

# **CONSTRUCTION DOCUMENTS PROJECT MANUAL**

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,  
HIGHWAY AND TRANSPORTATION

PUBLIC WORKS  
ENGINEERING DIVISION  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713

## **REQUEST FOR BIDS NO. 108049 TENANT IMPROVEMENTS THIRD FLOOR, CITY-COUNTY BUILDING 210 MARTIN LUTHER KING JR. BLVD. MADISON, WISCONSIN**

Opening Date: **THURSDAY, APRIL 3, 2008**

Time: **2:00 P.M.**

Performance / Payment Bond: **100% OF CONTRACT AMOUNT**

Bid Deposit: **5% OF BID AMOUNT**

Location: **PUBLIC WORKS OFFICE**

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FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

ROB NEBEL, PROJECT ENGINEER  
DANE COUNTY DEPARTMENT OF PUBLIC WORKS,  
HIGHWAY & TRANSPORTATION  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713  
TELEPHONE NO.: 608/267-0119  
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## **DOCUMENT INDEX FOR RFB NO. 108049**

### **PROCUREMENT AND CONTRACTING REQUIREMENTS**

Project Manual Cover Page  
Documents Index and Dane County Vendor Registration Program  
Invitation to Bid (Legal Notice)  
Instructions to Bidders  
Bid Form  
Fair Labor Practices Certification  
Best Value Contracting Application  
Sample Public Works Contract  
Sample Bid Bond  
Sample Performance Bond  
Sample Payment Bond  
General Conditions of Contract  
Supplementary Conditions

### **DIVISION 1 - GENERAL REQUIREMENTS**

01000 – Basic Requirements  
01058 – Recycling

### **DIVISION 2 - SITE CONSTRUCTION**

02070 – Selective Demolition

### **DIVISION 3 - CONCRETE**

03200 – Concrete Reinforcement  
03300 – Cast-in-Place Concrete

### **DIVISION 4 - MASONRY**

(Not Used)

### **DIVISION 5 - METALS**

05310 – Steel Decking  
05500 – Metal Fabrications

### **DIVISION 6 - WOOD AND PLASTICS**

06100 – Rough Carpentry  
06200 – Finish Carpentry  
06600 – Plastic Fabrications

### **DIVISION 7 – THERMAL AND MOISTURE PROTECTION**

07210 – Building Insulation  
07900 – Joint Sealers

### **DIVISION 8 - DOORS AND WINDOWS**

08110 – Steel Doors and Frames  
08210 – Wood Doors  
08410 – Aluminum-Framed Storefronts  
08710 – Door Hardware  
08800 – Glass and Glazing

### **DIVISION 9 - FINISHES**

09250 – Gypsum Board  
09300 – Tiling  
09310 – Neoprene Latex Mastic Membrane

09510 – Acoustical Ceilings  
09650 – Resilient Flooring  
09680 – Carpet  
09900 – Painting

**DIVISION 10 - SPECIALTIES**

10400 – Signage  
10522 – Fire Extinguisher Cabinets  
10800 – Toilet and Bath Accessories

**DIVISION 11 - EQUIPMENT**

(Not Used)

**DIVISION 12 - FURNISHINGS**

12304 – Plastic Laminate Faced Casework

**DIVISION 13 - SPECIAL CONSTRUCTION**

(Not Used)

**DIVISION 14 - CONVEYING SYSTEMS**

(Not Used)

**DIVISION 15 - MECHANICAL**

A15010 – Basic Plumbing General Requirements  
A15050 – Basic Plumbing Materials and Methods  
A15250 – Plumbing Systems Insulation  
A15400 – Plumbing Systems  
B15010 – Basic HVAC General Requirements  
B15050 – Basic HVAC Materials and Methods  
B15250 – HVAC Systems Insulation  
B15500 – HVAC Basic Piping Requirements  
B15750 – Mechanical Heat Transfer Equipment  
B15850 – Air Handling  
B15880 – Air Distribution  
B15950 – Automatic Temperature Control Work  
B15990 – Testing, Adjusting, and Balancing  
C15010 – Basic Fire Protection General Requirements  
C15050 – Basic Fire Protection Materials and Methods  
C15400 – Fire Protection Systems

**DIVISION 16 - ELECTRICAL**

16001 – General Electrical Requirements  
16100 – Basic Materials and Methods  
16515 – Lighting  
16722 – Fire Alarm System  
16751 – Telecommunications Distribution System  
16950 – Occupancy Sensor

**DRAWINGS – NOTE:** All drawings are to scale if printed on 24” x 36” paper.

G1 – Title Sheet  
D2.0 – Third Floor and Reflected Ceiling Demolition Plan  
A2.0 – Third Floor Plan  
A2.1 – Enlarged Partial Third Floor Plan  
A2.2 – Enlarged Partial Third Floor Plan  
A2.3 – Enlarged Partial Third Floor Plan  
A3.0 – Third Floor Reflected Ceiling Plan

A7.0 – Door and Frame Elevation, Parttion Types, Details and Schedule  
A7.1 – Interior Details  
A8.0 – Interior Elevations  
A9.0 – Third Floor Finish Plan and Schedule  
P1.0 – Third Floor Plumbing Demolition Plan  
P2.0 – Third Floor Plumbing Reconstruction Plan  
HD1.0 – Third Floor HVAC Demolition Plan  
H1.0 – Third Floor HVAC Plan  
H1.1 – HVAC Details and Mechanical Room Plan  
H1.2 – HVAC Details and Mech Room Section  
H1.3 – HVAC Details  
H1.4 – HVAC Details  
H2.0 – HVAC Schedules  
E0.0 – Floor Plan Electrical Demolition  
E1.0 – Floor Plan Lighting  
E2.0 – Floor Plan Power/Systems  
E3.0 – Electrical Schedules, Symbols List and Details  
E3.1 – Electrical Panelboard Schedules  
E4.0 – Electrical Riser Diagrams

#### **DANE COUNTY VENDOR REGISTRATION PROGRAM**

All bidders / proposers wishing to submit a bid / proposal should be registered with Dane County Purchasing before bid / proposal opening & must be registered before award of contract. Complete a Vendor Registration Form at [www.danepurchasing.com](http://www.danepurchasing.com), or obtain one by calling 608/266-4131.

## LEGAL NOTICE

### INVITATION TO BID

Dane County Department of Public Works, Highway & Transportation, 1919 Alliant Energy Center Way, Madison, WI 53713, will receive sealed Bids until:

**2:00 P.M., THURSDAY, APRIL 3, 2008**

**BID NO. 108049**

**TENANT IMPROVEMENTS  
THIRD FLOOR, CITY-COUNTY BUILDING  
210 MARTIN LUTHER KING, JR. BLVD., MADISON, WI**

Dane County is inviting Bids for construction services for tenant build-out of approximately 11,000 sq. ft. including drywall partitions, flooring, ceiling, HVAC, electrical and plumbing.

Request for Bids package may be obtained after 2:00 p.m. on Monday, March 10, 2008, at Dane County Public Works, Highway & Transportation Dept., 1919 Alliant Energy Center Way, Madison, WI 53713, by calling 608-266-4018, or downloading it from [www.countyofdane.com/pwht/bid/logon.aspx](http://www.countyofdane.com/pwht/bid/logon.aspx). Please call Rob Nebel, Project Manager, at 608-575-0890, for any questions or additional information.

All Bidders wishing to submit Bids should be a registered vendor with Dane County Purchasing & prequalified as Best Value Contractor before bid opening & must be registered & prequalified before award of contract. Complete Vendor Registration Form at [www.danepurchasing.com](http://www.danepurchasing.com) or obtain one by calling 608/266-4131. Complete Prequalification Application for Contractors at [www.co.dane.wi.us/pwht/pwengineer.aspx](http://www.co.dane.wi.us/pwht/pwengineer.aspx) or obtain one by calling 608/266-4018.

Pre-Bid Meeting will be held on Thursday, March 20, 2008 at 10:00 a.m. Meet on 3rd Floor of the City-County Building at the Martin Luther King, Jr. Blvd. elevator lobby. Bidders are strongly encouraged to attend.

**PUBLISH:      MARCH 6 & 13, 2008 - WISCONSIN STATE JOURNAL  
                    MARCH 10 & 17, 2008 - WESTERN BUILDER**

## INSTRUCTIONS TO BIDDERS

### TABLE OF CONTENTS

1. GENERAL.....	1
2. DRAWINGS AND SPECIFICATIONS.....	2
3. INTERPRETATION.....	2
4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR).....	2
5. BID GUARANTEE .....	3
6. WITHDRAWAL OF BIDS .....	3
7. CONTRACT FORM.....	3
8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS.....	4
9. EMERGING SMALL BUSINESS PROVISIONS.....	4
10. METHOD OF AWARD - RESERVATIONS .....	6
11. SECURITY FOR PERFORMANCE AND PAYMENTS.....	6
12. TAXES.....	6
13. SUBMISSION OF BIDS .....	7
14. SUBCONTRACTOR LISTING .....	7
15. ALTERNATE BIDS .....	8
16. INFORMATIONAL BIDS .....	8
17. UNIT PRICES.....	8
18. COMMENCEMENT AND COMPLETION .....	8
19. WORK BY COUNTY .....	9
20. SPECIAL HAZARDS COVERAGE.....	9
FORM A .....	10
FORM B.....	11
FORM C.....	12
FORM D .....	13

#### **1. GENERAL**

- A. Before submitting Bid, bidder shall thoroughly examine all Construction Documents. Successful Bidder shall be required to provide all the Work that is shown on Drawings, set forth in Specifications, or reasonably implied as necessary to complete Contract for this project.
- B. Bidder shall visit site to become acquainted with adjacent areas, means of approach to site, conditions of actual site and facilities for delivering, storing, placing, and handling of materials and equipment.
- C. Pre-bid meeting is scheduled on Thursday, March 20, 2008 at 10:00 AM. Meet on 3rd Floor of the City-County Building at the Martin Luther King Jr. Blvd. elevator lobby. Attendance by all bidders is optional, however bidders and subcontractors are strongly encouraged to attend.
- E. Failure to visit site or failure to examine any and all Construction Documents will in no way relieve successful Bidder from necessity of furnishing any necessary materials or equipment, or performing any work, that may be required to complete the Work in accordance with Drawings and Specifications. Neglect of above requirements will not be accepted as reason for delay in the Work or additional compensation.

## **2. DRAWINGS AND SPECIFICATIONS**

- A. Drawings and Specifications that form part of this Contract, as stated in Article 1 of General Conditions of Contract, are enumerated in Document Index of these Construction Documents.
- B. Complete sets of Drawings and Specifications for all trades will be issued to all Bidders, irrespective of category of work to be bid on, in order that all Bidders may be familiar with work of other trades as they affect their bid.

## **3. INTERPRETATION**

- A. No verbal explanation or instructions will be given in regard to meaning of Drawings or Specifications before Bid Opening. Bidders shall bring inadequacies, omissions or conflicts to County or Architect / Engineer's attention at least ten (10) days before Bid Opening. Prompt clarification will be available to all bidders by Addendum.
- B. Failure to so request clarification or interpretation of Drawings and Specifications will not relieve successful Bidder of responsibility. Signing of Contract will be considered as implicitly denoting that Contractor has thorough understanding of scope of the Work and comprehension of Construction Documents.
- C. County and Architect / Engineer will not be responsible for verbal instructions.

## **4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)**

- A. Before award of Contract can be approved, County shall be satisfied that Bidder involved meets following requirements:
  - 1. Has completed at least one (1) project of at least fifty percent (50%) of size or value of Division of work being bid and type of work completed is similar to that being bid. If greater magnitude of experience is deemed necessary, other than size or value of work, such requirements will be described in appropriate section of Specifications.
  - 2. Maintains permanent place of business.
  - 3. Can be bonded for terms of proposed Contract.
  - 4. Complies with Chapter 40 of the Dane County Ordinances with respect to Best Value Contracting qualification. Qualification with State of Wisconsin's Executive Order 108 or City of Madison's Best Value Contracting Ordinance meets qualification requirements of County.
  - 5. Is not presently on ineligible list maintained by County's Department of Administration for noncompliance with equal employment opportunities and affirmative action requirements.
  - 6. Is authorized to conduct business in Wisconsin. By submitting Bid, bidder warrants that it has: complied with all necessary requirements to do business in State of Wisconsin; that persons executing contract on its behalf are authorized to do so; and, if corporation, that name and address of bidder's registered agent are as set forth in Contract. Bidder shall notify County immediately, in writing, of any change in its registered agent, their address, and bidder's legal status. For partnership, term "registered agent" shall mean general partner.

- B. County's Public Works Project Engineer will make such investigations as are deemed necessary to determine ability of bidder to perform the Work, and bidder shall furnish to County's Public Works Project Engineer or designee all such information and data for this purpose as County's Public Works Project Engineer may request. County reserves right to reject Bid if evidence submitted by, or investigation of, bidder fails to satisfy County that bidder is responsible and qualified to carry out obligations of Contract and to complete the Work contemplated therein.

## **5. BID GUARANTEE**

- A. Bank certified check, cashier's check or Bid Bond, payable to County in amount not less than five percent (5%) of maximum bid, shall accompany each Bid as guarantee that if Bid is accepted, Bidder will execute and return proposed Contract and Performance and Payment Bonds within ten (10) days after being notified of acceptance of Bid. Company issuing bonds must be licensed to do business in Wisconsin.
- B. Any bid, which is not accompanied by bid guarantee, will be considered "No Bid" and will not be read at Bid Opening.
- C. If successful Bidder so delivers Contract, Certificate of Insurance, and Performance and Payment Bonds, check will be returned to Bidder. In case Bidder fails to deliver such Contract, insurance, and bond, amount of bid guarantee will be forfeited to County as liquidated damages.
- D. All checks tendered as bid guarantee, except those of three lowest qualified, responsible bidders, will be returned to their makers within three (3) days after Bid Opening. All such retained checks will be returned immediately upon signing of Contract and Performance and Payment Bonds by successful Bidder.

## **6. WITHDRAWAL OF BIDS**

- A. Bids may be withdrawn by written request received from bidder or authorized representative thereof prior to time fixed for Bid Opening, without prejudice to right of bidder to file new Bid. Withdrawn Bids will be returned unopened. Negligence on part of bidder in preparing their Bid confers no right for withdrawal of Bid after it has been opened.
- B. No Bid may be withdrawn for period of sixty (60) days after Bid Opening date.
- C. If Bid contains error, omission or mistake, bidder may limit liability to amount of bidder's guarantee by giving written Notice of Intent not to execute Contract to County within seventy-two (72) hours of Bid Opening.

## **7. CONTRACT FORM**

- A. Sample copy of contract that successful Bidder will be required to enter into is included in these Construction Documents and bidders are required to familiarize themselves with all conditions contained therein.



## 8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS

- A. In accordance with Wisconsin Statute 946.13, county official may not bid for or enter into any contract involving receipts or disbursements of more than \$7,500.00 in a year, in which they have private pecuniary interest, direct or indirect if at same time they are authorized to take official action with respect to making of this Contract. Any contract entered into in violation of this Statute is void and County incurs no liability thereon. This subsection does not affect application and enforcement of Wisconsin Statute 946.13 by state prosecutors in criminal courts of this state.

## 9. EMERGING SMALL BUSINESS PROVISIONS

- A. **Emerging Small Business Definition.** For purposes of this provision, ESB is defined as:
1. Independent business concern that has been in business minimum of one year;
  2. Business located in State of Wisconsin;
  3. Business comprised of less than 25 employees;
  4. Business must not have gross sales in excess of three million dollars (\$3,000,000.00) over past three years; and
  5. Business does not have history of failing to complete projects.
- B. **Emerging Small Business (ESB) Involvement.** Bidder shall make good faith effort to award minimum of ten percent (10%) of the Work to ESBs. Bidder shall submit report to Dane County Contract Compliance Officer within ten (10) days after Bid Opening demonstrating such efforts. Good faith efforts means significant contact with ESBs for purposes of soliciting bids from them. Failure to make or demonstrate good faith efforts will be grounds for disqualification.
- C. **Emerging Small Business Report.** Emerging Small Business Enterprise Report is to be submitted by Bidder in separate envelope marked "Emerging Small Business Report". This report is due by 2:00 p.m. following specified ten (10) days after Bid Opening. Bidder who fails to submit Emerging Small Business Report shall be deemed not responsive.
- D. **ESB Goal.** Ten percent (10%) ESB participation is goal of this project. ESB utilizations are shown as percentage of total Bid. If Bidder meets or exceeds specified goal, Bidder is only required to submit Form A - Certification, and Form B - Involvement. Goal shall be met if Bidder qualifies as ESB.
- E. **Report Contents.** Following award of Contract, Bidder shall submit copies of executed contracts for all Emerging Small Businesses. Emerging Small Business Report shall consist of these:
1. Form A - Certification;
  2. Form B - Involvement;
  3. Form C - Contacts;
  4. Form D - Certification Statement (if appropriate); and

5. Supportive documentation (i.e., copies of correspondence, telephone logs, copies of advertisements).
- F. **ESB Listing.** Bidders will solicit bids from ESB listing provided by Dane County.
- G. **ESB Certification.** All contractors, subcontractors and suppliers seeking ESB certification must complete and submit Emerging Small Business Certification Application to Dane County Contract Compliance Program.
- H. **Certification Statement.** If ESB firm has not been certified by County as ESB prior to submittal of this Bid, ESB Report cannot be used to fulfill ESB goal for this project unless firm provides "Form D - Certification Statement". Certification statement must be completed and signed by ESB firm.
- I. **Questions.** Questions concerning Emerging Small Business provisions shall be directed to:  
Dane County Contract Compliance Officer  
City-County Building, Room 421  
210 Martin Luther King, Jr. Blvd.  
Madison, WI 53703  
608/266-5623
- J. **Substituting ESBs.** In event of any significant changes in subcontract arrangements or if need arises to substitute ESBs, Bidder shall report such proposed changes to Contract Compliance Officer to making any official changes and request authorization to substitute ESB firm. Bidder further agrees to make every possible effort to replace ESB firm with another qualified ESB firm.
- K. **Good Faith Efforts.** Good faith efforts can be demonstrated by meeting all of these obligations:
1. Selecting portions of the Work to be performed by ESBs in order to increase likelihood of meeting ESB goal including, where appropriate, breaking down Contract into smaller units to facilitate ESB participation.
  2. Advertising in general circulation, trade associations, and women / minority focus media concerning subcontracting opportunities.
  3. Providing written notices to reasonable number of specific ESBs that their interest in Contract was being solicited in sufficient time to allow ESBs to participate effectively.
  4. Following up on initial solicitations of interest by contacting ESBs within five (5) working days prior to Bid Opening date to determine with certainty whether ESB were interested, to allow ESBs to prepare bids.
  5. Providing interested ESB with adequate information about Drawings, Specifications and requirements of Contract.
  6. Using services of available minority, women and small business organizations and other organizations that provide assistance in recruitment of MBEs / WBEs / ESBs.
  7. Negotiating in good faith with interested ESBs, not rejecting ESBs as unqualified without sound reason based on thorough investigation of their capabilities.

8. Submitting required project reports and accompanying documents to County's Contract Compliance Officer within twenty-four (24) hours after Bid Opening.

L. **Appeals Disqualification of Bid.** Bidder who is disqualified may appeal to Public Works & Transportation Committee and Equal Opportunity Commission.

## **10. METHOD OF AWARD - RESERVATIONS**

- A. Following will be basis of award of Contract, providing cost does not exceed amount of funds then estimated by County as available to finance Contract(s):
  1. Lowest dollar amount submitted by qualified responsible bidder on Base Bid for all work comprising project, combined any Owner accepted alternates. Alternates do not need to be chosen in order of their appearance on the Bid Form.
  2. County reserves right to reject all bids or any bid, to waive any informality in any bid, and to accept any bid that will best serve interests of County.
  3. Unit Prices and Informational Bids will not be considered in establishing low bidder.

## **11. SECURITY FOR PERFORMANCE AND PAYMENTS**

- A. Simultaneous with delivery of signed Contract, Bidder shall be required to furnish Performance and Payment Bonds as specified in Article 29 of General Conditions of Contract, "Contract Security". Surety Company shall be licensed to do business in Wisconsin. Performance and Payment Bonds must be dated same date or subsequent to date of Contract. Performance and Payment Bonds must emulate information in Sample Performance and Payment Bonds in Construction Documents.
- B. Provide certified copy of power of attorney from Surety Company showing that agent who signs Bond has power of attorney to sign for Surety Company. Secretary or Assistant Secretary of company must sign this certification, not attorney-in-fact. Certification must bear same or later date as Bond. Power of Attorney must emulate model power of attorney information detailed in Sample Performance and Payment Bonds.
- C. If Bidder is partnership or joint venture, State certified list, providing names of individuals constituting partnership or joint venture must be furnished. Contract may be signed by one partner of partnership, or one partner of each firm comprising joint venture, but Performance and Payment Bonds must be signed by all partners.
- D. If Bidder is a corporation, it is necessary that current certified copy of resolution or other official act of directors of corporation be submitted showing that person who signs Contract is authorized to sign contracts for corporation. It is also necessary that corporate seal be affixed to resolution, contract, and performance and payment bonds. If your corporation has no seal, it is required that above documents include statement or notation to effect that corporation has no seal.

## **12. TAXES**

- A. Bidder shall include in Bid, all Sales, Consumer, Use and other similar taxes required by law.
- B. In accordance with Wisconsin Statue 71.80(16)(a), successful nonresident bidder, whether incorporated or not, and not otherwise regularly engaged in business in this state, shall file

surety bond with State of Wisconsin Department of Revenue payable to Department of Revenue, to guarantee payment of income taxes, required unemployment compensation contributions, sales and use taxes and income taxes withheld from wages of employees, together with any penalties and interest thereon. Amount of bond shall be three percent (3%) of Contract or subcontract price on all contracts of \$50,000 or more.

### **13. SUBMISSION OF BIDS**

- A. All Bids shall be submitted on standard Bid Form bound herein and only Bids that are made on this Bid Form will be considered. Entire Bid Form and other supporting documents, if any, shall be removed or copied from Construction Documents, filled out, and submitted in manner specified hereinafter. Submit completed Bid Bond with Bid as well.
- B. No bids for any subdivision or any sub-classification of this Work, except as indicated, will be accepted. Any conditional Bid, amendment to Bid Form or appended item thereto, or inclusion of any correspondence, written or printed matter, or details of any nature other than that specifically called for, which would alter any essential provision of Construction Documents, or require consideration of unsolicited material or data in determining award of Contract, will disqualify Bid. Telecommunication alterations to Bid will not be accepted.
- C. Bidders must submit single Bid for all the Work.
- D. Bid amounts shall be inserted in words and in figures in spaces provided on Bid Form; in case of conflict, written word amounts will govern.
- E. Addenda issued after Bid Letting shall become part of Construction Documents. Bidders shall acknowledge receipt of such addenda in appropriate space provided on Bid Form. Bid will be rejected if receipt of any particular addendum applicable to award of Contract has not been acknowledged on Bid Form.
- F. All bidders are encouraged to submit their bids in special printed bid envelope available at Dane County Public Works, Highway & Transportation Department - Public Works Engineering Division. Bids submitted in any other type of envelope run risk of not being identified as bid and County shall not be liable therefore in any respect. Bids shall be signed, sealed and delivered at place and before time of closing designated in Invitation to Bid, and identified with project name, bid number, location, category of work being bid upon, Bid Opening date, name and address of bidder.
- G. Bidder shall be responsible for sealed Bid being delivered to place designated for Bid Opening on or before date and time specified. Bids received after time of closing will be rejected and returned to bidder unopened.
- H. Bid will be considered invalid and will be rejected if bidder has not signed it.
- I. Faxed Bids will not be accepted.

### **14. SUBCONTRACTOR LISTING**

- A. Bidders shall be required to submit list of major subcontractors for General Construction, Plumbing, HVAC, and Electrical work proposed for this project to include committed prices for each subcontractor. List shall be placed in separate sealed envelope that must be clearly identified as "Major Subcontractor List", for named project and name of Bidder submitting it.

County must receive envelope no later than date by which successful Bidder is required to submit his or her signed Contract, as established in Construction Documents.

#### **15. ALTERNATE BIDS**

- A. Bidder shall carefully read requests for Alternate Bids, and thoroughly examine Drawings and Specifications to determine extent various changes and conditions will affect Bid.
- B. Space is provided in Bid Form for requested Alternate Bids. Failure to submit bid for any requested Alternate Bids may result in rejection of entire Bid.
- C. Bidder shall state amount to be added / subtracted to Base Bid for providing alternates, including all incidentals, omissions, additions, and adjustments as may be necessary or required by such changes. If there is no difference in price, Bidder shall state, "No Change".
- D. Descriptions of requested Alternate Bids are as set forth in Construction Documents.

#### **16. INFORMATIONAL BIDS**

- A. Bidder shall state amount that is included in Base Bid for all equipment, materials and labor required to complete the Work described. Informational bids are amounts requested for accounting purposes and for allocation of funds only. It is not intended to omit any of the Work described or related items from this project.
- B. Description of requested Informational Bids, if any, is as set forth in Construction Documents.

#### **17. UNIT PRICES**

- A. Provide unit prices where requested on Bid Form. Unit prices will include all costs for materials, labor, insurance, taxes, overhead and profit necessary to perform specified work. Estimated quantities are approximate only. Payment will be based upon actual quantities placed, provided or installed. Failure to provide requested unit prices may result in rejection of entire Bid.
- B. County reserves right to accept or reject any unit prices as given in Bid.
- C. Bidder shall refer to Bid Form and applicable specification section to determine basis of unit measure and detailed information related to each unit price item requested.

#### **18. COMMENCEMENT AND COMPLETION**

- A. Successful Bidder shall commence work when schedule and weather permit, but no later than stated in Bid Form. Contractor shall pursue the Work regularly and continuously at reasonable rate to insure completion of the Work within time stated in Bid.
- B. Should it be found impossible to complete the Work on or before time specified for completion, written request may be submitted for extension of time setting forth reasons believed to justify granting of such request.

**19. WORK BY COUNTY**

- A. Additional minor demolition work not described in these Construction Documents will be accomplished by County and will not be included under this Contract.

**20. SPECIAL HAZARDS COVERAGE**

- A. Not Applicable.

**FORM A**

**DANE COUNTY  
EMERGING SMALL BUSINESS REPORT - CERTIFICATION**

In accordance with General Conditions of Contract, submit this Emerging Small Business Report within ten (10) days after Bid Opening.

PROJECT NAME: \_\_\_\_\_

\_\_\_\_\_

BID NO.: \_\_\_\_\_ BID OPENING DATE: \_\_\_\_\_

**BIDDER INFORMATION**

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

TELEPHONE NO.: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

**FORM B**

**DANE COUNTY  
EMERGING SMALL BUSINESS REPORT - INVOLVEMENT**

Page \_\_\_ of \_\_\_  
(Copy this Form as necessary to provide complete information)

COMPANY NAME: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_ BID NO.: \_\_\_\_\_

ESB NAME: \_\_\_\_\_ CONTACT PERSON: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

**Indicate percentage of financial commitment to this ESB: \_\_\_\_\_ % Amount: \$ \_\_\_\_\_**

ESB NAME: \_\_\_\_\_ CONTACT PERSON: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

**Indicate percentage of financial commitment to this ESB: \_\_\_\_\_ % Amount: \$ \_\_\_\_\_**

ESB NAME: \_\_\_\_\_ CONTACT PERSON: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

**Indicate percentage of financial commitment to this ESB: \_\_\_\_\_ % Amount: \$ \_\_\_\_\_**



**FORM C**

**DANE COUNTY  
EMERGING SMALL BUSINESS REPORT - CONTACTS**

Page \_\_\_ of \_\_\_  
(Copy this Form as necessary to provide complete information)

COMPANY NAME: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_ BID NO.: \_\_\_\_\_

	<u>ESB FIRM NAME CONTACTED</u>	<u>DATE</u>	<u>PERSON CONTACTED</u>	<u>DID ESB BID?</u>	<u>DID YOU ACCEPT BID?</u>	<u>REASON FOR REJECTION</u>
1)	_____	_____	_____	_____	_____	_____
2)	_____	_____	_____	_____	_____	_____
3)	_____	_____	_____	_____	_____	_____
4)	_____	_____	_____	_____	_____	_____
5)	_____	_____	_____	_____	_____	_____
6)	_____	_____	_____	_____	_____	_____
7)	_____	_____	_____	_____	_____	_____

**FORM D**

**DANE COUNTY  
EMERGING SMALL BUSINESS REPORT - CERTIFICATION STATEMENT**

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

\_\_\_\_\_ certify to best of my knowledge and  
Company

belief that this business meets Emerging Small Business definition as indicated in Article 9 and  
that information contained in this Emerging Small Business Report is true and correct.

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

\_\_\_\_\_  
Date

**BID FORM**

**BID NO. 108049**

**PROJECT: TENANT IMPROVEMENTS  
THIRD FLOOR, CITY-COUNTY BUILDING**

**TO: DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY &  
TRANSPORTATION PROJECT ENGINEER  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713**

**BASE BID - LUMP SUM:**

Work includes construction services for tenant build-out of approximately 11,000 sq. ft. including drywall partitions, flooring, ceiling, HVAC, electrical and plumbing. The undersigned, having examined the site where the Work is to be executed and having become familiar with local conditions affecting the cost of the Work and having carefully examined the Drawings and Specifications, all other Construction Documents and Addenda thereto prepared by Dane County Department of Public Works, Highway & Transportation hereby agrees to provide all labor, materials, equipment and services necessary for the complete and satisfactory execution of the entire Work, as specified in the Construction Documents, for the Base Bid stipulated sum of:

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price

The undersigned further agrees to add the alternate(s) portion of the Work as described, for the following addition(s) to or subtraction(s) from the Base Bid stipulated below. They further agree to honor the alternate(s) bid for 60 days from date of Award of Contract.

**ALTERNATE BID 1 - LUMP SUM:**

Provide painted hollow metal frames in lieu of aluminum storefront at door and window openings on the west side of corridor 3000. This alternate includes doors 318, 319, 321, 322b, 323b, 324b, 325b, 326, 327, 328, 329, 330, 331, and 332 and all adjacent openings.

**Deduct:** \_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price

**ALTERNATE BID 2 - LUMP SUM:**

Omit paint and prep of Mechanical Room 354 and 353 floors.

Deduct: \_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

Receipt of the following addenda and inclusion of their provisions in this Bid is hereby acknowledged:

Addendum No(s). \_\_\_\_\_ through \_\_\_\_\_

Dated \_\_\_\_\_

Dane County Department of Public Works, Highway & transportation must have this project completed by December 1, 2008. Assuming a Notice to Proceed is issued by May 19, 2008, what dates can you commence and complete this job?

Commencement Date: \_\_\_\_\_ Completion Date: \_\_\_\_\_  
(final, not substantial)

Name of Bidder: \_\_\_\_\_

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

Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Contact Person: \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_  
(Bid is invalid without signature)

<p><b>BID CHECK LIST:</b> These items <b>must</b> be included with Bid or completed <b>before</b> bidding</p> <p><input type="checkbox"/> Bid Form                      <input type="checkbox"/> Bid Bond                      <input type="checkbox"/> Fair Labor Practices Certification</p> <p><input type="checkbox"/> Best Value Qualified Contractor                      <input type="checkbox"/> Vendor Registration</p>
--

**FAIR LABOR PRACTICES CERTIFICATION**

The undersigned, for and on behalf of the BIDDER, APPLICANT or PROPOSER named herein, certifies as follows:

A. That he or she is an officer or duly authorized agent of the above-referenced BIDDER, APPLICANT or PROPOSER, which has a submitted a proposal, bid or application for a contract with the county of Dane.

B. That BIDDER, APPLICANT or PROPOSER has (check one):

\_\_\_\_\_ not been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

\_\_\_\_\_ been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

\_\_\_\_\_  
Officer or Authorized Agent Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Printed or Typed Business Name

**NOTE:** You can find information regarding the violations described above at: [www.nlr.gov](http://www.nlr.gov) and [werc.wi.gov](http://werc.wi.gov).

For reference, Dane County Ordinance 25.11(28)(a) is as follows:

(28) BIDDER RESPONSIBILITY. (a) Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The purchasing manager shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder’s responsibility to perform the contract.

**If you indicated that the NLRB or WERC have found you to have such a violation, you must include copies of any relevant information regarding such violation with your proposal, bid or application.**



# DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive  
Kathleen M. Falk

1919 Alliant Energy Center Way ♦ Madison, Wisconsin 53713  
Phone: (608) 266-4018 ♦ FAX: (608) 267-1533

Commissioner / Director  
Gerald J. Mandli

## BEST VALUE CONTRACTING APPLICATION

### CONTRACTORS/LICENSURE APPLICANTS

The Dane County Department of Public Works requires all bidders to be prequalified with the County prior to bid opening. In addition, the County reviews potential contractors and sub-contractors who wish to work on County contracts. This document shall be completed, properly executed, along with the necessary attachments regarding information relating to financial ability, equipment, experience in the work prescribed in the public contract, and other matters that the County requires for the protection and welfare of the public in the performance of a County contract.

The Contractor shall notify the County within 15 days of any information regarding any material changes to its business or operations that are relevant to the prequalification application. Failure to do so could result in suspension, revocation of the contractor's prequalification, debarment from County contracts for up to three years or other sanctions available under the law.

Contractors or subcontractors of any tier who attain prequalification status will retain that status for a period of two years from the date of qualification. Subcontractors must become prequalified ten days prior to commencing work under any Dane County Public Works Contract. Potential subcontractors are urged to become prequalified as early as possible.

No contracts will be awarded for construction work performed on Dane County projects unless the contractor is currently approved as a Wisconsin Trade Trainer or has applied for approval as an Apprenticeship Trade Trainer to the Wisconsin Department of Workforce Development and agrees to an acceptable apprenticeship program. If you are not currently approved as a Wisconsin Trade Trainer, or have not applied for approval as an Apprenticeship Trade Trainer, please contact the Department of Workforce Development – Bureau of Apprenticeship Standards at (608)266-3133 or visit their web site at [www.wisconsinapprenticeship.org](http://www.wisconsinapprenticeship.org).

### EXEMPTIONS

- Contractors or subcontractors of any tier automatically attain prequalification status with Dane County if the contractor has current Executive Order 108 precertification status with the State of Wisconsin or prequalification status with the City of Madison.
- Contractors who employ less than five (5) craft workers are not required to prequalify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor/subcontractor provides sufficient documentation to demonstrate one or more of the following:
  - apprentices are not available in a specific geographic area; or
  - the applicable apprenticeship program is unsuitable or unavailable; or
  - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possess all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for the project or obtain the same through the use of responsible, prequalified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Does your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
3	Does your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Does your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
5	Does your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
6	Does your firm acknowledge that it must pay all craft employees on public works projects the wage rates and benefits required under Section 66.0903 of the Wisconsin Statutes?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
7	Does your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
8	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
9	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
10	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
11	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
12	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
13	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than \$10,000?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
14	Is your firm Executive Order 108 precertified with the State of Wisconsin?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
15	Is your firm prequalified with the City of Madison?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
17	Is your firm exempt from being prequalified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
18	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also prequalified with the County or become so ten days prior to commencing work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>

## SIGNATURE SECTION

Your firm's Officer, or the individual who would sign a bid and/or contract documents must sign this document.

I do hereby certify that all statements herein contained are true and correct to the best of my knowledge:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed or Typed Name and Title

NAME AND ADDRESS OF CONTRACTOR	
Name of Firm	
Address	
City, State, Zip	
Telephone Number	
Fax Number	
E-mail Address	

## REMEMBER!

**Return all to forms and attachments, or questions to:**

**JOHN SCHRAUFNAGEL  
EMAIL: SCHRAUFNAGEL@CO.DANE.WI.US  
OFFICE: (608)266-4798, CELL: (608)575-3374, FAX: (608)267-1533**

**ATTN: JOHN SCHRAUFNAGEL  
DANE COUNTY DEPARTMENT OF PUBLIC WORKS  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WI 53713**



## APPENDIX A

### APPRENTICEABLE TRADES

Bricklayer  
Carpenter  
Cement Mason/Concrete Finisher  
Cement Mason (Heavy Highway)  
Construction Craft Laborer  
Data Communications Installer  
Electrician  
Environmental Systems Technician/HVAC Service Technician/HVAC Install/Service  
Glazier  
Heavy Equipment Operator/Operating Engineer  
Insulation Worker (Heat & Frost)  
Iron Worker (Assembler, Metal Buildings)  
Painter/Decorator  
Plasterer  
Plumber  
Roofer/Waterproofers  
Sheet Metal Worker  
Sprinkler Fitter  
Steamfitter (Service & Refrigeration)  
Taper & Finisher  
Telecommunications (Voice, Data & Video) Installer/Technician  
Tile Setter

**COUNTY OF DANE**

**PUBLIC WORKS CONTRACT**

Contract No. \_\_\_\_\_ Bid No. 108049

Authority: Res. \_\_\_\_\_, 2008-09

**THIS CONTRACT**, made and entered into as of the date by which authorized representatives of both parties have affixed their signatures, by and between the County of Dane (hereafter referred to as "COUNTY") and \_\_\_\_\_ (hereafter, "CONTRACTOR"), and

**WITNESSETH:**

**WHEREAS**, COUNTY, whose address is c/o Associate Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide Tenant Improvements on the third floor of the City-County Building [including Alternate Bid[s] 1 & 2 (if applicable)] ("the Project"); and

**WHEREAS**, CONTRACTOR, whose address is \_\_\_\_\_ is able and willing to construct the Project, in accordance with the Construction Documents;

**NOW, THEREFORE**, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and CONTRACTOR do agree as follows:

1. CONTRACTOR agrees to construct, for the price of \$\_\_\_\_\_ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, General Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by Dorschner Associates Inc. (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Document Index, all of which are made a part hereof and collectively evidence and constitute the Contract.
2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the General Conditions of Contract, and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the General Conditions of Contract.
3. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force

or any other reserve component of the military forces of the United States, or political beliefs. Such equal opportunity shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

**4.** CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) days of the effective date of this Contract. During the term of this Contract CONTRACTOR shall also provide copies of all announcements of employment opportunities to COUNTY'S Contract Compliance Office, and shall report annually the number of persons, by race, ethnicity, gender, and disability status, which apply for employment and, similarly classified, the number hired and number rejected.

**5.** During the term of this Contract, all solicitations for employment placed on CONTRACTOR'S behalf shall include a statement to the effect that CONTRACTOR is an "Equal Opportunity Employer."

**6.** CONTRACTOR agrees to furnish all information and reports required by COUNTY'S Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provisions of this Contract.

**7.** CONTRACTOR agrees that all persons employed by CONTRACTOR or any subcontractor shall be paid no less than the minimum wage established under Chapter 40, Subchapter II, Dane County Code of Ordinances. CONTRACTOR agrees to abide by and comply with the provisions of Chapter 40, Subchapter II of the Dane County Code of Ordinances, and said Subchapter is fully incorporated herein by reference.

**8.** This Contract is intended to be a Contract solely between the parties hereto and for their benefit only. No part of this Contract shall be construed to add to, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties including, but not limited to, employees of either of the parties.

**9.** The entire agreement of the parties is contained herein and this Contract supersedes any and all oral agreements and negotiations between the parties relating to the subject matter hereof. The parties expressly agree that the express terms of this Contract shall not be amended in any fashion except in writing, executed by both parties.

**IN WITNESS WHEREOF**, COUNTY and CONTRACTOR, by their respective authorized agents, have caused this Contract and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

\* \* \* \* \*

**FOR CONTRACTOR:**

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Printed or Typed Name and Title

NOTE: If CONTRACTOR is a corporation, Secretary should attest. In accordance with IRS Regulations, unincorporated entities are required to provide either their Social Security or Employer Number in order to receive payment for services rendered.

\* \* \* \* \*

This Contract is not valid or effectual for any purpose until approved by the appropriate authority designated below, and no work is authorized until the CONTRACTOR has been given notice to proceed by COUNTY'S Associate Public Works Director.

**FOR COUNTY:**

\_\_\_\_\_  
Kathleen M. Falk, County Executive Date

\_\_\_\_\_  
Robert Ohlsen, County Clerk Date

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310

Bid Bond

Bond No.

KNOW ALL MEN BY THESE PRESENTS, that we (Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and (Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of WI as Surety, hereinafter called the Surety, are held and firmly bound unto (Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called Obligee, in the sum of ( ) Percent of total amount bid Dollars (\$) Percent of attached bid.

For the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for Project No.: (Here insert full name, address, and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this day of , 20 .

(Witness) (Principal) (Seal) (Title) (Surety) (Seal) (Witness) ATTORNEY-IN-FACT

THE AMERICAN INSTITUTE OF ARCHITECTS



Bond No. \_\_\_\_\_

AIA Document A312

Performance Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address): \_\_\_\_\_

SURETY (Name and Principal Place of Business): \_\_\_\_\_

OWNER (Name and Address): \_\_\_\_\_

CONSTRUCTION CONTRACT  
Date: \_\_\_\_\_  
Amount: \$ \_\_\_\_\_  
Description (Name and Location): \_\_\_\_\_

BOND

Date (Not earlier than Construction Contract Date): \_\_\_\_\_

Amount: \$ \_\_\_\_\_

Modifications to this Bond: \_\_\_\_\_

None

See Page 3

CONTRACTOR AS PRINCIPAL  
COMPANY: \_\_\_\_\_  
(Corporate Seal)

SURETY COMPANY: \_\_\_\_\_  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:

Attorney-in-Fact

(Any additional signatures appear on page 3)

FOR INFORMATION ONLY-Name, Address and Telephone  
AGENT OR BROKER: \_\_\_\_\_

OWNER'S REPRESENTATIVE (Architect,  
Engineer or other party): \_\_\_\_\_

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and

3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.

4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

4.4 Waive its rights to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for

which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefor to the Owner; or

2. Deny liability in whole or in part and notify the Owner citing reasons therefor.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

**12 DEFINITIONS**

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other

claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

**MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:**

SAMPLE

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL  
Company: (Corporate Seal)

SURETY  
Company: (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

Signature: \_\_\_\_\_  
Name and Title:  
Address:



THE AMERICAN INSTITUTE OF ARCHITECTS



Bond No. \_\_\_\_\_

AIA Document A312

Payment Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT  
Date:  
Amount: \$  
Description (Name and Location):

SAMPLE

BOND

Date (Not earlier than Construction Contract Date):

Amount: \$

Modifications to this Bond:

None

See Page 6

CONTRACTOR AS PRINCIPAL  
COMPANY: (Corporate Seal)

SURETY COMPANY:  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:

Attorney-in-Fact

(Any additional signatures appear on page 6)

FOR INFORMATION ONLY-Name, Address and Telephone  
AGENT OR BROKER:

OWNER'S REPRESENTATIVE (Architect,  
Engineer or other party):

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
  - 2.1 Promptly makes payment, directly, or indirectly, for all sums due Claimants, and
  - 2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
  - 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2 Claimants who do not have a direct contract with the Contractor:
    1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2 Pay or arrange for payment of any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor

shall promptly furnish a copy of this Bond or shall permit a copy to be made.

**15. DEFINITIONS**

**15.1 Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's

subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

**15.2 Construction Contract:** The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

**15.3 Owner Default:** Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

**MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:**

SAMPLE

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL  
Company: (Corporate Seal)

SURETY  
Company: (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

Signature: \_\_\_\_\_  
Name and Title:  
Address:

# GENERAL CONDITIONS OF CONTRACT

## TABLE OF CONTENTS

GENERAL CONDITIONS OF CONTRACT .....	1
1. CONSTRUCTION DOCUMENTS .....	2
2. DEFINITIONS .....	2
3. ADDITIONAL INSTRUCTIONS AND DRAWINGS.....	2
4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES .....	3
5. CUTTING AND PATCHING.....	4
6. CLEANING UP .....	4
7. USE OF SITE .....	5
8. MATERIALS AND WORKMANSHIP .....	5
9. CONTRACTOR'S TITLE TO MATERIALS .....	5
10. "OR EQUAL" CLAUSE.....	6
11. PATENTS AND ROYALTIES.....	6
12. SURVEYS, PERMITS, REGULATIONS AND TAXES.....	7
13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE.....	7
14. WEATHER CONDITIONS.....	8
15. PROTECTION OF WORK AND PROPERTY .....	8
16. INSPECTION AND TESTING OF MATERIALS.....	8
17. REPORTS, RECORDS AND DATA .....	9
18. CHANGES IN THE WORK.....	9
19. EXTRAS.....	10
20. TIME FOR COMPLETION.....	10
21. CORRECTION OF WORK.....	10
22. SUBSURFACE CONDITIONS FOUND DIFFERENT .....	11
23. RIGHT OF THE DEPARTMENT TO TERMINATE CONTRACT.....	11
24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES.....	11
25. PAYMENTS TO CONTRACTOR .....	12
26. WITHHOLDING OF PAYMENTS.....	14
27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE .....	14
28. PAYMENTS BY CONTRACTOR.....	14
29. CONTRACT SECURITY.....	15
30. ASSIGNMENTS.....	15
31. MUTUAL RESPONSIBILITY OF CONTRACTORS .....	15
32. SEPARATE CONTRACTS.....	15
33. SUBCONTRACTS .....	15
34. PUBLIC WORKS PROJECT ENGINEER'S AUTHORITY .....	16
35. ARCHITECT / ENGINEER'S AUTHORITY .....	16
36. ESTIMATES OF QUANTITIES .....	17
37. LANDS AND RIGHTS-OF-WAY .....	17
38. GENERAL GUARANTEE.....	17
39. CONFLICTING CONDITIONS .....	18
40. NOTICE AND SERVICE THEREOF.....	18
41. PROTECTION OF LIVES AND HEALTH .....	18
42. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES.....	18
43. COMPLIANCE WITH FAIR LABOR STANDARDS .....	19
44. USE AND OCCUPANCY PRIOR TO ACCEPTANCE .....	19
45. MINIMUM WAGES .....	20
46. CLAIMS .....	20
47. ANTITRUST AGREEMENT .....	20
48. INSURANCE.....	21
49. WISCONSIN LAW CONTROLLING .....	23

## **1. CONSTRUCTION DOCUMENTS**

- A. Construction Documents, listed in Table of Contents of this Specification volume shall form a part of this Contract and provisions of Construction Documents shall be as binding upon parties as if they were fully set forth in Contract itself.
- B. These shall also be considered as part of Construction Documents: Addenda, including additions and modifications incorporated in such addenda before execution of Contract; requests for information; construction bulletins; change orders; and written interpretations by Architect / Engineer or Public Works Project Engineer that are made after execution of Contract.
- C. Construction Documents are complementary, and what is required by one shall be as binding as if required by all. Intent of Construction Documents is to include all labor, materials and equipment necessary for proper execution of the Work.

## **2. DEFINITIONS**

- A. These terms as used in this Contract are respectively defined as follows:
  - 1. All uses of term “County” in Construction Documents shall mean Dane County.
  - 2. All uses of term “Department” in Construction Documents shall mean Department of Public Works, Highway & Transportation, which is a unit of Dane County government. Department is County agency overseeing Contract with Contractor.
  - 3. Public Works Project Engineer is appointed by and responsible to Department. Public Works Project Engineer has authority to act on behalf of Department and will sign change orders, payment requests and other administrative matters related to projects.
  - 4. Public Works Project Engineer is responsible for supervision, administration and management of field operations involved in construction phase of this Work.
  - 5. Term “Work” includes all labor, equipment and materials necessary to produce project required by Construction Documents.
  - 6. Term “Substantial Completion” is date when project or specified area of project is certified by Architect / Engineer that construction is sufficiently completed, in accordance with Construction Documents, and as modified by any subsequent changes agreed to by parties, so that County may occupy project or specified area of project for use for which it was intended subject to permit approval for occupancy.
  - 7. Contractor is a person, firm, or corporation with whom County makes Contract. Though multiple contracts may be involved, Construction Documents treat them throughout as if each were of singular number.

## **3. ADDITIONAL INSTRUCTIONS AND DRAWINGS**

- A. Contractor may be furnished additional instructions and detail drawings as necessary to carry out the Work included in Contract. Additional drawings and instructions thus supplied to Contractor will coordinate with Construction Documents and will be so prepared that they can be reasonably interpreted as part thereof. Contractor shall carry out the Work in accordance with additional detail drawings and instructions.

#### **4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

- A. Unless otherwise specified, Contractor shall submit three (3) copies of all Shop Drawings for each submission, until receiving final approval. After final approval, provide five (5) additional copies for distribution and such other copies as may be required.
- B. Contractor shall submit, on an on-going basis and as directed, Product Data such as brochures that shall contain catalog cuts and specifications of all furnished mechanical and electrical equipment. After Architect / Engineer's approval, one (1) copy shall remain in Architect / Engineer's file, one (1) kept at Department's office and one (1) kept at job site by Contractor for reference purposes.
- C. Samples shall consist of physical examples furnished by Contractor in sufficient size and quantity to illustrate materials, equipment or workmanship, and to establish standards to compare the Work.
  - 1. Submit Samples in sufficient quantity (minimum of two (2)) to permit Architect / Engineer to make all necessary tests and of adequate size showing quality, type, color range, finish, and texture. Label each Sample stating material, type, color, thickness, size, project name, and Contractor's name.
  - 2. Submit transmittal letter requesting approval, and prepay transportation charges to Architect / Engineer's office on samples forwarded.
  - 3. Materials installed shall match approved Samples.
- D. Contractor shall review Shop Drawings and place their dated stamp thereon to evidence their review and approval and shall submit with reasonable promptness and in orderly sequence to cause no delay in the Work or in work of any other contractor. At time of submission, Contractor shall inform Architect / Engineer in writing of any deviation in Shop Drawings or Samples from requirements of Construction Documents. Architect / Engineer will not consider partial lists.
- E. Architect / Engineer will review and approve or reject Shop Drawings with reasonable promptness to cause no delay. Architect / Engineer's approval shall not relieve Contractor from responsibility for errors or omission in Shop Drawings.
- F. Contractor shall not commence any work requiring Shop Drawing, Product Data or Sample submission until Architect / Engineer has approved submission. All such work shall be in accordance with approved Shop Drawings, Product Data and Samples.
- G. Contractor shall keep on site of the Work, an approved or conformed copy of Shop Drawings and shall at all time give Department access thereto.
- H. By stamping and submitting Shop Drawings, Product Data and Samples, Contractor thereby represents that he or she has or will determine and verify all field measurements, field construction criteria, materials, catalog numbers, and similar data and that he or she has checked and coordinated each Shop Drawing, Product Data and Sample with requirements of the Work and of Construction Documents. Architect / Engineer shall return without examination, Shop Drawings, Product Data and Samples not so noted.
- I. All Shop Drawings from any one Contractor should be numbered consecutively and on cover sheet shall bear name and location of project, name of Contractor, date of submittal and date of each correction or revision and associated Specification section and page number.

## **5. CUTTING AND PATCHING**

- A. Contractor shall be responsible for all cutting, fitting or patching required to complete the Work or to make its parts fit together properly.
- B. Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of County or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. Contractor shall not cut or otherwise alter such construction by County or a separate contractor except with written consent of County and of such separate contractor; such consent shall not be unreasonably withheld. Contractor shall not withhold unreasonably from County or a separate contractor, Contractor's consent to cutting or otherwise altering the Work.

## **6. CLEANING UP**

- A. Contractor shall keep premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under Contract. Contractor shall remove from and about the Work waste materials, rubbish, Contractor's tools, construction equipment, machinery, and surplus materials at completion of the Work. Contractor shall maintain streets and sidewalks around the Work site in a clean condition. Contractor shall remove all spillage and prevent tracking of spillage arising from performance of the Work, into, out of, and within the Work site. Contractor shall establish a regular maintenance program of sweeping, vacuuming and / or hosing to minimize accumulation of dirt and dust upon such areas.
- B. If Contractor fails to clean up as directed in Construction Documents, County may do so and shall charge Contractor cost thereof.
- C. Contractor shall be responsible for broken windows and glass, and at completion of the Work shall replace such damaged or broken windows and glass. After replacing damaged or broken windows and glass, Contractor shall remove all labels, wash and polish both sides of all windows and glass.
- D. In addition to general cleaning (sweeping, vacuuming and / or hosing, as is appropriate to work surface), Contractor shall perform following final cleaning for all trades at completion of the Work:
  - 1. Remove temporary protections;
  - 2. Remove marks, stains, fingerprints and other soil or dirt from painted, decorated and finished woodwork and wall surfaces;
  - 3. Remove spots, plaster, soil and paint from ceramic tile, marble and other finished materials, and wash or wipe clean;
  - 4. Clean fixtures, cabinet work and equipment, removing stains, paint, dirt and dust, and leave same in undamaged, new condition;
  - 5. Clean aluminum in accordance with recommendations of manufacturer; and
  - 6. Clean resilient floors thoroughly with a well-rinsed mop containing only enough moisture to clean off any surface dirt or dust and buff dry by machine to bring surfaces to sheen.

## **7. USE OF SITE**

- A. Contractor shall provide County and Architect / Engineer access to the Work under all circumstances.
- B. Contractor shall confine operations at site to areas permitted by County, law, ordinance, permits and Construction Documents and shall not unreasonably encumber site with materials or equipment. Contractor shall assure free, convenient, unencumbered, direct and safe access to all properties adjacent to the Work for County, its employees, invitees and guests.

## **8. MATERIALS AND WORKMANSHIP**

- A. Contractor shall perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, necessary to complete the Work required by this Contract, within time specified, in accordance with provisions of Construction Documents.
- B. All equipment and materials incorporated in the Work covered by this Contract are to be new; use recycled and / or recovered materials to extent that such use is technically and economically feasible. Recovered materials are products recovered from solid waste in form identical to original form for use that is same as, or similar to original use. Recycled materials are products manufactured from solid waste.
- C. If requested, Contractor shall furnish satisfactory evidence as to kind and quality of construction materials proposed or used. Contractor shall furnish to Architect / Engineer, for approval, manufacturer name and model, performance capacities and other pertinent information of machinery, mechanical, electrical or other types of equipment, which Contractor plans to install.
- D. If not otherwise provided, materials and labor called for in this Contract shall be provided and performed in accordance with established practice and standards recognized by Architects, Engineers, Department, and construction industry.
- E. Reference to "Standard" specifications of any association or manufacturer, or codes of County authorities, intends most recent printed edition or catalog in effect on date that corresponds with date of Construction Documents.
- F. Whenever reference is made in Specifications that work shall be "performed", "applied", in accordance with "manufacturer's directions or instructions", Contractor to whom those instructions are directed shall furnish three (3) printed copies of such instructions to Architect / Engineer before execution of the Work.

## **9. CONTRACTOR'S TITLE TO MATERIALS**

- A. Contractor or any subcontractor shall not purchase materials or supplies for the Work subject to any chattel mortgage or under conditional sale contract or other agreement by which seller retains interest. Contractor warrants that all materials and supplies used in the Work are free from all liens, claims or encumbrances and Contractor has good title to them.



## **10. “OR EQUAL” CLAUSE**

- A. Whenever equipment or materials are identified on Drawings or in Specifications by reference to manufacturer’s or vendor’s name, trade name, catalog number, and other identifying information, it is intended to establish a standard; and any equipment or material of other manufacturers and vendors which will perform adequately duties imposed by general design will be considered equally accepted provided equipment or material so proposed is, in opinion of Architect / Engineer, of equal substance and function. Architect / Engineer and Department shall provide written approval before Contractor may purchase or install it.
- B. Equipment or materials of manufacturers, other than those named, may be used only upon following conditions:
1. That, in opinion of Architect / Engineer and Department, proposed material or equipment item is fully equal or superior (in design, materials, construction, workmanship, performance, finish, etc.) to named item. No compromise in quality level, however small, is acceptable.
  2. That, in substituting materials or equipment, Contractor assumes responsibility for any changes in system or for modifications required in adjacent or related work to accommodate such substitution despite Architect / Engineer’s and Department’s approval, and all costs growing out of approval of “or equal” items shall be responsibility of Contractor. No extra costs resulting from such approval shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
  3. It shall be understood that use of materials or equipment other than those specified, or approved equal by Architect / Engineer and Department, shall constitute a violation of Contract, and that Architect / Engineer and Department shall have right to require removal of such materials or equipment and their replacement with specified materials or equipment at Contractor’s expense.
  4. Product and manufacturer named first in Specifications or on information shown on Drawings is basis of selection of manufactured items and equipment, particularly mechanical equipment. In using other than first named products or manufacturers, including those specified as additionally approved or acceptable, Contractor assumes responsibility for any changes in system and for modifications in any work required to accommodate them. Architect / Engineer’s approval of such additionally acceptable products or manufacturers, either in Specifications or in an Addendum, does not relieve Contractor from obligation to coordinate such optional products with other Contractors, whose work may be affected by them, and to pay all additional costs resulting from their inclusion into the Work. Contractor’s liability shall include payment of Architect / Engineer’s fees for any additional services made necessary by or directly connected to such product changes. No extra costs resulting from such changes shall become responsibility of Department, Architect / Engineer or any other separate Contractor.
- C. No request for approval of “or equal” materials will be entertained except from Contractor. Identify any request for substitution as substitution on Contractor’s letter of transmittal and give reasons for substitution. Department may in its sole discretion allow substitutions of materials.

## **11. PATENTS AND ROYALTIES**

- A. If Contractor uses any design, device or material covered by letters, patent or copyright, it is mutually agreed and understood, that, without exception, contract prices shall include all royalties or costs arising from use of such design, device or materials, in any way involved in the Work.

- B. Contractor shall indemnify and save harmless County from any and all claims for infringement by reason of use of such patent or copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify County for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during prosecution of the Work or after completion of the Work.

## **12. SURVEYS, PERMITS, REGULATIONS AND TAXES**

- A. Department will furnish to Contractor all site, topography and property surveys necessary for execution of the Work.
- B. Contractor shall procure all permits, licenses and approvals necessary for execution of this Contract.
- C. Contractor shall give all notices and comply with all State of Wisconsin, Federal and local laws, codes, rules and regulations relating to performance of the Work, protection of adjacent property, and maintenance of passageways, guard fences or other protective facilities.
- D. Contractor shall pay all Sales, Consumer, Use and other similar taxes required by law.
- E. Contractor shall promptly notify Architect / Engineer of any variances of Drawings or Specifications with that of any State of Wisconsin, federal or local law, code, rule or regulation. Upon such notification, Architect / Engineer will require correction of variance to comply with applicable law, code, rule or regulation at no additional cost to Contractor.
- F. Work under this Contract shall comply with all applicable State of Wisconsin, Federal and local laws, codes and regulations.
- G. Contractor shall pay charges for water, sewer and other utility connections made by municipalities where required by Specifications.

## **13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE**

- A. Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and superintendence necessary to execute, complete and deliver the Work within specified time. Contractor agrees to secure at their own expense all personnel necessary to carry out the Work. Such personnel shall not be deemed County employees nor shall they have or be deemed to have any direct contractual relationship with County.
- B. Performance of any work necessary after regular working hours, on Sundays or Legal Holidays shall be without additional expense to County. Performance of any work at site at other than normal working hours must be coordinated with Public Works Project Engineer.
- C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.
- D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.
- E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ a construction superintendent or foreman, experienced in character of work covered by

Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Architect / Engineer and Department.

- F. Remove from project or take other corrective action upon notice from Architect / Engineer or Department for Contractor's employees whose work is considered by Architect / Engineer or Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.
- G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.
- H. Presence and observation of the Work by Architect / Engineer or Public Works Project Engineer shall not relieve Contractor of any obligations.

#### **14. WEATHER CONDITIONS**

- A. In event of temporary suspension of work, or during inclement weather, or whenever Architect / Engineer shall direct, Contractor shall, and shall cause subcontractors to protect carefully all work and materials against damage or injury from weather. If, in opinion of Architect / Engineer or Department, any work or materials that have been damaged or injured due to failure on part of Contractor or any subcontractors so to protect the Work, such materials shall be removed and replaced at expense of Contractor.

#### **15. PROTECTION OF WORK AND PROPERTY**

- A. Contractor shall at all times safely guard County's property from injury or loss in connection with this Contract. Contractor shall at all times safely guard and protect the Work, and adjacent property, from damage. Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in Contract, or by County, or County's duly authorized representative.
- B. Contractor may act in a diligent manner, without previous instructions from Architect / Engineer and / or Department, in an emergency that threatens loss or injury of property, or safety of life. Contractor shall notify Architect / Engineer and / or Department immediately thereafter. Promptly submit any claim for compensation by Contractor due to such extra work to Architect / Engineer and / or Department for approval as provided for in Article 18 herein.

#### **16. INSPECTION AND TESTING OF MATERIALS**

- A. Authorized representatives and agents of County government shall have access at all times to the Work wherever it is in preparation or progress and Contractor shall provide facilities for such access and for inspection.
- B. Should it be considered necessary or advisable at any time before final acceptance of the Work to make an examination of work already completed, by removing or tearing out same, Contractor shall upon request, promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any aspect, due to fault of Contractor or subcontractors thereof, Contractor shall assume all expenses of such examination and of satisfactory reconstruction. Contractor will be reimbursed for such examination and replacement in accordance with Article 18 - A.3., of these General Conditions of Contract if such work is found to meet requirements of Contract.

- C. If Specifications, Architect / Engineer's, or Public Works Project Engineer's instructions require any work to be specially tested or approved, Contractor shall give Architect / Engineer and Public Works Project Engineer timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Architect / Engineer shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.
- D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

## **17. REPORTS, RECORDS AND DATA**

- A. Contractor shall submit to Architect / Engineer and Public Works Project Engineer such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, invoices, records and other data as either may request concerning work performed or to be performed under this Contract.

## **18. CHANGES IN THE WORK**

- A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
  - 1. Unit bid prices previously approved.
  - 2. An agreed lump sum based on actual cost of:
    - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
    - b) Materials entering permanently into the Work.
    - c) Ownership or rental cost of construction tools and equipment during time of use on extra work.
    - d) Power and consumable supplies for operation of power equipment.
    - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
    - f) Social Security and old age and unemployment contributions.
    - g) Add to cost under (2), fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit and any other general expense.
    - h) On that portion of the Work under (2) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense.
    - i) Department may require correct amount of costs with supporting vouchers; Contractor shall keep and present in such form as directed.
  - 3. Cost-plus work, with a not-to-exceed dollar limit, based on actual cost of:
    - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
    - b) Materials entering permanently into the Work.

- c) Ownership or rental cost of construction tools and equipment during time of use on extra work. Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment.
  - d) Power and consumable supplies for operation of power equipment.
  - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
  - f) Social Security and old age and unemployment contributions.
  - g) To cost under (3), there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit, and any other general expense.
  - h) On that portion of the Work under (3) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense.
  - i) Contractor shall keep and present, in such form as directed, correct amount of cost together with such supporting vouchers as may be required by Department.
- B. If Contractor claims that by any instructions given by Architect / Engineer, Department, by drawings or otherwise, regarding performance of the Work or furnishing of material under Contract, involves extra cost, Contractor shall give Department written notice of cost thereof within two (2) weeks after receipt of such instructions and in any event before proceeding to execute work, unless delay in executing work would endanger life or property.
- C. No claim for extra work or cost shall be allowed unless it was done in pursuance of written Change Order from Architect / Engineer and approved by Department, as previously mentioned, and claim presented with payment request submitted after changed or extra work is completed.
- D. Negotiation of cost for a change in the Work shall not be cause for Contractor to delay prosecution of the Work if Contractor has been authorized in writing by Public Works Project Engineer to proceed.

## **19. EXTRAS**

- A. Without invalidating Contract, Department may order extra work or make changes by altering, adding to or deducting from the Work, contract sum being adjusted in accordance with Article 18 herein.

## **20. TIME FOR COMPLETION**

- A. Contractor agrees that the Work shall be prosecuted regularly and diligently and complete the Work as stated in Construction Documents.

## **21. CORRECTION OF WORK**

- A. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to inspection of Architect / Engineer and Public Works Project Engineer who shall be judge of quality and suitability of the Work, materials, and processes of manufacture for purposes for which they are used. Should they fail to meet Architect / Engineer's and Public Works Project Engineer's approval they shall be reconstructed, made good, replaced or corrected, by Contractor at Contractor's expense. Immediately remove all rejected material from site.

- B. If Contractor defaults or neglects to carry out the Work in accordance with Construction Documents or fails to perform any provision of Contract, Department may, after ten (10) days' written notice to Contractor and without prejudice to any other remedy County may have, make good such deficiencies. In such case, an appropriate Change Order shall be issued deducting from Contractor's payments then or thereafter, cost of correcting such deficiencies, including cost of Architect / Engineer's additional services made necessary by such default, neglect or failure.

## **22. SUBSURFACE CONDITIONS FOUND DIFFERENT**

- A. If Contractor encounters subsurface or latent conditions at site materially differing from those shown on Drawings or indicated in Specifications, Contractor shall immediately give notice to Architect / Engineer and Public Works Project Engineer of such conditions before they are disturbed. Architect / Engineer will thereupon promptly investigate conditions, and if Architect / Engineer finds that they materially differ from those shown on Drawings or indicated in Specifications, Architect / Engineer will at once make such changes as necessary, any increase or decrease of cost resulting from such changes to be adjusted in manner provided in above Article 18 entitled "Changes in the Work".

## **23. RIGHT OF THE DEPARTMENT TO TERMINATE CONTRACT**

- A. In event that any provisions of this Contract are violated by Contractor or by any subcontractors, County may serve written notice upon Contractor and Surety of its intention to terminate Contract, such notice to contain reasons for such intention to terminate Contract, and unless within ten (10) days after serving of such notice upon Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, Contract shall, upon expiration of said ten (10) days, cease and terminate.
- B. In event of any such termination, County shall immediately serve notice thereof upon Surety and Contractor, and Surety shall have right to take over and perform Contract subject to County's approval; provided, however, that if Surety does not commence performance thereof within ten (10) days from date of mailing to such Surety of notice of termination, County may take over the Work and prosecute same to completion by contract, or by force account, at expense of Contractor; Contractor and Surety shall be liable to County for any excess cost occasioned County thereby, and in such event County may take possession of and utilize in completing the Work, such materials and equipment as may be on the Work site and therefore necessary.

## **24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES**

- A. Contractor shall be responsible for Construction Schedule and coordination. Immediately after execution and delivery of Contract and before making first payment, Contractor shall notify all subcontractors to furnish all required information to develop a Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
  - 1. A list of construction activities;
  - 2. Start, finish and time required for completion of each activity;
  - 3. Sequential relationships between activities;
  - 4. Identify all long lead-time items, key events, meetings or activities such as required submittals, fabrication and delivery, procurement of materials, installation and testing;

5. Weekly definition of extent of work and areas of activity for each trade or Subcontract; and
  6. Other information as determined by Public Works Project Engineer.
- B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.
- C. Progress Reporting:
1. Contractor shall update and publish Construction Schedule on a monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by an explanation of reasons for revision; and shall be subject to approval by Department.
  2. Failure of Contractor to keep Schedule in updated format shall result in County hiring a firm specializing in construction schedule development and deducting those costs associated with updating process from payments due Contractor.
  3. Contractor shall submit show actual percentage of each activity completed, estimated future progress, and anticipated completion time.
- D. Responsibility for timely completion requires:
1. Contractor and subcontractors understand that performance of each is interdependent upon performance of others.
  2. Whenever it becomes apparent from current schedule, that phasing or progress completion dates will not be met, Contractor must take some or all following actions at no additional cost to County:
    - a) Increase construction manpower in such quantities and crafts as will eliminate backlog of work.
    - b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
    - c) Reschedule work (yet remain in conformance with Drawings and Specifications).
  3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Engineer.
- E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Architect / Engineer and Public Works Project Engineer.

## **25. PAYMENTS TO CONTRACTOR**

- A. Contractor shall provide:
1. Detailed estimate giving a complete breakdown of contract price by Specification Division; and
  2. Periodic itemized estimates of work done for purpose of making partial payments thereon.
- Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Engineer. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing a basis for additions to or deductions from Contract price.
- B. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month

upon receipt of Application and Certificate for Payment form from Architect / Engineer and approval of Department.

- C. Contractor shall submit for approval first to Architect / Engineer, and then to Public Works Project Engineer all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.
- D. Application and Certificate for Payment for preparatory work and materials delivered and suitably stored at site to be incorporated into the Work at some future period, will be given due consideration. Requesting payment for materials stored off site, may be rejected, however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered, conditional upon submission by Contractor of bills of sale, photographs and such other procedures as will adequately protect County's interest such as storage in a bonded warehouse with adequate coverage. If there is any error in a payment, Contractor is obligated to notify Department immediately, but no longer than ten (10) days from receipt of payment.
- E. Payments by County will be due within forty-five (45) days after receipt by Department of Application and Certificate for Payment.
- F. County will retain five percent (5%) of each Application and Certificate for Payment until final completion and acceptance of all the Work covered by Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at site, County will make remaining payments in full if Architect / Engineer and Public Works Project Engineer find that progress of the Work corresponds with Construction Schedule. If Architect / Engineer and Public Works Project Engineer find that progress of the Work does not correspond with Construction Schedule, County may retain up to ten percent (10%) of each Application and Certificate for Payment for the Work completed.
- G. All material and work covered by partial payments made shall become sole property of County, but this provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made, or restoration of any damaged work, or as a waiver of right of County to require fulfillment of all of terms of Contract.
- H. County will make final payment within sixty (60) days after final completion of the Work, and will constitute acceptance thereof.
- I. County may make payment in full, including retained percentages and less authorized deductions, upon completion and acceptance of each Division where price is stated separately in Contract.
- J. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County,



Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

## **26. WITHHOLDING OF PAYMENTS**

- A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged; whereupon, payment to Contractor shall be resumed in accordance with terms of this Contract, but in no event shall these provisions be construed to impose any obligations upon County to either Contractor or Contractor's Surety.
- B. In paying any unpaid bills of Contractor, County shall be deemed agent of Contractor, and any payment so made by County, shall be considered as a payment made under Contract by County to Contractor and County shall not be liable to Contractor for any such payment made in good faith.
- C. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of lawful demands of subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.
- D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

## **27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE**

- A. Making of final payment shall constitute a waiver of all claims by County except those arising from:
  - 1. Unsettled lien;
  - 2. Faulty or defective work appearing after substantial completion;
  - 3. Failure of the Work to comply with requirements of Construction Documents; or
  - 4. Terms of any special guarantees required by Construction Documents.
- B. Acceptance of final payment shall constitute a waiver of all claims by Contractor.

## **28. PAYMENTS BY CONTRACTOR**

- A. Contractor shall pay following not later than fifth (5<sup>th</sup>) day following each payment received from County:
  - 1. All transportation and utility services rendered;
  - 2. All materials, tools, and other expendable equipment that have been delivered at site of the Work to extent of ninety percent (90%) of cost thereof, and balance of cost thereof when said balance is paid to Contractor; and
  - 3. Each subcontractor, respective amount allowed Contractor because of work performed by subcontractor to extent of subcontractor's interest therein.

## **29. CONTRACT SECURITY**

- A. Contractor shall furnish a Performance and Payment Bonds in an amount at least equal to one hundred percent (100%) of Contract price as security for faithful performance of this Contract and payment of all persons performing labor on project under this Contract and furnishing materials in connection with this Contract.
- B. Sample Performance and Payment Bonds that Contractor will be required to execute is bound into these Construction Documents. Before construction Contract is consummated, completed Performance and Payment Bonds must be approved by Department.

## **30. ASSIGNMENTS**

- A. Contractor shall not assign whole or any part of this Contract or any moneys due or to become due hereunder without written consent of Department. In case Contractor assigns all or any part of any moneys due or to become due under this Contract, instrument of assignment shall contain a clause substantially to effect that it is agreed that right of assignee in and to any moneys due or to become due to Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for performance of the Work called for in this Contract.

## **31. MUTUAL RESPONSIBILITY OF CONTRACTORS**

- A. If, through acts of neglect on part of Contractor or any subcontractor shall suffer loss or damage on the Work, Contractor agrees to settle with such subcontractor by agreement or arbitration if such other subcontractor will so settle. If such subcontractor shall assert any claim against County on account of any damage alleged to have been sustained, Department shall notify Contractor, who shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives against any such claim.

## **32. SEPARATE CONTRACTS**

- A. Department may award other contracts for the Work and all Contractors shall fully cooperate with each other and carefully adjust their work to that provided under other contracts as may be directed by Department. No Contractor shall commit or permit any act that will interfere with performance of the Work by any other Contractor.
- B. Contractor shall coordinate the Work with those of other Contractors. Cooperation will be required in arrangement for storage of materials and in detailed execution of the Work. Contractor, including subcontractors, shall keep informed of progress and detail work of others and shall notify Architect / Engineer or Department immediately of lack of progress or defective workmanship on part of others. Failure of Contractor to keep informed of the Work progressing on site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by Contractor of status of the Work as being satisfactory for proper coordination with Contractor's own work.

## **33. SUBCONTRACTS**

- A. Contractor may use services of specialty subcontractors on those parts of the Work that, under normal contracting practices, are performed by specialty subcontractors.

- B. Contractor shall not award any work to any subcontractor without prior approval of Department. Qualifications of subcontractors shall be same as qualifications of Contractor. Request for subcontractor approval shall be submitted to Department fifteen (15) days before start of subcontractor's work. If subcontractors are changed or added, Contractor shall notify Department in writing.
- C. Contractor shall be as fully responsible to County for acts and omissions of subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for acts and omissions of persons directly employed by Contractor.
- D. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to Contractor by terms of General Conditions of Contract and other Construction Documents insofar as applicable to work of subcontractors and to give Contractor same power as regards terminating any subcontract that Department may exercise over Contractor under any provision of Construction Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and County.
- F. Contractor shall insert in all subcontracts, Articles 26, 33, 43 and 45, respectively entitled: "Withholding of Payments", "Subcontracts", "Affirmative Action Provision and Minority / Women / Disadvantaged Business Enterprises", and "Minimum Wages", and shall further require all subcontractors to incorporate physically these same Articles in all subcontracts.

#### **34. PUBLIC WORKS PROJECT ENGINEER'S AUTHORITY**

- A. Public Works Project Engineer shall:
  - 1. Administer and ensure compliance with Construction Documents;
  - 2. Provide responsible on-site observations of construction and have authority to request work and to stop work whenever necessary to insure proper enforcement of Construction Documents;
  - 3. Convene and chair project meetings and foreman's coordination meetings when necessary to coordinate resolution of conflicts between Contractors, Architects, Engineers, Consultants, and Department; and
  - 4. Check and inspect material, equipment and installation procedures of all trades for proper workmanship and for compliance with Drawings, Specifications and Shop Drawings, permit no material on project site that is not satisfactory and reject work not in compliance with Construction Documents.

#### **35. ARCHITECT / ENGINEER'S AUTHORITY**

- A. Architect / Engineer is retained by, and is responsible to Department acting for County.
- B. Architect / Engineer shall determine amount, quality, acceptability, and fitness of several kinds of work and materials that are provided under this Contract and shall decide all questions that may arise in relation to said work and construction thereof.
- C. Architect / Engineer shall decide meaning and intent of any portion of Specifications and of any Drawings where they may be found obscure or be in dispute.

- D. Architect / Engineer shall provide responsible observation of construction. Architect / Engineer has authority to stop the Work whenever such stoppage may be necessary to insure proper execution of Construction Documents.
- E. Architect / Engineer shall be interpreter of conditions of Construction Documents and judge of its performance.
- F. Within a reasonable time, Architect / Engineer shall make decisions on all matters relating to progress of the Work or interpretation of Construction Documents.
- G. Architect / Engineer's decisions are subject to review by Public Works Project Engineer.

### **36. ESTIMATES OF QUANTITIES**

- A. Whenever estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of Construction Documents, they are given for use in comparing bids and right is especially reserved to increase or diminish them as they may be deemed reasonably necessary or desirable by Department to complete the Work included in this Contract, and cost for such increase or diminution shall be adjusted in manner provided for in General Conditions of Contract Article 18 entitled "Changes in the Work".

### **37. LANDS AND RIGHTS-OF-WAY**

- A. Prior to start of construction, County shall furnish all land and rights-of-way necessary for carrying out and completion of the Work to be performed under this Contract.

### **38. GENERAL GUARANTEE**

- A. Neither final certificate of payment nor any provision in Construction Documents nor partial or entire occupancy of premises by County shall constitute an acceptance of work not done in accordance with Construction Documents or relieve Contractor of liability in respect to any expressed warranties or responsibility for faulty materials or workmanship.
  - 1. In no event shall making of any payment required by Contract constitute or be construed as a waiver by County of any breach of covenants of Contract or a waiver of any default of Contractor and making of any such payment by County while any such default or breach shall exist shall in no way impair or prejudice right of County with respect to recovery of damages or other remedy as a result of such breach or default.
- B. Contractor shall remedy and make good all defective workmanship and materials and pay for any damage to other work resulting there from, which appear within a period of one (1) year from date of substantial completion, providing such defects are not clearly due to abuse or misuse by County. Department will give notice of observed defects with reasonable promptness.
- C. Guarantee on work executed after certified date of substantial completion will begin on date when such work is inspected and approved by Architect / Engineer and Public Works Project Engineer.
- D. Where guarantees or warranties are required in sections of Specifications for periods in excess of one (1) year, such longer terms shall apply; however, Contractor's Performance and Payment Bonds shall not apply to any guarantee or warranty period in excess of one (1) year.

### **39. CONFLICTING CONDITIONS**

- A. Any provision in any of Construction Documents which may be in conflict or inconsistent with any Articles in these General Conditions of Contract or Supplementary Conditions shall be void to extent of such conflict or inconsistency.
- B. In case of ambiguity or conflict between Drawings and Specifications, Specifications shall govern.
- C. Printed dimensions shall be followed in preference to measurements by scale. Large-scale drawings take precedence over small-scale drawings. Dimensions on Drawings and details are subject to field measurements of adjacent work.

### **40. NOTICE AND SERVICE THEREOF**

- A. Any notice to Contractor from Department relative to any part of this Contract shall be in writing and considered delivered and service thereof completed, when said notice is posted, by certified or registered mail, to Contractor at Contractor's last given address, or delivered in person to said Contractor, or Contractor's authorized representative on the Work.

### **41. PROTECTION OF LIVES AND HEALTH**

- A. In order to protect lives and health of Contractor's employees under Contract, Contractor shall comply with all pertinent provisions of Wisconsin Administrative Code, Rules of Department of Commerce, relating to Safety and Health.
- B. Contractor alone shall be responsible for safety, efficiency and adequacy of Contractor's tools, equipment and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

### **42. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES**

- A. Affirmative Action Provisions.
  - 1. During term of their Contract, Contractor agrees not to discriminate on basis of race, religion, color, sex, handicap, age, sexual preference, marital status, physical appearance, or national origin against any person, whether a recipient of services (actual or potential), an employee, or an applicant for employment. Such equal opportunity shall include but not be limited to following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation or level of service(s). Contractor agrees to post in conspicuous places, these affirmative action standards so as to be visible to all employees, service recipients and applicants for this paragraph. Listing of prohibited bases for discrimination shall not be construed to amend in any fashion state or federal law setting forth additional bases and exceptions shall be permitted only to extent allowable in state or federal law.
  - 2. Contractor is subject to this Article only if Contractor has ten (10) or more employees and receives \$10,000.00 or more in annual aggregate contracts with County. Contractor shall file and Affirmative Action Plan with Dane County Contract Compliance Officer in accord with Chapter 19 of Dane County Code of Ordinances. Such plan must be filed within fifteen (15) days of effective date of this Contract and failure to do so by said date shall constitute ground for immediate termination of Contract by County. Contractor shall also, during term of this Contract, provide copies of all announcements of

- employment opportunities to County's Contract Compliance Office, and shall report annually number of persons, by race, sex and handicap status, who apply for employment and, similarly classified, number hired and number rejected.
3. Contact Dane County Contract Compliance Officer at Dane County Contract Compliance Office, 210 Martin Luther King, Jr. Blvd., Room 421, Madison, WI 53703, 608/266-4114.
  4. In all solicitations for employment placed on Contractor's behalf during term of this Contract, Contractor shall include a statement to effect Contractor is an "Equal Opportunity Employer". Contractor agrees to furnish all information and reports required by County's Contract Compliance Officer as same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and provision of this Contract.
- B. Minority / Women / Disadvantaged / Emerging Small Business Enterprises.
1. Chapter 19.508 of Dane County Code of Ordinances is official policy of Dane County regarding utilization of, to fullest extent of, Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs) Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs).
  2. Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. A list of subcontractors will be required of low bidder as stated in this Contract. List shall indicate which are MBEs / WBEs / DBEs / ESBEs and percentage of subcontract awarded, shown as a percentage of total dollar amount of bid.

#### **43. COMPLIANCE WITH FAIR LABOR STANDARDS**

- A. During term of this Contract, Contractor shall report to County Contract Compliance Officer, within ten (10) days, any allegations to, or findings by National Labor Relations Board (NLRB) or Wisconsin Employment Relations Commission (WERC) that Contractor has violated statute or regulation regarding labor standards or relations. If investigation by Contract Compliance Officer results in final determination that matter adversely affects Contractor's responsibilities under this Contract, and which recommends termination, suspension or cancellation of this Contract, County may take such action.
- B. Contractor may appeal any adverse finding by Contract Compliance Officer as set forth in Dane County Ordinance 25.015(11)(c) through (e).
- C. Contractor shall post this statement in prominent place visible to employees: "As condition of receiving and maintaining contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation or union organizing."

#### **44. USE AND OCCUPANCY PRIOR TO ACCEPTANCE**

- A. Contractor agrees to use and occupancy of a portion or unit of the Work before formal acceptance by Department, provided Department:
  1. Secures written consent of Contractor; except when in opinion of Public Works Project Engineer, Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements.
  2. Secures endorsement from insurance carrier and consent of Surety permitting occupancy of building or use of the Work during remaining period of construction, or, secures consent of Surety.
  3. Assumes all costs and maintenance of heat, electricity and water.

4. Accepts all work completed within that portion or unit of the Work to be occupied, at time of occupancy.

#### **45. MINIMUM WAGES**

- A. Contractor shall post, at appropriate conspicuous point on site of project, a schedule showing all determined minimum wage rates for various classes of laborers and mechanics to be engaged in the Work under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by laborers and mechanics so engaged.
- B. Supplementary Conditions section in Construction Documents lists wage determinations required by State Law.
- C. If, after award of Contract, it becomes necessary to employ any person in a trade or occupation not classified in wage determinations, such person shall be paid at not less than such rate as shall be determined by Wisconsin Department of Workforce Development. Such approved minimum rate shall be retroactive to time of initial employment of such person in such trade or occupation. Contractor shall notify Department of Contractor's intention to employ persons in trades or occupations not so classified in sufficient time for Department to obtain approved rates for such trades or occupations.
- D. Specified wage rates are minimum rates only, and Department will not consider any claims for additional compensation made by Contractor because of payment by Contractor of any wage rate in excess of applicable rate contained in this Contract. Contractor shall adjust any disputes in regard to payment of wages in excess of those specified in this Contract.
- E. Submit required affidavit(s) to Department of Public Works, Highway & Transportation, as requested and with final application for payment for work under said contract. Affidavit(s) shall clearly indicate name, trade or occupation, and paid wages of every laborer, workman or mechanic employed by Contractor and all subcontractors during billing period including accurate record of number of hours worked by each employee and actual wages paid as stipulated in Wisconsin Statute 66.0903. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County, Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

#### **46. CLAIMS**

- A. No claim may be made until Department's Associate Public Works Director has reviewed Architect / Engineer's decision as provided for in Article 35 of General Conditions of Contract. If any claim remains unresolved after such review by Department's Associate Public Works Director, claim may be filed under Wisconsin Statute 893.80. Work shall progress during period of any dispute or claim. Unless specifically agreed between parties, venue will be in Dane County, Wisconsin.

#### **47. ANTITRUST AGREEMENT**

- A. Contractor and County recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by County. Therefore, Contractor hereby assigns to County any and all claims for such overcharges as to goods and materials purchased in

connection with this Contract, except as to overcharges which result from antitrust violations commencing after price is established under this Contract and any change order thereto.

## 48. INSURANCE

### A. Contractor Carried Insurance:

1. Contractor shall not commence work under this Contract until Contractor has obtained all insurance required under this Article and has provided evidence of such insurance to Risk Manager, 425 City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703. Contractor shall not allow any subcontractor to commence work until insurance required of subcontractor has been so obtained and approved. Company providing insurance must be licensed to do business in Wisconsin.
2. Worker's Compensation Insurance:
  - a) Contractor shall procure and shall maintain during life of this Contract, Worker's Compensation Insurance as required by statute for all of Contractor's employees engaged in work at site of project under this Contract and, in case of any such work sublet, Contractor shall require subcontractor similarly to provide Worker's Compensation Insurance for all of latter's employees to be engaged in such work unless such employees are covered by protection afforded by Contractor's Worker's Compensation Insurance.
  - b) If any claim of employees engaged in hazardous work on project under this Contract is not protected under Worker's Compensation Statute, Contractor shall provide and shall cause each subcontractor to provide adequate Employer's Liability Insurance for protection of such of Contractor's employees as are not otherwise protected.
3. Contractor's Public Liability and Property Damage Insurance:
  - a) Contractor shall procure and maintain during life of this Contract, Contractor's Public Liability Insurance and Contractor's Property Damage Insurance in an amount not less than \$1,000,000 bodily injury, including accidental death, to any one person, and subject to same limit for each person, in an amount not less than \$1,000,000 on account of one accident, and Contractor's Property Damage Insurance in an amount not less than \$1,000,000 or a combined single limit of at least \$1,000,000 with excess coverage over and above general liability in an amount not less than \$5,000,000. Contractor shall add "Dane County" as an additional insured for each project.
  - b) Contractor's Public Liability and Property Damage Insurance shall include Products, Completed Operation, and Contractual Liability under Insurance Contract. Contractual Liability coverage shall be carried in (substantially) following form: "Insurance shall in all instances save, defend, indemnify and hold harmless County and Architect / Engineer against all claims, demands, liabilities, damages or any other costs which may accrue in prosecution of the Work and that insurance will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as a result of Contractor's operations" and each shall be listed as additional insured.
  - c) Obligations of Contractor under Article 48.A.2)b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
    - 1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
    - 2) giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
  - d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 each accident single limit,



bodily injury and property damage combined with excess coverage over and above general liability in an amount not less than \$5,000,000.

- e) Contractor shall either:
  - 1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor's Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
  - 2) Insure activities of subcontractors in Contractor's own policy.
- 4. Scope of Insurance and Special Hazards: Insurance required under Article 48.A.2 hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
- 5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and "Dane County" listed as an additional insured. Such certificates shall also contain (substantially) following statement: "Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by Risk Manager."

B. County Provided Protection:

- 1. County shall provide a Builder's Risk policy when applicable to project. County's Risk Manager, upon Contractor's request, will make available terms of this policy. By executing this Contract, Contractor warrants it is familiar with terms of said policy.

C. Indemnification / Hold Harmless:

- 1. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, and is caused in whole or in part by any act or omission of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a part indemnified hereunder.
- 2. In any and all claims against Dane County, its boards, commissions, agencies, officers, employees and representatives or by any employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, indemnification obligation under this Contract shall not be limited in any way by any limitation on amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts.
- 3. Obligations of Contractor under this Contract shall not extend to liability of Architect / Engineer, its agents or employees arising out of:
  - a) Preparation or approval of maps, drawings, opinion, reports, surveys, change orders, designs or specifications; or
  - b) Giving of or failure to give directions or instruction by Architect / Engineer, its agents or employees provided such giving or failure to give is primary cause of injury or damage.
- 4. Dane County shall not be liable to Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties.


**49. WISCONSIN LAW CONTROLLING**

- A. It is expressly understood and agreed to by parties hereto that in event of any disagreement or controversy between parties, Wisconsin law shall be controlling.

## SUPPLEMENTARY CONDITIONS

### 1. APPLICATION & CERTIFICATE FOR PAYMENT

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit partial and final Application & Certificate for Payment for work under said contract. Form shall provide similar information as shown on AIA G702™ and G703™ forms (samples shown below). Forms shall be submitted to project Architect / Engineer for review. After review, Architect / Engineer will forward these forms to Public Works Project Engineer for final approval.


**AIA Document G702™ – 1992**

**Application and Certificate for Payment**

<b>TO OWNER:</b>	<b>PROJECT:</b>	<b>APPLICATION NO:</b>	<b>Distribution to:</b>
		<b>PERIOD TO:</b>	OWNER <input type="checkbox"/>
		<b>CONTRACT FOR:</b>	ARCHITECT <input type="checkbox"/>
<b>FROM CONTRACTOR:</b>	<b>VIA ARCHITECT:</b>	<b>CONTRACT DATE:</b>	CONTRACTOR <input type="checkbox"/>
		<b>PROJECT NOS:</b>	FIELD <input type="checkbox"/>
			OTHER <input type="checkbox"/>

---

**CONTRACTOR'S APPLICATION FOR PAYMENT**  
Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM \$ \_\_\_\_\_

2. Net change by Change Orders \$ \_\_\_\_\_

3. CONTRACT SUM TO DATE (Line 1 + 2) \$ \_\_\_\_\_

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ \_\_\_\_\_

5. RETAINAGE:

a. % of Completed Work (Column D + E on G703) \$ \_\_\_\_\_

b. % of Stored Material (Column F on G703) \$ \_\_\_\_\_

Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ \_\_\_\_\_

6. TOTAL EARNED LESS RETAINAGE \$ \_\_\_\_\_

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate) \$ \_\_\_\_\_

8. CURRENT PAYMENT DUE \$ \_\_\_\_\_

9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) \$ \_\_\_\_\_

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:  
By: \_\_\_\_\_ Date: \_\_\_\_\_  
State of \_\_\_\_\_  
City of \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_  
Notary Public:  
My Commission expires: \_\_\_\_\_

---

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$	\$
Total approved this Month	\$	\$
<b>TOTALS</b>	<b>\$</b>	<b>\$</b>
<b>NET CHANGES by Change Order</b>	<b>\$</b>	

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

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

ARCHITECT:  
By: \_\_\_\_\_ Date: \_\_\_\_\_

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

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**Continuation Sheet**

AIA Document G703. APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.  
 In tabulations below, amounts are stated in the nearest dollar.  
 Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:  
 APPLICATION DATE:  
 PERIOD TO:  
 ARCHITECT'S PROJECT NO.:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED (SHEETS (S+R+E))	G TOTAL COMPLETED AND STORED TO DATE (D+E+F)	H % (G+C)	I BALANCE TO (PUSH (S-T))	J RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D+E)	THIS PERIOD					

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.  
 AIA Document G703™ – 1992. Copyright © 1993, 1995, 1996, 1997, 1970, 1976, 1982 and 1992 by The American Institute of Architects. All rights reserved. (WARNING) This AIA® Document is protected by U.S. Copyright Law and International Treaties. Unauthorized reproduction or distribution of this AIA® Document, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law. Purchasers are permitted to reproduce 175 copies of this document when completed. To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects legal counsel, copyright@aia.org.

**2. PREVAILING WAGE RATE DETERMINATION**

- A. These supplements shall modify, delete, and / or add to General Conditions of Contract. Where any article, paragraph, or subparagraph in General Conditions of Contract is supplemented by one of these paragraphs, provisions of such article, paragraph, or subparagraph shall remain in effect and supplementary provisions shall be considered as added thereto. Where any article, paragraph, or subparagraph in General Conditions of Contract is amended, voided, or superseded by any of these paragraphs, provisions of such article, paragraph, or subparagraph not so amended, voided, or superseded shall remain in effect.
  - 1. General Conditions of Contract Article 45, “Minimum Wages”, paragraph B. Following Prevailing Wage Rate Determination No. 200800417 is added to General Conditions of Contract.
  
- B. These State of Wisconsin forms, hereinafter set forth in this section, shall be filled out and submitted to Department of Public Works, Highway & Transportation:
  - 1. Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination (ERD-5724)
  - 2. Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination (ERD-10584)
  - 3. Disclosure of Ownership (ERD-7777)
  - 4. Request To Employ Subjourneyperson (ERD-10880)

# Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination

**NOTICE REQUIRED UNDER Section 15.04(1)(m), Wisconsin Statutes.** Authorization for this form is provided under Sections, 66.0903(9)(b) and 103.49(4r)(9b) 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. Personally identifiable information may be used for secondary purposes.

This form must **ONLY** be filed with the **Awarding Agency** indicated below.

State Of            )  )SS  County Of            )	Project Name		
	Project Number	Determination Number	
	Date Determination Issued	Date of Contract	
	Awarding Agency		
	Date Work Completed		

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below and have recently completed all of the work required under the terms and conditions of a contract with the above-named awarding agency and make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(c) or 103.49(4r)(c), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding agency.
- **I have** fully complied with all of the wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding agency indicated above.

Name of Corporation, Partnership, Sole Proprietorship or Business				
Street Address or P O Box	City	State	Zip Code	Telephone Number (    )    -
Print Name of Authorized Officer			Date Signed	
Signature of Authorized Officer				

**List of Agents and Subcontractors**

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		

**If you have any questions call (608) 266-0028**

## Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination

**NOTICE REQUIRED UNDER Section 15.04(1)(m), Wisconsin Statutes.** Authorization for this form is provided under Sections, 66.0903(9)(b) and 103.49(4r)(9b) 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. Personally identifiable information may be used for secondary purposes.

This form must **ONLY** be filed with the **Awarding Contractor** indicated below.

State Of            )    )SS  County Of            )	Project Name		
	Project Number		Determination Number
	Date Determination Issued		Date of Subcontract
	Awarding Contractor		
	Date Work Completed		

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below. We have recently completed all of the work required under the terms and conditions of a subcontract with the above-named awarding contractor. We make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(b) or 103.49(4r)(b), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding contractor.
- **I have** fully complied with all of the wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding contractor.

Name of Corporation, Partnership, Sole Proprietorship or Business				
Street Address	City	State	Zip Code	Telephone Number (    )    -
Print Name of Authorized Officer			Date Signed	
Signature of Authorized Officer				

**List of Agents and Subcontractors**

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( ) -			Telephone Number ( ) -		

**If you have any questions call (608) 266-0028**



## Disclosure of Ownership

**Notice required under Section 15.04(1)(m), Wisconsin Statutes.** 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.

- (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.
- (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.
- (3) This form must **ONLY** be filed, with the state agency or local governmental unit that will be awarding the contract, if **both (A) and (B) are met.**
  - (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.
  - (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.

### Other Construction Business

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

Name of Business

Street Address or P O Box

City

State

Zip Code

**I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.**

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**

## Request To Employ Subjourneyperson

Personal information you provide may be used for secondary purposes. [See Section 15.04(1)(m), Wisconsin Statutes for details.] The use of this form is mandatory. The authority for the use of this form is prescribed in Section DWD 290.025, Wisconsin Administrative Code. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.

The employer indicated below requests that the Department of Workforce Development (DWD) determine the prevailing wage rate(s) and related qualifications to enable such employer to utilize a subjourneyperson(s) on the following public works project, in accordance with the provisions of Section DWD 290.025, Wisconsin Administrative Code.

<b>1. Name of Public Works Project</b>	
<b>County</b>	<b>City, Village or Township</b>
<b>Determination Number</b>	<b>Project Number</b>

2. Name of Employee (Last, First and Initial)	P.O. Box or Street Address	City	State	Zip Code	Date of Birth	Journey Classification

<b>3. Name of Employer (Print)</b>	<b>Name of Person Making Request (Print)</b>		
<b>P O Box or Street Address</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>
<b>Telephone Number</b> (   )   -	<b>Title of Requestor</b>		

**READ CAREFULLY:** I fully understand that this request is ONLY applicable to the project and employee(s) listed above and that such employee(s) will ONLY work under the direction of and directly assist a skilled trades employee by frequently using the tools of a skilled trades employee and will NOT regularly perform the duties of a general laborer, heavy equipment operator or truck driver. If the employee(s) indicated above regularly perform(s) the work of a different trade or occupation, he/she will be compensated for such work at the applicable journeypersons prevailing wage rate. I agree not to employ any employee as a subjourneyperson on this project until I receive written confirmation from the DWD. After such confirmation is received, I will compensate the employee(s) indicated above in strict accordance with the directions received from the DWD.

Signature of Requestor \_\_\_\_\_ Date Signed \_\_\_\_\_

**MAIL COMPLETED REQUEST TO** Equal Rights Division, Labor Standards Bureau, P. O. Box 8928 Madison WI 53708.

You may call (608) 266-6860 if you need assistance in completing your request

SECTION 01000  
BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SECTION SUMMARY

- A. Section Includes:
1. Section Summary
  2. Summary of the Work
  3. Contractor Use of Premises
  4. Applications for Payment
  5. Alternates
  6. Coordination
  7. Cutting and Patching
  8. Conferences
  9. Progress Meetings
  10. Submittal Procedures
  11. Proposed Products List
  12. Shop Drawings
  13. Product Data
  14. Samples
  15. Manufacturers' Instructions
  16. Manufacturers' Certificates
  17. Quality Assurance / Quality Control of Installation
  18. References
  19. Interior Enclosures
  20. Protection of Installed Work
  21. Parking
  22. Progress Cleaning
  23. Products
  24. Transportation, Handling, Storage and Protection
  25. Product Options
  26. Substitutions
  27. Starting Systems
  28. Demonstration and Instructions
  29. Contract Closeout Procedures
  30. Final Cleaning
  31. Adjusting
  32. Operation and Maintenance Data
  33. Spare Parts and Maintenance Materials
  34. As-Built Drawings and Specifications

## 1.2 SUMMARY OF THE WORK

- A. Project Description: Perform the Work as specified and detailed in Construction Documents package. Contractor to provide construction services for tenant build-out of approximately 11,000 sq. ft. including drywall partitions, flooring, ceiling, HVAC, electrical and plumbing.
- B. Work by Owner: Additional minor demolition work not described in these Construction Documents will be accomplished by County and will not be included under this Contract.
- C. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy.

## 1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow work by Contractors or Subcontractors, work by Owner, and access by Owner. Note that the space below this Work will be occupied during all Work. Also, plumbing contractor will have to access the drop ceiling of the occupied space below.

## 1.4 APPLICATIONS FOR PAYMENT

- A. Submit two (2) copies of each application on AIA G702™ and G703™ forms or approved contractors invoice form.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Bi-weekly.

## 1.5 ALTERNATES

- A. Alternates quoted on Bid Form shall be reviewed and accepted or rejected at the Owner's option.
- B. Coordinate related work and modify surrounding work as required.
- C. Schedule of Alternates:
  - 1. Alternate Bid 1
    - a. Provide painted hollow metal frames in lieu of aluminum storefront at door and window openings on the west side of corridor 3000. This alternate includes doors 318, 319, 321, 322b, 323b, 324b, 325b, 326, 327, 328, 329, 330, 331, and 332 and all adjacent openings.
  - 2. Alternate Bid 2
    - a. Omit paint and prep of Mechanical Room 354 and 353 floors.

## 1.6 COORDINATION

- A. Coordinate scheduling, submittals, and work of various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work that are indicated diagrammatically on Drawings.

## 1.7 CUTTING AND PATCHING

- A. Employ a skilled and experienced installer to perform cutting and patching new work; restore work with new Products.
- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- D. Refinish surfaces to match adjacent finishes.

## 1.8 CONFERENCES

- A. Dane County Department Public Works, Highway & Transportation will schedule a preconstruction conference after Award of Contract for all affected parties.
- B. When required in individual Specification section, convene a pre-installation conference at project site prior to commencing work of the section.

## 1.9 PROGRESS MEETINGS

- A. Owner shall schedule and administer meetings throughout progress of the Work at minimum of one (2) per month.
- B. Owner shall preside at meetings, record minutes, and distribute copies within two (2) days to those affected by decisions made.

## 1.10 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Construction Documents references.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction work, and coordination of

information is in accordance with requirements of the Work and Construction Documents.

- C. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of completing the Work.
- D. Revise and resubmit submittals as required; identify all changes made since previous submittal.

#### 1.11 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) days after date of Award of Contract, submit complete list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

#### 1.12 SHOP DRAWINGS

- A. Submit number of copies that Contractor requires, plus two (2) copies that shall be retained by Public Works Project Engineer.

#### 1.13 PRODUCT DATA

- A. Submit number of copies that Contractor requires, plus two (2) copies that shall be retained by Public Works Project Engineer.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

#### 1.14 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Public Works Project Engineer's selection.

#### 1.15 MANUFACTURERS' INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

#### 1.16 MANUFACTURERS' CERTIFICATES

- A. When specified in individual Specification sections, submit manufacturers' certificate to Public Works Project Engineer for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.17 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.18 REFERENCES

- A. Conform to reference standard by date of issue current as of date for receiving bids.
- B. Should specified reference standard conflict with Construction Documents, request clarification from Public Works Project Engineer before proceeding.

1.19 INTERIOR ENCLOSURES

- A. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent distribution of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1.20 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual Specification sections.

1.21 PARKING

- A. One (1) parking stall for the general contractor shall be available in the City-County Building underground parking garage.
- B. An additional three (3) parking stalls shall be available in the Courthouse driveway. These stalls shall be available as follows:
  - 1. One (1) stall for the HVAC subcontractor.
  - 2. One (1) stall for the plumbing subcontractor.
  - 3. One (1) stall for the electrical subcontractor.
- C. Arrange for any additional parking to accommodate construction personnel.

1.22 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

### 1.23 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by Construction Documents.

### 1.24 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

### 1.25 PRODUCT OPTIONS

- A. Where definite material is specified, it is not intention to discriminate against "equal" product made by another manufacturer. Intention is to set definite standard of material quality. Should bidder choose to bid materials other than those specified, bidder shall submit said materials specifications to Project Engineer for approval at least seven (7) days prior to Bid Opening. Public Works Project Engineer shall consider requests for Substitutions up to seven (7) days prior to date of Bid Opening.
- B. Products and materials that are not specified, but have been approved for use by Public Works Project Engineer shall be identified in addenda to all bidding contractors.
- C. Requests for material or product substitutions submitted up to fifteen (15) days after Bid Opening may be considered, but Project Engineer is not required to consider them. Dane County reserves right to approve or reject substitutions based on Specification requirements and intended use.

### 1.26 REQUESTS FOR SUBSTITUTIONS

- A. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
- B. Submit three (3) copies of requests for Substitution for consideration. Limit each request to one (1) proposed Substitution.
- C. Substitutions shall not change contract price established at Bid Opening.

### 1.27 STARTING SYSTEMS

- A. Provide written notification prior to start-up of each equipment item or system.
- B. Ensure that each piece of equipment or system is ready for operation.



- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit written report that equipment or system has been properly installed and is functioning correctly.

#### 1.28 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

#### 1.29 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Construction Documents have been reviewed, the Work has been inspected, and the Work is complete in accordance with Construction Documents and ready for Public Works Project Engineer's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Sum / Price, previous payments, and amount remaining due.

#### 1.30 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior surfaces exposed to view.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

#### 1.31 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

#### 1.32 OPERATION AND MAINTENANCE DATA

- A. Provide operation and maintenance data for all mechanical and electrical equipment supplied and installed in project.

#### 1.33 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
- B. Deliver to the Work site and place in location as directed.

1.34 AS-BUILT DRAWINGS AND SPECIFICATIONS

- A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Public Works Project Engineer with original tracings of drawings and prints of specifications in reproducible format, one set of Drawings and Specifications and one set of as-builts drawings in AutoCAD 2007 (or lower) format on CD.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01058

### RECYCLING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Waste Management Goals
  - 2. Waste Management Plan
  - 3. Reuse
  - 4. Recycling
  - 5. Materials Sorting and Storage On Site
  - 6. Lists of Recycling Facilities Processors and Haulers
  - 7. Waste Management Plan Form

##### 1.2 WASTE MANAGEMENT GOALS

- A. Dane County requires that as many waste materials as possible produced as result of this project be salvaged, reused or recycled in order to minimize impact of construction waste on landfills and to minimize expenditure of energy and cost in fabricating new materials. Additional information may be found in The Dane County Green Building Policy, Resolution 299, 1999-2000.
- B. Contractor shall develop, with assistance of Public Works Project Engineer and Architect / Engineer, Waste Management Plan (WMP) for this project. Outlined in RECYCLING section of this specification are examples of materials that can be recycled or reused as well as recommendations for waste sorting methods.

##### 1.3 WASTE MANAGEMENT PLAN

- A. Contractor shall complete WMP and include cost of recycling / reuse in Bid. WMP will be submitted to Public Works Project Engineer within fifteen (15) days of Notice to Proceed date. Copy of blank WMP form is in this Section. Submittal shall include cover letter and WMP form with:
  - 1. Information on:
    - a. Types of waste materials produced as result of work performed on site;
    - b. Estimated quantities of waste produced;
    - c. Identification of materials with potential to be recycled or reused;
    - d. How materials will be recycled or reused;
    - e. On-site storage and separation requirements (on site containers);
    - f. Transportation methods; and
    - g. Destinations.

#### 1.4 REUSE

- A. Contractors and subcontractors are encouraged to reuse as many waste materials as possible. Salvage should be investigated for materials not reusable on site.

#### 1.5 RECYCLING

- A. These materials can be recycled in Dane County area:
  1. Wood.
  2. Wood Pallets.
  3. Fluorescent Lamps.
  4. Foam Insulation & Packaging (extruded and expanded).
  5. PVC Plastic (pipe, siding, etc.).
  6. Concrete.
  7. Corrugated Cardboard.
  8. Metal.
  9. Carpet Padding.
  10. Gypsum Drywall.
  11. Barrels & Drums.
  12. Solvents.

#### 1.6 MATERIALS SORTING AND STORAGE ON SITE

- A. Contractor shall provide separate containers for recyclable materials. Number of containers will be dependent upon project and site conditions.
- B. Contractor shall provide on-site locations for subcontractors supplied recycling containers to help facilitate recycling.

#### 1.7 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

- A. Web site [www.countyofdane.com](http://www.countyofdane.com) has recycling symbol (link) near top of page that lists current information for Dane County Recycling Markets. Contractors can also contact Dane County's Recycling Manager at 608/267-8815, or local city, village, town recycling staff listed in above referenced web site. Statewide listings of recycling / reuse markets at available from Wisconsin Department of Natural Resources, [www.dnr.state.wi.us/org/aw/wm/markets](http://www.dnr.state.wi.us/org/aw/wm/markets).

1.8 WASTE MANAGEMENT PLAN FORM

A. Contractor Information:

Name: \_\_\_\_\_

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

Phone No.: \_\_\_\_\_ Recycling Coordinator: \_\_\_\_\_

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)		RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & reused building materials	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Glass	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Wood	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Wood Pallets	_____ units	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Fluorescent Lamps	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Foam Insulation	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Asphalt & Concrete	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
PVC Plastic	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Corrugated Cardboard	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Metals	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Carpet Padding	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Gypsum / Drywall	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Barrels & Drums	_____ units	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	

Solvents	_____ gallons	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 02070

### SELECTIVE DEMOLITION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide for the demolition of such features as required in these specifications and on the drawings. Included are the following:
  1. Demolish partitions, ceilings, flooring, finishes, doors and other items as indicated.
  2. Protect portions of building adjacent to or affected by selective demolition. Take appropriate measures to protect existing facilities operations against dust contamination. Materials shall be removed from the existing building without disruption to the Owner or facility operations.
  3. Remove and legally dispose of demolished materials off-site.
  4. Demolish and salvage for reuse those items noted on the drawings.
  5. Recycle construction and demolition waste including metals and cardboard. Recycle carpet and ceiling tiles if practicable.
  6. Salvage existing doors and door hardware for reuse as indicated on drawings.

##### 1.03 RELATED WORK

- A. Resilient Flooring, Section 09650.

##### 1.04 SUBMITTALS

- A. For utilities or other services requiring removal or abandonment in-place, submit materials documenting completion of such work.
- B. Submit copies of records documenting recycling of demolition materials from the site.

##### 1.05 DEFINITIONS

- A. "Remove": Remove and legally dispose of items, except those indicated to be reinstalled.
- B. "Remove and Reinstall": Remove items indicated; clean, service and otherwise prepare them for reuse; store and protect against damage. Reinstall in the same location or in locations indicated.
- C. "Existing to Remain": Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the A/E, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

##### 1.06 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.

##### 1.07 RECORD DRAWINGS

- A. Maintain record drawings showing actual locations of utilities and other features encountered, and any deviations from the original design. Show actual limits of removal and demolition.

#### 1.08 SAFETY

- A. Verify that all gas and electrical utilities have been abandoned or disconnected and associated hazards mitigated, prior to beginning any demolition.
- B. Take all necessary precautions while dismantling piping containing gas, gasoline, oil or other explosive or toxic fluids or gases. Purge lines and contain materials in accordance with all applicable regulations. Store such piping outdoors until fumes are removed.
- C. Maintain a clean and orderly site. Remove debris at end of each workday.
- D. If hazardous materials are not anticipated, but encountered, terminate operations and contact the Owner immediately. Follow all applicable local, state and federal regulations pertaining to hazardous materials.

#### 1.09 PERMITS

- A. Unless otherwise noted, Contractor shall be responsible for obtaining and paying for all permits necessary to complete demolition work.
- B. If necessary, file and maintain Notification of Demolition and/or Renovation and Application for Permit Exemption (WDNR Form 4500-113) in accordance with the Wisconsin Administrative Code Chapter NR447.

#### 1.010 DISCONNECTION OF SERVICES

- A. Prior to starting removal and/or demolition operations be responsible and coordinate disconnection of all existing utilities, communication systems, alarm systems and other services.
- B. Disconnect all services in manner which insures continued operation in facilities not scheduled for demolition.
- C. Disconnect all services in manner which allows for future connection to that service.
- D. Disconnect services to equipment at unions, flanges, valves, or fittings wherever possible.

#### 1.011 REMOVAL/SALVAGING OF ITEMS

- A. Carefully remove all items that are scheduled to be salvaged.
- B. Secure salvaged items to allow for future movement; provide pallets, skids and other devices as necessary. Secure all loose parts.
- C. Provide crates, padding, tarps and other measures necessary to protect salvaged items during storage. Store items in secure location, safe from vandalism, weather, dust and other adverse elements.
- D. Where salvaged items are indicated to be turned over to Owner, deliver to location on property where designated by Owner.



- E. Where indicated to be incorporated into new work, store the salvaged item in secure location until trade responsible for re-installation mobilizes his equipment and storage facilities to the site, or otherwise accepts responsibility for the salvaged item.
- F. Items of salvage value that are not to be returned to the Owner or the A/E shall be removed from the structure. Storage or sale of such salvage items at project site is prohibited.

## PART 2 - PRODUCTS

### 2.01 EQUIPMENT

- A. Use Contractor's normal equipment for demolition purposes and which meets all safety requirements imposed on such equipment.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Examine all areas of work, verify all existing conditions, and report any unsatisfactory conditions.

### 3.02 PROTECTION OF EXISTING WORK AND FACILITIES

- A. Verify the locations of, and protect, any building elements, utilities, and all other such facilities that are intended to remain or be salvaged.
- B. Make such explorations and probes as necessary to ascertain any required protection measures that shall be used before proceeding with demolition.
- C. Take all measures necessary to safeguard all existing work and facilities which are outside the limits of the work.
- D. Furnish and install temporary enclosures or other barriers as shown on the plans or as otherwise necessary to protect existing features.
- E. Protect adjacent interior areas from collection of dust and noxious fumes. Seal HVAC system ductwork and grilles to prevent contamination of building or mechanical systems.
- F. Provide protection for workers, public, adjacent construction and occupants of existing building(s).
- G. Report damage of any facilities or items scheduled for salvaging to the Owner.
- H. Repair or replace any damaged facilities that are not scheduled for demolition.
- I. Do not damage building elements and improvements indicated to remain.
- J. Do not close or obstruct walks, drives, other occupied or used spaces, or facilities without the written permission from the A/E and the authorities having jurisdiction.
- K. Do not interrupt utilities serving occupied facilities without permission from the A/E and authorities having jurisdiction. If necessary, provide temporary utilities.
- L. Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.

- M. If necessary, provide additional materials to protect existing building components that are to remain.
- N. Where necessary to prevent collapse of any construction, install temporary shores, struts or bracing. Do not commence demolition work until all temporary construction is complete.
- O. Take precautions to guard against movement, settlement or collapse of any surrounding construction designated to remain and be liable for any such movement, settlement or collapse.

### 3.03 DEMOLITION

- A. Remove all equipment, fixtures and other materials scheduled for salvage prior to beginning demolition operations.
- B. Abandon gas, electric and communication utilities in accordance with local utility company requirements, or applicable substantive requirements if considered private.
- C. Remove all sealant, fasteners and damaged or rotten blocking from existing construction to remain where demolition occurs.

### 3.04 TRANSPORTATION AND DISPOSAL OF DEMOLITION WASTE

- A. Transport and dispose all demolition waste in accordance with local, state, and federal guidelines.
  - 1. Recycle fluorescent lamps and other lamps containing heavy metals with a company engaged in the proper handling and recycling of these materials.
  - 2. Properly dispose of any lamp ballasts containing PCB's.
- B. Whenever possible, or otherwise required by the Contract Documents, recycle demolition waste.
- C. Demolition waste that cannot be recycled shall be disposed of at a landfill or dumpsite designed and approved to accept the given waste.
- D. Maintain records documenting recycling of demolition waste. Record description of material, date removed, quantity removed and recycling destination.
  - 1. Provide copies of records to A/E at completion of project.

### 3.05 SCHEDULE

- A. Items to be removed shall be as indicated on the Drawings.
  - 1. Items to be stored and reinstalled.
  - 2. Items to be removed from site by Contractor.
- B. Items to remain (if clarification required).

### 3.06 CLEANING

- A. All adjacent areas shall be broom cleaned and ready to receive new construction.
- B. Remove from the site all debris resulting from the Work of this Section.

END OF SECTION

## SECTION 03200

### CONCRETE REINFORCEMENT

#### 1 GENERAL

##### 1.1 Related Documents

- A. Applicable provisions of Division 1 shall govern the work under this section.

##### 1.2 Scope

- A. Perform all Work required to complete the Concrete Reinforcement indicated by the Contract Documents, and furnish all items necessary for its proper installation.

##### 1.3 References

###### A. American Concrete Institute (ACI)

1. ACI 117, Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301, Standard Specifications for Structural Concrete.
3. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
4. ACI 318, Building Code Requirements for Reinforced Concrete.

###### B. American Society for Testing and Materials (ASTM)

1. ASTM A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A616, Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
5. ASTM A706, Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

###### C. American Welding Society's (AWS)

1. AWS A5.1, Mild Steel Covered Arc-Welding Electrodes.
2. AWS D1.4, Reinforcing Steel Welding Code.

###### D. Concrete Reinforcing Steel Institute (CRSI)

1. Manual of Standard Practice.
2. Recommended Practice for Placing Reinforcing Bars.

##### 1.4 Quality Assurance

- A. Welders' Qualifications: Welders shall be qualified in accordance with AWS D1.4.
- B. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust stained concrete at his expense.
- C. Tolerance for depth and minimum concrete cover in slabs, beams, walls, piers and columns shall be as follows.

<u>Tolerance</u>	<u>Tolerance on minimum</u>	
	<u>on depth</u>	<u>concrete cover</u>
d less than or equal to 8 inches	± 3/8 inch	- 3/8 inch
d greater than 8 inches	± 1/2 inch	- 1/2 inch

Exception: Tolerance for the clear distance to formed soffits shall be minus 1/4 inch and tolerance for cover shall not exceed minus 1/3 the minimum concrete cover required on structural plans and details. Refer to structural general notes on structural plan drawings for minimum concrete cover to reinforcement.

#### 1.5 Submittals

- A. All submittals larger than 11x17 inch format shall be one set of sepias and two sets of prints. Submittal drawings 11x17 inch format and smaller, shall be two sets of prints.
- B. Submit shop drawings for fabrication, bending and placement of concrete reinforcement showing bar schedules, stirrup spacing, diagrams of bent bars, splicing arrangement and assemblies as required for the fabrication and placement of concrete reinforcement. Show wall reinforcement on elevations drawn at a scale of not less than 1/4 inch to 1 foot-0 inches. Dimension length of all lapped splices or furnish tables showing required splices.
- C. Submit certified copies of mill tests showing the chemical and physical analysis of each heat of reinforcing steel delivered to the project.

#### 1.6 Product Delivery, Storage and Handling

- A. Deliver reinforcement and accessories to site not more than 48 hours before placement.
- B. Store in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.
- C. Take precautions to maintain identification after bundles are broken.

## 2 PRODUCTS

### 2.1 Materials

- A. Bars: New billet steel, ASTM A615 Grade 60, ASTM A706 Grade 60, or ASTM A616 Grade 60, Designation S1. See Contract Documents for specified steel.
- B. Tie Wires and Spirals: ASTM A82.
- C. Welded Wire Fabric: ASTM A185 supplied in flat sheets only.
- D. Welding Electrodes: Mild steel covered arc-welding types conforming to AWS A5.1.
- E. Bar Supports: As required for assembling and supporting reinforcement in place.
  1. Typical: CRSI Class B pre-galvanized.
- F. Splices and Mechanical Connections: Submit a list and request the use of splices or mechanical connections.

### 2.2 Fabrication

- A. Shop fabricate to comply with the Drawings.
- B. Conform with the requirements of ACI 315 where specific details are not shown or where the Drawings and specifications are not more demanding.
- C. Bundle, tag and mark all reinforcement. Use metal tags indicating bar size, lengths and other information corresponding to markings shown on shop drawings.
- D. Conform with the requirements of ACI 117 for reinforcement fabricating tolerances.

### 3 EXECUTION

#### 3.1 Preparation

- A. Clean reinforcement of loose rust, mill scale and other foreign materials immediately prior to placement.

#### 3.2 Installation

- A. Comply with CRSI recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
- B. Accurately position, support and secure reinforcement against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.
- C. Provide supports for reinforcement including bolsters, chairs, spacers and other devices suitable for proper spacing, supporting and fastening reinforcing in place. Use wire bar type supports complying with CRSI "Manual of Standard Practice".
- D. Use minimum #5 carrying bars where required.
- E. Use supports with sand plates or horizontal runners for slabs on grade where base materials shall not support chair legs.
- F. Provide stainless steel supports when in contact with forms of concrete surfaces to be exposed.
- G. Provide stainless steel supports where concrete surface shall have special concrete finish.
- H. Space reinforcing bars to comply with ACI 318.
- I. Relocate bars to avoid interference of other embedded items but not more than one bar diameter without approval.
- J. Provide sufficient number of supports of strength to carry the reinforcement.
- K. Locate last reinforcing bar within 2 inches of last leg of continuous bar support.
- L. Place reinforcement to obtain proper coverage for concrete protection. Arrange, space and tie bars and bar supports together with steel wire. Set wire tie ends into the concrete. Place and tie column dowels.
- M. Splice reinforcement with contact lapped splices in accordance with ACI 318 Class B considering both basic and top bar tables, unless indicated otherwise on the Drawings.
- N. Welding
  - 1. Employ shielded metal-arc method and conform to AWS D1.4.
  - 2. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.
  - 3. Only A706 Grade 60 rebar to be welded. No welding of A615 Grade 60 rebar permitted.
- O. Install welded wire fabric with one square plus 2 inches and end laps. Offset end laps.
- P. Protect installed reinforcing from construction loads.
- Q. Furnish and use templates for placement of column dowels, unless otherwise permitted.

#### 3.3 Field Bending or Straightening

- A. When permitted, bend or straighten reinforcement partially embedded in concrete in accordance with the following procedures.

1. Reinforcing bar sizes No. 3 through No. 5 may be bent cold the first time, provided reinforcement bar temperature is above 32 degrees Fahrenheit.
2. For other bar sizes, preheat reinforcement bars before bending in accordance with the procedures of ACI 301, Reinforcement and Reinforcement Support Section.

3.4 Field Quality Control

- A. After reinforcing has been placed, notify Architect/Engineer, a minimum of 24 hours prior to placement of concrete.
- B. Adjust reinforcement that has become dislodged during concrete placement.

END OF SECTION

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### 1 GENERAL

##### 1.1 Related Documents

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.2 Scope

- A. Perform all Work required to complete the Cast-In-Place Concrete indicated by the Contract Documents and furnish all items necessary for its proper installation.

##### 1.3 References

###### A. American Concrete Institute (ACI)

1. ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. ACI 211.2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
3. ACI 301, Specification for Structural Concrete for Buildings.
4. ACI 302, Guide for Concrete Floor and Slab Construction.
5. ACI 304, Recommended Practice for Measuring, Mixing and Placing Concrete.
6. ACI 305, Recommended Practice for Hot Weather Concreting.
7. ACI 306, Recommended Practice for Cold Weather Concreting.
8. ACI 308, Standard Practice for Curing Concrete.
9. ACI 318, Building Code Requirements for Reinforced Concrete.

###### B. American Society for Testing and Materials (ASTM)

1. ASTM C31, Standard Practice for Making and Curing Test Specimens in the Field.
2. ASTM C33, Standard Specification for Concrete Aggregates.
3. ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C94, Standard Specification for Ready-Mixed Concrete.
5. ASTM C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
6. ASTM C150, Standard Specification for Portland Cement.
7. ASTM C138, Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
8. ASTM C171, Standard Specification for Sheet Materials for Curing Concrete.
9. ASTM C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric.
10. ASTM C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
11. ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.

12. ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
13. ASTM C330, Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494, Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C567, Standard Test Method for Unit Weight of Structural Lightweight Concrete.
16. ASTM C618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
17. ASTM C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
18. ASTM C1017, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
19. ASTM C1240, Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete and Mortar.
20. ASTM E329, Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
21. ASTM E1155, Standard Test Method for Determining Floor Flatness and Levelness Using the *F*-Number System.

#### 1.4 Submittals

- A. The Subcontractor shall submit the following.
  1. Certified copies of mix designs for each concrete class specified including compressive strength test reports. Submit mix designs to the Architect/Engineer 7 days prior to first pour.
  2. Certification that materials meet requirements specified.
  3. Samples only as requested by the Architect/Engineer.
  4. Certification from vendor that samples originate from and are representative of each lot proposed for use.
- B. The Independent Testing Agency shall submit reports on tests and inspections performed to the Owner, Architect/Engineer, Subcontractor, and the Concrete Supplier.

#### 1.5 Quality Assurance

- A. Requirements of ACI 301 shall govern work, materials and equipment related to this section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.
- B. The Subcontractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements.
- C. Placing of concrete by means of pumping shall be an acceptable method of placement providing that the Subcontractor can demonstrate the following.
  1. Specified concrete strengths shall be met.
  2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
  3. Trial batches have been made or previous proportioning on the basis of field experience.
- D. When concreting during hot weather, conform with ACI 305R.



- E. When concreting during cold weather, conform with ACI 306R.
- 1.6 Product Delivery, Storage and Handling
- A. Insure storage facilities are weathertight and dry.
  - B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
  - C. Store bulk cement in bins capable of preventing exposure to moisture.
  - D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

## 2 PRODUCTS

### 2.1 Materials

#### A. General Requirements

1. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work unless the Architect/Engineer approves request for change made at least 10 days prior to anticipated date of casting.
2. Ready-mixed concrete shall meet requirements of ASTM C94.
3. Deviations in properties of materials tested by the Independent Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Subcontractor.
4. No frozen aggregates shall be permitted.

#### B. Portland cement: Portland cement shall conform with ASTM C150 Type I or II.

#### C. Aggregates:

1. Coarse aggregate shall conform with ASTM C33. Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than 2 percent by weight of shale or cherty material. Aggregates shall be in the saturated surface dry condition.
2. Fine natural sand shall conform with ASTM C33, except where specified for other gradation sizes.
3. Lightweight aggregate shall conform to ASTM C330, for fine and course gradation.

#### D. Water: Water shall be clean and potable, free from impurities detrimental to concrete.

#### E. Water-Reducing Admixtures:

1. Water-reducing admixtures shall conform with ASTM C494 Type A. Product shall be "WRDA" by Grace Construction Materials; "Pozzolith" by Master Builders; "Trimix" by Sonneborn-Chemrex Inc.; or approved equal.
2. Mid-range water-reducing (finish enhancement) admixtures shall be a non-calcium chloride product conforming with ASTM C494 Type A. Product shall be "Daracem 65" or "Daracem 55" by Grace Construction Materials; or approved equal.
3. High-range water-reducers (superplasticizer) shall conform with ASTM C494 Types F & G, and ASTM C1017 Type I. Product shall not contain purposely added chloride. Product shall be "Daracem 19" or "Daracem 100" by Grace Construction Materials; or approved equal.

- F. Air-Entraining Admixture: Air-entraining admixtures shall conform with ASTM C260. Products shall be "MB-VR" by Master Builders; "Sair" by Concrete Supplies and Service Co.; "Entraining Solution" by Protex Industries; "Darex AEA" by W.F. Grace & Co.; "Aerolith" by Sonneborn Building Products, Inc.; "Sika AER" by Sika Chemical Corp.; "Air-Entraining Agent" by W.R. Meadows; "Air Mix " by EUCO.
- G. Flyash: Flyash shall conform with ASTM C618 Class C.
- H. Ground Granulated Blast-Furnace Slag: Ground granulated blast-furnace slag shall conform with ASTM C989 Grade 120.
- I. Other Admixtures: As approved by the Architect/Engineer. Calcium chloride or admixtures containing calcium chloride shall not be permitted.
- J. Non-Shrink Grout under Column Base Plates: Premixed grout containing non-metallic aggregates and requiring only addition of water at the site. Minimum design strength 6,000 psi. Grout shall not contain gypsum. Product shall be "Set Grout" by Master Builders; or approved equal.
- K. Curing Materials
  - 1. Sheet Plastic: Polyethylene film conforming with ASTM C171, four mil thick, fungus-resistant.
  - 2. Waterproofing Paper: Kraft paper conforming with ASTM C171, two sheets of kraft paper cemented together with fiber strands reinforcing a bituminous material center.
  - 3. Liquid membrane-forming curing compounds shall be a dissipating, water-based material of pure resins conforming with ASTM C309, Type 1, Class B. Product shall be "Day-Chem Rez Cure, J-11-W" by Dayton Superior Corporation; "L&M Cure R" by L&M Construction Chemicals Inc.; "Horncure 100" by Tamms Industries; "Sealtight, 1100 Clear" by W.R. Meadows, Inc.; or approved equal.

2.2 Mixes

A. General Requirements

- 1. The Subcontractor shall provide mix design.
- 2. Prepare design mixes for each type and strength of concrete. Design concrete in accordance with ACI 318, Chapter 5, "Proportioning on the basis of field experience or trial mixtures".
- 3. Flyash or ground granulated blast furnace slag may be used for footings, pile caps, columns, grade beams, foundation walls, and retaining walls only. Flyash may be substituted on a pound for pound basis with a maximum amount of flyash being 15 percent of the total weight of flyash and Portland cement. Slag may be substituted on a pound basis with a minimum amount of slag being 25 percent of the total weight of slag and Portland cement.
- 4. Unless noted otherwise concrete is to be lightweight.

B. Concrete Mix Design Schedule

Type of construction	28 day strength psi	Slump (inches)	Maximum aggregate size (inch)	Percent of air entrainin g	Maximum water/cement ratio
Miscellaneous concrete	4000	4	3/4	2% ± 1	0.48

- 1. The water-cement ratio specified in table shall be calculated using the weight of cement plus the weight of flyash, slag, and silica fume.

2. Compressive strength in psi after 28 days when tested in accordance with ASTM C39.
  3. Aggregate is listed as maximum size in inches. Aggregate shall be in saturated surface dry (SSD) condition.
  4. Weight is listed as pounds per cubic foot, air dry.
  5. Slump:
    - a) In inches when tested in accordance with ASTM C143.
    - b) Maximum slump cannot vary in field by more than plus or minus 1 inch.
  6. Vault concrete weight shall be a minimum of 147 pounds per cubic foot.
  7. Mix shall be designed, tested and adjusted if necessary in ample time before first concrete is scheduled to be placed.
  8. Insure mix designs shall produce concrete to strengths specified and of uniform density without segregation.
  9. If mix yield exceeds one cubic yard, modify mix design to no more than one cubic yard without changing cement content.
  10. All super-plasticizer shall be added at job site.
  11. The Subcontractor's mix designs shall be subject to review by the Architect/Engineer and by the Independent Testing Agency.
  12. Introduction of calcium chloride shall not be permitted.
  13. Unspecified admixtures shall not be permitted without approval by the Architect/Engineer. After approval is obtained, Subcontractor shall modify mix designs and said modifications shall be accepted by the Independent Testing Agency before use.
  14. Lightweight concrete proportions shall be selected to meet the specified limit on a maximum air-dry unit weight as measured in accordance with ASTM C567.
- C. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.
- D. Non-Shrink Grout: Follow approved manufacturer's printed instructions.
- E. Adjustment to concrete mix design may be requested by the Subcontractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Submit revised mix designs to the Architect/Engineer for approval.

### 2.3 Mixing

- A. Mix concrete in accordance with ASTM C94.
- B. Batching Plant Conditions
1. Ensure equipment and plant shall afford accurate weighing, minimize segregation and shall efficiently handle all materials to satisfaction of the Architect/Engineer and the Independent Testing Agency.
  2. Replace at no additional expense equipment that the Architect/Engineer and the Independent Testing Agency deem inadequate or unsuitable.
  3. Use approved moisture meter capable of determining moisture content of sand.
  4. Scales calibrated within the past 6 months.
- C. General Requirements

1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
  2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs.
  3. Measure fine and coarse aggregates separately according to approved method which provides accurate control and easy checking.
  4. Adjust grading to improve workability; do not add water unless otherwise directed.
  5. Maintain proportions, values, or factors of approved mixes throughout Work.
  6. Mix concrete in transit mixers 3 minutes immediately prior to discharge in addition to mixing as called for by ACI 304.
- D. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

### 3 EXECUTION

#### 3.1 Inspection

- A. Examine units of work to be cast and verify the following.
  1. Construction of formwork is complete.
  2. Required reinforcement, inserts and embedded items are in place.
  3. Form ties at construction joints are tight.
  4. Concrete receiving places are free of debris.
  5. Depths of depressed conditions are correct for delayed finish noted and for its proper bonding to concrete.
  6. Conveying equipment is clean and properly operating.
  7. Obtain approval by the Architect/Engineer and Project Inspector of all location of control and construction joints, forms and reinforcement prior to placing concrete.
- B. Do not begin casting before unsatisfactory conditions have been corrected.

#### 3.2 Preparation

- A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.
- B. Protect finished surfaces adjacent to concrete receiving places.
- C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.
- D. Notify the Architect/Engineer at least 24 hours before casting concrete.
- E. Prior to topping slabs on metal deck, deck shall be free of soil, debris, standing water, loose mill scale, and all other foreign matter.

#### 3.3 Placing Concrete

- A. Place concrete in compliance with ACI 304.
- B. Dampen form surfaced other than mill-oiled or plastic coated prior to placing concrete.
- C. Do not place concrete through aluminum pipe.

- D. Take precautions to avoid displacement of reinforcement and formwork.
- E. Deposit concrete as near as possible to its final position with free fall not exceeding 3 feet in exposed concrete and 5 feet in unexposed concrete.
- F. Place panel or section in one continuous operation.
- G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.
- H. Protect freshly placed concrete from inclement weather.
- I. Place concrete continuously between predetermined expansion, control, and construction joints. Interruption in casting longer than 45 minutes shall be cause for discontinuing casting for remainder of day. In this event, cutback concrete and provide construction joints as the Architect/Engineer directs; clean forms and sand reinforcement as necessary to receive concrete at a later time.
- J. Cold Weather Placing: Protect concrete from physical damage or reduced strength caused by frost, freezing actions or low temperatures in compliance with ACI 306. Use of calcium chloride or admixtures containing calcium chloride as accelerators shall not be permitted.
- K. Hot Weather Placing: Place concrete in compliance with ACI 305. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees Fahrenheit.
- L. Consolidating
  - 1. Use vibrators for thorough consolidation of concrete.
  - 2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures.
  - 3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
  - 4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.
- M. Formed Elements
  - 1. Distribute concrete in maximum 24 inch high layers unless otherwise approved.
  - 2. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, shall not be permitted.
  - 3. Level top surface upon stopping work.
  - 4. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.
  - 5. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
- N. Place and finish floor slabs in accordance with ACI 302.1R, Section 7.2.

#### 3.4 Construction Joints

- A. Locate joints where indicated below on the Drawings or as approved by the Architect/Engineer.
- B. Clean joints of laitance, wet and slush with a coat of neat cement grout immediately prior to placing adjacent concrete.
- C. Place slabs without horizontal construction joints.

- D. Locate construction joints in structural slabs at midspan.
- 3.5 Control Joints
- A. For topping slabs on metal deck, wood deck or precast, divide into as nearly square as possible panels with a length to width ratio not to exceed 1.5 for slabs on grade. Joints to be spaced 15 plus or minus 5 feet apart and on column centerlines where possible. For supported floors, joints may be spaced 30 plus or minus 5 feet apart and on column centerlines where possible. Refer to the Drawings for additional information on control joints.
  - B. Joint indentation to be formed by insertion of strip joint material before concrete sets, grooving during finishing or saw cut when concrete is set hard enough not to produce a torn joint edge, but within 12 hours after placement.
  - C. Interior joints to be sealed with elastomeric sealants and placed in accordance with manufacturer's recommendations when required.
- 3.6 Curing
- A. General Requirements
    - 1. Cure concrete in accordance with the recommendation of ACI 308.
    - 2. Take curing measures immediately after casting and for measures other than application of curing compound, extend for 7 days. The Architect/Engineer may recommend longer periods based upon prevailing temperature, wind and relative humidity.
    - 3. Avoid alternate wetting and drying and fluctuations of concrete temperature.
    - 4. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling and damage.
    - 5. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.
  - B. Typical Curing Method: Obtain the Architect/Engineer's approval of alternate measures.
    - 1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
    - 2. When the daily mean ambient temperature is above 40 degrees Fahrenheit curing shall be continuous for a minimum of 7 days. If concrete is placed with daily mean ambient temperature of 40 degrees Fahrenheit or lower, precautions shall be taken as recommended by ACI 306.
    - 3. Concrete can be cured by one or a combination of curing methods of ACI 308, Chapter 2.
    - 4. When curing compound is used apply compounds per manufacturer's recommendations.
      - a) Do not use curing compounds on concrete floors to receive stained finishes.
    - 5. Keep forms and concrete surfaces moist during period forms are required to remain in place.
- 3.7 Cleaning, Patching and Defective Work
- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and in the judgment of the Architect/Engineer, these defects impair proper strength or appearance of the work, the Architect/Engineer shall require its removal and replacement at the Subcontractor's expense.

- B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc. with patching mortar. Patch shall match finish of adjacent surface unless otherwise indicated on the Drawings. Remove ledges and bulges.
  - C. Any honeycombed areas where reinforcement is exposed consult the Architect/Engineer before patching.
  - D. Compact mortar into place and neatly fill defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.
  - E. Rock Pockets
    - 1. Cut out to full solid surface and form key.
    - 2. Thoroughly wet before casting mortar.
    - 3. Where the Architect/Engineer deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.
  - F. Cleaning
    - 1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted or other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, or other delayed finishes or treatments.
    - 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.
- 3.8 Protection
- A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
  - B. Protect exposed corners of concrete from traffic or use which shall damage them in any way.
  - C. Make provisions to keep all exposed concrete free from laitance caused by spillage or leaking forms or other contaminants. Do not allow laitances to penetrate, stain, or harden on surfaces which have been textured.
- 3.9 Field Quality Control
- A. Concrete materials and operations shall be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection, nor shall it obligate the Architect/Engineer for final acceptance.
  - B. All testing agencies shall meet the requirements of ASTM E329.
  - C. Field testing and inspection shall be performed in accordance with ACI 301. Tests of concrete shall be made by an ACI Concrete Field Testing Technician Grade I, or equivalent.
  - D. The Independent Testing Agency shall provide the following.
    - 1. Perform testing in accordance with ACI 318.
    - 2. Inspect concrete placement.
    - 3. Test concrete to control slumps according to ASTM C143.
    - 4. Determine air content of normal weight concrete sample for each strength test in accordance with ASTM C231, ASTM C173, or ASTM C138.

5. Determine air content of lightweight concrete sample for each strength test in accordance with ASTM C173.
6. In determining the acceptability of fresh lightweight concrete, the unit shall be measured according to ASTM C138. If the measured weight in the field does not agree within 2 pounds per cubic foot above or below the original mix Architect/Engineer weight (including the absorbed water in the aggregates) corrective action shall be taken.
7. Continuously monitor concrete temperature as it arrives on the site.
8. Test concrete for required compressive strength as follows.
  - a) Make and cure 3 specimen cylinders according to ASTM C31 for each 100 cubic yards or every 5,000 square feet of slab area of each mix design of concrete placed in any one day. When the total quantity of concrete with a given mix design is less than 30 cubic yards, the strength tests may be waived by the Architect/Engineer, if in their judgment, adequate evidence of satisfactory strength is provided.
  - b) Retain one cylinder for 7 day test and 2 for the 28 day test.
  - c) Number each cylinder 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D, etc.; date each set and keep accurate record of pour each set represents.
  - d) Transport specimen cylinders from job to laboratory after cylinders have cured for 24 hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
  - e) Test specimen cylinders at age 7 days and age 28 days for specified strength according to ASTM C39.
  - f) Base strength value on average of 2 cylinders taken for 28 day test.

E. The Subcontractor shall provide the following.

1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information.
  - a) Design mix number.
  - b) Signature or initials of ready mix representative.
  - c) Time of batching.
  - d) Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
  - e) Total volume of concrete in each batch.
  - f) Notation to indicate equipment was checked for contaminants prior to batching.
  - g) Number of gallons of water that can be added in field.
  - h) Number of turns on drum since water was added at plant.
2. Pay the Independent Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.

3.10 Finishing

A. Concrete Surface Finishes

1. Interior slabs shall be steel trowel finished.

B. Floor Slab Tolerances



1. Slab thickness shall be within plus 3/8 inch to minus 1/4 inch.
2. General conformity to design grade shall fall within plus or minus 1/4 inch of the finished floor elevation shown on the plans.

C. Flatness and Levelness of Floor Slab

1. Floor flatness and levelness tolerances for floors shall conform with ACI 117, Sections 4.5.6 or 4.5.7.
2. Slabs shall be tested in accordance with ASTM E1155.
3. Slab on grade:
  - a) Specified overall values -  $F_F25/F_L20$
  - b) Minimum local values -  $F_F17/F_L15$

END OF SECTION

## SECTION 05310

### STEEL DECKING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 SUMMARY

- A. This Section includes the following:
  - 1. Non-composite form deck.

##### 1.03 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

##### 1.04 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- C. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

##### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. ASC Profiles, Inc.
2. Canam Steel Corp.;The Canam Manac Group.
3. Consolidated Systems, Inc.
4. DACS, Inc.
5. D-Mac Industries Inc.
6. Epic Metals Corporation.
7. Marlyn Steel Decks, Inc.
8. New Millennium Building Systems, LLC.
9. Nucor Corp.; Vulcraft Division.
10. Roof Deck, Inc.
11. United Steel Deck, Inc.
12. Valley Joist; Division of EBSCO Industries, Inc.
13. Verco Manufacturing Co.
14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

## 2.02 NON-COMPOSITE FORM DECK

A. Non-composite Steel Form Deck: Fabricate ribbed-steel sheet non-composite form-deck panels to comply with "SDI Specifications and Commentary for Non-composite Steel Form Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:

1. Uncoated Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum.
2. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
  - a. Color: Gray top surface with white underside.
3. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
4. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
  - a. Color: Gray top surface with white underside.
5. Profile Depth: As indicated on the construction drawings..
6. Design Uncoated-Steel Thickness: As indicated on the construction drawings. Select span used in design from subparagraph below.
7. Span Condition: As indicated on the construction drawings.

## 2.03 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches.
- I. Miscellaneous Roof-Deck Accessories: Install finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- J. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- K. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

#### 3.02 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 05 50 00  
METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Miscellaneous steel framing.
- B. Metal accessories.

1.03 RELATED WORK

- A. Metal Decking: Section 05310.

1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
  - 1. Shop drawings required for all items. Show all work to be fabricated with all construction details shown in appropriate scale, methods of attachments to other materials, finished dimensions, shop welds and grinding of welds, field assembly joints, etc.
  - 2. Coordinate work with other suppliers and subcontractors; obtain their approved shop drawing where necessary, or obtain any necessary additional detail information regarding mounting conditions or other aspects of related work.

1.05 QUALITY ASSURANCE

- A. Take field measurements prior to shop drawing preparation and fabrication.
- B. Comply with the provisions of the following except as otherwise indicated:
  - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges".
  - 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.
  - 3. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
  - 4. AWS D1.1 "Structural Welding Code".
- C. Qualify welding process and welding operators in accordance with the AWS "Standard Qualification Procedure". Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous twelve months. If recertification of welders is required, retesting will be the Contractor's responsibility.
- D. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Package, handle, deliver and store at the job site in a manner that will avoid damage or deformation. Damaged material will be rejected.
- B. Items to be built into concrete, masonry, etc. shall be furnished by the respective contractor and the contractor shall build this into the work as the work progresses.

#### 1.07 PROJECT CONDITIONS

- A. Verify dimensions in field for pre-cut or prefabricated items.
- B. Examine job conditions and adjoining construction which may affect the acceptability of the work.

### PART 2 - PRODUCTS

#### 2.01 METAL FOR FABRICATIONS

- A. Cold-rolled carbon steel sheets: ASTM A336.
- B. Structural Steel Sheet: Hot rolled ASTM A570, or cold-rolled ASTM A611, of grade required for design loading, minimum of Grade C.
- C. Galvanized carbon steel sheets: ASTM A446, with G90 zinc coating.
- D. Welding materials: AWS D1.1; type required for materials being welded.
- E. Shop coat primer: FS-TT-P-32, for shop application and field touch-up.
- F. Touch-up primer for galvanized surfaces.
- G. Steel shapes and fasteners, in general, for exterior use and where built into exterior wall : zinc coated.
- H. Structural Steel: ASTM A36.
- I. Stainless Steel: AISI Type 302/304, #4 satin finish, vertical grain except as otherwise specified.

#### 2.02 ACCESSORIES

- A. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A 47 or cast steel ASTM A 27. Provide bolts, washers and shims as require, hot-dipped galvanized, ASTM A 153.
- B. Non-shrink Grout: Master Builders "Masterflow 928" or L&M Construction Chemicals "Crystex".
- C. Concrete fill shall comply with requirements of Division-3 section "Concrete Work" for normal weight, ready-mix concrete with minimum 28-day compressive strength of 2500 psi, 440 lbs. cement per cu. yd. minimum and W/C ratio of 0.65 maximum, unless higher strengths indicated.
- D. Provide zinc-coated fasteners for exterior use where built into exterior walls or where shown on drawings. Select fasteners for the type, grade and class required.
  - 1. Provide hot-dipped galvanized coating for fasteners less than 1/2" diameter that are in contact with pressure-treated wood.

- E. Bolts and Nuts: Regular hexhead type, ASTM A 307, Grade A or Type 304 stainless steel, ASTM A 320. High Strength bolts and nuts, ASTM A 325.
- F. Lag Bolts: Square head type, FS FF-B-561.
- G. Machine Screws: Cadmium plated steel, FS FF-S-92, Security Screws.
- H. Wood Screws: Flat head carbon steel, FS FF-S-111.
- I. Plain Washers: Round, carbon steel, FS FF-W-92.
- J. Concrete Anchorage Devices: Wedge-type expansion bolts, FS FF-S-325, Group II, Type 4, Class 1, zinc coated or stainless steel as shown on the drawings and installed in accordance with manufacturer's recommendations.
  - 1. Kwik-bolt", Hilti Corporation
  - 2. "Wej-it", Wej-it Corporation.
- K. Masonry: Sleeve anchors zinc coated or stainless as shown on the drawings.
  - 1. Rawl Lok/Bolt.
  - 2. HILTI - Sleeve anchor.
- L. Toggle Bolts: Spring-wing type, FS FF-B-558, Type I, Class I and Style 1 zinc coated or stainless steel as shown on the drawings.
- M. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
- N. Electrodes for Welding: E70XX, comply with AWS code.

#### 2.03 FABRICATION

- A. Weld permanent connections wherever possible; use continuous welds where exposed and grind smooth; straighten members after welding.
- B. Do shop cutting, drilling, fitting wherever possible. Field measure before fabrication when necessary or required.
- C. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, security (countersunk) screws or bolts.

#### 2.04 FABRICATION

- A. Weld permanent connections wherever possible; use continuous welds where exposed and grind smooth; straighten members after welding.



- B. Do shop cutting, drilling, fitting wherever possible. Field measure before fabrication when necessary or required.
- C. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.

#### 2.05 SHOP PAINTING

- A. Clean steel items free of mill scale, rust and foreign matter, grease, oil, dust, and dirt in accordance with SSPC SP-2, SP-3, or SP-7.
- B. Apply one shop coat of metal primer using manufacturer's standard primer, except stainless steel, galvanized steel, and other non-ferrous items.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Anchor to masonry with expansion bolts or toggle bolts. Where built-in anchorage is not provided do not use wood plugs for anchorage.
- B. Bolts, screws, and similar fastenings for field connections shall be of the same material and finish as the parts being fastened.
- C. Immediately after erection, repaint field connections, weld burns, abraded surfaces. Scrape and wire brush loose and scaling paint to sound metal, follow with spot priming.
- D. Install brand name specialty products in accordance with the manufacturer's instructions and approved shop drawings.
- E. Do not proceed with installation until conditions are satisfactory.
- F. Install in accordance with approved shop drawings.
- G. Perform field welding in accordance with AWS D1.1.

END SECTION 05500

SECTION 06100  
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Blocking.

1.03 RELATED WORK

- A. Finish Carpentry: Section 06200.
- B. Plastic Laminate Faced Casework: Section 12304.

1.04 QUALITY ASSURANCE

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. Lumber: WPA - Western Wood Products Association.
  - 2. Plywood: American Plywood Association "Plywood Commercial/Industrial Construction Guide".

1.05 DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery to job site, place materials in area protected from weather.
- B. Store materials a minimum of 6-inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Do not store seasoned material in wet or damp portions of building.
- D. While unloading, protect sheet materials from corners breaking and damaging surfaces.

1.06 PROJECT CONDITIONS

- A. Examine the substrates and supporting structures and the conditions under which the carpentry work is to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Coordinate location of nailers, blocking, and similar supports to allow proper attachment of work. Also coordinate with Owner Furnished Owner Installed items.

PART 2 - PRODUCTS

2.01 ROUGH HARDWARE

- A. Nails, spikes, screws, bolts, and similar items of size and types to rigidly secure members in place or as otherwise indicated.

## 2.02 LUMBER

- A. Framing, Blocking: Douglas Fir-Larch, Southern Pine No. 2 or better, S4S, moisture content not to exceed 19%.
  - 1. Horizontal Framing: Construction grade.
  - 2. End jointed lumber not allowed.

## 2.03 PLYWOOD

- A. Plywood wall sheathing shall be 3/4 inch thick, 5-ply, CDX APA Rated, unsanded with a minimum 16/0 span rating.

## 2.04 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Discard units of material with defects which might impair quality of work, and units which are too small to fabricate the work with minimum joints or the optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true and accurately cut and fitted.
- C. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

### 3.02 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work.

END OF SECTION 06100

## SECTION 06200

### FINISH CARPENTRY

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Carpentry work which is exposed to view, non-structural, and not specified as part of other sections.
- B. The types of finish carpentry include, but are not necessarily limited to the following:
  - 1. Wood trim.
  - 2. Wood chair rail.
  - 3. Wood veneer paneling.

##### 1.03 RELATED WORK

- A. Related Sections: The following sections contain requirements that relate to this section:
- B. Rough Carpentry: Section 06100.
- C. Plastic Fabrications: Section 06600.
- D. Joint Sealants: Section 07900.
- E. Painting: Section 09900.

##### 1.04 SUBMITTALS

- A. General: Submit each item in this article according to the General Conditions of the Contract.
  - 1. Shop drawings for all millwork; receive approval prior to fabrication; draw in related or dimensional position with sections shown either full size or 3-inch scale. Indicate location of all exposed fasteners.
  - 2. Samples:
    - a. One 8-inch- long section of wood for each profile and use.
    - b. Two 8-inch by 8-inch wood panel samples with final finish.
- B. Product Data: For each type of component required. Include the following:
  - 1. Manufacturer's data on hardware, accessories, and finishes.

##### 1.05 QUALITY ASSURANCE

- A. Quality Standards: Architectural Woodwork Quality Standards, Guide Specification and Quality Control Program as set forth by the Architectural Woodwork Institute (AWI).

- B. Architectural Woodwork Manufacturer: Experienced in this type of work; successfully completed comparable work.
- C. Deviations from quality, grade, species, and finish specified under AWI Interior Woodwork for Transparent Finish and Interior Woodwork for Paint Finish will be allowed for individual items or components only if specified under separate headings covering such items.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver finish carpentry materials until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed.
- C. If finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.
  - 1. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for finish carpentry installation areas. Do not install finish carpentry until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
  - 2. Maintain temperature and humidity in installation area as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS, GENERAL

- A. Lumber standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
  - 1. NELMA – Northeastern Lumber Manufacturers Association.
  - 2. NHLA – National Hardwood Lumber Association.
  - 3. NLGA – National Lumber Grades Authority.
  - 4. SPIB - Southern Pine Inspection Bureau.
  - 5. WCLIB – West Coast Lumber Inspection Bureau.
  - 6. WWPA – Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- D. For exposed lumber, furnish pieces with grade stamps applied to ends of back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

#### 2.02 SOLID STOCK

- A. Interior: AWI 300 Custom Grade.

1. Species: Plain sawn, kiln-dried Red Oak.
2. Grade: AWI Lumber Grade III.
3. Texture: S2S2E, (smooth).
4. Sizes: As indicated on Drawings.
5. Sight exposed, stain finish to be selected by AE.

#### 2.03 INTERIOR TRIM

- A. Interior: AWI 300 Custom Grade.
1. Species: Plain sawn, kiln-dried Red Oak.
  2. Grade: AWI Lumber Grade III.
  3. Texture: Surfaces (smooth).
  4. Sight exposed, stain finish to be selected by AE.
  5. Thickness: 3/4 inch, unless noted otherwise.

#### 2.01 PLYWOOD

- A. Interior: AWI 200, plain sliced, book matched.
1. One side exposed: INT-APA-AC, Red Oak.
  2. Two sides exposed: INT-APA-AA, Red Oak.
  3. Stain finish to be selected by AE.

#### 2.04 ACCESSORIES

- A. Provide nails, screws and other anchoring devices of the proper type, size, material and finish for application to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications.
1. Nails, Wire, Brads and Staples: FS FF-N-105.
  2. Power-Driven Fasteners: CABO NER-272.
- B. Where interior finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153 or No. 304 stainless steel.
- C. Glue: Aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry use.
- D. Sealants: Comply with requirements of Division 7 Section "Joint Sealants" for materials required for sealing work.

#### 2.05 FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry on relative humidity conditions existing during time of fabrication and in installation areas.
- B. Field Dimensions
1. Millwork Manufacturer: Responsible for details, dimensions not controlled by job conditions; show on shop drawing all field measurements beyond his control. Contractor, Woodwork Manufacturer: Cooperate to establish, maintain these field dimensions.
- C. Leave all surfaces clean and true and all exposed wood surfaces sanded parallel with grain, free of discernible marks and ready for work under Division 9 Section "Painting".

- D. Cutouts: Make those required for mechanical and electrical items.
- E. Back out or kerf backs of the following members, except members with ends exposed in finished work:
  - 1. Standing and running trim wider than 5 inches.
- F. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius.
- G. Ease edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.
- H. Fabricate handrails to match existing handrail sizes and profiles and as indicated on Drawings.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.
- B. Examine substrate before installation. Verify that substrate is sound and plumb/level. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Wood frame walls shall be dry, clean, sound, well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces.
- D. Coordinate woodwork installation with wall flashings and other built-in components.

#### 3.03 INSTALLATION

- A. Do not use finish carpentry materials that are unsound, warped, improperly treaded or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
  - 1. Do not use manufactured units with defective surfaces, sizes or patterns.
- B. Install finish carpentry plumb, level, true and aligned with adjacent materials. Use concealed shims where required for alignment.
- C. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 1. Countersink nails; fill surface flush and sand where face nailing is unavoidable.
- D. Install to tolerance of 1/8 inch in 96 inches for plumb and level. Install adjoining finish carpentry with 1/32-inch maximum offset for lush installation and 1/16-inch maximum offset for reveal installation.
- E. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim and rails.
  - 1. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.



- F. Finish according to specified requirements.
  - 1. Refer to Division 9 Sections for final finishing of finish carpentry.

#### 3.04 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.
  - 1. Stagger joints in adjacent and related standing and running trim.
    - a. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint.
    - b. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required.
- B. Match color and grain pattern across joints.
- C. Drill pilot holes in wood before fastening as required to prevent splitting.
  - 1. Fasten to prevent movement or warping.
    - a. Countersink fastener heads on exposed carpentry work and fill holes.
    - b. Stagger nails along the length of long pieces of trim.

#### 3.05 PLYWOOD/PANELING

- A. Where grain character or color variations are noticeable, select and arrange panels on each wall for best match of adjacent panels. Install with uniform, tight joints between panels.
- B. Attach panels to supports with panel adhesive and temporary bracing or fasteners, plus nailing where covered by moldings (if any), according to manufacturer's instructions for concealed fastener installation.
- C. Hold paneling in place until adhesive dries with 6d finishing nails only as required to hold paneling in place until set. Use adhesive as recommended by manufacturer of paneling for type of installation shown.
- D. Solid stock at all exterior corners. Ease all corners true and continuous with sandpaper. Exposed edges not allowed.

#### 3.06 ADJUSTING

- A. Repair damaged or defective work as directed.
- B. Adjust and lubricate hardware for proper operation.

#### 3.07 CLEANING

- A. Clean exposed surfaces.
- B. Clean shop-finished woodwork, touch-up finish as required and remove and refinish damaged or soiled areas of finish.
- C. Protect finish carpentry and maintain conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION 06200

## SECTION 06600

### PLASTIC FABRICATIONS

#### PART 1:GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Solid Surface Countertops.

##### 1.03 RELATED WORK

- A. Finish Carpentry: Section 06200.

##### 1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
  - 1. Product Data: Manufacturer's catalog information edited to indicate products to be provided for this Project.
  - 2. Samples.

##### 1.05 QUALITY ASSURANCE

- A. Fabrication and installation shall be performed by a certified solid surfacing fabricator.

##### 1.06 WARRANTY

- A. Provide manufacturer's standard 10 year warranty against defects in workmanship.

#### PART 2:PRODUCTS

##### 2.01 MATERIALS

- A. Manufacturers.
  - 1. Dupont, Corian.
  - 2. Or approved equal by:
    - a. WilsonArt, Solid Surfacing.
    - b. Formica, Solid Surfacing.
    - c. Avonite.
    - d. Samsung, Staron.
    - e. Or approved equal.
- B. Countertops: 3/4 inch thick with nosing as indicated.
  - 1. Include steel mounting angles, bolts and anchors for complete installation.
  - 2. Color: Corian Canyon (E).
- D. No cracked, chipped, broken, stained, or defective material will be accepted.

- E. Color Match Differences: Minimal.
- F. Joint Adhesive: Manufacturer's recommended adhesive.
- G. Setting Adhesive: As recommended by manufacturer.

## 2.02 FABRICATION

- A. Field verify measurements.
- B. Finished Surfaces: Uniform gloss with all edges eased and sanded smooth.

## PART 3: EXECUTION

### 3.01 INSTALLATION

- A. Install fabricated items according to material manufacturers printed instructions.
- B. Set all items square and true with edges of face joints smooth, even, neat and tight against other materials.
  - 1. Where countertops meet wall surfaces, set with uniform space not to exceed 1/8-inch. Seal all joints with silicone sealant to a slightly concave joint, using backer rod where required. Apply sealant in accord with Section 07900.

### 3.02 PROTECTION, REPAIRING AND CLEANING

- A. Replace damaged and defective work.
- B. Clean according to manufacturer's directions. Use no acids or harsh abrasives.

END OF SECTION 06600

SECTION 07210  
BUILDING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Rigid Insulation.
- B. Vapor Retarder.
- C. Insulation Accessories.

1.03 RELATED WORK

- A. Gypsum Board (Sound Attenuation): Section 09290.

1.04 SUBMITTALS

- A. General: Submit each item in this article according to the General Conditions of the Contract.
  - 1. Manufacturer's Data: Submit manufacturer's data for each type of insulation required. Include data substantiating that the materials comply with specified requirements, including Greenguard Certification.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver material to the site in unopened packages, with identification labels intact.
- B. Protect insulations from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.
- C. Protect plastic insulation against ignition at all times.
- D. Remove damaged materials from site.

PART 2 - PRODUCTS

2.01 INSULATION TYPE 4: RIGID INSULATION;

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, thickness as indicated on Drawings:
  - 1. Manufacturers:
    - a. Styrofoam Square Edge as manufactured by Dow Chemical Company.
    - b. FoamulaR 250 by Owens Corning,.
    - c. Certifoam by DiversiFoam.
    - d. GreenGuard Insulation Board by Pactiv Building Products.

2. Type IV, 1.60 lb/cu. ft., unless otherwise indicated.

B. Adhesives:

1. OSI "Pro Series, QB-300 Multi Purpose Construction Adhesive".
2. PL Adhesives and Sealants, "PL 300 Low VOC Foam Board Adhesive".
3. Or approved equal.

C. Vapor Retarder:

1. Class II, tested in accordance with ASTM E 96.
2. 4 mil clear polyethylene.

D. Vapor Retarder Tape: As recommended by vapor retarder manufacturer.

2.02 SPRAYED POLYURETHANE FOAM SEALANT

A. Single-component polyurethane foam sealant for sealing cracks, gaps around openings and joints between other materials so as prevent air infiltration and water penetration. Provide products that have a VOC content of less than 250 g/l.

1. Manufacturers:

- a. OSI, Green Series, "Pro Foam Minimally Expanding Sealant".
- b. Dow, "Great Stuff Gaps and Cracks".
- c. Or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which insulation work is to be performed. Do not proceed with insulation work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor barriers, including removal of projections which might puncture vapor barriers.

3.03 INSTALLATION

A. General

1. Comply with manufacturer's instructions for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding.
2. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
3. Apply a single layer of insulation to required thickness, unless otherwise shown or required to make up total thickness.

B. Rigid Insulation: Set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

1. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

#### 3.04 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.
- E. Vapor retarder shall be installed in maximum material sizes so as eliminate intermediate horizontal joints and to achieve a minimum vertical joint spacing of 90-feet. The vertical joints shall have 12-inch overlaps and shall include two continuous runs of specified tape. The tape shall be used at the top and bottom seals.

#### 3.05 PROTECTION

- A. Protect installed insulation and vapor barriers from harmful weather exposures and physical abuses, by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION 07210

## SECTION 07900

### JOINT SEALERS

#### PART 1: GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Miscellaneous Joints.
- B. Floor Joints (interior).

##### 1.03 RELATED WORK

- A. Plastic Fabrications: Section 06600.
- B. Glass and Glazing: Section 08800.
- C. Plastic Laminate Faced Casework: Section 12304.

##### 1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
  - 1. Samples: Color range of material for selection.
  - 2. Manufacturer's Recommendations including performance requirements, recommendations and application instructions for approval of materials used.

##### 1.05 PROJECT CONDITIONS

- A. Examine the joint surfaces and backing, and their anchorage to the structure, and the conditions under which the joint sealer work is to be performed. Do not proceed with the joint sealer work until unsatisfactory conditions have been corrected.
- B. Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength. Wherever joint width is affected by ambient temperature variations, install sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range.

#### PART 2: PRODUCTS

##### 2.01 SEALANT

- A. Sealant for Locations Except as Specified in the Subsequent Paragraphs: PECORA Dynatrol I-XL, Degussa Sonneborn Sonolastic NP-1, TREMCO Dymonic, or other acceptable, one part polyurethane.
  - 1. Comparable means both quality and color options.
  - 2. VOC content limit: 100 g/L, less water and less exempt compounds.

- B. Horizontal Joint Sealant: PECORA NR-200 Urexpan, Sonolastic SL2, TREMCO THC-900, or other acceptable 2-part self-leveling polyurethane.
  - 1. Comparable means both quality and color options.
- C. Sealant for Interior Glazing: One part silicone equal to Tremco "Tremsil 600".

## 2.02 SEALANT ACCESSORIES

- A. Primer: When required, as recommended by the Sealant Manufacturer.
- B. Closed Cell Back-up (Backer Rod): Tremco "Closed Cell Backer Rod", Sonneborne "Sonofoam" or W.R. Meadows "Kool-Rod".

## PART 3: EXECUTION

### 3.01 JOINT PREPARATION

- B. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous or glazed joint surfaces as recommended by sealant manufacturer.
- C. Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

### 3.02 SEALANT APPLICATION, GENERAL

- A. Set joint filler units at proper depth or position in the joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.
- B. Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
- C. Apply compound with a gun having proper size nozzle or with a knife, as required. Use sufficient pressure to fill all voids and joints solid. Remove excess sealant and leave surfaces smooth, neat and clean. Upon completion sealant shall have a smooth, even finish and all joints shall be weathertight. All work shall be in accordance with manufacturer's printed instructions.
- D. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

### 3.03 PROTECTION

- A. Cure sealants in compliance with manufacturer's instructions and recommendations. Advise the Contractor of procedures required for the cure and protection of joint sealers during the construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at the time of Substantial Completion.

END OF SECTION 07900



SECTION 08110  
STEEL DOORS AND FRAMES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Steel Frames.

1.03 RELATED WORK

- A. Joint Sealers: Section 07900.
- B. Door Hardware: Section 08710.
- C. Glass and Glazing: Section 08800.
- D. Painting: Section 09900.

1.04 REFERENCES

- A. Comply with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
- B. ANSI A250.3 Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- C. ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- D. ANSI A250.5 Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors.
- E. ANSI A250.8 Nomenclature for Standard Steel Doors and Steel Door Frames.
- F. ANSI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- G. ANSI/DHI A115 Specifications for Hardware Preparations in Standard Steel Doors and Frames.
- H. ANSI/DHI A115.1G Installation Guide for Doors and Hardware.
- I. SDI-105-92 Recommended Erection Instructions for Steel Frames.
- J. SDI-106 Recommended Standard Door Type Nomenclature.
- K. SDI-111 Recommended Standard Details Steel Doors and Frames.

- L. SDI-117-93 Manufacturing Tolerances Standard Steel Doors and Frames.
- M. SDI-122-90 Installation and Troubleshooting Guide for Standard Doors and Frames.
- N. ASTM A240/A240M Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel.
- O. ASTM A366 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
- P. ASTM A568 Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements.
- Q. ASTM A569 Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- R. ASTM A620 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Drawing Quality, Special Killed.
- S. NFPA-101-94: Life Safety Code.

#### 1.05 SUBMITTALS

- A. Submit in accordance with the General Requirements of the Contract.
  - 1. Manufacturer's technical product data substantiating that products comply with requirements.
  - 2. Shop Drawings for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
    - a. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
    - b. Indicate coordination of glazing frames and stops with glass and glazing requirements.

#### 1.06 QUALITY ASSURANCE

- A. Comply with requirements of Steel Door Institute Standard SDI-100, "Recommended Specifications for Standard Steel Door and Frames", U.S. Department of Commerce Standard PS4-66, relative to manufacture of 1-3/4 inch thick flush steel doors, and applicable requirements of ANSI A115.
- B. Factory machine frames for hardware requiring routing and mortising.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work in cartons or crates to provide protection during transit and job storage.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to AE; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4 inch high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4 inch spaces between stacked doors to promote air circulation.

#### 1.08 PROJECT CONDITIONS

- A. Examine the openings and conditions under which hollow metal work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

## PART 2: PRODUCTS

### 2.01 MANUFACTURERS

- A. Amweld Building Products
- B. Benchmark Commercial Doors
- C. Ceco Door Products
- D. Curries Company
- E. Deansteel Manufacturing Co.
- F. Fenestra, Inc.
- G. Kewaunee Corporation
- H. Krieger Steel Products
- I. Mesker Door , Inc.
- J. Pioneer Industries, Inc.
- K. Precision Metals, Inc.
- L. Republic Builder Products
- M. Security Metal Products Corp.
- N. Steelcraft
- O. Trussbuilt, Inc.
- P. Williamsburg Steel Products Co
- Q. Or approved equal.

### 2.02 MATERIALS

- A. Steel: Commercial quality, level, cold-rolled steel conforming to ASTM A366, free of scale and surface defects. Commercial quality hot rolled and pickled steel conforming to ASTM A569 may be used as option for interior frames. Gauges are as follows:
  - 1. Interior Frames: 16-gage.
  - 3. Rough Bucks and Stiffeners: 12-gage.
  - 4. Miscellaneous Trim: 16 gage.

### 2.03 FABRICATION, GENERAL

- A. Make hardware mortises and reinforcements according to templates. Provide hinge, lock, door holder and closer hardware reinforcements. Mortise, drill tap for hardware; fabricate grooves, rabbets as necessary for weatherstripping.
- B. Clearances
  - 1. Edge clearances shall be provided as follows:
    - a. Between doors and frame, at head and jambs - 1/8 inch.
    - b. At door sills:
      - 1) Where no threshold is used - 3/8 minimum.
      - 2) Where threshold is used - 1/4 inch maximum between door & threshold.

## 2.04 METAL FRAME FABRICATION

- A. Provide metal frames of the types and styles indicated on the drawings or schedules and complying with SDI 100 for materials and construction requirements.
- B. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, as shown on drawings.
- C. All frames shall have mitered corners, be internally welded and ground smooth and provided with floor anchors.
- D. Provide one removable and one fixed stop at perimeter of openings for glazed frames. Removable stop on secure side.
- E. Provide closed metal covers over all hardware cutouts to protect against mortar.
- F. Provide integral channel frames, sub-frames and stiffeners to structure where indicated or required for fastening and stiffening frames.
- G. Provide steel spreader temporarily attached to feet of both jambs for welded frames.
- H. Provide three factory installed silencers on single door frames at strike jamb.
- I. Completely clean all frames by degreasing process, followed by one coat rust inhibitive primer equal to withstand a salt spray test (5% solution) of 70 hours. Thoroughly prime all surfaces without runs, smears, or bare spots, and under and inside all removable stops.

## PART 3: EXECUTION

### 3.01 INSTALLATION

- A. Install steel frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.
  - 1. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

2. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with self-tapping screws.
3. Fill heads of fasteners with body putty, grind smooth and touch-up prime.

### 3.02ADJUSTING

- A. Immediately after erection sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Check and readjust operating finish hardware items, leaving steel frames undamaged and in complete and proper operating condition.

END OF SECTION 08110

## SECTION 08210

### WOOD DOORS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Wood Doors.
- B. Re-use of Existing Wood Doors.

##### 1.03 RELATED WORK

- A. Finish Carpentry: Section 06200.
- B. Steel Doors and Frames: Section 08110.
- C. Aluminum-Framed Storefronts; Section 08410.
- D. Door Hardware: Section 08710.
- E. Glass and Glazing: Section 08800.
- F. Painting: Section 09900, for re-finishing of planed and cut surfaces.

##### 1.04 REFERENCES

- A. Reference Standards: Section 1300 of the Architectural Woodwork Institute (AWI). Door types specified in Part 2 below are AWI reference designations.
- B. Doors: Obtained from a single manufacturer.

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract
  1. Manufacturer's product data, specifications and installation instructions for each type of wood door.
    - a. Including information on recycled content.
  2. Color charts of wood finishes for initial selection.
  3. (2) 10" x 10" wood samples with finish for final selection.

##### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the "on-site care" recommendations of National Wood Window and Door Association (WDMA) pamphlet "Care and Finishing Wood Doors" and with manufacturer's instructions.
  1. Provide protective coverings for doors at the factory prior to shipping. Use heavy paper cartons or poly bags and mark with identification required for proper installation.

- B. Deliver and store within enclosed building only after humidity contributing work is completed and relative humidity is less than 50%. Stack doors laid flat, level and off floor, in dry, clean, well ventilated space.
- C. Do not drag doors across one another.

#### 1.07 WARRANTY

- A. Submit in duplicate manufacturer's written warranty per NWWDA Standard Door warranty but extending for life of installation for interior solid core doors, including refinishing and re-hanging costs for replacement doors.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Algoma Hardwoods, Inc.; Algoma, Wisconsin; (920) 487-5221.
- B. Eggers Industries; Two Rivers, Wisconsin: (920) 793-1351.
- C. Graham Division, Assa Abloy Door Group LLC; Mason City, Iowa: (641) 423-2444.
- D. Mohawk Flush Doors, Inc.; South Bend, Indiana: (574) 288-4464.
- E. Marshfield Door Systems; Marshfield, Wisconsin: (800) 869-3667.
- F. Oshkosh Architectural Door Company; Oshkosh, Wisconsin: (920) 233-6161.
- G. VT Industries; Holstein, Iowa; (800) 827-1615.

#### 2.02 MANUFACTURED UNITS

- A. Non-labeled Interior Wood Veneer Solid Core Doors: AWI type PC-5/7, Custom Grade.
  - 1. Core: Particleboard or agri-fiber with minimum 40% post-industrial, recycled content as certified by an independent, third party certification agency.
  - 2. Veneer: Book matched, Red Oak, plain sliced.
  - 3. Species of stiles to match face veneer.
  - 4. Transparent Finish: Factory finish to AWI section 1500, Custom standards.
    - a. Water-based stain with ultra-violet (UV) cured topcoats.
    - b. Sheen: Satin.
  - 5. Color: Finish to match stain finish of existing wood doors, as approved by A/E.
- B. Labeled Interior Wood Veneer Solid Core Doors: AWI FD.
  - 1. Edge Banding: Laminated.
  - 2. Veneer: Same as non-labeled doors.
  - 3. Species of stiles to match face veneer.
  - 4. Transparent Finish: Factory finish to AWI section 1500, Custom standards.
    - a. Water-based stain with ultra-violet (UV) cured topcoats.
    - b. Sheen: Satin.
  - 5. Color: Finish to match stain finish of existing wood doors, as approved by A/E.
  - 6. Provide mineral core blocking at closers.
- C. Hardware location per manufacturer's recommendations to meet ADA requirements.

- D. Glazed Openings
  - 1. Provide factory glazed units.
  - 2. Cut openings.
  - 3. At non-labeled doors, provide detailed stops of same species as wood veneer.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify that door frames are of type required for door and are installed as required for proper installation of doors.
- B. Do not install doors in frames which would hinder the operation of the doors.

#### 3.02 INSTALLATION

- A. Do not install in improperly installed frames.
- B. Fit for width by planing. For height, saw, first from bottom, then not over 1/2 inch from top. Bevel lock and hinges edge 1/8 inch in 2 inches.
- C. Provide 3/32 inch clearance between door and frame and 3/8 inch clearance between bottom of door and finish flooring.
- D. Seal all job site cut surfaces with stain to match existing and two coats of varnish.

#### 3.03 ADJUST AND CLEAN

- A. Replace or re-hang doors which are hingebound and do not swing or operate properly.
- B. Refinish or replace job finished doors damaged prior to Substantial Completion.

END OF SECTION 08210



## SECTION 08410

### ALUMINUM-FRAMED STOREFRONTS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Aluminum Frames.
- B. Hardware.
- C. Glazing.
- D. Accessories for a Complete Installation.

##### 1.03 RELATED WORK

- A. Door Hardware: Section 08710, for door hardware to be supplied and installed under this Section.
- B. Wood Doors: Section 08210.
- C. Glass and Glazing: Section 08800.

##### 1.04 QUALITY ASSURANCE

- A. Installer shall be an authorized representative of the door manufacturer for both installation and maintenance of type of units required for this Project.
- B. Installer: Not less than 2 year's experience in the installation and service of entrance doors of the same manufacturer.
- C. Fenestration must comply with a minimum testing performance requirements for an AAMA/NWWDA 101/1.S.2 HC-40 rating. The recognized standard for performance ratings of windows is AAMA/NWWDA 101/1.S.2.
- D. Comply with the manufacturers requirements and the following. In case of conflict, comply with the most stringent.
  - 1. NAAMM-Metal Finishes Manual, National Association of Architectural Metal Manufacturers.
  - 2. ASTM B221- Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.
  - 3. ASTM B244 – Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals With Eddy-Current Instructions.
  - 4. NFPA 80-Fire Doors and Windows.
  - 5. NFPA 252 – Fire Test for Doors Assemblies.
  - 6. UBC Standar4d 7 – 2 - Fire Test of Doors Assemblies: Positive pressure testing.

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract
  - 1. Manufacturer's product data and standard details for doors, including fabrication, finishing, hardware, accessories and other components of the work. Include roughing-in diagrams, wiring diagrams, parts lists, and maintenance instructions.
  - 2. Furnish templates, diagrams and other data to fabricators and installers of related work as needed for coordination of installation.
  - 3. Shop Drawings: Indicate anchors, joint system, expansion provisions, hardware, and other components not included in manufacturer's standard data. Include glazing details.
  - 4. Samples
    - a. Frame Color: Two 10-inch extrusions with finish, properly labeled.
    - b. Glass: Two 8 x 8 -inch square samples of each glass type indicated, properly labeled.
    - c. Corner of Frame: Sample to include fit, finish and tolerance of frame corner joint.
  - 5. Owner's Manual: Submitted prior to Substantial Completion. Include recommendations for maintenance, repair.

#### 1.06 MAUFACTURER/FABRICATOR AND INSTALLER QUALIFICATIONS

- A. Fenestration systems must be fabricated by a firm experienced in production of systems similar to those indicated, whose work has resulted in a record of successful in-service performance during the immediate past three years. The fabricator should have sufficient production capacity to produce required components without causing delays in the work.
- B. Fenestration systems must be installed by an experienced installer, having completed installations of fenestration similar in design and extent to those required for the project whose work has resulted in construction with a record of successful in-service performance during the immediate past three years.

### PART 2 - PRODUCTS

#### 2.01 ALUMINUM FRAMES

- A. Kawneer Trifab 400 Framing System.
- B. Or approved equal by:
  - 1. Omega Door Frame Products, Inc., Itasca, IL.
  - 2. ARCH Aluminum & Glass Co., Inc.
  - 3. Efcó
  - 4. Tubelite
  - 5. United States Aluminum
  - 6. Vistawall Architectural Products.
  - 7. Wausau Window Wall System.
  - 8. YKK AP America Inc.

#### 2.02 FINISH

- A. Clear Anodized.

#### 2.03 DOOR HARDWARE

- A. Hardware: Supply hardware as specified in Section 08710.

- B. All hardware shall be secured to aluminum door and frame members with a drill-and-tap screw fastener. Stripping of threads or other means of hardware attachment shall be cause for rejection of the entire assembly without additional cost to the Owner.

#### 2.04 GLASS

- A. Acceptable Manufacturers/Suppliers:

1. Interpane
2. Oldcastle
3. Pilkington
4. PPG Industries
5. Viracon

- B. Glass Products indicated below are based on proprietary products of Viracon. Products from any of the above listed manufacturers that meet the design criteria of the Viracon glass specified below are acceptable.

1. GLT 1: 1/4" float, clear, FS DD-G-451, Type I, class 2, quality q3.
2. GLT 4: 1/4" tempered, clear, FS DD-G-451, Grade B, Style 1, Type I, class 1, quality q3, free of tong marks, ANSI Z97.1.

#### 2.05 GLAZING ACCESSORIES

- A. Glazing Sealant: One-part silicone similar to Pecora 860, Sonneborn Omniplus or Tremco Spectrum 2.

1. Comparable means both quality and color options.

- B. Setting Blocks: 70-90 Shore "A" durometer, sized to accommodate size of glass used, compatible with glazing sealant.

- C. Spacers: Compatible with sealant used.

- D. Primer, Sealers, Cleaners: As recommended by glass manufacturer.

- E. Aluminum Stops: Pierced and/or fixed stop, finish to match aluminum framing.

1. Equal to Kawneer #069-190, or #169-114 and 069-113.

#### 2.06 FRAME ACCESSORIES

- A. Fasteners: Manufacturer's standard.

- B. Sealant for Locations Except as Specified in the Subsequent Paragraphs: PECORA Dynatrol I, Sonolastic NP-1, TREMCO Dymonic, or other acceptable one part polyurethane.

1. Comparable means both quality and color options.

- C. Primers: Of type recommended by sealant manufacturer.

- D. Back-up Materials: Non-staining type, compatible with sealant used; of a compressible nature, such as resilient foams, sponge rubber rod stock, glass fibers, untreated jute. Do not use materials impregnated with oils, asphalt or similar materials that are likely to bleed solvents, oils.

- E. Aluminum Cover/Closure Plates: 1/8" thick aluminum sheet in same finish as frames.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work.

#### 3.02 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations.
- B. Set units plumb, level and true to line, without warp or rack of frames or doors. Anchor securely in place. Separate aluminum and other metal surfaces from sources of corrosion or electrolytic action at points of contact.
- C. Accurately assemble joints and corners. Match components, ensuring continuity of line and design. Ensure joints and connections are flush and hairline.
- D. Use sufficient anchorage devices to securely and rigidly fasten frame assemblies in place.

#### 3.03 ADJUSTING

- A. Lubricate operating equipment and clean exposed surfaces.

#### 3.04 CLEANING

- A. Clean aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt and other substances.

#### 3.05 PROTECTION

- A. Institute protective measures and other precautions required to assure that entrance doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 08410

## SECTION 08710

### DOOR HARDWARE

#### PART 1:GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Door Hardware.

##### 1.03 RELATED SECTIONS

- A. Finish Carpentry: Section 06200.
- B. Steel Doors and Frames: Section 08110.
- C. Wood Doors: Section 08210.
- D. Aluminum-Framed Storefronts: Section 08410.

##### 1.04 REFERENCES

- A. Federal Specifications (FS)
  - 1. FF-H-106a Hardware, Builders'; Locks and Door Trim-Standard Finishes for Builders Hardware.
- B. National Fire Protection Association, Inc. (NFPA), Battery March Park, Quincy, MA 02269.
  - 1. NFPA 80 - Standard for fire doors and windows.
  - 2. NFPA 101 - Code for safety to life from fire in buildings and structures.
- C. Underwriter's Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062.
  - 1. Building Materials Directory.
- D. Hardware shall be in strict accord with Wisconsin Administrative Code Chapter Comm. 69 - "Barrier Free Design".

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Five (5) copies of a detailed, vertical type hardware schedule for approval.
    - a. List and describe each opening separately. Include doors with identical hardware, except hand, in a single heading. Include door number, room designations, degree of swing, and hand.
    - b. List related details. Include dimensions, door and frame material, and other conditions affecting hardware.
    - c. List all hardware items. Include manufacturer's name, quantity, product name, catalog number, size, finish, attachments, and related details.
    - d. Resubmit four (4) copies of the corrected schedule when required.

- e. Determine keying requirements, as directed by the Owner's Representative and submit five (5) copies of a detailed keying schedule for approval; resubmit four copies (4) of the corrected schedule when required.
2. Samples of hardware items as may be required. Identify each sample and indicate the location of subsequent installation in the project.
3. A copy of the approved hardware schedule and all pertinent templates or template information to each fabricator of material factory-prepared for the installation of hardware.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturers and product numbers listed herein establish a standard of quality. Similar items by other manufacturers may be accepted by prior approval in accord with the General Conditions of the Contract. Except where specified in the hardware schedule, furnish products of only one manufacturer for each type of hardware.
- B. Supplier: Company specializing in the builders' hardware industry.
- C. Items of hardware not definitely specified herein but necessary for completion of the Work shall be provided. Such items shall be of type and quality suitable to the service required and comparable to the adjacent hardware. Where size and shape of members is such as to prevent the use of types specified, hardware shall be furnished of suitable types having as nearly as practicable the same operation and quality as the type specified. Sizes shall be adequate for the service required. Include such nuances as strike type, strike lip, raised barrel hinges, mounting brackets, fasteners, shims, and coordination between conflicting products. All doors shall be provided with a stop.

#### 1.07 REGULATORY REQUIREMENTS

- A. Furnish UL listed hardware for all UL labeled openings in conformance with requirements for the class of opening scheduled.

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver hardware to the job site in the manufacturer's original containers marked to correspond with the approved hardware schedule for installation location.
- B. Store hardware in dry surroundings and protect against loss and damage.

### PART 2: PRODUCTS

#### 2.01 MANUFACTURERS

- A. Refer to the Hardware Schedule at the end of this Section.

#### 2.02 ACCESSORIES

- A. Furnish all necessary hardware accessories such as wood or machine screws, bolts, nuts, anchors, toggle bolts, and other fasteners, each of the type, size, material and finish for its intended purpose and each according to the material to which the hardware is being applied.
- B. Keying system will be determined by the Owner's Representative.

### PART 3: EXECUTION

#### 3.01 INSTALLATION

- A. Install hardware in accordance with manufacturer's recommendations and instructions.
- B. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the fire rating.
- C. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
- D. Remove, cover or protect hardware after fitting until paint or other finish is applied. Permanently install hardware after finishing operations are complete.
- E. Install closers on the room side of corridor doors, stair side of stairways, and interior side of exterior doors.
- F. Deliver one complete set of installation and adjustment instructions, and tools with the hardware.
- G. Coordinate security system electrical requirements at doors indicated to have such system.
- H. Coordinate all Owner Furnished Owner Installed hardware.

3.02 ADJUSTING

- A. At final completion, adjust and test all hardware for function and performance and leave in good operating condition.

3.03 CLEANING

- A. Clean all hardware to restore the original finish.

3.04 PROTECTION

- A. Protect the finished installation until acceptance of the project.

3.05 HARDWARE SCHEDULE

**A. Manufacturers**

- |                           |   |     |
|---------------------------|---|-----|
| 1. Hinges                 | Hager Hinge Co.   | HAG |
| a. Approved Equals:       | Stanley<br>McKinney   |     |
| 2. Lockset                | Best Access Systems   | BES |
| a. Approved Equals:       | No substitutions. Provide 7-pin cylinders to match existing. Coordinate with Best Access Systems for keying of project. |     |
| 3. Door Closers           | Stanley Security Solutions  | STA |
| a. Approved Equals:       | LCN, Model 4040<br>Sargent, Model 351   |     |
| 4. Kickplate              | Rockwood Mfg. Co  | ROC |
| 5. Biometric Hand Readers | Schlage Recognition Systems   | SCH |
| 6. Electric Strikes       | Von Duprin  | VON |
| a. Approved Equals:       | HES<br>Folger Adams   |     |

**B. Hardware Sets:**

**SET 01**

Opening(s): 300, 301, 302, 303, 304, 305, 307, 308, 309, 310, 311, 312, 313, 314, 315, 318, 319, 321, 326, 327, 329, 330, 331, 332, 337, 344, 350, 351

3 EA	HINGES	BB1279	652	HAG
1 EA	PASSAGE SET	93K N x 14D	626	BES
1 EA	WALL STOP	WS407	630	IVE

**SET 01A**

Opening(s): 322B, 323B, 324B, 325B, 343A

3 EA	HINGES	BB1279	652	HAG
1 EA	PUSH BUTTON ACCESS SET			Owner Furnished Owner Installed
1 EA	WALL STOP	WS407	630	IVE

**SET 02**

Opening(s): 306, 328

3 EA	HINGES	BB1279	652	HAG
1 EA	PASSAGE SET	93K N x 14D	626	BES
1 EA	OVERHEAD STOP	450	630	GLY

**SET 02A**

Opening(s): 336A

3 EA	HINGES	BB1279	652	HAG
1 EA	PUSH BUTTON ACCESS SET			Owner Furnished Owner Installed
1 EA	OVERHEAD STOP	450	630	GLY

**SET 03**

Opening(s): 333

3 EA	HINGES	BB1279	652	HAG
1 EA	PRIVACY SET	93K L x 14D	626	BES
1 EA	WALL STOP	WS407	630	IVE

**SET 04**

Opening(s): 320

3 EA	HINGES	BB1279	652	HAG
1 EA	PRIVACY SET	93K L x 14D	626	BES
1 EA	FLOOR STOP	FS438	626	IVE

**SET 05**

Opening(s): 322A, 323A, 324A, 325A, 336B, 343B

3 EA	HINGES	BB1279	652	HAG
1 EA	OFFICE LOCK	93K AB x 14D	626	BES
1 EA	WALL STOP	WS407	630	IVE

**SET 06**

Opening(s): 334, 3006

3 EA	HINGES	BB1279	652	HAG
1 EA	STOREROOM LOCK	93K D x 14D	626	BES
1 EA	CLOSER	D-4550 EDA	689	STA
1 EA	WALL STOP	WS407	630	IVE
1 EA	ELECTRIC STRIKE	6211	630	VON
1 EA	MOTION SENSOR	SCAN II		WHT SCH
1 EA	POWER SUPPLY	505		GRY SCH
1 EA	BIOMETRIC READER	HANDKEY II		GRY SCH



- Owner to provide laptop for programming
- Distributor to provide 1 day of training on biometric reader and accompanying software

**SET 07**

Opening(s): 349, 3007

3 EA	HINGES	BB1279	652	HAG
1 EA	STOREROOM LOCK	93K D x 14D	626	BES
1 EA	CLOSER	D-4550 EDA	689	STA
1 EA	WALL STOP	WS407	630	IVE
1 SET	SEALS	5050	BLK	NGP

**SET 08**

Opening(s): 3009A

3 EA	HINGES	BB1279	652	HAG
1 EA	CLASSROOM LOCK	93K R x 14D	626	BES
1 EA	CLOSER	D-4550 CS	689	STA
1 SET	SEALS	5050	BLK	NGP

**SET 09**

Opening(s): 3009B

3 EA	HINGES	BB1279	652	HAG
1 EA	STOREROOM LOCK	93K D x 14D	626	BES
1 EA	CLOSER	D-4550 CS	689	STA
1 SET	SEALS	5050	BLK	NGP

**SET 10**

Opening(s): 352

ALL HARDWARE EXISTING

END OF SECTION 08710

SECTION 08800  
GLASS AND GLAZING

PART 1:GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Glass in Hollow Metal Frames.
- B. Glazing in Interior Aluminum Frames.
- C. Glazing in Casework.

1.03 RELATED WORK

- A. Finish Carpentry: Section 06200.
- B. Joint Sealers: Section 07900.
- C. Aluminum-Framed Storefronts: Section 08410.

1.04 REFERENCES

- A. Reference Specification: "Glazing Manual", by Flat Glass Marketing Association.
- B. Materials: Conform in all respects to the "Safety Standard for Architectural Glazing Materials", 16CFR 1201, issued by the Consumer Product Safety Commission.

1.05 QUALITY ASSURANCE

- A. All materials used for this project shall be from the same batch run and manufacturer.
- B. Sound Transmission Resistance; Sound Transmission Class (STC) for typical application to be minimum of 32; AS tested by ASTM E4134.
- C. All performance testing must be conducted by an independent, impartial, third party, AAMA certified testing laboratory.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Manufacturer's recommended installation instructions.
  - 2. Two samples of each type of glass specified.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Package, handle, deliver and store to avoid damage. Scratched glass will be rejected.

## 1.07 PROJECT CONDITIONS

- A. Do not proceed with installation of liquid sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.

## PART 2: PRODUCTS

### 2.01 MANUFACTURERS

- A. Acceptable Manufacturers/Suppliers:

1. ACH Glass Operations
2. AFG Industries, Inc.
3. Altuglas International
4. Cyro Industries
5. Guardian Industries
6. Interpane
7. Misco
8. Oldcastle
9. Pilkington
10. Plaskolite, Inc.
11. PPG Industries
12. Saint-Gobain Glass
13. Solutia Inc.
14. Viracon

### 2.02 GLASS

- A. Some of the glass products indicated below are based on proprietary products. Products from any of the above listed manufacturers that meet the design criteria of the glass specified below are acceptable.
  1. GLT 1: 1/4" float, clear, FS DD-G-451, Type I, class 2, quality q3.
  2. GLT 4: 1/4" tempered, clear, FS DD-G-451, Grade B, Style 1, Type I, class 1, quality q3, free of tong marks, ANSI Z97.1.
  3. GLT 7: 1/4" wire, Misco, Type II, class 1, quality q8, ANSI Z97.1. Install orthogonally.
  4. GLT 19: 1/2", acrylic sheet, clear, scratch-resistant.
    - a. Equal to Arkema, Altuglas International, "Plexiglas".

### 2.03 GLAZING ACCESSORIES

- A. Glazing Sealant: One-part silicone equal to Pecora 860, Sonneborn Omniplus or Tremco Spectrum 2.
  1. Equal means both quality and color options.
- B. Setting Blocks: 70-90 Shore "A" durometer, sized to accommodate size of glass used, compatible with glazing sealant.
- C. Spacers: Compatible with sealant used.
- D. Primer, Sealers, Glazing Tape, Cleaners: As recommended by glass manufacturer.

## PART 3: EXECUTION

### 3.01 EXAMINATION

- A. Check that glazing channels are free of burrs, irregularities, and debris.
- B. Check that glass is free of edge damage or face imperfections.
- C. Do not proceed with installation until conditions are satisfactory.

### 3.02 PREPARATION

- A. Field Measurement.
  - 1. Measure size of frame to receive glass.
  - 2. Compute actual glass size, allowing for edge clearances.
- B. Preparation of surfaces.
  - 1. Remove protective coatings from surfaces to be glazed.
  - 2. Clean glass and glazing surfaces to remove dust, oil and contaminants.

### 3.03 INSTALLATION

- A. Install glass in accordance with glass manufacturer's recommended instructions.

### 3.04 CLEANING

- A. Remove excess glazing compound from installed glass.
- B. Remove labels from glass surface as soon as installed.
- C. Wash and polish both faces of glass.
- D. Remove debris from work site.

### 3.05 PROTECTION

- A. Attach crossed streamers away from glass face.
- B. Do not apply markers to glass surface.
- C. Replace damaged glass.

END OF SECTION 08800

SECTION 09250

GYPSUM BOARD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 WORK INCLUDED

- A. Metal Studs.
- B. Gypsum Board.
- C. Gypsum Base and Veneer Plaster.
- D. Patching Existing Plaster.
- E. Trim and Accessories.
- F. Acoustical Batt Insulation.

1.03 RELATED WORK

- A. Building Insulation: Section 07200.

1.04 REFERENCES

- A. Referenced Specifications: The more stringent requirement of this section or referenced specification applies.
  - 1. "Using Gypsum Board for Walls and Ceilings", The Gypsum Association - GA-201-85.
  - 2. "Recommended Specifications for the Application and Finishing Gypsum Boards", The Gypsum Association - GA-216.
- B. Fire Rated Assemblies: Provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL, or tested in accordance with ASTM E119 for type of construction shown.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Manufacturer's product data.
  - 2. Texture finish sample.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site with manufacturer's labels intact and legible.
- B. Handle materials with care to prevent damage.
- C. Deliver fire-rated material bearing testing agency label and required fire classification numbers.

- D. Storage
  - 1. Store materials inside under cover, stack flat, off floor.
  - 2. Stack wallboard so that long lengths are not over short lengths.
  - 3. Avoid overloading floor system.
  - 4. Store adhesives in dry area, provide protection against freezing at all times.

#### 1.07 PROJECT CONDITIONS

- A. During cold weather, maintain temperature range between 55 degrees F. to 70 degrees F. for 24 hours before, during, and after gypsum board and joint treatment applications.
- B. Ventilation
  - 1. Provide ventilation during and following adhesive and joint treatment applications.
  - 2. Use temporary air circulators in enclosed areas lacking natural ventilation.
  - 3. Protect installed materials from drafts during hot, dry weather.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Georgia Pacific.
- B. LaFarge.
- C. National Gypsum Company, Gold Bond.
- D. United States Gypsum Company.
- E. BPB America, Inc.
- F. Chicago Metallic.
- G. Dietrich Industries.
- H. Or approved equal.

##### 2.02 MATERIALS

- A. Gypsum Board: ASTM C 36, long edges tapered; in lengths as long as practical to keep number of end joints to absolute minimum.
  - 1. Regular Gypsum Board.
  - 2. Water Resistant Wallboard: 5/8-inch thick.
  - 3. Cementitious Backer Board: Aggregated, Portland cement board with woven, glass fiber, mesh facing; complying with ANSI A118.9.
    - a. Manufacturer: USG, Durock Interior Tile Backer Board or approved equal.
    - b. Thickness: 1/2 inch.
  - 4. Veneer Plaster Base: USG Imperial Gypsum Base, 5/8-inch thick.
- B. Accessories
  - 1. Metal Trim: USG No. 200-A.
  - 2. L-shaped Metal Trim for Veneer Plaster: USG No. 801-B.
  - 3. Metal Reveal Molding: Fry Reglet DRM-625-75.

4. Expansion Joints: USG No. 093.
  5. Drywall Screws for Metal Framing: 1" Type S-12 or Type S bugle head.
  6. Outside Corner Reinforcement: USG No. 104, 1-1/8" x 1-1/8" corner bead.
  7. Acoustical Sealant: Equal to Tremco "Tremflex 834" or Pecora "Acoustic and Insulation Sealant", low VOC formulation.
    - a. VOC content less than 50 g/l.
  8. Tie Wire: No. 18 SWG, steel wire.
  9. Steel runner channel brackets: 25 MSG galvanized steel.
  10. Corner angles: 25 MSG galvanized steel.
  11. Sound Attenuation Blanket: U.S. Gypsum Thermafiber, or approved equal.
- C. Metal Studs/Resilient Furring Channels.
1. Unless indicated otherwise, use 25-gage for partitions up to 12'-0" high, use 20-gage for partitions over 12'-0" high.
  2. Unless indicated otherwise, use 20-gage studs at door jambs, head.
  3. Track gauge shall be same gauge as nested studs.
- D. Suspension System
1. Chicago Metallic 640 system
    - a. Hanger Wire: 8-gage, annealed.
    - b. Carrying Channels: 1-1/2 inch cold rolled steel.
    - c. Screws: USG 1-inch type S.
    - d. Furring Channels: USG metal furring channel, attached with USG furring channel clips.
  2. Chicago Metallic 650 System complying with UL Design No. D502.
    - a. Hanger clips: 18 gauge galvanized steel.
    - b. Hanger wire: No. 12 SWG galvanized steel.
    - c. Carrying Channels: 16 gauge 1 1/2 inch cold rolled.
    - d. Furring Cross Channel: 16 gauge 7/8 inch where required.
    - e. Wall Molding: 26 gauge steel channel 1 11/16 inch deep with 15/16 inch flanges.
  3. Or approved equal.
- E. Drywall Finishing Accessories
1. Joint Compounds: Ready mixed type.
  2. Joint Reinforcement: USG Perf-A-Tape.
- F. Patching Materials at Plaster
1. Setting-Type Joint Compounds, Base Coat: USG Sheetrock, "Durabond" or approved equal.
    - a. Low shrinkage, chemically setting compounds rated for interior and exterior use.
    - b. Suitable for heavy fills and areas of high humidity.
    - c. Compatible for use over Portland cement plaster.
  2. Setting-Type Joint Compounds, Finish Coat: USG Sheetrock, Lightweight "Easy Sand" or approved equal.
    - a. Low shrinkage, chemically setting compounds rated for interior and exterior use.
    - b. Suitable for heavy fills and areas of high humidity.
    - c. Compatible for use over Portland cement plaster.
- G. Texture Finish Materials
1. Ceilings: USG Spray Fine Sand Texture Finish.
  2. Walls (Painted Only): "Orange Peel".
    - a. To match existing, adjacent plaster texture.
  3. Walls, Patching at Existing Plaster: USG Spray Fine Sand Texture Finish, or approved equal.
    - a. To match existing, adjacent plaster texture.

- H. Veneer Plaster Finishes
  - 1. One Coat System: USG Imperial Finish Plaster.

### PART 3 - EXECUTION

#### 3.01 GYPSUM BOARD

- A. Follow Gypsum Association's recommendations for installation procedures.
- B. Cut wallboards by scoring and breaking or sawing; scribe neatly at wall projections.
- C. Apply first to ceilings then to walls.
- D. Locate wallboard joints at openings so that no end joint aligns with edge of opening.
- E. Set fasteners with heads slightly below surface of wallboard. Avoid breaking face paper.
- F. Provide water resistant wallboard at rooms/areas with high humidity.

#### 3.02 METAL STUDS

- A. Attach metal runners at floor and at ceiling or structural elements above with suitable fasteners located 2 inches from each end, spaced 16 inches on center.
- B. Position studs vertically, engaging floor and ceiling runners. Splice studs with 8-inch nested lap, one positive attachment per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners, existing construction elements.
- C. Anchor studs adjacent to door frames, partition intersections, and corners to ceiling and floor runner flanges with USG metal lock fastener tool.
- D. Provide double studs at jambs and head of each door frame. Securely anchor studs to jamb and head anchor clips at metal door frames by bolt or screw attachment. Over metal frames, place a cut-to-length section of runner horizontally with web-flange bent at each end; secure with one positive attachment per flange. Position a cut-to length stud (extend to ceiling runner) at vertical board joints over door frame header. Place an additional track-to-track stud 6 inches from double jamb studs on both sides of framed openings.
- E. At curved surfaces, space studs and framing members 8 inches on center maximum.

#### 3.03 CEILING SUSPENSION SYSTEM

- A. Suspend carrying channels with 8-gage hanger wires spaced 48 inches on center, within 6 inches of ends.
- B. Install carrying channels 48 inches on center and within 6 inches of walls. Provide 1 inch clearance between channel ends and abutting walls, partitions.
- C. At splices, interlock flanges, overlap ends 12 inches, and secure with 16-gage double standard tie wire at each end.
- D. Erect furring channels at right angles to carrying channels, spaced 24 inches on center and within 6 inches of walls. Provide 1-inch clearance between channel ends and abutting walls, partitions.



- E. Secure to carrying channels with clips, or, saddle tie with 16-gage double standard tie wire. At splices nest channels at least 8 inches, securely wire tie at each end.
- F. Install additional cross reinforcing to restore lateral stability of suspension system at openings that interrupt carrying or furring channels.
- G. Apply wallboard of maximum practical length with long dimension at right angles to furring channels. Position and stagger end joints over channel web. Fit ends and edges closely, but not forced together.
- H. Fasten board to channels with 1-inch Type S screws spaced 12 inches on center in field of board, along abutting ends, edges.
- I. Comply with UL Design No. D502 requirements at fire rated assembly.

#### 3.04 EXPANSION JOINTS

- A. At Ceilings: 50'-0" on center each way maximum.
- B. At Walls: 30'-0" on center maximum.
- C. Provide continuous from each door jamb to top of partition.
- D. Provide at intersections with exposed masonry construction.

#### 3.05 SINGLE LAYER/ERECTION

- A. Position all ends, edges over framing members, except when edge joints are at right angles to framing members, or when end joints are back-blocked. Apply wallboard horizontally or vertically on walls to minimize the number of joints.
- B. Attach wallboard to metal framing supports by power driven screws. For vertical application space screws 12 inches on center in field of board, 8 inches on center staggered along vertical abutting edges. For horizontal application space screws 12 inches on center in field, along abutting end joints.

#### 3.06 MULTI-LAYER WALLBOARD ERECTION

- A. Base Layer: Erected as specified for "Single Layer Erection".
- B. Joints in face layer to fall at least 10 inches from parallel joints in base layer.
- C. Apply face layers with adhesive in accordance with wallboard manufacturer's printed instructions. Provide sufficient number and spacing of fasteners to hold top layer tight with bottom layer until adhesive dries.

#### 3.07 TILE BACKER BOARD

- A. Use as backing for all ceramic wall tile.
- B. Provide blocking for fixtures and accessories.
- C. Apply horizontally. Cut edges, utility holes, joints, angles.
- D. Do not tape joints in areas to be tiled.

### 3.08 JOINT TREATMENT APPLICATION

- A. Mix joint compound in accordance with manufacturer's recommendations.
- B. Apply compound in thin uniform layer to all joints, angles to be reinforced. Apply reinforcing tape centered over joint, seated into compound. Follow immediately with thin skim coat or embed tape. Fold and embed tape in interior angles to provide true angle.
- C. When embedding coat is thoroughly dry, apply second coat of compound, filling board taper flush with surface. Cover tape, feather out slightly beyond tape.
- D. On joints with no taper, cover tape, feather out at least 4 inches on either side of tape.
- E. No second coat is required on interior angles.
- F. When second coat is thoroughly dry, spread finish coat evenly over and extend slightly beyond second coat. Feather to a smooth, uniform finish.
- G. Over taped edges, do not allow finish coat to protrude beyond plane of surface. Apply finish coat to cover tape, taping compound at taped angles to provide true angle. When necessary, sand between coats and follow with final coat to provide smooth surface ready for decoration.
- H. Do not abrade adjacent face-paper surfaces.

### 3.09 FINISHING FASTENERS

- A. Apply compound to fastener depressions. Follow with minimum of two additional coats leaving depressions level with surface.
- B. Do not abrade adjacent face-paper surfaces.

### 3.010 FINISHING BEAD AND TRIM

- A. Apply first coat to beads, trim. Properly feather out from ground to plane of surface. Embed flanges of corner reinforcement with compound.
- B. When embedding coat is thoroughly dry, apply second coat in same manner as first-coat, extending compound slightly beyond onto face of board.
- C. When second coat is thoroughly dry, apply finish coat extending compound slightly beyond second coat, properly feathering from ground to plane of surface. Sand finish coat as necessary to provide flat smooth surface, ready for decoration.
- D. Do not abrade adjacent face-paper surfaces.

### 3.011 PATCHING AT PLASTER

- A. Mix setting-type compound in accordance with manufacturer's recommendations.
- B. Remove unsound and loose plaster.
  - 1. Enlarge cracks and fill with initial application of base coat.
- C. Apply patching compounds in thin uniform layers to all existing plaster damaged by selective demolition.

- D. Apply base coat over existing substrates. Substrates to be free of dust, residue and other contaminants.
- E. When base coat is thoroughly dry, apply second coat of compound, filling area to within 1/8" of adjacent surfaces.
- F. When second coat is thoroughly dry, spread finish coat evenly over and extend slightly beyond second coat and sides of patch.
- G. Do not allow finish coat to protrude beyond plane of existing surfaces. Feather out at sides of patch area.
  - 1. Apply finish coat to completely cover base coat and to provide true angles and smooth surface.
  - 2. When necessary, sand between coats and follow with additional final coats to provide smooth surface.
  - 3. Sand surface smooth and ready for decoration.

3.012 VENEER PLASTER

- A. Apply veneer plaster finish in accord with manufacturer's printed instructions.

3.013 ACOUSTIC SEALANT

- A. Apply sealant at intersections of wallboard and adjacent materials to form a complete seal to air and noise.

3.014 TEXTURE FINISH

- A. Apply texture finish in accord with manufacturer's printed instructions.
- B. Provide uniform texture over entire surface.
- C. Match textures of existing plaster.

3.015 ADJUST AND CLEAN

- A. Ridging
  - 1. Sand ridges to reinforcing tape without cutting through tape.
  - 2. Fill concave areas on both sides of ridge with topping compound.
  - 3. After fill is dry, blend in topping compound over repaired area.
- B. Fill cracks with compound and finish smooth and flush.

END OF SECTION 09250

## SECTION 09300

### TILING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Floor Tile.
- B. Base and Wall Tile.

##### 1.03 RELATED WORK

- A. Gypsum Board: Section 09250, for tile backer board.
- B. Neoprene Latex Mastic Membrane: Section 09310.

##### 1.04 REFERENCES

- A. The following specifications and standards are incorporated by reference:
  - 1. Tile Council of America, Inc. - "Handbook for Ceramic Tile Installation".

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Samples for colors on 12 inch by 12 inch panels in duplicate for tile specified.
  - 2. Samples in duplicate for each different trim piece required.
  - 3. Grout samples in duplicate indicating color range anticipated, texture.

##### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, handle, deliver and store at the job site in original unbroken containers in a manner that will avoid damage or contamination.
- B. All containers shall bear grade seals, manufacturer's name, size, color and quantities.

##### 1.07 PROJECT CONDITIONS

- A. Set and grout tile when ambient temperature is at least 50 degrees F. and rising.

##### 1.08 EXTRA MATERIALS

- A. Deliver stock of extra materials to Owner. Furnish extra materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
  - 1. Furnish one box for each type, color, pattern and size installed.

#### PART 2 - PRODUCTS

## 2.01 TILE

### A. Floor, Base and Wall tile.

1. Product: Ceramic porcelain tile, Dal-Tile “Landscape” (LS06 Rodi), or approved equal product by American Olean, Crossville, Interceramics, Terra Green Ceramics, United States Ceramic Tile Company, or approved equal.
  - a. Architect to select product from manufacturer’s full line, all price groups.
2. Floor and Wall Tile Type 1: Size 12 inches by 12 inches.
  - a. Provide trim for a complete installation.
3. Wall Base Tile Type 1: Cove, 6 inches high by 12 inches wide.

### B. Wall backsplash tile.

1. Product: Ceramic porcelain tile, Dal-Tile “Semi-Gloss” (0142 Luminary Gold), or approved equal product by American Olean, Crossville, Interceramics, Terra Green Ceramics, United States Ceramic Tile Company, or approved equal.
  - a. Architect to select product from manufacturer’s full line, all price groups.
2. Wall Tile Type 2: Size 6 inches by 6 inches.
  - a. Provide trim for a complete installation.

## 2.02 SETTING MATERIALS

### A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix containing dry, re-dispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
2. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.
  - a. For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

## 2.03 ACCESSORIES

- A. Portland Cement: ASTM C 150, type 1.
- B. Sand: ASTM C-144.
- C. Water: Clean and potable.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout: LATICRETE “Tri-Poly Fortified Sanded Grout (1500 Series)”; Bostik Findley “Hydroment Ceramic Tile Grout (sanded)”; or approved equal.
  1. Color: To be selected by AE from manufacturer’s full range of colors.
- F. Acrylic Additive: LATICRETE “1776 Grout Admix Plus”; Chargar Corporation “Acryl 60” or approved equal.

- G. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- H. Provide other materials not specifically described but required for a complete and proper installation.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine surfaces where tile is to be applied and notify the Contractor of any defects.

#### 3.02 INSTALLATION

##### A. General

1. Installation and workmanship shall be in accordance with ANSI A108.1 and as specified herein. The printed instructions of the tile manufacturer and the manufacturer of proprietary mortars and grouts shall be followed where applicable.
2. Before commencing work, establish field pattern and border line locations.
3. Center the work symmetrically so that no tile need be cut to less than half size.
4. Joints in wall tile shall be aligned vertically and horizontally; staggered joints will not be accepted.
5. Align joints when adjoining tiles on floor, base and trim are the same size.
6. Rub exposed edges smooth.

- B. Interior Wall Tile Setting Bed: TCA W202/Tile backer board substrates - acrylic modified latex-cement mortar.

- C. Handle, store, mix and apply proprietary setting and grouting materials in compliance with the manufacturer's instructions.

- D. Extend tile work into recesses and under equipment and fixtures to form a complete covering without interruptions, except as otherwise shown.

- E. Terminate work neatly at obstructions, edges, and corners without disruption of pattern or joint alignments.

- F. Comply with manufacturer's instructions for mixing and installation of proprietary materials.

- G. Neutralize and seal substrates in accordance with setting bed manufacturer's instructions, where required.

- H. Jointing Pattern: Grid pattern.

##### I. Expansion, Control Joints

1. Extend completely through tile mortar bed. Insert preformed back-up material to provide correct cavity depth for sealant.
2. Width of expansion, control joints: Same as tile joints.
3. Prior to grouting, keep expansion and control joints open and clean.
4. After tile is grouted and completely dry, remove temporary filler material. Brush joints clean, fill expansion and control joints.

#### 3.03 CLEANING

- A. After completion, clean all work, point open joints and replace defective work.

#### 3.04 PROTECTION

- A. Close off work spaces to traffic during installation and at least 48 hours after completion of work.
- B. Tiled vertical outside corners shall be protected with board corner strips in areas used as passageways.

END OF SECTION 09300

## SECTION 09310

### NEOPRENE LATEX MASTIC MEMBRANE

#### PART 1: GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Latex Mastic Membrane.

##### 1.03 RELATED WORK

- A. Tiling, Section 09300.

##### 1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Product data including specification and installation details. Installation instructions and recommendation of manufacturer shall be specified for this application.

##### 1.05 QUALITY ASSURANCE

- A. Use only material from a single manufacturer to ensure compatibility or as approved in writing by the membrane manufacturer.
- B. Use only pre-qualified and approved subcontractors employing skilled and experienced workers.
- C. Instructions: Request the service of a representative of the manufacturer for initial instructions in preparation, mixing and application of the materials. The manufacturer shall supply such service as required. Notify manufacturer in writing 30 days prior to requiring his services.

##### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, handle, deliver and store at the job site in manufacturers' unopened, undamaged, original packaging.
- B. Store materials on site in enclosures or under protective covering that assure materials are kept clean and dry. Store material off ground.

##### 1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Work shall be performed within range of temperatures, and in climatic conditions recommended by the manufacturer.

#### PART 2: PRODUCTS

##### 2.01 MATERIALS



- A. Latex Mastic Membrane shall be Mer-Krete HydroGuard 2000 Membrane as manufactured by Mer-Kote Products Inc. Torrance California (800) 851-6303, or approved equal.
- B. The composition when properly applied and cured should exhibit the following physical characteristics and properties:
  - 2. The membrane shall elongate a minimum of 500%.
  - 3. The membrane shall withstand a water head of 115 ft. for a period of sixty minutes without water transmission or rupture of the membrane.
  - 4. The minimum thickness of the membrane shall be 30 mils.
  - 5. Elongation over crack .22 inches (Split Slab Test).
  - 6. Adhesion in shear 250 psi or greater.
  - 7. Tensile 450 psi.
  - 8. Freeze Thaw cycle after cure - 250 cycles. No Change (M/K A-223 ) method.
  - 9. Membrane shall be ICBO Listed and meet ANSI A-118.10 Standard.
- C. Joint Backing: Closed cell polyethylene.
- D. Sealant: Single or two component urethane per manufacturer's requirements.

### PART 3: EXECUTION

#### 3.01 EXAMINATION

- A. Examine surfaces where latex mastic membrane is to be applied and notify the Contractor of any defects.

#### 3.02 INSTALLATION

- A. This membrane shall be installed in strict accordance with the manufacturers' printed specifications, details, and the most current requirements of the Tile Council of America guide lines.
  - 1. The waterproof membrane shall be applied using synthetic asphalt modified neoprene latex mastic, and synthetic reinforcement cloth (Type II). Two coats of rubber shall be applied to a total thickness of 30 mils by laminating wet mastic into cloth making certain the mat is saturated at the prescribed thickness. All vertical, base and edges shall be flashed in the same manner. A second coat of rubber must be applied to fill all pin holes.

#### 3.03 PROTECTION

- A. After successful completion of the flood test, waterproof membrane covering shall be adequately protected by the prime contractor against damage or misuse by other trades until final acceptance of the building.

#### 3.04 WARRANTY

- A. Warranty material and workmanship to the owner insuring performance of the waterproof membrane system is per manufacturers' specifications and all work has been performed to meet all applicable industry standards and as per standard of care issues for the industry involved. Warranty shall be -5- years material and labor.

END OF SECTION 09310

SECTION 09510  
ACOUSTICAL CEILINGS

PART 1:GENERAL

1.01RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02WORK INCLUDED

- A. Acoustical Board.
- B. Suspension Systems.

1.03RELATED WORK

- A. Mechanical (Air Supply and Return Devices): Division 15.
- B. Electrical (Light Fixtures): Division 16.

1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
  - 1. Manufacturer's product specifications and installation instructions for each acoustical ceiling material and suspension system required, including certified laboratory test reports.

1.05DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original, unopened, protective packaging, with manufacturer's labels indicating brand name, pattern, size and thickness as applicable, legible and intact.
- B. Store materials in original protective packaging to prevent soiling, physical damage or wetting.
- C. Store cartons open at each end to stabilize moisture content and temperature.

1.06PROJECT CONDITIONS

- A. Do not install interior acoustical ceilings until space is enclosed and weatherproof. Complete installation of damp materials before beginning work.
- B. Maintain humidity of 65 - 75 percent in areas where acoustical materials are to be installed 24 hours before, during, and after installation.
- C. Maintain a uniform temperature in the range of 55 to 70 degrees F. prior to and during installation of materials.

1.07EXTRA MATERIALS

- A. In accord with General Conditions of the Contract, deliver extra materials equal to a minimum of 50 square feet of each type of acoustical material supplied.

- B. All cartons shall be new, unopened, packaged with protective covering for storage, and identified with appropriate labels.

## PART 2: PRODUCTS

### 2.01 BOARD TYPE 1

- A. Lightly textured nodular lay-in panels, 3/4" thick x 2' x 2', Reveal edge (tegular), White. UL Classified Noise Reduction Coefficient (NRC) .60, Ceiling Attenuation Class (CAC) 35, Light Reflection Coefficient .82, "BioShield", 15 year warranty against sag, 82% recycled content.
- B. Celotex Brand, "Cashmere".
- C. Or approved equal by Armstrong World Industries, Ecophon Certaineed, or USG.

### 2.02 INTERMEDIATE DUTY SUSPENSION SYSTEM TYPE 1

- A. Armstrong, "Prelude ML, 15/16" Exposed Tee".
  - 1. Material: Hot-dipped, galvanized steel.
  - 2. Surface Finish: Baked polyester paint.
- B. Or approved equal by Chicago Metallic, National Rolling Mills, Donn/USG.
- E. Conform to all requirements of ASTM C-635 intermediate structural classification.
- F. Provide flat white finish, 15/16" face.

## PART 3: EXECUTION

### 3.01 EXAMINATION

- A. Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Do not begin installation until sufficient materials to complete a room are received.
- B. Install materials in accordance with manufacturer's printed instructions, governing regulations, fire resistance rating requirements, and industry standards applicable to work.
- C. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.
- D. Symmetrically locate grid layout in each space. Coordinate work with other trades so that lighting fixtures, grilles, and other ceiling fixtures work with grid layout.
- E. Do not use universal splices or other splices which would obstruct passage of recessed lighting fixtures through grid openings or limit fixture relocation upon flanges of ceiling grids.
- F. Support suspension system from structure above, not from ductwork, metal deck, equipment or piping.

- G. Space hangers not more than 6 inches from ends and not more than 4 feet on center.
- H. Install edge moldings at the perimeter of each acoustical ceiling area and at locations where edge of units would otherwise be exposed.
  - 1. Secure moldings to building construction by fastening with screw anchors into the substrate, through holes drilled in vertical leg. Space holes not more than 3 inches from each end and not more than 16 inches on center along each molding.
  - 2. Level moldings with ceiling suspension system, to a level tolerance of 1/8 inch in 12 feet.
  - 3. Miter corners of moldings accurately to provide hairline joints, securely connected to prevent dislocation. Cope exposed flanges of intersecting suspension system members, so that flange faces will be flush.
  - 4. Furnish additional tees for supporting grilles, diffusers and light fixtures. Refer to the reflected ceiling, HVAC and electrical plans for locations.
  - 5. Provide tegular edge at walls, other abutting vertical surfaces.
  - 6. Field paint cut edges to match surface color and sheen.
- I. Arrange acoustical units and orient directionally-patterned units, if any, in manner shown on reflected ceiling plans.

### 3.03CLEANING

- A. Clean exposed surfaces of acoustical ceilings, trim, edge moldings, and suspension members to comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
- B. Remove work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

### 3.04PROTECTION

- A. Provide required protection for the acoustical ceilings, including temperature, humidity limitations and dust control so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION 09510

## SECTION 09650

### RESILIENT FLOORING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Vinyl Composition Tile.
- B. Resilient Base.
- C. Accessories.
- D. Subfloor Preparation.

##### 1.03 RELATED WORK

- A. Selective Demolition: Section 02070.
- B. Cast-in-Place Concrete: Section 03300.
- C. Carpet (vinyl and metal reducers): Section 09680.

##### 1.04 QUALITY ASSURANCE

- A. Provide each type of resilient flooring and accessories from a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
- B. Installers Qualifications: Installer experienced (minimum of 2 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
- C. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials.
  - 1. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Manufacturer's technical data for each type of resilient flooring and accessory.
    - a. Data indicating adhesive and accessories meet VOC requirements.
  - 2. Manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.
  - 3. Submit samples of metal edge strips.

4. Two copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened containers with labels indicating brand names, colors and patterns, and quality designations legible and intact.
- B. Store and protect materials in accordance with manufacturer's recommendations.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65 degrees F and maximum temperature of 90 degrees F in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Subsequently, maintain minimum temperature of 55 degrees F in areas where work is completed.
- B. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.
- C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
- D. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's recommended bond and moisture test.
- E. Close areas to traffic and to other work until flooring is firmly set. Tile shall have 72 hours with no traffic.
- F. Where solvent based adhesives are used, provide safety sparkproof fans when natural ventilation is not adequate.

1.08 EXTRA MATERIALS

- A. Deliver stock of extra materials to Owner. Furnish extra materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
  1. Furnish one box for each type, color, pattern and size installed.

PART 2 - PRODUCTS

2.01 VINYL COMPOSITION TILE - 1

- A. General: 1/8 inch by 12 inches by 12 inches; ASTM F1066-87, Composition 1, Class 2.
- B. Armstrong Excelon Stonetex (52122 Pebble Gray), or approved equal by Mannington, or approved equal.

2.02 VINYL COMPOSITION TILE - 2

- A. General: 1/8 inch by 12 inches by 12 inches; ASTM F1066-87, Composition 1, Class 2.
- B. Armstrong Excelon Imperial (51915 Charcoal), or approved equal by Mannington, or approved equal.

2.03 RESILIENT WALL BASE

- A. General: Rubber, cove base, top set, roll stock.
  - 1. Height: 4" and 6", as indicated on Drawings.
- B. Manufacturers: Armstrong (61 Graphite Gray) or approved equal by:
  - 1. Flexco.
  - 2. Freudenberg Building Systems, Nora.
  - 3. Johnsonite.
  - 4. Roppe.

#### 2.04 ACCESSORIES

- A. Adhesives: Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions; equal to HENRY GreenLine GL33High-Performance VCT Adhesive, low VOC type.
- B. Adhesive for Wall Base: W.W. Henry "595 Cove Base Adhesive", zero-VOCs; W.F. Taylor "2035 Cove Base Adhesive" or "2040 Premium Cove Base Adhesive", GreenGuard certified; PL Adhesives & Sealants "Cove Base Adhesive"; Bostik Findley, Durabond "D-740 Multipurpose Wall Adhesive".
  - 1. Low-VOC type: VOC content less than 100 g/l.
- C. Concrete Slab Primer: Non-staining, low-VOC type, equal to W.F. Taylor Co. "Envirotec Healthguard" #2006, as approved by flooring and underlayment manufacturers.
- D. Patching, Leveling, Underlayments: The leveling materials must be portland cement based and provide a minimum 3,500 PSI compressive strength (ASTM C 109) and sufficient bond to existing subfloor surface.
  - 1. Ardex, Laticrete, Duralox, Mapei, or equivalent, approved by flooring manufacturer.
- E. Metal Edge Strip: Similar to Ceramic Tile Company CTC1132CTA.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Examine subfloor surfaces to determine that they are dry, clean, and smooth.
- B. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing compound. Do not use curing compounds on concrete subfloors.
- C. Do not allow resilient flooring work to proceed until subfloor surfaces are satisfactory. Indicate adverse conditions of any type by letter.

#### 3.02 PREPARATION

- A. Comply with ASTM F 710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring, and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
  - 1. Concrete floors with steel troweled (slick) finish shall be properly roughened (sanded) to ensure suitable adhesion.
  - 2. Concrete floors with curing, hardening and/or breaking compounds shall be abraded with mechanical methods only to remove compounds.
    - a. Do not use chemicals for removal.
    - b. Do not use wax or oil based sweeping compounds.

- B. Sand or grind subfloors to remove mortar, paint, other surface irregularities.
- C. Where filling, patching, leveling is required of thickness exceeding 1/8-inch apply latex type underlayment in two or more applications. Apply compound in accordance with manufacturer's printed instructions.
- D. Remove all debris, sand, and other materials which would result in lack of adhesion and/or star cracking.

### 3.03 VINYL COMPOSITION TILE INSTALLATION

- A. Install resilient flooring and accessories using method indicated in strict compliance with manufacturer's printed instructions. Extend resilient flooring into toe spaces, door reveals, and into closets and similar openings.
- B. Scribe, cut, and fit resilient flooring to permanent fixtures, built-in furniture and cabinets, pipes, outlets and permanent columns, walls and partitions.
- C. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.
- D. Tightly cement resilient flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll resilient flooring at perimeter.
- E. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
- F. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile with grain running parallel in adjacent tiles.
- G. Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.
- H. Apply wall base to all gypsum surfaces and casework, as indicated in Finish Schedule, and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
  - 1. Adhesive shall cover a minimum of 90 percent of ribbed back of base.
  - 2. Leave 1/4 inch uncovered space at top edge of base to prevent oozing.
  - 3. Roll base firmly, roll back toward starting point.
- I. Apply butt type metal edge strips where indicated on Finish Schedule, and before installation of resilient flooring. Secure units to substrate with countersunk stainless steel anchors, complying with manufacturer's recommendations.

### 3.04 WALL BASE INSTALLATION



- A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required.
- B. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Cut no shorter than full wall length.
- C. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
  - 1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
  - 2. Adhesive shall cover a minimum of 90 percent of ribbed back of base.
  - 3. Leave 1/4 inch uncovered space at top edge of base to prevent oozing.
  - 4. Roll base firmly, roll back toward starting point.

### 3.05 CLEANING

- A. Perform following operations immediately upon completion of resilient flooring.
  - 1. Sweep or vacuum floor thoroughly.
  - 2. Do not wash floor until time period recommended by resilient flooring manufacturer has elapsed to allow resilient flooring to become well-adhered to adhesive.
  - 3. Damp-mop floor being careful to remove black marks and excessive soil.
  - 4. Remove any excess adhesive or other surfaces blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.
  - 5. Provide two coats of wax of type as recommended by flooring manufacturer. Buff to shine for each coat.

### 3.06 PROTECTION

- A. Protect flooring against damage during construction period to comply with resilient flooring manufacturer's directions.

END OF SECTION 09650

## SECTION 09680

### CARPET

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 SUMMARY

- A. Standard Commercial Carpet.
- B. Metal Transition Strips.
- C. Floor Filler.
- D. Adhesives.

##### 1.03 RELATED WORK

- A. Related Sections include the following:
  - 1. Section 02070: "Selective Demolition" for removing existing floor coverings.
  - 2. Section 03300: "Cast-in-Place Concrete" for concrete floors.
  - 3. Section 09650: "Resilient Flooring" for resilient wall base installed with carpet.

##### 1.04 REFERENCES

- A. Carpet shall be in strict accord with Wisconsin Enrolled Commercial Building Code, Chapter 11 - "Accessibility".
- B. Carpet and Rug Institute (CRI).

##### 1.05 SUBMITTALS

- A. Product Data: For the following, including installation recommendations for each type of substrate:
  - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, fade resistance and printed statement of VOC content.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet: 12-inch square, (2) Samples.
  - 2. Exposed Edge, Transition, and other Accessory Stripping: 6-inch long, (2) Samples.
  - 3. Seaming diagrams. (Note: Any room or space with at least one dimension 12'- 0" or less shall not have a seam that is perpendicular to this 12'- 0" or less dimension)
- C. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

D. Warranties: Special warranties specified in this Section.

#### 1.06 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

#### 1.08 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

1. Test concrete sub-floors for acceptable moisture and alkalinity levels prior to installation of carpet systems in accordance with manufacturer's recommendations.

D. Floors must be free of dust, oils, grease, or other foreign matter.

E. Where items are indicated for installation on top of carpet, install carpet before installing these items.

F. Allow installation to cure for a minimum of 24 hours before subjecting it to any traffic, moving of furniture, or other heavy equipment.

#### 1.09 WARRANTY

A. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

3. Warranty Period: Lifetime.

#### 1.010 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

### PART 2 - PRODUCTS

#### 2.01 STANDARD COMMERCIAL CARPET

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Carpet, CPT-1:
    - a. Manufacturer: J&J Commercial
    - b. Style: "Static" (2260)
    - c. Color: "Pulse" (1378)
    - d. Backing: "ActionBac LTP"
  - 2. Characteristics: All carpet shall be same mill run throughout.

## 2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and equal to Commercialon 600 Carpet Adhesive or W. W. Henry, HENRY "GreenLine GL62 High-Performance Carpet Adhesive" and is recommended or provided by carpet manufacturer.
  - 1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
    - a. Meeting CRI low-VOC emission criteria #AA-580309.
    - b. Total VOCs: 10.00 mg/sq. m x h.
    - c. Formaldehyde: 0.05 mg/sq. m x h.
    - d. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.
- C. Carpet Sealer: Equal to Commercialon "Strong Seal 557 Solvent Free Carpet Seam Sealer"; or as recommended by carpet manufacturer to achieve full warranty coverage; suitable for abutting edges.
  - 1. Meeting CRI low-VOC emission criteria #AA-580309.
- D. Metal Transition Strip: Schluter-Systems "RENO-U", AEU 80 (5/16"), anodized aluminum.
  - 1. Plastic or vinyl material not acceptable.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
    - a. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
  - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

### 3.03 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
  - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations, seam preparation, seam trimming, seam characteristics, and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
  - 1. It door openings install adapters/transitions/reducers to be covered by door when in the closed position.
  - 2. Level adjoining border edges.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
  - 1. Install metal transition strip with anchoring leg under carpet where carpet abuts resilient terrazzo tile.
  - 2. Secure metal transition strip to substrate according to manufacturer's instructions.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
- H. All selvages shall be trimmed to ensure good side seams. All seams shall receive an 1/8" continuous bead of seam adhesive at the point the face yarn enters the back.
  - 1. Fit edges together with an invisible seam and bond with appropriate adhesive.

### 3.04 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.

- B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

END OF SECTION 09680

## SECTION 09900

### PAINTING

#### PART 1:GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- . Painting and finishing of interior exposed items and surfaces throughout Project.
- A. Field painting of exposed bare and covered pipes and ducts and hangers, exposed steel and iron work, all metal fabricated Section 05500 items, and primed metal surfaces including but not limited to, hollow metal work, equipment installed under mechanical and electrical work.
- B. HVAC items that require painting are:
  - 1. Grilles, radiation enclosures.
- C. "Paint" as used herein means all coating systems materials including primers, emulsions, enamels, stains, sealers and fillers, and other applied material whether used as prime, intermediate or finish coats.
- D. Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas.
- E. Following categories are not included as part of field-applied finish work.
  - 1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified.
  - 2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces in concealed areas and generally inaccessible areas.
  - 3. Finished Metal Surfaces.
  - 4. Operating Parts.

##### 1.03 RELATED WORK

- A. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.
- B. Examine the Contract Documents and be familiar with all their provisions regarding painting. All surfaces that are left unfinished by the requirements of other Sections shall be painted or finished as part of this Section.

##### 1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract:
  - 1. Paint: Submit a list of specified products with corresponding name of manufacturer, identifying name and number of proposed products along with manufacturer's written instructions for use of each product.

2. If manufacturer to be used is different from that of color chips furnished, prepare and submit two approximately 6 inch square, properly labeled samples of each color and sheen required on properly prepared paint-out cards or hardboard.
3. Stain: Two, 6 inch square properly labeled samples of each color and sheen required on actual wood for project.

#### 1.05 QUALITY ASSURANCE

- A. MPI Standards:
  1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
    - a. For areas to be renovated, comply with requirements in "MPI Maintenance Repainting Manual".

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials to site until having received all written approvals of submitted information and samples.
- B. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label.
- C. Store materials not in actual use in tightly covered containers.
- D. Take all precautions to ensure that workers and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.
- E. Remove rags and waste from storage areas daily.

#### 1.06 PROJECT CONDITIONS

- A. Apply water-base paints only when temperatures of surfaces to be painted and surrounding air temperatures are between 50 and 95 degrees F.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F. and 95 degrees F.
- C. Do not apply paint when relative humidity exceeds 85%; at temperatures less than 5 degrees F. above the dew point; or to damp or wet surfaces.

#### 1.07 SEQUENCING AND SCHEDULING

- A. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto newly-painted surfaces.

#### 1.08 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

#### PART 2: PRODUCTS



## 2.01 MANUFACTURERS

- A. AFM Safecoat.
- B. Benjamin Moore & Co.
- C. ICI/Dulux.
- D. PPG Architectural Finishes, Inc.
- E. Sherwin Williams Company

## 2.02 COLORS

- A. Colors: Paint-1 (General Paint), Ceilings.  
Paint-2 (General Paint), Walls.  
Paint-3 (Accent Paint)  
Paint-4 (Accent Paint)  
Paint-5 (Accent Paint)

## 2.03 MATERIALS

- A. Use the materials of the same manufacturer for each system.
- B. Sherwin Williams systems are called out in the system schedules to establish quality and dry mil thickness of finished installation for all systems. A different manufacturer may be used for color selection. Any manufacturer noted above may be used as long as quality and color requirements are met.
  - 1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
- C. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers.
- D. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- E. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:
  - 1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
  - 2. Non-flat Paints and Coatings: VOC content of not more than 150 g/L.
  - 3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

4. Restricted Components: Paints and coatings shall not contain any of the following:

- a. Acrolein.
- b. Acrylonitrile.
- c. Antimony.
- d. Benzene.
- e. Butyl benzyl phthalate.
- f. Cadmium.
- g. Di (2-ethylhexyl) phthalate.
- h. Di-n-butyl phthalate.
- i. Di-n-octyl phthalate.
- j. 1,2-dichlorobenzene.
- k. Diethyl phthalate.
- l. Dimethyl phthalate.
- m. Ethylbenzene.
- n. Formaldehyde.
- o. Hexavalent chromium.
- p. Isophorone.
- q. Lead.
- r. Mercury.
- s. Methyl ethyl ketone.
- t. Methyl isobutyl ketone.
- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

F. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

2.04 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.

2.05 METAL PRIMERS

- A. Rust-Inhibitive Primer (Water Based): MPI #107.

2.06 LATEX PAINTS

- A. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).
- B. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).
- C. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).
- D. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

2.07 EQUIPMENT

- A. Provide all brushes, rollers, ladders, scaffolding, and other equipment of any kind to properly execute each type of work.

## PART 3: EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.02 PREPARATION

- A. Perform preparation and cleaning procedures in accord with paint manufacturer's instructions and as specified for each particular substrate condition.
  - 1. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations.
    - a. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
    - b. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning.
  - 3. Remove dirt, rust, scale, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.
- B. Gypsum Board: Fill minor irregularities with patching material and sand to smooth level surfaces taking care not to raise nap of paper.
- D. Ferrous Metal
  - 1. Remove dirt and grease with mineral spirits or solvent recommended by paint manufacturer and clean cloths.
  - 2. Where not galvanized, shop coat of primer will exist on surface. If prime coat is not smooth, sand to bare metal and re-prime.
- E. Existing Surfaces: Prepare to provide good adhesion and appearance.
  - 1. Remove loose paint and rust from metal surfaces.
  - 2. Feather sand edges of existing paint and spot prime bare metal to provide a smooth surface.

### 3.03 APPLICATION

- A. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.

- B. Do no interior work until building is properly enclosed.
- C. Do work under adequate illumination and dust-free conditions.
- D. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- F. Materials
  - 1. Do not open containers until required for use.
  - 2. Stir materials thoroughly and keep at uniform consistency during application.
- G. Coats
  - 1. Number specified is minimum.
  - 2. Touch up suction spots between coats.
  - 3. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
  - 4. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - 5. Refinish surfaces affected by refitting work.

### 3.04 COLOR SEPARATION

- A. An average of one or two wall colors will be used per room. Ceilings generally will be a different color than walls. Finished closets will usually be same as adjoining rooms.
- B. Job painted metal items such as diffusers, grilles and registers will generally be same color as adjacent surface.
- C. Hardwood generally will be the same color stain throughout.

### 3.05 CLEANING

- A. During the progress of this work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

### 3.06 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct damage by cleaning, repairing or replacing.
- B. Provide "wet paint" signs to protect newly-painted finishes. Remove temporary protective wrappings, after completion of painting operations.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 SCHEDULE OF INTERIOR WORK

- A. In addition to obvious surfaces, the following do not require painting or finishing.
  - 1. Do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) acoustic materials, finished mechanical and electrical equipment including light fixtures and distribution cabinets.
  - 2. Painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
  - 3. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.
  - 4. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated.
  - 5. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plate.
  - 6. N/A indicates system not applicable to this Project.
- B. Walls and Ceilings
  - 1. Paint all rooms listed on Room Finish Schedule. Paint patched walls from 90 degree corner and patched ceilings complete.
  - 2. Do not apply next coat until previous is thoroughly dry.
  - 3. Provide final coat which is solid and even in color, free from runs, laps, sags, brush marks, air bubbles and excessive roller stipple and worked into crevices, joints and similar areas.
- C. Electrical Panel Box Covers and Doors
  - 1. Remove, paint and reinstall after paint is dry.
- D. Other Unfinished and Primed Surfaces
  - 1. Provide specified finish on exposed surfaces. This includes prime coated mechanical units, piping, pipe covering, conduit, and interior duct surfaces visible behind grilles.

Material	Type	Number and Type of Coating
2. IPS 4 - Wood	Stain (Satin)	One coat "Sherwood Wiping Stain", 2 coats "Wood Classics Fast Dry Varnish".
3. IPS 3 - Ferrous Metal Metal (Unprimed)	Latex Semi-gloss	One coat "Pro-Cryl Universal Primer", two coats "ProClassic Waterborne".
4. IPS 4 - Ferrous Metal (Primed)	Latex Semi-gloss	One coat "Pro-Cryl Universal Primer" and two coats "ProClassic Waterborne".
5. IPS 5 - Plaster	Latex-Flat	One coat primer, "PrepRite Interior Masonry Primer"

	Eggshell	Two top coats, "Harmony Interior Latex Eggshell".
6. IPS 6 - Gypsum Board (toilet rooms, Entry 334, Waiting/ Reception 335, Breakroom 337)	Epoxy-Semi-Gloss	One coat "ProMar Primer", two coats "Water Based Catalyzed Epoxy".
7. IPS 7 - Gypsum Board	Latex-Eggshell	One coat "Harmony Interior Latex Primer", two coats "Harmony Interior Latex Eggshell".
8. IPS 9 - Concrete Block	Latex-Eggshell	One coat "Loxon Block Surfer", two coats "Harmony Interior Latex Eggshell".
9. IPS 14 – Concrete (floor)	Epoxy	Two coats "Armorseal Tread-Plex"
10. IPS 15 - Copper/Alum (Finished Rooms Only)	Latex-Flat	One coat "DTM Acrylic Primer" Finish", Two coats "ProMar 200 Interior Latex Flat".
11. IPS 16 - Galvanized (Finished Rooms Only)	Latex-Flat	One coat "DTM Acrylic Primer" Finish, Two coats "ProMar 200 Interior Latex Flat".

END OF SECTION 09900

## SECTION 10400

### SIGNAGE

#### PART 1:GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Accessibility Signage.

##### 1.03 REFERENCES

- A. All signage shall be in strict accord with Wisconsin Enrolled Commercial Building Code.

##### 1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Manufacturer's Literature: Materials description, colors, and application instructions.

##### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Provide protective coverings for identifying devices prior to shipping.
- B. Handle and store to prevent damage and soiling.

#### PART 2:PRODUCTS

##### 2.01 ADA REQUIRED SIGNAGE

- A. Sign System: Veterans Industries Tactile and Braille Signs.  
Veterans Administration Medical Center  
Veterans Industries  
5000 West National Avenue, Building 7  
Milwaukee, Wisconsin 53295  
(414) 384-2000 extension 41250 Mr. G. David Flynn
- B. Or approved equal.
- C. Color: Rowmark, Ultra-Matte, Color to be selected by Architect from Manufacturer's full line.
- D. Provide proper gender symbol at each door leading to a room designed for handicap use (i.e., toilet rooms with grab bars, etc.).

##### 2.01 DEDICATION PLAQUE

- A. A cast bronze dedication plaque, 20 inches wide by 24 inches long, with concealed fasteners shall be provided. The plaque shall be placed where directed.

#### PART 3:EXECUTION

### 3.01 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for the installation of identification devices and dedication plaque.
- B. Install devices plumb, level and true to line.
- C. Install room and door identification signs at 5 feet from centerline of signs to finished floor.
  - 1. When used in conjunction with accessibility symbol, mount below symbol.

### 3.02 CLEANING

- A. Clean surfaces of identifying devices, dedication plaque and surrounding surfaces.
- B. Remove protective coatings, if any.

### 3.03 SIGNAGE SCHEDULE

- A. ADA Signage to be provided at Toilet Rooms.

END OF SECTION 10400



## SECTION 10522

### FIRE EXTINGUISHER CABINETS

#### PART 1:GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Type ABC Fire Extinguishers.
- B. Cabinets.

##### 1.03 RELATED SECTIONS

- A. Gypsum Board: Section 09250.

##### 1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Product Data: Manufacturer's catalog information and specifications edited to indicate specific extinguishers, cabinets and accessories to be provided for this Project. Include rough opening dimensions and certification of U.L. rating.

#### PART 2:PRODUCTS

##### 2.01 TYPE ABC FIRE EXTINGUISHERS (4A-60BC RATED)

- A. J.L. Industries Cosmic. 10E.
- B. Larsen's MP10.
- C. Potter - Roemer 3010.

##### 2.02 MOUNTING FX-1

- A. J.L. Industries Panorama 1017 semirecessed, 2-1/2 inch return, C70.
- B. Larsen's Gemini G2409-R3 semirecessed, 2-1/2 inch return, comparable door.
- C. Potter - Roemer Buena 7122 semirecessed, 2-1/2 inch return comparable door.

#### PART 3:EXECUTION

##### 3.01 INSTALLATION

- A. Install all items in conformance with manufacturer's directions.
- B. Prepare recesses in wall for fire extinguisher cabinets.

- C. Securely fasten fire extinguisher cabinets to structure, square and plumb.
- D. Mount fire extinguisher cabinets so the top of the extinguisher is not more than 4 feet above the floor.

END OF SECTION 10522

## SECTION 10800

### TOILET AND BATH ACCESSORIES

#### PART 1: GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Commercial Toilet and Bath Accessories.

##### 1.03 RELATED SECTIONS

- A. Rough Carpentry: Section 06100.
- B. Gypsum Board: Section 09250.
- C. Tiling: Section 09300.

##### 1.04 REFERENCES

- A. All work of this section shall be in strict accord with Wisconsin Enrolled Commercial Building Code.

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract
  - 1. Manufacturer's technical data.

##### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packaging with seals unbroken and bearing manufacturer's name and product.
- B. Store all materials in secure place to prevent damage.
- C. Remove all damaged materials from project immediately.

#### PART 2: PRODUCTS

##### 2.01 COMMERCIAL TOILET ACCESSORY MANUFACTURERS

- A. Bobrick Washroom Equipment, Inc.
- B. Kimberly Clark.
- C. Bradley Corporation.
- D. Gamco.
- E. McKinney.

F. American Specialties, Inc.

## 2.02 MANUFACTURED COMMERCIAL UNITS

### A. Grab Bars

1. Bobrick B-6806 Series Continuous Grab Bars, lengths as indicated in drawings.
2. Or approved equal.

### B. Grab Bars, Swing Up Type

2. Gamco #125-TP "SwingUp Grab Bar" with optional tissue holder, lengths as indicated in drawings.
3. Or approved equal.

### C. Mirrors with shelf, sizes as indicated on drawings.

1. American Specialties, Inc. 0605.
2. Bobrick B-292.
3. Bradley 7805.
4. Gamco AS Series.
5. Or approved equal.

### D. Sanitary Napkin Disposal

1. Bobrick B-254 Classic Series Sanitary Napkin Disposal.
2. Or approved equal.

### E. Double Clothes/Robe Hook

1. Bobrick B-6727.
2. Or approved equal.

### F. Folding Shower Seat, color to be selected by Architect from manufacturer's full line.

1. Gamco SS-4R-ADA Slatted Phenolic Shower Seat.
2. American Specialties, Inc. 8206-R Folding Shower Seat.
3. Or approved equal.

## 2.03 SEALANT

A. "GE silicone sealant", General Electric Company.

B. "Dow Corning 780", Dow Corning Corporation.

C. "Pecora 826", Pecora Chemical Corporation.

## 2.04 FASTENERS

A. Provide all fastening devices including screws, bolts, anchors, and backplates.

B. Exposed fasteners shall match finish of accessories.

## 2.05 FABRICATION

A. Fabricate all toilet and bath accessories of type 302 or 304 stainless steel with satin finish, unless otherwise specified or approved.

B. All accessories shall be by one manufacturer unless otherwise specified or approved.

- C. Manufacturer's labels or imprinted name shall not be visible.

### PART 3:EXECUTION

#### 3.01EXAMINATION

- A. Examine surfaces and recesses to receive toilet and bath accessories for dimensions, plumbness, blocking, and other conditions that affect installation.
- B. Do not proceed until conditions are acceptable.

#### 3.02INSTALLATION

- A. Install toilet and bath accessories according to manufacturer's direction.
- B. All accessories in any one space shall be of matching design and finish. If discrepancies are found, secure Architect's approval before proceeding.
- C. Set all recessed and semi-recessed accessories with continuous seal of sealant, around entire perimeter of all accessories to prevent moisture from reaching substrate.

#### 3.03ADJUSTING AND CLEANING

- A. Adjust accessories for proper operation.
- B. Replace damaged or defective items.
- C. Clean and polish accessories after removing labels and protective wrapping.
- D. Delivery accessory keys, service, and parts manual in accordance with the General Conditions of the Contract Closeout.

END OF SECTION 10800

## SECTION 12304

### PLASTIC LAMINATE FACED CASEWORK

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

##### 1.02 WORK INCLUDED

- A. Base and Wall Cabinets and associated Partitions and Shelving.
- B. Countertops.
- C. Work Surfaces (with braces beneath).
- D. Hardware.

##### 1.03 1.01 RELATED WORK

- A. Rough Carpentry: Section 06100.
- B. Joint Sealers: Section 07900.
- C. Resilient Flooring (resilient base): Section 09650.
- D. Mechanical (Sinks, pipe, fittings, final connections, etc.): Division 15.

##### 1.04 REFERENCES

- A. Plastic Laminate: National Electrical Manufacturers Association (NEMA) Publication No. LD3-1991.
- B. Fiberboard Core: ANSI A208.2.

##### 1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
  - 1. Product Data: Manufacturer's catalog information edited to indicate specific products and related accessories to be provided for this Project.
  - 2. Shop Drawings: Show layout of casework, typical details of construction, and finish selections.
    - a. Locate rough-in for services required and show methods of compensating for minor variations in actual job conditions within specified tolerances.
    - b. Include details of fastening to all other work, countertop layout for each location, details of countertop construction including backsplash, endsplash, and edge details, plastic laminate selections previously made by Architect/Engineer and type of core substrate material.
    - c. Field measure for all countertops.
    - d. Indicate all hardware and keying schedule.

##### 1.06 QUALITY ASSURANCE

- A. Quality Standards: Perform work in accordance with Architectural Woodwork Quality Standards (current edition), Guide Specification and Quality Control Program as set forth by the Architectural Woodwork Institute (AWI).
- B. ANSI/BHMA A156.9 – Cabinet Hardware.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver casework items only when proper storage conditions will be available. Store casework in protected area until ready for installation.
- B. Maintain optimum humidity and temperature conditions after receipt of materials.
- C. Store in manner to allow free circulation of air around all items.
- D. Maintain temperature of casework storage areas between 50 to 75 degrees Fahrenheit.

PART 2 - PRODUCTS

2.01 CASEWORK

- A. AWI Section 400, Custom grade.

2.02 MANUFACTURERS

- A. The following manufacturers are acceptable as long as they meet or exceed this specification.
- B. A.J. Pietsch Company, (414) 342-0531.
- C. Carley Wood Associates, Inc. (608) 249-7444.
- D. Central Wisconsin Woodworking, (715) 675-4491.
- E. Creative Laminates, Inc., (800) 441-5885.
- F. Diversified Woodcrafts Inc., (920) 842-2136.
- G. Glenn Rieder, Inc., (414) 449-2888.
- H. Hillcraft Ltd., (608) 221-3220.
- I. Lange Brothers Woodwork Co, Inc., (414) 466-2226.
- J. O'Keefe Incorporated, (715) 425-8981.
- K. Stück Wood Works Inc., (414) 351-5595.
- L. T. J. Hale Company, (262) 255-5555.
- M. Techline, (608) 238-6868.
- N. Wood Design Inc., (920) 563-4833.

- O. Woodmill Products, Inc., (262) 754-4641.
- P. Calmar Manufacturing (Tru-Bilt); (319) 562-3261.
- Q. Case Systems, Inc., (989) 496-9510.
- R. LSI Corporation of America, Inc., (612) 559-4664.
- S. Northern Woodwork, Inc.; (218) 681-2305.
- T. Osvold Company, (612) 331-1581.
- U. R.C. Smith Company, (952) 854-0711.
- V. Doug Mockett & Co. (800) 523-1269.
- W. A&M Hardware (888) 647-0200
- X. Or approved equal.

#### 2.03 BASE CABINETS

- A. Bottoms, Sides and Sub-top: 3/4-inch 45-47 pound density particle board.
  1. Face Side Finish: 8 to 11 MIL melamine resin overlay.
  2. Non-Exposed Side Finish: Phenolic backing sheet.
- B. Back Panel: 3/8-inch 45-47 pound density particle board.
  1. Finish: 8 to 11 MIL melamine resin overlay.
  2. Non-Exposed Side Finish: Phenolic backing sheet.
  3. If back exposed, provide 3/4-inch material, finished to match.
- C. Top of Base Cabinet: Full framed wood. Provide full sub-top and 6 inch spreaders between all drawers and door/drawer.
- D. Back panels rabbeted into sides top and bottom. Secure with hot melt glue and mechanical fasteners.
- E. Provide finished end panels at all exposed end locations. Ends adjacent to appliances shall be considered as exposed ends.

#### 2.04 DOOR/DRAWER CONSTRUCTION AND EDGING

- A. Door/Drawer Fronts: 3/4-inch thick core.
- B. Exposed Edges, Endsplashes: Finished to match exposed face.
- C. Laminate face/balancer to core with PVA rigid adhesives, under pressure, nor natural setting process. Heat process or contact adhesive not allowed.
- D. Door/Drawer/Cabinet Body Edges: 1 mm PVC thru-color, acid resistant hot melt applied.

#### 2.05 PLASTIC LAMINATE SURFACING



- A. Manufacturers: Wilsonart (vertical surface: D456-60 Café Crème, horizontal surface: D4674-60 Evening Tigris) or approved equal by Arpa, Formica, Lamin-Art, Nevamar, or approved equal.
- B. Exposed Exterior Surfaces (except countertops): NEMA GP28, 0.028 inch thick, standard vertical grade.
- C. Interior Surfaces/Backing Sheets: NEMA CL20, 0.020 inch thick, standard cabinet liner grade.

#### 2.06 DRAWERS

- A. Backs, Sides, Fronts: 1/2-inch thick, medium density fiberboard with melamine overlay.
- B. Dovetail fronts and backs, secure with glue.
- C. Bottoms: 3/8-inch thick.
- D. Rabbet bottoms into sides, front and back; staple and glue.
- E. Drawer fronts screwed on from drawer inside.
- F. Reinforcement: 1/2 inch thick under-bottom stiffeners, one at 24 inch drawers, two at 36 inch drawers, four at 48 inch drawers.

#### 2.07 SHELVES AND PARTITIONS

- A. Shelves under 27 inches long behind doors: 3/4-inch thick 45-47 pound density particle board.
- B. Shelves over 27 inches long behind doors and all open cabinets: 1 inch thick 45-47 pound density particle board.
- C. Shelves: 3/4 inch thick cabinet grade plywood (where indicated).
- D. Finish: Finished to match faces.
- E. Edging: 1 mm PVC thru-color, acid resistant, hot melt applied.

#### 2.08 BASES

- A. Two, continuous, 4 inch high by 1-1/2 inch thick lumber, or 4 inch high by 3/4 inch exterior grade plywood, 2 foot on center.
- B. Provide two positioning strips to cabinet bottom for concealed fastening.
- C. Provide 1/8 inch recess at exposed cabinet ends for flush vinyl base condition.

#### 2.09 COUNTERTOPS

- A. Plastic Laminate: 1-1/2 inches thick 45-47 pound density particle board, NEMA GP50 finish top and edges, and NEMA CL20 backer sheet.
  - 1. Square front edge, back and side splashes. Provide cutouts for built-in fixtures.

#### 2.010 HARDWARE

- A. Pulls: Doug Mockett & Co. 5 21/32" Aluminum Extrusion Pull – DP117B, Satin Aluminum.

- B. Self-Closing Hinges: Blum Model 71.6530 with 175L8100 base plate.
- C. Drawer Slides: Accuride or approved equal.
- D. Locks: Keyed to match, five pin. All casework to be lockable. Key casework alike per area.
- E. Steel Brackets: A&M Hardware or approved equal
  - 1. Color: To be selected by Architect from full line of powder coat finishes.
- F. Hardware finish: 626 (US26D) Brushed Chrome.
- G. Waste Bin Deflector: Stainless steel sheet metal, type 304, 16 gauge, #4 finish, hemmed edges.
- H. Keyboard Platform: Doug Mockett & Co., "KP1", adjustable type with non-skid pads and gel wrist pad.  
 Mouse Support: Doug Mockett & Co., "KPA1".

#### 2.011 WORKMANSHIP

- A. Cabinet parts shall be accurately machined utilizing hardwood dowels for premium quality grade joinery construction. Glue and mechanically fasten all joints for maximum rigidity.
- B. All cases shall be square, plumb, true and self-supporting.
- C. Provide removable back panels and closure panels for plumbing access where shown on Project Drawings.

#### PART 3 - EXECUTION

##### 3.01 DELIVERY

- A. Store and install in a ventilated building not exposed to extreme temperature and/or humidity.

##### 3.02 INSTALLATION

- A. Installation shall be by the manufacturer's authorized representatives using factory trained personnel experienced in the installation of this type of equipment.
- B. Uncrate, set up, place, level, scribe and anchor all cabinets according to manufacturer's recommendations.
- C. Remove and replace tops, backs, panels, shelves and other items necessary to allow other Sections to complete their work of connecting services.
- D. Do all cutting, boring, patching required for the installation of work of other Sections.
- E. Provide all necessary fillers, panels, end panels, scribes required to make complete installation as detailed.
- F. Where casework meets wall surfaces, set with uniform space not to exceed 1/8-inch. Seal all joints with silicone sealant to a slightly concave joint, using backer rod where required. Apply sealant in accord with Section 07900.
- G. Cabinets with surfaces having machine or tool marks will be rejected.
- H. All finishes must be smooth, uniform in color and match approved sample.

- I. Prior to final inspection, examine installation of the work of this Section. Repair or replace all defects found. Leave installation clean, undamaged and ready for use.

END OF SECTION 12304

## SECTION A15010

### BASIC PLUMBING GENERAL REQUIREMENTS

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION

- A. Applicable requirements of instruction to bidders, conditions of contract, and of Sections listed under related Sections of this Division apply to all work specified in this Division 15000.

##### 1.02 RELATED SECTIONS OF THIS DIVISION

- A. A15010 Basic Plumbing General Requirements
- B. A15050 Basic Plumbing Materials and Methods
- C. A15250 Plumbing Systems Insulation
- D. A15400 Plumbing Systems

##### 1.03 RELATED WORK OF OTHER SECTIONS OR DIVISIONS

- A. Division 1
- B. B15000 – HVAC
- C. 16000 - Electrical

##### 1.04 WORK INCLUDED IN THIS SECTION

- 1.05 Work Not Included in This Section
- 1.06 General Requirements
- 1.07 Visiting the Premises
- 1.08 Codes and Regulations
- 1.09 Permits, Fees and Inspections
- 1.10 Discrepancies
- 1.11 Workmanship and Materials
- 1.12 Manufacturer's Recommendations
- 2.01 Submitted Data and Shop Drawings
- 2.02 Maintenance Manuals
- 3.01 Openings, Cutting, and Repairing
- 3.02 Concrete Work
- 3.03 Cleaning Equipment and Materials
- 3.04 Cleanup
- 3.05 Guarantee

##### 1.05 WORK NOT INCLUDED IN THIS SECTION

- A. Electrical, Line Voltage Wiring
- B. Painting
- C. For temporary services and utilities, see Division 1 requirements.

## 1.06 GENERAL REQUIREMENTS

- A. This Section includes all new plumbing and drainage work to constitute complete installation as specified, shown on drawings, and as required, including such items as plumbing demolition, drainage and waste systems, hot and cold water distribution, plumbing fixtures, connections for heating and ventilating equipment.
- B. Obtain information on conditions affecting work at building, including the following:
  - 1. Complete information as to details of building construction, pipe, and equipment layout, in order to install system to clear structural work and piping of equipment of other trades.
  - 2. Accessibility: Minor deviations from the drawings may be made to allow for better and more coordinate accessibility. Changes of magnitude that may affect the work of other Contractors shall not be made without authorized approval.
  - 3. Storage Space: Stored materials shall be located so as to facilitate prompt inspection. See Conditions of Contract.
- C. On all conditions affecting work, obtain at building conditions of foundations and surfaces to support pipe and equipment.
  - 1. Examine details of building construction in order to install system to clear all structural work and finished work.
  - 2. Examine electrical, heating and ventilating, and special equipment and piping layouts and specifications.

## 1.07 VISITING THE PREMISES

- A. The Contractor, before submitting his bid on the work, must visit the site and familiarize himself with all visible existing conditions.
- B. As a result of having visited the premises, the Contractor shall be responsible for the installation of the work as it relates to such visible existing conditions.
- C. The submission of a bid will be considered an acknowledgement on the part of the bidder of his visitation to the site.

## 1.08 CODES AND REGULATIONS

- A. All work and materials shall be installed as shown and herein specified in accordance with the approved editions of state and local codes, laws, regulations, and the 2003 edition of the International Plumbing Code.

## 1.09 PERMITS, FEES AND INSPECTIONS

- A. Unless otherwise distinctly hereinafter specified, this Section of the work shall apply and pay for all necessary permits, fees, and inspections required by any public authority having jurisdiction for the performance of this work.

## 1.10 DISCREPANCIES

- A. The Drawings and Specifications are intended to cooperate. Any materials, equipment or systems related to this Section and exhibited on the Architectural and Plumbing Drawings, but not mentioned in the Specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the Specifications and set forth on the Drawings.
- B. In case of differences between the Drawings and Specifications, the Specifications shall govern first, and then the Drawings. Large-scale details shall take precedence over smaller scale Drawings as to shape and details of construction. Specifications shall govern as to materials.

- C. Drawings and Specifications are intended to be fully cooperative and to agree, but should any discrepancy or apparent difference occur between Drawings and Specifications or should error occur in the work of other affecting the work, the Contractors shall notify the Architect at once. If the Contractor proceeds with the work affected without instructions from the A/E, he shall make good any resultant damage or defect. All misunderstandings of Drawings and Specifications shall be clarified by the A/E.

#### 1.11 WORKMANSHIP AND MATERIALS

- A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. The Contractor shall furnish the services of an experienced superintendent who will be constantly in charge of the erection of the work until completed and accepted.
- B. Unless otherwise hereinafter specified, all materials and equipment under this Division of the Specifications shall be new, or best grade and as listed in printed catalogs of the manufacturer. Each article of its kind shall be the standard product of a single manufacturer.
- C. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating.
- D. Reference to standards are intended to be the latest revision of the standard specified.

#### 1.12 MANUFACTURER'S RECOMMENDATIONS

- A. Equipment and materials installed under this Division of the Specifications shall be installed according to manufacturers' recommendations, and installation instructions.

### PART 2 - PRODUCTS

#### 2.01 SUBMITTED DATA AND SHOP DRAWINGS

- A. Submit specified number of copies of drawings (five minimum) with dimensions, capacities, and information as soon as available from manufacturers. Shop drawings will not be reviewed if submittal is incomplete. Refer to list of submittal data required below.
- B. This Contractor shall review all the shop drawings for complete compliance to the drawings and the specifications before submitting the drawings to the A/E. The Contractor's review shall verify the following:
  - 1. All items requiring submittal are included in first submittal.
  - 2. Equipment being submitted was specified.
  - 3. Quantities submitted are correct.
  - 4. Sizes and capacities are as specified.
  - 5. Electrical characteristics have been checked with the Electrical Contractor, or verified at the site.

Any deviations from the Drawings or the Specifications shall be pointed out and provided with an explanation with the submittal.

- C. The Contractor shall stamp the shop drawings with his own review stamp, or submit a separate statement that the enclosed shop drawings have been reviewed in accordance with the specifications. The shop drawings shall not be reviewed without the Contractor's review statement.
- D. Final review of the drawings by the A/E or his representative shall not relieve the Contractor from the responsibility of complying with the requirements of the drawings and specifications.

E. Submittal Data:

1. Submit complete brochures giving names of manufacturers and catalog figure numbers, trade names, technical data, and requested information of each item listed as follows:
  - a. Cleanouts
  - b. Floor Drains
  - c. Plumbing Fixtures
  - d. Backflow Preventer

2.02 MAINTENANCE MANUALS

- A. Maintenance manuals, instructional data, and operating instructions for equipment and materials in this Section shall be assembled by trade and delivered to the following: Three (3) copies to the Owner.

PART 3 - EXECUTION

3.01 OPENINGS, CUTTING, AND REPAIRING

- A. This Contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls, slabs, and footings for all piping and equipment, including sleeves where required.
- B. Any drilling, or cutting, required for the performance of work under this Section shall be the responsibility of this Contractor, and the cost thereof shall be borne by him.
- C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in forms before pouring of concrete. This Contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drill or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.
- D. It shall be the responsibility of this Contractor to ascertain that all chases and openings are properly sized and located.
- E. All exposed, visible pipe wall penetrations shall be provided with pre-manufactured escutcheons as specified.

3.02 CONCRETE WORK

- A. All concrete provided under the work of this Section shall be in accordance with that specified under the "Concrete" section of these specifications.

3.03 CLEANING EQUIPMENT AND MATERIALS

- A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide protection for bearings, open connections, pipe coils, pumps, compressors, and similar equipment.
- B. All fixtures, piping, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.
- C. All piping shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, flush valves, and similar items shall be thoroughly cleaned. Remove and thoroughly clean and install all liquid strainer screens after the system has been in operation ten (10) days.

3.04 CLEANUP

- A. Remove from the premises all unused material and debris resulting from the performance of work under this Section.

3.05 GUARANTEE

- A. All materials and equipment provided and/or installed under this Section of the Specifications shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.
- B. In the event of occupancy by the Owner prior to final acceptance of the project, the guarantee date for equipment placed in operation shall be mutually agreed to by the Contractor and the Owner's representative.

End of Section A15010



## SECTION A15050

### BASIC PLUMBING MATERIALS AND METHODS

#### PART 1 - GENERAL

##### 1.01 RELATED SECTIONS OF THIS DIVISION

A15010 - Basic Plumbing General Requirements

A15250 - Plumbing Systems Insulation

A15400 - Plumbing Systems

##### 1.02 WORK INCLUDED IN THIS SECTION

2.01 Sleeving and Fire Stopping

2.02 Hangers and Inserts

2.03 Safing

2.04 Dissimilar Metals

2.05 Unions

2.06 Cleanouts

2.07 Floor Drains

2.08 Joints

2.09 Escutcheons

2.10 Electric Wiring

3.01 Installation

3.02 Tests

3.03 Disinfection and Flushing

#### PART 2 - PRODUCTS

##### 2.01 SLEEVING AND FIRE STOPPING

A. All penetrations of masonry, fire rated or smoke walls, floors, or roofs shall be done by use of sleeves manufactured for that purpose. Sleeves in concrete, masonry, or pre-cast concrete shall be galvanized steel with 1/4" minimum wall thickness. All other sleeves to be #22 gauge galvanized iron.

B. Installation:

1. Provide clearance of 1/2" around piping or insulation if pipe is insulated.

2. Each sleeve to pass through entire floor, wall, or roof construction (or as detailed) and end to be set flush with surrounding surface in which it is installed except sleeves through floors must project 2" above finished floor.

3. Fire and smoke rated floor and wall penetrations: Fill opening between pipe and sleeve with Nelson CLK (or Tremco or 3M approved equivalent) fire stop material. Fire and smoke rating of sealant shall match rating of wall or floor being penetrated.

##### 2.02 HANGERS AND INSERTS

A. Hangers shall be steel clevis type for steel or cast iron pipe with solid threaded stem support of adequate size. Dipped ring type for uninsulated copper. Where pipes are grouped, install

Strut trapeze with "U" spacers to hold pipe alignment. Adjustable band hangers for use on uninsulated piping.

- B. Where thermal movement in the pipe line will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions.
- C. All anchors, hangers, and supports to be designed to meet local structural requirements and Architect's approval. Perforated iron shall not be used on any part of the plumbing system.
- D. All hangers of one type shall be catalog items of one manufacturer.
- E. No work shall be supported from and structural bridging angles.
- F. Strut supports by B-Line or Unistrut are acceptable.
- G. Joints subject to thrust forces shall be restrained externally to prevent joint separation.
- H. The minimum rod diameter for single rigid rod hangers shall be as follows. Rods may be reduced one size for double rod hangers with 3/8 inch minimum diameter.

<u>Nominal Pipe or Tubing Size (Inch)</u>	<u>Nominal Rod Diameter (Inch)</u>
1/4	3/8
3/8	3/8
1/2	3/8
3/4	3/8
1	3/8
1-1/4	3/8
1-1/2	3/8
2	3/8
2-1/2	1/2
3	1/2
3-1/2	1/2
4	5/8

I. Hangers:

- 1. Hangers for Pipe Sizes 1/2" through 2":

Carbon steel, adjustable swivel ring. B-Line B3170NF, Grinnell 69 or 70.

Carbon steel, adjustable clevis, standard. B-Line B3100, Grinnell 260.

- 2. Multiple or Trapeze Hangers:

Steel channels with welded spacers and hanger rods.

J. Space hangers for pipe as follows:

<u>Pipe Material</u>	<u>Pipe Size</u>	<u>Maximum Horizontal Spacing</u>	<u>Maximum Vertical Spacing</u>
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"
Steel	1/2" through 1-1/4"	7' 0"	15' 0"
Steel	1-1/2" through 6"	10' 0"	15' 0"

2.03 SAFING

- A. All drains over excavated areas shall be safed. Safing shall consist of a four (4) pound, 35" diameter lead disc clamped to flashing flange.

2.04 DISSIMILAR METALS

- A. Manufacturers: Watts Regulator Company, Lochinvar, Wilkins or EPCO Sales, Inc.
- B. Provide dielectric unions, couplings, or flanges with an inert and non-corrosive, thermoplastic lining between copper or brass piping material and steel piping or tanks. Minimum pressure rating of not less than 175 psig at 180°.

#### 2.05 UNIONS

- A. Unions, flanges and gasket materials to have a pressure rating of not less than 150 psig at 180°. Locate at inlet and outlets of all equipment and apparatus.
  - 1. 2" and Smaller Copper: ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.

#### 2.06 CLEANOUTS

- A. Provide cleanouts as manufactured by Sioux Chief, J.R. Smith, Zurn, Josam, or Wade. Install at the base of every soil stack wherever there is a 90 degree change of direction and every fifty feet.

#### 2.07 FLOOR DRAINS

- A. Provide floor drains as manufactured by Sioux Chief, Smith, Zurn, Josam, or Wade, with threaded adjustable strainer and top as noted below.
- B. Installation to be made in accordance with manufacturer's directions, so that drains will serve the purpose intended.
- C. Floor Drains:
  - 1. FD-1: Sioux Chief Series 863-4NR, round polished metal ring and strainer.

#### 2.08 JOINTS

- A. Joints shall be watertight and gas-tight for the pressure required by test or system design, whichever is greater.
- B. Joints shall be made in the following manner:
  - 1. Soil, Waste and Vent Piping:
    - a. No-hub couplings, CISPI 310.
    - b. PVC solvent joints ASTM D2564; ASTM F656
  - 2. Water Piping:
    - a. Copper Water Tube (Above Ground): The joint surfaces shall be cleaned bright, properly fluxed and soldered or sweated with lead free (<.2%) solder, ASTM B32; flux ASTM B813.

#### 2.09 ESCUTCHEONS

- A. Provide on all exposed to view pipe passing through finished floor, walls, and ceilings with outside diameter sufficient to cover sleeved openings and inside diameter to fit snugly around pipe.
- B. All escutcheon plates to be metal, chromium plated brass in toilet rooms.

#### 2.10 ELECTRIC WIRING

- A. All line voltage wiring shall be by Electrical Contractor; Plumbing Contractor shall furnish wiring diagrams to Electrical Contractor for electric equipment furnished.

### PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Exposed and concealed horizontal lines of pipe shall be carried on specified hangers properly spaced to maintain alignment.
- B. Piping shall be concealed except where noted. Where suspended ceiling exists, piping shall be installed in coordination with mechanical ducts and equipment. Install in walls and partitions where practical. Exposed piping shall be installed parallel to or at right angles with building walls, except where otherwise shown on drawings.
- C. Exposed pipe passing through walls, floors, and ceilings shall be fitted with wall plates securely held in position and allowing clearance for expansion. Plates shall be large enough to cover opening around pipe.
- D. Install pipelines true to line and grade.
- E. Plated, polished, or soft metal piping shall not show tool marks or abrasions.
- F. Wherever changes in sizes of piping occur, changes shall be made with reducing fittings. The use of bushings will not be permitted.
- G. Cutting and boring through structural members shall be done only when approved by and under supervision of Architect and/or Structural Engineer.
- H. Offsets in all piping shall be made with fittings. Bending of pipe shall not be permitted.
- I. All hot and cold water piping shall be separated by at least 6".

### 3.02 TESTS

- A. Soil, Waste, and Vent Piping:
  - 1. Roughing-in tests consist of all work between the building drain connections to points above the finished floor and beyond the finished face of construction.
    - a. Water Test: Plug all openings and fill entire system, or sections of system, with water so as to develop no less than a 10 foot head, or 5 psi. The water pressure shall remain constant for not less than 15 minutes.
    - b. Air Test: Plug all openings and pressurize the entire system, or sections of system, to a pressure no less than 10 inches of mercury, or 5 psi, for a period of not less than 15 minutes.
- B. Water Distribution Piping: Test to a pressure of 100 psi in all parts of the system for eight (8) hours. The system shall be leak free.
- C. All tests to be made in the presence, and to the satisfaction, of the representative of the Architect.

### 3.03 DISINFECTION AND FLUSHING

- A. Disinfection of all water pipe shall be the responsibility of the Contractor. All pipe shall be clean at the time of installation which should result in a prompt, safe water sample. Delay in disinfection shall in no way create liability on the part of the Owner. Disinfection and flushing shall be done per state and local codes.

End of Section A15050

SECTION A15250  
PLUMBING SYSTEMS INSULATION

PART 1 - GENERAL

1.01 RELATED SECTIONS OF THIS DIVISION

- A15010 - Basic Plumbing General Requirements
- A15050 - Basic Plumbing Materials and Methods
- A15400 - Plumbing Systems

1.02 WORK INCLUDED IN THIS SECTION

- 1.03 General
- 1.04 Approved Materials
- 1.05 Workmanship
- 2.01 Domestic Hot Water Supply Piping
- 2.02 Domestic Cold Water Piping
- 3.01 Protection and Cleaning
- 3.02 Installation

1.03 GENERAL

- A. Clean all piping, apparatus and equipment to be covered, and insulate carefully without voids or the use of damaged sections. Use full length pieces only.
- B. All insulation thickness shall meet the minimum requirements as specified in state and local codes, unless herein specified to be greater.
- C. Remove insulation if defects develop after insulating. After repair of defects, replace the insulation equal to original without cost to Owner.
- D. All pipe covering, jackets, vapor barriers, adhesives and mastics shall have a flame spread classification of 25 or less, and a smoke developed classification of 50 or less.

1.04 APPROVED MATERIALS

- A. Fiberglas insulation materials and accessories as manufactured by Owens-Corning Fiberglas Corporation, Johns-Manville, Certaineed Saint-Gobain, Armstrong, and Knauf Fiber Glass.

1.05 WORKMANSHIP

- A. After completion of tests and final approval, clean all piping apparatus and equipment to be covered.
- B. Where methods are not specified herein, install insulation in accordance with manufacturer's instructions and methods, using competent, experienced workmen.
- C. Apply pipe covering without voids, without the use of damaged section, or without short pieces where full length would fit.
- D. Apply insulation without sagging. Any damages to the insulation caused by application of insulation shall be repaired without cost to the Owner.
- E. Insulation shall be properly terminated and sealed at ends.

PART 2 – PRODUCTS

## 2.01 DOMESTIC HOT WATER SUPPLY PIPING

- A. Cover piping with molded glass fiber meeting requirements of ASTM C-547, Class 1 with factory ASJ jacket with self sealing lap, with a K factor of 0.24 at 100°F. 1" thick through 4" pipe, 1-1/2" thick 5" and larger pipe. Fasten with galvanized flare type staples on 18" centers.
- B. Terminate covering with plastic material, troweled on a bevel, and finish with 10 x 20 glass mesh at each side of flanges or unions, leaving them uncovered. Finish with Sealfas 30-36.
- C. Insulate fittings and valves with hydraulic setting cement to thickness equal to insulation. Apply 10 x 20 glass mesh, and finish with Sealfas 30-36. Use of Zeston fitting jackets acceptable.

## 2.02 DOMESTIC COLD WATER PIPING

- A. Cover piping with molded glass fiber meeting requirements of ASTM C-547, Class 1, factory ASJ jacket with self-sealing lap, with a K factor of 0.24 at 75°F. 1/2" thick through 1" pipe, 3/4" thick 1-1/4" through 2" pipe, 1" thick for 1-1/2" pipe and larger.
- B. Insulate fittings, valves and flanges with hydraulic setting cement to thickness equal to insulation. Apply 10 x 20 glass mesh and vapor seal with Sealfas 30-36. Use of Zeston fitting jackets acceptable.
- C. Seal open ends of pipe insulation with vapor barrier adhesive at all joints, flanges, valves and fittings.

## PART 3 - EXECUTION

### 3.01 PROTECTION AND CLEANING

- A. Protect mechanical equipment and piping from dropping of material.
- B. Leave area in clean condition.

### 3.02 INSTALLATION

- A. Insulation shall be installed by a trained, certified, experienced, professional insulation installer.

End of Section A15250

SECTION A15400  
PLUMBING SYSTEMS

PART 1 - GENERAL

1.01 RELATED SECTIONS OF THIS DIVISION

- A15010 - Basic Plumbing General Requirements
- A15050 - Basic Plumbing Materials and Methods
- A15250 - Plumbing Systems Insulation

1.02 WORK INCLUDED IN THIS SECTION

- 1.03 Kind and Quality of Materials
  - 2.01 Pipe and Fitting Materials
  - 2.02 Valves
  - 2.03 Plumbing Fixtures
  - 3.01 Valving
  - 3.02 Sanitary Drain and Vent System Installation
  - 3.03 Plenum Spaces
  - 3.04 Water Supply System Installation
  - 3.05 Protection of Finished Work

1.03 KIND AND QUALITY OF MATERIALS

- A. Materials, appliances, and fixtures to be new, of best quality and grade, in strict accordance with specification requirements.

PART 2 - PRODUCTS

2.01 PIPE AND FITTING MATERIALS

- A. Pipe and pipe fittings shall conform to the latest editions of ASTM, AWWA or CISPI specifications as listed in this Specification. Cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Pipe Institute.
- B. Sanitary Drains and Vent:
  - 1. Inside of the Building:
    - a. Above Ground Floor: All drains 1-1/2" and less, type DWV, Type M, ASTM B88 copper tube with cast bronze drainage pattern fittings. 2" and over, no-hub pipe and fitting conforming to CISPI 301 with couplings conforming to CISPI 310 manufactured in USA or PVC, Schedule 40, ASTM D-2665;
- C. Water Pipe and Fittings:
  - 1. Above Ground Floor (Inside): Copper tube type "L" hard drawn temper, with wrought copper sweat fittings WW-T-799.

2.02 VALVES

- A. Domestic water valves for 1/2" to 2" size shall be full port two-piece ball valves with bronze hard chrome plate ball, thread or soldered ends, Milwaukee Model BA-155, Watts Model B-6080, Nibco 585-70.

- B. Reduced Pressure Backflow Preventer RPBP-1: Watts ¾" 909-QT-S.

## 2.03 PLUMBING FIXTURES

- A. General: In every case, fixtures must conform to general requirements given below and to specified requirements for each type. Waste and supplies, unless otherwise specified or required, shall be turned back into walls as high as possible under fixture. Piping shall be free from cross connections and of such design that back siphonage is impossible.
- B. Vitreous Ware: Fabricated of best quality clay and other ingredients complying with Federal Specification WW-P-541b, with wall and floor fixture contact surfaces ground true. Glazing, white, thoroughly fused, free from discoloration, chips or flaws and twice fired.
- C. Enameled Ware: Fabricated of best quality cast iron of necessary thickness to form fixtures of the best grade complying with Federal Specification WW-P-541b.
- D. All fixtures shall be so designed and constructed that all parts are accessible for repairs when fixtures are in place. Manufacturer's trademark or name located so that it will not be noticeable.
- E. Faucets, traps, exposed fittings, and trimming shall be chromium plated over nickel plating, unless otherwise specified.
- F. Fixtures as manufactured by the following list of manufacturers will be acceptable if they are of the same type, quality, and design and are approved by the Architect and Engineer.
  - 1. Plumbing Fixtures:
    - a. American Standard; U.S. Plumbing Products.
    - b. Kohler Co.
  - 2. Faucets:
    - a. Symmons
    - b. Kohler
  - 3. Fixture Seats:
    - a. Kohler Co.
    - b. Bemis Manufacturing Co.
    - c. Forbes-Wright Industries, Inc., Church Products
    - d. Olsonite Corp., Olsonite Seats
  - 4. Drinking Fountains:
    - a. Elkay Manufacturing Co.
    - b. Haws Co.
    - c. Halsey Taylor
    - d. Sunroc
    - e. Oasis
  - 5. Stops, Supplies, Traps:
    - a. McGuire
    - b. Brasscraft
    - c. Keeney Mfg. Co.
    - d. Kohler
    - e. Zurn
  - 6. Sinks:
    - a. Elkay
    - b. Just
    - c. Kohler



- G. Wall supports secured to hollow tile walls with "Ankyra" or toggle bolts, to concrete or masonry with bolts and iron and lead expansion shields; wood plugs are not acceptable. Caulk around all plumbing fixtures.
- H. Submit cuts and descriptions of all fixtures to Architect for approval.
- I. ADA Fixture Installations: All ADA labeled fixture installations shall conform to the requirements of the Americans with Disabilities Act (ADA), State and Local Accessibility Codes, Architectural Details, and the following:
  - 1. Water Closets (Flush Valves): Distance from finish floor to top of seat shall be 17" - 19" - no exceptions. Flush valve handle shall be ADA conforming and shall be located toward the wide side of the stall.
  - 2. Lavatories: Distance from finish floor to rim of fixture shall be 34". Knee space below shall be minimum of 27" at all points 6" from wall and beyond. Fixture front distance from wall shall be minimum 17". Furnish and install trap wrap kit on exposed off-set trap and supplies. Note special rough-in requirements to install off-set trap. Install trap parallel with wall. Install stops and supplies close to wall.
  - 3. Electric Water Coolers and Drinking Fountains: Install fixture so that the orifice is located maximum 36" above finish floor and knee space below unit is minimum of 27" clear. Consult manufacturers recommendations for additional rough-in requirements.
- J. Fixtures:

Water Closet WC-1 (ADA Compliant):

*Fixture:* Kohler Kingston K-4330

*Style:* Wall Hung Flush Valve

*Seat:* Bemis 1655.SSC, self-sustaining, check hinge.

*Gallons Per Flush:* 1.6

*Color:* White

*Flush Valve:* Sloan Royal 111

Lavatory L-1 (ADA Compliant):

*Fixture:* Kohler Kingston Model K-2005

*Color:* White

*Faucet Hole Centers:* 4"

*Faucet:* Kohler Coralais Model K-15598

*Stop and Supplies:* McGuire, chrome, loose key, angle valve and chrome tube supply.

*Drain:* Cast brass chrome plated grid drain with ADA offset drain and cast brass chrome plated P-trap, McGuire or equal.

Electric Water Cooler EWC-1 (ADA Compliant) (Hi-Low):

*Fixture:* Elkay model LZSTL-8-C

*Water Filter System:* Culligan undersink drinking water filter system US600 with filter no. D30.

*Trap:* McGuire cast brass, chrome plated

*Stop and Supply:* ball valve stop & copper tube supply.

Shower SH-1 (ADA Compliant):

*Shower Valve Assembly:* Symmons Temptrol 96-500-B30-L-V.

*Shower Stall:* Built by General Contractor.

Sink S-1 (ADA Compliant):

*Fixture:* Elkay LRAD-2219

*Material:* Stainless Steel

*Number of Compartments:* 1

*Sink Compartment Depth:* 6 inches

*Number of Faucet Holes:* 4

*Faucet:* Kohler Triton K-7761-K-CP/K-16012-4-CP.

*Trap:* Cast brass, chrome plated P-trap

*Stops and Supplies:* McGuire chrome angle stop and tube supplies.

*Disposer:* Insinkerator Badger I with cord and plug.

### PART 3 - EXECUTION

#### 3.01 VALVING

- A. Fixtures: Each individual fixture or piece of equipment shall have an independent shut-off valve adjacent to fixture in addition to the required branch shut-off valve. Where supplies are installed in walls, shut-off valves shall be concealed and an access panel shall be provided.
- B. Branches: Valve shut-off full size of branch for each branch takeoff to supply stack or fixture group.
- C. Drains: Provide valved drains at low points of systems as required or directed. All piping shall be arranged to be drained through valved drains.

#### 3.02 SANITARY DRAIN AND VENT SYSTEM INSTALLATION

- A. Drains: Extend drain pipe to all points according to pitch and elevation shown. Provide traps, heads, and all other fittings as required. Make changes in directions of pipe with Y's and 1/8 and 1/16 bends.
- B. Soil, Waste, and Vent: Install all soil, waste, and vent stacks as shown on the drawings. Support substantially in place with approved pipe clamps and supports, along with necessary supports for horizontal branches. Provide, where necessary, the adapter type fitting for connection between steel waste and cast iron soil pipe.
- C. Traps:
  - 1. Above Ground Floors: Provide for fixtures for all purposes where traps are required, unless otherwise so specified, cast brass fittings and pipe or approved cast brass traps with threaded cleanout screw.
- D. Vent Pipe: Shall be of diameter shown or required by Plumbing Code.

#### 3.03 PLENUM SPACES

- A. Plastic piping shall not be installed in air plenum spaces.

#### 3.04 WATER SUPPLY SYSTEM INSTALLATION

- A. Installation of Piping:
  - 1. All pipes and tubes shall be installed to permit expansion and contraction and without strain on jointing.
  - 2. Pipes shall be adequately supported at intervals and shall be installed straight and plumb without sags, kinks, or reduced deformed bends.

3. Make test of all water piping before building is plastered and allow to stand overnight. Inspect along all lines for leaks and dripping and tighten up immediately or replace as required.
4. Piping shall not be installed in exterior walls. All piping shall be rigidly supported.

3.05 PROTECTION OF FINISHED WORK

- A. Repair, replace, and pay for breakage of glass, patching, and repairing of all damage to finished work caused by this section of the work.

End of Section A15400

## SECTION B15010

### BASIC HVAC GENERAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Applicable requirements of instruction to bidders, conditions of contract, and of Sections listed under related Sections of this Division apply to all work specified in this Division B15000.

##### 1.02 RELATED SECTIONS OF THIS DIVISION

B15010-Basic HVAC General Requirement  
B15050-Basic HVAC Materials and Methods  
B15250-HVAC Systems Insulation  
B15500-HVAC Basic Piping Requirements  
B15750-Mechanical Heat Transfer Equipment  
B15850-Air Handling  
B15880-Air Distribution  
B15950-Automatic Temperature Control Work  
B15990-Testing, Adjusting, and Balancing

##### 1.03 RELATED WORK OF OTHER SECTIONS OR DIVISIONS

1010 - Summary of Work  
1020 - Allowances  
1045 - Cutting and Patching  
1100 - Alternative Bids  
1300 - Submittals  
1500 - Temporary Facilities and Control  
1522 - Temporary Enclosure  
1700 - Contract Close-out  
1710 - Cleaning  
9900 - Painting  
A15000 - Plumbing  
B15990 - Testing, Adjusting, and Balancing  
16000 - Electrical

*Testing, Adjusting and Balancing may be: (1) a separate division to be bid separately or (2) purchased directly by the Owner, and assigned to this Contract, or (3) purchased privately by the Owner.*

##### 1.04 WORK INCLUDED IN THIS SECTION

3.01 Codes and Permits  
3.02 Interpretation of Specifications, Drawings, and Associated Work  
3.03 Visiting the Premises  
3.04 Shop Drawings  
3.05 Dimensions and Locations  
3.06 Coordination and Cooperation  
3.07 Substitution of Equipment and Materials  
3.08 Record Drawings

- 3.09 Asbestos and Hazardous Waste Handling
- 3.10 Manual and Instructions
- 3.11 Warranties
- 3.12 Alternative Bids

1.05 GENERAL SCOPE

Provide a complete heating and air conditioning system in the building in accordance with the Bid Documents. Provide competent superintendent, or foreman, at the job site.

1.06 DESIGN CONDITIONS

A. Outside Conditions:

- 1. Winter: -15°F
- 2. Summer: 89°F, D.B.; 75°F, W.B.

B. Inside Conditions:

- 1. Winter: Minimum temperatures are all in accordance with requirements of Chapter ILHR 64, Wisconsin Administrative Code.
- 2. Summer: 75°F to 78°F, 50% Relative Humidity

C. Steam Pressure:

- 1. Low Pressure: 15 psi.

D. Water Temperatures:

- 1. Hot water supply shall be a maximum of 210°F at -15°F outside.
- 2. Chilled water supply shall be 45°F.
- 3. Cooling tower water supply shall be 85°F.

**PART 2 - PRODUCTS**

None

**PART 3 - EXECUTION**

3.01 CODES AND PERMITS

Comply with codes, laws, and ordinances in force at the building. Secure and pay for permits and inspection fees required for fulfilling requirements of these specifications.

3.02 INTERPRETATION OF SPECIFICATIONS, DRAWINGS, AND ASSOCIATED WORK

- A. This Contractor shall read the entire specification including Instruction to Bidder, General Conditions and Special Conditions, and Division 1, all of which are applicable to this work and shall thoroughly examine all the project plans as he will be required to do all of the work

belonging to this branch of work whether or not specifically mentioned herein, or indicated or shown on the Heating, Ventilating, and Air Conditioning plans.

- B. Successful bidder will not be allowed any extra compensation by reason of any matter or thing concerning which such bidder might have informed himself prior to the bid opening. It shall be understood that the act of submitting a bid by the Contractor carries with it the agreement to all items and conditions referred or indicated or implied on the drawings and the specifications and no consideration will be granted for any alleged misunderstanding of materials to be furnished or work to be done.
- C. Any conflict between the contract drawings and specifications or the Architectural, Plumbing, and Electrical Drawings and the Mechanical Drawings, or between the Architectural, Plumbing, and Electrical Specifications and the Mechanical Specifications shall be deemed to have been estimated the more expensive way of doing the work, unless the Contractor asks and receives a decision in writing as to which shall govern, prior to submitting his bid.
- D. The drawings indicate the general arrangement and approximate location of piping, ductwork, equipment, etc. Extreme accuracy is not guaranteed and field verification and coordination of all locations and dimensions of new and existing conditions and work is directed. When removing equipment, piping, ductwork, etc., contractor shall remove all supports and hangers associated with same.
- E. Do not scale from the drawings, if lengths are scaled for bidding the Contractor assumes the risks of accuracy.
- F. It shall be the Contractor's responsibility to notify other contractors to arrange clearances and access openings for all large equipment and to advise affected Contractors associated with this project of areas requiring coordination before any roughing-in is done, so associated work can be installed without interfering with installation of HVAC work.

### 3.03 VISITING THE PREMISES

- A. The Contractor, before submitting his bid on the work, must visit the project site and familiarize himself with all visible existing conditions.
- B. As a result of having visited the premises, the Contractor shall be responsible for the installation of the work as it relates to such visible existing conditions.
- C. The submission of a bid will be considered an acknowledgment on the part of the bidder of his visitation to the site.
- D. This Contractor shall arrange and provide all necessary equipment required to rig, lift, or move equipment into final location.

### 3.04 SHOP DRAWINGS

- A. Submit specified number of copies of drawings (five minimum) with dimensions, capacities, and information as soon as available from manufacturers.
- B. This Contractor shall review all the shop drawings for complete compliance to the Bid Documents before submitting the drawings to the A/E. The Contractor's review shall verify the following:

1. Equipment being submitted was specified.
2. Quantities submitted are correct.
3. Physical sizes, unit access, service clearances, and capacities are as specified.
4. Electrical characteristics have been checked with the Electrical Contractor, or verified at the site.
5. Equipment to be shipped assembled or as required to fit into final location.

Any deviations from the drawings, or the specification, shall be pointed out and provided with an explanation with the submittal.

- C. The Contractor shall stamp the shop drawings with his own Review for Approval stamp, or submit a separate statement indicating that the enclosed shop drawings have been reviewed in accordance with the specifications. The shop drawings shall not be reviewed without the Contractor's review statement.
- D. Final review of the drawings by the A/E or his representative shall not relieve the Contractor from the responsibility of complying with the requirements of the drawings and specifications.

### 3.05 DIMENSIONS AND LOCATIONS

- A. Verify measurements at the building, check levels, and grades, and be responsible for grading, fitting, joining, or adjusting of work to adjoining work by other Contractors.
- B. Where work on existing systems is required, this Contractor shall verify all equipment locations and sizes before ordering any new materials.
- C. Before the work is installed, the A/E reserves the right to slightly change location of piping, radiation, ducts, equipment, etc., without additional pay to Contractor.
- D. The drawings indicate the general arrangement and approximate location of piping, ductwork, equipment, etc. Extreme accuracy is not guaranteed and field verification and coordination of all locations and dimensions of new and existing conditions of work is the responsibility of this Contractor.

### 3.06 COORDINATION AND COOPERATION

- A. Coordinate this work with other Contractors, because no Contractor has exclusive right-of-way in installing his work.
- B. Make arrangements with other Contractors for framing, openings, spacing, chases, pipe runs, duct locations, ceiling heights, etc.

### 3.07 SUBSTITUTION OF EQUIPMENT AND MATERIALS

The design of the HVAC systems are based upon the manufacturer listed in the schedules. Where any other equipment either listed in the specification or substituted, is used, this Contractor will be responsible for any changes required to the system or to the building due to physical limitations of the equipment, and he shall pay for all structural, mechanical, and electrical changes required by the equipment. This Contractor shall inform the Owner, A/E and all Contractors, in

writing within five (5) days of award of contract, of any changes before they begin their respective work. No equipment shall be ordered prior to final review of shop drawings from the A/E. This Contractor shall bear all financial costs for rejected equipment ordered prior to final review of shop drawings from the A/E.

### 3.08 RECORD DRAWINGS

Record drawings shall be kept daily, noting all changes, and available upon demand. No progress payments will be approved unless record drawings are shown to be up-to-date.

### 3.09 ASBESTOS AND HAZARDOUS WASTE HANDLING

- A. In the event that this Contractor finds that this work requires the demolition, removal, or disposal of any asbestos or other hazardous waste, he shall halt work in the affected areas and inform the Owner of all conditions.
- B. The Owner shall test for asbestos and shall remove all hazardous wastes as defined by the Environmental Protection Agency.
- C. The Owner shall inform the Contractor when he may proceed with the work.

### 3.10 MANUAL AND INSTRUCTIONS

- A. Submit rough drafts of maintenance manual presenting valve charts and full details of construction, parts list, capacities, care, normal servicing and lubrication intervals, wiring diagrams, maintenance, and operation of mechanical equipment as shown on bid documents, scheduled, specified, and furnished under this Contract to A/E. Upon approval, furnish three (3) corrected copies bound in hard cover, three-ring binder with index and tabs indicating separations between equipment.
- B. Contractor shall instruct Owner's maintenance personnel in operations, lubrication points, and maintenance locations of equipment furnished under this Contract.
- C. All manufacturer's warranties shall be included in the manual. All extended warranties shall be included with their expiration date.

### 3.11 WARRANTIES

- A. This Contractor shall warrant all work, materials, and apparatus installed under this Contract, for one (1) year from the completion and acceptance of the entire system, and must keep same in repair for said period unless such defects are clearly the result of bad management after apparatus is out of his control.
- B. The one (1) year warranty period for equipment and materials shall begin after the entire system has been completed and accepted. It shall not start from the date of delivery, installation, or date of usage of equipment as required under "Temporary Heating". If any portion of the system is accepted by the Owner for his use prior to total completion, then the warranty period for only that portion will begin.

### 3.12 ALTERNATIVE BIDS - None

END OF SECTION



## **SECTION B15050**

### **BASIC HVAC MATERIALS AND METHODS**

#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION**

Applicable basic requirements of all HVAC work and methods described in this Section apply to all Sections listed in this Division B15000.

##### **1.02 RELATED WORK**

B15010 - Basic HVAC General Requirements

##### **1.03 WORK INCLUDED IN THIS SECTION**

- 3.01 Sleeves, Openings, Cutting, Patching, and Drilling
- 3.02 Suspended Ceiling Removal
- 3.03 Curbs and Bases
- 3.04 Painting and Finishes
- 3.05 Plumbing
- 3.06 Electrical
- 3.07 Lubrication
- 3.08 Identification
- 3.09 Architectural Access Panels
- 3.10 Vibration and Noise Control
- 3.11 Temporary Heating
- 3.12 Tests
- 3.13 Explosion Resistant Locations
- 3.14 Codes and Standards

#### **PART 2 - PRODUCTS**

None

#### **PART 3 - EXECUTION**

##### **3.01 SLEEVES, OPENINGS, CUTTING, PATCHING, AND DRILLING**

###### **A. General:**

- 1. This Contractor shall provide and patch all duct and pipe openings in the existing building unless this work is specifically mentioned to be done by another Contractor. This Contractor shall provide required lintels.
- 2. This Contractor shall provide all openings for piping in new construction.
- 3. General Contractor will provide and patch all duct openings required in new construction. This Contractor will inform the General Contractor of all duct opening sizes and locations in walls, ceilings, roof, and partitions. Make arrangements with various other Contractors for all special sleeves, framing, spacing, and chases.

4. This Contractor shall cut duct openings, if sizes and locations were not provided to the General Contractor within 48 hours after request for this information, and if construction proceeds without openings. Obtain A/E approval before cutting or drilling any steel, concrete, or masonry, and repair any damage to his satisfaction. No chopping or breaking out is permitted. This Contractor shall pay for repair of any unnecessary damage.
5. This Contractor shall patch all openings remaining after ducts and pipes have been removed under demolition work. Finished conditions shall be not less than existing conditions.
6. Roof patching shall be done by a qualified Roofing Contractor.

B. Penetrations:

1. Wherever pipes or ducts penetrate smoke partitions or fire rated floors or walls, fill opening around pipes or ducts with U.S.G. Thermofiber Felt and Firecode Gypsum Cement, Dow Corning Fire Stop Sealant, or equivalent material, equal to the rating of the assembly penetrated.
2. On all ducts passing through walls, floor, and ceilings exposed to occupied spaces provide painted galvanized steel metal escutcheons or angles with mitered corners on both sides of wall having outside dimensions to cover wall opening and inside dimensions to fit duct. Securely fasten in place to floor, walls, and ceilings.
3. Wherever ducts pass through roofs from packaged rooftop units or other roof openings, the annular roof openings should be packed with glass fiber and sealed on both sides with a nonhardening material such as "Tremco" acoustical sealant. The annular roof openings shall be cleanly cut and not over 3/8" oversize.
4. Furnish each duct opening in walls, floors, and ceilings having outside dimension 1" larger than outside dimension of uninsulated ductwork, unless the wall or floor is a fire wall, in which case, only the duct shall penetrate.
5. Provide steel pipe sleeves and caulking as indicated in Section B15500.
6. Provide 2" high angle iron frames around each duct opening through floors of equipment rooms located above the basement floor, and caulk so no water leakage can occur between frames and floor.

3.02 SUSPENDED CEILING REMOVAL

This Contractor to remove all suspended ceilings required to complete work as shown on Bid Documents in existing buildings, store in area as directed by Owner, and reinstall unless this work is specifically mentioned to be done by another Contractor. Any damaged ceiling tiles or supports shall be replaced by this Contractor to exactly match the existing.

3.03 CURBS AND BASES

- A. Provide concrete bases, footings, piers, platforms, curbs, pipe frames, steel grillage, etc., for all equipment as shown, or as required, unless otherwise noted on the Bid Documents. Be responsible for location, size, and any changes required by substitution of equipment.
- B. Concrete pump bases, set directly on existing structural slabs, shall be doweled and bonded with Weld-Crete directly to the slab.

#### 3.04 PAINTING AND FINISHES

- A. Painting will generally be done by others. Check painting specification.
- B. The following shall be painted by this Contractor of colors selected:
  - 1. Outdoor exposed piping.
  - 2. Indoor piping exposed to occupied areas.
  - 3. Uninsulated and exposed hangers in mechanical equipment rooms to match existing.
  - 4. Insulated piping and hangers exposed in mechanical equipment rooms to match existing.
  - 5. Structural iron provided by this Contractor. Prime plus two (2) coats.
  - 6. Steel stairways, railings, and floor grates provided by this Contractor. Prime plus two (2) coats.
  - 7. Wood surfaces provided by this Contractor to be primed and covered with two (2) finish coats.
  - 8. Any equipment which was not furnished with a factory finish. Prime plus two (2) coats.
  - 9. Any damaged or rusted surfaces where an existing finish has been destroyed.
- C. All surfaces shall be clean before painting. They shall be wire brushed free of rust and scale and then primed. All metal surfaces shall be adequately covered with two applications of rust inhibiting, zinc rich coating, of colors selected.

#### 3.05 PLUMBING

- A. The Heating Contractor shall locate final drain and cold water supply requirements for the Plumbing Contractor.
- B. The Plumbing Contractor shall provide the following:
  - 1. Floor drains.
  - 2. Hub drains.
  - 3. Site drains.
  - 4. Cold water supply terminated near requirements.

C. The Heating Contractor shall provide the following:

1. Drain piping to drains. Install all cooling coil drain pans at sufficient height to properly drain through water traps.
2. Final cold water supply connections.

3.06 ELECTRICAL

- A. All polyphase AC motors from 1 to 125 horsepower shall be manufactured and tested in accordance with NEMA MG1-12.53a standards for high efficiency motors. All motors shall meet as a minimum appropriate local utility rebate program guidelines. Provide motors with current characteristics verified by the Electrical Contractor. Notify the A/E of any discrepancies before ordering motors and controls.
- B. Provide starters and disconnects as described or shown on drawings and motor starter schedule. Starters shall be Square D. Starters and push button stations shall be furnished by only one of the above manufacturers. Equipment manufacturers and subcontractors shall verify the particular brand with the Prime Contractor. All integral disconnect switches shall be fused type, and shall contain auxiliary contacts to disconnect control circuits entering the starters. Starters for 208 volts, and above, shall have 115 volt control circuits and transformer. Three phase starters shall be provided with three overloads. All pilot lights shall be "Push to Test" type. Coordinate starter types, required relays, and interlocks with control specifications.
- C. This Contractor shall label all starters and disconnects indicating each piece of equipment being served.
- D. All disconnect switches furnished with the unit as factory furnished, or factory installed, shall be furnished with fuse clips.
- E. This Contractor shall consult the Electrical Contractor for the proper sized fuses to be provided for all disconnects and starters by this Contract.
- F. This Contractor shall turn over all individually mounted disconnects and starters furnished under this Contract to the Electrical Contractor for installation by him.
- G. The following line voltage wiring shall be done by the Electrical Contractor:
  1. To all individually mounted starters.
  2. To HVAC factory mounted control panels.
  3. To HVAC factory mounted disconnect switches.
  4. To motor control centers.
  5. From starters to motors.
  6. To electric heating equipment.

- H. The following equipment requiring line, or low-voltage, wiring shall be done by the Heating Contractor:
  - 1. All packaged electronic variable air volume control system wiring. Including wiring to interface with existing automatic hot water zone valves in hot water radiation and all wiring to unit control panel near unit.
- I. The following equipment requiring line, or low voltage, wiring shall be done by the Controls Contractor:
  - 1. DDC Electric thermostats.
  - 2. Pressure electric switches.
  - 3. Zone switches.
  - 4. Starter interlocks.
  - 5. Smoke dampers.
  - 6. Power source sufficient for all electric/electronic or electric control and wiring to all controls. Coordinate with Electrical Consultant and Contractor.
  - 7. Automatic dampers.
- J. All wiring shall be installed in conduit in accordance with Electrical Specifications or Codes governing wiring in plenum ceilings. Concealed low voltage wiring shall also be installed in conduit if required by the Electrical Specifications or Codes. No exposed wiring shall be installed in finished areas. Exposed wiring shall be installed in wire mold or conduit in unfinished areas in inconspicuous manner. Install all wiring and wiring devices neatly parallel or perpendicular to building lines.
- K. Furnish wiring diagrams to Electrical Contractor for all electrical equipment furnished under this Contract. Each diagram must be in accordance with actual installations. Furnish complete sets of wiring diagrams for Owner's bound maintenance manual as described under "Manual and Instructions".
- L. Any changes in this Contract, after the bid opening, to the number and size of motors and starters due to substitution of equipment will become this Contractor's responsibility to inform and coordinate these changes with all affected Contractors.
- M. See Section B15050: Codes and Standards.
- N. Variable Speed Controllers.
- O. Motor Control Center.

### 3.07 LUBRICATION

- A. All equipment must be checked and lubricated in accordance with manufacturer's instructions, before equipment is turned over to the Owner.

- B. Lubrication points that are hard to get at shall have extended fittings to point of easy access; and shall be clearly marked.

### 3.08 IDENTIFICATION

- A. Piping shall be identified with clean-cut stenciled letters at least 1" high that shall indicate content of pipe. Apply arrow marker stencils, similar to labels, with arrows pointing in direction of flow. Provide stencils at every point of pipe entry or exit through wall, at 50' intervals on straight run of pipe and at each main riser.
- B. Equipment: Provide laminated plastic plates with black face and white center of minimum size 3-1/2" x 1-1/2" x 1/8" nominal thickness, engraved with 1/4" high lettering. Use 1" lettering for major equipment. Fasten nameplates securely with stainless steel fasteners in conspicuous place. Where name- plates can not be mounted on cool surface, provide stainless steel standoffs. Identify equipment type and number (e.g. Pump No. 2) and service for areas or zones of building served e.g. south zone chilled water primary. All starters shall be similarly identified.
- C. All major equipment identification shall also include the date of start-up.
- D. Valve Tags: Provide Seton Name Plate Company, Style No. 2961 plastic color coded valve tags in accordance with ASA with the abbreviation "Heating" or "Cooling" above the numbers for all valves in this contract. Provide printed valve identification charts showing number, manufacturer, size, type, location, normal position (open or closed), and purpose of each valve including equipment it serves. Furnish three (3) copies of valve charts to the Owner, enclosed in a rigid vinyl covered three-ring binder. All charts must be typewritten. Fasten valve tags to valve handles with 4-1/2", size #16, Seton brass chains.
- E. Ducts: Stencil all ducts at air handling units in accordance with areas served. Letters shall be at least 1" high and in conspicuous locations.
- F. All insulation shall be identified as "ASBESTOS FREE" with direction arrows and termination reference points.

### 3.09 ARCHITECTURAL ACCESS PANELS

- A. Furnish 24" by 24" (larger where required) Milcor Type "K", or Cesco, steel access panels for installation in plaster or dry walls and ceilings.
- B. Furnish 24" by 24" (larger where required) Milcor Type "M", or Cesco, steel access panels for installation in masonry, brick, stone, tile, and wallboard walls and ceiling.
- C. Locate access panels at all concealed devices requiring accessibility for operation or maintenance. Notify Plastering, Drywall and Acoustical Tile Contractor of proper locations for access panels. Mark the location of all dampers located above acoustical tile ceilings as inconspicuous as possible.
- D. Provide fire rated access panels in all masonry shafts or ductwork requiring fire rated enclosures.
- E. Furnish access panels to proper Contractors for their accurate installation.

### 3.10 VIBRATION AND NOISE CONTROL

- A. The prime Contractor of this Contract shall provide Peabody Kinetics, Korfund, or Mason Industries vibration isolators and bases for all equipment furnished under this contract with minimum isolation as required for the installation.
- B. Floor Mounted Equipment: All floor-mounted centrifugal fans, pumps, air handling units, reciprocating equipment, etc., shall be mounted on bases and isolators as indicated on the drawings.
- C. Suspended Equipment: All suspended equipment shall be suspended from isolators as indicated on the drawings.
- D. Fan and Motor Bases: All steel bases shall be rectangular in shape, consisting of wide flange steel frames, with the motor located within the rectangular shape. All bases shall incorporate height saving devices.
- E. Pipe Hangers: See Pipe, Hangers, and Supports in Section B15500.
- F. Springs: All springs shall employ unhoused, stable, free-standing springs with a horizontal to vertical spring stiffness ratio of approximately one. Snubbers to limit extreme horizontal deflections during starts and stops shall be used. All spring mounts shall be provided with ribbed or waffled neoprene pads at least 1/4" thick to prevent transmission of high frequency vibrations to the building. Pads shall be loaded approximately 50 psi, and if bolts are necessary, they shall be isolated from mounts by soft neoprene sleeves at least 1/8" thick.
- G. Penetration: Wherever ducts and pipes pass through critical sound partition walls and floors, the annular openings should be packed with glass fiber and sealed on both sides with a non-hardening material such as "Tremco" acoustical sealant. The annular openings shall be cleanly cut and not over 3/8" wide.
- H. General Vibration Isolation Details:
  - 1. No rigid connections shall be made between spring mounted equipment and the structure.
  - 2. All fans shall be connected to ducts with flexible sleeves at least 6" wide and very slack.
  - 3. Piping connections to spring-mounted equipment shall be installed with spring type hangers at least three pipe hangers away from the unit.
  - 4. Electrical connections to equipment must be flexible and as slack as possible.

### 3.11 TEMPORARY HEATING

- A. Additional provisions for temporary heating are specified in Division 1.
- B. Central fan system shall not be used until the systems have been modified for temporary heating and until permission is granted by the A/E.
- C. This Contractor shall install all temporary located filters. Provide large return air openings in each return plenum with all supports and bracing as required to maintain these openings.

Temporary air filter racks and 2" throwaway filters shall be installed in the openings and maintained by this Contractor, replacing dirty air filters with clean air filters as required during temporary heating period.

- D. The supply fans shall operate while the return air fan shall not operate. The existing return ducts shall be blocked off so that all return air must pass through the temporary air filters. The return air from all rooms, and floors, shall flow to the central fan systems using open walls, doorways, stair wells, elevator shafts, and duct shafts. This Contractor shall inform the General Contractor of opening sizes required, and shall maintain all sizes to accomplish this circulation. All doors shall not be installed until after the temporary heating period.
- E. This Contractor shall, at the end of temporary heating requirement, remove all temporary air filters, close up the temporary return air openings, open up all return air ducts and install all permanently located air filters.

### 3.12 TESTS

- A. Make all tests and trials of the system. Fill and vent all water systems. Prepare systems for testing and assist the Testing Agency. See Section B15990: Testing, Adjusting, and Balancing.
- B. Pressure Test: Apply a hydrostatic test to each steam or water system. Provide pressure at least 125 pounds per square inch, or 20% above working pressure, whichever is greater, and maintain this pressure for four (4) hours.

### 3.13 CODES AND STANDARDS

Each factory fabricated product listed in this specification shall be built, rated, and tested in conformance with applicable Codes and Standards as published in Chapter 48 of the ASHRAE 2000 HANDBOOK: HVAC SYSTEMS AND EQUIPMENT.

END OF SECTION



## SECTION B15250

### HVAC SYSTEMS INSULATION

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Provide all HVAC insulation for piping, tanks, breeching, stacks, chillers, ductwork, plenums, and any additional equipment as indicated on the BID DOCUMENTS.

##### 1.02 RELATED WORK

B15010 - Basic HVAC General Requirements

B15050 - Basic HVAC Materials and Methods

##### 1.03 INSULATION WORK INCLUDED IN THIS SECTION

- 2.01 Hot Water Piping
- 2.02 Low Pressure Steam Piping
- 2.03 High Pressure Steam Piping
- 2.04 Condensate Piping
- 2.05 Convertors, Airtrol Tanks, and Flash Tanks
- 2.06 Cold Water Lines
- 2.07 Chilled Water Piping
- 2.08 Thermal Insulation (Rigid)
- 2.09 Thermal Insulation (Flexible)
- 2.10 Acoustical Insulation

##### 3.01 General Insulation Applications

##### 1.04 GENERAL SCOPE

- A. All insulation thickness shall meet **the minimum requirements as specified in Chapter ILHR 63, Wisconsin Administrative Code**, unless herein specified to be greater.
- B. All pipe covering, jackets, duct insulation, vapor barriers, adhesives, and mastics located in **sheet metal or ceiling air transfer plenums** shall have a flame spread classification of 25 or less, and a smoke developed classification of 50 or less. All pipe covering, jackets, etc., located in all other areas of the building shall have a flame spread classification of 25 or less, and a smoke developed classification of 150 or less.
- C. See Section B15050: Codes and Standards.

#### PART 2 - PRODUCTS

##### 2.01 HOT WATER PIPING

- A. Cover piping with molded glass fiber (4 lb. density) with K-factor of 0.24 at 75°F. or molded urethane (3 lb. density) with factory applied white fire retardant jacket with self-sealing lap. Fasten with galvanized flare-type staples on 4" centers.

- B. Insulate fittings with premolded fittings and valves with oversized insulation on pipes through 2". Apply 10 x 20 glass mesh and finish with Sealfas 30-36.
- C. Insulate fittings, valves, and flanges on pipes 2-1/2" and up with molded fittings, or mitered segments of insulation covered with 1/4" coat of hard setting cement. Apply 10 x 20 glass mesh and finish with coat of Sealfas 30-36.

#### 2.02 LOW PRESSURE STEAM PIPING

- A. Cover piping (15 psig, 250°F. maximum) with molded glass fiber (4 lb. density) with K-factor of 0.24 at 75°F. or molded urethane (3 lb. density) with factory applied white fire retardant jacket with self-sealing lap. Fasten with galvanized flare-type staples on 4" centers.
- B. Insulate fittings with premolded fittings and valves with oversized insulation on pipes through 2". Apply 10 x 20 glass mesh and finish with Sealfas 30-36.
- C. Insulate fittings, valves, and flanges on pipes 2-1/2" and up with molded fittings, or mitered segments of insulation covered with 1/4" coat of hard setting cement. Apply 10 x 20 glass mesh and finish with coat of Sealfas 30-36.
- D. NOT COVERED: Bleeders, drip piping, strainer bracket covers.

#### 2.03 CONDENSATE PIPING

- A. Cover piping with molded glass fiber (4 lb. density) with K factor of 0.24 at 75°F., or molded urethane (3 lb. density) with factory applied white fire retardant jacket with self-sealing lap. Fasten with galvanized flare-type staples on 4" centers.
- B. Terminate covering with plastic material, troweled on a bevel, and finish with 10 x 20 glass mesh at each side of flanges, valves, or unions, leaving them uncovered. Finish with Sealfas 30-36.
- C. Insulate fittings with premolded fittings. Apply 10 x 20 glass mesh and finish with Sealfas 30-36.

#### 2.04 CONVERTORS, AIRTROL TANK, AND FLASH TANKS

- A. Cover equipment with 2" semi-rigid glass fiberboard with 6 lbs. density and a K factor of 0.24 at 75°F. Wire in place and apply a 1/4" layer of finishing cement over wire mesh. Apply a heavy brush coat of Sealfas 30-36, imbed 10 x 20 glass mesh and apply a finish layer of Sealfas 30-36.

#### 2.05 COLD WATER LINES

- A. Cover piping with molded glass fiber (4 lb. density) or molded urethane (3 lb. density) with factory applied white fire retardant vapor barrier jacket with self-sealing lap. Apply 4" vapor barrier strips at all punctures with vapor-proof adhesive.
- B. Insulate all fittings, flanges, and valves on pipe up to 1-1/2" with fiberglass wrapping, finish with hydraulic setting cement, apply 10 x 20 glass mesh and vapor seal with Sealfas 30-35.
- C. Insulate all fittings, flanges, and valves on pipe 2" and up with molded fittings or with mitered segments of insulations, finished with Sealfas 30-35.

- D. Seal ends of pipe insulation with vapor barrier adhesive at all flanges, valves, and fittings, and at intervals of not more than 20' on continuous runs of pipe.

#### 2.06 CHILLED WATER PIPING

- A. Cover piping with molded glass fiber (4 lb. density) or molded urethane (3 lb. density) with factory applied white fire retardant vapor barrier jacket with self-sealing lap. Apply 4" vapor barrier strips at all punctures with vapor-proof adhesive.
- B. Insulate all fittings, flanges, and valves on pipe up to 1-1/2" with fiberglass wrapping, finish with hydraulic setting cement, apply 10 x 20 glass mesh and vapor seal with Sealfas 30-35.
- C. Insulate all fittings, flanges, and valves on pipe 2" and up with molded fittings or with mitered segments of insulation, finished with Sealfas 30-35.
- D. Seal ends of pipe insulation with vapor barrier adhesive at all flanges, valves, and fittings, and at intervals of not more than 20' on continuous runs of pipe.

#### 2.07 THERMAL INSULATION (RIGID)

- A. Insulation shall be minimum 4 lb. density with a compressive strength of 200 psf at 10% deformation, K factor of 0.24 at 75°F. and factory applied .0025" thick aluminum facing.
- B. Apply 2" thick to blanked-off louvers, vent ducts from automatic damper to relief hood, combustion air ducts from intake to automatic damper, exhaust ducts from automatic dampers to discharge louvers, or roof hoods, outside air ducts, ductwork located outdoors, and to mixed outside and return air ducts.
- C. Apply 1-1/2" thick to exposed air conditioned supply air ducts. Apply greater thickness as required to be flush with standing seams.
- D. Apply 1/2" thick on all hot water coil casing at each VAV device that has a hot water coil as part of VAV device.
- E. Fasten insulation with mechanical fasteners on 18" centers with a minimum of two rows of fasteners on all sides of ducts. Seal all joints and punctures with vapor barrier mastic. Imbed 4" wide 10 x 20 glass mesh at all joints to reinforce mastic.
- F. On all exposed ductwork apply brush coat of Sealfas 30-35, imbed 10 x 20 glass mesh while still wet, smooth out wrinkles and apply final brush coat.

#### 2.08 THERMAL INSULATION (FLEXIBLE)

- A. Insulation shall be 1 lb. density with a K factor of 0.29 at 75°F and a factory applied reinforced foil vapor barrier jacket.
- B. Apply 1-1/2" thick to concealed supply ductwork.
- C. Adhere insulation to duct surfaces with 50% mastic coverage. Use mechanical fasteners on 18" centers on side and bottom sections when width exceeds 24". Butt all edges, lap all joints with 2" facing overlap and seal all joints and punctures with vapor barrier mastic. Use tying cord to secure the insulation until adhesive sets.

## 2.09 ACOUSTICAL INSULATION

- A. Insulation shall be 1" thick Johns-Manville LinaCoustic or Owens Corning Aeroflex duct lining, minimum 1-1/2 lb. density with a K factor of 0.23 at 75°F. mean temperature, and shall meet erosion test method described in U.L. Pub-181. Apply to the inside surfaces of the following equipment:
1. The entire interior of every return-exhaust fan casing.
  2. The entire interior of every central fan system casing.
  3. Supply and return plenums and also 25' of supply and return ductwork from every air handling supply unit; include at least one 90° elbow in the above length, or add its equivalent to the above length.
  4. Line 25' of exhaust-return duct to all exhaust-return fans; include at least one elbow in the above length, or add its equivalent length to the above length.
  5. Line 25' of all exhaust ducts to exhaust fans and power roof ventilators; include at least one elbow in the above length, or add its equivalent length to the above length.
  6. Line all transfer ducts, and all ducts as noted on the drawings.
  7. Line all ductwork from variable air volume devices to air outlets.
  8. Do not line exhaust ducts connected to kitchen hoods, fume hoods, paint spray booths, welding booths, duct collectors, transformer vaults, and similar units.
- B. Apply to butted edges and to the inside of all ducts with 100% adhesive coverage and mechanical fasteners located on 12" centers and within 2" of butted edges. Apply heavy coat of mastic (CMC 17-477) and butt joints tight.
- C. Ducts sizes must be increased where sound insulation occurs to maintain duct sizes as indicated on drawings.

## PART 3 – EXECUTION

### 3.01 GENERAL INSULATION APPLICATIONS

- A. Clean all piping, apparatus, and equipment to be covered, and insulate carefully without voids or the use of damaged section. Use full length pieces only.
- B. Insulate sections of equipment requiring periodic servicing with removable sheet metal casings filled with the same thickness of material as the adjoining insulation.
- C. Remove insulation if defects develop after insulating. After repair of defects, replace the insulation equal to original without cost to Owner.
- D. Install all duct insulation without sagging, and repair all tears and punctures without cost to Owner.

- E. No thermal insulation required on casings, plenums, or ducts that have an acoustical lining, or on ducts that terminate exposed to the room they serve.
- F. Provide 0.016" aluminum METAL-ON jacket on all pipes that are exposed to the weather, or pass vertically exposed through occupied spaces, and as indicated on the drawings. BAND ALL JOINTS.
- G. Do not cover equipment name plates with insulation.
- H. See Section B15050, paragraph 3.07, Identification.

END OF SECTION

## SECTION B15500

### HVAC BASIC PIPING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Provide all piping, valves, fittings, pipe hangers, supports, anchors, sway bracing, vibration dampeners, flexible joints, specialties, etc., as specified and as schematically shown on the BID DOCUMENTS.

##### 1.02 RELATED WORK

B15010 - Basic HVAC General Requirement

B15050 - Basic HVAC Materials and Methods

##### 1.03 WORK INCLUDED IN THIS SECTION

2.01 Pipe, Steam, Fittings, and Valves (0 to 15 psig)

2.02 Pipe, Water, Fittings, and Valves

2.03 Pipe, Drain

2.04 Pipe, Flexible Connectors

2.05 Pipe, Hangers, and Supports

2.06 Traps

2.07 Strainers, Steam

2.08 Strainers, Water

2.09 Thermometers (Stem)

2.10 Thermometers (Dial)

2.11 Gauges

2.12 Expansion Joints, Ball

2.13 Expansion Joints, Bellows

3.01 Pipe and Fitting Installation

3.02 Steam Systems

3.03 Water Systems

3.04 Cleaning Water Piping Systems

3.05 Venting Hot Water Systems

#### PART 2 – PRODUCTS

##### 2.01 PIPE, STEAM, FITTINGS, AND VALVES (0 to 15 PSIG)

###### A. Pipe:

1. Steam Pipe: 4" and under, standard weight, continuous weld ASTM A-53, Grade F. 5" through 10", standard weight, ERW ASTM A-53, Grade B. 12" and up, .375" wall, ERW ASTM A-53, Grade B.
2. Condensate Pipe: 10" and under, extra heavy.
3. All piping shall be provided with a factory applied protective coating.

B. Fittings:

1. Steam Fittings: 2" and under, standard malleable or cast iron screwed, 2-1/2" and over, standard seamless steel long radius welding fittings.
2. Condensate Return Fittings: Extra heavy fittings.
3. Unions: 2" and under, 150 lb. standard malleable iron screwed, brass seat. Grinnell #463, or other approved.
4. Flanges: 2-1/2" and over, 150 lb. weld neck, flat faced flanges. All flange faces shall conform to valves specified.
5. Gasket: All sizes to be full faced 1/16" Cranite, or other approved.
6. Bolting: All bolting shall consist of heat treated alloy steel studs and nuts. Crane triplex or other approved, conforming to ASTM Specification A-193, Grades BC and B7 bolting.

C. Valves: All gate, globe, and check valves shall be Milwaukee Valve or Crane.

1. Gate Valves: 2" and under, 150 lb. brass, screwed with rising stem, Milwaukee #1151 or Crane #431UB. 2-1/2" and over, 125 lb. cast iron, flanged ends, with brass trim and rising stem, Milwaukee #F2885M or Crane 465-1/2. 6" and larger shall be equipped with 3/4" bypass piping.
2. Globe Valves: 2" and under, 200 lb. brass, screwed, with Nitra-hard plug-type disc, renewable body seat ring, and rising stem, Milwaukee #592A or Crane 212P. 2-1/2" and over, 125 lb. cast iron, flanged ends, with brass trim, Milwaukee #F2981M or Crane #351.
3. Check Valves: 2" and under, 200 lb. brass, screwed swing check, Milwaukee #508 or Crane #36. 2-1/2" and over, 125 lb. Ferro steel, flanged swing check valves, bronze trimmed with renewable seats, Milwaukee #F2974M or Crane #373.

2.02 PIPE, WATER, FITTINGS, AND VALVES

- A. Hot, Cold, Chilled, and Condenser Water Pipe: 4" and under, standard weight, continuous weld, ASTM A-53, Grade F. 5" thru 10", standard weight, ERW ASTM A-53, Grade B. 12" and up, .375" wall, ERW ASTM A-53, Grade B. All piping shall be provided with a factory applied protective coating.

B. Fittings:

1. Water System Fittings: 2" and under, standard malleable or cast iron screwed. 2-1/2" and over, standard seamless steel long radius welding fittings.
2. Unions: 2" and under, 150 lb. standard malleable iron screwed, brass seat, Grinnell #463, or other approved.

3. Flanges: 2-1/2" and over, 150 lb. weld neck flat faced flanges. All flange faces shall conform to valves specified.
  4. Gasket: All sizes to be full faced 1/16" Cranite, or other approved.
  5. Bolting: All bolting shall consist of heat treated alloy steel studs and nuts. Crane triplex or other approved, conforming to ASTM Specification A-193, Grades BC and B7 bolting.
- C. Valves: All gate, globe, and check valves shall be Milwaukee Valve or Crane. All valves shall be suitable for use when circulating antifreeze solution, cleaning solutions or cooling tower chemicals.
1. Gate Valves: 2" and under, 150 lb. brass, screwed with rising stem, Milwaukee #1151 or Crane 431UB. 2-1/2" and over, 125 lb. cast iron, flanged ends, with brass trim and rising stem, Milwaukee #F2885M or Crane #465-1/2.
  2. Globe Valves: 2" and under, 200 lb. brass, screwed, with Nitra-hard plug-type disc, renewable body seat ring, and rising stem, Milwaukee #592A or Crane #212P. 2-1/2" and over, 125 lb. iron body flanged, Milwaukee #F2981 or Crane 351.
  3. Check Valves (Spring Type): Check valves for all pump discharge lines shall be MUESSCO wafer type 101-AP ductile iron with bronze disc, stainless steel stem, stainless steel spring, spring loaded, silent type, 125 lb. ASA flanged.
  4. Check Valves (Swing Type): 2" and under, 200 lb. brass, screwed swing check, Milwaukee #508 or Crane #36. 2-1/2" and above, 125 lb. Ferro steel, flanged swing check valves, bronze trimmed with renewable seats, Milwaukee #F2974M or Crane #373.
  5. Stop or Balancing Valves: All valves indicated as "Stop or Balancing Valves" on the drawings shall be ball valves through 2", and butterfly-type for valves 2-1/2" and above.
    - a. 2" and under, 150 lb. cast bronze 2-piece ball valve with stainless steel ball, 350°F reinforced Teflon seals and packing, stainless steel lever handle with vinyl grip, Milwaukee #BA100 or Crane #9302.
    - b. 2-1/2" and above, 175 DeZurik, Crane #44 Quartermaster, Grinnell, Centerline, Keystone Fig. 212, or Milwaukee #ML123E iron body butterfly valves with 250°F double rubber seat, corrosion resistant bearings, #416 stainless steel shaft, aluminum bronze disc pinned to lever through 6" and an enclosed worm gear actuator on 3" and above. Valves for equipment isolation shall have lug style bodies and shall provide bubble tight shutoff at full rated pressure. Valves shall be installed with flat side of disc on higher static pressure side of the valve.
  6. Flow Metering Stop Valves: All valves indicated as "Flow Metering Stop Valve" shall be flow set valve packages as manufactured by Flow Design, Inc. in sizes from 1/2" to 4" consisting of two (2) valves as follows:



- a. Flow measuring valve (F), installed on entering side of equipment, shall consist of a 400 lb. rated ball valve with bronze body, plated ball, Teflon seats, vinyl grip handle, and integral venturi section with pressure - temperature taps.
- b. Flow setting valve (S), installed on leaving side of equipment, shall consist of a 300 lb. rated bronze body butterfly valve assembly with stainless steel disc, viton seats, vinyl grip handle, memory stops, and integral pressure - temperature taps.
- c. The above valves shall be installed in the following locations as shown on the drawings:
  - (1) Hot water coils
  - (2) Chilled water coils
  - (3) Secondary pipe loops
  - (4) Pumps
  - (5) Main loops and branches

#### 2.03 PIPE, DRAIN

- A. Drain pipe for extensive overhead systems shall be ASTM Specification B-88, type "L" hard copper. Fittings shall be cast brass sweat-type fittings soldered with 50/50 solder.
- B. Simple unit condensate drains shall be galvanized, or plastic pipe.

#### 2.04 PIPE, FLEXIBLE CONNECTORS

- A. Provide as shown on the drawings Flexonics, or equal, Series 300 bronze braided hose with screwed ends through 2" size and Series 400, type 321, stainless steel braided hose with flanged ends for pipes 2-1/2" and above. Each connector shall be rated for a minimum of 150 psi working pressure at 250°F and shall be of sufficient length to allow 3/4" offset motion. Flexible hose to be used for refrigeration service shall be cleaned, degreased, and sealed.
- B. Provide Flexonics, or equal, Model L, expansion compensators for installation in baseboard radiation as shown, or required, to control expansion. Each compensator shall be rated for 70 psi working pressure at 250°F.
- C. Provide Resistoflex type R6904 arch-type expansion joint complete with flanged ends and control rods with rubber grommets. Each rubber joint shall be suitable for 250°F temperature and shall be designed for a minimum of 100 psi working pressure.

#### 2.05 PIPE, HANGERS, AND SUPPORTS

- A. Provide Grinnell, Fee Mason, or Elcen adjustable hangers, special floor pipe supports, spring hangers, saddles, anchors, clamps, rods, miscellaneous iron supports and appurtenances as required. Provide any miscellaneous iron for hanger supports that may be required in addition to the building structure. All work shall conform to ASA Code B31.1 and MSS Standard Practice SP-58.
- B. Where pipes are supported from structural steel, use "C" clamps (Fig. 88) for pipes through 2". For pipes 2-1/2" and up, use beam clamps (Fig. 229), or welded attachment (Fig. 66).
- C. Where hangers are supported from existing beams, or concrete slabs of sufficient thickness, provide Phillips concrete fasteners, or expansion cases (Fig. 117).

- D. Where hangers are supported from new concrete slabs, provide concrete inserts (Fig. 279, 281, 282) depending upon load requirements.
- E. Spring-type hangers (Fig. 178) shall be installed throughout all boiler and equipment rooms where reciprocating or rotating equipment is installed. The same hangers shall be installed at least three (3) pipe hangers away from all equipment set on vibration isolators, and at the top of risers to absorb vertical movement.
- F. Suspend all steam and hot water mains thru 3" from clevis-type hangers (Fig. 260) with pipe covering saddles. Suspend all steam and hot water piping from 4" through 12" from clevis-type roller hangers (Fig. 181) with pipe covering saddles. Suspend all steam and hot water piping 14" and up from trapeze-type roller hangers (Fig. 171) with pipe covering saddles. Provide spring cushion roller-type hanger (Fig. 178), in lieu of Fig. 171 and 181, where required for vertical movement.
- G. Suspend all cold water, chilled water, and condenser water piping from clevis-type hangers (Fig. 260). At each chilled water hanger, provide an 18" long section of calcium silicate pipe covering, cover with a white fire retardant vapor barrier jacket and insert an insulation protection shield (Fig. 167) between the insulation and the hangers.
- H. Spacing of hangers shall not exceed the following schedule. This Contractor shall provide any additional steel members required to maintain the spacing. Provide hangers adjacent to concentrated loads such as valves, pumps, flanges, etc.

PIPE SIZE-IN.	HANGER SPACING-FT.	ROD SIZE-IN.
1	7	3/8
1-1/2	9	3/8
2	10	3/8
2-1/2	11	1/2
3	12	1/2
4	14	5/8
6	17	5/8

- I. Provide rods complete with adjusting and locking nuts.

## 2.06 TRAPS

- A. Float and Thermostatic Traps (0 to 30 psig): Traps shall be Trane, Hoffman, or Armstrong, 30 lb. spherical float and thermostatic type with renewable stainless steel seats and discs of the screwed-in type. Provide size and capacities based on 1/2 psi differential. For higher pressures, use high pressure floats.
- B. Inverted Bucket Traps (Up to 250 psig): Traps shall be Armstrong, inverted bucket type with 250 lb. cast iron bodies, brass buckets, stainless steel levers, seats, and plungers, removable covers, and built-in strainers.
- C. Thermostatic traps shall be used on all convective radiation.

## 2.07 STRAINERS, STEAM

- A. Y-Type Strainers: 2" and under, 250 lb. iron body, screwed, Keckley Style A with a 20 mesh monel screen. 2-1/2" and above, 250 lb. iron body, flanged, Keckley Style B, with a 20 mesh monel screen.
- B. Basket Type Strainers: 2" and under, 250 lb, iron body, screwed, Keckley Style DV with a 20 mesh monel screen. 2-1/2" and above, 250 lb. iron body, flanged, Keckley Style DV with a 20 mesh monel screen.

2.08 STRAINERS, WATER

- A. Y-Type Strainers: 2" and under, 250 lb. iron body, screwed, Keckley Style A with 1/16" perforated monel screen, 2-1/2" and above, 250 lb, iron body, flanged, Keckley Style B, with a monel screen and the following perforation:

Through 4" size: 1/16"  
5" and Up: 1/8"

- B. Basket Type Strainers: 2" and under, 250 lb., iron body, screwed, Keckley Style DV with a 1/16" perforated monel screen. 2-1/2" and above, 250 lb. iron body, flanged, Keckley Style DV with a monel screen and the following perforation:

Through 4" size: 1/16"  
5" and Up: 1/8"

2.09 THERMOMETERS (STEM)

- A. Provide Terice BX9 Series, adjustable angle, industrial type, red appearing mercury in glass thermometers, Duro, Ashcroft, Marshalltown, or Weiss manufactured to the following specifications:

Scale: 9" size with white background and black marking.

Case: Die cast aluminum and clear acrylic plastic lens.

Stem: Aluminum installed with minimum 2" extension into pipe.

Accuracy: Within 1% of range.

Wells: Brass with 2" extension for insulation.

- B. Location: Each thermometer shall be placed so that a good sample of water is taken. Locate thermometers in accessible locations for close visual observations. All thermometers shall be adjusted so that they are easily read from the floor or nearest platform.

C. Line Designation	° F/Div.	Range (°F)
Low Pressure Steam	2	30 - 300
Chilled Water	1	0 - 100
Condensate	2	30 - 300
Hot Water	2	30 - 240

2.10 THERMOMETERS (DIAL)

- A. Provide Ashcroft, Duro, Weiss Marshalltown, or Trerice bimetal 5" diameter dial every angle thermometer with 12" long stems, separable wells with lagging extension.
- B. Furnish case ring and stem in #304 stainless steel. Provide heavy duty glass and hermetically sealed construction with external adjustment. Face to be white with black numbers.
- C.

Line Designation	°F/Div.	Range (°F)
Low Pressure Steam	2	50 - 300
Chilled Water	1	30 - 130
Condensate	2	50 - 300
Hot Water	2	50 - 240
- D. Location: Each thermometer shall be placed so that a good sample of water is taken. Locate thermometers in accessible locations for close visual observations. All thermometers shall be adjusted so that they are easily read from the floor or nearest platform.

2.11 GAUGES

- A. Provide Trerice 500X, Duro, Ashcroft, Marshalltown, or Weiss 6" diameter dial duragage precision pressure gauge with white face and black numbers.
- B. Gauge to be provided with stainless steel movement, bronze socket, and tube, solid front enclosure and 1/4" isolating globe valve (200 lb.) fittings and gauge cocks.
- C. Select gauges so that the normal operating pressure is at the midpoint of the scale.

Line Designation	PSI/Div.	Range (PSI)
Low Pressure Steam	0.5	0 - 60
Primary Pumps	1	0 - 160
Secondary Pumps	1	0 - 160
City Water	1	0 - 160
Expansion Tank	1	0 - 160

- E. Provide altitude gauge Trerice #615 Series with combination scale for hot and chilled water system.

2.19 METERS, WATER, FLOW

- A. Provide Gerand Venturis and Indicators, or averaging pitot tube flow meters, Pressco, Taco, or Olympic as shown on drawings.
- B. Venturis to be used on all lines over 7 GPM with a maximum pressure drop of 0.8 ft. Venturis 1-1/4" through 2" brass screwed, 2-1/2 and over for butt welding to piping. Nipples, valves, and disconnects to be included with each venturi.
- C. Balvalve-Indicators shall be used on all units as scheduled 7 GPM and lower sizes 1/2" through 1". Pressure drop not to exceed 25".
- D. Balvalve-Indicator to consist of a brass Teflon seated tight shut-odd ball valve and locking device. A brass calibrated orifice with disconnects and metal tag will be installed on the unit

side of the valve. The valve will be adjusted and locked in position corresponding to the meter reading as given on the metal tag.

- E. Venturis and Indicators shall be furnished with chained metal tag showing location, size, GPM, and meter reading for GPM specified. All meters shall be installed with distances in accordance with the manufacturer's instructions for upstream and downstream valves, fittings, etc.
- F. A portable 0-50" 6" dial differential meter shall be provided with this project (or rented to Contractor) for balancing flow in all units. Venturis and Indicators shall be provided with individual meters as indicated on the drawings.

### **PART 3 - EXECUTION**

#### **3.01 PIPE AND FITTINGS INSTALLATION**

- A. Pipe welding shall comply with the provisions of the latest revision of the ASME Boiler and Pressure Vessel Code, and the ANSI Code for Pressure Piping B31.1, or such state or local requirements as may supplement codes mentioned above.
- B. Each Manufacturer, or Contractor, shall be responsible for the quality of welding done by his organization, and shall repair or replace any work not in accordance with these specifications.
- C. Maintain sizes and locations indicated with no changes to be made unless approved by the A/E. Follow the A/E's directions in locating the pipe runs before locating openings in floor slabs and walls.
- D. Welding is required on all piping located in building overhangs, underground piping, all piping 2-1/2" and over, and permitted on all, or part, of other piping in lieu of screwed joints.
- E. All stop and balancing valves shall be located for ease of accessibility. Consult the A/E about relocating valves that would be inaccessible if installed as shown.
- F. Pipe, valves, fittings, etc., shall be hydrostatically tested in accordance with ANSI Code for Pressure Piping B31.1.
- G. All welding fittings shall be as manufactured by Ladish, Tube Turn, or Midwest. Branch connections sized under 1/2 the main pipe diameter may be made with intersection welds with no projection of the small pipe into the larger pipe.
- H. Unions, Victaulic couplings and flanges shall be provided where valves, control equipment, etc., are installed in continuous runs of piping. Unions shall be provided in all screwed piping where required for disassembly, or for convenience in making repairs.
- I. All piping shall be cleaned out before installation by blowing out with compressed air, or by other approved method. Provide temporary plugs, or caps, for all open ends of pipe when work is not being carried on to completion.
- J. Welding of galvanized pipe or fittings will not be acceptable.

- K. Provide steel pipe sleeves with minimum wall thickness of 1/4" for all pipes passing through beams and walls of concrete, brick, tile, or masonry, and 22 gauge galvanized iron sleeves for pipes passing through other parts of construction. Provide steel pipe for all sleeves penetrating floors. Set sleeves 2" above floors and caulk so no water leakage can occur between sleeves and floors. Furnish each sleeve having inside diameter 1" larger than outside diameter of each uninsulated pipe and 1" larger than outside diameter of insulated piping, unless the wall or floor is a fire wall, in which case, only the pipe shall penetrate.

Wherever pipes penetrate sound barriers, smoke partitions, or fire rated floors or walls, fill opening around pipe with U.S.G. Thermofiber Felt and Firecode Gypsum Cement, Dow Corning Fire Stop Sealant, or equivalent material, equal to the rating of the assembly penetrated.

- L. On all pipes passing through floors, walls, and ceilings, provide chrome plated brass escutcheons of approved design and finish having outside diameter to cover sleeved openings and inside diameter to fit pipe. Securely fasten in place to floors, walls, and ceilings.
- M. Wherever copper, brass, or bronze piping systems are connected to steel or iron piping systems, this connection shall be made with dielectric isolators.

### 3.02 STEAM SYSTEMS

- A. Mains and returns to be graded down in direction of flow not less than 1" in 40'.
- B. Horizontal branch connections from mains to risers, and from risers to equipment, in which condensate travels in opposite direction to steam shall be graded not less than 1" in 5'.
- C. Where horizontal steam mains are reduced in size in the run, install eccentric fittings to prevent lodgment of water.
- D. Provide drip connections for pocketed sections of all steam piping to properly remove the condensate, whether or not shown on plans.
- E. Provide drip pockets at bottom of all risers and at drip connections to mains. All drip pockets shall be full size of pipe up to 4", and 4" for larger sizes. Provide 1" valved drain on all drip pockets. Provide a 1/2" test connection between trap and valve on discharge side of trap. Piping shall be arranged so that test connections may be used for a manual blow-off, or to test conditions on each side of trap. Provide strainer ahead of all traps.

### 3.03 WATER SYSTEMS

- A. Mains to be graded up in direction of flow, not less than 1" in 100', or run dead level where space is limited.
- B. Install 3/4" Crane #58 drain valves, with hose threads, removable cap, and disc material suitable for 210°F water, at bottom of all coils, radiation, and at all low points in the system on piping up to 4" size. Install 2" globe valves on all piping 5" and up unless shown differently on the drawings, and pipe 2" drains to nearest drain. Provide a cap on all drain lines above ceilings. Install air chambers and manual air vents at all high points of the system.

### 3.04 CLEANING WATER PIPING SYSTEMS

- A. Use Dearborn compound cleaner #19 alkaline, Mogul, Vulcan, or Nalco in the amount of 2 gallons per 100 gallons of water to preclean the piping system. Dissolve the compound so that it is in solution, preferably in warm water, and in such quantities that foaming will not be a problem.
- B. Provide 2 gallon shot feeder with shut-off, throttling, and drain valves across circulating pumps for all hot and chilled water systems.
- C. Circulate the solution in the system with all automatic valves fully open and water temperature at 210°F. Double the quantity of solution to be circulated in the system if heat cannot be provided. Drain the entire system after 24 hours. Fill system with clear water, and circulate for a period of 24 hours while continuously draining and filling the system. Provide a temporary and separate pump if the existing pumps can not be used adequately.
- D. Obtain system water analysis one week later and treat water in accordance with the manufacturer's recommendations.

### 3.05 VENTING HOT WATER SYSTEMS

- A. After the system has been cleaned, close all air vents except the vent at the bottom of the Airtrol tank vent fitting and begin filling the system. Leave Airtrol tank vent fitting open until water runs freely from it, and then close tightly. Do not open this vent again until system has to be drained. Vent all heating coils, radiation, and high points of the system. Feed more water to the system to provide at least 4 pounds per square inch pressure at the highest point of the system.
- B. After the system has been completely filled, start all circulating pumps to circulate and dislodge small air bubbles. Stop all circulating pumps and heat water in the system up to at least 220°F, and start circulating pumps. Stop circulating pumps and again vent entire system.

END OF SECTION

## SECTION B15750

### MECHANICAL HEAT TRANSFER EQUIPMENT

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Provide equipment required to transfer heat from the heating medium to areas requiring heating, or from the cooling medium to areas requiring cooling as shown on the BID DOCUMENTS.

##### 1.02 RELATED WORK

B15010 - Basic HVAC General Requirements

B15050 - Basic HVAC Materials and Methods

##### 1.03 WORK INCLUDED IN THIS SECTION

*All mechanical equipment listed in this Master Specification shall be reviewed with the manufacturer for options and specific application to the project being designed. Each product shall include the following reference: See Section B15050: CODES AND STANDARDS.*

**2.01 Coils, Hot Water**

**2.02 Coils, Chilled Water**

**2.03 Converters**

**2.04 Expansion Tanks**

**2.05 Pumps, Circulating**

**2.06 Radiation, Baseboard**

**2.07 Radiation, Finned Pipe**

**2.08 Radiation, Convectors**

2.09 Receiver, Condensate Pump Set

3.01 Installation, General

#### PART 2 - PRODUCTS

##### 2.01 COILS, HOT WATER

A. Provide Carrier or Trane copper (0.024) tube with aluminum fin air heating coils of sizes, rows, and ARI certified capacities as shown on drawings, complete with vertical headers and horizontal tubes, or serpentine type coil, with flanged metal or sheet metal drive slip casings.

B. Coils shall be furnished with air handling units, or located in central fan systems or used as booster coils suspended from ceiling hangers. Connect to flow and return with automatic valves, balancing valves, manual air vents, and drains as shown or required.

##### 2.02 COILS, CHILLED WATER

A. Provide Carrier or Trane drainable copper (0.024) tube with aluminum fin air cooling coils with ARI certified capacities as shown on drawings complete with vertical headers, horizontal tubes, and flanged metal casings for support and duct connections.



- B. Coils shall be furnished with air handling units, or located in central fan systems. Connect to flow and return with automatic valves, balancing valves, manual air vents, and drains for each row of tubes as shown or required.

#### 2.03 CONVERTERS

- A. Bell & Gossett converters, TACO, Patterson-Kelley, or Adscos, complete with 3/4" O.D. "U" shaped No. 18 Stubbs gauge copper tube removable heating element, having the capacity and heating surfaces as listed on the drawings.
- B. A manufacturer's data report for pressure vessels, Form U-1 as required for the ASME Code rules, is to be furnished to the owner. This form must be signed by a qualified inspector, holding a National Board Commission, certifying that construction conforms to the latest ASME Code Section VIII Div. 1 for pressure vessels. The ASME symbol "U" must also be stamped on the Heat Exchanger. The manufacturer must be registered with the National Board.
- C. The converters shall be furnished with saddles, which are to be set on channel irons that can be supported from angle iron or iron pipe leg stand.

#### 2.04 EXPANSION TANKS

- A. Bell & Gossett or TACO factory painted steel tanks. Securely support tanks on saddles suspended from ceiling with hanger rods.
- B. Provide airtrol tank fittings at tanks, boiler air fittings, or Rolairtrol unit with strainer and all other accessories noted on the drawings for complete air removal.
- C. A manufacturer's data report for pressure vessels, Form U-1 as required for the ASME Code rules, is to be furnished to the owner. This form must be signed by a qualified inspector, holding a National Board Commission, certifying that construction conforms to the latest ASME Code Section VIII Div. 1 for pressure vessels. The ASME symbol "U" must also be stamped on the Heat Exchanger. The manufacturer must be registered with the National Board.

#### 2.05 PUMPS, CIRCULATING

- A. Provide Bell & Gossett or TACO circulating pumps with capacities as indicated on the drawings in the following models:
  - 1. Side suction, in-line
  - 2. Side suction, in-line booster.
- B. All pumps shall be cast iron, bronze, fitted for 175 psi working pressure and 225°F operating temperature. In-line booster pumps shall be designed for 125 psi working pressure. Pumps shall be back pullout design to allow for servicing without disturbing piping, motor or required shaft alignment.
- C. Provide tapped and plugged openings for vents and drains and for suction and discharge gauge connections.

- D. Bearing assemblies shall be as follows:
1. Base mounted pumps shall have cast iron bearing housings for regreasable ball bearings
  2. Series 60 in-line and booster in-line pumps shall be provided with oil lubricated sleeve bearings
  3. Series 80 and 90 in-line pumps shall use NEMA JM frame motors with regreasable bearings
- E. Impeller shall be single or double suction enclosed type made of bronze, hydraulically and dynamically balanced, keyed and locked to a carbon steel shaft protected by a replaceable bronze shaft sleeve.
- F. Mechanical seal shall be single unbalanced type with Buna N/carbon rotating element and ceramic stationary seat.
- G. Base mounted coupled pumps shall be coupled with a Woods Sure-Flex spacer type or with extended hub to allow for pump servicing. Furnish with a coupling guard. In-line pumps shall be spring coupled.
- H. Motor shall meet NEMA specifications and shall be non-overloading over the entire pump curve. See Section B15050: Codes and Standards.
- I. Each pump and motor is to be provided with a nameplate giving the manufacturer's name, serial number of pump, capacity in GPM and head in feet at design condition, horsepower, voltage, frequency, speed and full load current.
- J. Contractor shall install the pumps in strict accordance with manufacturer's instructions to avoid any stress and misalignment. Mount base mounted pumps on concrete base and grout pump base after installation. Pumps shall be completely removable for servicing and replacement.
- K. Manufacturer to provide start-up service to verify proper wiring, rotation, base setting, alignment, lubrication and amperage draw. Service shall include capacity check of each pump, which is to be submitted directly to the Engineer indicating GPM, suction and discharge pressure and actual amperage draw. Manufacturer is to provide replacement of impellers or trimming of impellers to meet capacity requirements indicated on the plans at no additional cost to the owner.
- L. Provide one spare seal and casing gasket for each pump to owner.

#### 2.06 RADIATION, BASEBOARD

Provide Trane, Dunham-Bush, Mark Hot, or Sterling IBR rated radiation installed wall-to-wall complete with one-piece back panel, one-piece removable front enclosure, finned pipe, end panels, joining sleeves, corner pieces, dampers, column enclosures and grilles. Furnish enclosure with bonderized finish and fasten radiators to wall according to manufacturer's instructions.

2.07 RADIATION, FINNED PIPE

- A. Provide Trane, Dunham-Bush, Mark Hot, or Sterling IBR rated, ferrous or nonferrous, radiation installed wall-to-wall with die formed back plate to support the front enclosure off the wall.
- B. All hangers shall be of the ball bearing cradle or rod type to allow for expansion, contraction, or height adjustment.
- C. Enclosure shall be 16-gauge steel cabinet reinforced with welded gussets and joined with rolled or flanged edges. Enclosure shall be bonderized and given a baked enamel finish. Color as selected by the A/E.

2.08 RADIATION, CONVECTORS

- A. Provide Modine, Airtherm or Sterling convectors in the following types:
  - Type WH, wall hung with front outlet grilles.
  - Type FH, freestanding with front inlet and outlet grilles.
  - Type RH, semi-recessed with front inlet and outlet grilles and four-sided overlaps.
  - Type MH, fully recessed with front inlet and outlet grilles and four-sided overlap.
- B. All convectors shall be provided with Allen head fasteners, copper tube and aluminum fin radiators, air chambers where required and 16 gauge steel cabinets with factory baked-on enamel finish. Color as selected by the A/E.
- C. All recessed space for radiation on exterior walls shall be lined with 1" of insulation at back and all four sides of the recess.

**PART 3 - EXECUTION**

3.01 GENERAL, INSTALLATION

All installations shall be done in accordance with manufacturer's instructions and as shown on the drawings.

END OF SECTION

## SECTION B15850

### AIR HANDLING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Provide all air handling equipment required to move air as shown on the BID DOCUMENTS.

##### 1.02 RELATED WORK

B15010 - Basic HVAC General Requirements

B15050 - Basic HVAC Materials and Methods

##### 1.03 WORK INCLUDED IN THIS SECTION

*All mechanical equipment listed in this Master Specification shall be reviewed with the manufacturer for options and specific application to the project being designed. Each product shall include the following reference: See Section B15050: CODES AND STANDARDS.*

##### **2.01 Fans, Centrifugal, Inline**

##### **2.02 Units, HVAC**

#### PART 2 – PRODUCTS

##### 2.01 FANS, CENTRIFUGAL, INLINE

- A. Provide Greenheck Model SP, Acme, Carnes, or Loren Cook duct mounted, inline, centrifugal fan complete with motor, starter, sealed lifetime ball bearings, and disconnect switch. Provide fans with Certified Rating Seal of AMCA.
- B. Fan housing shall be of the square design, constructed of heavy gauge galvanized steel with square duct mounting collars. Fan construction shall include two removable, full size, access panels located perpendicular to the motor mounting panel.
- C. Fan wheel shall be centrifugal backward inclined, constructed of aluminum with wheel cone matched to inlet cone. Wheel shall be statically and dynamically balanced.
- D. Motors shall be heavy duty ball bearing type with motor and drive mounted out of the air stream for belt drive model.
- E. Fan shafts shall be ground and polished mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed.
- F. Fan shall be direct or belt drive as listed on the schedule. V-belt drive shall be sized for a minimum of 175% of motor horsepower. Sheaves shall be fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. This Contractor shall make any

necessary revisions to the V-belt drive to achieve the CFM specified against the static pressure of the installed system.

G. See Section B15050: Codes and Standards.

## 2.02 UNITS, HVAC

A. Provide Carrier units with arrangements and capacities as indicated on the drawings. All fans shall be selected in accordance with AMCA classifications for static pressures and outlet velocities with 10% increase allowance. All units shall bear the AMCA seal.

B. Each unit shall be complete with the following:

1. Casings and fans shall be able to withstand 4-1/2" of positive or negative static pressure. Fans shall be:

Air Foil or backward inclined type

with:

variable speed controller

2. Casings shall be reinforced sectionalized modules and all panels shall be removable for access to the internals of the unit.
3. Casing section panels shall be lined with Technifoam with aluminum foil faced insulation. Insulation shall meet NFPA-90A flame spread and smoke generation requirements. Condensate drain pan shall be double walled and insulated. Pan shall extend under the complete coil section and have threaded drain connections on both sides of the unit. Inner pan shall be coated with corrosion resistant elastomeric-based material.
4. Fan sections shall have a removable panel located on the drive side of the unit, of adequate size to permit removal of the fan wheel, motor, and drive. Include factory mounted internal spring vibration isolators 2" deflection; thrust restraints and flexible connections.
5. Motors, with 1.15 service factor, and starters shall be in accordance with the drawings, V-belt drives shall be 175% rated, and totally enclosed per (OSHA) requirements.
6. Remote Economizer controls.
7. Coils, Hot Water, (See Section B15750)
8. Coils, Chilled Water (See Section B15750)
9. Frequency drive bypass switch & isolation transformer.
10. Filter box section with access on both sides with 2" thick Farr 3030 prefilters ahead of 65% rigid type filters.

11. Dwyer No. 2000 Magnehelic filter gauge.
  12. Spare set of filters.
  13. Electric heating coil with capacity as scheduled complete with contactors, air flow switches, disconnects, thermal cutouts, SCR controllers, etc. all in accordance with UL and NEC requirements.
- C. Any unit, other than Carrier, shall be set on vibration isolation equipment. Any unit, other than Carrier, shall have flexible connections between ductwork and unit. See Section B15050 on Vibration and Noise Control.
- D. Carrier, Trane or McQuay shall be approved provided they can meet all conditions of specifications. Manufacturer shall submit performance data.
- E. See Section B15050: Codes and Standards.

### **PART 3 - EXECUTION**

None

END OF SECTION

## SECTION B15880

### AIR DISTRIBUTION

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

Provide ductwork, accessories, dampers, louvers, grilles, and all equipment related to air distribution and exhaust air ventilation as shown on the BID DOCUMENTS.

##### 1.02 RELATED WORK

B15010 - Basic HVAC General Requirements

B15050 - Basic HVAC Materials and Methods

##### 1.03 WORK INCLUDED IN THIS SECTION

*All mechanical equipment listed in this Master Specification shall be reviewed with the manufacturer for options and specific application to the project being designed. Each product shall include the following reference: See Section B15050: CODES AND STANDARDS.*

- 2.01 Dampers, Volume**
- 2.02 Dampers, Automatic**
- 2.03 Dampers, Backdraft**
- 2.04 Dampers, Fire**
- 2.05 Door, Pressure Relief**
- 2.06 Ductwork, Cleaning
- 2.07 Ductwork, Flexible**
- 2.08 Ductwork, Prefabricated**
- 2.09 Filters, Air, Medium Efficiency
- 2.10 Flexible Connections**
- 2.11 Grilles, Sidewall**
- 2.12 Grilles and Diffusers**
- 2.13 Guards, Metal**
- 2.14 Inspection, Access, Doors**
- 2.15 Louvers**
- 2.16 Pans, Drain**
- 2.17 Silencers, Air**
- 2.18 Thermometers, Air (Stem)**
- 2.19 Thermometers, Air (Dial)**
- 2.20 Units, Terminal, VAV, Reheat**

3.01 Installation, Equipment

3.02 Installation, Ductwork

##### 1.04 DESIGN CONDITIONS

- A. The entire sheet metal installation shall be fabricated of prime sheets of galvanized iron, and shall be installed in accordance with the latest editions of the HVAC DUCT CONSTRUCTION STANDARDS as prepared by SMACNA, INC., or as herein specified

otherwise. The editions shall serve as a guide for minimum requirements of the installation except as herein specified otherwise. Install the ducts, risers, etc. as indicated on drawings making all necessary changes in cross sections, offsets, etc., whether or not the same is specifically indicated. If ducts cannot be run as shown on the drawings, this contractor is to install the ducts between required points by any path available, subject to the approval of the A/E.

***SMACNA Standards state that if the designer does not state the pressure classification of the duct, the contractor will assume 1" w.g. for all ducts except VAV, which he will assume as 2".***

***All duct seams will separate when tested to 1-1/2 times the states pressure classification.***

- B. All ductwork shall be constructed to the following minimum SMACNA pressure standards:
  - 1. All supply, return, and exhaust ductwork, connected to fans whose total fan design static pressure is less than 1", shall be fabricated to 1" W.G. SMACNA standards. All ductwork shall be sealed to SMACNA Seal Class B. No snap lock seams will be accepted.
  - 2. All supply, return, and exhaust ductwork, connected to fans whose total fan design static pressure is greater than 1", shall be fabricated to 2" W.G. SMACNA standards. All ductwork shall be sealed to SMACNA Seal Class A. No snap lock seams will be accepted.
  - 3. All supply ductwork for variable volume systems shall be fabricated to 3" W.G. SMACNA standards up to the variable volume control boxes. All ductwork shall be sealed to SMACNA Seal Class A. No snap lock seam will be accepted.
  - 4. SMACNA Seal Class B shall be all transverse joints and longitudinal seams, Seal Class A shall be all transverse joints, longitudinal seams and duct wall penetrations.
- C. Ductwork shall not be hung or supported from metal roof decking. Provide necessary support from top chord of joist or structural members.

## **PART 2 - PRODUCTS**

### **2.01 DAMPERS, VOLUME**

- A. Provide dampers, whether indicated or not, in every supply, return, and exhaust branch from main trunk duct fitted with locking devices for adjusting the air delivery.
- B. Provide elevated dial regulators for insulated ducts.

### **2.02 DAMPERS, AUTOMATIC**

- A. Install automatic outside, return air, and exhaust air dampers, furnished by the Temperature Control Contractor.
- B. This Contractor shall install interior baffles to fit the dampers to the duct, and as required to eliminate any air stratification which may occur after the installation.

### **2.03 DAMPERS, BACKDRAFT**



Furnish and install in back of all vent openings Ruskin CBD-4, air balance or American Warming & Ventilating Co., #494, counterbalanced backdraft dampers with 16 gauge felt-lined aluminum blades with oil lite, nylon, or teflon bearings.

2.04 DAMPERS, FIRE

- A. For all fire dampers, Greenheck, Phillips, or Ruskin each with a reusable UL listed 165°F fusible link. See Section B15050: Codes and Specifications. All dampers shall be dynamic rated with fan systems on, and shall comply with UL555.
- B. Installed in all ductwork piercing rated walls, floors, or ceilings, or as required by Wisconsin Department of Industry, Labor, and Human Relations.
- C. Factory constructed in accordance with and shall bear an approved UL label, if required.
- D. Greenheck Model DFD-150 for rectangular low pressure ductwork with fire resistance rating 1-1/2 hour.
- E. Greenheck Model DFD-350 for rectangular low pressure ductwork with fire resistance rating three (3) hour.
- F. Greenheck Model DFD-350 for rectangular low pressure transfer air openings in walls with, or without transfer grilles and for fire resistance rating three (3) hour.
- G. Greenheck Model DFD-150 CR or CO for round and oval ductwork with fire resistance rating 1-1/2 hour.
- H. Greenheck Model DFD-350 CR or CO for round and oval ductwork with fire resistance rating 3 hour.
- I. Pressure drop through the retracted damper shall not exceed .04" W.C. at a velocity of 2,000 FPM. Provide type B damper.
- J. All fire dampers to be installed per UL555 installation instructions.
- K. Provide gasketed access doors at each fire damper for access to fusible links.
- L. This Contractor shall be responsible for providing the proper fire resistive rating for each as called for in Chapter 64 of the Wisconsin Administrative Code.

2.05 DOOR, PRESSURE RELIEF

- A. Provide Ruskin PRD18 pressure relief door, AMCA tested, to control positive or negative pressure in a duct system due to an accidentally closed damper while the fan is still running.
- B. The door shall automatically open to a factory set value between 3" and 8" static pressure, and will automatically close and reset when the static pressure is reduced to less than 3".
- C. The door shall be 18" x 18" size constructed of 12 gauge galvanized steel and installed vertically.

## 2.06 DUCTWORK, FLEXIBLE

- A. Provide Clevaflex type SFA, Genflex SFR-30a, or Therma Flex M-KE insulated ducts suitable for 6" positive or negative pressure, and 4000 fpm where indicated on the drawings. Ducts shall contain an aluminum inner duct, 1" thick 3/4 lb. density insulation and 0.004" seamless vapor barrier jacket. Provide factory installed compression clamps on each end with spin-in straight fittings equipped with volume dampers. Ducts shall be installed as follows:
  - 1. As final connection from duct to ceiling diffuser where the total length of flexible duct shall not exceed 24 inches.
  - 2. Where indicated as a branch run out from the main duct it shall be fully extended to a maximum length of seven (7) feet and supported to prevent excessive sagging.
  - 3. Splicing of flexible duct shall not be allowed.
- B. Flexible duct and insulation shall be fire resistive and shall have a flame spread of 25 or less, and smoke developed rating of 50 or less.

## 2.07 DUCTWORK, PREFABRICATED

- A. Spiral Round and Oval-Double Wall: Provide United Sheet Metal Company Acousti-K-27, Dual Duct, Ajax, or Semco double walled internally insulated spiral round and oval ducts.
- B. Spiral Round and Oval-Single Wall: Provide United Sheet Metal Company Uniseal, Dual Duct, Ajax, or Semco spiral round and oval ducts, as shown on the drawings.
- C. Rectangular-Double Wall: Provide United Sheet Metal Company Acousti-K-27, Dual Duct, Ajax, or Semco double walled internally insulated rectangular ducts.
- D. Duct Construction:
  - 1. Inner liner of double walled ducts to be perforated metal with hole sizing and spacing to give acoustic impedance. Insulation to be 1-1/4" fiberglass type compressed to 1" thick for installation between inner and outer shell with thermal conductivity of 0.27 maximum.
  - 2. Pressure shell for single and double walled round spiral duct to be 26 gauge for sizes 3" to 8", 24 gauge for sizes 9" to 22", 22 gauge for sizes 24" to 36", 20 gauge for sizes 38" to 50" and 16 gauge for sizes 51" to 60".
  - 3. Pressure shell for single and double walled oval spiral ducts shall be 22 gauge. If longitudinal seam oval used, pressure shell shall be 22 gauge for a maximum width up to 10", 20 gauge for 11" to 20", 18 gauge for 21" to 40", and 16 gauge for 41" to 61". Spiral oval duct shall be externally reinforced by Sheet Metal Contractor using double angle iron trapeze hangers with 1-1/2" by 1-1/2" by 1/8" angles located on centers, in accordance with manufacturer's catalog recommendations. If longitudinal seam oval ductwork is used, structural type couplings shall be provided on 4' centers.
  - 4. Pressure shell for rectangular double walled ducts shall conform to SMACNA standard gauges.

5. Provide all necessary joining couplings and install all joints as recommended by manufacturer for airtight installation with United tape and sealer.
6. All ducts located outside the building shall have watertight seams.

E. Duct Fittings:

1. Provide United Sheet Metal Company Acousti-K-27 double walled internally insulated fittings for all double walled ducts. Inner liner to be perforated metal with hold sizing and spacing to give acoustic impedance, and insulation shall be 1-1/4" fiberglass type compressed to 1" thick for installation between inner and outer shell with thermal conductivity of 0.27.
2. Provide United Sheet Metal Company Uniform fittings for all single wall ducts.
3. All 90 degree taps shall be of the conical type, and mitered elbows shall be provided with acoustical turning vanes, 90 degree elbows shall be of 5-piece construction; 45 degree elbows shall be of 3-piece construction; and 30 degree elbows shall be of 2-piece construction.
4. Round fittings shall be of 20 gauge and oval fittings shall be the same metal gauge as the ductwork, or heavier.
5. Provide bellmouth fittings and insulation ends at plenum takeoffs.

F. Sealing Joints:

1. Apply sealer to outer ring of duct coupling, or outer casing of fittings, before pushing pipe inside duct to bead stop. Use pop rivets or sheet metal screws to mechanically lock joint, and apply sealer to outside of joint in a band 2" wide covering the fastener heads and bead joint thoroughly.
2. Apply single wrap of tape over wet sealer. Do not apply additional sealer over tape.

- G. Testing: Pressure test system at 1-1/2 times design operating pressure with a total leakage not to exceed .5% of design CFM. Test system using United Sheet Metal test kit per instructions in duct manufacturer's installation manual. If leakage is greater than above limit, locate leaks and reseal, and retest.

2.08 FLEXIBLE CONNECTIONS

Make all inlet and discharge connections to air handling units and fans with 30 ounce Ventglas as manufactured by Ventfabrics, Inc.

2.09 GRILLES, SIDEWALL

All grilles and diffusers shall be Titus, E.H. Price, or Carnes. Supply, Return, Exhaust, and Transfer grilles shall as scheduled, see drawings.

2.10 GRILLES AND DIFFUSERS

- A. All grilles and diffusers shall be Titus, E.H. Price, Nailor, Carnes, Anemostat, or Krueger and shall be furnished equal to the grilles and diffusers shown on the schedule.

- B. Door grilles located in wood doors shall be of sizes as indicated on the door schedules and furnished with baked enamel finish. Turn over all grilles to the General Contractor for installation by the General Contractor.
- C. The supplier of the grilles and diffusers shall verify quantities, type of ceilings, and types of grilles with all Architectural and Mechanical drawings before ordering any materials.

#### 2.11 GUARDS, METAL

This Contractor shall remodel all metal guards for all V-belt drives. The back side shall be completely closed with sheet metal while the exposed side shall be covered with woven wire with openings for tachometer readings.

#### 2.12 INSPECTION, ACCESS, DOORS

- A. Provide Ventlok insulated access doors where shown on the drawings, or where required, for easy access to all equipment. Doors shall be equipped with Series 100 latches on all doors less than 4 square feet in area, and Series 300 on all larger doors. Seal all doors with sponge rubber gaskets.
- B. Provide double cam access doors at all booster coils and fire dampers. The door shall be at least 18" wide, unless duct size is less, and shall be at least 75% of the damper or coil height.

#### 2.13 LOUVERS

Provide 6", Greenheck or Dowco Corporation, extruded aluminum horizontal side drainable, properly reinforced louvers complete with extended or standard aluminum sills, standard heads, and 1/2" mesh aluminum wire screens on inside face of louver. Louvers shall be Model ESD-603; finish to be epoxy enamel or color anodized, color to be selected by owner.

#### 2.14 PANS, DRAIN

Provide stainless steel drain pans under each cooling coil. Provide a pan under each coil in a bank of coils, and drain each pan to the lower pans.

#### 2.15 THERMOMETERS, AIR (STEM)

- A. Provide Trerice BX9 Series, adjustable angle, industrial type, red appearing mercury in glass thermometers, Duro, Ashcroft, Marshalltown, or Weiss manufactured to the following specifications:

*Scale:* 9" size with white background and black markings.

*Case:* Die cast aluminum and clear acrylic plastic lens.

*Stem:* Aluminum installed with minimum 2" extension into pipe.

*Accuracy:* Within 1% of range.

Air duct thermometers shall have 12" long air sensitive bulb protected with a perforated aluminum bulb guard.

- B. Location: Each thermometer shall be placed so that a good sample of air is taken. Locate thermometers in accessible locations for close visual observations. All thermometers shall be adjusted so that they are easily read from the floor or nearest platform.

C. *Line Designation*      °F/Div.      Range (°F)

Air (Outside)	2	-40 - 110
Air (Tempered)	1	30 - 130

2.16 THERMOMETERS, AIR (DIAL)

- A. Provide Ashcroft, Duro, Weiss Marshalltown, or Trerice bi-metal 5" diameter dial every angle thermometer with 12" long stems with duct mounting flange.
- B. Furnish case ring and stem in #304 stainless steel. Provide heavy duty glass and hermetically sealed construction with external adjustment. Face to be white with black numbers.

C. *Line Designation*      °F/Div.      Range (°F)

Air (Outside)	2	-40 - 110
Air (Tempered)	1	30 - 130

- D. Location: Each thermometer shall be placed so that a good sample of air is taken. Locate thermometers in accessible locations for close visual observations. All thermometers shall be adjusted so that they are easily read from the floor or nearest platform.

2.17 UNITS, TERMINAL, VAV, REHEAT

- A. Furnish and install Trox normally open DDC variable volume air control valves with hot water reheat coil of the sizes and capacities shown on the plans to operate with duct pressure from 0.12" to 6.0" s.p.
- B. Valve housing and damper shall be constructed of 20 ga. (minimum) galvanized steel. Damper shall be mounted on a stainless steel shaft which is supported on each end by roller bearings.
- C. All valves shall be factory checked and calibrated for air flow limits. Valves shall be mountable in any position, from horizontal to vertical without affecting the calibration of the valve.
- D. Provide hot water reheat coils integrally mounted to the air valve with heating capacities as indicated on the drawings. Coils shall be 0.025 copper tube with aluminum fins. Provide access panels on the inlet side of the coil. Hot water automatic valve shall be provided by Section B15950.
- E. Controls: Air valve shall be pressure independent and shall control air flow within + 5% throughout its published range, without employment of a volume regulators, flow control tubing or velocity/velocity pressure sensors. Flow limiters will not be accepted. Installation shall require the piping of only one line, from the space thermostat to the pneumatic integral actuator. No main air line shall be required. Control valve shall consume no main air and will not be considered in compressor sizing. Valve shall be capable of restoring any controlled airflow within 15 seconds when subject to inlet static pressure changes of up to 3.0 in. w.g. Valve shall directly control velocity, not velocity pressure. Any change in

thermostat output shall result in a correspondingly linear change in the controlled air flow quantity.

- F. Titus, Carrier, or E.H. Price is an approved manufacture provided that additional costs associated with installing a 20 pound main control air line is included in the control contract for a pneumatic system. If any dispute arises regarding costs of 20 pound main control air line associated with the variable air volume valves the HVAC Contractor will absorb the costs.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION, EQUIPMENT**

Install in accordance with manufacturer's instructions.

#### **3.02 INSTALLATION, DUCTWORK**

- A. Seal all low velocity ductwork corner joints with Hard Cast #601 Iron Grip. Cover the corner openings with tape and mastic if the openings are too large to be sealed with mastic only such that the total duct leakage of the system does not exceed 5% of the total design volume. See paragraph 1.04 Design Conditions this section for duct sealing requirements.
- B. Where long sweep fittings cannot be installed, provide SMACNA Approved spilt runner adjustable single thickness blade turning vanes in all square and rectangular elbows and set for the proper angles. Blades shall be 2" apart with 1" extension on leaving air side or as described in SMACNA.
- C. Provide 45 degree entry converging tee boot fittings at all straight tap-in connections to the trunk duct where long radius takeoffs cannot be physically installed. Provide conical fittings at round duct takeoffs to trunk duct.
- D. This Contractor shall coordinate all work with the air balance and testing agency. (See Tests: Section B15050.) Furnish and install all volume dampers in locations required by the agency to adequately balance the system.
- E. Increase sizes of ducts lined with sound insulation so free area will correspond to dimensions shown on drawings.
- F. Provide copper flashing, or counterflashing, wherever required to make a watertight installation.
- G. Install all smoke pipe, prefabricated chimneys, and breechings as shown on the drawings.
- H. Install air thermometers at all central fan systems.
- I. All exhaust hoods and their ducts, which are exposed to the room they serve, shall be fabricated of #304, 18 gauge stainless steel. Entire hood to be heliarc welded with all joints ground smooth.
- J. Install flanged booster coils with an access door on the entering side of the booster coil.

- K. Install all supply ductwork tight to back of diffuser or grille to avoid leakage around diffuser or grille inlet which may cause marking of ducts, walls, or ceilings.
- L. Sleeves, Openings, Cutting, Patching, and Drilling: See Section B15050.
- M. Ductwork supported with threaded rod shall be provided with adjusting and locking nut. After ductwork is completed, adjusted and insulated as required, this contractor shall cut off excess support rod and grind smooth.

END OF SECTION

## **SECTION B15950**

### **AUTOMATIC TEMPERATURE CONTROL WORK**

#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION**

Provide Stafa hybrid DDC and pneumatic system of temperature control supplied and installed by ESI of Waukesha, WI (Contact Mr. Steve Davis 262-832-1326) in accordance with the Bid Documents and installed by equipment manufacturer and guaranteed direct to the owner for one (1) year from date of acceptance.

##### **1.02 RELATED WORK**

B15010 - Basic Mechanical General Requirements  
B15050 - Basic HVAC Materials and Methods  
B15990 - Testing, Adjusting, and Balancing

##### **1.03 WORK INCLUDED IN THIS SECTION**

- 2.01 Air Piping
- 2.02 Wiring
- 2.03 Thermostats
- 2.04 Receiver Controllers
- 2.05 Transmitters
- 2.06 Control Cabinet Enclosures
- 2.07 Automatic Control Valves
- 2.08 Automatic Dampers and Operators
  
- 3.01 Circulating Pump Control
- 3.02 Radiation Control
- 3.03 Unit Heater Control (Hot Water)
- 3.04 Occupied/Unoccupied Control
- 3.05 Booster Coil Control
- 3.06 Automatic Damper Control
- 3.07 Converter Control
- 3.08 Water Temperature Control
- 3.09 Smoke Detection System
- 3.10 Emergency Fan Shutdown
- 3.11 Testing, Adjusting, and Balancing Coordination

##### **1.04 SHOP DRAWINGS**

Submit the required copies of shop drawings which will indicate schematically the locations of all controls with their ranges and settings given. Each schematic drawing shall be fully described by typewritten sequence of operation.

#### **PART 2 - PRODUCTS**

##### **2.01 AIR PIPING**



- A. In exposed areas, such as storage rooms, equipment rooms, and rooms without ceilings, all pneumatic air piping shall be either hard drawn seamless metallic tubing, or polyethylene tubing, installed within a metallic raceway of either thin wall conduit (EMT), aluminum troughing with a snap-on cover or wiremold.
- B. Bare polyethylene tubing is acceptable for air piping in concealed areas above ceilings.
- C. All air piping shall be installed in a neat manner, run either parallel or perpendicular to the existing building lines and securely fastened to fixed members of the building structure at sufficient intervals to avoid excessive freedom of movement.
- D. All tubing installed in poured concrete, or concrete block walls shall be metallic tubing.
- E. All air piping located in finished areas shall be run concealed within walls or ceilings. All cutting and patching of existing surfaces and finishes shall be included.
- F. Connection point to steam valves shall have 6" copper whip to protect polyethylene tubing from coming in contact with steam valves.

## 2.02 WIRING

- A. See (Electrical) in Section B15050.
- B. All wiring located in finished areas shall be run concealed within walls or ceilings. All cutting and patching shall be included.
- C. See Section B15050: Codes and Standards.

## 2.03 THERMOSTATS

All room thermostats shall be Johnson Controls two pipe, relay, fully proportioning type with adjustable sensitivity. Dual thermostats, where required, shall have two independent sensing strips which shall be capable of being calibrated independently and at different temperatures. Thermostat covers shall be blank. All setpoint adjustments shall be concealed, except in private offices, or individually controlled areas, where the set points shall be adjusted externally. Verify all thermostat locations with the owner before completing the installations.

## 2.04 RECEIVER CONTROLLERS

All remote mounted receiver controllers shall be fully proportioning with adjustable sensitivity. Remote readjustable instruments shall have an adjustable ratio. Each controller shall be provided with a permanently connected means for indicating the exact point within the modulating range of which the controller is operating.

## 2.05 TRANSMITTERS

- A. All transmitters shall be capable of measuring the space or duct temperature and transmitting a pneumatic or electric signal directly proportional to the temperature. The range of the transmitter shall be 50°F or, when required, a wider range of 100°F. Each transmission system, consisting of transmitter and receiver combined shall have an accuracy of 1% of scale range. All transmitters shall be located at the point of measurement. All air sensors shall be equipped with 8" averaging bulbs. All immersion sensors shall be remote bulb type with liquid filled separable sockets. Rigid stem sensors will not be acceptable.

- B. Where transmitters are used in place of capillary thermostats, the transmitters shall be of the capillary type for both duct and immersion type mounting. All immersion type sensing bulbs are to be equipped with separable sockets.

#### 2.06 CONTROL CABINET ENCLOSURES

- A. All control cabinets shall be constructed with extruded aluminum alloy frames. All corners shall be securely riveted and supported by internal angle brackets. Internal butt joints around the door shall provide a 1/2" overlap seal around the cabinet frame. The cabinet shall have a removable face and back panel. The panels shall be made of aluminum bonded on both sides of plywood core. The face panel shall be held in place with continuous solid retaining bars. The panel hinges shall be run the entire height of the panel. A key locking latch shall be provided on all cabinets to insure only authorized access. All cabinets shall be Underwriters' Laboratories, Inc. listed for line voltage applications.
- B. All temperature and humidity indication, as called for in the control sequences, shall be installed on the face of the cabinet with a flush mounted 3-1/2" dial type thermometer chosen to match the transmitter range. Provide name tags to describe each reading.

#### 2.07 AUTOMATIC CONTROL VALVES

- A. All valve operators are to be fully proportional, unless otherwise specified. All operators are to fail safe, in either a normally open, or normally closed position in the event of control power failure. Where valves are operated in sequence with other valves, or dampers, they are to be equipped with pilot positioners, with adjustable ranges, for both throttling range and starting point.
- B. All radiator, fin pipe, or convector valves shall have operators fully concealed behind the cover. Valves 2" and smaller shall be of the screwed type.
- C. All valves shall be equipped with throttling plugs to provide linear flow characteristics. All operators shall be sized to insure smooth modulating of the valves.
- D. All water valves shall be sized for a maximum of 3 psi pressure drop, or as specifically sized on the drawings.
- E. All steam valves shall be sized for a maximum of 3 psi pressure drop, or as specifically sized on the drawings.

#### 2.08 AUTOMATIC DAMPERS AND OPERATORS

- A. Provide automatic dampers and operators as shown or indicated on drawings. Dampers shall be factory fabricated balanced type with formed double thickness galvanized steel or aluminum blades, with factory assembled linkages mounted in galvanized steel or aluminum frames. Blades shall have interlocking edges with compressible seals at the point of contact on both blade edges and ends. Rectangular dampers, 6" or more in a direction perpendicular to the axis, shall be louvered. Blades on louvered dampers must not be over 6" wide. Dampers shall not be more than 48" in length between bearings. Modulating dampers shall be of the opposed blade type. Two position dampers shall be parallel type.
- B. Dampers, when closed, shall be guaranteed by the manufacturer not to leak air in excess of 1/2% (based on 2000 FPM approach velocity and 4" w.g. static pressure).

- C. All dampers shall be sized by the control manufacturer in accordance with his recommendations. Any necessary blank-off plates or transitions, required to facilitate the standard size, shall be provided by the Sheet Metal Contractor.
- D. Positive positioners shall be installed on all damper motors where required to provide sufficient power and accurate sequencing.

### **PART 3 - EXECUTION**

#### **3.01 EXISTING CONTROL DEVICES**

- A. The bid for the control work shall be based on the premise that existing control devices are operational and are not in need of repair or replacement, unless otherwise noted.
- B. This subcontractor shall notify the architect / engineer and owner of existing control devices that need to be replaced or repaired that may be noted in the process of installation of the new work.

#### **3.02 TRAINING**

- A. The manufacturer shall provide factory trained instructor to give full instruction to designated personnel in the operation of the system installed. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. The manufacturer shall provide all students with a student binder containing product specific training modules for the system installed. All training shall be held during normal working hours of 8:00 am to 4:30 PM weekdays.
- B. Provide 4.0 hours of training for Owner's designated operating personnel. Training shall include:
  - 1. Explanation of drawings, operations and maintenance manuals
  - 2. Walk-through of the job to locate control components
  - 3. Operator workstation and peripherals
  - 4. DDC controller and ASC operation/function
  - 5. Operator control functions including graphic generation and field panel programming
  - 6. Explanation of adjustment, calibration and replacement procedures
  - 7. Student binder with training modules
- C. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available from the Manufacturer. If such training is required by the Owner, it will be contracted at a later date.

#### **3.03 CONTROL SEQUENCES - DESCRIPTION OF WORK**

- A. Control sequence is hereby defined to mean the manner in which, and methods by which, the automatic temperature control system shall function. The requirements for each type of operation are detailed in this section.
- B. All necessary operating equipment, devices and system components required for the automatic temperature control system shall be furnished and/or provided by the Automatic Temperature Control Subcontractor whether or not specifically itemized, in order to install a complete automatic temperature control system within the intent of this specification.

- C. The extent of the automatic temperature control system work shall be as shown on the drawings and in schedules and by the control performance requirements specified hereinafter in this section.

#### 3.04 VARIABLE AIR VOLUME BOX WITH REHEAT

- A. The sequence described here-within shall be furnished complete as described. The reheat portion shall connect for future use. All heating setpoints shall be a minimum of 50% and rooftop heating section shall be modulated.
- B. Furnish a two-way incremental modulating automatic valve for the reheat coil. (Provide three-way valves only as scheduled on drawings).
- C. VAV box operators shall be furnished by temperature control contractor and mounted in the field.
- D. Provide a remote adjustable setpoint room sensor that shall modulate the VAV box operator and the reheat coil automatic valve and in sequence to maintain setpoint.
- E. On a rise in space temperature above cooling setpoint, the room sensor shall modulate the VAV box from its minimum position to maximum open position (100%) while the reheat coil automatic valve remains fully closed.
- F. On a drop in space temperature toward cooling setpoint, the room sensor shall modulate the VAV box toward its minimum position.
- G. When the zone is between its cooling and heating setpoints, the VAV box shall be at minimum as scheduled.
- H. On a drop in space temperature below heating setpoint, the VAV box shall go to its heating position and the room sensor shall modulate the reheat coil automatic valve toward its fully open position.
- I. On a rise in space temperature toward heating setpoint, the VAV box shall remain at its minimum position and the room sensor shall modulate the reheat coil automatic valve toward its fully closed position.
- J. DDC signal (4mA to 20mA) of the VAV box and reheat coil automatic valve shall be arranged such that they do not overlap.
- K. This Contractor shall provide required wiring for proper operation of VAV box and the reheat coil valve.

#### 3.05 AIR HANDLING UNIT 1 (AHU-1)

- A. Each system consists of a draw-through air handling unit with a variable volume supply fan and return air fan with variable frequency drive (VFD), a HW heating coil, and a chilled water cooling coil.
- B. Furnish automatic dampers for the minimum and maximum outside air, return air, and discharge air ductwork a two-way modulating valve for the heating coil and two-way modulating valve for chilled water coil.

- C. Provide damper operators for the outside air, return air, and relief air dampers.
- D. System shall be indexed from occupied to unoccupied through the Building Automation System (BAS). In the occupied mode the unit shall run continuously. In the unoccupied mode it shall be cycled from the night thermostat, outside air damper shall be closed and return damper shall be fully open.
- E. Upon system start-up, the supply fan shall start and operate continuously, the VFD for the supply/return/exhaust fans shall be controlled as specified herein, the heating and cooling coil automatic valves shall become operable and the outside air, and return air dampers shall open to their respective minimum and maximum positions.
- F. The discharge air temperature setpoint shall be maintained at 55°F. (adjustable) by modulating the heating coil automatic valve, outside air, return air, exhaust air and cooling coil automatic dampers in sequence.
- G. The hot and chilled water valves shall be modulating.
- H. At outside temperatures lower than 55°F, the cooling shall be locked out.
- I. A differential floating dry bulb economizer shall position the outside air, return air and exhaust air dampers to their minimum and maximum positions. Provide an interlock to prevent the outside and air dampers from closing to minimum position when no cooling is available.
- J. A DDC system static pressure control program, with its sensors located two-thirds of the distance down the main supply ducts shall maintain a setpoint of 1" (adjustable) water column static pressure by modulating the VFD of the supply fan and VFD of the return air fan. Verify location of sensor with test adjusting and balancing contractor.
- K. A dedicated DDC static pressure high limit controller with manual reset (not used for any other static pressure control function) shall shut down the supply fan when the static pressure in the ductwork at the supply fan exceeds 2" water column (adjustable).
- L. A manual reset, low temperature protective thermostat(s), with a 20 ft. element located at the discharge of the heating coil, shall cause the system to shut down upon sensing a coil discharge temperature of less than 40°F.
- M. Upon system shutdown, the supply and return-exhaust fans shall stop, the outside air and relief air dampers shall close fully, the return air damper shall open fully, the cooling coil automatic valve shall assume its fully closed position and the heating coil automatic valve shall open; a solenoid valve wired into the supply and return-exhaust fan motor starter holding coil circuit shall provide a positive interlock for the shutdown of the automatic dampers.
- N. All components required for control of this system shall be installed in a temperature control panel located in 3<sup>rd</sup> Floor Mechanical Room.
- O. Mount supply and return air smoke detector furnished by E. C. that shall shut down the supply and return-exhaust fan when smoke is detected in the ductwork. All wiring of smoke detector by Electrical Contractor (see Division 16000).

### 3.06 CIRCULATING PUMP CONTROL

The heating system circulating pumps piped in parallel shall start through a pressure electric switch to operate continuously whenever the outside temperature is below 65°F, to provide heating during heating season. Above 65°F outside the circulating pumps shall operate continuously only on the day cycle. Provide a Hawkeye current based flow detection system across each pump to sound an alarm to the DDC building system in the event that either pump fails.

### 3.07 RADIATION CONTROL

Single type room thermostat shall control automatic radiator valve by gradual action to maintain room temperature. Perimeter radiation shall be the second stage of heating. For all existing steam radiation provide new automatic, modulating, control valve. Install to be done by HVAC Contractor.

### 3.08 OCCUPIED/UNOCCUPIED CONTROL

Occupied/unoccupied zone control, where required, shall be accomplished via software of the DDC building management system.

### 3.09 BOOSTER COIL CONTROL

All reheat booster coils shall be controlled from room thermostats. Auxiliary radiation, if installed in the same room supplied by a reheat booster coil, shall be modulated closed after the coil valves are fully closed, unless the radiation in the room is thermostatically controlled separately as indicated on the drawings.

### 3.10 AUTOMATIC DAMPER CONTROL

- A. Arrange to close all outside and exhaust air dampers whenever the supply or exhaust fan is stopped using frame-mounted linkage. Face-mounted L-brackets shall not be acceptable.
- B. Provide a return air thermostat for all air handling systems which will keep all outside and exhaust air dampers closed, and will prevent any exhaust fans on the zone from operating until the return air temperature has reached 70°F.

### 3.11 CONVERTER CONTROL

- A. Provide a dual outside/inside controller with adjustable ratio to vary the converter water temperature in accordance with outside temperatures by modulating the automatic steam valve to provide 210°F water at -10°F outside and reduce to 130°F at 65°F outside. The outside / inside controller shall be field adjustable.
- B. Converters with two (2) automatic steam valves in parallel shall be arranged to sequence the smaller valve to an open position first. Size valves for 1/3, 2/3 of load.

### 3.12 WATER TEMPERATURE CONTROL

Provide a dual outside/inside controller with adjustable ratio to automatically vary the supply water temperature in accordance with the outside temperatures by modulating the three-way mixing valve to provide 210°F water at -10°F outside and reduce to 130°F at 65°F outside. The valve shall be normally open to boiler water.

### 3.13 SMOKE DETECTION SYSTEM

- A. Electrical contractor shall furnish and install duct mounted smoke detectors for all air handling units and exhaust fans 2,000 CFM or greater. HVAC contractor shall mount sampling tubes and provide an access panel on both inlet and outlet of each smoke detector.
- B. On detection of combustion gases, the detector shall first stop the associated fan, then slowly close the supply and return smoke dampers to prevent duct rupture, and annunciate at the building automation center or fire control panel. All smoke detection wiring, both line and low voltage shall be run in conduit, per Section 16000.

### 3.14 EMERGENCY FAN SHUTDOWN

The Controls Contractor will arrange pneumatically or electrically to shut down all fans (as indicated on the Motor-Starter Schedule) from a Fire Emergency Switch which shall be located near the entrance. The switch shall be properly identified as to its purpose.

### 3.15 TESTING, ADJUSTING, AND BALANCING COORDINATION

This Contractor shall assist the Balancing Agency by completing all control work as follows:

1. Verify that all control components are installed in accordance with project requirements and are functional.
2. Verify that all controlling instruments are calibrated and set for design operating conditions.
3. Calibrate room thermostats after installation, and before the thermostat control verification tests are performed. The balancing agency shall prove the accuracy of final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.
4. Allow sufficient time in the project to provide assistance and instruction to the balancing agency in the proper use and setting of control components.

END OF SECTION

## SECTION B15990

### TESTING, ADJUSTING, AND BALANCING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

##### *CHOOSE ONE OF THE FOLLOWING PARAGRAPHS*

- A. Applicable requirements of instructions to bidders, Conditions of Contract, and of sections listed under General Requirements apply to work specified in this section. All work shall be bid separately as an independent contract.
- B. All work shall be bid as an integral part of the Mechanical Contractor's total contract.
- C. Provide all work necessary to test and adjust the systems to the final water and air quantities indicated on the Bid Documents.

##### 1.02 RELATED WORK

- B15010 - Basic HVAC General Requirements
- B15050 - Basic HVAC Materials and Methods
- B15950 - Automatic Temperature Control Work

##### 1.03 WORK INCLUDED IN THIS SECTION

- 3.01 Hydronic Balancing
- 3.02 Air Balance
- 3.03 Reports
- 3.04 Equipment and Procedures
- 3.05 Guarantee

##### 1.04 GENERAL SCOPE

- A. This Contractor shall be an independent hydronic and air testing agency, meeting the following minimum requirements:
  - 1. All work performed in this section shall be in accordance with Wisconsin Administrative Code ILHR 64.53.
  - 2. The Contractor shall be certified as a member of Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or have at least three (3) years of independent practice.
  - 3. Upon request, provide a list of projects completed by the Contractor indicating building square foot areas, air quantities in CFM, and types of air systems that are similar in scope to this project.
  - 4. The Contractor shall specialize in the testing, adjusting, and balancing of heating, ventilating, and air conditioning systems and all work shall be done under the direct



supervision of a qualified heating and air conditioning Engineer employed by the Contractor.

5. This Contractor shall not be associated with the same Contractor installing the hydronic, or air system.

## **PART 2 - PRODUCTS**

None

## **PART 3 - EXECUTION**

### **3.01 HYDRONIC BALANCING**

- A. The Mechanical Contractor shall fill and vent the entire system ready for balancing. This Contractor shall check all systems completely. The following minimum requirements shall serve as a guide check:
  1. Verify system pressures, air venting, correct water circulation through boilers, chillers, towers, pumps, coils, piping, etc.
  2. Check and verify cleanliness of the system and its chemical condition.
  3. Check all temperature controls for setting and operation. Request the assistance of the controls contractor to verify the settings and to assist in operating the system as herein requested.
  4. Check the accuracy of the thermostat settings by taking at least 20% of all temperature readings in a typical space for each separately controlled zone. See Section B15950.
- B. After the system has been prepared as stated above, proceed to provide these minimum requirements:
  1. Check water flow rates through equipment by pressure drops, flow meters, curves, or amperage on the following equipment:
    - a) Converters
    - b) Pumps
    - c) Coils
    - d) Flow Meters
  2. Advise the A/E immediately of any unusual conditions which will affect the balancing of the system.
  3. Adjust all flows, and mark all balancing valve settings with permanent indicating marks. Highlight all indicating marks with over-spray of paint.
- C. When the temperature is below 15°F outside, and after proper notification by the A/E, this Contractor shall recheck the heating system at no additional cost to the Owner.

- D. When air conditioning is required, and after proper notification by the A/E, this Contractor shall recheck the chilled water system at no additional cost to the owner.

### 3.02 AIR BALANCE

This Contractor shall prepare all air systems for balancing in the following manner:

1. Open all existing volume dampers to open position. Inspect all fire and smoke positions.
2. Check all filters, automatic damper positions, and fan rotations.
3. Test and adjust blower speeds, running amperage, and adjust the system for design CFM. Make allowances for excess air at the central fan systems for duct leakage. Record leakage value in report.
4. Install Venlok instrument test openings and make pitot tube traverse of all main and branch supply, return, and exhaust ducts.
5. Test static pressures at various points at all central fan systems.
6. Adjust all zones to provide proper design CFM for supply, return, and exhaust.
7. Test and adjust all air diffusers, grilles, and outlets to within +5% of design requirements.
8. Test and adjust air velocities in each room and adjust to minimize air drafts.
9. Check all operating controls for setting and operation.
10. Test the system with mixing dampers in the minimum outside air position, 50% open and 100% open.
11. Test for possible air stratification on the central fan systems and advise the Ventilating Contractor of baffles, or other devices, required to minimize this condition.
12. Mark the setting of the volume damper with an over-spray of paint to highlight the position of the arm.
13. Balance variable air volume boxes to minimum and maximum setting and record in Balancing Report.

### 3.03 REPORTS

- A. Report all finally adjusted test data and information on standard AABC report forms. Where such forms are unavailable, the Contractor shall develop printed, or typewritten forms on standard sheet sizes. Enclose all reports in a vinyl covered folder of the type which will allow reports to be inserted or removed as required. Submit four (4) copies of the report to the A/E for review.
- B. Report data shall include the following minimum data:
1. Instruments used and their calibration dates.

2. Fan design CFM and static pressure.
3. Outlet and inlet total design CFM and static pressures.
4. Actual fan CFM and static pressure.
5. Outlet and inlet actual total CFM and static pressures.
6. Fan and motor nameplate data, actual RPM fan and motor, amps, BHP, pulleys, and belt sizes.
7. Complete fan profiles at all conditions of CFM, maximum and minimum volume with 100% outside air and minimum outside air.
8. Duct traverse sheets with all traverses included.
9. VAV box design and actual CFM at maximum and minimum CFM.

#### 3.04 EQUIPMENT AND PROCEDURES

- A. The Contractor shall provide his own, or rented, instruments necessary to effect a complete water and air balance. All instruments shall have been calibrated within the previous three (3) months, and certification of the calibration shall be sent to the A/E upon request.
- B. The Mechanical or Ventilating Contractor shall replace any fixed and/or adjustable sheaves with new fixed sheaves and belt drives as necessary to achieve the design air quantities. All V-belt drives shall be inspected, and any drive with an unbalanced belt loading shall be replaced with a matched set of belts. All work shall be done at no additional cost to the owner.
- C. The Ventilating Contractor shall provide all additional volume dampers, turning vanes, and baffles as required to air balance the new system.
- D. The Mechanical Contractor shall provide all balancing valves, thermometers, pressure gauges, chemical cleaners, and shall fill all systems with water prior to water balancing.

#### 3.05 GUARANTEE

The Contractor shall guarantee that the system will be tested, adjusted, and balanced to the values as set forth on the plans and specifications; and that all data reported is accurate and can be verified at the project.

END OF SECTION

## SECTION C15010

### BASIC FIRE PROTECTION GENERAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Applicable requirements of instruction to bidders, conditions of contract and of Sections listed under related Sections of this Division apply to all work specified in this Division 15000.

##### 1.02 RELATED SECTIONS OF THIS DIVISION

C15010 - Basic Fire Protection General Requirements

C15050 - Basic Fire Protection Materials and Methods

C15400 - Fire Protection Systems

##### 1.03 RELATED WORK OF OTHER SECTIONS OR DIVISIONS

Division 1

A15000 - Plumbing

B15000 - HVAC

16000 - Electrical

##### 1.04 WORK INCLUDED IN THIS SECTION

1.05 Work Not Included In This Section

1.06 Reference Standards

1.07 General Requirements

1.08 Visiting the Premises

1.09 Codes and Regulations

1.10 Discrepancies

1.11 Certifications

1.12 Workmanship and Materials

1.13 Manufacturer's Recommendations

1.14 Design Criteria

2.01 Submitted Data and Shop Drawings

2.02 Maintenance Manuals

3.01 Openings, Cutting, and Repairing

3.02 Cleaning Equipment and Materials

3.03 Cleanup

3.04 Record Drawings

3.05 Protection

3.06 Guarantee

##### 1.05 WORK NOT INCLUDED IN THIS SECTION

- A. Temporary Utilities and Services (Refer to Division 1 Requirements)
- B. Electrical, Line Voltage Wiring
- C. Painting (unless specified otherwise)

#### 1.06 REFERENCE STANDARDS

NFPA 72 Installation, maintenance and use of protective signaling systems

Refer to 15060A for pipe and fitting reference standards.

NFPA 13 Installation of sprinkler systems.

#### 1.07 GENERAL REQUIREMENTS

- A. This is a Performance Specification for a contractor Design/Build Fire Sprinkler System remodeling. This fire protection contractor shall be the engineer of record as well as the contractor for the fire sprinkler system and related components. This section of the specifications is intended to establish a standard and a level of quality for bidding purposes and for construction. This Section of the work shall be responsible for preparing installation drawings, complete code-compliant design, engineering and construction coordination with other trades, hydraulic calculations, and submission of same to local, State, and insurance agencies having jurisdiction. Refer to Plumbing Plans for area to be remodeled. Refer to Architectural reflected ceiling plans for preferred sprinkler locations/patterns.
- B. In all exposed structure ceilings, sprinkler piping shall be installed as concealed as possible to ensure an unobtrusive, aesthetically appealing installation. Refer to structural plans and coordinate piping locations and purlin and beam penetrations prior to construction.
- C. Obtain information on conditions affecting work at building, including the following:
  - 1. Complete information as to details of building constructions, pipe and equipment layout, in order to install and revise existing system to clear structural work and piping of equipment of other trades.
  - 2. Accessibility: Minor deviations from the drawings may be made to allow for better and more coordinate accessibility. Changes of magnitude which may affect the work of other Contractors shall not be made without authorized approval.
  - 3. Storage Space: Stored materials shall be located so as to facilitate prompt inspection. See Conditions of Contract.
- D. On all conditions affecting work, obtain at building conditions of structure and surfaces to support pipe and equipment.
  - 1. Examine details of building construction in order to install system to clear all structural work and finished work.
  - 2. Examine electrical, heating and ventilating and special equipment and piping layouts and specifications.

#### 1.08 VISITING THE PREMISES

- A. The Contractor, before submitting his bid on the work, must visit the site and familiarize himself with all visible existing conditions.
- B. As a result of having visited the premises, the Contractor shall be responsible for the installation of the work as it relates to such visible existing conditions.
- C. The submission of a bid will be considered an acknowledgment on the part of the bidder of his visitation to the site.

#### 1.09 CODES AND REGULATIONS

- A. Design, materials and installation shall comply with National Fire Protection Association (NFPA) Standards, State and local codes, local Fire Chief or Fire Marshall.
- B. Inspection and approval of detailed plans of installation with insurance approval shall be submitted to Architect prior to installation.

#### 1.10 DISCREPANCIES

- A. The drawings and specifications are intended to cooperate. Any materials, equipment or systems related to this Section and exhibited on the Architectural and Fire Protection Drawings, but not mentioned in the Specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the Specifications and set forth on the Drawings. In the event of differences in the requirements between drawings, specifications, NFPA, State and Local codes or insurance agency, the more stringent requirement shall apply.

#### 1.11 CERTIFICATIONS

- A. Fire protection system components shall be UL listed and labeled. All components shall be Factory Mutual approved with the exception of sprinkler heads, double check valves and air compressors.

#### 1.12 WORKMANSHIP AND MATERIALS

- A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. The Contractor shall furnish the services of an experienced superintendent who will be constantly in charge of the erection of the work until completed and accepted.
- B. Unless otherwise hereinafter specified, all materials and equipment under this Division of the Specifications shall be new, or best grade and as listed in printed catalogs of the manufacturer. Each article of its kind shall be the standard product of a single manufacturer.
- C. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating.
- D. Reference to standards are intended to be the latest revision of the standard specified.
- E. Promptly inspect all shipments to insure that the materials being received are undamaged and comply with specifications.

#### 1.13 MANUFACTURER'S RECOMMENDATIONS

- A. Equipment installed under this Division of the Specifications shall be installed according to manufacturers' recommendations.

#### 1.14 DESIGN CRITERIA

- A. Remove existing sprinklers & piping from the area to be remodeled.
- B. Design and install a fully operational, code compliant, approved, complete hydraulically designed automatic sprinkler system for entire remodeling area and as needed outside the remodeling area due to HVAC work, as indicated on plumbing drawings.
- C. Water Supply: (Existing Fire Pump System)
  - 1. Existing Fire Pump Capacity: 1,000 GPM.
  - 2. Existing Fire Pump suction pressure at 0 GPM = 62 PSI.

3. Existing Fire Pump suction pressure at 1,578 GPM flowing = 48 PSI, (150% of Fire Pump rated capacity).

Verify all design criteria prior to installation drawing preparation and calculation. Perform flow tests if required for positive verification.

## PART 2 – PRODUCTS

### 2.01 SUBMITTED DATA AND SHOP DRAWINGS

- A. General: Refer to Division 1 requirements. Five (5) copies of each of brochures, shop drawings and material lists as required by the specifications, shall be prepared and submitted to the Architect for review within 30 days after award of the Contract. No work indicated on any one shop drawing shall be started until such drawings have been reviewed by the A/E.
- B. This contractor shall review all the shop drawings for complete compliance to the drawings and the specifications before submitting the drawings to the A/E. The contractor's review shall verify the following:
  1. All items requiring submittal are included in first submittal.
  2. Equipment being submitted was specified.
  3. Quantities submitted are correct.
  4. Sizes and capacities are as specified.
  5. Electrical characteristics have been checked with the electrical contractor, or verified at the site.

Any deviations from the drawings or the specifications shall be pointed out and provided with an explanation with the submittal.

- C. The contractor shall stamp the shop drawings with his own review stamp, or submit a separate statement that the enclosed shop drawings have been reviewed in accordance with the specifications. The shop drawings shall not be reviewed without the contractor's review stamp or written statement.
- D. Final review of the drawings by the A/E or his representative shall not relieve the contractor from the responsibility of complying with the requirements of the drawings and specifications.
- E. Submittal Data:
  1. Submit complete brochures giving names of manufacturers and catalog figure numbers, trade names, technical data and requested information of each item listed as follows:
    - a. Sprinklers
    - b. Tags, Labels and Signs
    - c. Installation Drawings and Calculations
    - d. Spare Sprinkler Cabinet.
  2. Submit shop drawings and detail description of items which are not manufactured and which have to be specifically fabricated.
  3. Submit a list of all material as specified; not covered by brochures or shop drawings.
  4. Submittal data shall be referenced to section and paragraph numbers of the specifications and to fixture and equipment numbers listed or scheduled and shall be assembled in

numerical order of the specification paragraphs. Submittals shall be bound in sets between cover and all sets within a section shall be identical.

5. Where equipment manufacturers named as equivalent or approved equal are proposed for use by the Contractor, he shall be responsible to coordinate the change with all trades affected. He shall submit for approval 1/4 inch scale working drawings of equipment rooms plan and section.
6. Prior to start of work, Contractor shall obtain approval of installation drawings from Owner's Insurance Company, Local Authorities having jurisdiction and Architect/Engineer.

## 2.02 MAINTENANCE MANUALS

- A. Maintenance manuals, instructional data and operating instructions for equipment and materials in this Section shall be assembled by trade and delivered to the following:
  - Three (3) copies to the Owner

## PART 3 – EXECUTION

### 3.01 OPENINGS, CUTTING, AND REPAIRING

- A. This Contractor shall cooperate with the work to be done under other Sections in providing information as to openings required in walls and floors for all piping and equipment, including sleeves where required.
- B. Any drilling or cutting required for the performance of work under this Section shall be the responsibility of this Contractor and the cost thereof shall be borne by him.
- C. It shall be the responsibility of this Contractor to ascertain that all chases and openings are properly located.
- D. This Contractor shall provide and patch all wall, floor and ceiling openings for installation of Fire Protection equipment in the existing building, unless this work is specifically mentioned to be done by another Contractor.
- E. This Contractor shall remove and replace suspended ceiling tiles and supports as required to install new Fire Protection work. This Contractor shall pay for repair of any unnecessary damage.
- F. Finished conditions shall be not less than existing conditions.

### 3.02 CLEANING EQUIPMENT AND MATERIALS

- A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work.
- B. All piping, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.

### 3.03 CLEANUP

- A. Remove from the premises all unused material and debris resulting from the performance of work under this section. Refer to Division 1 requirements.

### 3.04 RECORD DRAWINGS

- A. Record drawings, showing dimensions, locations of all piping, plugged outlets and equipment shall be kept up-to-date. Master copy shall be kept on the job. No fire protection progress



payments will be approved unless record drawings are up-to-date. Refer to project record drawings under Division 1 General Conditions.

3.05 PROTECTION

- A. Open ends of all piping must be effectively closed and kept closed during construction.

3.06 GUARANTEE

- A. All materials and equipment provided and/or installed under this Section of the Specifications shall be guaranteed for a period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.
- B. In the event of occupancy by the Owner prior to final acceptance of the project, the guarantee date for equipment placed in operation shall be mutually agreed to by the Contractor and the Owner's representative.

End of Section C15010

## SECTION C15050

### BASIC FIRE PROTECTION MATERIALS AND METHODS

#### PART 1 - GENERAL

##### 1.01 RELATED SECTIONS OF THIS DIVISION

C15010 - Basic Fire Protection General Requirements

C15400 - Fire Protection Systems

##### 1.02 WORK INCLUDED IN THIS SECTION

2.01 Sleeving and Fire Stopping

2.02 Hangers and Inserts

2.03 Identification

2.04 Escutcheons

2.05 Electric Wiring

3.01 Installation

3.02 Hanger Support and Spacing

3.03 Tests

#### PART 2 - PRODUCTS

##### 2.01 SLEEVING AND FIRE STOPPING

A. All penetrations of walls, floors, or roofs shall be done by use of sleeves manufactured for that purpose. Sleeves in concrete, masonry, or precast concrete shall be Schedule 40 steel pipe. All other sleeves to be #22 gauge galvanized steel.

B. Installation:

1. Provide clearance of 1/2" around piping.

2. Each sleeve to pass through entire floor, wall, or roof construction and end to be set flush with surrounding surface in which it is installed; sleeves through floors must project 2" above finished floor.

3. Fire rated floor and wall penetrations: Fill opening between pipe and sleeve with Nelson CLK or Tremco or 3M Fire Stop material. Fire and smoke rating of sealant shall match rating of wall or floor being penetrated.

##### 2.02 HANGERS AND INSERTS

A. Vertical support and bracing for steel risers shall be by use of carbon steel riser clamps at every floor and braced laterally at every floor or midspan, B-Line B3373, Grinnell 261.

B. Horizontal lines shall have hangers and rods adequate for size, material, and service. Total weight of equipment, including valves, fittings, pipe, pipe contents, and insulation, are not to exceed the limits indicated.

Hanger Rod Sizes (Per NFPA-13, Table 2-6.4)

1" to 4" = 3/8" diameter rod

5" to 8" = 1/2" diameter rod

C. All supports, guides, brackets, and braces shall be adequately fastened to the structure. No work shall be supported from any structural bridging angles.

Basic Fire Protection Materials and Methods

D. Pipe Hangers and Supports:

1. Swivel Ring, UL listed specifically for Fire Protection, all sizes.
2. Multiple or Tapeze Hangers:
  - a. Steel strut channels by B-Line or Grinnell.
3. Floor Support:
  - a. Carbon steel pipe saddle, stand and bolted floor flange.

E. Beam Clamps:

1. MSS SP-69 Types 19 and 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick with a retaining ring and threaded rod of 3/8, 1/2 and 5/8 inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Grinnell 86/92.
2. MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2" diameter. B-Line B3054, Grinnell 228.

F. All anchors, hangers, and supports to be designed to meet local structural requirements and Architect's approval.

G. All hangers of one type shall be catalog items of one manufacturer.

H. No pipes shall be hung or supported by other pipe or ductwork.

2.03 IDENTIFICATION

- A. Identification of all systems and valves shall be by means of purchased signs that shall indicate portions controlled by each valve or riser, list design criteria, valve duty, etc. in conformance with NFPA and F.M. standards.
- B. Signs shall be 0.022 aluminum, red and white Argco Trim-Line or approved equivalent.

2.04 ESCUTCHEONS

- A. Provide on all pipe passing through finished floor, walls, and ceilings with outside diameter sufficient to cover sleeved openings and inside diameter to fit snugly around pipe.

2.05 ELECTRIC WIRING

- A. All line voltage wiring shall be by Electrical Contractor; Fire Protection Contractor shall furnish wiring diagrams to Electrical Contractor for electric equipment furnished.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. As per NFPA rules and regulations and insurance carrier recommendations.
- B. Cutting and boring through structural members shall be done only when approved by and under supervision of Architect and/or Structural Engineer.
- C. Size, apply and install supports and anchors in compliance with manufacturer's recommendations.
- D. Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands.
- E. Coordinate hanger and support installation to properly group piping of all trades.
- F. Perform welding in accordance with standards of the American Welding Society.

Basic Fire Protection Materials and Methods

3.02 HANGER AND SUPPORT SPACING

- A. Place hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.
- B. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.
- C. Support riser piping independently of connected horizontal piping.
- D. Space hangers for pipe as follows (NFPA-13, Table 4-14.2.2.1):

<u>Pipe Material</u>	<u>Pipe Size</u>	<u>Maximum Horizontal Spacing</u>	<u>Maximum Vertical Spacing</u>
Steel	1/2" through 1-1/4"	12' 0"	15' 0"
Steel	1-1/2" through 8"	15' 0"	15' 0"

3.03 TESTS

- A. Conducted as required in accordance with NFPA Standards.
- B. Test piping in sections or entire system as required by sequence of construction. Do not conceal pipe until it has been successfully tested. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Entire test must be witnessed by the **Architect's** representative.
- C. Use clean water and remove air from the piping being tested where possible. Measure and record test pressure at the high point in the system.
- D. Test system at 200 psi for 2 hours showing no leakage. Where system design is in excess of 150 psig, test at a pressure 50 psig above system design pressure.
- E. All pressure tests are to be documented on NFPA Contractor's Material and Test Certificate forms.

End of Section C15050

SECTION C15400  
FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.01 RELATED SECTIONS OF THIS DIVISION

C15010 - Basic Fire Protection General Requirements

C15050 - Basic Fire Protection Materials and Methods

1.02 WORK INCLUDED IN THIS SECTION

1.03 Kind and Quality of Materials

2.01 Pipe and Fitting Materials

2.02 Valves

2.03 Sprinklers and Cabinets

3.01 Installation

3.02 Valving

3.03 Protection of Finished Work

1.03 KIND AND QUALITY OF MATERIALS

A. Materials, appliances, and fixtures to be new, of best quality and grade, in strict accordance with specification requirements.

PART 2 - PRODUCTS

2.01 PIPE AND FITTING MATERIALS

A. Pipe and pipe fittings are to conform to the appropriate commercial standards or Federal or American Society for Testing Materials specifications listed.

B. Overhead Distribution: Black steel pipe; 2" and under Allied Super 40, ASTM A135/A795, Type E, Grade A (or American Tube Dyna-Thread-40 equivalent). 2-1/2" and larger Allied Super Flo ASTM 795, Type E, Grade A (or American Tube Dyna-Flow-10 equivalent).

C. Malleable Iron Class 150 ASTM A197/ANSI B16.3 or cast iron Class A, ASTM A126 threaded fittings and pipe ends for 1" thru 2" sizes. Victaulic (Central or Gruvlok) couplings and mechanical grooved end fittings with EPDM gaskets for sizes 2 1/2 inch and larger. Gaskets for mechanical joints on dry systems shall be EPDM, flush seal.

D. Absolutely no threading of Schedule 10 or thin wall pipe and no plastic pipe allowed.

E. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.

F. Unions and Flanges:

1. 2" and smaller steel: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.

2. 2-1/2" and larger: ASTM A181 or A105, Class 150, grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. ANSI B16.1 or ANSI B16.5, Class 150 cast iron threaded flanges. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring

or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment.

## 2.02 VALVES

- A. Valve manufacturers: Kennedy, Milwaukee, Nibco, Stockham, Central, Watts.
  - 1. Drain valves shall be NIBCO KT65-UL, Milwaukee #536, bronze globe type, or Milwaukee #5361 angle globe.
  - 2. Valves shall be suitable for tamper-switch installation on main and floor control valves.

## 2.03 SPRINKLERS AND CABINET

- A. New sprinklers as manufactured by Viking, Star, Central, or approved equal.
- B. Sprinklers:
  - 1. Suspended Ceilings: Viking Micromatic Model "M" recessed pendant, polished chrome finish. Sprinkler with Viking Model E-1, recessed, white enamel finish escutcheon.
  - 2. Exposed Areas without Ceilings: Viking Model "M" upright, bronze.
  - 3. Sidewall Sprinklers: Viking Model "M", chrome finish.
  - 4. Flexible Sprinkler Connector: Commercial Ceiling Flexhead by Flexhead Industries Series 205/205-SS.
- C. Use Quick Response Sprinklers where applicable.
- D. Select fusible link temperature rating to not exceed maximum ambient temperature rating allowed under normal conditions at installed location. Provide ordinary temperature (165°) fusible link except at skylights, sealed display windows, attics and roof spaces, over cooking equipment, adjacent to diffusers, unit heaters, uninsulated heating pipes or ducts, or where other heat sources exist.
- E. Cabinets: Furnish and install one (1) red enameled steel sprinkler cabinet having spare sprinklers, which include all types and ratings installed. Also include a special wrench for removal and installation. Cabinet to be wall mounted; install on wall next to sprinkler riser or as directed by Building Maintenance. Quantity of heads as per NFPA 13, 2-2.7.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install piping so that system can be drained. Where possible, slope to main drain valve. Slope dry pipe and preaction systems subject to freezing at minimum 1/4"/10' on mains and 1/2"/10' on branches. Where piping not susceptible to freezing cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or valve/nipple/cap for drainage over 5 gallons. Pipe main drain valves to grade or to air gap sewer.
- B. Sprinklers: Locate sprinkler heads as indicated on fire protection plan and reflected ceiling plan maintaining minimum clearances from obstructions, ceilings and walls. Install sprinkler heads level in locations not subject to spray pattern interference. Where sprinklers are to be installed in suspended ceilings, sprinklers shall be located in the center of 2' x 2' tiles and in the center of 2' x 2' half of 2' x 4' tiles.

### 3.02 VALVING

- A. Valving: Approved type test valves, control valves, and drain valves at points required throughout system. All points of system shall be able to be drained through drain valves. All drain valves shall be exposed to view below ceilings of mechanical or storage spaces.

3.03 PROTECTION OF FINISHED WORK

- A. Repair, replace, and pay for breakage of glass, patching, and repairing of all damage to finished work caused by this Section of the work.

End of Section C15400

## SECTION 16001

### GENERAL ELECTRICAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SCOPE

- A. All requirements of Division 1 govern work under this Section.

##### 1.02 GENERAL PROVISIONS

- A. In general, the work includes: Electrical work and the kindred materials and operations as indicated on the drawings and as specified in the following articles of Section 16000, 16100, 16515, 16722, 16751 and 16950.
- B. Job Information: Obtain at building including:
  - 1. Conditions affecting this Section of the Work.
  - 2. Accessibility
  - 3. Storage space.

##### 1.03 GENERAL REQUIREMENTS

- A. This Section of the Specifications applies to all electrical work. The General Conditions, Supplementary Conditions, Summary of the Work, Instructions to Bidders and all Sections of the Conditions of the Contract form a part of these specifications and the Contractor shall consult them in detail. Electrical work indicated in other Sections of the Specifications to be done by the Electrical Contractor shall be included in the Work of this Section.

##### 1.04 DEFINITIONS

- A. Certain terms used herein; on the drawings; and in the contract documents, shall be defined as follows:
- B. Provide: Furnish and install complete and ready for service.
- C. Exposed: Exposed to view in any room, hallway, passageway, or outside.
- D. Approval: The approval of the Architect in writing or by signed rubber stamp applied to drawings, illustrations, etc.

##### 1.05 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. These specifications and attendant drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material necessary for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

##### 1.06 DRAWINGS

- A. The Electrical drawings do not attempt to show the complete details of building construction which affect the electrical installation. The Contractor shall refer to the architectural, civil, structural and mechanical drawings for additional details which affect the proper installation of this work. The Contractor is cautioned that diagrams showing electrical connections



and/or circuiting are diagrammatic only and must not be used for obtaining lineal runs of wire to conduit. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.

#### 1.07 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and of the quality used for the purpose in good commercial practice, and shall be standard product of reputable manufacturers. Each major component of equipment shall have the manufacturer's name, catalog number, and capacity or rating on a nameplate, securely affixed on the equipment in a conspicuous place.

#### 1.08 SUBSTITUTION AND APPROVAL OF MATERIAL

- A. See Instructions to Bidders.
- B. Such requests shall be accompanied by three copies of all necessary illustrations, cuts, drawings and descriptions of material proposed for substitution and shall fully describe all points in which it differs from the articles specified. Two copies will be retained by the Architect and one copy returned to the Contractor with approval or revisions indicated thereon.

#### 1.09 DAMAGE TO OTHER WORK

- A. The Electrical Contractor will be held rigidly responsible for all damages to the work of his own or any other trade resulting from the execution of his work. It shall be the Contractor's responsibility to adequately protect his work at all times. All damages resulting from his operations shall be repaired or the damaged portions replaced by the party originally performing the work, (to the entire satisfaction of the Architect), and all cost thereof shall be borne by the Contractor responsible for the damage.

#### 1.10 COOPERATION WITH OTHER TRADES

- A. This Contractor shall completely cooperate with all other trades in the matter of planning and executing of the work. Every reasonable effort shall be made to prevent conflict and interferences as to space requirements, dimensions, locations, openings, sleeving or other matters which tend to delay or obstruct the work of any trade.

#### 1.11 NEGLIGENCE

- A. Should the Contractor fail to provide materials, templates, etc., or other necessary information causing delay or expense to another party, he shall pay the actual amount of the damages to the party who sustained the loss.

#### 1.12 FIELD CHANGES

- A. Should any change in drawings or specifications be required to comply with local regulations and/or field conditions, the Contractor shall refer same to Architect for approval before any work which deviates from the original requirements of the drawings and specifications is started. In the event of disagreements as to the necessity of such changes, the decision of the Architect shall be final.

#### 1.13 CUTTING AND PATCHING IN NEW CONSTRUCTION

- A. As necessary and with approval to permit the installation of conduit or any part of the work

under this branch. Any cost caused by defective or ill-timed work shall be by the party responsible therefor. Patching of holes, openings, etc. resulting from the work of this branch shall be furnished by this contractor.

- B. See Division 1 for additional requirements.
- C. See also "Demolition, Renovation, and Disposition of Existing Equipment" in this Section.

#### 1.14 COMPLETION DATES

- A. This Contractor shall be in a position to meet all completion dates established by the Architect and shall furnish all labor of all classes required to meet such schedules and completion dates.

#### 1.15 STANDARDS, CODES AND PERMITS

- A. All work shall be installed in accordance with National, State and Local electrical codes, laws, ordinances and regulations. Comply with all applicable OSHA regulations.
- B. All materials shall have a U.L. label where a U.L. standards and/or test exists.
- C. Prepare and submit to all authorities having jurisdiction, for their approval, all applications and working drawings required by them.
- D. Secure and pay for all permits and licenses required.

#### 1.16 CLEAN-UP

- A. This Contractor shall at all times keep the premises free from excessive accumulation of waste material or rubbish resulting from his work, including tools, scaffolding and surplus materials, and he shall leave his work broom clean or its equivalent.
- B. In case of dispute, Architect may order the removal of such rubbish and charge the cost to the responsible contractor as determined by the Architect. At the time of final clean-up all fixtures and equipment shall be thoroughly cleaned and left in proper condition for their intended use.

#### 1.17 TESTS

- A. The Contractor shall provide all instrumentation, labor and conduct all tests required by the Architect. All tests shall be made before any circuit or item of equipment is permanently energized. Circuits shall be phased out and loads shall be distributed as evenly as possible on all phases. All phase conductors shall be entirely free from grounds and short circuits. All instrumentation and personnel required for testing shall be provided by the Contractor and all tests shall be conducted in the presence of the Architect or his authorized representative.
- B. System Tests:
  - 1. The following tests are required prior to energization of the electrical system:
    - a. Secondary feeders shall have an insulation resistance test utilizing a megger applying a test potential of 500 volts DC minimum.
    - b. Establish secondary phase to ground voltages.
    - c. Establish proper phase relationship and motor rotation.
  - 2. The following tests are required under normal load condition:

- a. Record secondary phase to phase and phase to ground voltages and phase currents at all major equipment, apparatus, and on all secondary feeders. Voltage readings shall be taken at line side terminals of distribution centers and panelboards.
  - b. Confirm proper phase relationship and motor rotation.
  - c. Confirm load balance at distribution centers and panels. Rebalance load if necessary such that the minimum unbalance between phases shall not exceed 7-1/2%.
  - d. Confirm operation of all electrically operated apparatus, such as circuit breakers, transfer switches, etc., by exercising same under load.
  - e. Record all settings and calibrations of circuit breakers, transfer switches, transformers, meters, timing devices, etc.
- C. Records:
1. All test data obtained by the E.C. or manufacturer/supplier shall be recorded and filed with the maintenance manual as part of permanent job records. Test data shall include identification of instruments employed (field test only), condition of test (time, date, weather, etc.), parameters of test, personnel conducting test, and any pertinent information or conditions noted during the test.

#### 1.18 SHOP DRAWINGS

- A. Submit to Engineer for review, copies of manufacturer's shop drawings and/or equipment brochure depicting:
  1. Lighting Fixtures
  2. Panelboards
  3. Occupancy Sensors
  4. Fire Alarm System Devices
  5. Telecommunications Equipment and Cabling
  6. Wiring Devices
  7. Other materials at the request of the Engineer
- B. See Section 01300.
- C. Shop drawings shall bear the Contractor's stamp indicating approval.
- D. Any equipment fabrication prior to shop drawing review shall be at the Contractor's risk.

#### 1.19 WORKMANSHIP

- A. The installation of all work shall be made so that its several component parts will function as a workable system complete with all accessories necessary for its operation, and shall be left with all equipment properly adjusted and in working order. The work shall be executed in conformity with the best accepted standard practice of the trade so as to contribute to efficiency and appearance. It shall also be executed so that the installation will conform and adjust itself to the building structure, its equipment and its usage.

#### 1.20 DRAWINGS OF OTHER TRADES

- A. The Contractor shall consult the drawings of the work for the various other trades; field

layouts of the parties performing the work of the other trades; their shop drawings, and he shall be governed accordingly in laying out his work.

- B. Specifically examine shop drawings to confirm voltage, current characteristics, and other wiring requirements for utilization equipment. Bring any discrepancies to the attention of the A/E.

#### 1.21 FIELD MEASUREMENTS

- A. The Contractor shall take all field measurements necessary for his work and shall assume the full responsibility for their accuracy.

#### 1.22 STRUCTURAL INTERFERENCES

- A. Should any structural interferences prevent the installation of the outlets, running of conduits, etc., at points shown on drawings, the necessary minor deviation therefrom, as determined by the Architect, may be permitted. Minor changes in the position of the outlets or equipment if decided upon before any work has been done by the Contractor shall be made without additional charge.

#### 1.23 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

- A. Before submitting a bid, the Contractor shall visit the site and familiarize himself with all features of the building and site which may affect the execution of his work. No extra payment will be allowed for the failure to obtain this information. If in the opinion of the Contractor there are omissions or errors in the plans or specifications, the Contractor shall clarify these points with the Architect before submitting his bid. In lieu of written clarification by addendum, resolve all conflicts in favor of the greater quantity or better quality.

#### 1.24 GUARANTEE

- A. The Contractor shall unconditionally guarantee his work and all components thereof, excluding lamps, for a period of one year from the date of his final payment. He shall remedy any defects in workmanship and repair or replace any faulty equipment which shall appear within the guarantee period to the entire satisfaction of the Architect at no additional charge.

#### 1.25 TEMPORARY WIRING AND SERVICE

- A. No temporary electrical service is required on this project. The existing electrical distribution system in the Dane County City-County Building shall provide any power required for construction.
- B. All contractors shall provide and maintain their own extension cords and additional lamps as required to perform his work properly. Contractors requiring temporary connections to 3 phase power service and single phase feeders for other than lighting and small fractional horsepower motorized tools shall make arrangement with the Electrical Contractor. Contractors requiring lighting outside of the building shall make their own arrangements with the Electrical Contractor and pay all costs for installation, maintenance and removal. Contractors requiring electrical equipment over one HP, including welders, hoists, heaters and coolers shall make their own arrangements for such service beyond the main switch and shall pay all costs thereof.

- C. No permanent electrical equipment or wiring shall be used for temporary connections, unless authorized by this Section, upon signed order and with approval by the Architect in behalf of the Owner. Such approvals shall not shorten guarantee period.
- D. Electrical energy to be paid for by owner.

#### 1.26 ELECTRICAL SERVICE

- A. The existing electrical service in the Dane County City-County Building shall remain as is.
  - 1. The building has a 208Y/120-volt, 3-phase, 4-wire service for general lighting and receptacle loads.
  - 2. The building also has a 480-volt electrical service that is used for large HVAC loads.
  - 3. Refer to the electrical drawings for partial one line riser diagrams and the work involved on the project.

#### 1.27 BRANCH CIRCUIT WIRING

- A. See plans for general arrangement of circuits, conduit runs, and ratings of branch circuits and special circuits.
- B. Provide everything necessary to comply with the general scheme shown, including all types of control.
- C. Circuit numbers as shown on plans are for contractor to plan his wiring and for estimating purposes. These numbers are not necessarily consecutive numbers of the panelboard breakers. Balanced load on bus is to be the determining factor in arrangement of circuits. Balance loading to within 7 1/2%.
- D. Minimum size of lighting system branch circuit conductors to be #12 AWG.
- E. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond outlet box conduit fitting.
- F. 120 volt circuit home runs greater than 50 feet in length shall have #10 AWG minimum size between panel and first receptacle or fixture outlet.

#### 1.28 MOTOR WIRING

- A. Unless otherwise indicated on the drawings or elsewhere in these specifications, all motors shall be furnished by others.
- B. Motors shall be set in place by others and the associated motor starters and controllers shall be turned over to this Contractor for erection and line voltage power wiring.
- C. Any contractor supplying starters and controllers that are not part of this contract shall index same and provide this Contractor with instructions as to proper location in sufficient time to permit the installation of a concealed raceway system.
- D. Where this Contractor is required to provide control wiring, the Contractor supplying the controllers shall provide all necessary and required wiring diagrams for proper installation.
- E. Low voltage (less than 115 volts) control wiring shall be by others, unless noted elsewhere in the specifications except that this Contractor shall extend circuit to associated transformers, wire and connect to same.

- F. This Contractor shall examine the plans and specifications of other sections and shall include in his bid all control wiring, as referenced to be performed by Section 16001.
- G. Required disconnect switches furnished by other sections shall be installed by Section 16001. Furthermore, this Contractor shall provide all disconnect switches required by code that are not furnished by other sections.

#### 1.29 SPECIAL OUTLETS

- A. General: Furnish and install outlets, wiring and receptacles accordingly, at locations required by equipment serviced or otherwise as directed. Extend wiring to outlets on equipment and make final connection.

#### 1.30 IDENTIFICATION

- A. General:
  - 1. Materials and equipment installed under this Section shall be clearly identified as listed below.
  - 2. Locate identification conspicuously.
  - 3. Terminology to be approved by Architect.
  - 4. See plans for any additional items to be identified.
  - 5. Loads such as motors shall be described by function rather than by the system of arbitrary number as shown on electrical plans.
  - 6. Use abbreviations sparingly.
- B. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely screwed or riveted to the following equipment. Size 1" x 4" with 3/8" high letters; unless space available dictates differently.
  - 1. Each panelboard, contactor, time switch, starter or disconnect switch. Locate on inside cover of panels.
  - 2. Each feeder at all accessible locations.
  - 3. Each end of empty conduit runs to indicate the intended use of the conduit and the location of opposite end. Use room numbers that are permanently assigned.
- C. Typewritten Directory: Each panelboard both new and existing shall be provided with a typewritten directory attached to the inside of panel door and covered with clear plastic indicating load served and rooms served by each protective device in the respective panel. Spares and spaces shall be clearly identified.
- D. Switch Station:
  - 1. All key switches shall be engraved indicating controlled item.
  - 2. All remote switches shall be engraved indicating controlled item.
- E. Conductor Identification:
  - 1. Identify each conductor at each wiring device, connector or splice point with permanently attached wrap-around adhesive markers as manufactured by Brady Co. or 3M.
  - 2. This identification shall include branch circuit number, control circuit, or any other appropriate number or lettering that will expedite future tracing and trouble shooting.

### 1.31 LOCATIONS OF OUTLETS AND WIRING DEVICES

#### A. Outlets:

1. Locations of outlets and electrical equipment on the drawings are approximate only. Unless otherwise indicated on the drawings or established in the specifications, the exact locations of electrical outlets shall be established in the field by directive from the Architect. Generally, outlets shall be located as required for proper installation of equipment served and otherwise locations shall be established by construction or code requirements and such as to be coordinated with equipment of other trades.
2. This Section shall consult with the Architect and refer to all details, sections, elevations and equipment plans and the plans of other trades for exact location.
3. The Architect reserves the right to make reasonable changes in the location of outlets, apparatus or equipment up to the time of roughing in. Such changes as directed shall be made by the Contractor without additional compensation.
4. Dimensions taken by scale shall not be used to establish rough-in locations.

#### B. Wiring Devices:

1. The approximate location of wiring devices are indicated on the drawings; the specific location shall be determined in accordance with "Location of Outlets" of these specifications and as follows.
2. This Section is referred to equipment plans, equipment shop drawings, elevation drawings and other detail or dimensional drawings, and he shall consult with the Architect before installation of proceeding with any work dependent upon this information.
3. Generally, wiring devices shall be located as follows:
  - a. Wall receptacles shall generally be centered 15" above the finished floor and 6" above surface of built-in counters and tables where same abuts wall and 4" above backsplashes if counters are so equipped.
  - b. Special purpose receptacles shall be located as required by equipment served.
  - c. Switches shall be centered 48" above finished floor on latch side of door opening with edge of plate not more than 12" from door frame, except as noted on the drawings.
  - d. In hazardous areas, the location of wiring devices shall be established by Code requirements which shall take precedence over conflicting information on the drawings or included herein.

### 1.32 TELEPHONE SYSTEM

- A. Refer to the electrical specification section 16751 – Telecommunication Distribution System for detailed information on the telephone system.
- B. Dane County is currently using a VOIP (voice over internet protocol) telephone system so all telephone cabling will be using same cabling used for data.
- C. Telephone instruments, switching equipment, wiring, terminal blocks, and other accessories

shall be furnished and installed by the Owner (Dane County)

- D. This Contractor shall supply all required conduit, sleeves, and service fittings for the telephone system.
- E. All conduits shall be complete with fish wire by this Contractor, and all telephone outlets shall be fed by a minimum 3/4" conduit.
- F. All telephone boxes shall be two gang boxes with one gang plaster cover.
- G. Verify all phone locations with the Architect in the field.

### 1.33 DEMOLITION, RENOVATION AND DISPOSITION OF EXISTING EQUIPMENT

- A. This Contractor shall note that portions of the existing building will remain in service during portions of the construction period. Areas of the building will be vacated as required to facilitate construction. This Contractor shall proceed with the completion of his work in such a manner as to cause the least possible interference with the Owner's operation. All work required in the existing building shall be done in a manner and time acceptable to the Owner.
- B. Outages and other work rendering existing equipment inoperative shall be held to a minimum - prior arrangements for each shall be made with the Owner and shall be acceptable as to time and duration.
- C. Electrical equipment in conflict with construction shall be removed and/or relocated as indicated on the drawings, as directed or required. This Contractor shall remove all electrical equipment released from service as a result of construction, and no equipment removed shall be reused, except as specifically directed on the drawings or elsewhere herein. All electrical equipment removed during construction shall be presented to the Owner for his acceptance or rejection. Materials rejected by the Owner become the Contractor's property and shall be removed from the site.
- D. This Contractor shall be responsible for the work of other trades as may be necessary to facilitate the installation of electrical work in the existing building. Such work necessary that is normally done by other trades and is not covered as a part of other divisions of the work shall be done under the direction and at the expense of the Electrical Contractor. This work shall include but is not limited to cutting, patching, and all work necessary and required to leave existing building in condition acceptable to the Architect.
- E. Any existing circuits or equipment not shown on the drawings and which are logically expected to be continued in service and which may be interrupted or disturbed during construction shall be reconnected in an approved manner. In addition, any existing circuit or equipment which may require relocations or rerouting, as a result of construction, shall be considered a part of the work of this branch and shall be done by this contractor with no additional compensation.
- F. All coring that is required for electrical work shall be by this Contractor.
- G. All new conduit and wiring shall be concealed where possible to do so without extensive cutting and patching. All exposed work shall be run in wiremold and installed only where approved by Architect. Routing shall be subject to Architects approval. Make use of all standard wiremold colors to match surfaces as closely as possible.



- H. All ballasts and lamps removed during the project, unless part of fixtures claimed by the Owner, become the Contractor's property and he shall dispose of them in accordance with applicable DNR and EPA regulations.

#### 1.34 SEALING AND FIREPROOFING

- A. Sealing and fireproofing of openings between conduit, cable tray, wireway, trough, cablebus, busduct, etc. and fire rated surfaces shall be the responsibility of the contractor whose work penetrates the opening.
- B. Sealing and fireproofing shall use materials and methods complying with ASTM E814 requirements appropriate to the rating of the material penetrated.
- C. Materials by Dow-Corning, 3M, Specified Technologies, Inc., and Chase-Foam are acceptable if in accordance with (B) above.
- D. Submit manufacturer's penetration details to authority having jurisdiction. Details shall confirm method's compliance with ASTM E814.
- E. Include copies of penetration details in Project Operation and Maintenance Manuals.

#### 1.35 ALTERNATE BIDS

- A. See Section 01030 for descriptions of alternates required.

END OF SECTION

## SECTION 16100

### BASIC MATERIALS AND METHODS

#### PART 1 - GENERAL

##### 1.01 SCOPE

- A. All requirements of Division 1 govern work under this Section.

##### 1.02 REFERENCES

- A. National Electrical Manufacturer's Association (NEMA).
- B. Underwriters Laboratories, Inc. (UL).
- C. American Society for Testing and Materials (ASTM).
- D. National Fire Protection Association (NFPA).

##### 1.03 SUBMITTALS

- A. Product Data
  - 1. Submit for disconnects, motor starters, panelboards, circuit breakers, overcurrent protective devices, transformers, and mini-power centers.
  - 2. Product data sheets with printed installation instructions.
- B. Shop Drawings:
  - 1. Submit for motor starters.
  - 2. Show enclosure dimensions, nameplate nomenclature, electrical ratings, and thermal unit schedule.
  - 3. Wiring diagrams and schematics.
- C. Approval of equipment supplied in this section is contingent upon Contractor verification of available fault current from electric utility.
  - 1. Notify ENGINEER if available fault current is higher than specified equipment.
- D. Submit in accordance with Section 01340.
- E. Operation and Maintenance (O&M) Data:
  - 1. Maintenance data for materials and products for inclusion in Operating and Maintenance specified in Section 01730.
  - 2. Submit in accordance with Section 01340 and 01730.
- F. Test Results:
  - 1. Report of field tests and observations certified by Contractor.

##### 1.04 QUALITY ASSURANCE

- A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).
  - 1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
  - 2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article

100.

- B. Regulatory Requirements:
  - 1. National Electrical Code: Components and installation shall comply with NFPA 70.
  - 2. Local codes and ordinances.

## PART 2 - PRODUCTS

### 2.01 ELECTRICAL METALLIC TUBING (EMT) INTERMEDIATE METALLIC CONDUIT (IMC) GALVANIZED RIGID STEEL CONDUITS (GRS)

- A. Manufacturers:
  - 1. Allied Steel
  - 2. Omega
  - 3. Wheatland
  - 4. Columbia
- B. Manufacturer's standard lengths and size.
- C. Protected inside and out by hot-dipped galvanized or electrogalvanized coating.
- D. Minimum size: 3/4 inch, except as follows:
  - 1. Conduit for lighting switch legs containing switched conductors only may be 1/2 inch.
  - 2. As noted on drawings.
- E. Do not use aluminum conduit.

### 2.02 PLASTIC CONDUIT (PVC)

- A. Manufacturers:
  - 1. Carlon.
  - 2. Genova.
  - 3. Certainteed.
- B. Standard lengths and sizes.
- C. Schedule 40 or 80, heavy wall rigid plastic (PVC) conduit manufactured to NEMA TC2 standards, UL listed, and as required by NEC.
- D. Rated for 90EC cable.
- E. Minimum size: 2" inches.

### 2.03 FLEXIBLE CONDUIT

- A. Manufacturers:
  - 1. Triangle PWC, Inc.
  - 2. Anaconda
  - 3. Flexsteel
  - 4. American Flexible Conduit

- B. Galvanized flexible steel.
- C. Standard conduit sizes.
- D. Minimum Size: 1/2 inch.

#### 2.04 LIQUIDTIGHT FLEXIBLE CONDUIT

- A. Manufacturers:
  - 1. O-Z/Gedney Company
  - 2. American Flexible Conduit
  - 3. Flex-Guard, Inc.
  - 4. Liquatite
  - 5. Anaconda
- B. Galvanized flexible steel.
- C. Standard conduit sizes.
- D. Minimum Size: 1/2 inch.
- E. Heavy wall PVC jacket.

#### 2.05 FITTINGS

- A. Manufacturers:
  - 1. Appleton Electric Company.
  - 2. Steel City, American Electric.
  - 3. Oz-Gedney Co.
- B. Steel or malleable iron, zinc galvanized or cadmium plated.
- C. Do not use set screw or indentor type fittings.
- D. Do not use aluminum or die cast fitting.
- E. EMT IMC and GRS Connectors and Couplings:
  - 1. Threaded.
  - 2. Gland compression type.
  - 3. Insulated throat.
  - 4. Rain and concrete type.
- F. Flexible Conduit Connectors and Couplings:
  - 1. Threaded.
  - 2. Insulated throat.
  - 3. Grounding type.
  - 4. Gland compression type.
- G. Liquidtight Flexible Conduit Fittings:
  - 1. Liquidtight.
  - 2. Insulated throat.
  - 3. Threaded.

4. Gland compression type.
  5. Grounding type.
- H. Expansion Joints:
1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.
  2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.
- I. Seals:
1. Wall entrance, Appleton Type FSK or FSC.
- J. Drain Fittings:
1. Automatic Drain Breather:
    - a. Explosionproof.
      - i. Safe for Class I, Groups C and D.
    - b. Capable of passing minimum 25 cc water/minimum and minimum 0.05 cubic foot air/minimum at atmospheric pressure.
  2. Condensate Drain:
    - a. Conduit outlet body, Type T.
    - b. Threaded, galvanized plug with 3/16 inch drilled holed through plug.

## 2.06 SURFACE METAL RACEWAY

- A. Manufacturers:
1. Wiremold Co.
  2. Hubbell Co.
  3. Steel City, American Electric
- B. General:
1. Wiremold Series 500 series or equal.
  2. Base and cover section to accommodate pulling conductors through raceway.
  3. capable of being over painted.
  4. Full complement of fitting must be available.
- C. The use of surface raceways shall be minimized on the project. Surface raceway shall only be used where installing new devices on existing walls that are not being furred out or where conduit cannot be installed in an existing wall
- D. Any use of surface raceway shall be approved by the Architect prior to installation.

## 2.07 WIRES, CABLES, AND CONNECTORS

- A. Manufacturers:
1. Wire and Cable:
    - a. Continental
    - b. Southwire.
    - c. Rome Cable.

- d. Houston Wire and Cable.
  - e. Beldon.
  - f. Dekoron.
  - g. Royal
  - h. South
  - i. General
- 2. Connectors:
    - a. Burndy.
    - b. Thomas and Betts.
    - c. Blackburn, American Electric.
  - 3. Electrical Tape:
    - a. 3M Scotch Brand.
    - b. Plymouth.
    - c. or equal.
- B. Copper wire only.
- C. 600 v insulation (ASTM standard compounds) and color code conductors for low voltage (secondary feeders and branch circuits) as required by NEC.
- 1. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for branch circuit and feeder conductors size No. 8 AWG and smaller.
  - 2. Type XHHW-2 Stranded: Single conductor for branch circuits, feeders and service conductors larger than No. 8 AWG.
  - 3. Provide grounding conductor with same insulation as circuit conductors when run with circuit conductors.
  - 4. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for 120 v control wiring and No. 14 AWG minimum for graphic indication, nonshielded instrumentation and other control wiring operating at less than 120 v unless otherwise noted on Drawings.
    - a. Provide high density polyethylene jacketed multi-wire cable assemblies in underground conduit or duct.
- D. Joints, Taps, and Splices:
- 1. Joints, Taps, and Splices in Conductors No. 10 AWG and Smaller: UL listed compression spring-type solderless connectors with plastic cover.
  - 2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless two or four-bolt compression type connectors of type that will not loosen under vibration or normal strains.
  - 3. Terminations: Compression-type crimp lugs.

## 2.08 BOXES

- A. Manufacturer:
- 1. Interior Outlet Boxes:
    - a. Appleton Electric Company.

- b. Raco.
    - c. Steel City, American Electric.
  - 2. Weatherproof Outlet Boxes:
    - a. Appleton Electric Company.
    - b. Crouse-Hinds Company.
    - c. O-Z/Gedney company.
    - d. Perfect-Line, American Electric.
  - 3. Junction and Pull Boxes:
    - a. Hoffman Engineering Company.
    - b. Keystone Columbia, Inc.
    - c. Electromate.
- B. Outlet Boxes - Flush Mounted:
  - 1. Wall Outlets: Square corner, galvanized masonry type with internally mounted ears or 4-inches square with raised cover having square corners and internally mounted ears.
  - 2. Ceiling Lighting Fixture Outlet Boxes: 4-inch square galvanized box with raised cover set flush with finished surface, complete with 3/8 inch fixture stud.
- C. Outlet Boxes - Surface Mounted:
  - 1. General Use: 4-inches square with raised device cover.
  - 2. Weatherproof: Cast galvanized with threaded hub.
  - 3. Safety outlet enclosure - Tay Mac Co. - Verify outlet configuration.
  - 4. Hazardous Locations: Cast galvanized approved for classification of area.
- D. Junction and Pull Boxes:
  - 1. Fabricate from code gauge galvanized steel, with covers held in-place by corrosion resistant machine screws.
  - 2. Size as required by code for number of conduits and conductors entering and leaving box.
  - 3. Provide with welded seams where applicable, and equipment with corrosion resistant nuts, bolts, screws, and washers.
  - 4. Finish with rust inhibiting primer.

## 2.09 FIRE RATED THROUGH FLOOR FITTINGS

- A. Manufacturers:
  - 1. Hubbell Electric Co.
  - 2. Square D.
  - 3. Steel City, American Electric.
- B. Rating:
  - 1. Floor fittings requiring penetration of floor slab listed by UL and have UL fire rating of 2 hours.
- C. Floor Service Pedestal:

1. Painted textured aluminum surface.
  2. 2 to 8 gangs of service capacity and suitable for:
    - a. Duplex receptacles 15 or 20-amp.
    - b. Single twist lock receptacle 20-or 30-amp.
    - c. Communication/data outlet (2/gang).
    - d. 1-inch ID protective bushing for cables.
    - e. Furniture feed plate suitable for 3/4-inch flexible metal conduit connection.
- D. Junction Boxes in Ceiling Space Below Floor:
1. Suitable to accommodate separate services of power and communications.
  2. Code approved for plenum space when applicable.
- E. Raceways through Floor:
1. Provide separation of power and low voltage.
  2. For 2-inch core holes:
    - a. 3/4 inch raceway for communication.
    - b. 1/2 inch raceway for power.
    - c. Heat Transfer: .11 square inch of copper cross section maximum for both.
  3. For 3-inch core holes:
    - a. 1-1/4 inch raceway for communication.
    - b. 1/2 inch raceway for power.
    - c. Heat Transfer: .16 square inch of copper cross section maximum for both.
- F. Abandonment Plates:
1. Maintain same UL listed fire rating.
  2. Packaged, identified, and turned over to OWNER.

## 2.10 WIRING DEVICES

- A. Manufacturers:
1. Hubbell Wiring Device Division.
  2. Pass and Seymour, Inc.
  3. Leviton
  4. Cooper Wiring Devices
- B. Fabricated Devices:
1. Factory-fabricated, specification grade wiring devices in type, color, and electrical rating for service indicated. Ivory color or as selected by ENGINEER OR OWNER.
  2. Wiring devices of one manufacturer.
  3. See Drawing symbol schedule for identification of device type.
- C. Switches:
1. General Use Lighting Switches: 20 amp toggle, equal to Hubbell No. 1221-I series.
  2. Switches controlling equipment, operation of which is not evident from switch position, shall include flush neon pilot light in conjunction with proper switch. Each



switch shall be complete with engraved plate to identify equipment being controlled (white letters on black, 1/8 inch high minimum).

D. Receptacles:

1. General use duplex receptacles: NEMA No. 5-20R, grounding type, 20 amp Hubbell No. 5362 Specification Grade.
2. Special purpose receptacles as shown on Drawings and schedules.
3. Receptacles supplied from standby emergency system to have red face.
4. GFI receptacles shall be Hubbell GFR5352IA

E. Wiring Device Plates and Covers:

1. Wall plates for wiring devices with ganging and cut-outs as indicated, provided with metal screws for securing plates to devices, screw heads colored to match finish of plate.
2. Plates for Flush Mounted Devices: Equal to Sierra P line specifications grade Type No. 430 brushed stainless steel.
3. Telephone outlet configuration to match telephone outlet jack or cable.
4. Device plates for surface mounted Type FS or FD boxes to be Type FSK galvanized steel.
5. Device plates for surface mounted, 4-inch square bossed to be ½ inch raised galvanized steel covers.
6. Weatherproof outlet enclosure for exterior devices or devices in damp locations to be marked galvanized gray cast malleable with gasketed lift cover plate as shown on Drawings. Suitable for wet locations while in use. Enclosure must be gasketed. Provide Intermatic WP1010MC, WP1010HMC, or WP1030MC with appropriate mounting base(s) and inserts.

## 2.11 MOTOR STARTERS

A. Manufacturers:

1. Allen Bradley
2. Eaton/Cutler-Hammer
3. Siemens
4. Square D
5. General Electric

B. Manual Starters:

1. Minimum short circuit withstand rating in combination with motor circuit protective device shall be 10,000 symmetrical amps or as indicated on Drawings.

C. Manual Motor Starter Construction:

1. Quick make and break toggle action.
2. Double break silver alloy contacts.
3. 1-piece melting alloy type thermal overload units.
4. Starter inoperative unless thermal unit in position.
5. Padlock provision.

6. Pilot light.
  7. NEMA standards for size and horsepower rating.
- D. Magnetic Starters:
1. Minimum short circuit withstand rating in combination with motor circuit protective device shall be 22,000 symmetrical amps or as indicated on Drawings.
- E. Magnetic Motor Starter Construction:
1. Mounted in vertical position, gravity dropout.
  2. Double break silver alloy contacts.
  3. Molded coil.
  4. Contacts and/or coil replacement without removing starter from enclosure or power wiring from starter.
  5. Straight-through wiring.
  6. Overload Relay:
    - a. 1-piece thermal unit construction.
    - b. One melting alloy type overload relay per phase, manually reset.
    - c. Interchangeable thermal units.
    - d. Thermal units must be in-place to operate starter.
    - e. Replaceable overload relay circuit contacts.
    - f. Trip at 6 times LRC in 20 seconds.
  7. Overload relay submersible pumps and hermetically sealed motors.
    - a. Same as above except trip at 6 times LRC in 3 to 5 seconds.
  8. NEMA standards for size and horsepower rating.
  9. NEMA Size 1 minimum.
- F. 2-Speed Motor Starters:
1. Provide separate winding type with two 3-pole starters unless otherwise specified.
  2. For remote 2-stage thermostat control, provide cutout of low speed signal on high speed operation.
- G. Reduced Voltage Motor Starter Construction:
1. Closed transition autotransformer type.
  2. 2-coil construction with 50%, 65%, and 80% starting voltage taps.
  3. Additional as applicable.
- H. Combination Starter:
1. Fusible Motor circuit protector type.
  2. Three-pole, three-phase NEMA size as indicated with three melting alloy overload relays.
  3. Hand-Off-Auto selector switch.
- I. Control Circuits:
1. Voltage not to exceed 120 v.
  2. Control transformer mounted in starter enclosure.

3. Fuses on one secondary line.
  4. One secondary line grounded.
  5. Transformer sized for device, accessories connected thereto, and 25% extra capacity minimum.
- J. Controls:
1. Reset button mounted in enclosure cover.
  2. Heavy duty, oiltight green push to test pilot lights mounted in enclosure cover when indicated.
  3. Heavy duty, oiltight pushbuttons and selector switches mounted in enclosure when indicated.
  4. 6-digit type elapsed time meters in tenths of hour mounted in enclosure cover when indicated.
- K. Enclosures:
1. Manual Starters:
    - a. General purpose flush mounted in finished areas.
    - b. NEMA 1 surface in unfinished areas.
    - c. NEMA 4 outdoors and wet locations.
  2. Magnetic Starters:
    - a. NEMA 12 indoors.
    - b. NEMA 4 outdoors and wet locations.

## 2.12 MOTOR AND CIRCUIT DISCONNECTS

- A. Manufacturers:
1. Eaton/Cutler-Hammer
  2. Siemens
  3. Square D
  4. Allen Bradley
  5. General Electric
- B. Enclosed Circuit Breaker Construction:
1. Dual cover interlock.
  2. External trip indication.
  3. Provisions for control circuit interlock.
  4. Padlock provisions for padlock in Off position.
  5. Handle attached to box, not cover.
  6. Handle position indicates On, Off or Tripped.
  7. Provisions for insulated or groundable neutral.
- C. Safety Switches:
1. NEMA heavy duty Type HD.
  2. Dual cover interlock.
  3. Visible blades.

4. Provisions for control circuit interlock.
  5. Pin type hinges.
  6. Tin plated current carrying parts.
  7. Quick make and break operator mechanism.
  8. Handle attached to box, not cover.
  9. Handle position indication, On in up position and Off in down position.
  10. Padlock provisions for up to 3 padlocks in Off position.
  11. UL listed lugs for type and size of wire specified.
  12. Spring reinforced fuse clips for Class R fuses.
  13. Provisions for insulated or groundable neutral.
  14. UL listed short circuit rating 200,000 RMS amp with Class R fuses.
- D. Enclosures:
1. Indoor: NEMA 1 code gauge steel with rust inhibiting primer and baked enamel finish.
  2. Outdoor: NEMA 3R code gauge zinc coated steel with baked enamel finish.

## 2.13 FUSES

- A. Manufacturers:
1. Bussmann
  2. Gould Shawmut
  3. Littlefuse
  4. Brush
- B. 250 v. Fuses:
1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp interrupting rating.
    - a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder, and main service protection.
- C. 600v Fuses:
1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp interrupting rating.
    - a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder and main service protection.
  2. Class L, bolt-in 601 to 6,000 amps, 200,000-amp interrupting rating.
    - a. Gould Shawmut A48Y, time delay for overload and short circuit protection for motor, transformer, feeder, and main service protection.
  3. Class CC, fast acting, single element, 1/10 to 30 amps, 200,000-amp interrupting rating.
    - a. Gould Shawmut ATDR, UL listed for motor control circuits, lighting ballasts, control transformers, and street lighting fixtures.
- D. Spare Fuses:

1. 10%, minimum of 3, of each type and rating of installed fuses.

## 2.14 PANELBOARDS

### A. Manufacturers:

1. Square D only to match building standard.

### B. Panelboard Ratings:

1. UL listed short circuit rating (integral equipment rating):
  - a. Up to 240 v: 10,000 RMS symmetrical amp minimum.
  - b. Up to 480 v. 14,000 RMS symmetrical amp minimum.
  - c. As shown on Drawings.

### C. Panelboard Construction:

1. Main breaker or main lugs only, per panelboard schedule.
2. Molded case circuit breakers.
3. Terminals:
  - a. UL listed for type or wire specified.
  - b. Anti-turn solderless compression type.
4. Bussing:
  - a. Distributed phase sequence type.
  - b. 225 amps, 98% conductivity hard drawn copper or as shown on panelboard schedule or Drawings.
  - c. Copper.
  - d. Mounting hardware behind usable space.
5. Gutters adequate for wire size used, 4-inch minimum.
6. Boxes:
  - a. Code gauge galvanized steel.
  - b. Without knockouts.
7. Fronts:
  - a. Panel front cover shall have piano hinge to allow access to wiring gutters without removal of panel trim. Hinged trim held in place with screw fasteners. Door shall be built into trim, which allows access to breakers as well as to hinged trim screw fasteners. Breaker access door shall have the following features:
    - i. Concealed piano hinge.
    - ii. Flush stainless steel cylinder tumbler type locks with spring loaded door pulls.
    - iii. Locks keyed alike.
    - iv. Rust inhibiting primer, baked enamel finish.
    - v. Dead front safety type.
    - vi. Concealed hinges and trim clamps..
    - vii. Circuit Directory:

- viii. Suitable for complete descriptions.
- ix. Clear plastic cover.
- 8. Typewritten card inside panel door.
- 9. Special features as shown on Drawings.
- 10. Code gauge steel.
- 11. Engraved laminated nameplate in accordance with Section 16001.

## 2.15 MOLDED CASE CIRCUIT BREAKERS

### A. Manufacturers:

- 1. Square D

### B. Permanent Trip Circuit Breakers:

#### 1. Lighting Panel Circuit Breakers:

- a. Thermal and magnetic protection.
- b. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
- c. Bolt-on type unless otherwise noted on Drawings.
- d. Quick make and break toggle action.
- e. Handle trip indication.
- f. Handle position indication, On, Off, and Tripped centered.
- g. UL listed for type of wire specified.
- h. UL listed short circuit rating (integrated equipment rating).
  - i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
  - ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.
- i. UL SWDL switching duty on 120 v. circuits for switched circuits.
- j. Switch neutral common trip per NEC 514-5 for fuel pumps.

#### 2. Power Panel Circuit Breakers:

- a. Thermal and magnetic protection.
- b. Magnetic protection only in combination with motor starters and motor circuit protectors (MCP).
- c. Single magnetic trip adjustment.
- d. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
- e. Push-to-trip test button.
- f. Bolt-on type.
- g. Quick make and break toggle action.
- h. Handle trip indication.
- i. Handle position indication, On, Off, and Tripped centered.
- j. UL listed for type of wire specified.
- k. UL listed short circuit rating (integrated equipment rating).
  - i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
  - ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.

## 2.16 GROUND-FAULT CIRCUIT INTERRUPTER RECEPTACLES (GFCI)

- A. Ratings:
  - 1. 120 vac.
  - 2. 20 amp.
- B. Tripping Requirement:
  - 1. UL Class A.
- C. Construction:
  - 1. Shallow depth.
  - 2. Line and load terminal screws.
  - 3. Noise suppression.
  - 4. Feed through.
  - 5. Standard duplex wall plates shall fit.
  - 6. NEMA 5-20R configuration.
- D. Meet requirements of UL 943 ground-fault circuit interrupters.

## 2.17 GROUNDING AND BONDING

- A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, more stringent requirements and greater size, rating, and quantity indications govern.
- B. Conductor Materials: Copper.
- C. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- D. Equipment Grounding Conductor: Green insulated.
- E. Grounding Electrode Conductor: Stranded cable.
- F. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B3.
  - 2. Assembly of Stranded Conductors: ASTM B8.
  - 3. Tinned Conductors: ASTM B33.
- G. Ground Bus: Bar annealed copper bars of rectangular cross section.
- H. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bar copper wire, terminated with copper ferules.
- I. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inches thick and 2 inches wide, except as indicated.
- J. Connector Products
  - 1. General: Listed and labeled as grounding connectors for materials used.
  - 2. Pressure Connectors: High-conductivity-plated units.
  - 3. Bolted Clamps: Heavy-duty units listed for application.
  - 4. Exothermic Welded Connections: Provide in kit form and select for specific types,

sizes, and combinations of conductors and other items to be connected.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Install products in accordance with NEC, manufacturer's instructions, applicable standards, and recognized industry practices to ensure products serve intended function.

#### 3.02 CONDUITS AND CONDUIT FITTINGS

- A. Complete conduit installation prior to installing cables.
- B. Unless specifically indicated otherwise on Drawings, use rigid galvanized steel conduit for general wiring.
- C. Provide watertight conduit system where installed in wet places, underground or where buried in masonry or concrete.
- D. EMT conduit may be used for conduit sizes up to 4 inches.
- E. Conduit shall be run concealed except exposed surface conduit may be installed where noted on Drawings or where concealment found to be impractical or impossible, and only with approval of ENGINEER.
- F. Continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes.
- G. Enter and secure to boxes ensuring electrical continuity from point of service to outlets.
- H. Conduit runs extending through areas of different temperature or atmospheric conditions or partly indoors and partly outdoors shall be sealed, drained, and installed in manner preventing drainage of condensed or entrapped moisture into cabinets, motors or equipment enclosures.
- I. Run conduits within concrete structures parallel to each other and spaced on center of at least three times conduit trade diameter with minimum 2-inch concrete covering. Conduits over 1 inch may not be installed in slab without approval of ENGINEER.
- J. Run exposed conduits parallel to or at right angles with lines of building.
- K. Route conduit runs above suspended acoustical ceilings not interfering with tile panel removals.
- L. Secure conduit in-place with not less than 1 malleable corrosionproof alloy strap or hanger per 8 feet of conduit.
  - 1. Do not use perforated strapping.
- M. Connections to Motors and Equipment Subject to Vibration:
  - 1. Flexible steel conduit not over 3 feet long or where exposed in mechanical and utility areas and not subjected to moisture, dirt, and fumes.
  - 2. Liquidtight flexible conduit not over 3 feet long where exposed in finished areas or where subject to moisture, dirt, fumes, oil, corrosive atmosphere, exposed or concealed, with connectors to ensure liquidtight, permanently grounded connection. Locate where least subject to physical abuse.
- N. Use double lock nuts and insulated bushings with threads fully engaged.



- O. Connectors at fixture bodies and boxes shall be rigidly secured with galvanized lock nut and bushing.
- P. Cap conduits after installation to prevent entry of debris.
- Q. Install conduit expansion fittings complete with bonding jumper in following locations.
  - 1. Conduit runs crossing structural expansion joint.
  - 2. Conduit runs attached to two separate structures.
  - 3. Conduit runs where movement perpendicular to axis of conduit may be encountered.
- R. Install 4 feet-0 inch to 6 feet-0 inch flexible steel conduit drops from independent junction box mounted above ceiling and accessible from below ceiling to recessed ceiling mounted equipment. Allow for positioning of equipment to tile increments.
- S. Negotiate beams and changes in ceiling heights with LB conduit fittings on outside corners and ells on inside corners. Arrange bends and offsets in parallel conduits to present neat symmetrical appearance.
- T. In precast areas, run conduits in insulation space or in floor topping without crossing conduits, using 3/4 in. maximum conduit size.
- U. Core drill through reinforced concrete with approval of ENGINEER.
- V. Split, crushed or scarred conduit not acceptable.
- W. Do not route over boiler, incinerator or other high temperature equipment.
- X. Flexible metal conduit can only be used for final connections to motors, transformers, or to light fixtures above suspended ceilings.

### 3.03 SURFACE METAL RACEWAY

- A. Mount to surface with No. 8 flathead fasteners or approved support clips.
- B. Do not pinch wires.
- C. Remove metal burrs and sharp edges.
- D. Provide bushing.
- E. Install in accordance with manufacturer's recommendations.
- F. Provide covers where two lengths come together.

### 3.04 WIRE AND CABLE

- A. Run wire and cable in conduit unless otherwise indicated on Drawings.
- B. On branch circuits, use standard colors.
- C. Each tap, joint or splice in conductors No. 8 AWG and larger shall be taped with 2 half-lap layers of vinyl plastic electrical tape and finish wrap of color coding tape, where required by code.
- D. Run ground wire with power circuits; conduit shall not be grounding path.
- E. Color Coding: Conductors for lighting and power wiring as indicated below.

<u>Phase</u>	<u>208/120v</u>	<u>480/277v</u>
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

### 3.05 BOXES

- A. Install knockout closures to cap unused knockout holes where blanks have been removed.
- B. Locate boxes to ensure accessibility of electrical wiring.
- C. Secure boxes rigidly to subsurface upon which being mounted or solidly embed boxes in concrete or masonry. Do not support from conduit.
- D. Do not burn holes, use knockout punches or saw.
- E. Provide outlet box accessories as required for each installation such as mounting brackets, fixture study, cable clamps, and metal straps for supporting outlet boxes compatible with outlet boxes being used and meeting requirements of individual wiring situations.
- F. Location of outlets and equipment shown on Drawings is approximate. Verify exact location.
- G. Minor modification in location of outlets and equipment is considered incidental up to distance of 10 feet with no additional compensation, provided notification of modification is given prior to roughing in of outlet.
- H. Flush outlets shall have edges or plaster flush with finished wall or ceiling surfaces so plates can be drawn tightly to wall or ceiling surfaces.
- I. Mounting heights:
  1. Shall conform to ADA guidelines.
  2. In general, unless otherwise shown on Drawings:
    - a. Switches: 48 inches above floor to top of box.
    - b. AC Receptacles and Telephone Outlets: 15 inches above floor to bottom of box or 6 inches above counters, counter backsplashes in finished areas; 48 inches to top of box above floor in unfinished areas.
    - c. Wall Bracket Lighting Fixtures: 8 inches above mirrors or 6 feet-6 inches above floor.
    - d. Pushbuttons: 48 inches above floor to top of box.
    - e. Motor Starters and Disconnect Switches: 60 inches above floor.
      - i. Thermostats: 48 inches above floor.
    - f. Bells and Horns: 8 feet-0 inches above floor.
    - g. Clocks: 8 ft.-0 inches above floor.
    - h. Fire Alarm visual signals 80" above floor.
    - i. Emergency Battery Units: 8 ft. - 0 inches above floor or 12" below ceiling.
- J. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall, minimum 12 inches.

- K. Where emergency switches occur adjacent to normal light switches, install in separate boxes in accordance with NEC and device plate color coding separation.
- L. Light Fixture Outlet Boxes:
  - 1. Securely mount with approved type bar hangers spanning structural members to support weight of fixture.
  - 2. Do not support from conduit.
  - 3. Equip with 3/8-inches fixture stud and tapped fixture ears.

### 3.06 FIRE RATED THROUGH FLOOR FITTINGS

- A. Spacing and location as noted on Drawing.
- B. Install in accordance with manufacturer's instructions.

### 3.07 WIRING DEVICES

- A. Do not install devices until wiring is complete.
- B. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or otherwise. Make circuit connections by using wire connectors and pigtails.
- C. Install gasket plates for devices or system components having light emitting features such as switch with pilot light and dome lights. Where installed on rough textured surfaces, seal with black self-adhesive polyfoam.
- D. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box connection or as shown on Drawings.
- E. Wrap wiring devices with insulating tape.
- F. Install emergency switches which occur adjacent to normal light switches in separate boxes to maintain systems isolation in accordance with NEC.

### 3.08 MOTOR STARTERS

- A. Examine area to receive motor starters to ensure adequate clearance for starter installation.
- B. Anchor firmly to wall or structural surface.

### 3.09 MOTOR AND CIRCUIT DISCONNECTS.

- A. Locate disconnect switches as shown on Drawings and required by NEC.
- B. Provide control circuit interlock as required by NEC.

### 3.10 OVERCURRENT PROTECTIVE DEVICES.

- A. Install fuses just prior to energizing equipment.
- B. Locate circuit breakers as shown on Drawings.
- C. Install GFCI receptacles as required by NEC.

### 3.11 PANELBOARDS

- A. Flush or surface mount as specified on drawings and schedules.

- B. Support panel cabinets independently to structure with no weight bearing on conduits.
- C. Install recessed panelboards to allow cover to be drawn tight against wall to provide neat appearance.
- D. Install panelboards so top breaker is not higher than 6 feet-0 inches above floor.
- E. Adjacent panel cabinets shall be same size and mounted in horizontal alignment.
- F. Install typewritten directory in each panelboard, accurately indicating rooms or equipment being served after final circuit changes have been made to balance circuit loads.
- G. Install four spare 1 inch conduits from top of each flush mounted panelboard to area above ceiling for future use. On flush mounted panelboards located on first and higher level floors, provide two spare 1 inch conduits from bottom of panelboard to ceiling area of floor below for future use.

### 3.12 GROUNDING AND BONDING

- A. Application
  - 1. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.
    - a. Install separate insulated equipment grounding conductors with circuit conductors. Raceway may be used as equipment ground conductor where feasible in non-hazardous areas and permitted by NEC for lighting circuits. Install insulated equipment ground conductor in nonmetallic raceways unless designated for telephone or data cables.
  - 2. Underground Conductors: Bare tinned, stranded copper except otherwise indicated.
  - 3. Signal and Communications: For telephone, alarm, instrumentation and communication systems, provide #4 AWG minimum green insulated copper conductor in raceway from grounding electrode system to each terminal cabinet or central equipment location.
  - 4. Ground separately derived systems required by NEC to be grounded in accordance with NEC paragraph 250-26.
  - 5. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to grounding electrode as indicated in addition to separate equipment grounding conductor run with supply branch circuit.
  - 6. Connections to Lighting Protection System: Bond grounding conductors or grounding conductor conduits to lighting protection down conductors or grounding conductors in compliance with NFPA 78.
- B. Installation
  - 1. General: Ground electrical systems and equipment in accordance with NEC requirements except where Drawings or Specifications exceed NEC requirements.
  - 2. Ground Rods:
    - a. Locate minimum of one-rod length from each other and at least same distance from any other grounding electrode.
    - b. Interconnect ground rods with bare conductors buried at least 24 inches below grade.

- c. Connect bare-cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated.
  - d. Make connections without damaging copper coating or exposing steel.
  - e. Use 3/4-inch by 10-foot ground rods except as otherwise indicated.
  - f. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated.
3. Metallic Water Service Pipe:
- a. Provide insulated copper ground conductors, sized as indicated, in conduit from building main service equipment, or ground bus, to main metallic water service entrances to building.
  - b. Connect ground conductors to street side of main metallic water service pipes by means of ground clamps.
  - c. Bond ground conductor conduit to conductor at each end.
4. Braided-Type Bonding Jumpers:
- a. Use elsewhere for flexible bonding and grounding connections.
5. Route grounding conductors along shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
- C. Connections
1. General: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
- a. Use electroplated or hot-tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series.
  - b. Make connections with clean bare metal at points of contact.
  - c. Aluminum to steel connections: stainless steel separators and mechanical clamps.
  - d. Aluminum to galvanized steel connections: tin-plated copper jumpers and mechanical clamps.
  - e. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
2. Exothermic Welded Connections:
- a. Use for connections to structural steel and for underground connections except those at test wells.
  - b. Install at connections to ground rods and plate electrodes.
  - c. Comply with manufacturer's written recommendations.
  - d. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
3. Terminations:
- a. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs.
  - b. Where metallic raceways terminate at metallic housings without mechanical

- and electrical connection to housing, terminate each conduit with grounding bushing.
- c. Connect grounding bushings with bare grounding conductor to ground bus in housing.
- d. Bond electrically noncontinuous conduits at both entrances and exist with grounding bushings and bare grounding conductors.

### 3.13 FIELD QUALITY CONTROL

- A. Control Circuits, Branch Circuits, Feeders, Motor Circuits, and transformers:
  - 1. Megger check to phase-to-phase and phase-to-ground insulation levels.
    - a. Do not megger check solid state equipment.
  - 2. Continuity.
  - 3. Short circuit.
  - 4. Operational check.
- B. Wiring Devices:
  - 1. Test receptacles with Hubbell 5200, Woodhead 1750 or equal tester for correct polarity, proper ground connection, and wiring faults.

### 3.14 ADJUSTMENT AND CLEANING

- A. Motor Starters and Disconnects:
  - 1. Adjust covers and operating mechanisms for free mechanical movement.
  - 2. Tighten wire and cable connections.
  - 3. Verify overcurrent protection thermal unit size with motor nameplate to provide proper operation and compliance with NEC.
  - 4. Clean interior of enclosures.
  - 5. Touch up scratched or marred surfaces to match original finish.
- B. Circuit Breakers:
  - 1. Adjustable settings shall be set to provide selective coordination, proper operation, and compliance with NEC.
- C. Restore damaged areas on PVC jacketed rigid conduit with spray type touch-up coating compound or as directed by manufacturer.
- D. Pull cleaning plug through conduits to clear of dirt, oil, and moisture.

END OF SECTION

## SECTION 16515

### LIGHTING

#### PART 1 - GENERAL

##### 1.01 SCOPE

- A. All requirements of Division 1 govern work under this Section.

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Interior lighting fixtures.
  - 2. Exterior lighting fixtures.
  - 3. Lamps.
  - 4. Ballasts.
  - 5. Emergency lighting units.

##### 1.03 REFERENCES

- A. American National Standards Institute (ANSI):
  - 1. C78 Series - Lamps.
  - 2. C82.2-84 - Fluorescent Lamp Ballasts.
  - 3. C82.4-85 - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
  - 4. ANSI C2-90 - National Safety Code.
- B. Institute of Electrical and Electronics Engineers (IEEE):
  - 1. C62.41-91 - IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- C. National Fire Protection Association (NFPA):
  - 1. 70-93 - National Electric Code.
- D. Underwriters Laboratory (UL):
  - 1. 844-90 - UL Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.
  - 2. 924-90 - UL Standard for Safety Emergency Lighting and Power Equipment.
  - 3. 935-84 - UL Standard for Safety Florescent-Lamp Ballast.
  - 4. 1092 (P) - UL Standard for Safety Proposed First Edition of the Standard for Process Control Equipment.
  - 5. 1570-88 - UL Standard for Safety Florescent Lighting Fixtures.
  - 6. 1571-91 - UL Standard for Safety Incandescent Lighting Fixtures.
  - 7. 1572-91 - UL Standard for Safety High Intensity Discharge Lighting Fixtures.
  - 8. 1573-85 - UL Standard for Safety Stage and Studio Lighting Units.
  - 9. 1574-87 - UL Standard for Safety Track Lighting Systems.
  - 10. UL 773-87 - UL Standard for Safety Plug-In, Locking Type Photo controls for Use

with Area Lighting.

#### 1.04 DEFINITIONS

- A. Emergency Lighting Unit: Fixture with integral emergency battery power supply and means for controlling and charging battery. Also known as emergency light set. Emergency units are available with integral lamps only.
- B. Fixture: Complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts required to distribute light, position and protect lamps, and connect lamps to power supply. Internal battery powered exit signs and emergency lighting units also include battery and means for controlling and recharging battery. Emergency lighting units are available with and without integral lamp heads and lamps.
- C. Luminaire: Fixture.
- D. Average Life: Time after which 50% will have failed and 50% will have survived under normal conditions.

#### 1.05 SUBMITTALS

- A. Product Data:
  - 1. Describe fixtures, lamps, ballasts, poles, emergency lighting units, and accessories. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and following information:
    - a. Outline drawings of fixtures indicating dimensions and principal features.
    - b. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.
    - c. Data on batteries and chargers of emergency lighting units.
  - 2. Air and thermal performance data for air handling fixtures. Provide data required to be submitted in Section 15940.
  - 3. Sound performance data for air handling fixtures. Provide certified test reports indicating sound power level and sound transmission class.
- B. Shop Drawings: Detail nonstandard fixtures and indicating dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Samples: Submit sample of fixture if different than specified.
- D. Miscellaneous:
  - 1. For substitutes only, product certifications signed by manufacturers of lighting fixtures certifying that their fixtures comply with specified requirements.
  - 2. Warranty for rechargeable battery.
  - 3. Coordination drawings for fixtures that require coordination with other equipment installed in same space.
- E. Submit in accordance with Section 01340.

#### 1.06 QUALITY ASSURANCE

- A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).



1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
  2. Terms "listed" and "labeled" shall be as defined in National Electric Code, Article 100.
- B. Regulatory Requirements:
1. National Electric Code: Components and installation shall comply with NFPA 70.
  2. Comply with ANSI C2, "National Electrical Safety Code".
- C. Coordinate fixtures mounting hardware and trim with ceiling tile.

#### 1.07 WARRANTY

- A. Requirements:
1. Special Project Warranty Period (Where called for herein.): 10 years, beginning on date of Substantial Completion. Full warranty shall apply for first year of period, and prorata warranty for last 9 years.
  2. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
  3. Color Retention: Warranty against fading, staining, chalking due to effects of weather and solar radiation.
  4. Furnish extra materials matching products installed, as described below, packaged with protective covering for storage, and identified with labels describing contents. Deliver extra materials to OWNER.
    - a. Lamps: 10 lamps for each 100 of each type and rating installed. Furnish at least 1 of each type.
    - b. Ballasts: 1 for each 100 of each type and rating installed. Furnish at least 1 of each type.

### PART 2 - PRODUCTS

#### 2.01 FIXTURES, GENERAL

- A. Comply with requirements specified in Articles below and lighting fixture schedule.

#### 2.02 FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, except as indicated. Form and support components to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:
1. White surfaces: 85%.
  2. Specular Surfaces: 83%.
  3. Diffusing Specular Surfaces: 75%.

- 4. Laminated Silver Metallized Film: 90%.
- E. Exterior Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed fixtures.
- F. Exterior Exposed Hardware Material: Stainless steel.
- G. Lenses, Diffusers, Covers, and Globes: 100% virgin acrylic plastic or water white, annealed crystal glass except as indicated.
  - 1. Plastic: Highly resistant to yellowing and other changes due to aging, exposure to heat and UV radiation.
  - 2. Lens Thickness: 0.125 inches, minimum.
- H. Photoelectric Relay: UL 773.
  - 1. Contact Relays: Single-throw, arranged to fail in the "on" position and factory set to turn light unit on at 1.5 to 3 footcandles and off at 4.5 to 10 footcandles with 15 seconds minimum time delay.
  - 2. Relay Mounting: In fixture housing.

#### 2.03 SUSPENDED FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
- B. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount single fixture. Finish same as fixture.
- C. Rod Hangers: 3/16-inch diameter cadmium plated, threaded steel rod.
- D. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

#### 2.04 FLUORESCENT FIXTURES

- A. Fixtures: Conform to UL 1570.
- B. Ballasts: All fluorescent ballasts shall be electronic type and shall meet the following specs:
  - 1. UL Listed (Class P) sound rating A and CSA certified.
  - 2. Comply with EMI and RFI limits set by the FCC (CFR 47 part 18) or NEMA and not interfere with normal electrical equipment.
  - 3. Meet any applicable standards set forth by ANSI.
  - 4. Be potted or conformal coated in a metallic case and not contain PCBs.
  - 5. Provide normal rated lamp life as stated by lamp manufacturers (i.e. rated life at 3 hour burn time per start).
  - 6. Provide independent test results from an approved testing laboratory for all of the specifications below. This is required for all submitted ballasts.
  - 7. Nominal power factor of .90 or higher.
  - 8. Total harmonic distortion of less than 10% at 120 or 277 volts (universal voltage).
  - 9. Ballast factor 0.70 through 1.2, as shown on the lighting fixture schedule.
  - 10. Frequency of operation shall be 40 kHz - 50 kHz and units shall operate without visible flicker.

11. Ballast efficiency factor shall meet Consortium of Energy Efficiency ([www.cee1.org](http://www.cee1.org)) specifications (adopted by Focus on Energy program).
  12. Multi-lamp ballasts shall operate in parallel so that when one lamp burns out, the other lamps will continue to operate at full light output.
  13. Ballasts shall carry a minimum 5 year warranty with a \$10 replacement labor allowance.
  14. Ballasts shall not be affected by lamp failure.
  15. Ballasts shall be a standard production item.
  16. Ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type and UL Listing.
  17. Ballasts shall withstand line transients as defined in IEEE 587, Category A.
- C. Acceptable ballast manufacturer's names and product lines are as follows:
1. Osram Sylvania – Quicktronic High Efficiency and Quicktronic PROstart.
  2. GE Lighting – Ultramax and UltraStart.
  3. Maxlite – High Efficiency Ballast.
  4. Advance – Optanium.
  5. Universal Lighting Technologies – F32T8.
- D. Manufacturer names are used to develop quality and performance requirements only. All manufacturers and their products shall meet the system performance requirements and this entire specification.
- E. Compact Fluorescent Ballasts (Electronic)
1. Ballasts shall be high power factor, class P, with voltage rating matching the branch circuit voltage.
  2. Ballast factor shall be 0.85 or higher.
  3. Ballast shall have lamp fault shut-off circuitry to prevent starting of a faulty lamp.
  4. Cold-weather ballast must reliably start and operate the lamp in ambient temperatures down to 0°F for the rated life of the lamp.
- F. Dimming Ballasts (Fluorescent)
1. Ballast shall provide continuous, flicker-free dimming from 100% to 5%.
  2. Ballast shall have Total Harmonic Distortion of less than 10%.
  3. Ballast power factor shall be greater than 0.95.
  4. Ballast factor shall be 0.85 or higher for T8 lamps, 0.95 or higher for T5 lamps.
  5. Ballast shall be high frequency electronic type and operate lamps at a frequency above 25kHz for T5 lamps.
  6. Ballast shall have built-in inrush current limiting circuitry, maximum of 7 amps for 120 volts and 3 amps for 277 volts.
  7. Ballast shall have internal fusing.

8. Ballast shall have ultra-quiet operation.
9. Operating temperature shall not exceed 75° C on the case during normal operation.
10. Minimum lamp starting temperature shall be 10°C / 50° F.

#### 2.05 INCANDESCENT FIXTURES

- A. Conform to UL 1571.

#### 2.06 EXIT SIGNS

- A. Conform to UL 924.
  1. Sign Colors: Conform to local code.
- B. Self-Powered Exit Signs (Battery Type): Integral automatic high/low trickle charger in self-contained power pack.
  1. Battery: Sealed, maintenance-free, nickel cadmium type with special project warranty.
- C. Self-Powered Exit Signs (Luminous Source Type): Licensed for public use by U.S. Nuclear Regulatory Commission. signs have solid-state tritium gas energy source and provide legibility in total darkness at 100 feet after 10 years of service.

#### 2.07 EMERGENCY LIGHTING UNITS

- A. Conform to UL 924. Provide self-contained units with following features and additional characteristics as indicated.
  1. Battery: Sealed, maintenance-free, lead-acid type with 10-year nominal life minimum, and special project warranty.
  2. Charger: Minimum 2-rate, fully-automatic, solid-state type, with sealed transfer relay.
  3. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80% of nominal or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. Relay disconnects lamps and battery automatically recharges and floats on trickle charge when normal voltage is restored.
  4. Time-Delay Relay: Provide time-delay relay in emergency lighting unit control circuit arranged to hold unit "on" for fixed interval after restoration of power from an outage. Provide adequate time delay to permit HID lamps to restrike and develop output.
  5. Wire Guard: Where indicated, provide heavy chrome plated wire guard arranged to protect lamp heads or fixtures.

#### 2.08 EMERGENCY FLUORESCENT POWER SUPPLY

- A. Conform to UL 924.
- B. Internal Type: Self-contained, modular, battery-inverter unit factory-mounted within fixture body.
  1. Test Switch and LED Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  2. Battery: Sealed, maintenance-free, nickel-cadmium type, with minimum nominal 10-year life.

3. Charger: Fully-automatic, solid-state, constant-current type.
  4. Operation: Relay automatically turns 2 lamps on when supply circuit voltage drops to 80% of nominal or below. Relay disconnects lamp and battery automatically recharges when normal voltage is restored.
- C. External Type: Self-contained, modular, battery-inverter unit. Exterior fluorescent light fixtures are specified in Section 16525.
1. Test Switch and LED Indicator Light: Visible and accessible without entering ceiling space.
  2. Battery: Sealed, maintenance-free, nickel-cadmium type, with minimum nominal 10-year life.
  3. Charger: Fully-automatic, solid-state, constant-current type.
  4. Operation: Relay automatically turns 2 lamps of associated fixture on when supply circuit voltage drops to 80% or nominal or below. Battery automatically recharges when normal voltage is restored.

## 2.09 LAMPS

- A. Conform to ANSI C78 series applicable to each type of lamp.

## 2.10 FINISH

- A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project warranty period and replace with new fixtures.
- B. Other Parts: Manufacturer's standard finish.
- C. Verify and provide light fixture finishes as selected by ARCHITECT for all light fixture types. Include colored finish selection tables with product submittals. Upon request submit actual material finish swatches for A/E review.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved submittals.
- B. Support For Recessed and Semirecessed Fixtures: Units may be supported from suspended ceiling support system. Install ceiling system support rods or wires at minimum of four rods or wires per fixture located not more than 6 inches from fixture corners.
1. Fixtures Smaller Than Ceiling Grid: Install minimum of four rods or wires for each fixture and locate at corner of ceiling grid where fixture is located. Do not support fixtures by ceiling acoustical panels.
  2. Fixtures of Sizes Less Than Ceiling Grid: Center in acoustical panel. Support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
  3. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corners.
- C. Support for Suspended Fixtures: Brace pendants and rods that are 4 feet long or longer to

limit swinging. Support stem mounted single-unit suspended fluorescent fixtures with twin-stem hangers. For continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of chassis, including one at each end.

- D. Lamping: Lamp units according to manufacturer's instructions.

### 3.02 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Give 7-day notice of dates and times for field tests.
- C. Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source.
- D. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation.
  - 1. Duration of supply.
  - 2. Low battery voltage shut-down.
  - 3. Normal transfer to battery source and retransfer to normal.
  - 4. Low supply voltage transfer.
- E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

### 3.03 ADJUSTING AND CLEANING

- A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

## SECTION 16722

### FIRE ALARM SYSTEM

#### PART 1 - GENERAL

##### 1.01 SCOPE OF WORK

- A. The building (Dane County City-County Building) in Madison has a complete fire alarm system in place. This project will provide a renovated fire alarm system with new devices in the area of remodeling only. The areas outside the scope of work shall remain as is.
- B. The existing fire alarm system within the City/County building is a Simplex 2120 fire alarm control panel that was installed in the early 1980's.
- C. Under a recent project completed in 2007, the fire alarm control panel was upgraded to be a SimplexGrinnell 4100U fire alarm control panel. All new fire alarm devices shall be intelligent, addressable devices that are compatible with the 4100U fire alarm control panel currently installed.
- D. The contractor shall be aware the building does meet the definition of high-rise construction and all fire alarm devices shall contain the ability for digital voice communications. Therefore, speaker/strobe devices will be used instead of horn/strobe devices. Provide any necessary power extender (NAC) panels for the visual notification devices as required.
- E. Provide wiring as required to incorporate these new devices into the existing SimplexGrinnell 4100U fire alarm control panel. Coordinate this work with the Madison sales office of SimplexGrinnell.
- F. The Contractor shall be aware that most of the building will remain occupied during construction of this remodeled area.
  - 1. The Contractor shall be responsible for turning off/turning on the fire alarm system to allow for work to be performed. Also, the Contractor shall be responsible for contacting Dane County building maintenance staff at any time when the fire alarm system is down. This will allow for an announcement to be made to all building occupants.
  - 2. All testing shall be done during non-occupied hours.
  - 3. Extreme care should be taken on the part of the Contractor to reduce or eliminate nuisance tripping of the fire alarm smoke detectors during construction. Extensive nuisance tripping of the fire alarm system cannot be tolerated due to the high volume of occupants in the building.

##### 1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies
  - 1. National Fire Protection Association (NFPA):
    - a. NFPA No. 70 - National Electric Code (NEC).
    - b. NFPA No. 101 - Life Safety Code.
  - 2. Wisconsin Enrolled Building Commercial Building Code 2002.
  - 3. Underwriters Laboratories, Inc.
  - 4. Local codes and ordinances.

- B. Reference Standards:
  - 1. National Fire Protection Association (NFPA):
    - a. NFPA No. 72
  - 2. National Electrical Manufacturer's Association (NEMA).
- C. System equipment to be of one manufacturer and supported by factory trained, established service organization of equipment manufacturer who shall stock parts for equipment supplied.
- D. Equipment must be manufactured by firm actively manufacturing fire alarm systems for minimum of 10 years.
- E. Manufacturer's Services:
  - 1. Manufacturer's representative factory trained service engineer for equipment specified herein shall be present at job site to supervise final adjustment of system after installation complete, equipment startup, and training of OWNER'S personnel for system operation.
  - 2. Manufacturer shall direct services to system and equipment operation, maintenance, troubleshooting, and equipment and system related areas.

### 1.03 SUBMITTALS

- A. Shop Drawings to include:
  - 1. Data sheets and equipment description.
  - 2. Bill of materials listing components.
  - 3. Component wiring diagrams.
  - 4. System wiring and interconnection diagrams showing all devices – not a typical diagram.
- B. Operation and Maintenance (O & M) Data: Submit in accordance with Division 1. Provide electronic record drawings in Autocad Version 2002 or newer on CD.
- C. Field quality control test results.

### 1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive equipment at job site, verify applicable components and quantity delivered per invoice.
- B. Handle equipment to prevent internal components damage, breakage, denting, and scoring enclosure and finish.
- C. Do not install damaged equipment.
- D. Store equipment in clean, dry space and protect from dirt, fumes, water, construction debris, and physical damage.
- E. After installation, protect from damage by Work of other trades.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Use of manufacturer's name and model or catalog number is for purpose of establishing



standard of quality, general configuration, and operating characteristics desired only.

## 2.02 ACCEPTABLE MANUFACTURERS

- A. SimplexGrinnell
- B. Due to the existence of the existing SimplexGrinnell fire alarm control panel, no other manufacturers will be accepted.

## 2.03 SYSTEM OPERATION

- A. The system operation for the existing SimplexGrinnell 4100U fire alarm control panel shall remain as is with no modifications. This equipment was recently installed

## 2.04 FIRE ALARM CONTROL PANEL

- A. The fire alarm control panel is an existing SimplexGrinnell 410U addressable FACP. This equipment will remain in place and the fire alarm system shall be extended to the areas of remodeling with compatibility with this fire alarm control panel.

## 2.05 SMOKE DETECTION

- A. Smoke detectors shall be Photoelectric type, SimplexGrinnell True Alarm Analog Sensing 4098 series.
  - 1. Analog addressable.
  - 2. Light scattering principle.
  - 3. UL magnet test feature.
  - 4. Remote test by control panel command.
  - 5. Dual alarm and power LED.
  - 6. Adjustable sensitivity via panel command.
  - 7. Mounts on 4" octagon or 4" square box with square to round ring.
- B. Duct smoke detector shall be SimplexGrinnell addressable True Alarm Photoelectric Sensor 4098-9755.
  - 1. Analog addressable.
  - 2. For air velocity between 300 and 4000 feet per minute.
  - 3. Sampling tube as required for duct width dimensions.
- C. Isolation module:
  - 1. Automatically isolate wire-to-wire short circuit from SLC loop.
  - 2. Provide one for each 20 addressable/intelligent devices.
  - 3. Amber LED shall flash to indicate activation.
  - 4. Mount on 4 inch square or 4 inch square box with 2 gang ring.

## 2.06 HEAT DETECTION

- A. Heat detector shall be SimplexGrinnell E-Series Electronic Heat Detector 4098 series
  - 1. Analog addressable fixed plus rate of rise.
  - 2. Dual termistors.
  - 3. Self restoring.

4. Mount on 4" octagon or 4" square box with square to round ring.

## 2.07 MODULES:

- A. Monitor module
  1. Monitor contact closing devices (Class B).
  2. Addressable.
  3. Mounts on 4" square or 4" square with 2 gang ring.
- B. Control module
  1. Addressable.
  2. DPDT relay contact rated at 3.0A, 30VDC, 0.5A 110VAC.
  3. Mount on 4" square or 4" square with 2 gang ring.
  4. Must be located with 3' of device being controlled.
- C. Isolation module
  1. Automatically isolate wire-to-wire short circuit from SLC loop.
  2. Provide one for each 20 addressable/intelligent devices (Maximum of 25 devices per module).
  3. Amber LED shall flash to indicate activation.
  4. Mount on 4" square or 4" square with 2 gang ring.

## 2.08 PULL STATIONS

- A. Pull station shall be a SimplexGrinnell 4099-9003
  1. Double action, Push operation, English
  2. Addressable.
  3. Lexan construction.
  4. Key reset.
  5. Within ADA 5lb. pull force.
  6. Includes Braille text on station handle.
  7. Bi-color LED visible through handle of station.
  8. Mount on 4" square with 1 gang ring.

## 2.09 NOTIFICATION DEVICES - SIGNALS

- A. Speaker/Strobe unit shall be Wheelock Series ET70 addressable speaker/visual notification devices.
  1. Speaker
    - a. High quality voice or tone reproduction with tamps for 1/4, 1/2 , 1 or 2 watts at 25 or 70.7 VRMS.
  2. Strobe
    - a. 15/75cd, 75cd, or 110cd strobe as required (synchronized) (See plans for candela requirements).
  3. Mounts on 4" square or 4" square with 1- or 2-gang ring.
  4. All devices shall be wall-mounted wherever possible. However, where required due

to existing conditions, ceiling mounted speaker/strobe devices shall be allowed to be used.

- B. Strobe unit shall be Wheelock Series RSS visual notification devices mounted to RSSP plates.
  - 1. 15/75cd, 75cd, or 110cd strobe as required (synchronized) (See plans for candela requirements).
  - 2. Mounts on 4" square box or 4" square with 1- or 2-gang ring.
- C. Provide mini-horns where shown on the plans. Mini-horns may be ceiling mounted.

#### 2.10 REMOTE ANNUNCIATOR

- A. Remote annunciator shall be SimplexGrinnell 4603-9101 LCD annunciator.
  - 1. 80 character display.
  - 2. Function switches which can be displayed.
  - 3. Back box furnished with annunciator.

#### 2.11 NOTIFICATION APPLIANCE CIRCUIT PANEL

- A. Notification Appliance Circuit Panel (NAC) shall be SimplexGrinnell 4009 Series
  - 1. Provides four, power-limited NACs with general alarm operation, available as Class B or Class A, each rated 2 A (expandable to eight NACs)
    - a. Includes 8 A power supply/charger
    - b. Follows coded or non-coded alarm input

#### 2.12 MAGNETIC DOOR HOLDERS

- A. Door holder shall be LCN 404SE (Furnished and installed by General Contractor):
  - 1. Closer holder combination
  - 2. 24V DC solenoid

#### 2.13 FLOW, PRESSURE AND TAMPER SWITCHES

- A. Wire and install in accordance with requirements of other specification sections and wire as specified in this section. Provide necessary monitor modules and circuits. Wire and install outdoor sprinkler alarm bell. Flow, pressure, tamper switches and sprinkler alarm bell furnished by others.

#### 2.14 SLAVE FAN RELAY

- A. Slave fan relay shall be SimplexGrinnell model 4090-9002 Relay IAM

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which fire alarm system to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of Work.

#### 3.02 INSTALLATION

- A. Installation of the Fire Alarm/Life Safety System shall be in strict compliance with

manufacturer's recommendations. Consult the manufacturer's Control Panel and Peripheral Equipment installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation.

- B. Power Requirements:
  - 1. The Fire Alarm Control Panel (FACP) and/or Notification Appliance Circuit (NAC) panels shall be connected to a separate 20 ampere, 120 volt dedicated branch circuit labeled as FIRE ALARM.
  - 2. The Control Panel Cabinet shall be grounded securely using a copper grounding conductor.
  - 3. Conduit shall enter into the Fire Alarm Control panel backbox only at those areas of the back box which have factory conduit knockouts.
  - 4. All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; an audible and visual trouble signal will be activated until system and its associated field wiring are restored to normal condition.
- C. Cables must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
- D. SLC loops shall be loaded to no more than 75% of their capacity.
- E. Install wiring in accordance with Section 16001 and shall be in accordance with the NEC, NFPA 72 1999, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer. See Article 3.06 FREE AIR CABLING for further requirements.
  - 1. SLC loop shall be 2 #16 shielded FPLR or FPLP cable as required.
  - 2. Signal circuit wiring shall be 2 conductor #14 or 2 conductor #12 FPLR or FPLP cable as required. 2#14 or 2#12 THHN is acceptable if signal circuits are enclosed in listed raceway. Synchronization modules shall be utilized to provide audio and visual synchronization over 2 conductors. Consult loading chart for proper wire gauge and wire length to insure against excessive DC voltage drop. A minimum of 20.5V DC must be available at the last signal of a NAC under full alarm condition.
  - 3. Provide 2 #14 from control panel or door holder power supply to door holders.
- F. Provide all fire alarm system wiring drops to devices within raceways and junction boxes. Where existing conditions prohibit fishing existing walls, so as to avoid excessive cutting and restoration metallic wiremold finished to match existing wall surface shall be permitted where allowed by OWNER/ENGINEER, routing subject to OWNER/ENGINEER approval. Install conduit in accordance with Section 16001 and as shown on Drawings.
- G. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- H. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage. Ref: NFPA 72, 1999 2-3.6.1.3.
- I. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished

areas and may be exposed in unfinished areas if approved by Owner/Engineer before installation. All system junction boxes shall be as manufactured by system supplier or painted red and stenciled with fire alarm system designation.

- J. All fire detection and alarm system devices shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas if approved by Owner/Engineer before installation.
- K. All conductor identification shall be labeled in accordance with 16001 at all accessible locations including at control panel, junction boxes and at devices for future tracing and maintenance.
- L. Provide concealed 3/4" conduit and wire to telephone terminal board from main fire alarm control panel.
- M. Coordinate connections with supplier of central station network system.
- N. Provide concealed 3/4" conduit and wire to security panel for monitoring of trouble, supervisory and system alarm.
- O. Provide elevator recall and elevator shunt trip using addressable control modules. Utilizing detector auxiliary contacts is not acceptable and violates NFPA 72, 1999 3-9.2.1. Provide Elevator shunt trip power supervision for integrity per NFPA 72, 1999 3-9.4.4.

### 3.03 ADJUSTMENT AND CLEANING

- A. Clean system equipment and enclosure of dirt and debris.

### 3.04 FIELD QUALITY CONTROL

- A. Provide the service of a NICET certified, Level II minimum, factory-trained technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and test for the system.
- B. System shall test free from grounds, opens, and short circuits.
- C. Upon completion of installation of fire alarm equipment, CONTRACTOR shall provide ENGINEER with signed written statement substantially in form as follows.
- D. "The undersigned having been engaged as the CONTRACTOR on the "DANE COUNTY CITY-COUNTY BUILDING" confirms the fire alarm equipment was installed in accordance with wiring diagrams, instructions, and directions provided to us by the manufacturer."

### 3.05 WARRANTY

- A. All work performed and all material and equipment furnished under this contract shall be from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

### 3.06 FREE AIR WIRING

- A. All wiring shall be run "free-air", in conduit or in surface raceway. "Free-air" wiring is allowed where it can be completely concealed. If wiring cannot be concealed, it shall be installed in wiremold in finished areas and in conduit in unfinished areas.

- B. Where installed “free-air”, comply with the following:
1. Cable shall run at right angles and be kept clear of other trades work.
  2. Cables shall be supported according to code utilizing bridle rings anchored to ceiling concrete, piping supports or structural steel beams. Rings shall be designed to maintain cables bend to larger than the minimum bend radius (typically 4 x cable diameter).
  3. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 12-inches, another support shall be used.
  4. Cable shall never be laid directly on the ceiling grid.
  5. Cables shall not be attached to or supported by, existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit.
  6. A coil of 2 feet in each cable shall be placed in the ceiling at each “free-air” wired fire alarm device. These "service loops" shall be secured at the last cable support before the cable reaches the device and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
  7. Devices wired with conduit shall be provided with an 8-inch wire tail at each device box and 36-inch wire tails at the FACP and FAAP.
  8. To reduce or eliminate EMI, the following minimum separation distances from  $\leq 480V$  Power lines shall be adhered to:
    - a. Twelve (12) inches from power lines of  $<5\text{-kVa}$ .
    - b. Eighteen (18) inches from high voltage lighting (including fluorescent).
    - c. Thirty-nine (39) inches from power lines of  $5\text{-kVa}$  or greater.
    - d. Thirty-nine (39) inches from transformers and motors.
  9. All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellem grips shall be used to spread the strain over a longer length of cable.
  10. Manufacturers minimum bend radius specifications shall be observed in all instances. Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.
  11. All vertical cable extensions to fire alarm devices located below the finished ceiling shall be in conduit.
- C. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may move or wear in a manner to pose a hazard to the cable, shall not be used.
- D. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to insure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a “break-away” or other approved method.

### 3.07 DEPARTMENT OF COMMERCE SUBMITTALS

- A. This Contractor is responsible for making required Department of Commerce or City of Madison Fire Department submittals.
- B. Pay any Department of Commerce or City of Madison Fire Department fees for reviewing submittal. These fees should be included in the contractors bid.
- C. Make submittal after engineering review has been obtained for shop drawings.
- D. Incorporate any Department of Commerce or City of Madison Fire Department comments into shop drawings and as-builts.

END OF SECTION

## SECTION 16751

### TELECOMMUNICATIONS DISTRIBUTION SYSTEM

#### PART 1 - GENERAL

##### 1.01 SCOPE

- A. The basic scope of this project is as follows:
  - 1. Provide a new telecommunications closet on the 3<sup>rd</sup> Floor to serve the portion of the floor being remodeled. This closet shall contain space for future remodeling projects as well. Provide new open equipment racks in the closet as required for the equipment to be installed.
  - 2. Provide a 12-strand multi-mode fiber optic cabling between the 3<sup>rd</sup> Floor telecommunications closet and the Main Computer Room location on the 5<sup>th</sup> Floor of the Dane County City-County Building. The fiber optic cabling is for voice and data communications. Coordinate the installation of this cable with the Dane County Information Technology (IT) staff.
  - 3. From the telecommunications closet, provide horizontal Category 6 cabling out to the workstation outlets as indicated on the floor plans.
  - 4. Provide all certification and testing of the equipment and cabling as required.
- B. Section Includes: Equipment, materials, labor, and services to provide telephone and data distribution system including, but not limited to:
  - 1. Raceway, boxes, and cable tray
  - 2. Telephone and data cabling terminations
  - 3. Optical fiber and terminations
  - 4. Telecommunications outlets
  - 5. Terminal blocks/cross-connect systems
  - 6. Equipment racks and cabinets
  - 7. System testing
  - 8. Documentation and submissions
- C. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.
- D. Existing Systems
- E. Work not included:
  - 1. The following work will be done by others:
    - a. Off-site services.
    - b. Providing 120V wiring and outlets.
    - c. Providing data concentrators, hubs, servers, computers, and other active devices.
  - 2. Painting will be done by the owner



## 1.02 REFERENCES

- A. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:
1. ANSI/NECA/BICSI-568 -- Standard for Installing Commercial Building Telecommunications Cabling
  2. ANSI/TIA/EIA Standards
    - a. ANSI/TIA/EIA-568-B.1 -- Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
    - b. ANSI/TIA/EIA-568-B.2 -- Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components
    - c. ANSI/TIA/EIA-568-B.3 -- Optical Fiber Cabling Components Standard
    - d. ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces
    - e. ANSI/TIA/EIA-606(A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
    - f. ANSI/TIA/EIA-607(A) -- Commercial Building Grounding and Bonding Requirements for Telecommunications
    - g. ANSI/TIA/EIA-526-7 -- Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
    - h. ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
    - i. ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications Cabling Standard
- B. Install cabling in accordance with the most recent edition of BICSI® publications:
1. BICSI -- Telecommunications Distribution Methods Manual
  2. BICSI -- Cabling Installation Manual
  3. BICSI -- LAN Design Manual
  4. BICSI -- Customer-Owned Outside Plant Design Manual
- C. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner's representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

## 1.03 PERMITS, FEES, AND CERTIFICATES OF APPROVAL

- A. The owner will make application and pay for building permit.
- B. As prerequisite to final acceptance, supply to the owner certificates of inspection from an inspection agency acceptable to the owner and approved by local municipality and utility company serving the project.

#### 1.04 SYSTEM DESCRIPTION

- A. Telecommunications cabling system generally consists of one telecommunications outlet in each workstation, wall telephones in common and mechanical areas and telecommunications rooms (TRs) located on each floor.
  - 1. For this project, one new telecommunications room is being created. See floor plans for the exact location.
  - 2. The equipment room (ER) is currently existing and is located on the 5<sup>th</sup> Floor of the City-County Building.
  
- B. The typical work area consists of a single-gang plate with two standards compliant work area outlets.
  - 1. One work area outlet consists of one (1) four-pair data Category 6 cable or above, installed from work area outlet to the TR. Terminate data cables on rack mounted modular patch panels located in the appropriate TR.
  
- C. Vertical/horizontal backbone cabling consists of 50/125 mm multimode optical fiber cable installed from the telecommunications closet (room) to the Main Computer Room on the 5<sup>th</sup> Floor of the City-County Building. The backbone cabling to be used for both voice and data communications within the building.

#### 1.05 SUBMITTALS

- A. Submit to the engineer/designer shop drawings, product data (including cut sheets and catalog information), and samples required by the contract documents. Submit shop drawings, product data, and samples with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer/designer will indicate approval of shop drawings, product data, and samples submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.
  - 1. By submitting shop drawings, product data, and samples, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings, product data, and samples conform to the requirements of the work and of the contract documents. The engineer/designer remains responsible for the design concept expressed in the contract documents as defined herein.
  - 2. The engineer's/designer's approval of shop drawings, product data, and samples submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer/designer in writing of such deviation at time of submittal, and the engineer/designer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.
  - 3. The engineer's/designer's approval of shop drawings, product data, and samples shall not relieve the contractor of responsibility for errors or omissions in such shop

drawings, product data, and samples.

4. The engineer's/designer's review and approval, or other appropriate action upon shop drawings, product data, and samples, is for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents. The engineer's/designer's review of such submittals is not conducted for the purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the contractor as required by the contract documents. The review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The engineer's/designer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- B. Perform no portion of the work requiring submittal and review of shop drawings, product data, or samples, until the engineer/designer has approved the respective submittal. Such work shall be in accordance with approved submittals.
  - C. Submit shop drawings, product data, and samples as a complete set within thirty (30) days of award of contract.
    1. For initial submission and for resubmission required for approval, submit four (4) copies of each item. The engineer/designer will only return two copies. Make reproductions as required for your use and distribution to subcontractors.
    2. Illegible submittals will not be checked by the engineer.
  - D. General: Submit the following:
    1. Bill of materials, noting long lead time items
    2. Optical loss budget calculations for each optical fiber run
    3. Project schedule including all major work components that materially affect any other work on the project
  - E. Shop drawings: Submit the following:
    1. Backbone (riser) diagrams.
    2. System block diagram, indicating interconnection between system components and subsystems.
    3. Interface requirements, including connector types and pin-outs, to external systems and systems or components not supplied by the contractor.
    4. Fabrication drawings for custom-built equipment.
  - F. Product Data -- Provide catalog cut sheets and information for the following:
    1. Wire, cable, and optical fiber
    2. Outlets, jacks, faceplates, and connectors
    3. All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings
    4. Terminal blocks and patch panels
    5. Enclosures, racks, and equipment housings
    6. Splice housings
  - G. Project record drawings:

1. Submit project record drawings at conclusion of the project and include:
  - a. Approved shop drawings
  - b. Plan drawings indicating locations and identification of work area outlets, nodes, telecommunications rooms (TRs), and backbone (riser) cable runs
  - c. Telecommunications rooms (TRs) and equipment room (ER and/or MC) termination detail sheets.
  - d. Cross-connect schedules including entrance point, main cross-connects, intermediate cross-connects, and horizontal cross-connects.
  - e. Labeling and administration documentation.
  - f. Warranty documents for equipment.
  - g. Copper certification test result printouts and diskettes.
    - (a.) Optical fiber power meter/light source test results.

#### 1.06 QUALITY ASSURANCE

- A. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size.
- B. Upon request by the engineer/designer, furnish a list of references with specific information regarding type of project and involvement in providing of equipment and systems.
- C. Equipment and materials of the type for which there are independent standard testing requirements, listings, and labels, shall be listed and labeled by the independent testing laboratory.
- D. Where equipment and materials have industry certification, labels, or standards (i.e., NEMA - National Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with standards.
- E. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.
- F. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the owner and engineer/designer.

#### 1.07 WARRANTY

- A. Specification Note: Insert manufacturer's extended warranty verbiage if requested.
- B. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship for a period of not less than fifteen (15) years from date of acceptance by the owner. The owner shall deem acceptance as beneficial use.
- C. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect equipment during transit, storage, and handling to prevent damage, theft, soiling, and

misalignment. Coordinate with the owner for secure storage of equipment and materials. Do not store equipment where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged equipment; remove from site and replace damaged equipment with new equipment.

#### 1.09 SEQUENCE AND SCHEDULING

- A. Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for conformance to specific job completion dates. As a minimum, dates are to be provided for bid award, installation start date, completion of station cabling, completion of riser cabling, completion of testing and labeling, cutover, completion of the final punch list, start of demolition, owner acceptance, and demolition completion.

#### 1.10 USE OF THE SITE

- A. Use of the site shall be at the owner's direction in matters in which the owner deems it necessary to place restriction.
- B. Access to building wherein the work is performed shall be as directed by the owner.
- C. The owner will occupy the premises during the entire period of construction for conducting his or her normal business operations. Cooperate with the owner to minimize conflict and to facilitate the owner's operations.
- D. Schedule necessary shutdowns of plant services with the owner, and obtain written permission from the owner. Refer to article - CONTINUITY OF SERVICES herein.
- E. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the owner.

#### 1.11 CONTINUITY OF SERVICES

- A. Take no action that will interfere with, or interrupt, existing building services unless previous arrangements have been made with the owner's representative. Arrange the work to minimize shutdown time.
- B. Owner's personnel will perform shutdown of operating systems. The contractor shall give three (3) days' advance notice for systems shutdown.
- C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Hubbell, Ortronics, Panduit
  1. Or any other approved equivalent manufacturer that meets the performance requirements of this specification. Category 6 performance is standard.
  2. Contractor shall be a certified installer.
- B. Berk-Tek
- C. Belden
- D. Mohawk

- E. Commscope
- F. Superior Essex
- G. Optical Cable Corporation

## 2.02 FABRICATION

- A. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of equipment and its installation.

## 2.03 SUITABILITY

- A. Provide products that are suitable for intended use, including, but not limited to environmental, regulatory, and electrical.

## 2.04 BACKBONE CABLE

- A. VOICE/DATA TELECOMMUNICATIONS SERVICE BACKBONE CABLE (Edit for items that will actually be used on the project. Alter parameters for fire rating of cable jacket(s) as required.)
  - 1. Multimode 50/125  $\mu\text{m}$  diameter tight-buffered optical fiber, with fiber counts as indicated on drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.3
    - a. Listed type OFNP, OFNR, OFCR, and/or OFCP (as required in the NEC 2002).

## 2.05 STATION CABLE

- A. VOICE TELECOMMUNICATIONS STATION CABLE
  - 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.
    - a. Listed Type CMP (as required in the NEC 2005).
- B. DATA STATION CABLE (Copper)
  - 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.
    - a. Listed Type CMP (as required in the NEC 2005).

## 2.06 WORK AREA OUTLETS

- A. VOICE/DATA WORK AREA OUTLETS (Copper only)
  - 1. Single-gang mounting plate with four (4) openings containing the following devices:
    - a. Voice Outlet - 8-pin modular, Category 6, unkeyed, white, pinned to T568A standards.
    - b. Data Outlet - 8-pin modular, Category 6, unkeyed, blue, pinned to T568A standards.
  - 2. The device color of outlets and jacket color for cabling that will be used on the project shall be coordinated with the Dane County Information Technology (IT) Department

prior to the beginning of any work. It is intended that the Dane County standard being maintained.

**B. WALL VOICE OUTLETS**

1. Single-gang stainless steel faceplate with six-conductor jack and wall telephone mounting lugs

**C. DATA ONLY WORK AREA OUTLET**

1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, blue data jack, pinned to T568A standards

**D. VOICE ONLY WORK AREA OUTLET**

1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, white telephone jack, pinned to T568A standards

**2.07 PATCH PANELS**

- A. 19 in. rack mountable, 24-port 8-pin modular to insulation displacement connector (IDC) meeting Category 5e performance standards, and pinned to either T568 (A or B) standards. Typical examples of IDC connections are the 110, BIX, and Krone.

**2.08 RACK MOUNTED OPTICAL FIBER TERMINATION PANEL**

- A. 19 in. rack mounted 72-port rack-mounted optical fiber termination panel with cable strain relief, grounding lugs, slack storage and three 12-port duplex SC or approved alternative connector panels with adapters and provisions for six (6) splice trays.

**2.09 SPLICE TRAYS**

- A. Sized for multimode fibers, nonmetallic with clear plastic cover, 12-fiber splice capacity, compatible with splice enclosure and splicing method.

**2.10 OPTICAL FIBER CONNECTORS**

- A. Ceramic tipped field installed 568SC connectors, which meet or exceed the performance specifications in ANSI/TIA/EIA-568-B.3.

**2.11 OPTICAL FIBER JUMPERS**

- A. Dual 50/125- $\mu\text{m}$  (and/or singlemode) optical fiber jumper cable, 1 m long with 3.0 mm Duplex 568 SC optical fiber connectors on each end.

**2.12 OPTICAL FIBER PIGTAILS**

- A. 50/125  $\mu\text{m}$  (and/or singlemode) optical fiber pigtail 1 m long with 3.0 mm single 568 SC optical fiber connectors on one end

**2.13 OPEN FRAME EQUIPMENT RACK**

- A. Open frame, 19 in. equipment rack, 7 foot 6 in. overall height with flange base, mounting rails drilled front and back and tapped to EIA standards, and a front-rack mountable 10 outlet multiple outlet electrical strip.

## 2.14 SPLICE HOUSING

- A. Encapsulated, re-enterable splice housing, sized as required with bonding straps, accessories, end caps and encapsulant as required
- B. Splice modules (such as 710 series or MS2) for use within splice housing

## 2.15 SPARES

- A. Furnish the following spare equipment and parts:
  - 1. Terminal block connectors, if required
  - 2. Test set cords, if required
  - 3. Install one test cord set in each telecommunications closet
  - 4. Five (5) percent of base bid quantity of each type of jack shall be provided
  - 5. Five (5) percent of base bid quantity of each type of outlet

## PART 3 - EXECUTION

### 3.01 PRE-INSTALLATION SITE SURVEY

- A. Prior to start of systems installation, meet at the project site with the owner's representative and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the General Contractor will be necessary to plan the crucial scheduled completions of the equipment room and telecommunications closets.
- B. Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.
- C. The contractor shall be responsible for meeting with the Owner's (Dane County) Information Technology staff prior to the start of any installation to coordinate the work to be installed as part of this project. It is the design intent to maintain any cabling or installation standards that are currently in use by Dane County.
  - 1. Failure to perform this meeting may cause work to be removed and reinstalled if not deemed acceptable by Dane County.

### 3.02 HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS

- A. Be responsible for safekeeping of your own and your subcontractors' property, such as equipment and materials, on the job site. The owner assumes no responsibility for protection of above named property against fire, theft, and environmental conditions.

### 3.03 PROTECTION OF OWNER'S FACILITIES

- A. Effectively protect the owner's facilities, equipment, and materials from dust, dirt, and damage during construction.
- B. Remove protection at completion of the work.

### 3.04 INSTALLATION

- A. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative.



Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

- B. Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and National Electrical Code® (NEC) and with manufacturer's printed instructions.
- C. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.
  - 1. Where manufacturer does not provide bending radii information, minimum-bending radius shall be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the engineer and the owner.
- D. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or galvanized rigid conduit (GRC) sleeves and shall be firestopped after installation and testing, utilizing a firestopping assembly approved for that application.
- E. Install station cabling to the nearest telecommunications room (TR), unless otherwise noted.
- F. Installation shall conform to the following basic guidelines:
  - 1. Use of approved wire, cable, and wiring devices
  - 2. Neat and uncluttered wire termination
- G. Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support cables installed above removable ceilings.
- H. Install adequate support structures for 10 foot of service slack at each TR.
- I. Support riser cables every three (3) floors and at top of run with cable grips.
  - 1. Limit number of four-pair data riser cables per grip to fifty (50)
- J. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings or noted below:
- K. Provide overvoltage protection on both ends of cabling exposed to lightning or accidental contact with power conductors.

### 3.05 GROUNDING

- A. Grounding shall conform to ANSI/TIA/EIA 607(A) - Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code®, ANSI/NECA/BICSI-568 and manufacturer's grounding requirements as minimum.
- B. Bond and ground equipment racks, housings, messenger cables, and raceways.
- C. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system via #6 AWG green insulated copper grounding conductor.

### 3.06 LABELING

- A. Labeling shall conform to ANSI/TIA/EIA-606(A) standards. In addition, provide the following:
  - 1. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high

characters.

2. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:
  - a. Inside receptacle box at the work area.
  - b. Behind the communication closet patch panel or punch block.
  - c. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein.
  - d. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-606(A) standard color codes for termination blocks.
  - e. Mount termination blocks on color-coded backboards.
  - f. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
  - g. Label cables, outlets, patch panels, and punch blocks with room number in which outlet is located, followed by a single letter suffix to indicate particular outlet within room, i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number.
  - h. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner two (2) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.
  - i. Three (3) sets of as-built drawing shall be delivered to the owner within four (4) weeks of acceptance of project by the owner. A set of as-built drawings shall be provided to the owner in magnetic media form (3.5" floppy disks) and utilizing CAD software that is acceptable to the owner. The magnetic media shall be delivered to the owner within six (6) weeks of acceptance of project by owner.

### 3.07 TESTING

- A. Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level IIe or higher field testers.
- B. Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded, and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.
  1. Perform testing of copper cables with tester meeting ANSI/TIA/EIA-568-B.1 requirements.

### **Category 6 Test Parameters:**

#### **Category 6 Cable Permanent Link Test**

TELECOMMUNICATIONS DISTRIBUTION SYSTEM

Frequency	TIA/EIA 568B.2-1 Insertion Loss Attenuation	TIA/EIA 568B.2-1 NEXT Worst Pair to Pair	TIA/EIA 568B.2-1 PSNEXT Worst Case Loss	TIA/EIA 568B.2-1 ELFEXT Worst Pair to Pair Loss	TIA/EIA 568B.2-1 PSELFEXT Loss	TIA/EIA 568B.2-1 Return Loss
Mhz	Max. dB	dB	dB	DB	dB	dB
1.00	1.9	65.0	62.0	64.2	61.2	19.1
4.00	3.5	64.1	61.8	52.1	49.1	21.0
8.00	5.0	59.4	57.0	46.1	43.1	21.0
10.00	5.5	57.8	55.5	44.2	41.2	21.0
16.00	7.0	54.6	52.2	40.1	37.1	20.0
20.00	7.9	53.1	50.7	38.2	35.2	19.5
25.00	8.9	51.5	49.1	36.2	33.2	19.0
31.25	10.0	50.0	47.5	34.3	31.3	18.5
62.50	14.4	45.1	42.7	28.3	25.3	16.0
100.00	18.6	41.8	39.3	24.2	21.2	14.0
200.00	27.4	36.9	34.3	18.2	15.2	11.0
250.00	31.1	35.3	32.7	16.2	13.2	10.0

C. Propagation Delay

1. The maximum propagation delay determined in accordance with the ANSI/TIA/EIA – 568B.2 for a Permanent Link configuration shall be less than 498-ns measured at 10MHz. (Note: In determining the permanent link propagation delay, the propagation delay contribution of connecting hardware is assumed to not exceed 2.5 ns from 1 MHz to 250MHz).

D. Delay Skew

1. For all frequencies from 1 MHz to 250 MHz, Category 6 cable propagation delay skew shall not exceed 44ns/100m at 20 degrees C, 40 degrees C, and 60 degrees C. In addition, the propagation delay skew between all pairs shall not vary more than +/- 10ns from the measured value at 20 degrees C when measured at 40 degrees C and 60 degrees C. Compliance shall be determined using a minimum 100m of cable.

E. In order to establish testing baselines, cable samples of known length and of the cable type and lot installed shall be tested. The cable may be terminated with an 8-position Category 6 Modular plug (8-pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be calculated based on this test and be utilized during the testing of the installed cable plant. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.

F. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacement and changes as are necessary, and shall then repeat the test or tests which disclosed faulty or defective material, equipment or installation method, and shall make additional tests as the Engineer deems necessary at no additional expense to the project or user agency.

G. Optical Fiber Testing

1. Initially test optical cable with a light source and power meter utilizing procedures as stated in ANSI/TIA/EIA-526-14A: OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant and ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss of Installed Singlemode Fiber Cable Plant. Measured results shall be plus/minus 1 dB of submitted loss budget calculations. If loss figures are outside this range, test cable with optical time domain reflectometer to determine cause of

variation. Correct improper splices and replace damaged cables at no charge to the owner

- a. Cables shall be tested at 850 and 1300 nm for multimode optical fiber cables.
  - b. Testing procedures shall utilize “Method B” – One jumper reference.
  - c. Bi-directional testing of optical fibers is required.
- H. Where any portion of system does not meet the specifications, correct deviation and repeat applicable testing at no additional cost to the owner.

### 3.08 FIELD QUALITY CONTROL

- A. Employ job superintendent or project manager during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. This person shall maintain current RCDD® (Registered Communications Distribution Designer) registration and shall be responsible for quality control during installation, equipment set-up, and testing.
- B. At least 30 percent of installation personnel shall be BICSI Registered Telecommunications Installers. Of that number, at least 15 percent shall be registered at the Technician Level, at least 40 percent shall be registered at the Installer Level 2, and the balance shall be registered at the Installer Level 1.
- C. Installation personnel shall meet manufacturer’s training and education requirements for implementation of extended warranty program.

END OF SECTION

## SECTION 16950

### OCCUPANCY SENSOR LIGHTING CONTROL SYSTEM

#### PART 1 - GENERAL

##### 1.01 SCOPE

- A. All requirements of Conditions of Contract and Division 1 govern work under this Section.

##### 1.02 GENERAL PROVISIONS

- A. In general, the work includes:
  1. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.
  2. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 16.
  3. Contractor must submit data sheets on sensors, control units and all junction boxes and mounting accessories, including all wiring diagrams.

##### 1.03 EQUIPMENT QUALIFICATION

- A. Products supplied shall be from a manufacturer that has been continuously involved in the manufacturing of occupancy sensors for a minimum of five (5) years.
- B. All components shall be UL listed, offer a five (5) year warranty and meet all state and local applicable codes requirements.

##### 1.04 SYSTEM DESCRIPTION

- A. The objective of this section is to ensure the proper installation of the occupancy sensor based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.
- B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.
- C. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The suppliers obligation shall include repair or replacement, and testing without charge to the owner, all or in parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

##### 1.05 SUBMITTALS

- A. Manufacturer shall substantiate conformance to this specification by supplying the necessary documents, performance data, and wiring diagrams. Any deviations to this specification must be clearly stated by letter and submitted.
- B. Submit a lighting plan clearly marked by manufacturer showing proper product, location,

and orientation of each sensor.

- C. Submit any interconnection diagrams per major sub-system showing proper wiring.
- D. Submit standard catalog literature which includes performance specifications indicating compliance to the specification.

#### 1.06 SYSTEM OPERATION

- A. It shall be the contractor's responsibility to make all proper adjustments to assure owner's satisfaction with the occupancy system.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. The Watt Stopper, Inc.
- B. Or Equivalent Devices by the Following Manufacturers
  - 1. Hubbell
  - 2. Leviton
  - 3. Sensor Switch

#### 2.02 SYSTEM OPERATION

- A. All products shall be Watt Stopper product numbers:
  - 1. Ceiling Sensors: W-500A, W-1000A, W-2000A, W-2000H, W-PIR, DT-100L, CI-100, CI-200.
  - 2. Wall Sensors: WI-120A, WI-277A, WS-120, WS-277, WM-120, WM-277.
  - 3. Power and Slave Packs: A-120E, A-277E, S-120/277.
  - 4. Low Temperature: CB-100, CB-200.
- B. Wall switch sensors shall be capable of detection of motion at desk top level up to 300 square feet, and gross motion up to 1,000 square feet.
- C. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1,000 watts at 277 volts, and shall have 180 degree coverage capability.
- D. Bi-level wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1,000 watts to 277 volts.
- E. Passive Infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.
- F. Passive Infrared and Dual Technology sensors shall have fully automatic operation, offer daylighting footcandle adjustment control and be able to accommodate dual level lighting.
- G. All sensors shall be capable of operating normally with electronic ballast, PL lamp systems, and rated motor loads.
- H. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
- I. All sensors shall have readily accessible, user adjustable controls for time delay and

sensitivity. Controls shall be recessed to limit tampering.

- J. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
- K. Ultrasonic operating frequency shall be crystal controlled to within plus or minus 0.005% tolerance to assure reliable performance and eliminate sensor cross talk. Sensors using multiple frequencies are not acceptable.
- L. All sensors shall provide a method of indication to verify that motion is being detected during testing and that the unit is working.
- M. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging, and other control options. Sensors utilizing separate components to achieve this function are not acceptable.
- N. All sensors shall have no leakage current to load in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
- O. The Contractor shall certify in writing that installed sensors comply with the specified California Energy Commission criteria for ultrasonic sound.
- P. All sensors shall have UL rated, 94V-0 plastic enclosures.

### 2.03 CIRCUIT CONTROL HARDWARE - CU

- A. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to mount on external J boxes and be integrated self-contained unit consisting internally of load switching control relay and a transformer to provide low-voltage power to a minimum of two (2) sensors.
- B. Relay Contacts shall have ratings of:
  - 1. 13A - 120 VAC Tungsten
  - 2. 20A - 120 VAC Ballast
  - 3. 20A - 277 VAC Ballast

### 2.04 CONTROL WIRING

- A. A. Control wiring between sensors and controls units shall be Class II, 18-24 AWG stranded U.L. Classified, PVC insulated or Teflon jacketed cable approved for use in plenums, where applicable.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. It shall be the contractor's responsibility with the suppliers assistance to locate and aim sensory in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within in the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate

only rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.

- B. It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the owner's facility, to verify placement of sensors and installation criteria.
- C. Proper judgement must be exercised in executing the installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems, or;

END OF SECTION