the container. Provide only plants that are  
4 acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

5 2.2 FERTILIZERS

6 A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade  
7 planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting  
8 nutrients into a form that can be absorbed by plant roots.

9 1. Size: 5-gram tablets.

10 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent  
11 potassium, by weight plus micronutrients.

12 2.3 MULCHES

13 A. Organic Mulch: Ground or shredded bark.

14 2.4 WEED-CONTROL BARRIERS

15 A. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven  
16 polypropylene fabric, 4.8 oz./sq. yd. (162 g/sq. m).

17 2.5 PESTICIDES

18 A. General: Pesticide registered and approved by the EPA, acceptable to authorities having  
19 jurisdiction, and of type recommended by manufacturer for each specific problem and as  
20 required for Project conditions and application. Do not use restricted pesticides unless  
21 authorized in writing by authorities having jurisdiction.

22 PART 3 - EXECUTION

23 3.1 EXCAVATION FOR TREES AND SHRUBS

24 A. Planting Pits and Trenches: Excavate circular planting pits.

25 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with  
26 vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom  
27 raised slightly to support root ball and assist in drainage away from center. Do not further  
28 disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling.  
29 Scarify sides of planting pit smeared or smoothed during excavation.

30 2. Excavate approximately three times as wide as ball diameter.

31 3. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to  
32 accommodate vertical roots for bare-root stock.

- 1 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the  
2 bottom of the root ball.
- 3 B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless  
4 otherwise indicated.
- 5 3.2 TREE AND SHRUB PLANTING
- 6 A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to  
7 ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to  
8 where the top-most root emerges from the trunk. After soil removal to expose the root flare,  
9 verify that root ball still meets size requirements.
- 10 B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly;  
11 do not break.
- 12 C. Set each plant plumb and in center of planting pit or trench with root flare 1 inch (25 mm)  
13 above adjacent finish grades.
- 14 1. Backfill: Planting soil for trees, use excavated soil for backfill.  
15 2. Balled and Burlapped Stock: After placing some backfill around root ball to stabilize  
16 plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and  
17 from sides, but do not remove from under root balls. Remove pallets, if any, before  
18 setting. Do not use planting stock if root ball is cracked or broken before or during  
19 planting operation.  
20 3. Balled and Potted and Container-Grown Stock: Carefully remove root ball from container  
21 without damaging root ball or plant.  
22 4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging  
23 root ball or plant. Do not use planting stock if root ball is cracked or broken before or  
24 during planting operation.  
25 5. Bare-Root Stock: Support stem of each plant and spread roots without tangling or turning  
26 toward surface. Plumb before backfilling, and maintain plumb while working. Carefully  
27 work backfill around roots by hand. Bring roots into close contact with the soil.  
28 6. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air  
29 pockets. When planting pit is approximately one-half filled, water thoroughly before  
30 placing remainder of backfill. Repeat watering until no more water is absorbed.  
31 7. Place planting tablets equally distributed around each planting pit when pit is  
32 approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm)  
33 from root tips; do not place tablets in bottom of the hole.
- 34 a. Bare-Root Stock: Place tablets beside soil-covered roots; do not place tablets  
35 touching the roots.  
36 b. Quantity: Three for each caliper inch of plant.
- 37 8. Continue backfilling process. Water again after placing and tamping final layer of soil.
- 38 D. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with  
39 the surrounding soil on the slope; the edge of the root ball on the downhill side will be above  
40 the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

1 3.3 TREE AND SHRUB PRUNING

- 2 A. Remove only dead, dying, or broken branches. Do not prune for shape.
- 3 B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- 4 C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural  
5 and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders;  
6 remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural  
7 character.
- 8 D. Do not apply pruning paint to wounds.

9 3.4 PLANT MAINTENANCE

- 10 A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring  
11 planting saucers, resetting to proper grades or vertical position, and performing other operations  
12 as required to establish healthy, viable plantings.
- 13 B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes.  
14 Replace mulch materials damaged or lost in areas of subsidence.
- 15 C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and  
16 pathogens or disease. Use integrated pest management practices when possible to minimize use  
17 of pesticides and reduce hazards. Treatments include physical controls such as hosing off  
18 foliage, mechanical controls such as traps, and biological control agents.
- 19 D. Apply pesticides and other chemical products and biological control agents according to  
20 authorities having jurisdiction and manufacturer's written recommendations. Coordinate  
21 applications with Owner's operations and others in proximity to the Work. Notify Owner before  
22 each application is performed.
- 23 E. Protect plants from damage due to landscape operations and operations of other contractors and  
24 trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace  
25 damaged plantings.

26 3.5 MAINTENANCE SERVICE

- 27 A. Maintenance Service: Provide maintenance by skilled employees of landscape Installer.  
28 Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after  
29 plants are installed and continue until plantings are acceptably healthy and well established, but  
30 for not less than maintenance period below:
  - 31 1. Maintenance Period for Trees and Shrubs: 12 months from date of planting completion.
  - 32 2. Maintenance Period for Ground Cover and Other Plants: Six months from date of  
33 planting completion.

34 END OF SECTION

**SECTION E: BIDDERS ACKNOWLEDGEMENT**  
**THERESA TERRACE NEIGHBORHOOD CENTER**  
**CONTRACT NO. 7385**

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2014 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda to the Contract Nos. \_\_\_\_\_ through \_\_\_\_\_ issued thereto, at the prices for said work as contained in this proposal. (Electronic bids submittals shall acknowledge addendum under Section E and shall not acknowledge here)
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. I hereby certify that I have met the Bid Bond Requirements as specified in Section 102.5.  
*(IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).*
5. I hereby certify that all statements herein are made on behalf of \_\_\_\_\_ (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of \_\_\_\_\_ a partnership consisting of \_\_\_\_\_; an individual trading as \_\_\_\_\_; of the City of \_\_\_\_\_ State of \_\_\_\_\_; that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf; and that the said statements are true and correct.

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
TITLE, IF ANY

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

\_\_\_\_\_  
(Notary Public or other officer authorized to administer oaths)  
My Commission Expires \_\_\_\_\_  
Bidders shall not add any conditions or qualifying statements to this Proposal.

## SECTION F: DISCLOSURE OF OWNERSHIP & BEST VALUE CONTRACTING

### THERESA TERRACE NEIGHBORHOOD CENTER CONTRACT NO. 7385

State of Wisconsin  
Department of Workforce Development  
Equal Rights Division  
Labor Standards Bureau

## Disclosure of Ownership

<p><b>Notice required under Section 15.04(1)(m), Wisconsin Statutes.</b> The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d) and 103.49(7)(d), Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes. Personal information you provide may be used for secondary purposes.</p>			
<p>(1) On the date a contractor submits a bid to or completes negotiations with a state agency or local governmental unit, on a project subject to Section 66.0903 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency or local governmental unit the name of any "other construction business", which the contractor, or a shareholder, officer or partner of the contractor, owns or has owned within the preceding three (3) years.</p> <p>(2) The term "other construction business" means any business engaged in the erection, construction, remodeling, repairing, demolition, altering or painting and decorating of buildings, structures or facilities. It also means any business engaged in supplying mineral aggregate, or hauling excavated material or spoil as provided by Sections 66.0903(3), 103.49(2) and 103.50(2), Wisconsin Statutes.</p> <p>(3) This form must <b>ONLY</b> be filed, with the state agency or local governmental unit that will be awarding the contract, if <b>both (A) and (B) are met</b>.</p> <p>(A) The contractor, or a shareholder, officer or partner of the contractor:                  (1) Owns at least a 25% interest in the "other construction business", indicated below, on the date the contractor submits a bid or completes negotiations.                  (2) Or has owned at least a 25% interest in the "other construction business" at any time within the preceding three (3) years.</p> <p>(B) The Wisconsin Department of Workforce Development (DWD) has determined that the "other construction business" has failed to pay the prevailing wage rate or time and one-half the required hourly basic rate of pay, for hours worked in excess of the prevailing hours of labor, to any employee at any time within the preceding three (3) years.</p>			
<b>Other Construction Business</b>			
Not Applicable <input type="checkbox"/>			
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
<p><b>I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.</b></p>			
Print the Name of Authorized Officer			
Signature of Authorized Officer		Date Signed	
Name of Corporation, Partnership or Sole Proprietorship			
Street Address or P O Box	City	State	Zip Code

**If you have any questions call (608) 266-0028**

ERD-7777-E (R. 09/2003)

**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

**Best Value Contracting**

1. The Contractor shall indicate the non-apprenticeable trades used on this contract.

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2. Madison General Ordinance (M.G.O.), 33.07(7), does provide for some exemptions from the active apprentice requirement. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin. Please check applicable box if you are seeking an exemption.

- Contractor has a total skilled workforce of four or less individuals in all apprenticeable trades combined.
- No available trade training program; The Contractor has been rejected by the only available trade training program, or there is no trade training program within 90 miles.
- Contractor is not using an apprentice due to having a journey worker on layoff status, provided the journey worker was employed by the contractor in the past six months.
- First-time Contractor on City of Madison Public Works contract requests a onetime exemption but intends to comply on all future contracts and is taking steps typical of a "good faith" effort.
- Contractor has been in business less than one year.
- Contractor doesn't have enough journeyman trade workers to qualify for a trade training program in that respective trade

3. The Contractor shall indicate on the following section which apprenticeable trades are to be used on this contract. Compliance with active apprenticeship, to the extent required by M.G.O. 33.07(7), shall be satisfied by documentation from an applicable trade training body; an apprenticeship contract with the Wisconsin Department of Workforce Development or a similar agency in another state; or the U.S Department of Labor. This documentation is required prior to the Contractor beginning work on the project site.

- The Contractor has reviewed the list and shall not use any apprenticeable trades on this project.

**LIST APPRENTICABLE TRADES** (check all that apply to your work to be performed on this contract)

- BRICKLAYER
- CARPENTER
- CEMENT MASON / CONCRETE FINISHER
- CEMENT MASON (HEAVY HIGHWAY)
- CONSTRUCTION CRAFT LABORER
- DATA COMMUNICATION INSTALLER
- ELECTRICIAN
- ENVIRONMENTAL SYSTEMS TECHNICIAN / HVAC SERVICE TECH/HVAC INSTALL / SERVICE
- GLAZIER
- HEAVY EQUIPMENT OPERATOR / OPERATING ENGINEER
- INSULATION WORKER (HEAT & FROST)
- IRON WORKER
- IRON WORKER (ASSEMBLER, METAL BLDGS)
- PAINTER & DECORATOR
- PLASTERER
- PLUMBER
- RESIDENTIAL ELECTRICIAN
- ROOFER & WATER PROOFER
- SHEET METAL WORKER
- SPRINKLER FITTER
- STEAMFITTER
- STEAMFITTER (REFRIGERATION)
- STEAMFITTER (SERVICE)
- TAPER & FINISHER
- TELECOMMUNICATIONS (VOICE, DATA & VIDEO) INSTALLER-TECHNICIAN
- TILE SETTER

## SECTION G: BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT \_\_\_\_\_ (a corporation of the State of \_\_\_\_\_) (individual), (partnership), hereinafter referred to as the "Principal") and \_\_\_\_\_, a corporation of the State of \_\_\_\_\_ (hereinafter referred to as the "Surety") and licensed to do business in the State of Wisconsin, are held and firmly bound unto the City of Madison, (hereinafter referred to as the "Obligee"), in the sum of five per cent (5%) of the amount of the total bid or bids of the Principal herein accepted by the Obligee, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The conditions of this obligation are such that, whereas the Principal has submitted, to the City of Madison a certain bid, including the related alternate, and substitute bids attached hereto and hereby made a part hereof, to enter into a contract in writing for the construction of:

### **THERESA TERRACE NEIGHBORHOOD CENTER CONTRACT NO. 7385**

1. If said bid is rejected by the Obligee, then this obligation shall be void.
2. If said bid is accepted by the Obligee and the Principal shall execute and deliver a contract in the form specified by the Obligee (properly completed in accordance with said bid) and shall furnish a bond for his/her faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

If said bid is accepted by the Obligee and the Principal shall fail to execute and deliver the contract and the performance and payment bond noted in 2. above executed by this Surety, or other Surety approved by the City of Madison, all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to forfeit to the Obligee as liquidated damages the sum mentioned above, it being understood that the liability of the Surety for any and all claims hereunder shall in no event exceed the sum of this obligation as stated, and it is further understood that the Principal and Surety reserve the right to recover from the Obligee that portion of the forfeited sum which exceed the actual liquidated damages incurred by the Obligee.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Obligee may accept such bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

Seal

\_\_\_\_\_  
Principal Date

By:

\_\_\_\_\_

\_\_\_\_\_  
Name of Surety

By:

\_\_\_\_\_  
Date

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under License No. \_\_\_\_\_ for the year \_\_\_\_\_, and appointed as attorney in fact with authority to execute this bid bond and the payment and performance bond referred to above, which power of attorney has not been revoked.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Agent

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State and Zip Code

\_\_\_\_\_  
Telephone Number

**NOTE TO SURETY & PRINCIPAL**

The bid submitted which this bond guarantees shall be rejected if the following instrument is not attached to this bond:

Power of Attorney showing that the agent of Surety is currently authorized to execute bonds on behalf of the Surety, and in the amounts referenced above.

## Certificate of Biennial Bid Bond

TIME PERIOD - VALID (FROM/TO)
NAME OF SURETY
NAME OF CONTRACTOR
CERTIFICATE HOLDER <p style="text-align: center;">City of Madison, Wisconsin</p>

This is to certify that a biennial bid bond issued by the above-named Surety is currently on file with the City of Madison.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the biennial bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing Surety will give thirty (30) days written notice to the certificate holder indicated above.

\_\_\_\_\_  
Signature of Authorized Contractor Representative

\_\_\_\_\_  
Date

## SECTION H: AGREEMENT

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_ in the year Two Thousand and Fourteen between \_\_\_\_\_ hereinafter called the Contractor, and the City of Madison, Wisconsin, hereinafter called the City.

WHEREAS, the Common Council of the said City of Madison under the provisions of a resolution adopted \_\_\_\_\_, and by virtue of authority vested in the said Council, has awarded to the Contractor the work of performing certain construction.

NOW, THEREFORE, the Contractor and the City, for the consideration hereinafter named, agree as follows:

1. **Scope of Work.** The Contractor shall, perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and contract; perform all items of work covered or stipulated in the proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

### THERESA TERRACE NEIGHBORHOOD CENTER CONTRACT NO. 7385

2. **Completion Date/Contract Time.** Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.
3. **Contract Price.** The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) Dollars being the amount bid by such Contractor and which was awarded to him/her as provided by law.
4. **Wage Rates for Employees of Public Works Contractors**

**General and Authorization.** The Contractor shall compensate its employees at the prevailing wage rate in accordance with section 66.0903, Wis. Stats., DWD 290 of the Wisconsin Administrative Code and as hereinafter provided unless otherwise noted in Section D: Special Provisions, Subsection 102.10 – Minimum Rate of Wage Scale.

“Public Works” shall include building or work involving the erection, construction, remodeling, repairing or demolition of buildings, parking lots, highways, streets, bridges, sidewalks, street lighting, traffic signals, sanitary sewers, water mains and appurtenances, storm sewers, and the grading and landscaping of public lands.

“Building or work” includes construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work, except for the delivery of mineral aggregate such as sand, gravel, bituminous asphaltic concrete or stone which is incorporated into the work under contract with the City by depositing the material directly in final place from transporting vehicle.

“Erection, construction, remodeling, repairing” means all types of work done on a particular building or work at the site thereof in the construction or development of the project, including without limitation, erecting, construction, remodeling, repairing, altering, painting, and decorating, the transporting of materials and supplies to or from the building or work done by the employees of the Contractor, Subcontractor, or Agent thereof, and the manufacturing or furnishing of

materials, articles, supplies or equipment on the site of the building or work, by persons employed by the Contractor, Subcontractor, or Agent thereof.

"Employees working on the project" means laborers, workers, and mechanics employed directly upon the site of work.

"Laborers, Workers, and Mechanics" include pre-apprentices, helpers, trainees, learners and properly registered and indentured apprentices but exclude clerical, supervisory, and other personnel not performing manual labor.

**Establishment of Wage Rates.** The Department of Public Works shall periodically obtain a current schedule of prevailing wage rates from DWD. The schedule shall be used to establish the City of Madison Prevailing Wage Rate Schedule for Public Works Construction (prevailing wage rate). The Department of Public Works may include known increases to the prevailing wage rate which can be documented and are to occur on a future specific date. The prevailing wage rate shall be included in public works contracts subsequently negotiated or solicited by the City. Except for known increases contained within the schedule, the prevailing wage rate shall not change during the contract. The approved wage rate is attached hereto.

**Workforce Profile.** The Contractor shall, at the time of signature of the contract, notify the City Engineer in writing of the names and classifications of all the employees of the Contractor, Subcontractors, and Agents proposed for the work. In the alternative, the Contractor shall submit in writing the classifications of all the employees of the Contractor, Subcontractors and Agents and the total number of hours estimated in each classification for the work. This workforce profile(s) shall be reviewed by the City Engineer who may, within ten (10) days, object to the workforce profile(s) as not being reflective of that which would be required for the work. The Contractor may request that the workforce profile, or a portion of the workforce profile, be submitted after the signature of the contract but at least ten (10) days prior to the work commencing. Any costs or time loss resulting from modifications to the workforce profile as a result of the City Engineer's objections shall be the responsibility of the Contractor.

**Payrolls and Records.** The Contractor shall keep weekly payroll records setting forth the name, address, telephone number, classification, wage rate and fringe benefit package of all the employees who work on the contract, including the employees of the Contractor's subcontractors and agents. Such weekly payroll records must include the required information for all City contracts and all other contracts on which the employee worked during the week in which the employee worked on the contract. The Contractor shall also keep records of the individual time each employee worked on the project and for each day of the project. Such records shall also set forth the total number of hours of overtime credited to each such employee for each day and week and the amount of overtime pay received in that week. The records shall set forth the full weekly wages earned by each employee and the actual hourly wage paid to the employee.

The Contractor shall submit the weekly payroll records, including the records of the Contractor's subcontractors and agents, to the City Engineer for every week that work is being done on the contract. The submittal shall be within twenty-one (21) calendar days of the end of the Contractor's weekly pay period.

Employees shall receive the full amounts accrued at the time of the payment, computed at rates not less than those stated in the prevailing wage rate and each employee's rate shall be determined by the work that is done within the trade or occupation classification which should be properly assigned to the employee.

An employee's classification shall not be changed to a classification of a lesser rate during the contract. If, during the term of the contract, an employee works in a higher pay classification than the one which was previously properly assigned to the employee, then that employee shall be considered to be in the higher pay classification for the balance of the contract, receive the appropriate higher rate of pay, and she/he shall not receive a lesser rate during the balance of the

contract. For purposes of clarification, it is noted that there is a distinct difference between working in a different classification with higher pay and doing work within a classification that has varying rates of pay which are determined by the type of work that is done within the classification. For example, the classification "Operating Engineer" provides for different rates of pay for various classes of work and the Employer shall compensate an employee classified as an "Operating Engineer" based on the highest class of work that is done in one day. Therefore, an "Operating Engineer's" rate may vary on a day to day basis depending on the type of work that is done, but it will never be less than the base rate of an "Operating Engineer". Also, as a matter of clarification, it is recognized that an employee may work in a higher paying classification merely by chance and without prior intention, calculation or design. If such is the case and the performance of the work is truly incidental and the occurrence is infrequent, inconsequential and does not serve to undermine the single classification principle herein, then it may not be required that the employee be considered to be in the higher pay classification and receive the higher rate of pay for the duration of the contract. However, the Contractor is not precluded or prevented from paying the higher rate for the limited time that an employee performs work that is outside of the employee's proper classification.

Questions regarding an employee's classification, rate of pay or rate of pay within a classification, shall be resolved by reference to the established practice that predominates in the industry and on which the trade or occupation rate/classification is based. Rate of pay and classification disputes shall be resolved by relying upon practices established by collective bargaining agreements and guidelines used in such determination by appropriate recognized trade unions operating within the City of Madison.

The Contractor, its Subcontractors and Agents shall submit to interrogation regarding compliance with the provisions of this ordinance.

Mulcting of the employees by the Contractor, Subcontractor, and Agents on Public Works contracts, such as by kickbacks or other devices, is prohibited. The normal rate of wage of the employees of the Contractor, Subcontractor, and Agents shall not be reduced or otherwise diminished as a result of payment of the prevailing wage rate on a public works contract.

**Hourly contributions.** Hourly contributions shall be determined in accordance with the prevailing wage rate and with DWD. 290.01(10), Wis. Admin. Code.

**Apprentices and Subjourney persons.** Apprentices and sub journeypersons performing work on the project shall be compensated in accordance with the prevailing wage rate and with DWD 290.02, and 290.025, respectively, Wis. Admin. Code.

**Straight Time Wages.** The Contractor may pay straight time wages as determined by the prevailing wage rate and DWD 290.04, Wis. Admin. Code.

**Overtime Wages.** The Contractor shall pay overtime wages as required by the prevailing wage rate and DWD 290.05, Wis. Admin. Code.

**Posting of Wage Rates and Hours.** A clearly legible copy of the prevailing wage rate, together with the provisions of Sec. 66.0903(10)(a) and (11)(a), Wis. Stats., shall be kept posted in at least one conspicuous and easily accessible place at the project site by the Contractor and such notice shall remain posted during the full time any laborers, workers or mechanics are employed on the contract.

**Evidence of Compliance by Contractor.** Upon completion of the contract, the Contractor shall file with the Department of Public Works an affidavit stating:

- a. That the Contractor has complied fully with the provisions and requirements of Sec. 66.0903(3), Wis. Stats., and Chapter DWD 290, Wis. Admin. Code; the Contractor has received evidence of compliance from each of the agents and subcontractors; and the

names and addresses of all of the subcontractors and agents who worked on the contract.

- b. That full and accurate records have been kept, which clearly indicate the name and trade or occupation of every laborer, worker or mechanic employed by the Contractor in connection with work on the project. The records shall show the number of hours worked by each employee and the actual wages paid therefore; where these records will be kept and the name, address and telephone number of the person who will be responsible for keeping them. The records shall be retained and made available for a period of at least three (3) years following the completion of the project of public works and shall not be removed without prior notification to the municipality.

**Evidence of Compliance by Agent and Subcontractor.** Each agent and subcontractor shall file with the Contractor, upon completion of their portion of the work on the contract an affidavit stating that all the provisions of Sec. 66.0903(3), Wis. Stats., have been fully complied with and that full and accurate records have been kept, which clearly indicate the name and trade or occupation of every laborer, worker or mechanic employed by the Contractor in connection with work on the project. The records shall show the number of hours worked by each employee and the actual wages paid therefore; where these records shall be kept and the name, address and telephone number of the person who shall be responsible for keeping them. The records shall be retained and made available for a period of at least three (3) years following the completion of the project of public works and shall not be removed without prior notification to the municipality.

**Failure to Comply with the Prevailing Wage Rate.** If the Contractor fails to comply with the prevailing wage rate, she/he shall be in default on the contract.

5. **Affirmative Action.** In the performance of the services under this Agreement the Contractor agrees not to discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered. The notice will include a job description, classification, qualifications and application procedures and deadlines. The Contractor agrees to interview and consider candidates referred by the Affirmative Action Division if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date started in the notice.

Articles of Agreement  
Article I

The Contractor shall take affirmative action in accordance with the provisions of this contract to insure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin and that the employer shall provide harassment free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the City setting out the provisions of the nondiscrimination clauses in this contract.

Article II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin.

Article III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided by the City advising the labor union or worker's representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

Article V

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works contractors in a form approved by the Affirmative Action Division Manager.

Article VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City Affirmative Action Division with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

Article VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action Provisions of this contract or Section 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the City at its option may do any or all of the following:

1. Cancel, terminate or suspend this Contract in whole or in part.
2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.

3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or five thousand dollars (\$5,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

#### Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

#### Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract. (In federally funded contracts the terms "DBE, MBE and WBE" shall be substituted for the term "small business" in this Article.)

**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused these presents to be sealed with its corporate seal and to be subscribed by its Mayor and City Clerk the day and year first above written.

Countersigned:

	Company Name
Witness	Date

CITY OF MADISON, WISCONSIN

Provisions have been made to pay the liability that will accrue under this contract.

Approved as to form:

Finance Director	City Attorney
Signed this _____ day of _____, 20_____	
Witness	Date

**SECTION I: PAYMENT AND PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS, that we \_\_\_\_\_  
as \_\_\_\_\_ principal, \_\_\_\_\_ and

Company of \_\_\_\_\_ as surety, are held and firmly bound unto the City of  
Madison, Wisconsin, in the sum of \_\_\_\_\_ (\$\_\_\_\_\_) Dollars, lawful money of the  
United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our  
respective executors and administrators firmly by these presents.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully  
perform all of the terms of the Contract entered into between him/herself and the City of Madison for the  
construction of:

**THERESA TERRACE NEIGHBORHOOD CENTER  
CONTRACT NO. 7385**

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the  
prosecution of said work, and save the City harmless from all claims for damages because of negligence  
in the prosecution of said work, and shall save harmless the said City from all claims for compensation  
(under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is  
to be void, otherwise of full force, virtue and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_

Countersigned:

\_\_\_\_\_  
Company Name (Principal)

\_\_\_\_\_  
Witness

\_\_\_\_\_  
President Seal

\_\_\_\_\_  
Secretary

Approved as to form:

\_\_\_\_\_  
Surety Seal

Salary Employee       Commission

\_\_\_\_\_  
City Attorney

By \_\_\_\_\_  
Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under  
License No. \_\_\_\_\_ for the year 20\_\_\_\_\_, and appointed as attorney-in-fact with  
authority to execute this payment and performance bond which power of attorney has not been revoked.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Agent Signature

## SECTION J: PREVAILING WAGE RATES

## PREVAILING WAGE RATE DETERMINATION

Issued by the State of Wisconsin  
Department of Workforce Development  
Pursuant to s. 66.0903, Wis. Stats.  
Issued On: 01/06/2014  
Amended On: 02/28/2014

**DETERMINATION NUMBER:** 201400001

**EXPIRATION DATE:** Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2014. If NOT, You MUST Reapply.

**PROJECT NAME:** ALL PUBLIC WORKS PROJECTS UNDER SEC 66.0903, STATS - CITY OF MADISON

**PROJECT LOCATION:** MADISON CITY, DANE COUNTY, WI

**CONTRACTING AGENCY:** CITY OF MADISON-ENGINEERING

<b>CLASSIFICATION:</b>	Contractors are responsible for correctly classifying their workers. Either call the Department of Workforce Development (DWD) with trade or classification questions or consult DWD's Dictionary of Occupational Classifications & Work Descriptions on the DWD website at: <a href="http://dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm">dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm</a> .
<b>OVERTIME:</b>	<p>Time and one-half must be paid for all hours worked:</p> <ul style="list-style-type: none"><li>- over 10 hours per day on prevailing wage projects</li><li>- over 40 hours per calendar week</li><li>- Saturday and Sunday</li><li>- on all of the following holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25;</li><li>- The day before if January 1, July 4 or December 25 falls on a Saturday;</li><li>- The day following if January 1, July 4 or December 25 falls on a Sunday.</li></ul> <p>Apply the time and one-half overtime calculation to whichever is higher between the Hourly Basic Rate listed on this project determination or the employee's regular hourly rate of pay. Add any applicable Premium or DOT Premium to the Hourly Basic Rate before calculating overtime.</p> <p>A DOT Premium (discussed below) may supersede this time and one-half requirement.</p>
<b>FUTURE INCREASE:</b>	When a specific trade or occupation requires a future increase, you MUST add the full hourly increase to the "TOTAL" on the effective date(s) indicated for the specific trade or occupation.
<b>PREMIUM PAY:</b>	If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whenever such pay is applicable.
<b>DOT PREMIUM:</b>	This premium only applies to highway and bridge projects owned by the Wisconsin Department of Transportation and to the project type heading "Airport Pavement or State Highway Construction." DO NOT apply the premium calculation under any other project type on this determination.
<b>APPRENTICES:</b>	Pay apprentices a percentage of the applicable journey person's hourly basic rate of pay and hourly fringe benefit contributions specified in this determination. Obtain the appropriate percentage from each apprentice's contract or indenture.
<b>SUBJOURNEY:</b>	Subjourney wage rates may be available for some of the trades or occupations indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer interested in using a subjourney classification on this project MUST complete Form ERD-10880 and request the applicable wage rate from the Department of Workforce Development PRIOR to using the subjourney worker on this project.

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project**. A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-6861.

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**The following statutory provisions apply to local governmental unit projects of public works and are set forth below pursuant to the requirements of s. 66.0903(8), Stats.**

**s. 66.0903 (1) (f) & s. 103.49 (1) (c) "PREVAILING HOURS OF LABOR"** for any trade or occupation in any area means 10 hours per day and 40 hours per week and may not include any hours worked on a Saturday or Sunday or on any of the following holidays:

1. January 1.
2. The last Monday in May.
3. July 4.
4. The first Monday in September.
5. The 4th Thursday in November.
6. December 25.
7. The day before if January 1, July 4 or December 25 falls on a Saturday.
8. The day following if January 1, July 4 or December 25 falls on a Sunday.

**s. 66.0903 (10) RECORDS; INSPECTION; ENFORCEMENT.**

(a) Each contractor, subcontractor, or contractor's or subcontractor's agent performing work on a project of public works that is subject to this section shall keep full and accurate records clearly indicating the name and trade or occupation of every person performing the work described in sub. (4) and an accurate record of the number of hours worked by each of those persons and the actual wages paid for the hours worked.

**s. 66.0903 (11) LIABILITY AND PENALTIES.**

(a) 1. Any contractor, subcontractor, or contractor's or subcontractor's agent who fails to pay the prevailing wage rate determined by the department under sub. (3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor is liable to any affected employee in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional amount as liquidated damages as provided under subd. 2., 3., whichever is applicable.

2. If the department determines upon inspection under sub. (10) (b) or (c) that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the department shall order the contractor to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages within a period specified by the department in the order.

3. In addition to or in lieu of recovering the liability specified in subd. 1. as provided in subd. 2., any employee for and in behalf of that employee and other employees similarly situated may commence an action to recover that liability in any court of competent jurisdiction. If the court finds that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the court shall order the contractor, subcontractor, or agent to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages.

5. No employee may be a party plaintiff to an action under subd. 3. unless the employee consents in writing to become a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.

<b>BUILDING OR HEAVY CONSTRUCTION</b>
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Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

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**SKILLED TRADES**

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Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
101	Acoustic Ceiling Tile Installer	30.48	15.90	46.38
102	Boilermaker Future Increase(s): Add \$1.50/hr on 1/01/2015; Add \$1.50/hr. on 01/01/2016	32.05	28.04	60.09
103	Bricklayer, Blocklayer or Stonemason Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.01	17.35	49.36
104	Cabinet Installer	30.48	15.90	46.38
105	Carpenter	30.48	15.90	46.38
106	Carpet Layer or Soft Floor Coverer	30.48	15.90	46.38
107	Cement Finisher	31.58	16.13	47.71
108	Drywall Taper or Finisher	24.80	16.60	41.40
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.07	19.25	53.32
110	Elevator Constructor	42.86	23.84	66.70
111	Fence Erector	24.72	0.00	24.72
112	Fire Sprinkler Fitter	36.07	18.73	54.80
113	Glazier	38.03	13.42	51.45
114	Heat or Frost Insulator	33.68	24.31	57.99
115	Insulator (Batt or Blown)	15.00	9.50	24.50
116	Ironworker	31.25	19.46	50.71
117	Lather	30.48	15.90	46.38

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
118	Line Constructor (Electrical)	38.25	17.31	55.56
119	Marble Finisher	26.89	19.18	46.07
120	Marble Mason	32.01	17.35	49.36
121	Metal Building Erector	22.00	10.00	32.00
122	Millwright	32.11	15.95	48.06
123	Overhead Door Installer	20.95	4.94	25.89
124	Painter	24.50	16.60	41.10
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.98	15.90	46.88
127	Pipeline Fuser or Welder (Gas or Utility)	30.79	19.74	50.53
129	Plasterer	31.03	17.71	48.74
130	Plumber Future Increase(s): Add \$1/hr on 6/1/2014.	36.42	16.87	53.29
132	Refrigeration Mechanic	41.60	16.71	58.31
133	Roofer or Waterproofer	29.40	6.25	35.65
134	Sheet Metal Worker	34.45	22.57	57.02
135	Steamfitter Future Increase(s): Add \$1.70/hr on 6/1/2014.	42.95	17.81	60.76
137	Teledata Technician or Installer Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.25	12.24	34.49
138	Temperature Control Installer	32.94	18.80	51.74
139	Terrazzo Finisher	26.89	19.18	46.07
140	Terrazzo Mechanic	30.20	18.42	48.62
141	Tile Finisher	23.85	17.18	41.03
142	Tile Setter	29.81	17.18	46.99
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	34.48	15.90	50.38
146	Well Driller or Pump Installer	25.32	15.65	40.97
147	Siding Installer	25.92	18.04	43.96

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.16	14.34	43.50
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

#### TRUCK DRIVERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
201	Single Axle or Two Axle	32.39	18.46	50.85
203	Three or More Axle	18.00	22.88	40.88
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	18.00	22.88	40.88
207	Truck Mechanic	18.00	22.88	40.88

#### LABORERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
301	General Laborer Premium Increase(s): Add \$1.00/hr for certified welder; Add \$.25/hr for mason tender	24.21	14.63	38.84
302	Asbestos Abatement Worker	24.36	14.44	38.80
303	Landscaper	21.01	9.37	30.38
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	21.01	13.63	34.64
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased) Premium Increase(s): DOT PREMIUMS: Pay two times the hourly basic rate on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	18.33	13.65	31.98
314	Railroad Track Laborer	23.46	3.30	26.76
315	Final Construction Clean-Up Worker	16.00	0.00	16.00

**HEAVY EQUIPMENT OPERATORS  
SITE PREPARATION, UTILITY OR LANDSCAPING WORK ONLY**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
501	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Milling Machine; Boring Machine (Directional, Horizontal or Vertical); Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Backhoe (Track Type) Having a Mfgr's Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Crane, Shovel, Dragline, Clamshells; Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Grader or Motor Patrol; Master Mechanic; Mechanic or Welder; Robotic Tool Carrier (With or Without Attachments); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor (Scraper, Dozer, Pusher, Loader); Trencher (Wheel Type or Chain Type Having Over 8 Inch Bucket).	33.42	18.96	52.38
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under).	32.89	18.96	51.85
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.82	18.96	49.78
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Premium Increase(s): Add \$.50/hr for Friction Crane, Lattice Boom or Crane Certification (CCO).	41.65	21.71	63.36
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	37.10	21.57	58.67

507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54
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**HEAVY EQUIPMENT OPERATORS  
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK**

<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		
		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
		<b>\$</b>	<b>\$</b>	<b>\$</b>
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Premium Increase(s): Add \$.50/hr for >200 Ton / Add \$1/hr at 300 Ton / Add \$1.50/hr at 400 Ton / Add \$2/hr at 500 Ton & Over.	35.62	18.96	54.58
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over).	36.35	6.95	43.30
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type).	33.42	18.96	52.38
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket).	32.89	18.96	51.85

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	30.82	18.96	49.78
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	24.19	17.89	42.08
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment).	36.34	21.14	57.48
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment). Future Increase(s): Add \$1.60/hr on 06/01/2014; Add \$1.65/hr on 06/01/2015.	32.32	18.55	50.87
516	Fiber Optic Cable Equipment Future Increase(s): Add \$1.75/hr on 02/01/2014.	27.89	17.20	45.09

<b>SEWER, WATER OR TUNNEL CONSTRUCTION</b>
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Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

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**SKILLED TRADES**

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<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
103	Bricklayer, Blocklayer or Stonemason Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	35.10	18.40	53.50
105	Carpenter Future Increase(s): Add \$1.25/hr on 6/2/2014. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.68	19.81	53.49
107	Cement Finisher Future Increase(s): Add \$1.87 on 6/1/14; Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	33.51	16.13	49.64
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.82	22.61	55.43
111	Fence Erector	24.72	0.00	24.72
116	Ironworker	31.25	19.46	50.71
118	Line Constructor (Electrical)	38.25	17.31	55.56
125	Pavement Marking Operator	16.00	7.35	23.35
126	Piledriver	30.98	15.90	46.88
130	Plumber	33.75	14.07	47.82
135	Steamfitter	42.45	16.71	59.16
137	Teledata Technician or Installer	21.89	11.85	33.74

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	38.80	20.17	58.97
146	Well Driller or Pump Installer	25.32	15.65	40.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.16	14.34	43.50
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

### TRUCK DRIVERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
201	Single Axle or Two Axle	30.00	15.00	45.00
203	Three or More Axle	16.00	7.35	23.35
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	16.00	7.35	23.35
207	Truck Mechanic	16.00	7.35	23.35

### LABORERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
301	General Laborer Premium Increase(s): Add \$.20 for blaster, bracer, manhole builder, caulker, bottomman and power tool; Add \$.55 for pipelayer; Add \$1.00 for tunnel work 0-15 lbs. compressed air; Add \$2.00 for over 15-30 lbs. compressed air; Add \$3.00 for over 30 lbs. compressed air.	25.60	14.62	40.22
303	Landscaper	25.28	11.46	36.74
304	Flagperson or Traffic Control Person	24.70	10.72	35.42
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
314	Railroad Track Laborer	23.46	3.30	26.76

**HEAVY EQUIPMENT OPERATORS  
SEWER, WATER OR TUNNEL WORK**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Premium Increase(s): Add \$.25/hr for all >45 Ton lifting capacity cranes	34.62	18.96	53.58
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type).	33.42	18.96	52.38
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket).	32.89	18.96	51.85

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
524	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Environmental Burner; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Hoist (Tugger, Automatic); Grout Pump; Jeep Digger; Lift Slab Machine; Mulcher; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Tining or Curing Machine; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames. Future Increase(s): Add \$1.05/hr on 6/2/2014; Add \$1.55/hr on 6/1/2015. Premium Increase(s): Add \$.25/hr for operating tower crane.	35.11	19.45	54.56
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.19	20.94	51.13
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	24.19	17.89	42.08
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	38.80	20.17	58.97
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	34.50	20.04	54.54
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54

<b>AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION</b>
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Includes all airport projects (excluding buildings) and all projects awarded by the Wisconsin Department of Transportation (excluding buildings).

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**SKILLED TRADES**

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<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		
		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.01	17.35	49.36
105	Carpenter	30.48	15.90	46.38
107	Cement Finisher Future Increase(s): Add \$1.87 on 6/1/14; Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	33.51	16.13	49.64
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.07	19.25	53.32
111	Fence Erector	24.72	0.00	24.72
116	Ironworker	31.25	19.46	50.71
118	Line Constructor (Electrical)	38.25	17.31	55.56
124	Painter	21.87	11.37	33.24
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.98	15.90	46.88
133	Rofer or Waterproofer	29.40	6.25	35.65
137	Teledata Technician or Installer	21.89	11.85	33.74
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	34.48	15.90	50.38
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	34.43	15.24	49.67
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	35.50	15.89	51.39

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

**TRUCK DRIVERS**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
201	Single Axle or Two Axle	34.22	19.90	54.12
203	Three or More Axle Future Increase(s): Add \$1.30/hr on 6/1/2014. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	24.52	17.77	42.29
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1.75/hr on 6/1/14); Add \$1.25/hr on 6/1/15); Add \$1.30/hr on 6/1/16); Add \$1.25/hr on 6/1/17. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/busines/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/busines/civilrights/laborwages/pwc.htm</a> .	29.27	20.40	49.67
205	Pavement Marking Vehicle	23.31	17.13	40.44
206	Shadow or Pilot Vehicle	34.22	19.90	54.12
207	Truck Mechanic	23.31	17.13	40.44

## LABORERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
301	General Laborer Future Increase(s): Add \$1.60/hr on 6/1/2014. Premium Increase(s): Add \$.10/hr for topman, air tool operator, vibrator or tamper operator (mechanical hand operated), chain saw operator and demolition burning torch laborer; Add \$.15/hr for bituminous worker (raker and luteman), formsetter (curb, sidewalk and pavement) and strike off man; Add \$.20/hr for blaster and powderman; Add \$.25/hr for bottomman; Add \$.35/hr for line and grade specialist; Add \$.45/hr for pipelayer. / DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	29.32	14.63	43.95
302	Asbestos Abatement Worker	24.36	14.44	38.80
303	Landscaper Future Increase(s): Add \$1.60/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	29.32	14.63	43.95
304	Flagperson or Traffic Control Person Future Increase(s): Add \$1.60/hr on 6/1/2014. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	25.67	14.63	40.30
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
314	Railroad Track Laborer	23.46	3.30	26.76

**HEAVY EQUIPMENT OPERATORS  
AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
531	Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Traveling Crane (Bridge Type). Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	36.72	20.40	57.12
532	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs., & Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	36.22	20.40	56.62

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
533	<p>Air Track, Rotary or Percussion Drilling Machine &amp;/or Hammers, Blaster; Asphalt Heater, Planer &amp; Scarifier; Asphalt Milling Machine; Asphalt Screed; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. &amp; Under); Bituminous (Asphalt) Plant &amp; Paver, Screed; Boatmen (NOT Performing Work on the Great Lakes); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb &amp; Gutter Machine; Concrete Spreader &amp; Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane Wlth a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches &amp; A-Frames.</p> <p>Future Increase(s):                      Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015);                      Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s):                      DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day &amp; Christmas Day. 2) Add \$1.50/hr night work premium.                      See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a>.</p>	35.72	20.40	56.12

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
534	<p>Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed &amp; Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver &amp; Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine.</p> <p>Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day &amp; Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a>.</p>	35.46	20.40	55.86
535	<p>Air Compressor (&amp;/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical &amp; Horizontal); Automatic Belt Conveyor &amp; Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&amp;/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.</p> <p>Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day &amp; Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a>.</p>	35.17	20.40	55.57
536	Fiber Optic Cable Equipment.	26.69	16.65	43.34
537	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
538	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	38.80	20.17	58.97

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>				
<b><u>CODE</u></b>	<b><u>TRADE OR OCCUPATION</u></b>	<b><u>HOURLY BASIC RATE OF PAY</u></b>	<b><u>HOURLY FRINGE BENEFITS</u></b>	<b><u>TOTAL</u></b>
		<b>\$</b>	<b>\$</b>	<b>\$</b>
539	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	34.50	20.04	54.54
540	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks-Great Lakes ONLY.	34.50	20.04	54.54

<b>LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION</b>
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Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

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**SKILLED TRADES**

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Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.01	17.35	49.36
105	Carpenter	32.93	19.93	52.86
107	Cement Finisher	31.48	15.68	47.16
109	Electrician	31.27	22.81	54.08
111	Fence Erector	24.72	0.00	24.72
116	Ironworker	31.25	19.46	50.71
118	Line Constructor (Electrical)	38.25	17.31	55.56
124	Painter	24.50	16.60	41.10
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.98	15.90	46.88
133	Rofer or Waterproofer	29.40	6.25	35.65
137	Teledata Technician or Installer	21.89	11.85	33.74
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	38.80	20.17	58.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	34.43	15.24	49.67
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

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**TRUCK DRIVERS**

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Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
201	Single Axle or Two Axle	30.00	15.00	45.00

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
203	Three or More Axle	17.00	0.00	17.00
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	17.00	0.00	17.00
206	Shadow or Pilot Vehicle	30.00	15.00	45.00
207	Truck Mechanic	17.00	0.00	17.00

**LABORERS**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
301	General Laborer	28.07	13.25	41.32
303	Landscaper Future Increase(s): Add \$1.60/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	29.04	14.63	43.67
304	Flagperson or Traffic Control Person	24.70	10.72	35.42
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
314	Railroad Track Laborer	23.46	3.30	26.76

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**HEAVY EQUIPMENT OPERATORS  
CONCRETE PAVEMENT OR BRIDGE WORK**

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<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
541	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	36.72	20.40	57.12
542	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	36.22	20.40	56.62

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
543	<p>Air Track, Rotary or Percussion Drilling Machine &amp;/or Hammers, Blaster; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. &amp; Under); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb &amp; Gutter Machine; Concrete Spreader &amp; Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches &amp; A-Frames.</p> <p>Future Increase(s):            Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015);            Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s):            DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day &amp; Christmas Day. 2) Add \$1.50/hr night work premium.            See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a>.</p>	35.72	20.40	56.12
544	<p>Backfiller; Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed &amp; Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Pile Driver &amp; Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine.</p>	33.96	19.79	53.75
545	<p>Air Compressor (&amp;/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Automatic Belt Conveyor &amp; Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&amp;/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.</p>	30.32	18.46	48.78
546	Fiber Optic Cable Equipment.	26.69	16.65	43.34

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>				
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
		<b>\$</b>	<b>\$</b>	<b>\$</b>
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	38.80	20.17	58.97
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	34.50	20.04	54.54
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54

**HEAVY EQUIPMENT OPERATORS  
ASPHALT PAVEMENT OR OTHER WORK**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>				
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
		<b>\$</b>	<b>\$</b>	<b>\$</b>
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	35.12	18.46	53.58
552	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	36.22	20.40	56.62

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
553	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.	32.89	18.96	51.85
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler.	33.67	19.48	53.15
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: <a href="http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm">http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm</a> .	35.17	20.40	55.57
556	Fiber Optic Cable Equipment.	26.69	16.65	43.34

<b>RESIDENTIAL OR AGRICULTURAL CONSTRUCTION</b>
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Includes single family houses or apartment buildings of no more than four (4) stories in height and all buildings, structures or facilities that are primarily used for agricultural or farming purposes, excluding commercial buildings. For classification purposes, the exterior height of a residential building, in terms of stories, is the primary consideration. All incidental items such as site work, driveways, parking lots, private sidewalks, private septic systems or sewer and water laterals connected to a public system and swimming pools are included within this definition. Residential buildings of five (5) stories and above are NOT included within this definition.

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**SKILLED TRADES**

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Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
101	Acoustic Ceiling Tile Installer Future Increase(s): Add \$1.25/hr on 6/2/2014.	33.68	19.81	53.49
102	Boilermaker	26.00	4.73	30.73
103	Bricklayer, Blocklayer or Stonemason	32.01	13.26	45.27
104	Cabinet Installer	22.00	1.05	23.05
105	Carpenter	30.48	3.24	33.72
106	Carpet Layer or Soft Floor Coverer	23.68	3.20	26.88
107	Cement Finisher	20.93	5.94	26.87
108	Drywall Taper or Finisher	22.50	0.88	23.38
109	Electrician	27.50	7.47	34.97
110	Elevator Constructor	42.86	23.84	66.70
111	Fence Erector	18.52	4.89	23.41
112	Fire Sprinkler Fitter	52.82	5.54	58.36
113	Glazier	38.03	13.42	51.45
114	Heat or Frost Insulator	30.00	0.00	30.00
115	Insulator (Batt or Blown)	19.00	14.33	33.33
116	Ironworker	31.25	19.46	50.71
117	Lather	30.48	3.24	33.72
119	Marble Finisher	26.89	19.18	46.07
120	Marble Mason	32.01	13.26	45.27
121	Metal Building Erector	17.00	3.82	20.82
123	Overhead Door Installer	12.00	0.00	12.00
124	Painter	20.00	4.22	24.22

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
125	Pavement Marking Operator	30.00	0.00	30.00
129	Plasterer	25.00	0.00	25.00
130	Plumber	30.00	10.62	40.62
132	Refrigeration Mechanic	19.75	8.56	28.31
133	Roofer or Waterproofer	17.00	3.72	20.72
134	Sheet Metal Worker	21.03	3.40	24.43
135	Steamfitter	31.72	16.10	47.82
137	Teledata Technician or Installer	24.75	8.09	32.84
138	Temperature Control Installer	22.50	0.70	23.20
139	Terrazzo Finisher	26.89	19.18	46.07
140	Terrazzo Mechanic	30.20	18.42	48.62
141	Tile Finisher	23.77	16.50	40.27
142	Tile Setter	21.00	0.00	21.00
143	Tuckpointer, Caulker or Cleaner	32.50	0.02	32.52
146	Well Driller or Pump Installer	27.60	5.80	33.40
147	Siding Installer	20.18	0.00	20.18

#### TRUCK DRIVERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
201	Single Axle or Two Axle	28.05	4.16	32.21
203	Three or More Axle	18.00	2.37	20.37
205	Pavement Marking Vehicle	18.00	2.37	20.37
207	Truck Mechanic	19.00	1.85	20.85

#### LABORERS

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
301	General Laborer	18.14	10.16	28.30
302	Asbestos Abatement Worker	17.00	3.86	20.86

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
303	Landscaper	30.00	0.00	30.00
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
315	Final Construction Clean-Up Worker	16.00	0.00	16.00

**HEAVY EQUIPMENT OPERATORS  
RESIDENTIAL OR AGRICULTURAL CONSTRUCTION**

<b>Fringe Benefits Must Be Paid On <u>All</u> Hours Worked</b>		<b>HOURLY BASIC RATE OF PAY</b>	<b>HOURLY FRINGE BENEFITS</b>	<b>TOTAL</b>
<b>CODE</b>	<b>TRADE OR OCCUPATION</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>
557	Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type); Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Crane, Shovel, Dragline, Clamshells; Forestry Equipment, TImbco, Tree Shear, Tub Grinder, Processor; Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type); Winches & A-Frames.	29.70	20.08	49.78
558	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Backfiller; Belting, Burlap, Texturing Machine; Boiler (Temporary Heat); Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Jeep Digger; Lift Slab Machine; Mulcher; Oiler; Post Hole Digger or Driver; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Roller (Rubber Tire, 5 Tons or Under); Screed (Milling Machine); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Stump Chipper; Telehandler; Vibratory Hammer or Extractor, Power Pack.	29.70	16.00	45.70

\*\*\*\*\* END OF RATES \*\*\*\*\*