



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. 315028 FEN OAK SECOND FLOOR RENOVATIONS LYMAN F. ANDERSON AGRICULTURE & CONSERVATION CENTER 5201 FEN OAK DRIVE MADISON, WISCONSIN

DORSCHNER|ASSOCIATES, INC.
849 EAST WASHINGTON AVENUE SUITE 112
MADISON WISCONSIN 53703
608.204.0777

JDR ENGINEERING, INC.
5525 NOBEL DRIVE, SUITE 110
MADISON WISCONSIN 53711

Due Date / Time: **TUESDAY, MAY 19, 2015, 2:00 P.M.**

Location: **PUBLIC WORKS OFFICE**

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

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

FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

ROB NEBEL ASSISTANT PUBLIC WORKS DIRECTOR
TELEPHONE NO.: 608/267-0119
FAX NO.: 608/267-1533
E-MAIL: NEBEL@COUNTYOFDANE.COM

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LEGAL NOTICE

INVITATION TO BID

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

2:00 P.M., TUESDAY, MAY 19, 2015

REQUEST FOR BIDS NO. 315028

FEN OAK SECOND FLOOR RENOVATIONS

LYMAN F. ANDERSON AGRICULTURE AND CONSERVATION CENTER

5201 FEN OAK DRIVE MADISON, WISCONSIN

Dane County is inviting Bids for construction services for the renovation of approximately 8,000 S.F. of the Fen Oak Second Floor and modifications to a First Floor Conference Room. The area of renovation will provide office space for the Dane County Land & Water Resources Department and the United States Department of Agriculture Dane County Farm Service Agency and Natural Resources Conservation Service. Only firms with capabilities, experience & expertise with similar projects should obtain this packet & submit Bids.

Request for Bids package may be obtained after **2:00 p.m. on Thursday, April 30, 2015** by downloading it from countyofdane.com/pwbids. Please call Rob Nebel, Assistant Public Works Director, at 608/267-0119, or Eric Urtes, AIA-Project Manager, at 608/266-4798 for any questions or additional information.

All Bidders must be a registered vendor with Dane County & pay an annual registration fee & must be pre-qualified as a Best Value Contractor before award of Contract. Complete Vendor Registration Form at danepurchasing.com/registration or obtain one by calling 608/266-4131. Complete Pre-qualification Application for Contractors at countyofdane.com/pwht/BVC_Application.aspx or obtain one by calling 608/266-4029.

A facility tour for Bidders will be held **Thursday, May 7, 2015 at 10:00 a.m.** at the Lyman F. Anderson Agriculture and Conservation Center, 5201 Fen Oak Drive, Madison, Wisconsin, starting on the second floor in Room 208. Bidders are strongly encouraged to attend this tour in order to bid on the Work.

PUBLISH:

TUESDAY, APRIL 28, 2015 AND MAY 5, 2015 - WISCONSIN STATE JOURNAL

TUESDAY, APRIL 28, 2015 AND MAY 5, 2015 - THE DAILY REPORTER

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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, May 7, 2015 at 10:00 a.m. at the Lyman F. Anderson Agriculture and Conservation Center, 5201 Fen Oak Drive, Madison, Wisconsin, starting on the second floor in Room 208. Attendance by all bidders is optional, however bidders and subcontractors are strongly encouraged to attend.
- D. 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 Due Date. Bidders shall bring inadequacies, omissions or conflicts to Owner or Architect / Engineer's attention at least ten (10) days before Bid Due Date. 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. Owner or Architect / Engineer will not be responsible for verbal instructions.

4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)

- A. Before award of Contract can be approved, Owner 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. Has record of satisfactorily completing past projects and supplies list of no more than five (5) most recent, similar projects, with architect or engineer's and owner's names, addresses and telephone numbers for each project. Submit to Public Works Project Engineer within three (3) days after Bid Due Date. Criteria which will be considered in determining satisfactory completion of projects by bidder will include:
 - a. Completed contracts in accordance with drawings and specifications.
 - b. Diligently pursued execution of work and completed contracts according to established time schedule unless Owner grants extensions.
 - c. Fulfilled guarantee requirements of construction documents.
 - d. Is not presently on ineligible list maintained by County's Department of Administration for noncompliance with equal employment opportunities and affirmative action requirements.
 - e. 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 Owner 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. Owner reserves right to reject Bid if evidence submitted by, or investigation of, bidder fails to satisfy Owner 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 Due Date.
- 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 (3) lowest qualified, responsible bidders, will be returned to their makers within three (3) days after Bid Due Date. 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 Due Date, 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 Due 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 Owner within seventy-two (72) hours of Bid Due Date.

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 \$15,000.00 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 twenty-five (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 twenty-four (24) hours after Bid Due Date 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 twenty-four (24) hours after Bid Due Date. Bidder who fails to submit Emerging Small Business Report shall be deemed not responsive.
- D. **ESB Goal.** Goal of this project is ten percent (10%) ESB participation. 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 Due 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 Due Date.

- 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 with such additive Owner accepted alternates.
 - 2. Owner 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 itself 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 Statute 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 may be rejected if receipt of any particular addendum applicable to award of Contract has not been acknowledged on Bid Form.
- F. Bids shall be signed, placed in envelope, sealed and delivered before due time to place designated in Invitation to Bid, and identified with project name, bid number, location, category of work being bid upon, Bid Due Date, name and address of bidder.
- G. Bidder shall be responsible for sealed Bid being delivered to place designated for Bid Due Date 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.
- J. Bidder's organization shall submit completed with Bid, Fair Labor Practices Certification form, included in these Construction Documents.

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. Not Applicable.

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. Refer to Article 20 of General Conditions of Contract, titled "Time for Completion".

19. WORK BY OWNER

- A. This work will be accomplished by Owner or will be let under separate contracts and will not be included under this Contract:
 - 1. Testing and Balancing.
 - 2. Relocation of files and furniture, except where noted for Contractor Installation.
 - 3. Installation of the demising wall in the first floor conference room and opening 114.
 - 4. Wireless Access Points to be Owner Provided Contractor Installed.

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 24 hours after Bid Due Date.

PROJECT NAME: _____

BID NO.: _____ BID DUE 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

Name of Bidding Firm: _____

BID FORM

BID NO. 315028

**PROJECT: FEN OAK SECOND FLOOR RENOVATIONS
LYMAN F. ANDERSON AGRICULTURE & CONSERVATION CENTER
5201 FEN OAK DRIVE MADISON, WISCONSIN**

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

BASE BID - LUMP SUM:

Work includes construction services for the renovation of approximately 8,000 S.F. of the Fen Oak Second Floor and modifications to a First Floor Conference Room. The area of renovation will provide office space for the Dane County Land & Water Resources Department and the United States Department of Agriculture Dane County Farm Service Agency and Natural Resources Conservation Service. 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 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, as stipulated below.

ALTERNATE BID 1 - LUMP SUM:

Provide CPT-1 and RB-1 in Second Floor areas noted 'Existing Carpet' on A9.1 including removal of existing.

_____ and _____ /100 Dollars
Written Price

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

ALTERNATE BID 2 - LUMP SUM:

Provide Access Control System including associated modifications to doors and frames.

_____ and _____ /100 Dollars
Written Price

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

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INFORMATIONAL BID 1 - LUMP SUM:

Work related to United States Department of Agriculture Dane County Farm Service Agency and Natural Resources Conservation Service. All Division 26 work (phone, data, power) in Fed Server Room 230 and associated with the relocation of Fed staff. Modifications to openings to secure the FSA suite including work at FSA Entry 234 and door 228 (including demo, framing and paint). Refer to G1.0 for general description of this area.

_____ and _____/100 Dollars
Written Price

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

INFORMATIONAL BID 2 - LUMP SUM:

Work included in Section 23 09 23 – Direct Digital Control System for HVAC

_____ 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 October 16, 2015. Assuming this Work can be started by June 18, 2015, what dates can you commence and complete this job?

Commencement Date: _____ Completion Date: _____
(final, not substantial)

I hereby certify that all statements herein are made on behalf of:

(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

- 1. A corporation organized and existing under the laws of the State of _____, or
- 2. A partnership consisting of _____, or
- 3. A person conducting business as _____;

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Of the City, Village, or Town of _____ of the State of _____.

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

The undersigned further agrees to honor the Base Bid and the Alternate Bid(s) for 60 days from date of Award of Contract.

SIGNATURE: _____
(Bid is invalid without signature)

Print Name: _____ Date: _____

Title: _____

Address: _____

Telephone No.: _____ Fax No.: _____

Email Address: _____

Contact Person: _____

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THIS PAGE IS FOR BIDDERS' REFERENCE AND NEED NOT BE SUBMITTED WITH BID FORM.

BID CHECK LIST:

These items **must** be included with Bid:

- Bid Form Bid Bond Fair Labor Practices Certification
[Project Experience / Reference Summary]

BIDDERS SHOULD BE AWARE OF THE FOLLOWING:

DANE COUNTY VENDOR REGISTRATION PROGRAM

Any person bidding on any County contract must be registered with the Dane County Purchasing Division & pay an annual registration fee. A contract will not be awarded to an unregistered vendor. Obtain a *Vendor Registration Form* by calling 608/266-4131 or complete a new form or renewal online at:
www.danepurchasing.com/registration

DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION

Contractors must be pre-qualified as a Best Value Contractor with the Dane County Public Works Engineering Division before the award of contract. Obtain a *Best Value Contracting Application* by calling 608/266-4018 or complete one online at:
www.countyofdane.com/pwht/BVC_Application.aspx

EQUAL BENEFITS REQUIREMENT

By submitting a Bid, the contractor acknowledges that a condition of this contract is to provide equal benefits as required by Dane County Code of Ordinances Chapter 25.016. Contractor shall provide equal benefits as required by that Ordinance to all required employees during the term of the contract. Equal Benefits Compliance Payment Certification shall be submitted with final pay request. For more information:
www.danepurchasing.com/partner_benefit.aspx

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DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive
Joseph T. Parisi

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 contractors to be pre-qualified as a best value contractor with the County prior to being awarded a contract. In addition, the County pre-qualifies potential contractors and sub-contractors who wish to work on County contracts. Subcontractors must become pre-qualified ten (10) days prior to commencing work under any Dane County Public Works Contract. Potential subcontractors are urged to become pre-qualified as early as possible. This document shall be completed, properly executed, along with the necessary attachments and additional information that the County requires for the protection and welfare of the public in the performance of a County contract.

Contractors or subcontractors of any tier who attain pre-qualification status will retain that status for a period of two (2) years from the date of qualification. Contractors shall notify the Dane County Department of Public Works, Highway & Transportation within fifteen (15) days of any changes to its business or operations that are relevant to the pre-qualification application. Failure to do so could result in suspension, revocation of the contractor's pre-qualification, debarment from County contracts for up to three (3) years and / or other sanctions available under the law.

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: dwd.wisconsin.gov/apprenticeship/.

EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to pre-qualify.
- 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;
 - 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 any project or obtain the same through the use of responsible, pre-qualified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Will 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	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Will 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	Will 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	Will 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 an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Is your firm exempt from being pre-qualified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
17	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 pre-qualified with the County or become so ten days prior to commencing work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
18	Contractor has been in business less than one year?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
19	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
20	Not applicable. My firm does not intend to work on Best Value Contracts. Note: Best Value Contracting is required to bid on most Public Works Contracts (if unclear, please call Jan Neitzel Knox 608-266-4029).	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:

JAN NEITZEL KNOX
EMAIL: NEITZEL-KNOX@COUNTYOFDANE.COM
OFFICE: (608)266-4029, FAX: (608)267-1533

**DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY & TRANSPORTATION
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
Elevator Mechanic / Technician
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 / Waterproofer
Sheet Metal Worker
Sprinkler Fitter
Steamfitter (Service & Refrigeration)
Taper & Finisher
Telecommunications (Voice, Data & Video) Installer / Technician
Tile Setter

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 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 and 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.

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COUNTY OF DANE

PUBLIC WORKS CONSTRUCTION CONTRACT

Contract No. _____ Bid No. 315028

Authority: 2014 RES - _____

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 Assistant Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide Construction Services for the Fen Oak Renovations ("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 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 Table of Contents, 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 comply with provisions of Chapter 25.016 of the Dane County Code of Ordinances, which pertains to domestic partnership benefits.

7. 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.

8. 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.

9. 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.

10. 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.

11. CONTRACTOR must be pre-qualified as a Best Value Contractor with Dane County Public Works Engineering Division before award of Contract. Subcontractors must be pre-qualified ten (10) days prior to commencing Work under this Contract.

12. Attachment A is the Contractor's Bid and is made a part of this Contract.

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 Assistant Public Works Director.

FOR COUNTY:

Joseph T. Parisi, County Executive _____
Date

Scott McDonell, County Clerk _____
Date

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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):

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:

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GENERAL CONDITIONS OF CONTRACT

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1. CONSTRUCTION DOCUMENTS

- A. Construction Documents, listed in Table of Contents of this Specification volume shall form 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 Manager 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 Manager is appointed by and responsible to Department. Public Works Project Manager 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 Manager 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 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 omissions 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, 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 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 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 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 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 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 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 standards; 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 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 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 Manager.
- 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 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 Manager 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 is caused directly by errors contained in Contract, or by County, or County's duly authorized representative.
- B. Contractor may act diligently, without previous instructions from Architect / Engineer and / or Department, in 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 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 Manager's instructions require any work to be specially tested or approved, Contractor shall give Architect /

Engineer and Public Works Project Manager 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 Manager 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. 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 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 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 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 Manager 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 Manager 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 Manager'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, 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 Manager 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 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 Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
 - 1. 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 Manager.
- 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 monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by 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 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 labor 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 Manager.
- 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 Manager.

25. PAYMENTS TO CONTRACTOR

- A. Contractor shall provide:
1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
 2. Periodic itemized estimates of work done for purpose of making partial payments thereon.
- B. Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Manager. Costs employed in making up any of these schedules are for determining

basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.

- C. 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.
- D. Contractor shall submit for approval first to Architect / Engineer, and then to Public Works Project Manager 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.
- E. 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 bonded warehouse with adequate coverage. If there is any error in payment, Contractor is obligated to notify Department immediately, but no longer than ten (10) days from receipt of payment.
- F. Payments by County will be due within forty-five (45) days after receipt by Department of Application and Certificate for Payment.
- G. 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 Manager find that progress of the Work corresponds with Construction Schedule. If Architect / Engineer and Public Works Project Manager 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.
- H. 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 waiver of right of County to require fulfillment of all of terms of Contract.
- I. County will make final payment within sixty (60) days after final completion of the Work, and will constitute acceptance thereof. Submit Equal Benefits Compliance Payment Certification with final pay request. Payment may be denied if Certification is not included.
- J. 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.
- K. 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 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 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, workers, 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 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 waiver of all claims by Contractor.

28. PAYMENTS BY CONTRACTOR

- A. Contractor shall pay following not later than fifth (5th) 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 Performance and Payment Bonds in 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 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 MANAGER'S AUTHORITY

- A. Public Works Project Manager 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 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 Manager.

36. STATED ALLOWANCES

- A. Stated allowances enumerated in Instructions to Bidders shall cover net cost of materials or equipment, and all applicable taxes. Contractor's cost of delivery and unloading at site, handling costs on site, labor, installation costs, overhead, profit and any other incidental costs shall be included in Contractor's bid, but not as part of cash allowance.
- B. Department will solicit at least two (2) bids on materials or equipment for which allowance is stated and select on basis of lowest qualified responsible bid. Contractor will then be instructed to purchase "Allowed Materials". If actual price for purchasing "Allowed Materials", including taxes, is more or less than "Cash Allowance", Contract price shall be adjusted accordingly. Adjustment in Contract price shall not contain any cost items excluded from cash allowance.

37. 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".

38. 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.

39. 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 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 waiver by County of any breach of covenants of Contract or 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 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 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 Manager.
- 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.

40. 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.

41. 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.

42. 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.

43. 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 recipient of services (actual or potential), employee, or 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 statement to affect Contractor is "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. 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 percentage of total dollar amount of bid.

44. 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."

45. DOMESTIC PARTNERSHIP BENEFITS

- A. Contractor agrees to provide same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or cash equivalent if such benefit cannot reasonably be provided. Contractor agrees to make available for County inspection Contractor's payroll records relating to employees providing services on or under this Contract or subcontract. If any payroll records of Contractor contain any false, misleading or fraudulent information, or if Contractor fails to comply with provisions of Chapter 25.016, Dane County Ordinances, contract compliance officer may withhold payments on Contract; terminate, cancel or suspend Contract in whole or in part; or, after due process hearing, deny Contractor right to participate in bidding on future County contracts for period of one year after first violation is found and for period of three years after second or subsequent violation is found.

46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE

- A. Contractor agrees to use and occupancy of 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 Manager, 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.

47. MINIMUM WAGES

- A. Contractor shall post, at appropriate conspicuous point on site of project, 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 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, worker 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.

48. CLAIMS

- A. No claim may be made until Department's Assistant 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 Assistant Public Works Director the 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.

49. 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.

50. 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 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 amount not less than \$1,000,000 on account of one accident, and Contractor's Property Damage Insurance in amount not less than \$1,000,000 or combined single limit of at least \$1,000,000 with excess coverage over and above general liability in amount not less than \$5,000,000. Contractor shall add "Dane County" as 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. "Contractor 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 Contractor will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as result of Contractor's operations" and each shall be listed as additional insured on Contractor's and sub-contractors' insurance policies.
 - c) Obligations of Contractor under Article 50.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 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 50.A.2 & 50.A.3. 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 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. Builder's Risk:

1. County shall provide Builder's Risk policy. Terms of this policy will be made available by County's Risk Manager, upon Contractor's request. 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 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.

51. 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.

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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 Architect / Public Works Project Manager for approval.


AIA Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO.:	Distribution to:
		PERIOD TO:	OWNER <input type="checkbox"/>
FROM CONTRACTOR:	VIA ARCHITECT:	CONTRACT FOR:	ARCHITECT <input type="checkbox"/>
		CONTRACT DATE:	CONTRACTOR <input type="checkbox"/>
		PROJECT NOS.:	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 or 5b or Total in Column I of G703) \$ _____

6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total) \$ _____

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificates) \$ _____

8. CURRENT PAYMENT DUE \$ _____

9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 7 plus 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 law due.

CONTRACTOR:
 By: _____ Date: _____
 State of _____
 County of _____
 Subscribed and sworn to before me this _____ day of _____
 Notary Public
 My Commission expires: _____

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. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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

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AIA Document G703™ – 1992

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 2-OR E)	G TOTAL COMPLETED AND STORED TO DATE (D+G)	H % (G ÷ C)	I BALANCE TO FINISH (C - G)	J RETAINAGE (OR VARIABLE RATE)
			D FROM PREVIOUS APPLICATION (D + E)	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, 1979, 1976, 1993 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 100 copies of this document when completed. To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects: aia@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 47, “Minimum Wages”, paragraph B. Following Prevailing Wage Rate Determination No. 201501429 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. Disclosure of Ownership (ERD-7777)
 - 2. Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination (ERD-5724)
 - 3. List of Agents and Subcontractors (Page 2 - ERD-5724)
 - 4. Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination (ERD-10584)
 - 5. List of Agents and Subcontractors (Page 2 - ERD-10584)
 - 6. Request To Employ Subjourneyperson (ERD-10880)

PREVAILING WAGE RATE DETERMINATION

Issued by the State of Wisconsin
Department of Workforce Development
Pursuant to s. 66.0903, Wis. Stats.
Issued On: 4/27/2015

DETERMINATION NUMBER: 201501429

EXPIRATION DATE: Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2015. If NOT, You MUST Reapply.

PROJECT NAME: FEN OAK SECOND FLOOR RENOVATIONS
PROJECT NO: 315028

PROJECT LOCATION: MADISON CITY, DANE COUNTY, WI

CONTRACTING AGENCY: DANE COUNTY PUBLIC WORKS

CLASSIFICATION:	Contractors are responsible for correctly classifying their workers. Either call the Department of Workforce Development (DWD) with trade or classification questions or consult DWD's Dictionary of Occupational Classifications & Work Descriptions on the DWD website at: dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm .
OVERTIME:	<p>Time and one-half must be paid for all hours worked:</p> <ul style="list-style-type: none">- over 10 hours per day on prevailing wage projects- over 40 hours per calendar week- Saturday and Sunday- on all of the following holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25;- The day before if January 1, July 4 or December 25 falls on a Saturday;- The day following if January 1, July 4 or December 25 falls on a Sunday. <p>Apply the time and one-half overtime calculation to whichever is higher between the Hourly Basic Rate listed on this project determination or the employee's regular hourly rate of pay. Add any applicable Premium or DOT Premium to the Hourly Basic Rate before calculating overtime.</p> <p>A DOT Premium (discussed below) may supersede this time and one-half requirement.</p>
FUTURE INCREASE:	When a specific trade or occupation requires a future increase, you MUST add the full hourly increase to the "TOTAL" on the effective date(s) indicated for the specific trade or occupation.
PREMIUM PAY:	If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whenever such pay is applicable.
DOT PREMIUM:	This premium only applies to highway and bridge projects owned by the Wisconsin Department of Transportation and to the project type heading "Airport Pavement or State Highway Construction." DO NOT apply the premium calculation under any other project type on this determination.
APPRENTICES:	Pay apprentices a percentage of the applicable journey person's hourly basic rate of pay and hourly fringe benefit contributions specified in this determination. Obtain the appropriate percentage from each apprentice's contract or indenture.
SUBJOURNEY:	Subjourney wage rates may be available for some of the trades or occupations indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer interested in using a subjourney classification on this project MUST complete Form ERD-10880 and request the applicable wage rate from the Department of Workforce Development PRIOR to using the subjourney worker on this project.

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project**. A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-6861.

The following statutory provisions apply to local governmental unit projects of public works and are set forth below pursuant to the requirements of s. 66.0903(8), Stats.

s. 66.0903 (1) (f) & s. 103.49 (1) (c) "PREVAILING HOURS OF LABOR" for any trade or occupation in any area means 10 hours per day and 40 hours per week and may not include any hours worked on a Saturday or Sunday or on any of the following holidays:

1. January 1.
2. The last Monday in May.
3. July 4.
4. The first Monday in September.
5. The 4th Thursday in November.
6. December 25.
7. The day before if January 1, July 4 or December 25 falls on a Saturday.
8. The day following if January 1, July 4 or December 25 falls on a Sunday.

s. 66.0903 (10) RECORDS; INSPECTION; ENFORCEMENT.

(a) Each contractor, subcontractor, or contractor's or subcontractor's agent performing work on a project of public works that is subject to this section shall keep full and accurate records clearly indicating the name and trade or occupation of every person performing the work described in sub. (4) and an accurate record of the number of hours worked by each of those persons and the actual wages paid for the hours worked.

s. 66.0903 (11) LIABILITY AND PENALTIES.

(a) 1. Any contractor, subcontractor, or contractor's or subcontractor's agent who fails to pay the prevailing wage rate determined by the department under sub. (3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor is liable to any affected employee in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional amount as liquidated damages as provided under subd. 2., 3., whichever is applicable.

2. If the department determines upon inspection under sub. (10) (b) or (c) that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the department shall order the contractor to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages within a period specified by the department in the order.

3. In addition to or in lieu of recovering the liability specified in subd. 1. as provided in subd. 2., any employee for and in behalf of that employee and other employees similarly situated may commence an action to recover that liability in any court of competent jurisdiction. If the court finds that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the court shall order the contractor, subcontractor, or agent to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages.

5. No employee may be a party plaintiff to an action under subd. 3. unless the employee consents in writing to become a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.

BUILDING OR HEAVY CONSTRUCTION

Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

SKILLED TRADES

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
101	Acoustic Ceiling Tile Installer Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016.	32.72	16.00	48.72
102	Boilermaker Future Increase(s): Add \$1.50/hr. on 01/01/2016	33.35	28.24	61.59
103	Bricklayer, Blocklayer or Stonemason Future Increase(s): Add \$1.40 on 06/01/2015; Add \$1.45 on 06/06/2016 Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.82	18.66	51.48
104	Cabinet Installer Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016.	32.72	16.00	48.72
105	Carpenter Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.72	16.00	48.72
106	Carpet Layer or Soft Floor Coverer Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016.	32.72	16.00	48.72
107	Cement Finisher	31.98	12.04	44.02
108	Drywall Taper or Finisher	26.05	18.23	44.28
109	Electrician Future Increase(s): Add \$1.20/hr on 6/1/15; Add \$1.25/hr on 6/1/16. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.82	19.67	54.49
110	Elevator Constructor	43.84	27.09	70.93

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
111	Fence Erector	18.00	6.09	24.09
112	Fire Sprinkler Fitter	36.79	18.81	55.60
113	Glazier Future Increase(s): Add \$.75/hr eff. 06/01/2015; Add \$.90/hr eff. 06/01/2016	37.07	14.42	51.49
114	Heat or Frost Insulator	33.43	25.81	59.24
115	Insulator (Batt or Blown) Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016.	32.72	16.00	48.72
116	Ironworker	31.50	20.01	51.51
117	Lather	31.40	15.90	47.30
118	Line Constructor (Electrical)	39.50	17.73	57.23
119	Marble Finisher	16.25	2.32	18.57
120	Marble Mason	32.09	18.04	50.13
121	Metal Building Erector	19.05	8.08	27.13
122	Millwright Future Increase(s): Add \$1.47/hr on 6/1/2015; Add \$1.47/hr on 6/1/2016.	34.44	16.07	50.51
123	Overhead Door Installer	27.46	1.98	29.44
124	Painter	25.75	16.60	42.35
125	Pavement Marking Operator	30.10	17.34	47.44
126	Piledriver Future Increase(s): Add \$1.50/hr on 6/1/2015; Add \$1.60/hr on 6/1/2016. Premium Increase(s): Add \$.65/hr for Piledriver Loftzman; Add \$.75/hr for Sheet Piling Loftzman. DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	30.11	26.51	56.62
127	Pipeline Fuser or Welder (Gas or Utility)	30.83	20.89	51.72
129	Plasterer Future Increase(s): Add \$1.56 on 06/01/2015; Add \$1.61 on 06/01/2016; Add \$1.66 on 06/01/2017	32.65	19.36	52.01
130	Plumber Future Increase(s): Add \$1.80 on 6/1/15	37.57	17.47	55.04

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
132	Refrigeration Mechanic Future Increase(s): Add \$1.80 on 6/1/15	44.20	18.26	62.46
133	Rofer or Waterproofofer	29.40	11.31	40.71
134	Sheet Metal Worker	34.45	22.54	56.99
135	Steamfitter Future Increase(s): Add \$1.80/hr on 6/1/15.	44.20	18.26	62.46
137	Teledata Technician or Installer Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	12.74	35.24
138	Temperature Control Installer	42.95	15.04	57.99
139	Terrazzo Finisher	16.25	2.32	18.57
140	Terrazzo Mechanic	31.18	17.35	48.53
141	Tile Finisher	23.85	17.18	41.03
142	Tile Setter	29.81	17.18	46.99
143	Tuckpointer, Caulker or Cleaner	23.60	7.10	30.70
144	Underwater Diver (Except on Great Lakes)	35.40	15.90	51.30
146	Well Driller or Pump Installer	25.32	15.65	40.97
147	Siding Installer	36.17	19.44	55.61
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	30.16	15.11	45.27
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	31.60	26.76	58.36
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	27.65	14.49	42.14
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	27.83	15.01	42.84
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.90	9.83	31.73

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle	32.89	18.96	51.85
203	Three or More Axle	18.00	21.99	39.99

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47
205	Pavement Marking Vehicle	20.85	11.02	31.87
207	Truck Mechanic	18.00	21.99	39.99

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer Future Increase(s): Add \$1.35/hr eff. 06/01/2015; Add \$1.25/hr eff. 06/06/2016 Premium Increase(s): Add \$1.00/hr for certified welder; Add \$.25/hr for mason tender	24.97	15.12	40.09
302	Asbestos Abatement Worker	18.00	9.58	27.58
303	Landscaper	18.75	10.26	29.01
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	21.55	14.14	35.69
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased) Premium Increase(s): DOT PREMIUMS: Pay two times the hourly basic rate on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	18.82	14.16	32.98
314	Railroad Track Laborer	14.50	5.29	19.79
315	Final Construction Clean-Up Worker Future Increase(s): Add \$1.35/hr eff. 06/01/2015; Add \$1.25/hr eff. 06/06/2016	24.97	15.12	40.09

**HEAVY EQUIPMENT OPERATORS
SITE PREPARATION, UTILITY OR LANDSCAPING WORK ONLY**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
501	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Milling Machine; Boring Machine (Directional, Horizontal or Vertical); Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Backhoe (Track Type) Having a Mfgr's Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Crane, Shovel, Dragline, Clamshells; Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Grader or Motor Patrol; Master Mechanic; Mechanic or Welder; Robotic Tool Carrier (With or Without Attachments); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor (Scraper, Dozer, Pusher, Loader); Trencher (Wheel Type or Chain Type Having Over 8 Inch Bucket). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	31.62	19.78	51.40
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	41.65	21.71	63.36
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Premium Increase(s): Add \$.50/hr for Friction Crane, Lattice Boom or Crane Certification (CCO).	41.65	21.71	63.36

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	35.72	17.85	53.57
507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	35.46	20.40	55.86

**HEAVY EQUIPMENT OPERATORS
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016. Premium Increase(s): Add \$.50/hr for >200 Ton; Add \$1/hr at 300 Ton; Add \$1.50/hr at 400 Ton; Add \$2/hr at 500 Ton & Over.	36.67	19.78	56.45
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016. Premium Increase(s): Add \$.25/hr for all >45 Ton lifting capacity cranes.	35.42	19.78	55.20
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	34.22	19.78	54.00

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	<u>TOTAL</u>
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames. Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	31.62	19.78	51.40
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	30.99	19.78	50.77
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment). Future Increase(s): Add \$1/hr on 6/1/2015; Add \$1/hr on 5/30/2016.	36.34	22.14	58.48
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment). Future Increase(s): Add \$1.65/hr on 6/1/2015.	33.12	19.35	52.47
516	Fiber Optic Cable Equipment	28.89	17.95	46.84

SEWER, WATER OR TUNNEL CONSTRUCTION
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Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

SKILLED TRADES

CODE	TRADE OR OCCUPATION	Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		
		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.09	18.04	50.13
105	Carpenter Future Increase(s): Add \$1.50/hr on 6/1/2015; Add \$1.65/hr on 6/1/2016. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.13	20.61	54.74
107	Cement Finisher Future Increase(s): Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	35.18	16.78	51.96
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.93	22.77	56.70
111	Fence Erector	18.00	6.09	24.09
116	Ironworker	31.50	20.01	51.51
118	Line Constructor (Electrical)	39.50	17.73	57.23
125	Pavement Marking Operator	30.10	17.34	47.44
126	Piledriver	29.56	25.71	55.27
130	Plumber	21.50	0.00	21.50
135	Steamfitter	42.95	17.81	60.76
137	Teledata Technician or Installer	22.25	12.24	34.49
143	Tuckpointer, Caulker or Cleaner	23.60	7.10	30.70
144	Underwater Diver (Except on Great Lakes)	35.40	15.90	51.30

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
146	Well Driller or Pump Installer	25.32	15.65	40.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	35.55	15.57	51.12
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	31.60	15.19	46.79
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	27.65	13.44	41.09
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.68	13.28	38.96
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.97	34.72

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle Future Increase(s): Add \$1.15/hr on 6/1/2015. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	25.18	18.31	43.49
203	Three or More Axle	19.50	4.97	24.47
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	20.85	11.02	31.87
207	Truck Mechanic	19.50	4.97	24.47

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer Future Increase(s): Add \$1.35/hr eff. 06/01/2015; Add \$1.25/hr eff. 06/06/2016 Premium Increase(s): Add \$.20 for blaster, bracer, manhole builder, caulker, bottomman and power tool; Add \$.55 for pipelayer; Add \$1.00 for tunnel work 0-15 lbs. compressed air; Add \$2.00 for over 15-30 lbs. compressed air; Add \$3.00 for over 30 lbs. compressed air.	26.34	15.13	41.47
303	Landscaper	39.43	0.00	39.43

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
304	Flagperson or Traffic Control Person	31.95	0.00	31.95
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.33	13.65	31.98
314	Railroad Track Laborer	14.50	5.29	19.79

**HEAVY EQUIPMENT OPERATORS
SEWER, WATER OR TUNNEL WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Future Increase(s): Add \$1.55/hr on 6/1/2015. Premium Increase(s): Add \$.25/hr for operating tower crane.	37.24	20.10	57.34
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	34.22	19.78	54.00
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
524	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Environmental Burner; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Hoist (Tugger, Automatic); Grout Pump; Jeep Digger; Lift Slab Machine; Mulcher; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Tining or Curing Machine; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	30.82	18.96	49.78
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.69	18.46	49.15
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	30.19	18.96	49.15
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	41.65	21.71	63.36
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	41.65	21.71	63.36
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	35.72	17.85	53.57
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	35.46	20.40	55.86

LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION
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Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

SKILLED TRADES

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.09	18.04	50.13
105	Carpenter Future Increase(s): Add \$1.42/hr on 6/1/2015; Add \$1.42/hr on 6/1/2016. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.72	16.00	48.72
107	Cement Finisher Future Increase(s): Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	35.18	16.78	51.96
109	Electrician	35.72	19.17	54.89
111	Fence Erector	18.00	6.09	24.09
116	Ironworker	31.50	20.01	51.51
118	Line Constructor (Electrical)	39.50	17.73	57.23
124	Painter	25.75	16.60	42.35
125	Pavement Marking Operator	30.10	17.34	47.44
126	Piledriver	29.56	25.71	55.27
133	Rofer or Waterproofer	29.40	11.31	40.71
137	Teledata Technician or Installer	22.25	12.24	34.49
143	Tuckpointer, Caulker or Cleaner	23.60	7.10	30.70
144	Underwater Diver (Except on Great Lakes)	35.40	15.90	51.30
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	35.55	15.57	51.12

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	31.60	15.19	46.79
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	27.65	13.44	41.09
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.68	13.28	38.96
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.97	34.72

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle Future Increase(s): Add \$1.15/hr on 6/1/2015. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	25.18	18.31	43.49
203	Three or More Axle	16.00	0.00	16.00
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47
205	Pavement Marking Vehicle	20.85	11.02	31.87
206	Shadow or Pilot Vehicle	24.37	17.77	42.14
207	Truck Mechanic	16.00	0.00	16.00

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer	29.32	12.44	41.76
303	Landscaper Future Increase(s): Add \$1.05/hr eff. 06/01/2015; Add \$1.00/hr eff. 06/01/2016; Add \$1.00/hr eff. 06/01/2017 Premium Increase(s):	30.13	15.14	45.27

Fringe Benefits Must Be Paid On All Hours Worked

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u> \$	<u>HOURLY FRINGE BENEFITS</u> \$	<u>TOTAL</u> \$
	DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).			
304	Flagperson or Traffic Control Person	19.06	14.29	33.35
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.33	13.65	31.98
314	Railroad Track Laborer	14.50	5.29	19.79

**HEAVY EQUIPMENT OPERATORS
CONCRETE PAVEMENT OR BRIDGE WORK**

Fringe Benefits Must Be Paid On All Hours Worked

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u> \$	<u>HOURLY FRINGE BENEFITS</u> \$	<u>TOTAL</u> \$
541	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	37.72	21.15	58.87

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
542	<p>Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver.</p> <p>Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm.</p>	37.22	21.15	58.37
543	<p>Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.</p>	35.72	17.85	53.57

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
544	Backfiller; Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine. Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	36.46	21.15	57.61
545	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.	35.17	20.40	55.57
546	Fiber Optic Cable Equipment.	28.89	17.95	46.84
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	41.65	21.71	63.36
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	41.65	21.71	63.36
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	35.72	17.85	53.57
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	35.46	20.40	55.86

**HEAVY EQUIPMENT OPERATORS
ASPHALT PAVEMENT OR OTHER WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	36.72	20.40	57.12
552	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	37.22	21.15	58.37
553	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames. Future Increase(s): Add \$1.60/hr on 6/2/2015; Add \$1.60/hr on 6/3/2016.	33.69	19.78	53.47

Fringe Benefits Must Be Paid On All Hours Worked

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u> \$	<u>HOURLY FRINGE BENEFITS</u> \$	<u>TOTAL</u> \$
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler. Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017.	36.17	20.80	56.97
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$1.25/hr on 6/1/2015; Add \$1.30/hr on 6/1/2016; Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	36.17	21.15	57.32
556	Fiber Optic Cable Equipment.	27.89	17.20	45.09

***** END OF RATES *****

POST THE WHITE SHEET

As the public entity receiving this prevailing wage rate determination, **YOU ARE REQUIRED** by law to post the prevailing wage rate determination (i.e., white sheet) in at least one conspicuous and easily accessible place on the project site that is available to all construction workers. The white sheet must remain posted from the onset of the project until all construction labor on the project has been completed.

[See, Wis. Admin. Code §DWD 290.12(1)]

Posting the white sheet inside the general contractor's trailer does not meet this requirement. That placement is not available/accessible to all workers and is not a location over which you have control.

If you have questions about posting, please call (608)266-6861 and ask for prevailing wage intake.

State of Wisconsin - Department of Workforce Development

This list has been prepared in accordance with the provisions of §§66.0903(12) and 103.49(7), Wis. Stats., and Chapter DWD 294 of the Wisconsin Administrative Code. All contractors on this list were found to have committed a "debarable offense" related to certain labor standard provisions determined or established for a state or local public works project. No state agency, local governmental unit or owner or developer may knowingly solicit bids from, negotiate with or award any contracts to or approve or allow any subcontracts with a debarred contractor, including all divisions, affiliates or other organizational elements of such contractor that are engaged in construction business activities, until the debarment is terminated. The name of each debarred contractor must remain on this list for a period of three (3) years from the termination date indicated below. The contractor is, however, only "debarred" from the "effective date" through the "termination date" indicated for that contractor. Questions regarding this list should be addressed to Julie Eckenwalder, Equal Rights Division, P. O. Box 8928, Madison, WI 53708 or call (608) 266-3148. Deaf, hearing or speech-impaired callers may contact the department by calling its TDD number (608) 264-8752.

<u>Name of Contractor</u>	<u>Address</u>	<u>Effective Date</u>	<u>Termination Date</u>	<u>Cause Code</u>	<u>Date of Violation(s)</u>	<u>Limitations/Deviations</u>
A-1 Duran Roofing & Insulation Services, Inc.	3700 N Fratney St Milwaukee, WI 53212	11/1/14	10/31/17	1, 2 and 4	2011- 2012	None
Abel, Mike	8095 NW 64 th St Miami, FL 33166					
	See, Abel Electric, Inc					
Abel Electric, Inc	3385 Belmar Rd Green Bay, WI 54313	9/1/12	8/31/15	1	2011	None
Arnie Christiansen Mason Contractors, LLC	2304 65 th Dr Franksville, WI 53126	9/1/14	8/31/16	1, 2 and 4	2011	None
Atkins, Scott	See, Freedom Insulation, Inc					
Boecker, Roger	See, R-Way Pumping, Inc					
Brechtl, Mark G	See, Ecodec, Inc					
Cargill Heating and Air Conditioning Company, Inc	3049 Edgewater La La Crosse, WI 54603	3/1/14	2/28/17	1 and 2	2011	None
Castlerock Commercial Construction, Inc	PO Box 11699 Milwaukee, WI 53211-0699	2/1/12	1/31/15	1, 2 and 4	2009 & 2010	None

<u>Name of Contractor</u>	<u>Address</u>	<u>Effective Date</u>	<u>Termination Date</u>	<u>Cause Code</u>	<u>Date of Violation(s)</u>	<u>Limitations/Deviations</u>
Christiansen, Andy	See, Arnie Christiansen Mason Contractors, LLC					
Christiansen, Arnold	See, Arnie Christiansen Mason Contractors, LLC					
Darnick, Gregory L	See, Darnick Trucking, LLC					
Darnick Trucking, LLC	W914 County Rd V Berlin, WI 54923	11/1/14	10/31/15	1, 2 and 4	2012 & 2013	None
Dem/Ex Group, Inc	805 S Adams St Manito, IL 61546	12/1/11	11/30/14	1 and 2	2010	None
Duran, Bernardo	See, A-1 Duran Roofing & Insulation Services and RRS2 Inc					
Ecodec, Inc	5106 Wintergreen Dr Madison, WI 53704	10/1/14	9/30/17	1	2011 & 2012	None
Fisher, Ed &/or Fisher, Rhonda	See, Dem/Ex Group, Inc					
Freedom Insulation, Inc	117925 219th Ave Chippewa Falls, WI 54729	9/1/11	8/31/14	1	2008- 2010	None
Galstad, Michael E (aka Michael Earl Galstad)	See, Cargill Heating and Air Conditioning Company, Inc					
Gjolaj, Ded	See, Horizon Bros Painting Corp					
Horizon Bros Painting Corp	1053 Kendra La Howell, MI 48843	10/1/14	9/30/16	4	2012	None
JT Roofing, Inc	350 Tower Dr Saukville, WI 53080	6/1/12	5/31/15	1, 2 and 4	2007 & 2008	None

<u>Name of Contractor</u>	<u>Address</u>	<u>Effective Date</u>	<u>Termination Date</u>	<u>Cause Code</u>	<u>Date of Violation(s)</u>	<u>Limitations/Deviations</u>
Jinkins, Richard	See, Castlerock Commercial Construction, Inc					
Oden, Cassie	See, A-1 Duran Roofing & Insulation Services and RRS2 Inc					
Ofstie, Darin	See, Precision Excavating and Grading, LLC					
Peret, Robert	See, A-1 Duran Roofing & Insulation Services and RRS2 Inc					
Precision Excavating and Grading, LLC or Precision Excavating Enterprises, LLC	2104 Pierce Saint Croix Rd Baldwin, WI 54002	5/1/11	4/30/14	1, 2 and 4	2006- 2008	None
R-Way Pumping, Inc	3023 Lake Maria Rd Freeport, MN 56331	3/1/12	2/28/15	1, 2 and 4	2008	None
RRS2 Inc	133 N Jackson St, #427 Milwaukee, WI 53202 or 1313 N Franklin Pl, #805 Milwaukee, WI 53202	11/1/14	10/31/17	1, 2 and 4	2011- 2012	None
Thull, Gerald T	See, JT Roofing, Inc					

Cause Code: 1 = Failure to Pay Straight Time 2 = Failure to Pay Overtime 3 = Kickback 4 = Payroll Records.

PREVAILING WAGE – Contractors

Any public works project that has a total estimated project cost that equals or exceeds prevailing wage project thresholds requires a prevailing wage rate determination issued by the Department of Workforce Development (DWD). Public works include erecting, constructing, remodeling, repairing, demolishing, alterations, painting and decorating projects for a local governmental unit or state agency. State law excludes minor service or maintenance work, warranty work, or work under a supply-and-installation contract. There is a statutory definition for most of these exclusions. The prevailing wage laws that apply to local governmental units and their contractors are §§66.0903 and 103.503, Wis. Stats. The prevailing wage laws that apply to state agencies and their contractors are §§103.49 and 103.503, Wis. Stats. The applicable administrative rules for all prevailing wage projects are DWD 290 and DWD 294, Wis. Adm. Code. These laws include provisions that apply to all contractors and subcontractors working on prevailing wage projects.

Any contractor or subcontractor working on a local governmental unit or state agency's public works project that equals or exceeds current prevailing wage project thresholds must do all of the following:

- Receive and review the project's prevailing wage rate determination (i.e., white sheet).
- Tell subcontractors the project is subject to state prevailing wage law and include the prevailing wage rate determination in the construction contract, or if there is no written contract, provide a copy of the project determination to each subcontractor.
- Hire subcontractors who do *not* appear on the "Consolidated List of Debarred Contractors."
- Have a written substance abuse testing program in place that fulfills the requirements of §103.503, Wis. Stats., before commencing work on the project.

- Notify subcontractors that if DWD finds that a contractor or subcontractor violated the prevailing wage law, DWD will assess liquidated damages of 100% of the wages owed to employees.
- Apply to DWD for subjourney wage rates prior to employing these individuals on the project.
- Receive and retain a completed Affidavit of Compliance from each subcontractor brought on to the project before providing final payment to those subcontractors.
- Submit a completed Affidavit of Compliance to the contractor who brought the subcontractor on to the project before receiving final payment for the project.
- Maintain payroll records for 3 years that comply with §§66.0903(10)(a) or 103.49(5)(a), Stats. and DWD 274.06.
- Respond to requests from DWD or the project owner to provide payroll records and/or respond to prevailing wage complaints filed by employees or third parties.

For more information, visit the prevailing wage website: http://dwd.wisconsin.gov/er/prevailing_wage_rate/default.htm. For further assistance, call the Equal Rights Division at 608-266-6861 and ask for prevailing wage.

Disclosure of Ownership

The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d), 66.0904(10)(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 [Privacy Law, s. 15.04(1) (m), Wisconsin Statutes].

- (1) On the date a contractor submits a bid to or completes negotiations with a state agency, local governmental unit, or developer, investor or owner on a project subject to Section 66.0903, 66.0904 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency, local governmental unit, or developer, investor or owner, 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), 66.0904(2), 103.49(2) and 103.50(2), Wisconsin Statutes.
- (3) This form must ONLY be filed, with the state agency project owner, local governmental unit project owner, or developer, investor or owner of a publicly funded private construction project 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; or
 - (2) 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

Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
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			
Authorized Officer Signature	Date Signed		
Corporation, Partnership or Sole Proprietorship Name			
Street Address or P O Box	City	State	Zip Code

If you have any questions call (608) 266-6861

Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination

Authorization for this form is provided under Sections 66.0903(9)(c), 66.0904(7)(c) and 103.49(4r)(c) 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 [Privacy Law, s. 15.04(1)(m), Wisconsin Statutes].

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

State Of)	Project Name		
	DWD Determination Number	Project Number (if applicable)	
)SS	Date Determination Issued	Date of Contract	
County Of)	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), 66.0904(7)(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 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, Business, State Agency or Local Governmental Unit				
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) 266-6861

Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination

Authorization for this form is provided under Sections 66.0903(9)(b), 66.0904(7)(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.

Personal information you provide may be used for secondary purposes [Privacy Law, Section 15.04(1)(m), Wisconsin Statutes].

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

State Of _____))SS County Of _____)	Project Name	
	DWD Determination Number	Project Number (if applicable)
	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), 66.0904(7)(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 the entire 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, Business, State Agency or Local Governmental Unit				
Street Address or PO Box	City	State	Zip Code	Telephone Number ()
Print Name of Authorized Officer			Date Signed	
Authorized Officer Signature				

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) 266-6861

Request to Employ Subjourneyperson

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 (Privacy Law, s. 15.04(1)(m), 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 use a subjourneyperson(s) on the following prevailing wage project, in accordance with the provisions of Section DWD 290.025, Wisconsin Administrative Code.

1. Name of Project Appearing on the Project Determination	
County	City, Village or Town
DWD Project Determination Number	Project Number (if applicable)
2. Job Classification(s) for which you request a subjourney rate (i.e., carpenter, electrician, plumber, etc.)	
a.	b.
c.	d.
3. Employer Name (Print)	
Requester Name (Print)	
Address	
City	State
Zip Code	
Telephone Number	
Requester Title	
Email address (if you prefer to receive your response via email)	
Fax Number (if you prefer to receive your response via fax)	
<p>READ CAREFULLY: I understand that this request is ONLY applicable to the project and job classification(s) listed above and that subjourney employees primarily work under the direction of and assist a skilled trade employee by frequently using the tools of a skilled trade and will NOT regularly perform the duties of a general laborer, heavy equipment operator or truck driver. If the subjourney employee regularly performs the work of a different trade or occupation, he/she will be compensated for such work at the applicable journeyperson prevailing wage rate. I agree to compensate subjourney employees in strict accordance with the directions received from the DWD.</p>	
Requester Signature	Date Signed

MAIL the completed request to:
 EQUAL RIGHTS DIVISION, LABOR STANDARDS BUREAU
 PO BOX 8928, MADISON WI 53708
 OR

FAX the completed request to: (608) 267-4592 / **DO NOT e-mail your request.**
 Call (608) 266-6861 for assistance in completing this form.

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SECTION 01 00 00
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. Informational Bids
 7. Coordination
 8. Cutting and Patching
 9. Conferences
 10. Progress Meetings
 11. Submittal Procedures
 12. Proposed Products List
 13. Shop Drawings
 14. Product Data
 15. Samples
 16. Manufacturers' Instructions
 17. Manufacturers' Certificates
 18. Quality Assurance / Quality Control of Installation
 19. References
 20. Interior Enclosures
 21. Protection of Installed Work
 22. Parking
 23. Progress Cleaning
 24. Products
 25. Transportation, Handling, Storage and Protection
 26. Product Options
 27. Substitutions
 28. Starting Systems
 29. Demonstration and Instructions
 30. Contract Closeout Procedures
 31. Final Cleaning
 32. Adjusting
 33. Operation and Maintenance Data
 34. Spare Parts and Maintenance Materials
 35. 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 a phased renovation of approximately 8,000 S.F. of the Fen Oak Second Floor and modifications to a First Floor Conference Room. The area of renovation will provide office space for the Dane County Land & Water Resources

Department and the United States Department of Agriculture Dane County Farm Service Agency and Natural Resources Conservation Service.

- B. Work by Owner: Refer to Instructions to Bidders, Article 19.
- C. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy. This includes, but is not limited to, Contractor submittal to the City of Madison Fire Department for approval and permitting of the Access Control System.
- D. Examination of Plans, Specification and Site: If in the opinion of the Contractor there are omissions or errors in the plans or specifications, the Contractor shall request clarification per the Instructions to Bidders, Article 3, Interpretation. In lieu of written clarification by addendum, resolve all conflicts in favor of the greater quantity or better quality.
- E. Phasing Plan: Prior to commencing construction, Contractor shall submit a schedule to accommodate the below phasing plan including shop drawing submittal review and material procurement.
 - 1. Refer to G1.0 for general locations identifying the 5 phases of construction.
 - 2. Identify access required to all surrounding occupied spaces for coordination, including adjacent floors.
 - 3. Server Room 230 and Data Room 239 equipment will remain operational throughout construction. Refer to Section 01 00 00 1.3 Contractor Use of Premise for temporary shutdown of services.
 - 4. Complete construction of Data Closet 239 prior to demolition of existing data closet.
 - 5. Phase 1 and Phase 2 may begin concurrently.
 - 6. Phase 3 may not begin until Phase 1 is complete and staff are relocated into the completed Phase 1 space.
 - 7. Phase 4 may not begin until Phase 2 is complete.
 - 8. Phase 5 will be occupied as surge space, work to follow Phase 3 completion.
 - 9. Staff will be relocated from each phase during construction. All adjacent spaces will remain occupied.

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. Portions of the Work will remain occupied, as well as adjacent areas of the building during construction.
- B. Construction activities with significant noise or temporary disruption of services will be required to be coordinated and scheduled with Owner to occur prior to 7:45AM or after 4:30 PM.
- C. Contractor should arrange with Owner to use existing water and electrical service.
- D. Contractor should arrange with Owner to use nearby existing toilet facilities. Toilet facilities used by workers shall be kept clean and sanitary at all times.

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: Monthly.

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: Provide CPT-1 and RB-1 in Second Floor areas noted 'Existing Carpet' on A9.1 including removal of existing.
2. Alternate Bid 2: Provide Access Control System including associated modifications to doors and frames.

1.6 INFORMATIONAL BIDS

A. Refer to Instructions to Bidders Article 16.

B. Schedule of Informational Bids:

1. Informational Bid 1: Work related to United States Department of Agriculture Dane County Farm Service Agency and Natural Resources Conservation Service. All Division 26 Work (phone, data, power) in Fed Server Room 230 and associated with the relocation of Fed staff. Modifications to opening to secure the FSA Suite including Base Bid Work at FSA Entry 234 and Door 228 (including demo, framing and paint).
2. Work included in Section 23 09 23 – Direct Digital Control System for HVAC.

1.7 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.

1.8 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.

1.9 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.

1.10 PROGRESS MEETINGS

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

1.11 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.

1.12 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.

1.13 SHOP DRAWINGS

- A. Contractor shall electronically submit Shop Drawings for each submission, until receiving final approval. When copies for distribution are requested, submit the number of copies that Contractor requires, plus two (5) copies that shall be retained by Public Works Project Manager and the Architect/Engineer. Refer to General Conditions Article 4.

1.14 PRODUCT DATA

- A. Contractor shall electronically submit Product Data for each submission, until receiving final approval. When copies for distribution are requested, submit the number of copies that Contractor requires, plus two (5) copies that shall be retained by Public Works Project Manager and the Architect/Engineer. Refer to General Conditions Article 4.
- 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.

1.15 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 AE's selection. Refer to General Conditions Article 4.

1.16 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.

1.17 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.

1.18 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.

1.19 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.

1.20 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. Temporary partitions shall consist of minimum 3/8" plywood panels fastened to wood framework and plastic sheeting.

1.21 PROTECTION OF INSTALLED WORK

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

1.22 PARKING

- A. One (1) parking stall for the general contractor shall be available in the Fen Oak Parking lot.
- B. An additional three (3) parking stalls shall be coordinated for use in the Fen Oak Parking lot. One (1) stall for the HVAC subcontractor. One (1) stall for the plumbing subcontractor. One (1) stall for the electrical subcontractor.
- C. Arrange for any additional parking to accommodate construction personnel.

- D. An area will be designated for a dumpster location near the parking lot.
- 1.23 PROGRESS CLEANING
- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- 1.24 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.
- 1.25 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION
- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.
- 1.26 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 Architect/Engineer or Project Manager is not required to consider them. Dane County reserves right to approve or reject substitutions based on Specification requirements and intended use.
- 1.27 REQUESTS FOR SUBSTITUTIONS
- A. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
 - B. Electronically submit requests for Substitution for consideration. Limit each request to one (1) proposed Substitution. Provide three (3) copies of samples as required for Substitution consideration.
 - C. Substitutions shall not change contract price established at Bid Opening.
- 1.28 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.

1.29 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.

1.30 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 Architect/Engineer and Public Works Project Manger inspection. Submit a list of any items that are not complete for Architect review prior to scheduling substantial and final completion site visits.
- B. Submit final Application for Payment identifying total adjusted Contract Sum / Price, previous payments, and amount remaining due.

1.31 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.

1.32 ADJUSTING

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

1.33 OPERATION AND MAINTENANCE DATA

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

1.34 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.

1.35 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 2010 (or lower) format on CD.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 74 19

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
- B. Related Sections:
 - 1. Section 01 00 00 - Basic Requirements
 - 2. Section 02 41 19 – Selective Demolition

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. Asphalt & Concrete.
 7. Bricks & Masonry
 8. Corrugated Cardboard.
 9. Metal.
 10. Carpet Padding.
 11. Gypsum Drywall.
 12. Shingles.
 13. Barrels & Drums.
 14. 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/pwht/recycle/categories.aspx lists current information for Dane County Recycling Markets. Contractors can also contact Dane County's Special Projects & Recycling Manager at 608/266-4990, or local city, village, town recycling staff listed at site www.countyofdane.com/pwht/recycle/contacts.aspx. Statewide listings of recycling / reuse markets are available from UW Extension at www4.uwm.edu/shwec/wrmd/search.cfm

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 _____ Landfilled _____ Other	Name: _____
Glass	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood Pallets	_____ units	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Fluorescent Lamps	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Foam Insulation	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Asphalt & Concrete	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Bricks & Masonry	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
PVC Plastic	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Corrugated Cardboard	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Metals	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Carpet Padding	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Gypsum / Drywall	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____

Shingles	_____ cu. yds. _____ tons	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Barrels & Drums	_____ units	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
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 02 41 19

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, hollow metal frames, 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 as per requirements of Section 01 74 19.

1.03 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.

1.04 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.

1.05 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.

1.06 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.

1.07 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.

1.08 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.

1.09 DISCONNECTION OF SERVICES

- A. Prior to starting removal and/or demolition operations be responsible and coordinate disconnection with owner 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.

1.010 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 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 owner, A/E and the authorities having jurisdiction.
- K. Do not interrupt utilities serving occupied facilities without permission from the owner, 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 02 41 19

SECTION 06 10 00
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 SCOPE

- A. Perform all Work required to complete the Rough Carpentry indicated by the Construction Documents, and furnish all items necessary for its proper installation.

1.03 RELATED WORK

- A. Door Hardware, Section 08 71 00 (for hardware mounting requirements).
- B. Solid Surface, Section 06 61 00.
- C. Plastic Laminate-Faced Casework, Section 06 41 16.

1.04 SUBMITTALS

- A. Submit in accordance to the General Conditions of the contract.
- B. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses indicated on the documents. Indicate species and grade selected for each use, and design values approved by American Lumber Standards Committee.
- C. Schedule for completion of rough framing for coordination of templating for shop fabrication of architectural woodwork.
- D. Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, and finishing treated materials:
 - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standard.

1.05 REFERENCES

- A. American Institute of Timber (AITC)
 - 1. AITC, Timber Construction Manual
- B. American Forest and Paper Association (AFPA)
 - 1. AFPA, National Design Specification for Wood Construction.
 - 2. AFPA, Design Values for Wood Construction, NDS Supplement.
- C. American Plywood Association (APA)
 - 1. APA, Plywood Design Specification.
- D. American National Standards Institute (ANSI)

1. ANSI A190.1, Structural Glued Laminated Wood.
 2. ANSI A208.1, Material Formed Wood Particle Board.
- E. American Society for Testing and Materials (ASTM)
1. ASTM E84, Test for Surface Burning Characteristics of Building Materials.
- F. American Wood Preservers Association (AWPA)
1. AWPA C-20, Structural Lumber - Fire Retardant Treatment by Pressure Processes.
- G. American Wood Preservers Bureau (AWPB)
1. AWPB LP-2, Pressure Treatment with Water-Borne Preservatives.
- H. National Bureau of Standards (NBS)
1. NBS PS 1, Voluntary Product Standard for Construction and Industrial Plywood.
 2. NBS PS 20, Voluntary Product Standard for Lumber.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site dry and store above ground on level wood blocking, cover from rain, allowing drainage of water from all parts. Handle with care to avoid damage.

1.07 COORDINATION

- A. Correlate location of all framing, furring, blocking, grounds and similar items with all trades including electrical by Owner.
- B. Verify all dimensions and shop drawing requirements prior to proceeding with work.
- C. Avoid delay of work of other trades dependent on or affected by carpentry work.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Low-Emitting Materials, Adhesives, and Sealants: Materials used on the interior of the building (defined as inside the weatherproofing system and applied on site) must not exceed the following requirements.
1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management (SCAQMD) Rule # 1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005.
 2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36, requirements in effect on October 19, 2000.
- B. Low- Emitting Materials, Composite Wood & Agrifiber Products: Composite wood and agrifiber products used inside the weatherproofing system shall contain no added urea-formaldehyde resins.
1. Laminating Adhesives used to fabricate on-site and shop applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood for nailers, blockings and other miscellaneous boards: Construction grade, S4S, dried, 19 percent maximum moisture content. Pressure preservative treat items in contact with flashing, waterproofing, masonry, concrete or the ground.

- B. Plywood sheathing shall be 5/8 inch thick, 5-ply, CDX APA Rated, un-sanded with a minimum 24/0 span rating. Sheathing shall be by 48 inches wide by 96 inches long.
- C. Fire-retardant treated wood products shall be pressure-impregnate wood materials to comply with ASTM E84, Class A and with AWPA C-20 and C-27. Each piece shall bear UL label "FR-S" for 25 maximum flame spread. Moisture content after treatment shall be 19 percent for lumber and 15 percent for plywood.
 - 1. Treated materials shall be "Dricon" as manufactured by Koppers Company, Inc.
- D. Rough hardware shall include all nails, spikes, screws, bolts and similar items of types and sizes sufficient to draw and rigidly secure members for which they are used. Fasteners shall be galvanized plated at exterior locations and at all treated wood applications.
 - 1. Truss tie-down clips shall be fabricated from 18 gauge galvanized steel with sufficient length to allow it to be fasten below to two plates. Clips shall have a maximum allowable uplift load up to 415 pounds. Clips shall be "Du-al" as manufactured by Teco Corporation; "H2.5" as manufactured by Simpson Strong-Tie Company, Inc.; "RT-7 Kant-Sag" as manufactured by United Steel Products Company; or approved equal.
- E. Adhesive shall be of proper design and characteristics to rigidly secure materials for which they are used. Adhesive shall be "Titebond VOC-Compliant Heavy Duty Construction Adhesive" conforming with ASTM C557, as manufactured by Franklin International; or approved equal.
 - 1. Provide construction adhesive with a VOC content of less than 70 g/l.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine all adjoining work, verify all governing dimensions, and report any unsatisfactory conditions.
- B. Provide temporary enclosures, partitions, or stairs to properly protect and facilitate the work.

3.02 GENERAL INSTALLATION

- A. Install materials and systems in accordance with manufacturer's published instructions and requirements. Install materials with uniform appearance and in proper relation with adjacent construction.
- B. Framing Standard: Comply with AF&PA's "Manual for Wood Frame Construction," unless otherwise indicated.
- C. Maximum concentrated load on any joist to not exceed 100 pounds. Add joists when concentrated load exceeds this value.
- D. Provide a minimum of three inches of bearing for dimensional lumber. Refer to the supplier requirements for bearing of laminated veneer lumber, unless noted otherwise.
- E. Cut and frame all lumber into the respective locations, true to line, grade, plumb and level. Form nailers, blockings and bucks to the shape and dimension indicated. Cut and frame all rough carpentry work required by the other sections.
- F. Use only sound, thoroughly seasoned materials of longest practical lengths and sizes to minimize jointing. Use materials free from warp which cannot be easily corrected by anchoring and attachment.

- G. Treat all wood nailers and, blocking, furring, other wood in contact with concrete, masonry adjacent to grade or exterior which shall be inaccessible in finished work.
- H. Provide blocking, bucks and framing for all trades as required.
- I. Include 2 inch nominal blocking in metal stud partitions required for backing of all accessories, cabinetry, and other surface or recessed items.
- J. Where finish trim is applied directly to framing members or blocking, such members shall be perfectly straight, clear and well seasoned. Warp or other poor characteristics not allowed.
- K. Provide solid surfaces at least 1 1/2 inches wide in both directions at all corners for securing finishes.

3.03 HARDWARE

- A. Secure permanently and in proper position all materials with the necessary fastenings to provide the strength and rigidity required to complete the work. Provide washers under bolt heads and nuts in contact with wood.
- B. Bolt nailers and blocking to steel, masonry or concrete members with bolts of proportionate strength of members attached, length required, spaced 2 feet 0 inches on center and 4 inches from each end, except as otherwise indicated. Unless otherwise indicated, anchor bolts shall be 3/8 inch diameter by length required or comparable power actuated fasteners.
- C. Nail plywood in accord with APA recommendations.

3.04 CLEANING

- A. Remove from the site all debris resulting from the Work of this Section.

END OF SECTION 06 10 00

1 SECTION 06 20 00

2
3 FINISH CARPENTRY

4
5 GENERAL

6
7 1.01 RELATED DOCUMENTS

- 8
9 A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section
10 as though repeated herein.

11
12 1.02 WORK INCLUDED

- 13
14 A. Carpentry work which is exposed to view, non-structural, and not specified as part of other sections.
15
16 B. The types of finish carpentry include, but are not necessarily limited to the following:
17 1. Wood trim.
18 2. Wood base.

19
20 1.03 RELATED WORK

- 21
22 A. Related Sections: The following sections contain requirements that relate to this section:
23
24 B. Rough Carpentry: Section 06 10 00.
25
26 C. Door Hardware: Section 08 71 00.
27
28 D. Painting: Section 09 90 00.

29
30 1.04 SUBMITTALS

- 31
32 A. General: Submit each item in this article according to the General Conditions of the Contract.
33 1. Shop drawings for all millwork; receive approval prior to fabrication; draw in related or
34 dimensional position with sections shown either full size or 3-inch scale.
35 2. Samples:
36 B. One 24-inch- long section of wood running trim, casing, moulding, or similar lineal mill work.
37 C. One 2 square foot sample of panel goods, screen materials, decking or similar flat surfaces.

- 38
39 1.05 Product Data: For each type of component required. Include but not limited to the following:
40 1. Manufacturer's data on hardware, accessories, and finishes.

41
42 1.06 QUALITY ASSURANCE

- 43
44 A. Quality Standards: Architectural Woodwork Quality Standards, Guide Specification and Quality
45 Control Program as set forth by the Architectural Woodwork Institute (AWI).
46
47 B. Architectural Woodwork Manufacturer: Experienced in this type of work; successfully completed
48 comparable work.
49
50 C. Deviations from quality, grade, species, and finish specified under AWI Interior Woodwork for
51 Transparent Finish and Interior Woodwork for Paint Finish will be allowed for individual items or
52 components only if specified under separate headings covering such items.

53
54 1.07 DELIVERY, STORAGE AND HANDLING

- 1 A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage,
2 soiling and deterioration.
- 3
- 4 B. Do not deliver finish carpentry materials until painting, wet work, grinding and similar operations
5 which could damage, soil or deteriorate woodwork have been completed.
- 6
- 7 C. If finish carpentry materials must be stored in other than installation areas, store only in areas
8 meeting requirements specified for installation areas.
- 9 1. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for
10 finish carpentry installation areas. Do not install finish carpentry until required temperature
11 and relative humidity have been stabilized and will be maintained in installation areas.
- 12 2. Maintain temperature and humidity in installation area as required to maintain moisture
13 content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture
14 content, from date of installation through remainder of construction period. The fabricator of
15 woodwork shall determine optimum moisture content and required temperature and humidity
16 conditions.
- 17

18 PART 2 - PRODUCTS

19 2.01 MATERIALS, GENERAL

- 22 A. Lumber standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber
23 and with applicable grading rules of inspection agencies certified by American Lumber Standards
24 Committee Board of Review.
- 25
- 26 B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the
27 following:
 - 28 1. NELMA – Northeastern Lumber Manufacturers Association.
 - 29 2. NHLA – National Hardwood Lumber Association.
 - 30 3. NLGA – National Lumber Grades Authority.
 - 31 4. SPIB - Southern Pine Inspection Bureau.
 - 32 5. WCLIB – West Coast Lumber Inspection Bureau.
 - 33 6. WWPA – Western Wood Products Association.
 - 34
- 35 C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection
36 agency evidencing compliance with grading rule requirements and identifying grading agency,
37 grade, species, moisture content at time of surfacing, and mill.
- 38
- 39 D. For exposed lumber, furnish pieces with grade stamps applied to ends of back of each piece, or omit
40 grade stamps entirely and provide certificates of grade compliance issued by inspection agency.
- 41
- 42 E. INTERIOR
- 43
- 44 F. Interior: AWI 300 Custom Grade.
 - 45 1. Species: Book matched, Red Oak, plain sawn.
 - 46 2. Grade: NHLA – FAS.
 - 47 3. Texture: S2S2E, (smooth).
 - 48

49 2.011 ACCESSORIES

- 51 A. Provide nails, screws and other anchoring devices of the proper type, size, material and finish for
52 application to provide secure attachment, concealed where possible, and complying with applicable
53 Federal Specifications.
 - 54 1. Nails, Wire, Brads and Staples: FS FF-N-105.
 - 55 2. Power-Driven Fasteners: CABO NER-272.

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- 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. Exterior rated for exterior use.
- D. Coat Hook: Bobrick, SS Clothes Hook B-6727
- E. Sealants: Comply with requirements of Division 7 Section "Joint Sealants" for materials required for sealing work.

2.012 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.

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.

- 1 C. Wood frame walls shall be dry, clean, sound, well-nailed, free of voids, and without offsets at joints.
2 Ensure that nail heads are driven flush with surfaces. Leave no hammer or automated fastener dents
3 or scuffs.
4
5 D. Coordinate woodwork installation with wall flashings and other built-in components.
6
7 E. Prime and backprime exterior wood, including cut ends, for painted, stained and oil finish exposed
8 on the exterior. Comply with requirements for surface preparation and application in Division 9
9 Section "Painting".

10
11 3.03 INSTALLATION

- 12
13 A. Do not use finish carpentry materials that are unsound, warped, improperly treated or finished,
14 inadequately seasoned, or too small to fabricate with proper jointing arrangements.
15 1. Do not use manufactured units with defective surfaces, sizes or patterns.
16
17 B. Install finish carpentry plumb, level, true and aligned with adjacent materials. Use concealed shims
18 where required for alignment.
19
20 C. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by
21 manufacturer.
22 1. Countersink nails; fill surface flush and sand where face nailing is unavoidable.
23
24 D. Install to tolerance of 1/8 inch in 96 inches for plumb and level. Install adjoining finish carpentry
25 with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal
26 installation.
27
28 E. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim
29 and rails.
30 1. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim
31 and rails.
32
33 F. Finish according to specified requirements.
34 1. Refer to Division 9 Sections for final finishing of finish carpentry.
35

36 3.04 STANDING AND RUNNING TRIM INSTALLATION

- 37
38 A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of
39 lumber available. Do not use pieces less than 24 inches long, except where necessary.
40 1. Stagger joints in adjacent and related standing and running trim.
41 B. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact
42 throughout length of joint.
43 C. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across
44 joints, if required.
45
46 D. Match color and grain pattern across joints.
47
48 E. Drill pilot holes in wood before fastening as required to prevent splitting.
49 1. Fasten to prevent movement or warping.
50 F. Countersink fastener heads on exposed carpentry work and fill holes.
51 G. Stagger nails along the length of long pieces of trim.
52

53 3.05 ADJUSTING

- 54
55 A. Repair damaged or defective work as directed.

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B. Adjust and lubricate hardware for proper operation.

3.06 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 06 20 00

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SECTION 06 41 16

PLASTIC LAMINATE CLAD 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, Wall and Custom Storage Cabinets and associated Partitions and Shelving.
- B. Hardware.

1.03 RELATED WORK

- A. Rough Carpentry: Section 06 10 00.
- B. Joint Sealers: Section 07 92 00.
- C. Solid Surface: Section 06 61 18.
- D. Plumbing (Sinks, pipe, fittings, final connections, etc.): Division 22.

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 casework manufacturers are acceptable as long as they meet or exceed this specification.
 1. A.J. Pietsch Company, (414) 342-0531.
 2. Carley Wood Associates, Inc. (608) 249-7444.
 3. Central Wisconsin Woodworking, (715) 675-4491.
 4. Creative Laminates, Inc., (800) 441-5885.
 5. Diversified Woodcrafts Inc., (920) 842-2136.
 6. Glenn Rieder, Inc., (414) 449-2888.
 7. Hillcraft Ltd., (608) 221-3220.
 8. Lange Brothers Woodwork Co, Inc., (414) 466-2226.
 9. Stück Wood Works Inc., (414) 351-5595.
 10. T. J. Hale Company, (262) 255-5555.
 11. Techline, (608) 238-6868.
 12. Wood Design Inc., (920) 563-4833.
 13. Woodmill Products, Inc., (262) 754-4641.
 14. Or approved equal.
- B. Hardware manufacturers.
 1. Doug Mockett & Co. (800) 523-1269.
 2. A&M Hardware (888) 647-0200
 3. Or approved equal.

2.03 BASE AND CUSTOM STORAGE CABINETS

- A. Bottoms, Sides and Sub-top: 3/4-inch 45-47 pound density particle board.
 1. Finish where not exposed: 8 to 11 mil melamine resin overlay.
- B. Back Panel: 3/8-inch 45-47 pound density particle board.
 1. Finish: 8 to 11 mil melamine resin overlay to match cabinet interior.
 2. Non-Exposed Side Finish: 8 to 11 mil melamine resin overlay to match.
 3. If back exposed, provide 3/4-inch material, finished to match.
- C. Top of Base, Custom Storage 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 or 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:
 - 1. Finished to match exposed face.
 - 2. At repair in Room 107. Provide PVC edge. Color to be selected from manufacturer's full line of color.
- 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 , 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 if applicable.
- D. Colors:
 - 1. Horizontal Surface Plastic Laminate color to be selected from manufacturer's full range.
 - 2. Vertical Surface Plastic Laminate color to be selected from manufacturer's full range.
- E. Contrasting text where indicated on drawings.

2.06 DRAWERS

- A. Backs, Sides, Fronts: 1/2-inch thick, medium density fiberboard with melamine overlay.
- B. Dovetail/dado 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

- A. Shelves under 27 inches long: 3/4-inch thick 45-47 pound density particle board.

- B. Shelves over 27 inches long: 1 inch thick 45-47 pound density particle board. Provide additional bracket supports at long space shelving.
- C. Finish: Finished to match faces.
- D. Edging: Material to match the shelf.

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. See drawings for base dimension.
- B. Provide two positioning strips to cabinet bottom for concealed fastening.

2.09 HARDWARE

- A. Pulls:
 1. Doug Mockett & Co. 5 21/32" Aluminum Extrusion Pull – DP117B, Satin Aluminum at Copy Room 107 to match existing.
 2. Hafele Hardware Pull 124.02.320, Polished.
- B. Self-Closing Hinges: Blum Model 71.6530 with 175L8100 base plate.
- C. Drawer Slides: Accuride or approved equal.
- D. Locks:
 1. Cabinet Locks: Keyed to match, five pin. All casework to be lockable. Key casework alike per area.
 2. Custom Storage Cabinet Locks: Hafele, Safe-o-Mat Coin Return Locks, Series 500.
- E. Steel Brackets
 1. For upper shelving and work surfaces: Hafele, Hebgo bracket, approved equal by A&M Hardware or approved equal.
 - a. Color: To be selected by Architect from full line of powder coat finishes.
- F. Hardware finish: 626 (US26D) Brushed Chrome.
- G. Keyboard Platform: Doug Mockett & Co., "KP1", adjustable type with non-skid pads and gel wrist pad. Mouse Support: Doug Mockett & Co., "KPA1".
- H. Clothes Hook: Bobrick B-6727, stainless steel.
- I. Thin Client CPU holder
 1. Ergomart Thin Client CPU Holder, finish to be selected from manufacturer's full range.

2.010 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 07 92 00.
- 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.

3.02 FINISH SCHEDULE

PLam base cabinets To be selected from manufacturer's full line

END OF SECTION 06 41 16

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SECTION 06 61 18

SOLID SURFACE

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

Solid surface countertops and caps

1.03 RELATED WORK

- A. Rough Carpentry: Section 06 61 00.
- B. Plastic Laminate Clad Casework: Section 06 41 16 for shelf or work surface brackets.
- C. Gypsum Wall Board Section 09 29 00.

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.
 - a. Joint adhesives or mastics, color matched.
 - b. Joint sealants.
 - c. Fastening adhesive
 - 2. Samples:
 - a. Product Data.
 - b. Solid surface sheet material.
 - c. Include color chart showing full range of available colors for sheet

1.05 QUALITY ASSURANCE

- A. Fabricator/Installer Qualifications: Minimum three years experience in fabrication and installation of solid surface materials or certification by Distributor.
 - 1. Qualifications: Proof of fabricator qualifications.
 - 2. Certificates: Copies of ISO certifications.
 - 3. Test Reports:
 - a. Flammability test reports.
 - b. Food preparation zone use test reports.
 - 4. Manufacturer's Fabrication and Installation Manual.
 - 5. Manufacturer's Fabrication and Installation Check List.
- B. Shop Drawings: Provide plans, sections, and large-scale details. Include attachment provisions and fabrication methods.

1.06 WARRANTY

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

1.07 MAINTENANCE

- A. Extra Materials: Provide for future repair use by Owner.
 - 1. Minimum 4 sf per 50 lf of each color material.

1.08 SPECIAL INSTRUCTIONS

- A. Do not deliver components to project site until spaces are ready for installation.

1.09 ENVIRONMENTAL CONDITIONS

- A. Installation spaces must be maintained at normal occupancy temperature and humidity levels for minimum 72 hours prior to and continuously following installation.

1.010 ENVIRONMENTAL REQUIREMENTS

- A. Low-Emitting Materials, Field applied Paints and Coatings: Interior paints and coatings applied on-site must meet the limitations and restrictions concerning chemical components set by the following standards:
 - 1. "All Other Architectural Coatings, Primers and Undercoats: South Coast Air Quality Management District (SCAQMD) Rule #1113, Architectural Coatings", rules in effect on January 1, 2004.
- B. Low-Emitting Materials, Adhesives, and Sealants: Materials used on the interior of the building (defined as inside the weatherproofing system and applied on site) must not exceed the following requirements.
 - 1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management (SCAQMD) Rule # 1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005.
 - 2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36, requirements in effect on October 19, 2000.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Solid Surface
 - 1. Solid Surface
 - a. Formica, Solid Surfacing
 - b. Or approved equal by: Dupont, Corian; Wilsonart, Solid Surfacing.
- B. Material Selections: refer to 3.04 Finish Schedule for quantity of colors/materials, manufacturer's may differ.
- C. No cracked, chipped, broken, stained, or defective material will be accepted.
 - 1. Materials fabricated to thickness and size shown on drawings.
 - a. All sizes to be field verified.
- D. Color Match Differences: Minimal.
- E. Adhesives: Use manufacturer's recommended adhesives, and installation instructions. See product fabrication manuals for application techniques and surface preparation.
 - 1. Lumicore adhesive per manufacturer requirements.
 - 2. RP corner adhesive.

2.02 FABRICATION

- A. Field verify measurements.
- B. Finished Surfaces: Uniform as chosen by A/E from full range with all edge profiles as shown on drawings.
- C. Color and finish: To be selected by Architect from full range of colors and finishes.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine cabinets upon which countertops will be installed. Coordinate with cabinet specification section to assure that cabinets are set to the following tolerance or better.
 - 1. Verify that cabinets are level to 1/8 in. in 10 ft .
 - 2. Review manufacturer's Fabrication and Installation Check List.
- B. Examine walls upon which base will be installed.
 - 1. Verify wall is flat and acceptable for base application.
 - 2. Review manufacturer's Fabrication and Installation Check List.
- C. Coordinate with responsible entity to correct unsatisfactory conditions.
- D. Commencement of work by installer is acceptance of conditions.

3.02 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.
- C. Resin materials must be separated from metal at all times, especially threads, which can cause crazing.

3.03 PROTECTION, REPAIRING AND CLEANING

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

3.04 FINISH SCHEDULE

Solid Surface	To be selected from manufacturer's full line
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END OF SECTION 06 61 18

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SECTION 07 84 00

FIRESTOPPING

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. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, fire resistive joints, and perimeter openings in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof assemblies including both empty openings and openings containing penetrants.
 - 2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
 - 3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate on side of the barrier.
 - 4. Joints between fire resistance rated assemblies.
- C. Related Sections include, but are not limited to, the following:
 - 1. Division 4 – Unit Masonry
 - 2. Division 5 – Expansion, Control, and Seismic Joints
 - 3. Division 8 – Glass, Glazing and Metal Curtain Wall Systems
 - 4. Division 9 – Gypsum Wallboard
 - 5. Division 22 and 23 – Mechanical; Pipe and Duct
 - 6. Division 26 – Electrical; Lighting, Power, Alarms, and Communications

1.03 REFERENCES

- A. American Society For Testing and Materials Standards (ASTM):
 - 1. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E 814: Standard Test Method for Fire Tests of Through-Penetration Firestops.
 - 3. ASTM E 1966: Test Method for Resistance of Building Joint Systems.
 - 4. ASTM E 1399: Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width.
 - 5. ASTM E 119: Methods of Fire Tests of Building Construction and Materials.
 - 6. ASTM E 2307: Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus
 - 7. ASTM E 2174: Standard Practice for On-Site Inspection of Installed Fire Stops
 - 8. ASTM E 2393: Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- B. Underwriters Laboratories Inc. (UL):
 - 1. UL 723: Surface Burning Characteristics of Building Materials.
 - 2. UL 1479: Fire Tests of Through-Penetration Fire Stops.
 - 3. UL 2079: Tests for Fire Resistance of Building Joint Systems.

- C. UL Fire Resistance Directory -Volume 2:
 - 1. Through-Penetration Firestop Devices (XHJI)
 - 2. Fire Resistive Ratings (BXUV)
 - 3. Through-Penetration Firestop Systems (XHEZ)
 - 4. Fill, Void, or Cavity Material (XHHW)
- D. Omega Point Laboratories (OPL)
 - 1. Directory of Listed Building Products, Materials & Assemblies – Volume II

1.04 DEFINITIONS

- A. Firestopping: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating of that wall or floor.
- B. System: The use of a specific firestop material or combination of materials around a specific penetrant(s) or into a specific joint in conjunction with a specific wall and/or floor construction type.
- C. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- D. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- E. Membrane-penetration: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- F. Fire Resistive Joint: Any gap, joint, or opening, whether static or dynamic, between two fire-rated barriers including where the top of a wall meets a floor; wall edge to wall edge configurations; floor edge to floor edge configurations; floor edge to wall configurations.
- G. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a non-rated exterior wall assembly.
- H. Engineering Judgment: A firestopping assembly proposed for conditions where a tested and listed firestopping system does not exist.

1.05 PERFORMANCE REQUIREMENTS

- A. Penetrations: Provide through-penetration firestop systems that are produced and installed to resist the spread of fire, passage of smoke and other hot gases according to requirements indicated, to restore the original fire-resistance rating of barrier penetrated.
 - 1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E 814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 - 2. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814 or UL 1479, but not less than one (1) hour or the fire resistance rating of the barrier being penetrated.
 - 3. T-Rated Systems: Provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814 or UL 1479, where required by the Building Code.
 - 4. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 5. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

- B. Fire Resistive Joints: Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E 1399 and E 1966), but not less than the fire resistance rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.
 - 1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
- C. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E 84.
- D. Where there is no specific third party tested and classified firestop system available for an installed condition, the firestopping contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Approving Authority and Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.

1.06 SUBMITTALS

- A. Submit in accordance with general conditions of this contract.
- B. Product Data: For each type of firestopping product selected. Certify that firestopping materials are asbestos free and contain volatile organic compounds (VOCs) within limits of the local jurisdiction.
- C. Design Listings: Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.
- D. Where there is no specific third party tested and classified firestop system available for a particular configuration, the firestopping contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) for submittal.
- E. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Submit document from manufacturer wherein manufacturer recognizes the installer as qualified.

1.07 QUALITY ASSURANCE

- A. Provide firestopping system design listings from UL or OPL in accordance with the appropriate ASTM Standard(s) per article 1.5.
- B. Contractor Qualifications: An acceptable installer shall meet any two of the following requirements:
 - 1. Licensed by State or Local Authority where applicable.
 - 2. Trained and approved by the firestop manufacturer.
 - 3. Shown to have successfully completed not less than 5 comparable scale projects.
- C. Single Source Limitations: Obtain firestop systems, for each kind of penetration and construction condition indicated from a single manufacturer, where possible.
- D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.
- E. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.

- F. Firestopping sealants must be flexible, allowing for normal pipe movement.
- G. Firestopping materials shall not crack or pull back from contact surfaces such that a void is created.
- H. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- I. Materials used shall be in accordance with the manufacturer's written installation instructions.
- J. Label each firestopping system installation with the following information:
 - 1. Firestopping product name
 - 2. System listing number
 - 3. Name and address of manufacturer
- K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E 2174, Standard Practice for On-Site Inspection of Installed Fire Stops.
- L. Inspection of fire resistive joints and perimeter barriers shall be in accordance with ASTM E 2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, UL or OPL classification marking, and mixing instructions for multi-component materials.
- B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. All firestop materials shall be installed prior to expiration of shelf life.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate per the manufacturer's written instructions on the product's Material Safety Data Sheet.
- C. Verify the condition of the substrates before starting work.
- D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that firestopping assemblies are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not conceal firestopping installations until the Owner's inspection agency or Authorities Having Jurisdiction have examined each installation.

D. Schedule firestopping after installation of penetrants but prior to concealing the openings.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Low-Emitting Materials, Adhesives, and Sealants: Materials used on the interior of the building (defined as inside the weatherproofing system and applied on site) must not exceed the following requirements.
1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management (SCAQMD) Rule # 1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005.
 2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36, requirements in effect on October 19, 2000.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Firestopping products specified in system design listings by UL or OPL may be used providing they conform to the construction type, penetrant type, annular space requirements, and fire rating involved in each separate assembly.
- B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least ten projects where similar products have been installed and accepted.
- C. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by the firestopping manufacturer and approved by UL or OPL for the firestop systems indicated. Accessories include, but are not limited to the following items:
1. Permanent forming/damming/backing materials, including the following:
 - a. Mineral wool insulation.
 - b. Foams or sealants used to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Polyethylene/polyurethane backer rod.
 - e. Rigid polystyrene board.
 - f. Temporary forming materials.
 - g. Substrate primers.
 - h. Steel sleeves
- D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

2.02 MIXING

- A. For those products requiring mixing before application, comply with firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.03 MANUFACTURERS

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

1. Grace Construction Products, 62 Whittemore Ave, Cambridge MA 02140, (866) 333-3726.
2. Hilti USA; 5400 S. 122nd E. Ave, Tulsa, OK 74146 (800) 445-8827
3. 3M Fire Protection; 3M Center, St. Paul, MN 55144 (888) 364-3577
4. Or Approved Equal.

2.04 MATERIALS

A. Intumescent Firestop Sealants and Caulks:

1. FlameSafe FS1900
2. Or Approved Equal

B. Elastomeric Water-Based Sealant:

1. FlameSafe FS1900, FS900
2. Or Approved Equal

C. Elastomeric Silicone Sealant:

1. FlameSafe Silicone
2. Or Approved Equal

D. Firestop Putty:

1. FlameSafe FSP1000 Putty & FSP1077 Putty Pads
2. Or Approved Equal

E. Firestop Devices:

1. FlameSafe FSWSD Collar, FSIS Intumescent Sleeve, FlameSafe FSD Device
2. Or Approved Equal

F. Wrap Strips:

1. FlameSafe FSWS 100 Wrap Strip, FSWS 150 Wrap Strip
2. Or Approved Equal

G. Firestop Mortars:

1. FlameSafe FSM Mortar
2. Or Approved Equal

H. Firestop Bags/Pillows:

1. FlameSafe Bags, FlameSafe Pillows
2. Or Approved Equal

I. Elastomeric Coating:

1. FlameSafe FS3000
2. Or Approved Equal

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.

3.03 PENETRATION FIRESTOP SYSTEMS

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" article in Part 1 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in article 1.7.
- C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.
- E. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 JOINT FIRESTOP SYSTEMS

General: Install fire resistive joint firestop systems to comply with "Performance Requirements" article in Part 1 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated. System to meet UL2079-"Tests for Fire Resistance of Building Joint Systems.

- A. Installation of firestopping shall be performed by an applicator/installer qualified as described in article 1.7.
- B. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's Engineered Judgment per the manufacturer's installation instructions.
- C. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.
- D. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill joint as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates forming the openings.

3. Completely fill recesses provided for each joint configuration.
4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.

3.05 FIELD QUALITY CONTROL

- A. All penetrations shall maintain the fire rating of the assembly through which they pass by the use of UL, OPL, or Engineered Judgement firestopping systems.

3.06 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.
- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION 07 84 00

SECTION 07 92 00

JOINT SEALANTS

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.

1.03 RELATED WORK

- A. Section 06 61 18, Solid Surface.
- B. Section 09 29 00, Gypsum Board.

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.

PART 2 - PRODUCTS

2.01 SEALANT

- A. Sealant for Locations Except as Specified in the Subsequent Paragraphs and related Sections:
 - 1. Multi-part, Nonsag, Polyurethane: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
 - a. PECORA, Dynatrol II.
 - b. BASF, Sonneborn, Sonolastic NP-2.
 - c. TREMCO, Dymeric 240.
 - d. Or equal as approved by A/E.
 - 1) Equal means both quality and color options.
 - 2. Horizontal Joint Sealant, Traffic-Grade, 2-part self-leveling polyurethane: ASTM C 920, Type M, Grade NS, Class 50, for Use T.
 - a. PECORA, NR-200 Urexpan.
 - b. BASF, Sonneborn, Sonolastic SL2.
 - c. TREMCO THC-900.
 - d. Or equal as approved by A/E.

- 1) Equal means both quality and color options.

2.02 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolac.
 - b. OSI, Green Series, SA-167.
 - c. Pecora Corporation; AC-20+.
 - d. Tremco Incorporated; Tremflex 834.
 2. Paintable.

2.03 SEALANT ACCESSORIES

- A. Primer: When required, as recommended by the Sealant Manufacturer.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- D. Closed Cell Back-up (Backer Rod): Tremco "Closed Cell Backer Rod", Sonneborne "Sonofoam" or W.R. Meadows "Kool-Rod".
- E. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

PART 3 - EXECUTION

3.01 JOINT PREPARATION

- A. 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.
- B. 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. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
 - E. 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.
 - F. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.
- 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 07 92 00

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SECTION 08 11 13

HOLLOW METAL 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. Hollow Metal Frames.

1.03 RELATED WORK

- A. Joint Sealers: Section 07 92 00.
- B. Door Hardware: Section 08 71 00.
- C. Painting: Section 09 90 00.

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 Corportation
- 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.
 - 2. Rough Bucks and Stiffeners: 12-gage.
 - 3. 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 rated seals.
- 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 hollow metal 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.

3.02 ADJUSTING

- 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 08 11 13

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SECTION 08 12 00
ALUMINUM 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. Prefinished aluminum framing systems for interior use.
- B. Accessories for a Complete Installation.

1.03 RELATED WORK

- A. Door Hardware: Section 08 71 00, for door hardware to be installed under this section.
- B. Flush Wood Doors: Section 08 14 16.
- C. Glass and Glazing: Section 08 80 00.

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. AMA 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
- E. AAMA 607.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodize Finishes for Architectural Aluminum.
- F. AAMA 608.1 - Voluntary Guide Specification and Inspections Methods for Electrolytically Deposited Color Anodic Finished for Architectural Aluminum.

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. Selection Samples: Provide aluminum chips in full range of manufacturer's standard finish for Architect's color selection.
5. Verification Samples: Provide two samples of each framing member required, not less than 12 inches long in selected finish.
6. 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 MANUFACTURERS

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

2.02 MATERIALS

- A. Aluminum: Controlled alloy billets of 6063 T5, to assure compliance with tight dimensional tolerances and maintain color uniformity.

2.03 DOOR HARDWARE

- A. Hardware: See Section 08 71 00 for hardware to be supplied by Section 08 71 00 for installation under this section.
- B. All hardware shall be secured to 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 EXTRUDED ALUMINUM FRAMES

- A. Provide frames with the following characteristics:
 - 1. Rectilinear design.
 - 2. 2 inch face profile.
 - 3. 9/32 inch return.
 - 4. 0.070 inch rabbet wall thickness.
 - 5. Throat sizes 3-3/4", 4-7/8".
 - 6. Adjustable throat frames expandable from 3-5/8" up to 7-1/4".

2.05 FABRICATION

- A. Pre-machine jambs and prepare for hardware, with concealed reinforcement plates, drilled and tapped as required and fastened within frame with concealed screws.
- B. Provide corner reinforcements and alignment clips for precise butt or mitered connections.
- C. Fabricate all components to allow secure installation without exposed fasteners.
- D. Provide all accessories for butt glazed condition and closure piece adjacent to existing aluminum storefront.

2.06 FINISHES

- A. Factory finish extruded frame components so that any part exposed to view upon completion of installation will be uniform in finish and color.
- B. Color: Anodized to match existing light champagne anodized aluminum.
- C. Color anodic coating: Comply with AAMA 608.1
 - 1. Class 2, AAM12C22A34 color coating electrolytically deposited, 0.4-0.7 mil thickness minimum.
 - 2. Class 2, AAM12C22A44 color coating electrolytically deposited, 0.4-0.7 mil thickness minimum.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine project conditions and verify that the work of this section may properly commence.
- B. 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 printed installation instructions and approved shop drawings. Strictly adhere to maintaining specified wall thickness to insure dimension does not exceed throat size specified.
- 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. Install partition components in the longest possible lengths, with no component less than 4 feet. Use concealed installation clip to assure that splices and connections are tightly butted and properly aligned.
- D. Secure clips to main structural components and not to snap-in or trim members.
- E. Do not use screws or other fasteners that will be exposed to view when installation is complete.
- F. Accurately assemble joints and corners. Match components, ensuring continuity of line and design. Ensure joints and connections are flush and hairline.
- G. Use sufficient anchorage devices to securely and rigidly fasten frame assemblies in place.

3.03 ADJUSTING AND CLEANING

- A. Clean exposed frames promptly after installation, using cleaning methods recommended by frame manufacturer.
- B. Touch up marred areas so that touch-up is not visible from a distance of 4 feet. Remove and replace frames that cannot be satisfactorily adjusted.

3.04 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 08 12 00

SECTION 08 14 16
FLUSH 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.

1.03 RELATED WORK

- A. Finish Carpentry: Section 06 20 00.
- B. Hollow Metal Doors and Frames: Section 08 11 13.
- C. Aluminum Frames: Section 08 12 00.
- D. Door Hardware: Section 08 71 00.
- E. Glass and Glazing: Section 08 80 00.
- F. Painting: Section 09 90 00.

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: 1-3/4" solid core per AWI PC-5, unless otherwise indicated.
 - 2. Veneer:
 - a. AWI "A" Grade face veneer.
 - b. Book matched, Red Oak, plain-sliced, balance match for transparent finish.
 - 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 08 14 16

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SECTION 08 71 00

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 06 20 00.
- B. Hollow Metal Doors and Frames: Section 08 11 13.
- C. Aluminum Frames: Section 08 12 00.

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.

1 f. Prior to final payment, provide a record copy of hardware schedules, including all revisions and
2 updates. All openings shall be listed to reflect final installed configuration only.

3
4 2. Samples of hardware items as may be required. Identify each sample and indicate the location of
5 subsequent installation in the project.

6 3. A copy of the approved hardware schedule and all pertinent templates or template information to each
7 fabricator of material factory-prepared for the installation of hardware.
8

9 1.06 QUALITY ASSURANCE

10
11 A. Manufacturers and product numbers listed herein establish a standard of quality. Similar items by other
12 manufacturers may be accepted by prior written approval by the architect in accord with the General Conditions
13 of the Contract. Except where specified in the hardware schedule, furnish products of only one manufacturer
14 for each type of hardware.
15

16 B. Supplier: Hardware Supplier: The hardware supplier shall be a corporate member in good standing of The
17 Door and Hardware Institute (DHI), employing at least one Architectural Hardware Consultant (AHC) who is
18 currently participating in DHI's continuing education program (CEP).
19

20 C. Items of hardware not definitely specified herein but necessary for completion of the Work shall be provided.
21 Such items shall be of type and quality suitable to the service required and comparable to the adjacent hardware.
22 Where size and shape of members is such as to prevent the use of types specified, hardware shall be furnished
23 of suitable types having as nearly as practicable the same operation and quality as the type specified. Sizes
24 shall be adequate for the service required. Include such nuances as strike type, strike lip, raised barrel hinges,
25 mounting brackets, fasteners, shims, and coordination between conflicting products. All doors shall be
26 provided with a stop.
27

28 1.07 REGULATORY REQUIREMENTS

29
30 A. Furnish UL listed hardware for all UL labeled openings in conformance with requirements for the class of
31 opening scheduled.
32

33 1.08 DELIVERY, STORAGE AND HANDLING

34
35 A. Deliver hardware to the job site in the manufacturer's original containers marked to correspond with the
36 approved hardware schedule for installation location.
37

38 B. Store hardware in dry surroundings and protect against loss and damage.
39

40 PART 2 - PRODUCTS

41
42 2.01 MANUFACTURERS

43
44 A. Refer to the Hardware Schedule at the end of this Section.
45

46 2.02 ACCESSORIES

47
48 A. Furnish all necessary hardware accessories such as wood or machine screws, bolts, nuts, anchors, toggle bolts,
49 and other fasteners, each of the type, size, material and finish for its intended purpose and each according to the
50 material to which the hardware is being applied.
51

52 B. Keying system will be determined by the Owner's Representative.
53

1 PART 3 - EXECUTION

2
3 3.01 INSTALLATION

- 4 A. Install hardware in accordance with manufacturer's recommendations and instructions.
- 5
- 6 B. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the fire
- 7 rating.
- 8
- 9 C. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
- 10
- 11 D. Remove, cover or protect hardware after fitting until paint or other finish is applied. Permanently install
- 12 hardware after finishing operations are complete.
- 13
- 14 E. Install closers on the room side of corridor doors, stair side of stairways, and interior side of exterior doors.
- 15
- 16 F. Deliver one complete set of installation and adjustment instructions, and tools with the hardware.
- 17
- 18 G. Coordinate security system electrical requirements at doors indicated to have such system.
- 19
- 20 H. Coordinate all Owner Furnished Contractor Installed hardware.

21
22 3.02 ADJUSTING

- 23
- 24 A. At final completion, adjust and test all hardware for function and performance and leave in good operating
- 25 condition.
- 26

27 3.03 CLEANING

- 28
- 29 A. Clean all hardware to restore the original finish.
- 30

31 3.04 PROTECTION

- 32
- 33 A. Protect the finished installation until acceptance of the project.
- 34

35 3.05 HARDWARE SCHEDULE

36

37 A. Manufacturers

- 38 1. Hinges Hager Hinge Co. HAG
- 39 a. Approved Equals: Stanley
- 40 McKinney
- 41
- 42 2. Lockset Best Access Systems BES
- 43 a. Approved Equals: Provide 7-pin cylinders to match existing. Coordinate with Best Access
- 44 Systems for keying of project, No Substitutions. Best Access Systems is
- 45 indicated in this specification as a basis of design, Marshall Best Security
- 46 Corporation to accept Best Access System Core is an acceptable equal.
- 47 3. Door Closers LCN LCN
- 48 a. Approved Equals: No substitutions.
- 49 4. Kickplate Rockwood Mfg. Co ROC
- 50 5. Electric Strikes Von Duprin VON
- 51 a. Approved Equals: HES
- 52 7. Clothes Hook Bobrick BBK
- 53

1 B. Hardware Sets:

2

3 **SET 01**

4 1 EA ELECTRIC STRIKE 9600 630 VON
5 1 EA CARD READER BY DIVISION 28 13 00

6

7 **SET 02**

8 EA HINGES AS SPECIFIED 652 HAG
9 1 EA POWER TRANSFER EPT-2 SP28 VON
10 1 EA PANIC DEVICE FL-E2103 x 4908A 630 PHI
11 1 EA RIM CYLINDER 1E72 626 BES
12 1 EA CLOSER 4010 689 LCN
13 1 EA WALL STOP WS407 630 IVE
14 1 EA CARD READER BY DIVISION 28 13 00
15 -LEVER TRIM TO BE TIED TO FIRE-ALARM SYSTEM TO UNLOCK UPON
16 EMERGENCY SIGNAL OR LOSS OF POWER

17

18 **SET 03**

19 EA HINGES AS SPECIFIED 652 HAG
20 1 EA CORE 1C72 626 BES
21 REMAINDER OF EXISTING HARDWARE TO BE RE-USED.

22

23 **SET 04**

24 1 EA PASSAGE SET 93K N x 14D 626 BES
25 1 EA DEL. EG. MAG LOCK M490DEP 628 SCH
26 1 EA POWER SUPPLY PS902-FA GRY SCH
27 1 EA MOTION SENSOR SCAN II WHT SCH
28 1 EA CLOSER 4010 689 LCN
29 1 EA WALL STOP WS407 630 IVE
30 1 EA CARD READER BY DIVISION 28 13 00
31 REMAINDER OF EXISTING HARDWARE TO BE RE-USED.

32 -Door normally closed and locked. Upon approach from push side, motion sensor will shunt delayed egress system
33 and allow immediate egress. From pull side, using card reader will shunt delayed-egress system and allow entry.
34 Pushing on door for longer than 1 second, without using card reader, will sound local alarm. After 15 seconds,
35 magnetic lock will release and allow door to be opened.

36

37 **SET 05**

38 EA HINGES AS SPECIFIED 652 HAG
39 1 EA OFFICE LOCKSET 93K AB x 14D 626 BES
40 1 EA WALL STOP WS407 630 IVE

41

42 **SET 06**

43 1 SET BARN DOOR HDWR H200A AL PEM
44 1 SET BRACKET 2815 AL PEM
45 1 EA FLUSH PULL 94BTB 630 ROC

46

47 **SET 07**

48 1 EA CLASSROOM LOCKSET 93K R x 14D 626 BES

49

50

51 **SET 08**

52 EA HINGES AS SPECIFIED 652 HAG
53 1 EA FLUSH PULL 94C (Active Leaf) 630 ROC

1	1	EA	DEAD BOLT	83T S	626	BES
2	1	EA	FLUSH BOLT	FB458	626	IVE
3	1	EA	FLUSH BOLT	FB458 x 24"	626	IVE
4	1	EA	DUST PROOF STRIKE	DP2	626	IVE
5	2	EA	OVERHEAD STOP	450	630	GLY

6

7 **SET 09**

8	1	EA	STOREROOM LOCKSET	93K D x 14D	626	BES
9	2	EA	THROUGH BOLTS	TO FIT EXISTING PULL PREPS		
10	1	EA	ELECTRIC STRIKE	6211	630	VON
11	1	EA	CLOSER	4110 H EDA	689	LCN
12	1	EA	CARD READER	BY DIVISION 28 13 00		
13	-CONTRACTOR TO MODIFY EXISTING FRAMES TO RECEIVE ELECTRIC					
14	STRIKES					

15

16 **SET 10**

17	1	EA	CORE	1C72	626	BES
18	REMAINDER OF EXISTING HARDWARE TO BE RE-USED.					

19

20 **SET 11**

21		EA	HINGES	AS SPECIFIED	652	HAG
22	1	EA	STOREROOM LOCKSET	93K D x 14D	626	BES
23	1	EA	ELECTRIC STRIKE	6211	630	VON
24	1	EA	CARD READER	BY SECURITY CONTRACTOR		
25	-CONTRACTOR TO MODIFY EXISTING FRAMES TO RECEIVE ELECTRIC					
26	STRIKES					

27

28 **SET 12**

29	1	EA	STOREROOM LOCKSET	93K D x 14D	626	BES
30	1	EA	ELECTRIC STRIKE	6211	630	VON
31	1	EA	CARD READER	BY SECURITY CONTRACTOR		
32	-CONTRACTOR TO MODIFY EXISTING FRAMES TO RECEIVE ELECTRIC					
33	STRIKES					

34

35

36

37

END OF SECTION 08 71 00

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SECTION 08 80 00
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. Glass in Wood Doors.

1.03 RELATED WORK

- A. Joint Sealers: Section 07 90 00.
- B. Flush Wood Doors: Section 08 14 16.
- C. Hollow Metal Frames: Section 08 11 13.

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.
- D. Warranty for Laminated Glass: Manufacturer/fabricator's standard form, signed by manufacturer/fabricator, agreeing to replace laminated-glass units that display edge separation, delamination, and blemishes exceeding those allowed by ASTM C 1172, within [five] years of date of manufacture.

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 4: 1/4" – 5/8" tempered, clear, FS DD-G-451, Grade B, Style 1, Type I, class 1, quality q3, free of tong marks, ANSI Z97.1. Glazing thickness to meet manufacturer and code requirements per application, refer to drawings for configuration.
 2. GLT 4A: 1/2" minimum laminated glass, clear, FS DD-G-451, Grade B, Style 1, Type I, class 1, quality q3, free of tong marks, ANSI Z97.1: minimum 1/4" glass, minimum 0.030" thick, translucent PVB interlayer, minimum 1/4" glass. ASTM C 1172, meeting Category II material testing requirements per 16 CFR 1201, with polyvinyl butyral interlayer. Glazing thickness to meet code requirement per application, refer to drawings for configuration.
 3. GLT 6: Fire-rated and impact safety-rated glazing material. Overall Unit Thickness: For interior use, 1 1/2". Manufacturer: SAFTI FIRST. Model: "SuperLite I-XL 90". Fire rating: 45 minutes. Each piece of fire rated glazing shall be permanently labeled with the manufacturer's logo, UL logo and fire rating.

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 08 80 00

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SECTION 09 29 00

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. Gypsum Board.
- B. Acoustical Batt Insulation.
- C. Trim and Accessories.

1.03 RELATED WORK

- A. Section 06 10 00, Rough Carpentry
- B. Section 09 90 00, Painting

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 including acoustic sealant.
 - 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.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Recycled content: Provide products manufactured from recycled content as specified, to be measured and documented according to the LEED Green Building Rating System.
 1. Gypsum Board: Minimum 5% post-consumer, 94% pre-consumer.
- B. Regional Materials: Provide materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site.
 1. Gypsum Board: 100%.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Domtar.
- B. Flintkote.
- C. Georgia Pacific.
- D. Gold Bond.
- E. LaFarge.
- F. National Gypsum Company.
- G. United States Gypsum Company.
- H. Dietrich Industries.
- I. Chicago Metallic.
- J. BPB America, Inc.
- K. Arden Architectural Specialties Inc.
- L. Reef Industries
- M. Fry Reglet Architectural Metals
- N. 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. Abuse-resistant Gypsum Board: USG Fiberock AR.
 - 3. Water Resistant Wallboard: 5/8-inch thick.
 - 4. Fire Code Board: Type "X" or Fire code "C".
 - 5. Embedded Glass Reinforced Gypsum Sheathing. 1/4" or as shown on drawings.
 - a. Certainteed "ProRoc 14" Flex" or approved equal.
 - 6. 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.
 - b. Thickness: 1/2 inch or 5/8 inch as shown on drawings.
 - 7. Or approved equal.

- B. Accessories
 - 1. Metal Trim: USG No. 200-A or approved equal.
 - 2. L-shaped Metal Trim USG No. 801-B.
 - 3. Metal Reveal Molding: Fry Reglet DRM-625-75.
 - 4. Metal Reveal Molding: Fry Reglet DRM-625-200.
 - 5. Metal 'Z' Reveal Molding, 1/4" wide: Fry Reglet DRMZ-625-25.
 - 6. Metal "Z" Reveal Molding, 1/2" deep X 1/2" wide: Fry Reglet DRMZ-50-50
 - 7. Metal 'Z' Reveal Molding 5/8" wide X 1/2" deep Fry-Reglet DRMZ- 625-50.
 - 8. Metal 'Z' Reveal Molding, 1" wide: Fry Reglet DRMZ-100-100.
 - 9. Metal "Z" Reveal Molding 2" wide: Fry Reglet DRMZ-625-200
 - 10. Expansion Joints: USG No. 093.
 - 11. Drywall Screws for Metal Framing: 1" Type S-12 or Type S bugle head.
 - 12. Outside Corner Reinforcement: USG No. 104, 1-1/8" x 1-1/8" corner bead.
 - 13. Acoustical Sealant: Equal to Tremco "Tremflex 834" or Pecora "Acoustic and Insulation Sealant", low VOC formulation.
 - a. VOC content less than 50 g/l.
 - 14. Sound Attenuation Blanket: U.S. Gypsum Thermafiber, 3" for an STC of 49
 - 15. Or approved equals.

- C. Drywall Finishing Accessories
 - 1. Joint Compounds: Ready mixed type, or approved equal.
 - 2. Joint Reinforcement: USG Perf-A-Tape, or approved equal.

- D. Texture Finish Materials
 - 1. Walls (Painted Only): Sand texture to match existing sample on site.
 - a. Existing walls within the project area are to receive texture.

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. Maintain a 5/8" space between floor and bottom edge of gypsum board.
- E. Locate wallboard joints at openings so that no end joint aligns with edge of opening.

- F. Set fasteners with heads slightly below surface of wallboard. Avoid breaking face paper.
- G. Provide water resistant wallboard at rooms/areas with high humidity.

3.02 CEMENTITIOUS BACKER BOARD

- A. Cementitious Backer Board Installation:
 1. Use as backing for all ceramic wall tile.
 2. Install as indicated to comply with ANSI A108.11 and in accordance with manufacturer's instructions.
 3. Complete plumbing rough-in before boards are erected.
 4. Separate board from rough-in and fixtures and fill space as recommended by manufacturer.
 5. Securely fasten boards to substrate as required.
 6. Follow manufacturer's instructions for treatment of edge terminations.
 7. At joints and corners, embed fiberglass tape in skim coat of mortar.
- B. Cementitious Backer Board Joints: Prepare and finish joints in accordance with manufacturer's instructions.

3.03 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 or where new construction abuts existing.

3.04 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.

3.05 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.

3.06 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 10 inches on either side of tape.
- E. When second coat is thoroughly dry, spread finish coat evenly over and extend slightly beyond second coat. Feather to a smooth, uniform finish.
- F. 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.
- G. Do not abrade adjacent face-paper surfaces.

3.07 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.

3.08 FINISHING BEAD AND TRIM

- A. Mechanically fasten outside corner reinforcement per manufacturer's instructions.
- B. Apply first coat to beads, trim. Properly feather out from ground to plane of surface. Embed flanges of corner reinforcement with compound.
- C. When embedding coat is thoroughly dry, apply second coat in same manner as first-coat, extending compound slightly beyond onto face of board.
- D. 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 a level 4 flat smooth surface, ready for decoration.
- E. Do not abrade adjacent face-paper surfaces.

3.09 ACOUSTIC SEALANT

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

3.010 TEXTURE FINISH

- A. Apply texture finish in accord with manufacturer's printed instructions.
- B. Provide uniform texture over entire surface: Heavy Orange Peel to match existing.
- C. At existing ceilings and walls match Heavy Orange Peel texture of existing where work is adjacent to existing wallboard.

3.011 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 09 29 00

SECTION 09 51 00
ACOUSTICAL CEILINGS

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. Acoustical Board.
- B. Suspension Systems.

1.03 RELATED WORK

- A. Mechanical (Air Supply and Return Devices): Division 23.
- B. Electrical (Light Fixtures): Division 26.

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.

1.05 DELIVERY, 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.

1.06 PROJECT 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.

1.07 EXTRA 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, ¾" 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.

2.03 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.

3.03 CLEANING

- 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.

3.04 PROTECTION

- 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 09 51 00

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SECTION 09 65 00

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. Resilient Wall Base.
- B. Subfloor and substrate preparation.
- C. Non-PVC Tile Flooring.
- D. Finish, clean and protect floor per manufacturers' recommendations.

1.03 RELATED WORK

- A. Section 06 10 00, Rough Carpentry

1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Installers Qualifications of work similar to that required for this project.
 - 2. Manufacturer's technical data for each type of resilient flooring, adhesive and accessory.
 - a. Data indicating adhesive meets VOC requirements.
 - 3. 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. Submit two samples to illustrate product shade, design and finish.
 - 4. Two copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.
 - 5. On-site pre-installation meeting is required with designated area of resilient base installed for Owner and A/E approval of corners formed by installed on site or factory preformed corner units prior to proceeding.

1.05 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.

1.06 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 68 degrees F, plus or minus 5 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 72 hours before beginning installation.
- C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
- D. Where solvent based adhesives are used, provide safety spark-proof fans when natural ventilation is not adequate.

1.08 WARRANTY

- A. Provide manufacturer's 1 warranty against defects in manufacturing and workmanship of resilient flooring products. Provide manufacturer's standard limited wear warranty/conductivity warranty as specified under each product as applicable.

1.09 EXTRA MATERIALS

- A. Furnish full size units equal to 2 percent of quantity of resilient flooring installed as extra materials. Properly label and package extra materials. Deliver to Owner's designated storage area.

1.010 ENVIRONMENTAL REQUIREMENTS

- A. Low-Emitting Materials, Adhesives, and Sealants: Materials used on the interior of the building (defined as inside the weatherproofing system and applied on site) must not exceed the following requirements.
 - 1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management (SCAQMD) Rule # 1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005.
 - 2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36, requirements in effect on October 19, 2000.
- B. Low- Emitting Materials, Composite Wood & Agrifiber Products: Composite wood and agrifiber products used inside the weatherproofing system shall contain no added urea-formaldehyde resins.
 - 1. Laminating Adhesives used to fabricate on-site and shop applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

PART 2 - PRODUCTS

2.01 General: Resilient Flooring and Base

- A. RF-1:

1. Material: Non-VCT Tile, The Mohawk Group Stonewalk II, or approved equal
2. Non-PVC tile flooring. Free of PVC, halogens, plasticizers and asbestos and will not emit VOC's.
3. Color: As selected by Architect from Manufacturer's full line.

2.02 RESILIENT WALL BASE

- A. RB-1:
 1. Material, Rubber 5/8" Butt Toe Base, height 4" high.
 - a. Roll stock.
 - b. Color: to be selected by architect from manufacturer's full range.
- B. RB-2:
 1. Material, Rubber, 5/8" Butt Toe Base, 4" high.
 - a. Roll stock
 - b. Color: to be selected by architect from manufacturer's full range
- C. Manufacturers: Provide products from one of the following only if equal and approved by A/E:
 1. Armstrong.
 2. Roppe.
 3. Or approved equal.

2.03 ACCESSORIES

- A. Installer to provide all accessories required for a complete installation and confirm all product compatibility with existing products.
- 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.
 - a. Or approved equal.
- C. 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrate surfaces to determine that all substrates are dry, clean, smooth, level and structurally sound.
- B. Do not allow resilient wall base work to proceed until substrate surfaces are satisfactory. Indicate adverse conditions of any type by letter.

3.02 PREPARATION

- A. Prepare concrete and wood sub-floor according to manufacturers' recommendations.

- B. 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.
- C. Sand or grind subfloors to remove mortar, paint and other surface irregularities.
- D. Apply primer to under all areas to receive filling, patching or underlayment materials.
 - 1. Provide adequate ventilation during application of primer.
- E. Where filling, patching, leveling is required of thickness exceeding 1/8-inch apply underlayment in two or more applications. Apply compound in accordance with manufacturer's printed instructions.
- F. Remove all debris, sand and other materials which would result in lack of adhesion and/or star cracking.
- G. For installations over wood subfloors, substrate shall be smooth, level and structurally sound. The following guidelines apply:
 - 1. Per ASTM F 1482, "A combination of a wood subfloor and panel underlayment shall be of double layer construction. Total thickness shall be a minimum of 1".
 - 2. Wood Underlayments: Use only approved underlayment panel such as Arctic birch (also known as Baltic birch) in 1/4" thickness (5 ply) or 3/8" thickness (7 ply). Halex and Tecply are two brand names for these types of products. A/C grade plywood with one side finished is also acceptable.

3.03 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.
 - 5. Note joints between RB and RS are to be horizontal to the flat floor surface of the main floor of the room.

3.04 RESILIENT FLOOR 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 butt type metal edge strip, rectangular profile only if transition between RF-1 and RF-2 at ramp is not achievable without metal edge strip with A/E and Owner approval before installation of resilient flooring. Secure units to substrate with countersunk stainless steel anchors, complying with manufacturer's recommendations.

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. Clean surfaces only after adhesive has fully cured, no sooner than 72 hours after installation.
 - 4. Thoroughly clean floor, being careful to remove black marks and excessive soil, according to manufacturer's instructions using products approved by manufacturer. Remove any excess adhesive or other surfaces blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.
 - 5. Provide initial finish coat of type recommended by flooring manufacturer. Final installation is to achieve a uniform finish of all cork tile in Room 201.
 - a. Buff each coat as required by manufacturer's instructions.
 - b. Provide number of coats as recommended by manufacturer.
- B. Perform following operations immediately upon completion of resilient wall base.
 - 1. Clean surfaces only after adhesive has fully cured, no sooner than 72 hours after installation.
 - 2. Thoroughly clean wall base, being careful to remove black marks and excessive soil, according to manufacturer's instructions using products approved by manufacturer. Remove any excess adhesive or other surfaces blemishes, using appropriate cleaner recommended by resilient flooring manufacturers.

3.06 PROTECTION

- A. Protect wall base against damage during construction period to comply with resilient flooring manufacturer's directions.

END OF SECTION 09 65 00

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SECTION 09 68 00

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. Transitional Mouldings.
- C. Floor Filler.
- D. Adhesives.

1.03 RELATED WORK

- A. Related Sections include the following:
 - 1. Section 02 41 19: "Selective Demolition" for removing existing floor coverings.
 - 2. Section 09 65 00: "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.
- 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. Floors must be free of dust, oils, grease, or other foreign matter.
- D. 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-sized Tiles 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 TILES

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Carpet, CPT-1:
 - a. Carpet Tile
 - b. Manufacturer: Shaw
 - c. Collection: Worklife
 - d. Style: Focus Tile
 - 1) Installation Method to be selected by Architect from manufacturer's recommendations.
 - 2) Color: Meditate
 - e. Size: 24"x24"
 - f. Backing: EcorWorx® Tile

2. Carpet, CPT-2:
 - a. Carpet Tile
 - b. Manufacturer: Shaw
 - c. Collection: Color Form and Color Frame
 - d. Style: Color Frame
 - 1) Installation Method to be selected by Architect from manufacturer's recommendations.
 - e. Color to be selected from manufacturer's full range.
 - f. Size: 24"x24"
 - g. Backing: EcorWorx® Tile

B. 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 pressure sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when calculated according to 40CFR 59, Subpart D (EPA Method 24).
- C. Transitional Mouldings:
 1. Carpet to VCT:
 - a. Johnsonite Adapter, CTA-XX-A or approved equal.
 - 1) Length: 12-feet.
 - 2) Color to be selected from Manufacturer's full range of colors.

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. 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.
- E. Install metal transition strip with anchoring leg under carpet where carpet abuts resilient terrazzo.
 - 1. Secure metal transition strip to substrate according to manufacturer's instructions.
- F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. 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.
- H. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
- I. 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 09 68 00

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SECTION 09 90 00

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

- A. Painting and finishing of interior and exterior exposed items and surfaces throughout Project.
- B. Refinishing as indicated on Drawings, including removal of paint and finishes, preparation, painting and finishing.
- C. Field painting of exposed bare and covered pipes and ducts and hangers, conduits, uni-strut, exposed steel and iron work, all metal fabricated Section 05 50 00 items, and primed metal surfaces including but not limited to, hollow metal work, equipment installed under mechanical and electrical work.
- D. "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.
- E. 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.
- F. 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.
4. Pre-installation meeting is required before stripping procedures begin, with an area where surfaces are tested to provide the least intrusive and damaging methods. Owner and A/E approval required for the selected method.
5. Prepare and repaint an area of each designated interior surface to requirements specified herein, with specified paint or coating showing selected color, gloss/sheen, texture and workmanship to MPI Repainting Manual standards for review and approval by Owner and A/E. When approved, interior surface shall become acceptable standard of finish quality and workmanship for similar on-site repainting work.

1.05 QUALITY ASSURANCE

- A. AWI, Architectural Woodwork Standards.
- B. Master Painters Institute (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".

1.06 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.

1.07 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.

1.08 SEQUENCING AND SCHEDULING

- A. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto newly-painted surfaces.

1.09 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.

1.010 ENVIRONMENTAL REQUIREMENTS

- A. Low-Emitting Materials, Field applied Paints and Coatings: Interior paints and coatings applied on-site must meet the limitations and restrictions concerning chemical components set by the following standards:
 - 1. Topcoat Paints, Green Seal Standard GS-11, Paints: First Edition, May 20, 1993.
 - 2. Anti-Corrosive and Anti-Rust Paints: Green Seal Standard GS-03, Anti-Corrosive Paints", Second Edition, January 7, 1997. For applications on ferrous metal substrates.
 - 3. "All Other Architectural Coatings, Primers and Undercoats: South Coast Air Quality Management District (SCAQMD) Rule #1113, Architectural Coatings", rules in effect on January 1, 2004.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. AFM Safecoat.
- B. Benjamin Moore & Co.
- C. Cabot.
- D. ICI/Dulux.
- E. PPG Architectural Finishes, Inc.
- F. Sherwin Williams Company.
- G. U-C Coatings Corp.
- H. Target Coatings
- I. Diamond Vogel Paint
- J. Or approved equal.

2.02 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.

2.03 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

2.04 METAL PRIMERS

A. Rust-Inhibitive Primer (Water Based): MPI #107.

2.05 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).

2.06 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:

1. Gypsum Board: 12 percent.
2. Concrete: Must be cured a minimum of 45 days.

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. Follow manufacturer's instructions for use of stripping solutions to avoid raising grain of wood.
 3. Do not dip fabricated units (doors, etc.) in stripping solution to avoid saturating wood or damaging glued connections.
 4. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning.
 5. Remove dirt, rust, scale, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.
- B. New wood: Prepare substrate and apply finish according to manufacturer's recommendations. Apply to smooth clean surfaces only.
- C. Gypsum Board: Fill minor irregularities with patching material and sand to smooth level surfaces taking care not to raise nap of paper.
- D. Existing Ferrous Metal
1. Spot remove failed, damaged or rough existing paint to bare metal by means of stripping as indicated above. If existing metal surface is not smooth, sand or wire brush.
 - a. Sand edges of existing paint to a feather edge.
 2. Remove dirt and grease with mineral spirits or solvent recommended by paint manufacturer and clean cloths.
- E. 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.

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 work under adequate illumination and dust-free conditions.
- C. 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.

- D. 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.
- E. Materials
 - 1. Do not open containers until required for use.
 - 2. Stir materials thoroughly and keep at uniform consistency during application.
- F. 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. 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. Wood Trim:

1. Apply finishes to all areas as shown on drawings per manufacturer's instructions.

D. Electrical Panel Box Covers and Doors

1. Remove, paint and reinstall after paint is dry.

E. 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.

F. Material	Type	Number and Type of Coating
1. IPS 1 – Wood	Latex-Eggshell	One coat "ProMar Primer", two coats "ProMar 200 Eg-shel Alkyd".
2. IPS 4 - Wood	Stain (Satin)	One coat "Sherwood Wiping Stain", 2 coats "Target Coatings 9000 Series 'Clear Coat' Polyurethane Ultra-Low VOC". Custom Colors to match A/E's finish control sample.
3. IPS 5 – Plaster	Latex-Flat Eggshell	One coat primer, "PrepRite Interior Masonry Eggshell Primer", Two top coats, "Harmony Interior Latex Eggshell".
4. IPS 7 - Gypsum Board	Latex-Eggshell Zero-VOC	One coat "Harmony Interior Latex Primer", Two coats "Harmony Interior Latex Eggshell".
5. IPS 13 - Ferrous Metal (Unprimed)	Latex -Semi-gloss	One coat "Pro Industrial Pro-Cryl Primer", two coats "Pro Industrial Acrylic".
6. IPS 14 - Ferrous Metal (Primed)	Latex -Semi-gloss	One coat "Pro Industrial Pro-Cryl Primer", two coats "Pro Industrial Acrylic".
7. IPS 16 - Galvanized (Finished Rooms Only)	Latex-Flat	One coat "DTM Acrylic Primer Finish", two coats "ProMar 200 Interior Latex Flat".

- G. Color Schedule: all colors to be confirmed prior to drawdown submittal. Accent colors noted below to be selected from manufacturer's full range.

PT-1	Match existing
PT-2	accent color
PT-3	accent color
HM Frames	Match existing

END OF SECTION 09 90 00

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SECTION 12 21 13

HORIZONTAL LOUVER BLINDS

PART 1:GENERAL

1.01 DESCRIPTION

- 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. Horizontal Louver Mini Blinds.

1.03 SUBMITTALS

- A. Make the following submittals in accordance with the General Conditions of the Contract.
 - 1. Product Data: Indicate model, finishes, mounting instructions.
 - 2. Samples: Two 12-inch pieces of slats, fabrics, or other finished material, indicating full range of color.
 - 3. Shop Drawings: Indicate dimensions of openings scheduled to receive blinds, based on field measurements, illustrations of special components not detailed on manufacturer's data sheets, details of divisions between adjacent units, abutments at corners, head and sill.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store blinds in original packaging to area to protect from damage.
- B. Handle so as to prevent damage or soiling.

PART 2:PRODUCTS

2.01 MANUFACTURERS

- A. Bali CustoMiser Aluminum Custom Mini Blind.
- B. Levalor Monaco.
- C. Kirsch Mini.
- D. Or approved equal.

2.02 FEATURES

- A. Bottom Rail: Steel, standard top surface contoured to match slat, reinforced to prevent twisting or sagging, with plastic end caps.
- B. Ladder: Standard braided polyester.
- C. Tilter: Standard enclosed lubricated mechanism with 180 degree tilt range, designed to hold slats at set angle.
 - 1. Worm, gear drive actuated by nondetachable rod. Full length rod, top only locking.
- D. Equalizers: Self-aligning, nylon, designed to maintain slats in horizontal position.
- E. Color: Architect will choose from full range of standard colors and perforated slats.

1 F. Size blinds to overlap window/wall jambs 1 inch.

2

3 PART 3:EXECUTION

4

5 3.01INSPECTION

6

7 A. Check that surfaces to which work will be secured are sound and free of irregularities interfering with
8 installation.

9

10 B. Do not begin installation until unsatisfactory conditions have been corrected.

11

12 3.02INSTALLATION

13

14 A. Install blinds in accordance with manufacturer's installation procedures, approved Shop Drawings.

15

16 B. Assure adequate clearance to permit unencumbered operation.

17

18 C. Replace damaged items with new material.

19

20 D. Repair surfaces damaged by improper installation.

21

22 3.03 SCHEDULE OF OPENINGS

23

24 A. Interior openings: Room 211, 215, 218A, 221, 225.

25

26

27

END OF SECTION 12 21 13

SECTION 12 24 13

ROLLER WINDOW SHADES

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. Manually operated sunscreen roller shades on exterior windows scheduled within the project scope.

1.03 RELATED WORK

- A. Rough Carpentry, Section 06 10 00: blocking for support of window shade brackets.
- B. Substrate for window shade systems and installation of accessories supplied only under this section.

1.04 QUALITY ASSURANCE

- A. Manufacturer shall have 15 years experience in the manufacture of products comparable with those specified in this section.
- B. Manufacturer shall provide all shading components and electrical components for a complete installation and a single source of shading and lighting control where applicable.
- C. The manufacturer or licensed agent shall be approved to provide the products specified, honor all claims against the product in accordance with the warranty.
- D. Manufacturer shall provide 24/7 technical support to aid in troubleshooting system wiring and assist in system programming.
- E. Installer shall be qualified for installation by experience and be approved by the manufacturer.

1.05 SUBMITTALS

- A. Submit manufacturer's descriptive literature for each product type specified. Details shall indicate materials, finishes, construction, and mounting requirements. Also include installation and operating instructions.

1.06 SHOP DRAWINGS

- A. Indicate Head, jamb, and sill details to aid General Contractor to coordinate work as well as relevant dimensions and mounting requirements for each product type and mounting condition.
- B. Provide shade schedule coordinating room number, opening size(s), quantities and key to details.
- C. Submit a proposed seaming diagram for Architect approval at any openings where seams are required. Utilize manufacturer's maximum fabric dimension to minimize seams.

1.07 SAMPLES

- 1 A. Portfolio of shade fabric swatches for initial fabric color selection from manufacturer's full range of
- 2 available fabrics. Provide sample and profiles of all aluminum fascias for selection from
- 3 manufacturer's full range of available fascias.
- 4
- 5 B. Material samples for color and finish selection of controls.
- 6
- 7 C. One fully operational window shade sample of each type required complete with selected shade fabric
- 8 including sample of seam/batten when applicable. Location of sample to be determined by Architect.
- 9
- 10 D. One complete set of all shade components demonstrating compliance.
- 11
- 12 1.08 CERTIFICATION
- 13
- 14 A. Test Reports indicating compliance with Fabric test properties listed in Section 2.
- 15
- 16 1.09 MANUFACTURER'S INSTRUCTION
- 17
- 18 A. Installation, Programming, and Maintenance instructions to be included in product packaging.
- 19
- 20 B. 24-Hour / 7-Day Technical support shall be available to aid with unforeseen installation difficulties.
- 21 1.10 DELIVERY, STORAGE, AND HANDLING
- 22 A. Storage and Protection
- 23 1. Do not deliver items to the project until all concrete, masonry, plaster, painting and other wet
- 24 work has been completed and is dry.
- 25 2. Deliver shades to project in protective packaging, uniquely labeled to identify each shade for each
- 26 opening. Schedule delivery to prevent delays to completion of work, but to minimize on-site
- 27 storage time.
- 28 3. Store materials in a dry, secure place. Protect from weather, surface contaminants, corrosion,
- 29 construction traffic, and all other potential damage.
- 30 B. PROJECT / SITE CONDITIONS
- 31 1. Shade system shall not be installed until the building is operating in ambient temperature and
- 32 humidity ranges consistent with that intended for buildings ultimate use.
- 33 C. SCHEDULING
- 34 1. Do not fabricate shades without obtaining field dimensions for each opening.
- 35 2. Coordinate construction of surrounding conditions to allow for timely field dimension verification.
- 36 3. Manufacturer's standard lead times apply. Reference submittal and schedule accordingly for
- 37 project timeline.
- 38 D. EXTRA MATERIALS
- 39 1. The manufacturer shall make available to the end user a method of ordering new equipment for
- 40 expansions, replacement, or parts to be used as spares twenty-four hours a day, seven days a week.
- 41 2. The manufacturer must make available new or remanufactured parts for a minimum period of ten
- 42 years from the final date of commissioning.
- 43 PART 2 - PRODUCTS
- 44 1.01 MANUFACTURERS
- 45 A. To establish the standard of quality, design, and function desired, drawings and specifications are

- 1 based on the Manual Solar Shades by:
2 1. Springs Window Fashions, SWFcontract.
3 2. Or approved equal by MechoShade Systems, Inc., Hunter Douglas, or approved equal.
4 3. Dealer contact information: Interiors by J&L, Janice Quinton, 608.592.4221 or other approved
5 dealer.

6 1.02 GENERAL SYSTEM SPECIFICATIONS

7 A. OPERATION

- 8 1. Manual.

9 1.03 ROLLER SHADES

10 A. MOUNTING

- 11 1. Roller shade brackets shall allow for symmetrical light gaps as small as 3/4" on each side of
12 shade.
13 2. System shall have a roller shade leveling adjustment that allows level adjustment while the
14 roller shades are mounted to the brackets.
15 3. System shall allow a side-to-side adjustment of up to ±3/8" on each side while the shade is
16 mounted to the bracket to properly center shade over the window.
17 4. System shall have a projection adjustment of up to 1/2" allowing the shade to clear the trim or
18 move the shade closer to the window in order to have a tighter seal between the fabric and the
19 window.
20 5. System dual brackets shall be provided to permit two shades rollers to be mounted in the same
21 opening .

22 B. SHADE TUBE

- 23 1. 2.5" aluminium extrusion
24 2. Fabric shall be connected to the tube with double-sided adhesive strip applied for exact and firm
25 mounting of the fabric and for easy adjustment of fabric to prevent telescoping.
26 3. A minimum of one turn of fabric will be placed on the roller before the working section of
27 fabric starts, to protect the fabric and smooth out the starting seam.

28 C. FABRICS

- 29 1. Qualifications
30 a. Fire – Provide shade fabrics tested in accordance with:
31 i. 1989 NFPA 701 small scale Vertical Burn Test and rated "PASS."
32 ii. 1996 NFPA 701 small scale Vertical Burn (telephone booth test) and rated "PASS."

33 E. MANUFACTURING

- 34 1. Where applicable, shade fabric will be ultrasonically cut and friction sealed to minimize fraying.
35 2. Woven yarn fabrics will be interlocking and heat-treated so that all material is securely bonded.
36 3. Shade Fabric panels shall be 100% visually inspected for defects using a light box integrated
37 into the manufacturing line.
38 4. 100% visual inspections shall be performed on each shade seam and hem bar welds and
39 compared to strict aesthetic standards.

- 1 5. Shade seam weld strength process shall be tested on a daily basis to ensure controlled
- 2 consistency of weld quality.
- 3 6. Shade panels shall be 100% checked for squareness ($\pm 1/16''$)
- 4 7. Shade panels shall be 100% visually inspected to ensure there are no frayed edges or defects in
- 5 the cut.

6 F. LIGHT FILTERING FABRICS

- 7 1. Equal to Phifer Shearweave 2410, Greenguard Certified.
- 8 a. Openness factor to be selected by architect from manufacturer's full range.
- 9 b. Color to be selected by architect from manufacturer's full range.

10 G. BLACKOUT FABRIC

- 11 1. Where indicated in schedule.

12 H. FASCIA

- 13 1. To be selected from manufacturer's full range.

15 I. HEM BAR

- 16 1. Standard Sealed Hem Bar shall be a 1" wide by .1875" thick extruded aluminum bar enclosed on
- 17 all sides in a thermally sealed pocket across the bottom of the shading fabric.

18
19 PART 3 - EXECUTION

20 3.01 EXAMINATION

- 21 A. Refuse delivery of any damaged packaging.
- 22 B. Ensure all parts match specified bill of materials and purchase order.

23 3.02 INSTALLATION

- 24 A. Install shades in windows level and plumb to provide smooth operation.
- 25 B. Install in accordance with manufacturer's product data and approved shop drawings
- 26 C. Field measurement and installation shall be performed by a factory-trained technician.

27 3.03 FIELD QUALITY CONTROL

- 28 A. Site test/Inspection
- 29 1. Examine substrate and conditions for installation. Do not commence installation until conditions
- 30 are satisfactory. Commencement of installation indicates acceptance of site conditions by
- 31 Contractor. Notify the Design Professional upon inspection when the project conditions are
- 32 unacceptable for shade installation. "Beginning of installation" means acceptance of substrate and
- 33 project conditions.

34 3.04 ADJUSTING

- 35 A. Adjust fabric on tube to prevent telescoping of fabric over time.

36 3.05 CLEANING

- 37 A. Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove
- 38 and replace work that cannot be satisfactorily repaired.

1 1. Clean exposed surfaces, including metal and shade fabric, using non-abrasive materials and
2 methods recommended by the Shade Fabric Manufacturer. Remove and replace work that cannot
3 be satisfactorily cleaned.

4 3.06 DEMONSTRATION

5 A. Demonstrate operation method and instruct Owner's personnel in the proper operation and maintenance of
6 the window shade systems.

7 3.07 SCHEDULE OF OPENINGS

8 A. Exterior Openings: Rooms 221, 218A, Open Office 220 west facing glazing.
9
10

11 END OF SECTION 12 24 13
12

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SECTION 21 05 00
COMMON WORK RESULTS FOR FIRE-SUPPRESSION

PART 1 - GENERAL

SCOPE

This section includes information common to two or more technical fire protection specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Related Documents
- Regulatory Requirements
- Reference Standards
- Quality Assurance
- Abbreviations and Symbols
- Definitions
- Coordination
- Continuity of Existing Services
- Protection of Finished Surfaces
- Sleeves and Openings
- Sealing and Firestopping
- Off Site Storage
- Submittals
- Operating and Maintenance Instructions
- Record Drawings
- Testing
- Cleaning
- Warranty

PART 2 - PRODUCTS

- Pipe Penetrations
- Identification
- Equipment Accessories
- Gauges
- Sealing and Firestopping

PART 3 - EXECUTION

- Demolition
- Openings, Cutting and Patching
- Building Access
- Equipment Access
- Coordination of Work
- Pipe Penetrations
- Identification
- Sleeves

RELATED WORK

Provisions of Division 01 shall govern work under this Section.

This section applies to all Division 21 Sections of Fire Suppression.

REGULATORY REQUIREMENTS

Refer to Division 01 of the Project Manual.

Codes and Standards:

Fire Protection work shall conform to the requirements of Wisconsin Building Code (COMM), NFPA Standards, and local regulations regarding design, materials and installation.

Materials and workmanship shall comply with applicable Codes, local ordinances, industry standards and utility regulations. In case of differences between Codes, and the Contract Documents, the most stringent shall govern.

Non-Compliance:

Should the Contractor perform any work that does not comply with the above requirements, he shall bear all costs necessary to correct the deficiencies.

Permits, Inspections, and Fees:

Request and obtain permits and inspection appointments.

Provide fees and charges for approvals, reviews, or other inspections.

Include copies of the certificates in the Operating and Maintenance Instructions.

Fees and charges assessed by local utilities for water or other services shall be included in the bid.

REFERENCE STANDARDS

Abbreviations of standards organizations referenced in this and other sections are as follows:

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASPE	American society of Plumbing Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CS	Commercial Standards, Products Standards Sections, Office of Engineering Standards Service, NBS
EPA	Environmental Protection Agency
FM	Factory Mutual System
FS	Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
IAPMO	International Association of Plumbing & Mechanical Officials
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
MCA	Mechanical Contractors Association
MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories Inc.

QUALITY ASSURANCE

Substitution of Materials: Refer to Division 01 of the Project Manual.

All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the intended performance from the system into which these items are placed.

ABBREVIATIONS AND SYMBOLS

Key to abbreviations and symbols shall be on the Drawings.

The following are additional abbreviations used in the Specifications:

A/E	Architect/Engineer
GC	General Contractor
PC	Plumbing Contractor
FPC	Fire Protection Contractor
HC	Heating Ventilating and Air Conditioning Contractor
EC	Electrical Contractor

DEFINITIONS

Furnish:

Supply and deliver to Project site ready for unpacking, assembly and installation

Install:

Operations at Site including unpacking, assembling, erecting, placing, anchoring, applying, finishing, cleaning, and connecting related devices required for product fully functional for intended use after installation.

Provide:

Furnish and install, such that product is fully functional for intended use.

COORDINATION

The Drawings show the general arrangement of piping and equipment and shall be followed as closely as actual building construction and the work of other trades permits. Architectural and Structural Drawings shall take precedence. Because of the scale of the Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate conditions affecting the Work and arrange accordingly, providing offsets, fittings and accessories as may be required to meet conditions.

CONTINUITY OF EXISTING SERVICES

Refer to Division 01 of the Project Manual.

Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

PROTECTION OF FINISHED SURFACES

Refer to Division 01, of the Project Manual.

SEALING AND FIRESTOPPING

Sealing and firestopping of sleeves/openings between piping, etc. and the sleeve or structural opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

OFF SITE STORAGE

Refer to Division 01 of the Project Manual.

SUBMITTALS

Refer to Division 01, of the Project Manual.

Submit shop drawings with space for approval stamps of GC and A/E.

Refer to Division 01, of the Project Manual.

Not more than two weeks after award of contract but before any shop drawings are submitted, contractor to submit the following fire protection system data sheet. List piping material types, ASTM number, schedule or pressure class, joint type, manufacturer and model number where appropriate. List valves, specialties and equipment with manufacturer and model number. The approved fire protection system data sheet(s) will be made available to the Owners Project Representative for their use on this project.

FIRE PROTECTION SYSTEM DATA SHEET

<u>Item</u>	<u>Pipe Service/Sizes</u>	<u>Manufacturer/Model No.</u>	<u>Remarks</u>
Pipe			
Fittings			
Hangers & Supports			
Sprinkler Heads			
Valves			
Specialty Valves			
Pipe Specialties			
Fire Protection Specialties			
Fire Protection Equipment			

Shop drawing submittals are to be bound in a three ring binder, labeled, contain the project manual cover page and a material index list page showing item designation, manufacturer and additional items supplied with the installation. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Include wiring diagrams of electrically powered equipment.

Submittals shall be sent to the local Fire Chief or Fire Marshal for review prior to the Architect/Engineer. Include copy of approval letter in submission to Architect/Engineer.

Submit plans indicating water supply location and size, piping layout and size, sprinkler locations and type, hanger locations and type, equipment locations and type, valve locations and type, occupancy classes, hydraulic reference points, design areas and discharge densities.

Submit hydraulic calculations for water supply and sprinkler systems. Include summary sheet and detailed work sheets. Describe characteristics of water supply and location of effective point used in calculations. Include graph illustration of water supply, hose demand, sprinkler demand.

Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

- Operating and Maintenance Manuals 2 copies
- Architect/Engineer 2 copies
- Local Fire Chief or Marshal 1 copy

Firestop Systems:

Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgement can be based upon.

OPERATING AND MAINTENANCE INSTRUCTIONS

Refer to Division 01 of the Project Manual.

Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:

- Copies of all approved submittals along with approval letters.
- Manufacturer's wiring diagrams for electrically powered equipment.
- Records of tests performed to certify compliance with system requirements.
- Certificates of inspection by regulatory agencies.
- Parts lists for equipment and specialties.
- Manufacturer's installation, operation and maintenance recommendations for equipment and specialties.
- Valve schedules
- Lubrication instructions, including list/frequency of lubrication
- Warranties
- Additional information as indicated in the technical specification sections

RECORD DRAWINGS

Refer to Division 01 of the Project Manual.

In addition to the data indicated in the General Requirements, maintain fire protection layout record drawings and hydraulic calculations on originals prepared by the installing contractor/subcontractor. Include copies of these record drawings and calculations with the Operating and Maintenance manuals.

TESTING

Equipment, material and labor required for testing, shall be provided by the Contractor.

Contractor shall notify Inspector(s) one day prior to the time when the test is ready to be performed. Contractor shall notify the A/E of date and time for tests.

After the test, indicate in writing the time, date, name and title of the person approving the test. This shall also include the description and what portion of the system has been tested. The person approving the test shall sign the certification.

Records shall be maintained of testing that has been completed, and shall be made available at the job site to authorities.

Upon completion of the work, records and certifications approving testing requirements shall be submitted.

Defective work or material shall be replaced or repaired, and the test repeated. Repairs shall be made with new materials.

CLEANING

Contractor shall keep the premises broom clean and free of all surplus materials, rubbish and debris which is caused by his employees or resulting from his work.

Foreign matter shall be blown out, or flushed out, of pipes, tanks, pumps, strainers, motors, devices, switches, and panels.

Identification plates on equipment shall be free of paint and dirt.

The Contractor shall leave his portion of the work ready for operation.

WARRANTY

Warrant that work functions for one year following acceptance of the system(s).

The Contractor shall keep the system in good working order at no expense, unless defects are clearly the result of improper or abnormal usage.

The Contractor shall submit to the A/E upon request for acceptance of the work, written certification that the entire system has been installed and adjusted for operation in accordance with the Contract Documents.

PART 2 - PRODUCTS

ELECTRICAL REQUIREMENTS

General:

Work shall conform to requirements of Division 26.

Provide wiring diagrams.

PIPE PENETRATIONS

Refer to Division 01 requirements as well as the following.

Fire, Smoke And Fire/Smoke Rated Surfaces:

3M CP 25N/S or CP 25S/L caulk, 3M FS 195 wrap/strip with restricting collar, 3M CS 195 composite sheet, Pipe Shields Inc. Series F fire barrier kits, Proset Systems fire rated floor and wall penetrations, Insta-Foam Products Insta-Fire Seal Firestop Foam or Dow Corning Fire Stop System.

All fire stopping systems shall be provided by the same manufacturer.

UL listed or tested by independent testing laboratory, approved by State and Local Code jurisdictions.

Use product that has a rating not less than rating of wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Sleeves in concrete to be Schedule 40 steel pipe with integral water stop unless fire stop material used includes a sleeve that is an integral part of rated assembly.

Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

Non-Rated Surfaces:

Stamped steel, chrome plated, hinged, split ring escutcheons or floor/ceiling plates for covering openings in occupied spaces.

In exterior wall openings below grade, use modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the un-insulated pipe and cored opening or a water-stop type wall sleeve.

At interior partitions where pipe penetrations are sealed, use Tremco Dymonic, Sika Corp. Sikaflex 1a, Sonneborn Sonolastic NPI, or Mameco Vulkan 116 urethane caulk to effectively seal. Use galvanized sheet metal sleeves in hollow wall penetrations.

PIPING AND VALVE IDENTIFICATION

Manufacturers:

Setonply © Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by W. H. Brady.

Pipe Identification:

Pipe identification shall conform to ANSI A13.1 "Scheme for Identification of Piping Systems".

Printed labels identifying the fluid conveyed and direction of flow shall be attached to pipes in accessible locations, at intervals not to exceed 20 feet, not less than once in each room, at each branch, adjacent to each access door or panel, at each valve and where exposed piping passes through walls and floors.

Outside Diameter of Pipe Covering	Minimum Size of Letters
up to 1¼"	½"
1½" to 2"	¾"
2½" to 6"	1½"

Manufacturers:

EMED Co., Seton Name Plate Company, or W. H. Brady.

Stencils:

Not less than 1 inch high letters/numbers for marking pipe and equipment.

Valve Tags:

Identify each valve by means of 1½" diameter brass tag fastened to body of valve with copper or brass chain. Identification number shall be stamped thereon with letters a minimum of ½" high. System identification abbreviation shall be stamped with letters a minimum of ¼" high.

The following prefixes shall be used:

SPKR - Sprinklers

Manufacturers:

EMED Co., Seton Name Plate Company, or W. H. Brady.

Valve Charts:

Furnish three charts listing each valve. Two charts shall be delivered to A/E. An additional chart shall be framed behind glass and hung in location selected by Owner. Charts shall show the following:

Valve number	Size
Manufacturer	Type of valve
Type of service	Location

Furnish typewritten chart indicating equipment or areas served by each numbered valve and incorporate in Operating and Maintenance Manuals.

EQUIPMENT ACCESSORIES

Provide equipment accessories, connections, and incidental items.

Install piping connecting to pumps and other equipment without strain at the piping connection. If requested by the A/E, remove the bolts in these flanged connections, or disconnect piping, to demonstrate that piping has been properly connected.

GAUGES

Acceptable Manufacturers:

American, Taylor, Terrice, U.S. Gauge, Weiss, or Winters Instruments.

Pressure Gauges:

Industrial quality with phosphor bronze bourdon tube, brass socket, 3½ inch dial face, bronze bushed movement, aluminum case with black finish, white background, black figures readable by person standing on floor.

Ranges shall be as follows:

Fire Protection Water:
0 to 200 psig

PART 3 - EXECUTION

GENERAL

Coordination Of Work:

Review the complete set of Drawings and Specifications and report discrepancies to the A/E. Obtain written instructions for changes necessary. Coordinate with each trade prior to beginning installation and make provisions to avoid interferences. Changes required caused by neglect to coordinate shall be made without expense to the project.

Piping shall not be located above electrical panels.

Anchor Bolts, Sleeves, and Supports:

These items required for the Work shall be furnished by the FPC for proper installation of his work. They shall be installed (except as otherwise specified) by the trade furnishing and installing the material in which they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade requiring them. Expense resulting from the improper location or installation of anchor bolts, sleeves, inserts and supports shall be paid for by the Contractor for the trade with responsibility for directing their proper location.

Adjustments In Locations:

Locations of pipes and equipment, shall be adjusted to accommodate the work interferences anticipated and encountered. Prior to fabrication determine the exact route and location of each pipe (subject to A/E's approval).

Right Of Way:

New lines which pitch shall have the right-of-way over those which do not pitch. For example: Gravity drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed. Notify A/E and other trades of conflicts.

Offsets, transitions and changes in direction of electrical raceways, pipes, and ducts shall be made to maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.

DEMOLITION

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.

All pipe, sprinklers, equipment, wiring, associated conduit and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the Owner for his use at a place and time he so designates. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

OPENINGS, CUTTING AND PATCHING

Refer to Division 01 requirements.

The FPC may perform core drilling for openings in existing walls and floors at the direction of the A/E. Framed openings shall be by the GC.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS

Install all piping, valves, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster walls or ceilings, furnish the access doors to the General Contractor.

Accessible ceilings, (i.e. lay-in ceilings) do not require access panels. Provide color coded thumb tacks or screws, depending on surface, for use in accessible ceilings.

COORDINATION OF WORK

Install systems, equipment and piping in cooperation with other trades. Locations of pipes, equipment, fixtures, etc., shall be adjusted to accommodate the work interferences anticipated and encountered. Prior to fabrication determine the exact route and location of each pipe (subject to A/E's approval).

Any work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

Offsets, transitions and changes in direction of electrical raceways, pipes and ducts shall be made as required whether or not indicated on the Drawings.

Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions. If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

PIPING INSTALLATION

Installation Arrangement:

Install work to permit removal (without damage to other parts) of parts requiring replacement or maintenance. Arrange pipes and equipment to permit ready access to valves, cocks, traps, starters, motors, and control components and to clear the openings of swinging and overhead doors and of access panels.

Connections Different From Those Shown:

Where equipment requiring different arrangement or connections from those shown is used, install the equipment to operate properly and in harmony with the intent of the Drawings and Specifications. When requested by the A/E, submit drawings showing the proposed installation.

Upon approval of the revisions, make changes in piping, ductwork, supports, insulation, wiring, and panelboards. Provide additional motors, controllers, valves, fittings and other additional equipment required for the proper operation of the system resulting from the selection of equipment, including required changes in affected trades. The Contractor shall be responsible for the proper location of rough-in and connections by other trades.

Changes shall be made at no increase in the Contract amount or additional cost to the other trades.

SLEEVES

Provide galvanized sheet metal sleeves for fire rated pipe penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing poured concrete walls where penetration is core drilled, pipe sleeve is not required. Grout holes directly around steel pipe.

In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 3/4 inch above the adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to existing floor structure.

PIPE PENETRATIONS

General:

Coordinate location of building surface penetrations with appropriate contractors. Furnish sleeves, inserts, and devices to be built into structure to contractor performing Work. Prepare Shop Drawings for approval for penetrations of structural elements, including floor slabs, shear walls, and bearing walls. Do not allow penetrations to be made until Shop Drawings are approved.

Fire Rated Surfaces:

Install products in accordance with the manufacturer's instructions where pipe penetrates a fire rated surface. When pipe is insulated, use product that maintains integrity of insulation and vapor barrier. Where sleeve must be installed in existing floor, grout area around sleeve to restore floor integrity. In wet area floor penetration, top surface of penetration to be 2 inches above adjacent floor with additional height obtained by means of concrete pad poured integral with floor.

Non-Rated Surfaces:

Install escutcheons or floor/ceiling plates where pipe penetrates non-fire rated surfaces in occupied spaces. Size units to accommodate insulation, where applicable. Escutcheons are not required when insulation completely covers wall opening and insulation end is trimmed in a neat manner. Occupied spaces for this Paragraph include only those rooms with finished ceilings and penetration occurs below ceiling.

Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or insulation is completely blocked.

Completely seal (or caulk) around pipe penetrations through non-rated, smoke tight corridor walls in healthcare facilities. Refer to architectural drawings for additional information.

Completely seal pipe penetrations, as specified below, for walls of the following rooms below:

- Toilet rooms.
- Conference rooms.

ESCUTCHEON PLATES

Provide plates on pipes passing through finished floors, walls and ceilings, with outside diameter to cover sleeve opening and inside diameter to fit snugly around pipe. Set tight to building surface. Escutcheon plates shall be chromium plated metal.

PAINTING

Refer to Division 09.

IDENTIFICATION

Identify equipment in mechanical equipment rooms by stenciling equipment number and service with one coat of black enamel against a light background or white enamel against a dark background. Use a primer where necessary for proper paint adhesion.

Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

Identify interior piping mains not less than once every 25 feet, not less than once in each room, adjacent to each access door or panel, and on both sides of the partition where exposed piping passes through walls or floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel against a light background or white enamel against a dark background or approved pipe marking label systems.

Identify valves with signs per NFPA rulings.

Provide hydraulic design information sign of permanently marked weatherproof metal or engraved nameplate material. Secure to main fire risers/valves with brass chain. Information to include location of the design areas, discharge densities, required flow and residual pressure at the base of riser, hose stream demand and sprinkler demand.

END OF SECTION

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SECTION 21 05 29
HANGERS AND SUPPORTS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE

This section includes specifications for supports of all fire protection equipment and materials as well as piping system anchors. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Quality Assurance
- Description
- Design Criteria
- Submittals

PART 2 - PRODUCTS

- Manufacturers
- Structural Supports
- Pipe Hangers and Supports
- Beam Clamps
- Riser Clamps
- Concrete Inserts
- Anchors

PART 3 - EXECUTION

- Installation
- Hanger and Support Spacing
- Riser Clamps
- Concrete Inserts
- Anchors

RELATED WORK

Provisions of Division 01 shall govern work under this Section.

Division 03 - Concrete

Section 21 05 00 – Common Work Results for Fire-Suppression

Section 21 10 00 – Water-Based Fire-Suppression Systems

REFERENCE STANDARDS

MSS SP-58

MSS SP-69

NFPA 13 Installation of Sprinkler Systems (Latest prevailing addition).

UL Underwriters' Laboratories Listed.

FM Factory Mutual Approved

QUALITY ASSURANCE

Substitution of Materials: Refer to Division 01 of the Project Manual.

DESCRIPTION

Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.

Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord of any truss or joist.

Fasteners depending on soft lead for holding power or requiring explosive powder actuation will not be accepted.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

DESIGN CRITERIA

Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58 and SP-69 unless noted otherwise.

Materials and application of pipe hangers and supports shall be in accordance with NFPA rulings and be UL/FM listed and approved.

SUBMITTALS

Submit data in accordance with Section 21 05 00 and Division 01 of the Project Manual.

Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe size and type of service. Provide details on the working drawings submitted for approval with all pertinent information listed.

PART 2 - PRODUCTS

MANUFACTURERS

B-Line, Fee and Mason, Grinnell, Hilti, Michigan Hanger, Pate, PHD Manufacturing, Piping Technology, Powers/Rawl, Proset, Roof Products & Systems, Unistrut, or Victaulic.

STRUCTURAL SUPPORTS

Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the drawings.

PIPE HANGERS AND SUPPORTS

Hangers for Pipe Sizes 1/2" through 4":

Carbon steel, adjustable swivel ring with 3/8" min. UL/FM approved hanger rods. B-Line B3170NF, Grinnell 69 or 70.

Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Grinnell 260.

Hangers for Pipe Sizes 4" Through 8":

Carbon steel adjustable swivel ring with 1/2" min. UL/FM approved hanger rods. B-Line B3170NF, Grinnell 69 or 70.

Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Grinnell 260.

Multiple or Trapeze Hangers:

Manufactured steel channel system with manufacturers slotted interlocking pipe clamps with screw/nut securing and threaded hanger rods or steel channels with welded spacers and threaded hanger rods.

Steel channel, 12-gauge thickness, Dura-Green epoxy coating, B-Line B11. Restrain individual pipes with B-Line B2000 series or Vibraclamp series strut clamps.

Wall Support:

Carbon steel welded bracket with hanger. B-Line 3060 Series, Grinnell 190 Series.
Steel channels with pipe clamps.

Vertical Support:

Carbon steel riser clamp. B-Line B3373, Grinnell 261 for above floor use. Grinnell 40 with bolts and concrete anchors for attachment to underside of concrete floor deck.

Floor Support:

Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093.

Copper Pipe Supports:

All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or polyvinylchloride coated. Where steel channels are used, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Grinnell PS 1400 series.

PIPE HANGER RODS

Steel Hanger Rods:

Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts. Steel, electro-plated, threads on both ends, B-Line B3205

Size rods for individual hangers and trapeze support as indicated in the following schedule:

Pipe Size:	Diam. Of Rod:
Up to and Including 4"	3/8" or 9.5mm min.
5",6" and 8"	1/2" or 12.7mm min.

BEAM CLAMPS

MSS SP-69 Types 19 & 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.

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 inch diameter. B-Line B3054, Grinnell 228.

CONCRETE INSERTS

Poured in Place:

MSS SP-69 Type 18 wedge type to be constructed of a black carbon steel body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity. B-Line B2505, Grinnell 281.

MSS SP-69 Type 18 universal type to be constructed of black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. B-Line B3014N, Grinnell 282.

Drilled Fasteners:

Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Powers/Rawl, Redhead.

ANCHORS

Use welding steel shapes, plates, and bars to secure piping to the structure.

PART 3 - EXECUTION

INSTALLATION

Size, apply and install supports and anchors in compliance with manufacturers recommendations.

Secure pipe in place to prevent vibration, maintain proper slope and provide for expansion and contraction.

Design supports of strength and rigidity to suit loading, service, and manner which do not unduly stress the building construction. Where support is from concrete construction, take care not to weaken concrete or penetrate waterproofing. Fasten supports and hangers to building steel framing wherever practical. Do not use another pipe for support. Do not use perforated iron, chain or wire as hangers.

Use inserts for suspending hangers from reinforced concrete slabs wherever practical. Where inserts are not practical, provide channels or angles from which to suspend hangers/supports. Fasten structural steel to concrete with expansion bolts.

Provide expansion anchors in concrete slabs for installation of threaded support rods.

Provide hangers capable of vertical adjustment after piping is erected. Do not pierce ductwork with hanger rods. On threaded support rods and bolts, weld nuts to rods, peen threads, or provide double set of nuts with lock washers to prevent loosening. Use beam clamps for attaching hangers to structural steel.

Coordinate hanger and support installation to properly group piping of all trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.

Perform welding in accordance with standards of the American Welding Society.

HANGER AND SUPPORT SPACING

Support horizontal piping per NFPA 13.

Provide vertical support at each floor level as the pipe passes through the floor. For piping that does not pass through the floor, provide adequate support to stabilize the vertical portion of the piping.

Provide galvanized steel supports for steel piping.

Provide CPVC dipped hangers or provide Unistrut "Uni-Cushion" vinyl strip at galvanized hangers for copper lines.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of these specifications.

Space hangers for pipe as follows:

Pipe Material:	Pipe Size:	Max. Horiz. Spacing:	Max. Vert. Spacing:
Copper	3/4" through 1"	8'-0"	10'-0"
Copper	1-1/4" through 1-1/2"	10'-0"	10'-0"
Copper	2" through 3"	12'-0"	10'-0"
Steel	1" through 1-1/4"	12'-0"	15'-0"
Steel	1-1/2" through 8"	15'-0"	15'-0"

Unsupported length from the last hanger and an end sprinkler shall be as follows:

Pipe Size:	Length:
1" piping	Not greater than 36"
1-1/4" piping	Not greater than 48"
1-1/2" piping	Not greater than 60" or larger

RISER CLAMPS

Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor. Use method of securing the vertical risers to the building structure below in stairwell locations.

ANCHORS

Install where indicated on the drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION

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SECTION 21 10 00
WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

SCOPE

This section contains specifications for an Automatic Fire Sprinkler System for this project. Included are the following topics:

PART 1 – GENERAL

- Scope
- Related Work
- Reference Standards
- Description
- System Description
- Design Standards
- Quality Assurance
- Submittals

PART 2 – PRODUCTS

- Pipe
- Fittings
- Joints
- Valves
- Flow Switches
- Tamper Switches
- Sprinklers
- Miscellaneous Equipment

PART 3 – EXECUTION

- Installation
- General
- Valves
- Gauges
- Switches
- Sprinklers
- Testing

RELATED WORK

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

Section 21 05 00 – Common Work Results for Fire-Suppression

Section 21 05 29 – Hangers and Supports for Fire-Suppression Piping and Equipment

REFERENCE STANDARDS

Applicable provisions of Division 01 shall govern work under this section.

Local and State Codes and Regulations.

National Fire Codes (NFC) published by NFPA; latest edition of standards listed:

NFPA 13 - Sprinkler Systems

Local Fire Department requirements.

All items to be UL listed or FM approved for intended usage.

DESCRIPTION

Fire Protection Contractor shall furnish all calculations, design, drawings, material, equipment, labor and related items required to complete the work indicated on drawings and specifications.

The work under this Section includes, but is not limited to the following:

- Provide all components for a complete wet automatic sprinkler system for the remodeled spaces.

This portion of the project is design build. The contractor shall follow the specifications for type of systems, materials and equipment to use.

The contractor will be the Engineer of Record and shall prepare, seal and submit drawings and calculations as required to obtain approval and building permit from State, Insurance Company, and local authority. Submit drawings and calculations to all authorities as required.

These documents, along with local regulations and codes, will be the basis for the Fire Protection design and construction.

The contractor shall calculate, size and select all systems as defined by the documents. This shall include coordination with other trade contractors including wiring of flow switch(es) and supervisory switch(es). All calculations, sizes, and system layouts shall include provisions for future additions.

SYSTEM DESCRIPTION

Connect to the existing fire protection dry pipe sprinkler main in the ceiling space. Provide a dry pipe automatic sprinkler cross main, and branch piping to connect to sprinkler heads in all spaces of the addition and added toilet rooms.

DESIGN STANDARDS

Sprinkler system shall be designed and hydraulically calculated by the Contractor to provide densities as indicated below. Hydraulically calculate the system based on Ordinary Hazard Occupancy in garage areas.

Design system for the most hydraulically remote area based on the following:

Space Type/ Location:	Occupancy Classification	Density (GPM/Ft ²)	Area (Ft. ²)	Hose (GPM)	Max Vel. (Ft./Sec.)	Duration (Min.)
Toilet Rooms	Light Hazard	0.10	1,500	100	20	60
Garage Areas	Ordinary (Group II)	0.20	1,500	250	20	90

Contractor shall perform a field flow and pressure test on municipal water supply main to verify existing conditions, as well as conditions of any new municipal main installation, in the adjacent street, and obtain any additional test data required for design. Tests to be representative of high water use periods.

Contractor shall submit seven (7) copies of hydraulic calculations with shop drawings on standard form specified in NFPA No. 13, Chapter 7, Sections 7-2 through 7-3.5 inclusive and Figures A-7-3.3 and A-7-3.4.

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 21 05 00 and Division 01 of the Project Manual.

Fire protection system components shall be rated for a minimum operating pressure of 175 psig.

To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied from the same manufacturer as the grooved components.

SUBMITTALS

Shop Drawings:

Submit shop drawings of all fire sprinkler system components.

Plans:

Submit contractor-prepared plans/drawings.

Submit per NFPA 13; installation plans, working plans, shop drawings, hydraulic calculations, and manufacturer's data on devices, etc., indicating by model and number to be used for review and approval. Contractor shall obtain the necessary insurance underwriters, State and Local Fire Department approvals prior to submitting shop drawings. Include copy of approval letter in submission to Architect/Engineer.

Prepare drawings at minimum scale of 1/8" per foot for plans and 1/4" per foot or larger for details. Show all piping, lighting, equipment, ductwork, sprinklers, hangers, roof construction and occupancy of each area, including ceiling and roof heights.

Installation shall be coordinated with the latest architectural, structural, mechanical, plumbing and electrical drawings.

Contractor shall submit drawings to Engineer which have been reviewed and stamped "approved" by the authority having jurisdiction. No work shall commence until all approvals have been obtained. Allow sufficient time in the construction schedule for the approvals.

As-Built Drawings:

Maintain at the site an up-to-date marked set of as-built drawings which shall be corrected and delivered to the Architect upon completion of the work.

Furnish the Architect one (1) reproducible print of corrected shop drawings, including plans, revised to show "as built" conditions.

PART 2 - PRODUCTS

PIPE

Wet Systems:

Carbon steel pipe, black, thickness per NFPA 13, conforming to ASTM A53, A135, A795.

Sprinkler piping shall be schedule 40 threaded up to 2" in size.

Schedule 10 threaded light wall not allowed.

FITTINGS

Malleable iron, Class 150, threaded, ANSI B16.3.

Ductile iron, grooved end, 1000 lb/in² working pressure rating, UL listed or FM approved for automatic sprinkler.

Ductile or malleable iron, plain end with EPDM gasket, carbon steel bolts or locking lugs UL listed or FM approved for automatic sprinkler, Grinnell "Sock-it".

Carbon steel, butt-welded, class 150, ASTM A234.

Carbon steel, Class 150, flanged, ASTM A105.

JOINTS

Iron Pipe:

Tapered pipe threads, with Teflon tape, ANSI B2.1.

Mechanical coupling, EPDM gasket, UL listed or FM approved for automatic sprinkler.

Rigid Type:

Housings shall be cast with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall only be permitted if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer's latest recommendations. Victaulic FireLock® EZ Style 009H (1-1/4" thru 4") and Victaulic Style 107H QuickVic™ (2" thru 8") shall be installation ready stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. 10" and larger sizes shall be Victaulic Style 07 Zero-Flex standard rigid coupling.

Flexible Type:

Use in seismic areas and where required by NFPA 13. Victaulic Style 177 QuickVic™ (2" thru 8") shall be installation ready stab-on design, for direct 'stab' installation onto grooved end pipe without prior field disassembly and no loose parts. 10" and larger sizes shall be Victaulic Style 75 or 77 standard flexible coupling.

VALVES

Manufacturers:

Grinnell, Nibco, TYCO, Victaulic, or Wilkins.

Shutoff Valve:

Butterfly Valve:

Ductile iron body, epoxy coated, EPDM encapsulated ductile iron disc, 300 psi maximum working pressure, indicating type, with tamper switch in actuator, grooved end connections, UL Listed or FM approved, Victaulic Figure 705-W.

Check Valve:

Ductile iron body, rubber-encapsulated disc, 250 psi maximum working pressure, grooved end connections. Victaulic style 717.

Test Drain Valve:

Ball valve type, bronze, combination test and drain, with site glass, Sure-Test by G/J Innovations.

If design flow cannot be reached through the inspector's test drain, then the FPC shall install forward flow by-pass around the fire department connection check valve.

FLOW SWITCHES

UL listed and FM approved vane type waterflow switch with metal enclosure, adjustable pneumatic retard and electrical characteristics compatible with alarm system. Equal to Potter Model VSR-F.

TAMPER SWITCHES

For O S & Y valve or post indicator installations, UL listed, FM approved, to monitor position of valve, tamper resistant cover screws, single or double SPDT switch contacts, corrosion resistant, for indoor or outdoor use, NEMA 4 & 6P enclosures. Equal to Potter Model PCVS-1, -2 and OSYSU-1, 2.

SPRINKLERS

Manufacturer:

Products of the following manufacturers determined to be equal by the Architect/Engineer will be accepted: Grinnell, Reliable, TYCO, Victaulic and Viking.

General:

Fusible link or glass bulb type, cast brass or bronze construction. Provide heads with nominal 1/2" discharge orifice except where greater than normal density requires large orifice.

Select fusible link or glass bulb temperature rating to not exceed maximum ambient temperature rating allowed under normal conditions at installed location. Provide ordinary temperature (165 degree) fusible link or glass bulb type except at skylights, sealed display windows, unventilated attics and roof spaces, over cooking equipment, adjacent to diffusers, unit heaters, uninsulated heating pipes or ducts, mechanical rooms, storage rooms, or where otherwise indicated.

Provide quantity of spare heads as noted below and 1 wrench for each type of head and each temperature range installed. Provide 6 spare heads per 300 or less installed heads, 12 per 1000 or less and 24 for more than 1000. Provide steel cabinet for storage of heads and wrenches.

Types:

Refer to Sprinkler Schedule on plans for sprinkler head types and finishes in each area. Provide sprinkler guards in areas where sprinklers may be subject to damage (i.e. mechanical rooms).

Finished Areas:

Chrome plated bronze body quick response pendent sprinklers with glass bulb heat sensor. Semi-recessed sprinklers shall have adjustable recessed escutcheon. Design Basis: Victaulic Model V27.

Unfinished Areas:

Plain bronze body, upright or pendent, quick response sprinklers, with solder link or glass bulb for wet system. Design Basis: Victaulic Model V27 or V36.

Ratings:

See sprinkler ratings indicated on Sprinkler Schedule on plans. Use higher temperature-rated sprinkler heads in areas near heat sources, elevator equipment rooms, and elevator shafts.

MISCELLANEOUS EQUIPMENT

Provide other equipment and accessories, not listed, but required for a complete sprinkler system in accordance with NFPA and FM requirements.

PART 3 - EXECUTION

INSTALLATION

Install sprinkler system in accordance with requirements of NFPA 13 and local regulations of the fire marshal.

Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and recommendations. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by Victaulic. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. A Victaulic factory-trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any tools to remove bulb protectors.

GENERAL

Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of window, doorway, stairway or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of fire protection piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures and grilles before installing piping. All exposed overhead piping shall be installed above the bottom chord of roof joists.

Maintain piping in clean condition internally during construction.

Provide clearance for access to valves and piping specialties.

Install piping so that system can be drained. Where possible, slope to main drain valve. Piping may be installed level (WET SYSTEMS ONLY). Where piping cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or valve/nipple/cap for drainage over 5 gallons.

Do not install piping within exterior walls.

Do not route piping above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.

VALVES

Properly align piping before installation of valves. Do not support weight of piping system on valve ends. Mount valves in locations which allow access for operation, servicing and replacement. Install all valves with the stem in the upright or horizontal position. Valves installed with the stems down will not be accepted. All system shut-off valves shall have a supervisory switch.

GAUGES

Provide a valved pressure gauge in main sprinkler risers.

SWITCHES

Provide valved test connection for flow switch adjacent to flow switch. Test flow switch to verify proper operation.

SPRINKLERS

Locate sprinklers maintaining clearances from obstructions, ceilings and walls. Install sprinklers level in locations not subject to spray pattern interference.

Sprinklers shall be centered in all ceiling panels and tiles. A 1" tolerance for sprinkler placement is acceptable.

TESTING

Refer to Section 21 05 00 – Common Work Results for Fire Suppression.

Hydro-statically pressure test the fire sprinkler system piping as required in NFPA 13. Keep records of all testing for submission in Operation and Maintenance Manuals.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

SCOPE

This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Abbreviations
- Definitions
- Drawings
- Electronic Drawings
- Codes and Standards
- Continuity of Existing Services
- Protection of Finished Services
- Sleeves and Openings
- Sealing and Firestopping
- Submittals
- Specified Materials and Equipment
- Equipment Installation
- Off-site Storage
- Certificates and Inspections
- Operation and Maintenance Data
- Training of Owner Personnel
- Record Drawings
- Project Closeout
- Testing and Balancing

PART 2 - PRODUCTS

- Access Panels and Doors
- Pipe Penetrations
- Duct Penetrations
- Identification

PART 3 - EXECUTION

- Demolition
- Cutting and Patching
- Building Access
- Equipment Access
- Coordination of Work
- Pipe Penetrations
- Duct Penetrations
- Cleaning
- Identification
- Lubrication
- Project Closeout

RELATED WORK

Section 07 84 00 - Fire Stopping

Section 23 05 13 - Common Motor Requirements for HVAC.

Section 23 33 00 - Air Duct Accessories.

REFERENCE

Refer to Division 01 of the Project Manual.

REFERENCE STANDARDS

Abbreviations of standards organizations referenced in other sections are as follows:

AABC	Associated Air Balance Council
ADC	Air Diffusion Council
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
EPA	Environmental Protection Agency
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
MCA	Mechanical Contractors Association
MICA	Midwest Insulation Contractors Association
MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association. Inc.
UL	Underwriters Laboratories Inc.
ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
UL1479	Fire Tests of Through-Penetration Firestops
UL723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the performance from the system into which these items are placed. This may include changes found necessary during the testing, adjusting, and balancing phase of the project.

ABBREVIATIONS

A/E	Architect/Engineer
CxA	Commissioning Authority
GC	General Contractor
FPC	Fire Protection Contractor
PC	Plumbing Contractor
HC	Heating Contractor
EC	Electrical Contractor

TCC Temperature Contractor
DDC Direct Digital Controls
BAS Building Automation System
TCS Temperature Control System

DEFINITIONS

Furnish:

Supply and deliver to Project site ready for unpacking, assembly and installation

Install:

Operations at Site including unpacking, assembling, erecting, placing, anchoring, applying, finishing, cleaning, and connecting related devices required for product fully functional for intended use after installation.

Provide:

Furnish and install, such that product is fully functional for intended use.

DRAWINGS

Drawings show general arrangement of piping, equipment and appurtenances and shall be followed as closely as actual building construction and work of other trades permits. Work shall conform to requirements shown on Drawings. General and structural drawings shall take precedence. Because of the scale of Drawings, it is not possible to indicate all offsets, fittings and accessories required. Investigate structural and finish conditions affecting work and arrange work accordingly, providing offsets, fittings and accessories required to meet constructed conditions.

HVAC equipment and systems, including piping and ductwork shall be installed as high as possible unless otherwise noted on Drawings. Equipment and systems shall also be installed to maintain required operation and maintenance clearances.

ELECTRONIC DRAWINGS

Drawings in electronic format will be made available to successful HVAC contractor. Drawings provided may or may not be updated to reflect Addenda items. Use of Drawings is limited to this Project and may not be forwarded to any other party for any purpose. Use of files will be at Contractor's sole risk and without liability or legal exposure to JDR Engineering, Inc or its employees. Architectural drawings or any other drawings not produced by JDR Engineering will not be provided.

CODES AND STANDARDS

Materials and workmanship shall comply with applicable codes, specifications, local ordinances, industry standards and utility company regulations. In case of differences between building codes, specifications, state laws, local ordinances, industry standards and utility company regulations and contract documents, the most stringent shall govern. Promptly notify A/E in writing of differences.

Non-Compliance:

If Contractor installs materials or performs Work that does not comply with above requirements, he shall correct Work and shall bear costs arising from correcting deficiencies.

CONTINUITY OF EXISTING SERVICES

Do not interrupt or change existing services without prior written approval from the Owner, Architect, Engineer or Construction Manager. When interruption is required, coordinate the down-time with the user agency to minimize disruption to their activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

PROTECTION OF FINISHED SURFACES

Refer to Division 01 of the Project Manual.

Furnish one can of touch-up paint for each different color factory finish which is to be the final finished surface of the product. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

SLEEVES AND OPENINGS

Refer to Division 01 of the Project Manual.

SEALING AND FIRE STOPPING

Sealing and firestopping of sleeves/openings between ductwork, piping, etc. and the sleeve, structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

SUBMITTALS

Refer to Division 01 and General Conditions of the Contract.

Shop Drawings are to be reviewed by lead contractor and HVAC contractor before submission to A/E. Submittals shall be stamped by contractor and clearly indicate corrections made by contractor during review process. Submittals not reviewed and stamped by contractor will be automatically rejected.

Submit for equipment and systems specified in respective specification sections, marking each submittal with specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and number, as identified in Contract Documents. Include plan designation mark (i.e. "AHU-1") on submittals. Include dimensions, capacities, ratings, and installation instructions.

Before submitting electrically powered equipment, verify electrical power and control requirements for equipment are in agreement with motor schedule on HVAC and electrical drawings. Include statement on Shop Drawing transmittal to Architect/Engineer if equipment submitted and motor schedules are not in agreement, indicating discrepancies. See related comments in Section 23 05 13, Part 1 under Electrical Coordination.

Include wiring diagrams of electrically powered equipment.

Firestop Systems:

Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Submit manufacturer's color charts where finish color is specified to be selected by Architect/Engineer.

Submit quantity of Shop Drawings specified under Division 01 Specification Section titled "Submittals."

Submittals shall be legible, clear and complete. Shop Drawings submitted incomplete, illegible or not specific to Project will be returned as "not reviewed". In addition, equipment installed without having approved Shop Drawings will be considered defective and shall be removed and replaced with approved equipment at no expense to Project.

SPECIFIED MATERIALS AND EQUIPMENT

Design is based on equipment specified by manufacturer and model number as specified on drawing schedules. Where certain items are specified by manufacturer or trade name, Contractor's bid shall be based on use of named item. Where 1 make is described and other makes are listed, comparable models of other named equipment may also be used, provided they meet requirements of Specifications.

When equipment or accessories used differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those on Drawing schedules, Contractor shall be responsible for costs involved in integrating equipment or accessories into system. Contractor shall be responsible for obtaining original design performance from system into which items are placed, regardless of whether manufacturer/model is specified equivalent or substitute. This may include changes found necessary during testing, adjusting, and balancing phase of Project.

If Contractor wishes to use items other than those named in Specifications in base bid, request for approval of substitution must be made in writing to A/E at least 14 days prior to opening of bids. Include complete technical and descriptive data with request. If approved, an Addendum will be issued notifying bidders of approval. Request for approval will be considered only if requested by prime bidding Contractor.

EQUIPMENT INSTALLATION

Drawings show general arrangement and location of equipment and appurtenances. It is Contractor's responsibility to install equipment in a location and manner that allows for proper service and maintenance access to equipment. Work shall generally conform to requirements shown on Drawings. However, location of equipment may require field adjustments to obtain required service space. DO NOT SCALE OFF PLANS to determine proper location of equipment. Because of scale of Drawings, it is not possible to indicate exact routing of ductwork and piping, and offsets, fittings and accessories required to provide proper service access to equipment. Contractor shall route and install ductwork and piping to provide required service access to equipment.

If, during construction phase of Project, contractor feels inadequate space exists, or equipment locations must be substantially modified to provide proper service and maintenance access, prior to installing equipment, contractor shall notify engineer in writing, outlining general concerns and proposed modifications. Equipment installed without providing manufacturer's required maintenance and service clearance shall be considered defective. Contractor shall remove and relocate piping, ductwork and equipment, to provide required service clearances at contractor's expense.

OFF-SITE STORAGE

Refer to Division 01 of the Project Manual.

CERTIFICATES AND INSPECTIONS

Refer to the General Conditions of the Contract, Article 13.

Obtain and pay for required Federal, State and local installation inspections, certificates and permits required, except those provided by Architect/Engineer in accordance with State and local Codes. Deliver originals of certificates to Architect or Construction Manager.

OPERATION AND MAINTENANCE DATA

Refer to Division 01 of the Project Manual.

Provide HVAC systems and equipment operation and maintenance manuals in accordance with requirements of Project Specifications.

Assemble material in 3-ring or post binders, using an index at front of each volume and tabs for each system or type of equipment. In addition to data indicated in General Requirements, include the following information:

- Copies of all approved shop drawings.
- Manufacturer's instructions for installation, operation, and maintenance.
- Manufacturer's wiring diagrams for electrically powered equipment.
- Records of tests performed to indicate compliance with system requirements (system start-up reports).
- Temperature control Record Drawings and control sequences.
- Parts lists for manufactured equipment.
- Valve schedules.

- Lubrication instructions, including list/frequency of lubrication done during construction.
- Warranties.
- Testing, adjusting and balancing data.
- Additional information as required in technical specification sections.

TRAINING OF OWNER PERSONNEL

Instruct Owner's personnel in proper operation and maintenance of systems and equipment provided as part of Project, using Operating and Maintenance manuals during instruction. Demonstrate startup and shutdown procedures for equipment. Training shall be during normal working hours.

Provide a total of 4.0 hours of training (minimum) over a total of 1.0 training sessions. Coordinate with Owner at least 2 weeks prior to scheduling training systems.

All training sessions shall be videotaped and included in the operation and maintenance manuals. The contractor shall provide the video camera and camera operator. Video files shall be in electronic format (DVD).

RECORD DRAWINGS

Refer to Division 01 of the Project Manual.

Maintain Record Drawings on daily basis to be turned over at completion of Project.

Maintain temperature control record drawings on originals prepared by installing contractor/subcontractor. Include copies of record drawings with Operating and Maintenance manuals.

PROJECT CLOSEOUT

Refer to Division 01 of Project Manual.

The Contractor shall complete and provide items and materials, training and start-up associated with project closeout as specified under Division 1 of the Project Manual. In addition to these items, the Contractor shall provide the following items prior to acceptance of the installation as specified in accordance with all applicable Codes and all Sections of this Specification:

- Final air and water system balancing completed in accordance with the requirements of Section 23 05 93 and code, including the submission of testing, adjusting and balancing reports. Reports shall indicate the amount of total supply air, return air and outside ventilation air being provided to the spaces and to the air handling system(s).
- Submission of Operating and Maintenance instructions in accordance with the requirements of Division 1, of this Section, and code. Operation and Maintenance Manuals shall include a copy of completed testing, adjusting and balancing report for Owner's records.
- Submission of start-up report for temperature control system, signed by technician in responsible charge of control system, indicating system has been adjusted, calibrated and put into operation in accordance with requirements of this specification and code.

TESTING AND BALANCING

Testing and balancing of HVAC systems will be contracted separately by the owner. This contractor shall fully coordinate with the test and balance contractor during testing and balancing.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS

Provide access panels at locations requiring access to mechanical equipment. Locations include, but are not limited to areas above drywall ceilings, shaft enclosures and other furred-in spaces concealing valves, ducts or equipment. Provide UL listed, fire rated access panels when penetrating fire rated chase or shaft areas.

Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12 inch by 12 inch for hand access and 24 inch by 24 inch for body access.

Panels shall be Milcor brand or equivalent.

Panels shall include concealed hinges, cam type locking devices, and have frame/border type necessary for particular wall or ceiling construction they are installed. Access panels shall be flush mounted, recessed frame type units. Access panels shall be prime coated steel, able to accept field painting for general office applications and stainless steel for use in labs, toilet rooms, shower rooms and similar wet areas.

Refer to Architectural Room Finish Schedule for wall and ceiling surfaces and finishes.

Panel construction shall utilize 16 gauge frame with not less than 18 gauge hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and shall be key locked for public area applications.

PIPE PENETRATIONS

Non-Rated Surfaces:

Stamped steel, chrome plated, hinged, split ring escutcheons or floor/ceiling plates for covering openings in occupied spaces.

In exterior wall openings below grade, use modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the un-insulated pipe and cored opening or a water-stop type wall sleeve.

At interior partitions where pipe penetrations are sealed, use Tremco Dymonic, Sika Corp. Sikaflex 1a, Sonneborn Sonolastic NPI, or Mameco Vulkan 116 urethane caulk to effect seal. Use galvanized sheet metal sleeves in hollow wall penetrations.

DUCT PENETRATIONS

Non-Rated Surfaces:

Pack annular space with fiberglass batt insulation or mineral wool insulation. Provide 4" sheet metal escutcheon around on both side of partition or floor to cover annular space.

IDENTIFICATION

Stencils:

Not less than 1 inch high letters/numbers for marking pipe and equipment.

Engraved Name Plates:

White letters on black background, 1/16 inch thick plastic laminate, beveled edges, screw mounting, Setonply ® Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by W. H. Brady.

Valve Tags:

Round brass tags with 1/2 inch numbers, 1/4 inch system identification abbreviation, 1/4 inch minimum diameter, with brass jack chains or brass "S" hooks around valve stem, available from EMED Co., Seton Name Plate Company, or W. H. Brady.

Pipe Markers:

At least 3/4 inch high legend for piping under 3 inch diameter and at least 2 inch high legend for piping 3 inch diameter and larger. Include flow arrows. Manufacturers: W.H. Brady Co., EMED Co. or Seton Name Plate Company.

PART 3 - EXECUTION

DEMOLITION

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe or duct is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the user agency to minimize disruption to the existing building occupants.

All pipe, wiring and associated conduit, insulation, ductwork, and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor. All piping and ductwork specialties are to be removed from the site by the Contractor unless they are dismantled and removed or stored by the user agency. All designated equipment is to be turned over to the user agency for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

CUTTING AND PATCHING

Refer to Division 01 of the Project Manual.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS

Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Mechanical Contractor and installed by the General Contractor.

Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

COORDINATION OF WORK

Verify devices are compatible for surfaces on which they are used. This includes, but is not limited to, diffusers, registers, grilles, and recessed or semi-recessed heating and cooling terminal units installed in/on architectural surfaces.

Coordinate work with other contractors prior to installation. Installed work not coordinated and that interferes with other contractor's work shall be removed or relocated at installing contractor's expense.

Verify system completion prior to start of testing and balancing. Work to be completed prior to testing and balancing shall include, but not be limited to the following: flushing, pressure testing, chemical treatment, filling of hydronic systems, proper pressurization and air venting of hydronic systems, cleaning and replacement of filters, cleaning of strainers, duct and pipe system cleaning, adjusting and calibration of controls, controls cycled through their sequences. Install dampers, shutoff and balancing valves, flow measuring devices, gauges, temperature controls for fully functional and balanced systems. Demonstrate starting, interlocking and control features of each system so test and balance agency can perform work. Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions. If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

PIPE PENETRATIONS

General:

Coordinate location of building surface penetrations with appropriate contractors. Furnish sleeves, inserts, and devices to be built into structure to contractor performing Work. Prepare Shop Drawings for approval for penetrations of structural elements, including floor slabs, shear walls, and bearing walls. Do not allow penetrations to be made until Shop Drawings are approved.

Non-Rated Surfaces:

Install escutcheons or floor/ceiling plates where pipe penetrates non-fire rated surfaces. Size units to accommodate insulation, where applicable.

In exterior wall openings below grade, place water-stop type wall sleeve before concrete pour or core drill opening after pour. Assemble rubber links to proper size for pipe and tighten in place in accordance with manufacturer's instructions.

Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or insulation is completely blocked.

Completely seal pipe penetrations through all interior walls. All penetrations for piping thru interior walls are required to be air tight.

DUCT PENETRATIONS

General:

Coordinate location of building surface penetrations with appropriate contractors. Furnish sleeves, inserts, and other devices to be built into structure to contractor performing Work. Prepare Shop Drawings for approval for penetrations of structural elements, including floor slabs, shear walls, and bearing walls. Do not allow penetrations to be made until Shop Drawings are approved.

In wet area, top surface of penetration to be 2 inches above adjacent floor. Additional height shall be obtained by means of concrete pad or pipe sleeve poured integral with floor. Wet areas are mechanical equipment rooms or spaces containing air handling unit coils, convertors, pumps, chillers, boilers, and similar equipment.

Non-Rated Surfaces:

Install sheet metal blank-off plates and caulk where ducts penetrate non-fire rated surfaces. Size units to accommodate insulation, where applicable.

Install galvanized sheet metal sleeve to provide backing for sealant. Apply sealant to both sides of penetration in manner that annular space between duct sleeve and duct or insulation is completely blocked.

Completely seal duct penetration through all interior walls. All penetrations for duct thru interior walls are required to be air tight.

CLEANING

Contractor shall, at all times, keep premises free of waste or surplus materials, rubbish and debris caused by his employees or resulting from his work.

After equipment and fixtures have been installed, Contractor shall remove stickers, stains, labels and temporary covers.

Foreign matter shall be removed from pipes, tanks, pumps, fans, motors, devices, switches, fixtures, panels and ductwork before acceptance of systems.

Contractor shall leave his portion of Work in safe and clean condition ready for operation.

In case of dispute, Owner may remove rubbish, excess materials or do cleaning, and charge cost to Contractor.

IDENTIFICATION

Identify equipment in mechanical equipment rooms and above ceilings, including terminal heating devices by stenciling equipment number and service with 1 coat of black enamel against light background or white enamel against dark background. Use primer where necessary for proper paint adhesion. Do not label equipment in occupied spaces (for example cabinet heaters and ceiling fans).

Identification plates on equipment shall be free of excess paint and shall be legible.

Where stenciling is not appropriate for equipment identification, engraved nameplates shall be used.

Identify piping not less than once every 30 feet, not less than once in each room, adjacent to each access door or panel, and on both side of partition where exposed piping passes through walls, floors or roofs. Place flow directional arrows at each pipe identification location. Use 1 coat of black enamel against light background or white enamel against dark background.

Identify valves with brass tags bearing system identification and valve sequence number. Valve tags are not required at terminal device unless valves are greater than 10 feet from device or located in another room not visible from terminal unit. Provide typewritten valve schedule indicating valve number and equipment or areas supplied by each valve; locate schedules in each mechanical room and in each Operating and Maintenance manual. Schedules in mechanical rooms shall be framed under clear plastic.

Use engraved nameplates to identify control equipment and motor starters. Motor starters shall be provided with engraved nameplate identifying piece of equipment it serves by plan identification (i.e. "AHU-1").

LUBRICATION

Lubricate bearings with lubricant as recommended by manufacturer before equipment is operated for any reason. Once equipment has been run, maintain lubrication in accordance with manufacturer's instructions until Owner accepts Work. Maintain log of lubricants used and frequency of lubrication. Include information in Operating and Maintenance Manuals at completion of Project.

PROJECT CLOSEOUT

Contractor shall provide the following submittal data prior to final site walk-through review (found on next page). If this closeout work is not completed or is inaccurately completed, the Contractor shall be responsible for the expense of additional site reviews made by A/E.

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

SCOPE

This section- includes requirements for single and three phase motors that are used with equipment specified in other sections. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operating and Maintenance Data
- Electrical Coordination and General Requirements
- Product Criteria

PART 2 - PRODUCTS

- Motors

PART 3 - EXECUTION

- Motor Installation

RELATED WORK

- Section 23 09 14 – HVAC Controls
- Section 23 34 00 – HVAC Fans
- Section 23 81 46 – Water Source Heat Pumps
- Division 26 00 00 - Electrical

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI/IEEE 112	Test Procedure for Polyphase Induction Motors and Generators
ANSI/NEMA MG-1	Motors and Generators
ANSI/NFPA 70	National Electrical Code

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Include with the equipment which the motor drives the following motor information: motor manufacturer, horsepower, voltage, phase, hertz, rpm, full load efficiency. Include project wiring diagrams prepared by the contractor specifically for this work.

OPERATION AND MAINTENANCE DATA

Include manufacturer's instructions in manuals with specific equipment to which they apply. Include the following information if not previously documented on Shop Drawings: full load power factor, service factor, NEMA design designation, insulation class, and frame type.

ELECTRICAL COORDINATION AND GENERAL REQUIREMENTS

All starters, overload relay heater coils, disconnect switches and fuses, relays, wire, conduit, pushbuttons, pilot lights, and other devices required for the control of motors or electrical equipment are furnished and installed by the Electrical Contractor, except as specifically noted elsewhere in this division of specifications.

Electrical drawings and/or specifications show number and horsepower rating of all motors furnished by this Contractor, together with their actuating devices if these devices are furnished by the Electrical Contractor. Should any discrepancy in size, horsepower rating, electrical characteristics or means of control be found for any motor or other electrical equipment after contracts are awarded, Contractor is to immediately notify the architect/engineer of such discrepancy.

Costs involved in any changes required due to equipment substitutions initiated by this contractor will be the responsibility of this contractor. See related comments in Section 23 05 00 - Common Work Results for HVAC, under Shop Drawings.

Electrical Contractor will provide all line voltage power wiring unless noted otherwise on the Drawings.

HVAC contractor shall be responsible for providing control wiring (line and low voltage) for Project unless noted otherwise on the Drawings.

Furnish project specific wiring diagrams to Electrical Contractor for all equipment and devices furnished by this Contractor and indicated to be wired by the Electrical Contractor.

PRODUCT CRITERIA

Motors to conform to all applicable requirements of NEMA, IEEE, ANSI, and NEC standards and shall be listed by U.L. for the service specified.

Select motors for conditions in which they will be required to perform; i.e., general purpose, splashproof, explosion proof, standard duty, high torque or any other special type as required by the equipment or motor manufacturer's recommendations.

Furnish motors for starting in accordance with utility requirements and compatible with starters as specified.

PART 2 - PRODUCTS

MOTORS

SINGLE PHASE, SINGLE SPEED MOTORS

Use NEMA rated 115 volt, single phase, 60 hertz motors for all motors 1/2 HP and smaller. Provide 208 volt, single phase, 60 hertz motors for heat pump units.

Use permanent split capacitor or capacitor start, induction run motors equipped with permanently lubricated and sealed ball or sleeve bearings and Class A insulation. Service factor to be not less than 1.35.

PART 3 - EXECUTION

INSTALLATION

Mount motors on a rigid base designed to accept a motor, using shims if required under each mounting foot to get a secure installation.

When motor will be flexible coupled to the driven device, mount coupling to the shafts in accordance with the coupling manufacturer's recommendations. Using a dial indicator, check angular misalignment of the two shafts; adjust motor position as necessary so that the angular misalignment of the shafts does not exceed 0.002 inches per inch diameter of the coupling hub. Again using the dial indicator, check the shaft for run-out to assure concentricity of the shafts; adjust as necessary so that run-out does not exceed 0.002 inch.

When motor will be connected to the driven device by means of a belt drive, mount sheaves on the appropriate shafts in accordance with the manufacturer's instructions. Use a straight edge to check alignment of the sheaves; reposition sheaves as necessary so that the straight edge contacts both sheave faces squarely. After sheaves are aligned, loosen the adjustable motor base so that the belt(s) can be added and tighten the base so that the belt tension is in accordance with the drive manufacturer's recommendations. Frequently recheck belt tension and adjust if necessary during the first day of operation and again after 80 hours of operation.

Verify the proper rotation of each three-phase motor as it is being wired or before the motor is energized for any reason.

Lubricate all motors requiring lubrication. Record lubrication material used and the frequency of use. Include this information in the maintenance manuals.

END OF SECTION

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SECTION 23 05 23.10

HVAC GENERAL DUTY VALVES AND PIPING SPECIALTIES

PART 1 - GENERAL

SCOPE

This section contains specifications for HVAC piping specialties for all piping systems. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS

- Valve Manufacturers
- Water System Valves
 - Ball Valves
 - Balance Valves
- P/T (Pressure/Temperature) Test Plugs
- Air Vents
- Braided Hose Connections

PART 3 - EXECUTION

- General
- Shut-off Valves
- Balancing Valves
- Calibrated Balancing Valves
- P/T (Pressure/Temperature) Test Plugs
- Air Vents

RELATED WORK

- Section 23 21 13 - Hydronic Piping
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 07 00 - HVAC Insulation
- Section 23 81 46 - Water Source Heat Pumps

REFERENCE

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

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Contractors shall submit a schedule of all valves indicating type of service, dimensions, materials of construction, and pressure/temperature ratings for all valves to be used on the project. Temperature ratings specified are for continuous operation.

Include materials of construction, dimensional data, ratings/capacities/ranges, pressure drop data where appropriate, and identification as referenced in this section and/or on the drawings.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Where valves are specified for individual mechanical services (i.e. hot water heating, steam, etc.) all valves shall be of the same manufacturer.

All piping specialties are to be rated for the highest pressures and temperatures in the respective system in accordance with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.

PART 2 - PRODUCTS

VALVE MANUFACTURERS

The following manufacturers and models are considered acceptable subject to compliance with specified requirements.

Standard Valves:

Standard valves are based on models and styles manufactured by Nibco. Equivalent valves as manufactured by the following are acceptable: Apollo, Bray, Centerline, Crane, DeZurik, Hammond, Jamesbury, Keystone, Milwaukee, Powell, or Stockham.

Calibrated Balancing Valves: Armstrong, Bell & Gossett, Flowset, Mueller, Nibco, Taco, or Tour and Anderson.

WATER SYSTEM VALVES

All water system valves to be rated at not less than 125 psig water working pressure at 240°F unless noted otherwise.

BALL VALVES:

2" and smaller: Two piece bronze body; threaded or soldered ends, as appropriate to the pipe material; stainless steel or chrome plated brass/bronze ball; conventional port; glass filled teflon seat; threaded packing gland follower; blowout-proof stem; 600 psig WOG.

Valve stems shall allow operators to clear insulation without interference. Provide stem extensions when valve operators interfere with pipe insulation.

Apollo 70-100/200 series, Hammond 8301/8311, Milwaukee BA100/150, Nibco T/S 585-70

BALANCE VALVES:

2" and smaller: Bronze or copper alloy body with calibrated ball, globe or venturi/valve arrangement, integral pointer and calibrated scale to register degree of valve opening, memory stop, drain tapping, threaded or soldered ends, with or without integral unions, P/T or Shraeder pressure taps with integral check valves and seals, adjustable memory stop, suitable for 200 psig water working pressure at 250°F.

Armstrong CBV, Bell & Gossett Circuit Setter Plus, Griswold Quickset, Nibco 1710 Series, Taco Accu-Flo, Victaulic series 786/787.

P/T (PRESSURE/TEMPERATURE) TEST PLUGS

Brass plug with 1/4" NPT threads, EPDM or neoprene valve core, knurled cap with cap strap. Use extended length plugs to clear insulated piping. Adaptors shall have 1/4" FPT connection for standard pressure gauges.

AIR VENTS

MANUAL KEY TYPE VENTS:

Bell and Gossett Model 4V; Eaton/Dole Model 9, 9B, or 14A.

Bronze body with nonferrous internal parts, screwdriver operated, designed to relieve air from the system when vent is opened, rated at not less than 125 psig at 220°F.

BRAIDED HOSE CONNECTIONS

Use specified for heat pump unit connection only.

1 ½" and Smaller:

Hose to have solid brass couplings, 304 SS ferrules, and 304 SS outer braid covering with EPDM core and fiber gasket. Braided hose to be suitable for temperature ranges of 5°F to 200°F and pressure ranges up to 250 PSIG.

PART 3 - EXECUTION

GENERAL

Properly align piping before installation of valves in an upright position; operators installed below the valves will not be accepted.

Install valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.

Install all temperature control valves.

Install all valves with the stem in the upright position. Valves may be installed with the stem in the horizontal position only where space limitations do not allow installation in an upright position or where large valves are provided with chain wheel operators. Where valves 2-1/2" and larger are located more than 12'-0" above mechanical room floors, install valve with stem in the horizontal position and provide a chain wheel operator. Valves installed with the stems down, will not be accepted.

Install stem extensions when shipped loose from valve.

Prior to flushing of piping systems, place all valves in the full-open position.

SHUT-OFF VALVES

Install shut-off valves at all equipment, at each branch take-off from mains, and at each automatic valve for isolation or repair.

BALANCING VALVES

Provide balancing valves for all major equipment and at each major branch takeoff and at the discharge of each pump as indicated on drawings and details.

CALIBRATED BALANCE VALVES:

Install where indicated on the drawings and details for balancing of hydronic systems. Retain the shipping container for use as removable insulation.

P/T (PRESSURE/TEMPERATURE) TEST PLUGS

Install in piping systems as indicated on the drawings and/or details. Do not insulate over test plugs.

AIR VENTS

MANUAL KEY TYPE VENTS:

Install at all high points where air may collect and not be carried by the system fluid. Use a soft Type L copper "pigtail" so the vent can be positioned for venting and collecting any water that might escape.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE

This section includes specifications for supports of all HVAC equipment and materials as well as piping system anchors. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Description
- Shop Drawings
- Design Criteria

PART 2 - PRODUCTS

- Pipe Hanger and Support Manufacturers
- Structural Supports
- Pipe Hangers and Supports
- Beam Clamps

PART 3 - EXECUTION

- Installation
- Hanger and Support Spacing

RELATED WORK

- Section 23 05 48 - Vibration Control
- Section 23 07 00 - HVAC Insulation

REFERENCE

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

REFERENCE STANDARDS

MSS SP-58 Materials, Design, Manufacture, Selection, Application, and Installation

QUALITY ASSURANCE

Refer to Division 01 of Project Manual.

DESCRIPTION

Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for pressure piping.

Do not hang any mechanical item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

Protect insulation at all hanger points; see Related Work above.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Schedule of all hanger and support devices indicating shields, attachment methods, and type of device for each pipe size and type of service. Reference section 23 05 00.

DESIGN CRITERIA

Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58 unless noted otherwise.

Piping connected to rotating or reciprocating equipment is to have vibration isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the 100 pipe diameter/3 support distance.

Piping flexible connections and vibration isolation supports are required for piping connected to coils that are in a fan assembly where the entire assembly is mounted on vibration supports; the vibration isolation supports are required for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Piping flexible connection and vibration isolation supports are not required when the fan section is separately and independently isolated by means of vibration supports and duct flexible connections. Standard pipe hangers/supports as specified in this section are required when there are no vibration isolation devices in the piping and beyond the 100 pipe diameter/3 support distance.

Piping supported by laying on the bottom chord of joists or trusses will not be accepted.

Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.

Allow sufficient space between adjacent pipes and ducts for insulation, valve operation, routine maintenance, etc.

PART 2 - PRODUCTS

PIPE HANGER AND SUPPORT MANUFACTURERS

Anvil, B-Line, Fee and Mason, Kindorf, Michigan Hanger, Unistrut, or approved equal. Anvil figure numbers are listed below; equivalent material by other manufacturers is acceptable.

STRUCTURAL SUPPORTS

Provide all supporting steel required for the installation of mechanical equipment and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support tanks and equipment.

PIPE HANGERS AND SUPPORTS

HANGERS FOR STEEL PIPE SIZES 1/2" THROUGH 2":

Carbon steel, adjustable, clevis, black finish. Anvil figure 65 or 260.

MULTIPLE OR TRAPEZE HANGERS:

Steel channels with welded spacers and hanger rods if calculations are submitted.

COPPER PIPE SUPPORT:

Carbon steel ring, adjustable, copper plated or polyvinylchloride coated.

STEEL HANGER RODS:

Threaded both ends, threaded one end, or continuous threaded, black finish.

Size rods for individual hangers and trapeze support as indicated in the following schedule.

Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated.

Maximum Load (Lbs.) (650°F Maximum Temp.)	Rod Diameter (inches)
610	3/8
1130	1/2
1810	5/8

Provide rods complete with adjusting and lock nuts.

BEAM CLAMPS

MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick for single threaded rods of 3/8, 1/2, and 5/8 inch diameter, for use with pipe sizes 4 inch and less. Furnish with a hardened steel cup point set screw. Anvil figure 86.

PART 3 - EXECUTION

INSTALLATION

Install supports to provide for free expansion of the piping and duct system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Piping shall be supported independently from ductwork and all other trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes for the supporting steel.

HANGER AND SUPPORT SPACING

Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of this specification.

Space hangers for pipe as follows:

Pipe Material	Pipe Size	Max. Spacing
Steel	1/2" through 1-1/4"	6'-6"
Steel	1-1/2" through 6"	10'-0"
Copper	1/2" through 1-1/4"	5'-0"
Copper	1-1/2" and larger	8'-0"

END OF SECTION

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SECTION 23 05 48

VIBRATION CONTROL

PART 1 - GENERAL

SCOPE

This section includes specifications for vibration isolation material for equipment, piping systems, and duct systems. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Quality Assurance
- Design Criteria
- Shop Drawings

PART 2 - PRODUCTS

- Materials
- Vibration Isolation Manufacturers
- Type 5: Spring Hanger with Neoprene
- Performance

PART 3 - EXECUTION

- Installation

RELATED WORK

- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 33 00 - Air Duct Accessories
- Section 23 34 00 - HVAC Fans
- Section 23 81 46 - Water Source Heat Pumps

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

DESIGN CRITERIA

Isolate all motor driven mechanical equipment from the building structure and from the systems which they serve to prevent equipment vibrations from being transmitted to the structure. Consider equipment weight distribution to provide uniform isolator deflections.

For equipment with variable speed capability, select vibration isolation devices based on the lowest speed.

Provide flexible piping connections for all piping to rotating or reciprocating equipment mounted on vibration isolators except do not use flexible piping connectors on any type of gas piping or with inline pumps. Piping connected to a coil which is in an assembly mounted on vibration isolators is to have flexible piping connections and piping vibration hangers as specified below. Piping connected to a coil which is in an assembly where the fan is separately isolated by means of vibration isolators and duct flexible connections does not require flexible piping connectors or piping vibration hangers.

Credit will be given for the inherent flexibility and vibration absorption characteristics of mechanical grooved pipe connections providing that supporting calculations are submitted for approval.

Coordinate the selection of devices with the isolator and equipment manufacturers.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Include isolator type, materials of construction, isolator free and operating heights, and isolation efficiency based on the lowest operating speed of the equipment supported.

PART 2 - PRODUCTS

MATERIALS

Use materials that will retain their isolation characteristics for the life of the equipment served. Use industrial grade neoprene for elastomeric materials.

Treat all isolators to resist corrosion. For isolation devices exposed to the weather or used in high humidity areas, hot dip galvanize steel parts, apply a neoprene coating on all steel parts, or use stainless steel parts; include limit stops to resist wind.

Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.

Use isolators with a ratio of lateral to vertical stiffness not less than 1.0 or greater than 2.0.

VIBRATION ISOLATOR MANUFACTURERS

Mason Industries, Amber/Booth Co., Vibration Mounting & Controls, Peabody Noise Control, or approved equal.

TYPE 5: SPRING HANGER WITH NEOPRENE

Vibration hanger with a steel spring and 0.3" deflection neoprene element in series. Use neoprene element molded with a rod isolation bushing that passes through the hanger box. Select spring diameters and size hanger box lower holes large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Select springs so they have a minimum additional travel to solid equal to 50% of the rated deflection.

PERFORMANCE

Select vibration isolation devices as indicated below or to provide not less than 95% isolation efficiency, whichever is greater.

TYPE OF EQUIPMENT	----- Floor Span or Column Spacing-----							
	--On Grade--		---20 Feet---		---30 Feet---		---40 Feet---	
	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.	Iso. Type	Min. Static Defl. In.
HEAT PUMP UNITS: Suspended Thru 5 hp	-	-	5	1.00	5	1.00	5	1.00

PART 3 - EXECUTION

INSTALLATION

Install vibration isolation devices for motor driven equipment in accordance with the manufacturer's installation instructions.

Do not allow installation practices to short circuit any isolation device.

END OF SECTION

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SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC
(FOR INFORMATIONAL PURPOSES ONLY)

PART 1 - GENERAL

SCOPE

This specification section is issued for informational purposes only and shall not be included in the bidding contractor's scope of work. Testing, Adjusting and Balancing of HVAC systems will be contracted separately by Dane County under a separate contract. The HVAC contractor is expected to fully coordinate work the independent third party Testing, Adjusting and Balancing Contractor procured by the County.

This section includes air and water testing, adjusting and balancing for the entire project. Included are the following topics:

PART 1 - GENERAL

Scope
Related Work
Reference
Reference Standards
Description
Submittals

PART 2 - PRODUCTS

Instrumentation

PART 3 - EXECUTION

Performing Testing, Adjusting and Balancing
Deficiencies

RELATED WORK

Section 23 05 00 - Common Work Results for HVAC
Section 23 07 00 - HVAC Insulation
Section 23 09 23 - HVAC Controls

REFERENCE

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

REFERENCE STANDARDS

AABC National Standards for Total System Balance, Sixth Edition, 2002.
ASHRAE ASHRAE Handbook, 2007 HVAC Applications, Chapter 37, Testing Adjusting and Balancing.
NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, Seventh Edition, 2005.
TABB Tab Procedural Guide, First Edition, 2003.

DESCRIPTION

The Contractor will separately contract with an independent test and balance agency to perform all testing, adjusting, and balancing of air and hydronic systems required for this project. Work related to the testing, adjusting, and balancing that must be performed by the installing mechanical contractor is specified in other section of these specifications.

Provide total mechanical systems testing, adjusting and balancing. Requirements include the balance of air and water distribution, adjustment of new and existing systems and equipment to provide design

requirements indicated on the drawings, electrical measurement and verification of performance of all mechanical equipment, all in accordance with standards published by AABC, NEBB, or TABB.

Test, adjust and balance all air and hydronic systems so that each room, piece of equipment or terminal device meets the design requirements indicated on the drawings and in the specifications.

Accomplish testing, adjusting and balancing work in a timely manner that allows partial occupancy of major buildings, occupancy of one building when the project involves many buildings, and completion of the entire project in the time stated in the Instruction to Bidders and in accordance with the completion schedule established for this project.

Verify that provisions are being made to accomplish the specified testing, adjusting and balancing work. If problems are found, handle as specified in Part 3 under Deficiencies.

QUALITY ASSURANCE

Qualifications

An independent Firm specializing in the Testing and Balancing of HVAC systems for a minimum of 3 years. A Firm not engaged in the commerce of furnishing or providing equipment or material generally related to HVAC work other than that specifically related to installing Testing and Balancing components necessary for work in this section such as, but not limited to sheaves, pulleys, and balancing dampers.

A certified member of AABC or certified by NEBB or TABB in the specific area of work performed. Maintain certification for the entire duration of the project. If certification of firm or any staff performing work is terminated or expires during the duration of the project, contact DFD immediately.

Technicians on this project must have satisfactorily completed work on a minimum of (3) three projects of at least 50% in size, and of similar complexity. Size is defined as the quantity of each specific individual item requiring testing and balancing such as, but not limited to, equipment, devices, terminal devices, and grilles and diffusers.

SUBMITTALS

Submit testing, adjusting and balancing reports bearing the seal and signature of the NEBB, AABC or TABB Certified Test and Balance Supervisor. The reports certify that the systems have been tested, adjusted and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed and are operating; and are an accurate record of all final quantities measured to establish normal operating values of the systems.

PART 2 - PRODUCTS

INSTRUMENTATION

Provide all required instrumentation to obtain proper measurements. Application of instruments and accuracy of instruments and measurements to be in accordance with the requirements of NEBB, AABC, or TABB Standards and instrument manufacturer's specifications.

All instruments used for measurements shall be accurate, and calibration histories for each instrument to be available for examination by DD upon request. Calibration and maintenance of all instruments to be in accordance with the requirements of NEBB, AABC, or TABB Standards

PART 3 - EXECUTION

PERFORMING TESTING, ADJUSTING AND BALANCING

Perform testing, adjusting and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards except as may be modified below.

Unless specifically instructed in writing, all work in this specification section is to be performed during the normal workday.

In areas containing ceilings, remove ceiling tile to accomplish balancing work; replace tile when work is complete and provide new tile for any tile that are damaged by this procedure. If the ceiling construction is such that access panels are required for the work of this section and the panels have not been provided, inform the owner's project representative.

Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary for adequate performance of procedures. Patch using materials identical to those removed, maintaining vapor barrier integrity and pressure rating of systems.

In air systems employing filters, blank off sufficient filter area to simulate a pressure drop that is midway between that of a clean filter and that of a dirty filter.

Measure and record system measurements at the fan to determine total flow. Adjust equipment as required to yield specified total flow at terminals. Proceed taking measurements in mains and branches as required for final terminal balancing. Perform terminal balancing to specified flows balancing branch dampers, deflectors, extractors and valves prior to adjustment of terminals.

Measure and record static air pressure conditions across fans, coils and filters. Indicate in report if cooling coil measurements were made on a wet or dry coil and if filter measurements were made on a clean or dirty filter. Spot check static air pressure conditions directly ahead of terminal units.

Adjust outside air, return air and relief air dampers for design conditions at both the minimum and maximum settings and record both sets of data. Balance modulating dampers at extreme conditions and record both sets of data. Balance variable air volume systems at maximum air flow rate, full cooling, and minimum flow rate, full heating; record all data.

Adjust register, grille and diffuser vanes and accessories to achieve proper air distribution patterns and uniform space temperatures free from objectionable noise and drafts within the capabilities of the installed system.

Provide fan and motor drive sheave adjustments necessary to obtain design performance. Provide drive changes specifically noted on drawings, if any. If work of this section indicates that any drive or motor is inadequate for the application, advise the owner's project representative by giving the representative properly sized motor/drive information (in accordance with manufacturers original service factor and installed motor horsepower requirements); Confirm any change will keep the duct/piping system within its design limitations with respect to speed of the device and pressure classification of the distribution system. Required motor/drive changes not specifically noted on drawings or in specifications will be considered an extra cost and will require an itemized cost breakdown submitted to owner's project representative. Prior authorization is needed before this work is started.

Areas or rooms designed to maintain positive, negative or balanced air pressures with respect to adjacent spaces, as indicated by the design air quantities, require special attention. Adjust fan drives, distribution dampers, terminals and controls to maintain indicated pressure relationship.

Final air system measurements to be within the following range of specified cfm:

Fans	0% to +10%
Supply grilles, registers, diffusers	0% to +10%
Return/exhaust grilles, registers	0% to -10%
Room pressurization air	-5% to +5%

Final water system measurements must be within the following range of specified gpm:

Heat pump flow rates

0% to -10%

Contact the temperature control Contractor for assistance in operation and adjustment of controls during testing, adjusting and balancing procedures. Cycle controls and verify proper operation and setpoints. Include in report description of temperature control operation and any deficiencies found.

Permanently mark equipment settings, including damper and valve positions, control settings, and similar devices allowing settings to be restored. Set and lock memory stops.

Leave systems in proper working order, replacing belt guards, closing access doors and electrical boxes, and restoring temperature controls to normal operating settings.

Coordinate and assist CxP with all verification activities defined within section (01 91 01, 02) including providing all required sampling data necessary for the commissioning process.

Verify and record, in the T&B Report, "K" factors for all VAV air terminal devices and air flow stations.

Verify butterfly valves utilized for hydronic system balancing are provided with position-lock operators (memory stops) in accordance with Section 23 05 23. The adjustment and marking of lever-lock operators that use throttling notches will not be accepted. Lock all memory stops so the valves can be reopened to their balanced positions if they are used for isolation purposes.

DEFICIENCIES

Division 23 00 00 contractor to correct any installation deficiencies found by the test and balance agency that were specified and/or shown on the Contract Documents to be performed as part of that division of work. Test and balance agency will notify the Architect and Engineer of these items and instructions will be issued to the Division 23 00 00 contractor for correction of the deficient work. All corrective work to be done at no cost to the Owner. Retest mechanical systems, equipment, and devices once corrective work is complete as specified.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 - GENERAL

SCOPE

This section includes insulation specifications for heating, ventilating and air conditioning piping, ductwork and equipment. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Description
- Definitions
- Shop Drawings
- Operation and Maintenance Data
- Environmental Requirements

PART 2 - PRODUCTS

- Materials
- Insulation Types
- Flexible Fiberglass Insulation
- Rigid Fiberglass Insulation – Ductwork
- Rigid Fiberglass Insulation - Piping
- Adhesives, Mastics, Sealants, and Reinforcing Materials
- Insulation Inserts and Pipe Shields
- Accessories

PART 3 - EXECUTION

- Examination
- Installation
- Protective Jacket Installation
- Piping, Valve and Fitting Insulation
- Pipe Insulation Schedule
- Duct Insulation
- Duct Insulation Schedule

RELATED WORK

- Section 23 05 00 - Common Work Results for HVAC
- Section 23 21 13 - Hydronic Piping
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 31 00 – Metal Ducts

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ASTM B209 Aluminum and Aluminum Alloy Sheet and Plate
- ASTM C165 Test Method for Compressive Properties of Thermal Insulations
- ASTM C177 Heat Flux and Thermal Transmission Properties
- ASTM C195 Mineral Fiber Thermal Insulation Cement
- ASTM C240 Cellular Glass Insulation Block

ASTM C302	Density of Preformed Pipe Insulation
ASTM C303	Density of Preformed Block Insulation
ASTM C355	Test Methods for Test for Water Vapor Transmission of Thick Materials
ASTM C449	Mineral Fiber Hydraulic Setting Thermal Insulation Cement
ASTM C518	Heat Flux and Thermal Transmission Properties
ASTM C552	Cellular Glass Block and Pipe Thermal Insulation
ASTM C921	Properties of Jacketing Materials for Thermal Insulation
ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
ASTM D1000	Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
ASTM D1621	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D1940	Method of Test for Porosity of Rigid Cellular Plastics
ASTM D2126	Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
ASTM D5590	Test Method for Determining the Resistance of Coatings to Fungal Defacement
ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E814	Standard Test Method for Fire Tests of Penetration Firestop Systems
ASTM E2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
MICA	National Commercial & Industrial Insulation Standards
NFPA 225	Surface Burning Characteristics of Building Materials
UL 723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

Insulation systems shall be applied by experienced contractors. Within the past five (5) years, the contractor shall be able to document the successful completion of a minimum of three (3) projects of at least 50% of the size and similar scope of the work specified in this section.

DESCRIPTION

Furnish and install all insulating materials and accessories as specified or as required for a complete installation. The following types of insulation are specified in this section:

- Pipe Insulation
- Duct Insulation

Install all insulation in accordance with the latest edition of MICA (Midwest Insulation Contractors Association) Standard and manufacturer's installation instructions. Exceptions to these standards will only be accepted where specifically modified in these specifications, or where prior written approval has been obtained from the DFD Project Representative.

DEFINITIONS

Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other areas, including walk-through tunnels, shall be considered as exposed.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, fitting materials along with material safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

ENVIRONMENTAL REQUIREMENTS

Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install insulation products that have been exposed to water.

Protect installed insulation work with plastic sheeting to prevent water damage.

PART 2 - PRODUCTS

MATERIALS

Manufacturers: Armacell, CertainTeed, Manson, Childers, Dow, Extol, Fibrex, Halstead, Foster, Imcoa, Johns Manville, Knauf, Owens-Corning, , Pittsburgh Corning, , VentureTape or approved equal.

Materials or accessories containing asbestos will not be accepted.

Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

Pipe insulation which is not located in an air plenum may have a flame spread rating not over 25 and a smoke developed rating no higher than 450 when tested in accordance with UL 723 and ASTM E84.

INSULATION TYPES

Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

FLEXIBLE FIBERGLASS INSULATION

Owens-Corning "All-Service Duct Wrap" or "R" Series Microlite with a minimum density of 0.75 lbs. per cu. ft., thermal conductivity of not more than 0.35 at 75 degrees F mean temperature, and be suitable for operating temperature up to 250 degrees F.

Jacket: Vapor retarder facing shall be foil-scrim-kraft laminate jacket, factory applied to insulation. Permeance shall not exceed 0.02 perms when tested in accordance with ASTM E 96. Beach puncture resistance shall be 50 units minimum.

RIGID FIBERGLASS INSULATION - DUCTWORK

Owens-Corning 700 Series, having thermal conductivity of not more than 0.23 at 75 degrees F mean temperature and a maximum operating temperature of 450 degrees F.

Inside applications: Minimum nominal density of 3 lbs. per cu. ft.

Jacket: FRK foil reinforced vapor barrier jacket, factory applied to insulation, maximum permeance of 0.02 perms (aged) and minimum beach puncture resistance of 25 units.

RIGID FIBERGLASS INSULATION - PIPING

Owens-Corning SSL-II having a thermal conductivity of not more than 0.23 at 75 degrees F mean temperature and maximum operating temperatures of 450 degrees F.

Jacket: White kraft reinforced vapor barrier all service jacket, factory applied to insulation with self-sealing pressure sensitive adhesive lap, maximum permeance of 0.02 perms (aged) and minimum beach puncture resistance of 50 units.

ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.

FIBERGLASS INSULATION ADHESIVE:

Must comply with ASTM C916, Type II: Foster 85-60, Childers CP-127, Duro Dyne SSG.

VAPOR RETARDING MASTIC:

Below ambient equipment/piping insulation, mastic water vapor permeance shall be less than 0.03 perms at 45 mils dry film thickness per ASTM E 96: Foster 30-65 Vapor Fas, Childers CP-34, Vimasco 749.

INSULATION INSERTS AND PIPE SHIELDS

Manufacturers: B-Line, Pipe Shields, Value Engineered Products.

Construct inserts with calcium silicate or polyisocyanurate (service temperatures below 300 degrees F only), minimum 140 psi compressive strength. Piping 12" and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be minimum 180 degree coverage on bottom supported piping and full 360 degree coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate.

Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/premanufactured product described above. On low temperature systems, high density rigid polyisocyanurate may be substituted for calcium silicate provided insert and shield length and shield gauge are increased to compensate for lower insulation compressive strength.

Precompressed 20# density molded fiberglass blocks, Hamfab or equal, of the same thickness as adjacent insulation may be substituted for calcium silicate inserts with one 1"x6" block for piping through 2-1/2" and three 1"x6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/premanufactured product described above.

Wood blocks will not be accepted.

ACCESSORIES

All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.

Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

Insulation bands to be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness to be 0.015 inch for aluminum and 0.010 inch for stainless steel.

Tack fasteners to be stainless steel ring grooved shank tacks.

Staples to be clinch style.

Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool. Finishing cement to be ASTM C449.

Fibrous glass or canvas fabric reinforcing used with lagging adhesive shall have a minimum untreated weight of 6 oz./sq. yd.

Joint sealants and metal jacketing sealants to be non-shrinking and permanently flexible.

Vapor retarding coatings to have maximum applied water vapor permeance of 0.03 perms or less at 45 ,ils dry as tested by ASTM E96.

Fungicidal water base duct liner coating (Foster 40-20 or equal) to be compatible with vapor retarding coating. This product must be EPA registered to be used inside HVAC ducts. Coating must comply with ASTM D 5590 with 0 growth rating.

PART 3 - EXECUTION

EXAMINATION

Verify that all piping, equipment, and ductwork are tested and approved prior to installing insulation. Do not insulate systems until testing and inspection procedures are completed.

Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

INSTALLATION

All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Do not install products when the ambient temperature or conditions are not consistent with the manufacturer's recommendations. Surfaces to be insulated must be clean and dry.

Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.

Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.

All pipe and duct insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required. Vapor retarding jacket shall be maintained continuous through all penetrations.

Provide a continuous unbroken moisture vapor retarding jacket on insulation applied to systems noted below. Attachments to cold surfaces shall be insulated and vapor sealed to prevent condensation.

Provide a complete vapor retarding jacket for insulation on the following systems:

- Insulated Duct

PROTECTIVE JACKET INSTALLATION

ALL SERVICE JACKETS (ASJ) and FOIL SCRIM ALL SERVICE JACKETS (FSJ):

Install according to manufacturer's recommendations using factory supplied lap seals and butt strip seals.

SELF-ADHERING JACKETS (SAJ):

Install according to manufacturer's recommendations. Cut allowing minimum 4" overlap on ends and 6" on longitudinal joints. Align parallel to surface. Remove release paper and press flat to surface to avoid wrinkles. Rub entire surface for full adhesion and sealing at joint overlaps. On exterior applications, provide a bead of compatible caulk along exposed edges.

PIPING, VALVE, AND FITTING INSULATION

GENERAL:

Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2" lap on jacket seams and 2" tape on butt joints, firmly cemented with lap adhesive unless otherwise noted. Additionally secure with staples along seams and butt joints.

On systems requiring a vapor retarding jacket, seal off all raw ends of insulation and butt joints with vapor retarding mastic at intervals of not more than 20 feet on piping. Coat staples, longitudinal and transverse seams with vapor retarding mastic and on systems requiring vapor retarding jacket, coat insulated elbows, fittings, and valves with vapor retarding mastic.

Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor retarding jacket is not required or where roller hangers are not being used, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor retarding jacket, extend insulation and vapor retarding jacketing/coating around riser clamp.

Where insulated piping is installed on hangers and supports, the insulation shall be installed continuous through the hangers and supports. High density inserts shall be provided as required to prevent the weight of the piping from crushing the insulation. Pipe shields are required at all support locations. The insulation shall not be notched or cut to accommodate the supporting channels.

INSULATION INSERTS AND PIPE SHIELDS:

Provide pipe shields at all hanger and support locations. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Quantity and placement of inserts shall be according to the manufacturer's installation instructions, however the inserts shall be no less than 12" in length. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required for system.

Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4" and smaller copper piping provided 12" long 22 gauge pipe shields are used.

FITTINGS AND VALVES:

Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Where the ambient temperature exceeds 150 degrees F, cover insulation with fabric reinforcing and mastic. Where the ambient temperatures do not exceed 150 degrees, furnish and install PVC fitting covers.

PIPE INSULATION SCHEDULE:

Provide insulation on new and existing remodeled piping as indicated in the following schedule:

SERVICE	INSULATION	JACKET	INSULATION THICKNESS BY PIPE SIZE				
			< 1"	1" to < 1-1/2"	1-1/2" to < 4"	4" to < 8"	8" and Larger
Heat Pump Condensate Drain	Rigid Fiberglass	ASJ	0.5"	0.5"	1"	1"	1"

The following piping and fittings are not to be insulated:

- Piping unions for systems not requiring a vapor retarding Jacket

For systems with fluid temperatures 65° F or less, furnish and install removable elastomeric insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel. Examples include but are not limited to: flow sensing devices, circuit setters, manual ball valve air vents, drain valves, blowdown valves, pressure/temperature test plugs, grease fittings, pump bearing caps, equipment labels, etc. Covers shall be tight fitting to ensure a complete vapor retarding barrier.

DUCT INSULATION

GENERAL:

Secure flexible duct insulation on sides and bottom of ductwork over 24" wide and all rigid duct insulation with weld pins. Space fasteners 18" on center or less as required to prevent sagging.

Secure rigid board insulation to ductwork with weld pins. Apply insulation with joints firmly butted as close as possible to the equipment surface. Pins shall be located a maximum of 3" from each edge and spaced no greater than 12" on center.

Install weld pins without damage to the interior galvanized surface of the duct. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4" tape of same material as jacket. Seal tape with plastic applicator and secure with staples. All joints, seams, edges and penetrations to be fully vapor sealed with vapor retarding mastic.

Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.

External supply duct insulation is not required where ductwork contains continuous 1" acoustical liner. Provide 4" overlap of external insulation over ends of acoustically lined sections.

Where insulated ductwork is supported by trapeze hangers, the insulation shall be installed continuous through the hangers. Drop the supporting channels required to facilitate the installation of the insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent the weight of the ductwork from crushing the insulation.

DUCT INSULATION SCHEDULE:

Provide duct insulation on new and existing remodeled ductwork in the following schedule:

SERVICE	INSULATION TYPE	JACKET	THICKNESS
Exposed supply ducts*	Rigid Fiberglass	FSJ	2"
Concealed supply ducts	Flexible Fiberglass	FSJ	1-1/2"

* Exposed supply branch ducts located in the space they are serving do not require insulation. Exposed supply main ducts running through spaces they serve shall be insulated as exposed supply ducts scheduled above.

END OF SECTION

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SECTION 23 09 23

HVAC CONTROLS SYSTEM

PART 1 - GENERAL

SCOPE

This section includes electric control system specifications for all HVAC work as well as related electric control for systems found in other specification sections. It also includes Direct Digital Control (DDC) main communication trunk, software programming, and other equipment and accessories to constitute a complete Direct Digital Control (DDC) system. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Quality Assurance
- Reference Standards
- Acceptable Manufacturers and Scope of Work
- Submittals
- Design Criteria
- Operation and Maintenance Data
- Material Delivery and Storage

PART 2 - PRODUCTS

- General
- Thermostat Guards
- Electric/Electronic Thermostats
- Space Temperature Wall Module
- Temperature Sensors
- Current Status Switches
- Power Supplies

PART 3 - EXECUTION

- Installation
- Air Piping
- Wire and Air Piping Conduit and Tubing Installation Schedule
- Room Thermostats and Temperature Sensors
- Current Status Switches

RELATED WORK

- Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC - Coordination
- Section 23 09 93 - Sequence of Operation
- Division 23 - HVAC - Equipment provided to be controlled or monitored
- Division 26 - Electrical - Installation requirements & Equipment provided to be controlled or monitored
- Division 28 - Electronic Safety and Security

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Installing contractor(s) must be a manufacturer's branch office or an authorized representative of a Direct Digital Control (DDC) equipment manufacturer that provides engineering and commissioning of the DDC equipment. Submit written confirmation of such authorization from the manufacturer. Indicate in letter of authorization that installing contractor has successfully completed all necessary training required for engineering, installation, and commissioning of equipment and systems and that such authorization has

been in effect for a period of not less than three years. DDC equipment may or may not be required to be installed by this contractor as part of the project, but the intent of this quality assurance specification is to ensure that the installing contractor has the capabilities to engineer, install, and commission the field devices supplied under this section for temperature control. See Acceptable Manufacturers and Scope of Work Section below.

REFERENCE STANDARDS

ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ANSI/ASTM B32	Specification for Solder Metal
ASTM B75	Seamless Copper Tube
ASTM D1693	Environmental Stress-Cracking of Ethylene Plastics
ASTM D 635	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
UL 94	Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
AMCA 500-D	Laboratory Method of Testing Dampers for Rating

ACCEPTABLE MANUFACTURERS AND SCOPE OF WORK

The DDC scope of work for this project consists of providing DDC controls on three (3) new water source heat pumps and one (1) transfer air fan. The DDC work is divided into two (2) parts:

Part A – DDC Front End / System Integration

The Part A scope of work includes:

- Provide and install new temperature control panel(s). Control panel(s) shall be large enough for future integration of existing Johnson Controls Building Automation System.
- Provide and install new Niagara framework based Jace-600 Network Controller(s) for integration of local controllers (Part B below).
- Integrate new JACE Controller(s) with existing Niagara DDC Server located at the City County Building (210 Martin Luther King Jr. Blvd, Madison, WI).
- Provide new building automation graphics, for three (3) new heat pumps and transfer air fan systems. Graphics shall include the entire second floor, but the only “active” areas will be the newly installed equipment.
- Provide appropriate submittals for review.
- Provide Operation and Maintenance Manuals.

Part A acceptable Manufacturer: Vykon Jace-600 / Tridium (Niagra Framework).

Part A acceptable installing contractor: Environmental Systems Inc. (Wisconsin Office),
3410 Gateway Road, Brookfield, WI 53045
Office: 262-544-8860. Fax: 262-544-0783.
Contact: Jerry Gitlewski.

Part B – DDC Local Controllers, Programming and Wiring

The Part B scope of work includes:

- Provide and install local DDC controller (Application Specific Controller) for each new heat pump and transfer fan.
- Provide and install local DDC thermostats.
- Provide programming and control points for local DDC controller as indicated in Specification Section 23 09 93.
- Provide all control wiring and conduit between/from local controller and thermostat to network system controller.
 - Label all control wiring.
 - Test all control wiring for continuity prior to Part A contractor assuming responsibility. Provide written documentation confirming all cabling is tested and acceptable.
- Provide appropriate submittals for review.

- Provide Operation and Maintenance Manuals.

Part B acceptable manufacturers: Alerton, Distech and Andover Controls

Part B acceptable installing contractors: Installing contractor shall meet the following requirements:

1. The installing contractor shall be a recognized manufacturer approved, installer and service provider for the proposed controls.
2. The installing contractor shall have a branch facility within a 100-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7 day a week basis.
3. The contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total project for at least 10 times the value of this contract in the each of the preceding five years.

SUBMITTALS

Include the following information:

For electric instrumentation, submit manufacturer's data sheets indicating model number, pressure/temperature ratings, capacity, methods and materials of construction, installation instructions, and recommended maintenance. General catalog sheets showing a series of the same device is not acceptable unless the specific model is clearly marked.

For Direct Digital Controls, submit manufacturer's specifications for each control device furnished, including installation instructions and startup instructions. General catalog sheets showing a series of the same device is not acceptable unless the specific model is clearly marked. Annotated software program documentation shall be submitted for system sequences, along with descriptive narratives of the sequence of operation of the entire system involved. Submit wiring diagram for each electrical control device along with other details required to demonstrate that the system has been coordinated and will function as a system.

Schematic flow diagrams of systems showing fans, coils, valves, and other control devices. Label each device with setting or adjustable range of control. Indicate all wiring, clearly, differentiating between factory and field installed wiring. Wiring should be shown in schematics that detail contact states, relay references, etc. Diagrammatic representations of devices alone are not acceptable.

Details of construction, layout, and location of each temperature control panel within the building, including instruments location in panel and labeling. Also include on drawings location of mechanical equipment controlled (room number), horsepower and flow of motorized equipment (when this data is available on plans), locations of all remote sensors and control devices (either by room number or column lines).

A complete description of each control sequence for equipment that is not controlled by direct digital controls. Direct digital controlled equipment control sequences will be provided by the DDC control contractor.

Prior to request for final payment, submit record documents which accurately record actual location of control components including panels, thermostats, wiring, and sensors. Incorporate changes required during installation and start-up.

All submittals are to comply with submission and content requirements specified in Division 01 of the Project Manual.

DESIGN CRITERIA

Size all control apparatus to properly supply and/or operate and control the apparatus served.

Provide control devices subject to corrosive environments with corrosion protection or construct them so they are suitable for use in such an environment.

Provide devices exposed to outside ambient conditions with weather protection or construct them so they are suitable for outdoor installation.

Use only UL labeled products that comply with NEMA Standards. Electrical components and installation to meet all requirements of the electrical sections (Division 26) of project specifications.

OPERATION AND MAINTENANCE DATA

- Operation and maintenance instructions for the equipment and systems provided including:
 - Recommendations for frequency of service and preventative maintenance.
 - List indicating types/grades of oil/grease, packing materials, normal and abnormal tolerances for devices and method of equipment adjustment/calibration.
 - A description of recommended replacement parts and materials with the owner should stock.
 - A summary of equipment vendors or where replacement parts can be procured.
 - Manufacturers literature indicating features, materials of construction, and operating limits of installed equipment (equipment brochures are not acceptable).
 - A complete set of record control drawings.
 - Name, address and telephone number of the person or office to contact for service during the warranty period.
 - Name, address and telephone number of the person or service organization to be contacted for service after the warranty period.

MATERIAL DELIVERY AND STORAGE

Provide factory shipping cartons for each piece of equipment and control device. This contractor is responsible for storage of equipment and materials inside and protected from the weather.

PART 2 - PRODUCTS

DIRECT DIGITAL CONTROLS

System to be capable of integrating multiple building functions, including equipment supervision and control, alarm management, energy management, and trend data collection.

DDC to consist of Network Controllers, stand-alone Application Specific Controllers (ASC's), DDC system servers, and other operator interface devices.

The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, ASC's, and operator devices.

The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate both the ANSI/ASHRAE Standard 135-1995 BACnet and LonWorks technology communication protocols in one operable integrated system.

The supplied computer software shall employ object-orientated technology for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI/ASHRAE Standard 135-1995, BACnet and LonMark to assure interoperability between all system components is required. For each LonWorks device that does not have LonMark certification, the device supplier must provide an XIF file for the device. For each BACnet device, the device supplier must provide a PICS document showing the installed device's compliance level. Minimum compliance is Level 3; with

the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet.

All components and controllers supplied under this contract shall be true peer-to-peer communicating devices. Components or controller requiring "polling" by a host to pass data shall not be acceptable.

The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open DataBase Connectivity or Structural Query Language compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database and user interface programs shall not be acceptable.

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

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

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

NETWORKING/COMMUNICATIONS

The design of the DDC shall be networked. The highest level networking shall use Ethernet and the sub-level networking shall use serial communications. Inherent in the system's design shall be the ability to expand or modify the highest network either via a local area network (LAN), wide area network (WAN), or a combination of the two schemes.

The highest-level DDC communications network shall be capable of direct connection to and communication with a high-speed LAN or WAN utilizing an Ethernet connection. Communication protocol used shall be BACnet/IP and LonWorks.

The supervisory controller shall directly oversee a local network such that communications may be executed directly to and between programmable controllers and ASC's. All operator devices, either network resident or connected via dial-up modems, shall have the ability to access all points and application reports on the network.

Provide serial communication ports on all ASC's for operator's terminal communications with the DDC Controller.

Access to system data shall not be restricted by the hardware configuration of the DDC system.

Global data sharing or global point broadcasting shall allow point data to be shared between programmable controllers and ASC's when it would be impractical to locate multiple sensors.

Network design shall include the following provisions:

- Data transfer rates for alarm reporting and quick point status from multiple programmable controllers and ASC's. The minimum baud rate shall be 9600 baud.
- Support of any combination of programmable controllers and ASC's. A minimum of 32 programmable controllers and ASC's shall be supported on a single local network. The buss shall be addressable for up to 32 ASC's.
- Detection of single or multiple failures of ASC's or the network media.
- Error detection, correction, and re-transmission to guarantee data integrity.
- Use commonly available, multiple-sourced, networking components.

- Use of an industry standard communication transport, such as, ARCNET, Ethernet, and IEEE RS-485 communications interface.

NETWORK AUTOMATION ENGINE/CONTROLLER

Manufacturer: Vykon / Jace 600 / Tridium (Niagra Framework)

The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Automation Engines.

Automation network – The NAE shall reside on the automation network and shall support a subnet of system controllers.

User Interface – Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.

- The web based UI software shall be imbedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.
- The NAE shall support up four (4) concurrent users.
- The web based user shall have the capability to access all system data through one NAE.
- Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NAE.
- Systems that require the user to address more than one NAE to access all system information are not acceptable.
- The NAE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NAE.
- Systems that support UI Graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.
- The web based UI shall support the following functions using a standard version of Microsoft Internet Explorer:
 - Configuration
 - Commissioning
 - Data Archiving
 - Monitoring
 - Commanding
 - System Diagnostics
- Systems that require workstation software or modified web browsers are not acceptable.
- The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

SUPERVISORY CONTROLLERS

Manufacturers: Distech, Alerton, Vykon/Niagara, Andover.

Supervisory controllers shall be microprocessor-based, multi-tasking, multi-user and digital control processors.

Each supervisory controller shall have sufficient memory to support its own operating system and databases including:

- Control processes
- Energy management application
- Alarm management
- Trend data
- Maintenance support applications
- Operator I/O
- Dial-up communications
- Manual override monitoring

The system shall be modular in nature, and shall permit easy expansion through the addition of field controllers, sensors, and actuators.

Supervisory controllers shall provide at least two RS-232C or USB serial communication ports or Ethernet ports for simultaneous operation of multiple operator I/O devices, such as laptop computers, personal computers, and video display terminals.

Supervisory controllers shall monitor the status of all overrides and include this information in the logs and summaries to inform the operator that automatic control has been inhibited.

Each supervisory controller shall continuously perform self-diagnostics, communications diagnostics, and diagnostics of all subsidiary equipment. Supervisory controllers shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each supervisory controller.

Isolation shall be provided at all network terminations, as well as all field point terminations, to suppress induced voltage transients consistent with IEEE Standard 587-1980. Isolation levels shall be sufficiently high to allow all signal wiring to be run in the same conduit as high voltage wiring acceptable by electrical code.

In the event of the loss of normal power, there shall be an orderly shutdown of the supervisory controller to prevent the loss of data base or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data, and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.

Upon restoration of normal power, the supervisory controller shall automatically resume full operation without manual intervention.

Should supervisory controller memory be lost for any reason, the supervisory controller shall have the capability of reloading its programming via high speed local area network from the control system archive workstation or server, the local RS-232C port, or telephone line dial-in.

APPLICATION SPECIFIC CONTROLLERS

Network controller shall be able to extend its monitoring and control through the use of stand-alone application specific controllers (ASC's).

Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor based, multi-tasking, real-time digital control processor. ASC shall communicate with Network/Supervisory Controllers thru BACNet or LonWorks communication protocol.

Each ASC shall have sufficient memory to support its own operating system and databases including:

- Control Processes
- Energy Management Applications
- Operator I/O (Portable Service Terminal)

The operator interface to any ASC point or program shall be through the supervisory controller connection to any ASC on the network.

ASC's shall directly support the temporary use of a portable service terminal that can be connected to the ASC via zone temperature or directly at the controller. The capabilities of the portable service terminal shall include, but not be limited to, the following information for the:

- Display temperatures
- Display status
- Display setpoints
- Display control parameters
- Override binary output control
- Override analog output control
- Override analog setpoints
- Modification of gain and offset constants

All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

ASC's shall support, but not be limited to, the following configurations of systems to address current requirements as described in Section 23 09 93 portions of this specification:

- Water Source Heat Pumps
- Transfer Air Fans

All system setpoints, proportional bands, control algorithms, calibration constants, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

All application specific controllers shall be fully programmable. Question and answer or template programming is not acceptable unless this is used to generate the initial application program and the result is able to be freely modified without restriction. Control sequences for terminal unit control that utilize devices wired directly to the terminal unit application controller shall be programmed in the application specific controller and shall be stand-alone in function, i.e. occupancy sensing, temperature setpoint setback, etc. Network controllers shall not be involved in the control sequence logic unless it involves sharing data between or from individual terminal unit controllers to be utilized in a global sequence, i.e. trim and respond strategies, terminal unit grouping, etc.

OPERATOR INTERFACE REQUIREMENTS

Operator interface software shall minimize operator training through the use of English language prompting and English language point identification.

TEXT-BASED DISPLAYS:

The operator interface shall provide consistent text-based displays of all system point and application data described in this specification. Point identification, engineering units, status indication, and application naming conventions shall be the same at all operator devices.

GRAPHIC-BASED DISPLAYS:

The operator interface shall provide graphic based displays of each system. The point data associated with each system shall dynamically update at a minimum of every 30 seconds. Graphic displays shall be linked to each other to provide a "drill down" capability from main graphic displays to more specific system based displays. Provide a building level graphic display that links to system graphics. For systems that have ASC controlled terminal unit controls, provide a building floor plan with dynamic temperatures shown on the graphic that can be drilled into for more specific terminal information. Points provided in the graphic shall have the override and adjust capability specified under operator commands. The contractor providing the DDC system under this Section shall provide all graphic displays for the project. Submit all graphic displays to the Agency control personnel for review and approval. Graphics shall be completed to provide enough time for approval and time for binding to be in place before control system commissioning is scheduled to occur.

PASSWORD PROTECTION:

Multiple-level password access protection shall be provided to allow the user/manager to limit control, display, and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password.

Level 1: Data access and display

- Level 2 = Level 1 + operator overrides and commands
- Level 3 = Level 2 + database generation and modification

A minimum of 4 passwords shall be supported at each supervisory controller.

Operators will be able to perform only those commands available for their respective passwords. Menu selections displayed at any operator device shall be limited to only those items defined for the access level of the password used to log-on.

Provide user definable, automatic log-off timers of from 1 to 60 minutes to prevent operators from inadvertently leaving devices on-line.

OPERATOR COMMANDS:

The operator interface shall allow the operator to perform commands including, but not limited to, the following:

- Start-up or shutdown selected equipment
- Adjust setpoints
- Override analog and binary outputs

- Add/modify/delete time programming
- Enable/disable process execution
- Lock/unlock alarm reporting for each point
- Enable/disable totalization for each point
- Enable/disable trending
- Enter temporary override schedules
- Define holiday schedules
- Change time/date
- Enter/modify analog alarm limits
- Enable/disable analog alarm limits
- Enable/disable demand limiting
- Enable/disable duty cycle

LOGS AND SUMMARIES:

Reports shall be generated manually, and directed to the displays. As a minimum, the system shall allow the user to easily obtain the following general listing of all points in the system that shall include, but not be limited to:

- Points currently in alarm
- Off-line points
- Points currently in override status
- Points in weekly schedules
- Holiday programming

Summaries shall be provided for specific points, for a logical point group, for a user-selected group of groups, or for the entire facility without restriction due to the hardware configuration on the facility management system. Under no conditions shall the operator need to specify the address of hardware controller to obtain system information.

SYSTEM CONFIGURATION AND DEFINITION:

All temperature and equipment control strategies and energy management routines shall be definable by the operator. System definition and modification procedures shall not interfere with normal system operation and control.

The system shall be provided complete with all equipment, software, and documentation necessary to allow an operator to independently perform the following functions:

- * Add/delete/modify application specific controllers
- * Add/delete/modify points of any type, and all associated point parameters, and tuning constants
- * Add/delete/modify alarm reporting definition for each point
- * Add/delete/modify energy management applications
- * Add/delete/modify time and calendar-based programming
- * Add/delete/modify totalization for every point
- * Add/delete/modify historical data trending for every point
- * Add/delete/modify configured control processes
- * Add/delete/modify dial-up telecommunication definition
- * Add/delete/modify all operator passwords
- * Add/delete/modify alarm messages

NETWORK-WIDE STRATEGY DEVELOPMENT

Inputs and outputs for any process shall not be restricted to a single ASC, but shall be able to include data from any and all other ASC's to allow the development of network-wide control strategies.

SYSTEM DEFINITION/CONTROL SEQUENCE DOCUMENTATION

All portions of system definition shall be self-documenting and be capable of providing hardcopy printouts of all configuration and application data.

DATA BASE SAVE/RESTORE/BACK-UP:

Backup copies of all controller databases shall be stored in at least one personal computer or laptop. Users shall have the ability to manually execute upload and downloading of a programmable controller, ASC and supervisory controller database.

WEB BASED HTML BROWSER INTERFACE

Provide a HTML based browser interface (Web Server) for accessing the DDC system. This shall include all hardware and software to provide an Ethernet twisted pair connection to the owners local or wide area network (LAN or WAN) that can be used to access the DDC system through a standard internet browser.

All information shall be provided to the owners IT staff to facilitate connection through the owners LAN/WAN.

At a minimum, this interface shall be capable of all functions described under the Operator Interface section, Password Protection, Operator Commands, and Logs and Summary subsections of this specification.

LOCAL CONTROL PANELS

Use control panels with suitable mounting brackets for system.

Fabricate panels of 14 gauge furniture grade steel or 6063-T5 extruded aluminum alloy, totally enclosed on six sides, hinged door and keyed lock, with manufacturer's standard shop painted finish and color.

Provide UL listed cabinets for use with line voltage devices.

Control panels that have devices or terminations that are fed or switch 50V or higher shall enclose the devices, terminations, and wiring so that Personal Protective Equipment (PPE) is not required to service the under 50V devices and terminations within the control panel. As an alternative, a separate panel for only the 50V and higher devices may be provided and mounted adjacent to the under 50V control panel.

Plastic control enclosures will be approved provided all conduits are bonded and grounded.

Provide control panels for all DDC Controllers, ASC's and associated function modules. All controls to be in control panels provided under this Section except for the following:

- Terminal unit controllers mounted within the terminal unit equipment enclosure.
- Above accessible lay-in tile ceilings where heat pump controllers are designed to be directly mounted on heat pumps.

All wiring for controllers shall be managed in a neat and workmanlike manner.

Permanently label all controls, tag all control wiring, and document both on control drawings.

ELECTRIC/ELECTRONIC THERMOSTATS

For single setpoint applications, provide line or low voltage electric type suitable for heating or heating and cooling as required.

For line voltage ventilation applications that control fans and where otherwise specified in the sequence of operations, this Contractor shall provide an integral manual On/Off/Auto selector switch. Minimum contact rating shall be equal to electrical load of device being controlled.

DDC WALL MOUNTED THERMOSTAT

Digital thermostat shall be mounted on the wall in occupied spaces. Units shall include:

- Temperature/Setpoint digital display with ability to lock-out setpoint adjustment thru the BAS.
- Timed unoccupied override pushbutton with indicator
- Wall module shall have a thermistor temperature sensor with operating range of 40 to 90 deg. F. under a locking cover/enclosure designed for mounting on a standard electrical switch box. Each zone shall have thermostat with user adjustability.
- Accurate to plus or minus 0.5 deg. F at 70 deg. F.

TEMPERATURE SENSORS

Thermistor temperature sensor manufacturers: PreCon, Badger Data Industrial, BAPI, and ACI

Use thermistor or RTD type temperature sensing elements constructed so accuracy and life expectancy is not affected by moisture, physical vibration, or other conditions that exist in each application.

RTD's shall be of nickel or platinum construction and have a base resistance of 1000Ω at 70°F and 77°F respectively. 100Ω platinum RTD's are acceptable if used with temperature transmitters.

The temperature sensing device used must be compatible with the DDC controllers used on the project.

RTD

Accuracy (Room Sensor Only)	minimum $\pm 1.0^{\circ}\text{F}$
Accuracy (Averaging)	minimum $\pm 1.2^{\circ}\text{F}$
Accuracy (Other than Room Sensor or Averaging)	minimum $\pm 0.65^{\circ}\text{F}$
Range	minimum -40 - 220°F

Thermistor

Accuracy (All)	minimum $\pm 0.36^{\circ}\text{F}$
Range	minimum -30 - 230°F
Heat Dissipation Constant	minimum 2.7 mW/°C

Temperature Transmitter

Accuracy	minimum $\pm 0.1^{\circ}\text{F}$ or $\pm 0.2\%$ of span
Output	4-20 mA

Provide limited range or extended range sensors if required to sense the range expected for a respective point. Use RTD type sensors for extended ranges beyond -30 to 230°F. If RTD's are incompatible with DDC controller direct temperature input use temperature transmitters in conjunction with RTD's.

Use wire size appropriate to limit temperature offset due to wire resistance to 1.0°F. If offset is greater than 1.0°F due to wire resistance, use temperature transmitter. If feature is available in DDC controller, compensate for wire resistance in software input definition.

Terminal unit space sensors specified with overrides or adjustments shall be furnished under Section 23 09 23, 23 09 24, or 23 09 25. Terminal unit space sensors specified to be provided without overrides or adjustments shall be provided under this Section. Terminal unit discharge temperature sensors shall be provided under this Section.

Use averaging elements on duct sensors when the ductwork is ten square feet or larger. All mixed air and heating coil discharge sensors shall have averaging elements regardless of duct size.

In piping systems use temperature sensors with separable wells designed to be used with temperature element.

CURRENT STATUS SWITCHES

Provide a current sensor with adjustable threshold and digital output with LED display, equal to a Veris model H-708/H-904. Threshold adjustment must be by a multi-turn potentiometer or set by multiprocessor that will automatically compensate for frequency and amperage changes associated with variable frequency drives. When used on variable speed motor applications, use a current sensor that will not change state due to varying speeds.

POWER SUPPLIES

Provide all required power supplies for transducers, sensors, transmitters and relays. All low voltage transformers shall have a resettable secondary circuit breaker and be listed as class 2 power supplies.

PART 3 - EXECUTION

GENERAL

All electronic work required as an integral part to the integration into the existing Direct Digital Control system work is the responsibility of this section unless specifically indicated otherwise in this section or in Division 26.

Contractors shall provide all labor, materials, engineering, tools, checkout and certificates required to integrate the new HVAC equipment into the existing DDC system.

Any and all points added with this project shall be grouped for display purposes into the system such that all points associated with existing DDC system can appear together on the flat panel display or printed log. Assignment of points to a group shall not be restricted by hardware configuration of the points of direct digital control. It shall be possible to assign a point to appear in more than one system. An English descriptor and an alpha/numeric identifier shall identify each system.

INSTALLATION

Install system with trained mechanics and electricians employed by the control equipment manufacturer or an authorized representative of the manufacturer. Where installing contractor is an authorized representative of the control manufacturer, such authorization shall have been in effect for a period of no less than three years.

Install all control equipment, accessories, wiring, and piping in a neat and workmanlike manner. All control devices must be installed in accessible locations. This contractor shall verify that all control devices furnished under this Section are functional and operating the mechanical equipment as specified in Section 23 09 93.

Line voltage wiring to power the DDC Controllers, not provided by the Division 26 contractor, to be by this contractor.

All cables to the electronic input/output devices, sensors, relays and interlocking wiring (all of which shall be supplied and installed under this section of specification) interfaced with the Direct Digital Control System shall be extended into the existing DDC panel with a minimum of 5 ft. of cable.

Label all control devices with the exception of valves, and terminal unit devices with permanent printed labels that correspond to control drawings. Temperature control junction and pullboxes shall be identified utilizing spray painted green covers. Other electrical system identification shall follow the 26 05 53 specification.

All control devices and electrical boxes mounted on insulated ductwork shall be mounted over the insulation. Provide mounting stand-offs where necessary for adequate support. Cutting and removal of insulation to mount devices directly on ductwork is not acceptable. This contractor shall coordinate with the insulation contractor to provide for continuous insulation of ductwork.

Mounting of electrical or electronic devices shall be protected from weather if the building is not completely enclosed. This Contractor shall be solely responsible for replacing any equipment that is damaged by water that infiltrates the building if equipment is installed prior to the building being enclosed.

Provide all electrical relays and wiring, line and low voltage, for control systems, devices and components. Install all high voltage and low voltage wiring (includes low voltage cable) in metal conduit, Electrical Non-metallic Tubing (ENT), or Electrical Metallic Tubing (EMT), as scheduled below and hereafter referred to generically as conduit except above accessible ceilings as noted below. See Wire and Air Piping Conduit Installation Schedule below for specific conduit or tubing to be used. All raceways, enclosures, fittings and associated supports shall be provided and installed according to the requirements set forth in Division 16, NFPA 90 (NEC) and Chapter SPS 316 of the Wisconsin Administrative Code. All conduits shall be routed parallel and/or perpendicular to walls and adjacent piping. Raceways shall be

located to maintain headroom and working clearance around equipment and devices that require inspection and service.

In general, support all raceways from the building structure. No component of a raceway system shall be secured to corrugated metal roof deck. Do not impose on the installations of other trades. Securing conduit, rods, straps, hangers, etc. to suspended ceiling components, electrical raceways, plumbing piping, fire protection sprinkler piping, HVAC piping or ductwork, or their associated support systems, will not be accepted.

Conduit shall be a minimum of 1/2 " for low voltage control provided the pipe fill does not exceed 40%.

Where HVAC equipment control panels, or devices, do not provide for the direct connection of conduits, exposed wiring may be extended to complete the final connections, providing it does not exceed 18 inches in length.

Minimum low voltage wiring gauge to be 18 AWG for outputs and 20 AWG for inputs. All low voltage wiring to be stranded.

Low voltage wiring can be run without conduit above accessible lay-in tile ceilings. All wiring in mechanical rooms, above inaccessible hard ceilings, exterior locations, and in any exposed areas, and in all other locations shall be in conduit. Wire for wall sensors shall be run in conduit. Wiring for radiation valves shall be run in conduit where routed through walls.

Where wiring is installed free-air, installation shall comply with the following:

- Wiring shall utilize the cable tray wherever possible.
- Wiring shall run at right angles and be kept clear of other trades work.
- Wiring shall be supported utilizing "J" or "Bridal-type" steel mounting rings anchored to ceiling concrete, piping supports, walls above ceiling or structural steel beams. Mounting rings shall be of open design (not a closed loop) to allow additional wire to be strung without being threaded through the ring. For mounting rings that do not completely surround the wire, attach the wire to the mounting ring with a strap.
- At HVAC terminal units only, where the wiring serves a specific device; e.g. controller, actuator, transmitter, etc. associated with the unit, the j-hooks or Bridal rings required to support the wiring, may be secured to the rods or straps that support the ductwork or piping that serves the unit. Wall penetrations shall be sleeved.
- Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If wiring "sag" at mid-span exceeds 6-inches; another support shall be used.
- Wall penetrations shall be sleeved, fire stopped and sealed air tight.
- Wiring shall not be supported from existing cabling, existing tubing, plumbing or steam piping, ductwork, any component of a suspended ceiling, or electrical or communications conduit.

Provide communication trunk wiring to terminal unit controllers that are specified to be connected to the building automation system. Communication trunk wiring shall be as required by the equipment specified under this section and shall be routed to the DDC panel designated for that equipment as shown on the plans or the closest DDC panel if not designated. If communication trunks require daisy chained style wiring, provide two communication cables to the DDC panel so that the communication trunk is not dead ended.

Install all terminal unit DDC controls and associated sensors furnished under this section. Contractors shall provide all 24VAC power transformers and wiring for DDC terminal unit controls. This contractor shall provide all communication wiring to the DDC supervisory controller. Provide all power and communication wiring type and installation as required by the DDC controller manufacturer. Tag all terminal units with printed labels to match the terminal unit room schedules. This contractor shall terminate wiring for all terminal unit controllers and perform end to end point checkout of all inputs and

outputs to the terminal unit controllers. This contractor shall verify the communication trunk and controller addressing.

All wiring in control panels shall be terminated on a terminal strip. Wire nuts are not acceptable. A maximum of two wires shall be terminated under any one terminal.

All electrical wiring are to be permanently tagged or labeled within one inch of terminal strip with a numbering system to correspond with the "Record Drawings".

After completion of installation, test and adjust control equipment. Submit data showing set points and final adjustments of controls.

WIRE AND AIR PIPING CONDUIT AND TUBING INSTALLATION SCHEDULE

The following conduit schedule shall apply to both polyethylene tubing and wire in conduit where conduit is specified for air tubing or wiring. Conduit and tubing referenced below shall meet specifications in Section 26 05 33 and as defined below.

- Conduit other than that specified below for specific applications shall not be used.
- Concealed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.
- Exposed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.

ROOM THERMOSTATS AND TEMPERATURE SENSORS

Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate room thermostats and sensors 48 inches above floor. Align with light switches and humidistats. For drywall installations, thermostat mounting shall use a back-box attached to a wall stud, drywall anchors are not acceptable.

Any room thermostats or sensors mounted on an exterior wall shall be mounted on a thermally insulated sub-base. Subbase to provide a minimum of one half inch of insulation.

Where thermostats or sensors are mounted on exterior walls or in any location where air transfer will affect the measured temperature or humidity seal the conduit and any other opening that will affect the measurement.

CURRENT STATUS SWITCHES

Provide for each fan or pump specified, or shown on point list. Set threshold adjustment to indicate belt or coupling loss. Readjust threshold for proper operation after final balancing is completed.

END OF SECTION

SECTION 23 09 93

SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 - GENERAL

SCOPE

This section includes control sequences for HVAC equipment as well as equipment furnished by others that may need monitoring or control. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Description of Work
- Submittals
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

- General
- Water Source Heat Pump with Radiation Control
- Water Source Heat Pump Control
- Transfer Fan Control (TF-1)
- Electric Baseboard Radiation Control

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 23 09 23 – HVAC Controls

Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC – Coordination

Division 23 - HVAC - Equipment provided to be controlled or monitored

Division 26 - Electrical - Equipment provided to be controlled or monitored

REFERENCE

Section 23 09 23 work includes furnishing and installing all field devices, including electronic sensors for the DDC of this section, equipment, and all related field wiring, interlocking control wiring between equipment, pneumatic tubing, sensor mounting, etc., that is covered in that section.

DESCRIPTION OF WORK

Control sequences are hereby defined as the manner and method by which automatic controls function. Requirements for each type of operation are specified in this section.

Operation equipment, devices and system components required for automatic control systems are specified in other Division 23 control sections of these specifications.

All temperature, humidity, and pressure sensing, and all other control signal transportation for the control sequences shall be furnished under Section 23 09 23.

Sequences for equipment controlled by Direct Digital Controls (DDC) or electric self-contained controls as specified are accomplished by hardware and software provided under Section 23 09 23.

SUBMITTALS

Refer to Division 01 of the Project Manual, Section 23 05 00 and Sections 23 09 23 for descriptions of what should be included in the submittals.

Shop drawings shall be provided by contractor(s) providing equipment under Section 23 09 23. The contractor providing the DDC equipment shall provide a complete narrative of the sequence of operations for equipment that is controlled through the DDC system. The contractor providing the 23 09 23 equipment shall provide a complete narrative of the sequence of operation for equipment that is controlled directly from that equipment (without control logic through the DDC system). The narrative of the sequence of operation shall not be a verbatim copy of the sequences contained herein, but shall reflect the actual operation as applied by the contractor.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Reference Section 23 09 23.

PART 2 - PRODUCTS

Not applicable to this Section – reference Section 23 09 23 for product descriptions.

PART 3 - EXECUTION

CONTROL SEQUENCES

GENERAL SETPOINTS:

All setpoints indicated in the control specification are to be adjustable. The setpoints shall be readily available to be modified in the mechanical system software system summary (either textual or graphic based) and under the same software level as hardware points. Some less used setpoints may be provided on a lower software level, if requested by the user Agency for clarity. The setpoints indicated herein are only specified as a calculated starting point (or initial system operation). It is expected that setpoint adjustments and control loop tuning shall be required to provide optimum system operation based on requirements of the building. The control contractor shall work with the balancing contractor and the user Agency to provide the final system setpoint adjustments and control loop tuning after the system is in operation and building is in use. Document all final setpoints on the as-built control drawings. Any questions regarding the intended operation of the HVAC equipment and control systems shall be referred to the HVAC design engineer through the appropriate construction communication process. The following setpoints should be used as initial setpoints unless otherwise specified in the individual control sequences or instructed by the user Agency. If the contractor fails to check with the user Agency for final setpoints, they shall adjust setpoints at no additional cost.

Occupied Space Terminal Unit Heating: 68° F
Occupied Space Terminal Unit Cooling: 76° F
Unoccupied Space Terminal Unit Heating: 62° F
Unoccupied Space Terminal Unit Cooling: 82° F
Mechanical or Unoccupied Space Ventilation: 82° F
Mechanical or Unoccupied Space Heating: 60° F

ANTI-CYCLING:

When HVAC equipment or a sequence is specified to be started and stopped by a temperature, humidity, pressure setpoint or any other controlled variable, there shall be an adjustable differential setpoint that shall

be set to prevent short cycling of the systems and equipment due to minor changes in the controlled variable. Temperature differential setpoints shall be set at 2° F and non-temperature setpoints shall be set at 10% of the controlled range unless otherwise specified. Setpoints shall indicate at when the process should be turned on. Heating and cooling differentials shall be set for above setpoint and will be used to turn the process off. For example, an economizer sequence called to switch at 68° F, would turn on at 68° F and off at 70° F since it is a cooling function. A heating lockout setpoint of 50° F would turn on heating control at 50° F and off at 52° F Non-temperature differentials shall be set above setpoint if the setpoint is indicating a minimum value or below setpoint if the setpoint is indicating a maximum value. Provide minimum runtime timers for loads that are cycled to prevent over-cycling. Timers shall be set as specified or as needed to prevent damage or excessive wear to the equipment. Unless otherwise specified in the individual control sequences, fans and pumps shall have a minimum runtime on timers of 15 minutes (adj.) and off timers of 5 minutes (adj.). Safeties shall override runtime timers.

DEADBANDS:

Provide deadbands for all DDC control loops to prevent constant hunting of output signals to controlled devices. Deadbands shall be set to provide adequate control around setpoint as follows unless otherwise specified in the individual control sequences:

Temperature Control: $\pm 0.5^{\circ}$ F

Humidity Control: $\pm 1\%$ RH

Airflow Control: $\pm 2\%$ of total flow

AHU Static Pressure Control: ± 0.01 in. w.c.

ALARMS:

Provide all alarmed points with adjustable time delays to prevent nuisance tripping under normal operation and on equipment start-up. For all commanded outputs that have status feedback, provide an alarm that will indicate the commanded output is not in its commanded state. Provide alarms on all points as indicated on point charts. For existing campus automations systems, add/delete what is called on the point charts for after consultation with user Agency to provide consistent alarming throughout the automation system.

For devices that have form "C" contacts available for alarm monitoring, use closed contacts for the Normal condition and open contacts on Alarm condition. This will provide a level of supervision by detecting a break in the wiring.

EQUIPMENT START/STOP FAILURE STATES:

All start/stop points for equipment shall utilize normally open contacts unless called out specifically in the individual control sequences.

CURRENT SWITCH SETUP:

When current switches are used for proving fan status, they shall be set up so that they will detect belt or coupling loss by the reduction in current draw on loss of coupled load. The current switch set up shall be redone by the 23 09 14 contractor after the balancer is complete.

THERMOSTATS AND SENSORS:

All devices and equipment including terminal units, specified to be controlled in a control sequence by a thermostat or sensor, shall be provided with a thermostat or sensor, whether or not the device is indicated on the plans. Consult the HVAC design engineer for the thermostat or sensor location.

WEEKLY SCHEDULING

Provide scheduling of DDC terminal units in groups based on occupancy. Work with the user Agency to determine how many groups are required and which zones should be included. Individual terminal units shall be able to receive temporary schedules that will override the group schedules. Temporary override buttons at the zone sensor (where specified on point charts) shall override the scheduling to occupied. When groups that consist of more than 20% of terminal units are indexed to occupied, the associated air handling unit shall start if not already running.

WATER SOURCE HEAT PUMP WITH ELECTRIC RADIATION CONTROL

This sequence is typical for multiple terminal zone control heat pumps.

The existing building automation shall control the heat pump unit.

Units shall be enabled/disabled (occupied/unoccupied) by the existing BAS.

During the occupied mode the fan shall be energized and run continuously.

On a call for heating, the electric baseboard radiation shall operate for 1st stage heating. On a further drop in space temperature, the heat pump unit mounted DDC controller shall operate the unit to provide 2nd stage heating to maintain space temperature setpoint.

The electric baseboard radiation shall be locked out when the outdoor temperature is above 60°F (adjustable).

On a call for cooling, the heat pump unit mounted DDC controller shall operate the unit to provide cooling to maintain space temperature setpoint.

Upon satisfied setpoint, unit heating or cooling shall be disabled via unit controls.

During the unoccupied mode, the unit supply fan and heating/cooling shall be “off”. On a call for setback or setup heating/cooling, the unit fan shall cycle on and unit heating/cooling shall be enabled to maintain setback/setup space temperature setpoint.

Provide the following DDC input/output points:

- Analog Inputs
 - Zone Temperature
 - Supply Air Temperature
- Digital Inputs
 - Heat Pump Unit Status (Current Sensing Switch)
- Digital Outputs
 - Unit Start/Stop (Control Relay)
 - Electric baseboard enable (Control Relay)
- Alarms
 - Zone Temperature High/Low Limit (Analog)
 - Supply Air Temperature High/Low Limit (Analog)
 - Unit Status (Digital)
- Energy Management System Functions
 - Zone Temperature Day/Night Setback
 - Outside Air Lockout (Basedboard Radiation only)
 - Unit Start/Stop (Optimum and Scheduled)

WATER SOURCE HEAT PUMP CONTROL

This sequence is typical for multiple terminal zone control heat pumps.

The existing building automation shall control the heat pump unit.

Units shall be enabled/disabled (occupied/unoccupied) by the existing BAS.

During the occupied mode the fan shall be energized and run continuously.

On a call for heating or cooling, the heat pump unit mounted DDC controller shall operate the unit to provide heating or cooling to maintain space temperature setpoint.

Upon satisfied setpoint, unit heating or cooling shall be disabled via unit controls.

During the unoccupied mode, the unit supply fan and heating/cooling shall be "off". On a call for setback or setup heating/cooling, the unit fan shall cycle on and unit heating/cooling shall be enabled to maintain setback/setup space temperature setpoint.

Provide the following DDC input/output points:

- Analog Inputs
 - Zone Temperature
 - Supply Air Temperature
- Digital Inputs
 - Heat Pump Unit Status (Current Sensing Switch)
- Digital Outputs
 - Unit Start/Stop (Control Relay)
- Alarms
 - Zone Temperature High/Low Limit (Analog)
 - Supply Air Temperature High/Low Limit (Analog)
 - Unit Status (Digital)
- Energy Management System Functions
 - Zone Temperature Day/Night Setback
 - Unit Start/Stop (Optimum and Scheduled)

TRANSFER FAN CONTROL (TF-1)

Furnish a line voltage thermostat. On a rise in space temperature, above space temperature setpoint (75°F adjustable), the transfer fan shall become energized and run continuously. On a drop in space temperature, below space temperature setpoint, the transfer fan shall become de-energized.

Provide DDC space temperature sensor for monitoring purposes only.

Provide the following DDC input/output points:

- Analog Inputs
 - Zone Temperature

Refer to Section 23 34 00 for additional requirements.

ELECTRIC BASEBOARD RADIATION CONTROL

Refer to heat pump unit with radiation sequence as described above.

END OF SECTION

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SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

SCOPE

This section contains specifications for all HVAC hydronic pipe and pipe fittings for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria

PART 2 - PRODUCTS

- Heat Pump Loop
- Vents and Relief Valves
- Cooling Coil Condensate
- Unions and Flanges
- Mechanical Grooved Pipe Connections

PART 3 - EXECUTION

- General
- Threaded Pipe Joints
- Copper Pipe Joints
- Water Systems
- Vents and Relief Valves
- Cooling Coil Condensate
- Unions and Flanges
- Piping System Leak Tests

RELATED WORK

Section 23 05 23 – HVAC General-Duty Valves and Piping Specialties
Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
Section 23 07 00 - HVAC Insulation

REFERENCE STANDARDS

ANSI B16.3	Malleable Iron Threaded Fittings
ANSI B16.4	Cast Iron Threaded Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A74	Cast Iron Soil Pipe and Fittings
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A126	Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A181	Forgings, Carbon Steel for General Purpose Piping
ASTM A197	Cupola Malleable Iron
ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures

ASTM A380 Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems
ASTM B75 Seamless Copper Tube
ASTM B88 Seamless Copper Water Tube

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

QUALITY ASSURANCE

Order Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each bundle, depending on size of pipe, and in accordance with appropriate ASTM specification.

Order copper water tube with each length marked with name or trademark of manufacturer and type of tube; with each shipping unit marked with purchase order number, metal or alloy designation, temper, size, and name of supplier in accordance with ASTM B88.

Installed material not meeting specification requirements must be replaced with material that meets Specifications without additional cost to Project.

Steel piping and fittings shall be manufactured in the United States.

DELIVERY, STORAGE, AND HANDLING

Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

Offsite storage agreements will not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

DESIGN CRITERIA

Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

Construct all piping for the highest pressures and temperatures in the respective system in accordance with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.

Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

Where ASTM A53 type F pipe is specified, ASTM A53 grade A type E or S, or ASTM A53 grade B type E or S may be substituted at Contractor's option. Where ASTM A53 grade A pipe is specified, ASTM A53 grade B pipe may be substituted at Contractor's option. Where the grade or type is not specified, Contractor may choose from those commercially available.

Where ASTM B88, type L hard temper copper tubing is specified, ASTM B88, type K hard temper copper tubing may be substituted at Contractor's option.

PART 2 - PRODUCTS

HEAT PUMP LOOP

2" and Smaller

ASTM A53, Type F, standard weight (Schedule 40) black steel pipe with ASTM A126/ANSI B16.4, Class 125, standard weight cast iron threaded fittings.

Contractor may use ASTM B88 seamless, Type L, hard temper copper tube with ANSI B16.22 wrought copper solder-joint fittings in lieu of steel pipe for piping 2" and smaller. Piping materials may be changed only once in loop to minimize electrolysis.

VENTS AND RELIEF VALVES

Use pipe and pipe fittings as specified for the system to which the relief valve or vent is connected.

COOLING COIL CONDENSATE

ASTM B88, type L hard temper copper tubing with ASTM B145/ANSI B16.23 cast red bronze or ASTM B75/ANSI B16.29 wrought solder-type drainage fittings.

UNIONS AND FLANGES

2" and Smaller: 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. Use ANSI B16.18 cast copper alloy unions on copper piping. Use unions of a pressure class equal to or higher than that specified for the fittings of the respective piping service but not less than 250 psi.

MECHANICAL GROOVED PIPE CONNECTIONS

The use of mechanical grooved pipe connections is not allowed to be used on this project.

PART 3 - EXECUTION

GENERAL

Carefully inspect all pipe, fittings, valves, equipment and accessories before installation. Any items that are unsuitable, cracked or otherwise defective shall be rejected and removed from the job site immediately. Excluding minor surface rust, piping that exhibits significant oxidation or corrosion will be rejected.

Exercise care at every stage of storage, handling, laying and erecting to prevent entry of foreign matter into piping, fittings, valves, equipment and accessories. Do not erect or install any item that is not clean.

Remove all loose dirt, scale, oil, chips, burrs and other foreign material from the internal and external surfaces of all pipe and piping components prior to assembly, including debris associated with cutting, threading and welding.

During fabrication and assembly, remove slag and weld spatter from internal pipe surfaces at all joints by peening, chipping and wire brushing.

During construction, until system is fully operational, keep all openings in piping and equipment closed except when actual work is being performed on that item of the system. Use plugs, caps, blind flanges or other items designed for this purpose.

Furnish and install all flanges, caps, bypasses, drains, valves, etc. required to facilitate flushing and draining all heating and cooling system piping.

Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not acceptable.

"Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the main.

Install drains throughout the systems to permit complete drainage.

Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment

Install all valves, control valves, and piping specialties, including items furnished by others, as specified and/or detailed. Make connections to all equipment installed by others where that equipment requires the piping services indicated in this section.

THREADED PIPE JOINTS

Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

COPPER PIPE JOINTS

Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with emery cloth or sandpaper. Remove residue from the cleaning operation, apply flux, and assemble joint. Use 95-5 solder or brazing to secure joint as specified for the specific piping service.

Where mechanically formed tee fittings are allowed, form mechanically extracted collars in a continuous operation, consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. Use an adjustable collaring device. Notch and dimple the branch tube. Remove all debris created by the forming process from the inside of the pipe. Braze the joint, applying heat properly so that pipe and tee do not distort; remove distorted connections.

WATER SYSTEM

Run water mains level or pitch horizontal mains up 1 inch in 40 feet in the direction of flow. Install manual air vents at all high points where air may collect. If vent is not in an accessible location, extend air vent piping to the nearest code acceptable drain location with vent valve located at the drain.

Main branches and runouts to terminal equipment may be made at the top, top 45 degree, side, and/or bottom 45 degree of the main provided that there are drain valves suitably located for complete system drainage and manual air vents are located at all top and top 45 degree connections. Bottom connections are not acceptable unless approved by the DFD Mechanical Inspector.

Use top or top 45 degree connection to main for upfeed risers and bottom 45 degree connection to main for downfeed risers. Bottom connections are not acceptable unless approved by the DFD Mechanical Inspector.

Use a minimum of two elbows in each pipe line to a piece of terminal equipment to provide flexibility for expansion and contraction of the piping systems. Offset pipe connections at equipment to allow for service, such as removal of the terminal device.

Use eccentric fittings for changes in horizontal pipe sizes with the fittings installed for proper air venting. Concentric fittings may be used for changes in vertical pipe sizes.

VENTS AND RELIEF VALVES

Install vent and relief valve discharge lines as indicated on the drawings, as detailed, and as specified for each specific valve or piping specialty item. In no event is a termination to occur less than six feet above a roof line.

COOLING COIL CONDENSATE

Trap each cooling coil drain pan connection with a trap seal of sufficient depth to prevent conditioned air from moving through the piping. Extend drain piping to nearest code approved drain location. Construct trap with plugged tee for cleanout purposes as detailed.

UNIONS AND FLANGES

Install a union or flange, as required, at each piece of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.

PIPING SYSTEM LEAK TESTS

Verify that the piping system being tested is fully connected to all components and that all equipment is properly installed, wired, and ready for operation. If required for the additional pressure load under test, provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can withstand any additional weight load that may be imposed by the test.

Provide all piping, fittings, blind flanges, and equipment to perform the testing.

Conduct pressure test with test medium of air or water unless specifically indicated. Minimum test time is indicated in the table below; additional time may be necessary to conduct an examination for leakage. Each test must be witnessed by the Division's representative. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.

Do not insulate pipe until it has been successfully tested.

For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

For air tests, gradually increase the pressure to not more than one half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. The piping system exclusive of possible localized instances at pump or valve packing shall show no evidence of leaking. After testing is complete, slowly release the pressure in a safe manner.

<u>System</u>	<u>Pressure</u>	<u>Medium</u>	<u>Duration</u>
Heat Pump Loop	100 psig	Water	8 hr

All pressure tests are to be documented on a Division of Facilities Development form included in this specification.

On piping that cannot be tested because of connection to an active line, provide temporary blind flanges and hydrostatically test new section of piping. After completion of test, remove temporary flanges and make final connections to piping. Die penetrate test pass weld or x-ray the piping that was not hydrostatically tested up to the active system.

INITIAL FILL AND VENT

Fill hydronic systems with appropriate working fluids as specified. All system fluids shall be chemically treated as is typical building standard.

For closed piping systems, all air trapped at high points shall be relieved through the manual air vents prior to the systems being tested and balanced.

Check system operating pressure and verify pressure at fill location corresponds the specified fill pressure.

END OF SECTION

PIPING SYSTEM LEAKAGE TEST REPORT

State of Wisconsin
Department of Administration
Division of Facilities Development

Date
Submitted: _____

Project Name: _____

Location: _____ DFD Project No: _____

Contractor: _____

- HVAC Refrigeration Controls
- Power Plant Plumbing Sprinkler
- Test Medium: Air Water Other _____

Test performed per specification section No. _____

Specified Test Duration _____ Hours Specified Test Pressure _____ PSIG

System Identification: _____

Describe Location: _____

Test Date: _____

Start Test Time: _____ Initial Pressure: _____ PSIG

Stop Test Time: _____ Final Pressure: _____ PSIG

Tested By: _____ Witnessed By: _____

Title: _____ Title: _____

Signed: _____ Signed: _____

Date: _____ Date: _____

Comments: _____

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SECTION 23 31 00

METAL DUCTS

PART 1 - GENERAL

SCOPE

This section includes specifications for all duct systems used on this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Design Criteria

PART 2 - PRODUCTS

- General
- Materials
- Low Pressure Ductwork (Maximum 3 inch pressure class)
- Duct Sealant
- Gaskets

PART 3 - EXECUTION

- Installation
- Ductwork Support
- Low Pressure Duct (Maximum 3 inch pressure class)
- Cleaning

RELATED WORK

Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC
Section 23 33 00 – Air Duct Accessories

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

ASTM A623	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
ASTM A527	Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
ASTM 924	Standard Specification for General Requirements for Sheet Steel, Metallic-coated by the Hot-dip Method
ASTM C 411	Test Method for Hot Surface Performance of High Temperature Thermal Insulation
ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM C 1338	Test Method for Determining Fungal Resistance of Insulation Materials and Facings
ASTM C 916	Standard Specification for Adhesives for Duct Thermal InsulationNFPA 90A
UL 181	Standard for Safety for Factory Made Air Ducts and Air Connectors.

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Include manufacturer's data and/or Contractor data for the following:

- Fabrication and installation drawings.
- Schedule of duct systems including material of construction, gauge, pressure class, system class, method of reinforcement, joint construction, fitting construction, and support methods, all with details as appropriate.
- Duct sealant and gasket material.
- Duct liner including data on thermal conductivity, air friction correction factor, and limitation on temperature and velocity.

DESIGN CRITERIA

Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under specified operating conditions.

Use material, weight, thickness, gauge, construction and installation methods as outlined in the following SMACNA publications, unless noted otherwise:

- HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005
- HVAC Air Duct Leakage Test Manual, 2nd Edition, 2012
- HVAC Systems - Duct Design, 4th Edition, 2006
- Rectangular Industrial Duct Construction Standard, 2nd Edition, 2004
- Round Industrial Duct Construction Standards, 2nd Edition, 1999
- Thermoplastic Duct (PVC) Construction Manual, 2nd Edition, 1995

Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

DELIVERY, STORAGE AND HANDLING

Promptly inspect shipments to ensure that Ductwork is undamaged and complies with the specification.

Protect Ductwork against damage.

Protect Ductwork by storing inside or by durable, waterproof, above ground packaging. Do not store material on grade. Protect Ductwork from dirt, dust, construction debris and foreign material. Where end caps/packaging are provided, take precautions so caps/packaging remain in place and free from damage.

Offsite storage agreements do not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

PART 2 - PRODUCTS

GENERAL

All sheet metal used for construction of duct shall be 24 gauge or heavier except for round and spiral ductwork and spiral duct take-offs 12" and below may be 26 gauge where allowed in SMACNA HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005.

Duct sizes indicated on plans are net inside dimensions; where duct liner is specified, dimensions are net, inside of liner.

DUCTWORK PRESSURE CLASS

Minimum acceptable duct pressure class, for all ductwork except transfer ductwork, is 2 inch W.G. positive or negative, depending on the application. Transfer ductwork minimum acceptable duct pressure class is 1 inch W.G. positive or negative, depending on the application. Duct system pressure classes not indicated on the drawings to be as follows:

Duct Type/Location	Pressure Class	Duct Construction	Lining
Supply duct downstream of Heat Pumps	2 in. pressure class	Single Wall	No
Transfer air ducts	½ in. pressure class	Single Wall	Yes
Exhaust air ducts	2 in. pressure class	Single Wall	No
Return air ducts	2 in. pressure class	Single Wall	No

MATERIALS

GALVANIZED STEEL SHEET:

Use ASTM A 653 galvanized steel sheet of lock forming quality. Galvanized coating to be 1.25 ounces per square foot, both sides of sheet, G90 in accordance with ASTM A90. Provide "Paint Grip" finish or galvaneal sheetmetal for ductwork that will be painted.

LOW PRESSURE DUCTWORK (Maximum 3 inch pressure class)

Fabricate and install ductwork in sizes indicated on the drawings and in accordance with SMACNA recommendations, except as modified below.

Construct so that all interior surfaces are smooth. Use slip and drive or flanged and bolted construction when fabricating rectangular ductwork. Use spiral lock seam construction when fabricating round spiral ductwork. Sheet metal screws may be used on duct hangers, transverse joints and other SMACNA approved locations if the screw does not extend more than 1/2 inch into the duct.

Use elbows and tees with a center line radius to width or diameter ratio of 1.5 wherever space permits. When a shorter radius must be used due to limited space, install single wall sheet metal splitter vanes in accordance with SMACNA publications, Type RE 3. Where space will not allow and the C value of the radius elbow, as given in SMACNA publications, exceeds 0.31, use rectangular elbows with turning vanes as specified in Section 23 33 00. Square throat-radius heel elbows will not be acceptable. Straight taps or bullhead tees are not acceptable.

Where rectangular elbows are used, provide turning vanes in accordance with Section 23 33 00.

Provide expanded take-offs or 45 degree entry fittings for branch duct connections with branch ductwork airflow velocities greater than 700 fpm. Square edge 90-degree take-off fittings or straight taps will not be accepted.

Button punch snaplock construction will not be accepted on aluminum ductwork.

Round ducts may be substituted for rectangular ducts if sized in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission of the Architect/Engineer.

Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

Rectangular:

Rectangular high-pressure duct using transverse joint system as manufactured by Ductmate or Nexus. Duct shall be flanged, gasketed and sealed, with bolted construction.

Single Wall Round:

Manufacturers:

Ajax, Semco, Lindab or United Sheet Metal.

Machine formed round and flat oval spiral lock seam duct constructed of G-90 galvanized steel.

Contractor fabricated spiral round ductwork meeting specified construction standards is acceptable with prior approval of Architect/Engineer. Submit construction details, description of materials to be used, type of service, reinforcing methods, and sealing

DUCT SEALANT

Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal & Seal, Lockformer cold sealant, Mon-Eco Industries, United Sheet Metal, or approved equal. Silicone sealants are not allowed in any type of ductwork installation.

Install sealants in strict accordance with manufacturer's recommendations, paying special attention to temperature limitations. Allow sealant to fully cure before pressure testing of ductwork, or before startup of air handling systems.

GASKETS

3 INCH PRESSURE CLASS AND LOWER:

Soft neoprene or butyl gaskets in combination with duct sealant for flanged joints.

PART 3 - EXECUTION

INSTALLATION

Verify dimensions at the site, making field measurements and drawings necessary for fabrication and erection. Check plans showing work of other trades and consult with Architect in the event of any interference.

Make allowances for beams, pipes or other obstructions in building construction and for work of other contractors. Transform, divide or offset ducts as required, in accordance with SMACNA HVAC Duct Construction Standards, Figure 4-7, except do not reduce duct to less than six inches in any dimension and do not exceed an 8:1 aspect ratio. Where it is necessary to take pipes or similar obstructions through ducts, construct easement as indicated in SMACNA HVAC Duct Construction Standards, Figure 4-8, Fig. E. In all cases, seal to prevent air leakage. Pipes or similar obstructions may not pass through high pressure or fume exhaust ductwork.

Cut or drill temporary test holes in ducts for required testing. Cap with neoprene plugs, threaded plugs, or threaded or twist-on metal caps. Test openings for test and balance work will be provided under Section 23 05 93.

Provide frames constructed of angles or channels for coils, filters, dampers or other devices installed in duct systems, and make all connections to such equipment including equipment furnished by others. Secure frames with gaskets and screws or nut, bolts and washers.

Install duct to pitch toward outside air intakes and drain to outside of building. Solder or seal seams to form watertight joints.

Where two different metal ducts meet, the joint shall be installed in such a manner that metal ducts do not contact each other by using proper seal or compound.

Do not install ductwork through dedicated electrical rooms or spaces unless the ductwork is serving this room or space.

Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

Provide adequate access to ductwork for cleaning purposes.

Provide temporary capping of ductwork openings to prevent entry of dirt, dust and foreign material.

Protect diffusers, registers and grilles with plastic wrap or some other approved form of protection to maintain dirt and dust free and to prevent entry of dirt, dust and foreign material into the Ductwork.

Install prefabricated grease ductwork assemblies in accordance with manufacturer requirements and NFPA 96.

During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

DUCTWORK SUPPORT

Support ductwork in accordance with SMACNA HVAC Duct Construction Standards, Figure 5-5, except supporting ductwork with secure wire method is not allowed.

Support with 3/32 inch, 7 x 7, stainless steel air-craft cable, with matching serrated spring loaded wedge mechanism fasteners rated for actual load. Steel cable hanging systems will be allowed on round ductwork under 12 inches diameter if installed utilizing two fasteners with two cable loops. Comply with the manufacturer's installation instructions.

LOW PRESSURE DUCTWORK (MAXIMUM 3 INCH PRESSURE CLASS)

Seal ductwork in accordance with SMACNA seal Class "B". Seams, joints, and penetrations shall be sealed.

Install manual balancing damper in each branch duct and for each diffuser or grille. Use of splitter dampers, extractors, or grille face dampers is not acceptable as use as balancing dampers.

Hangers must be wrapped around bottom edge of duct and securely fastened to duct with sheetmetal screws or pop rivets. Trapeze hangers may be used at Contractor's option.

CLEANING

Remove all dirt and foreign matter from the entire duct system and clean diffusers, registers, grilles and the inside of air-handling units before operating fans.

Clean duct systems with high power vacuum machines where systems have been used for temporary heat, air-conditioning, or ventilation purposes during construction. Protect equipment that may be harmed by excessive dirt with filters, or bypass during cleaning.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

SCOPE

This sections includes accessories used in the installation of duct systems. Included are the following topics:

PART 1 - GENERAL

- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data

PART 2 - PRODUCTS

- Manual Volume Dampers
- Turning Vanes
- Flexible Duct
- Duct Lining
- Duct Flexible Connections

PART 3 - EXECUTION

- Manual Volume Dampers
- Turning Vanes
- Duct Flexible Connections

RELATED WORK

- Section 23 05 29 – Hanger and Supports for HVAC Piping and Equipment
- Section 23 05 48 – Vibration Control
- Section 23 31 00 – Metal Ducts

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

NFPA 90A	Standard for Installation of Air Conditioning and Ventilating Systems
SMACNA	HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition, 1995
UL 214	
UL 555 (6 th edition)	Standard for Fire Dampers and Ceiling Dampers
UL 555S (4 th edition)	Leakage Rated Dampers for Use in Smoke Control Systems

QUALITY ASSURANCE

Refer to Division 01 of Project Manual.

SHOP DRAWINGS

Refer to Division 01 of Project Manual.

Submit for all accessories and include dimensions, capacities, ratings, installation instructions, and appropriate identification.

Include certified test data on dynamic insertion loss, self-noise power levels, and aerodynamic performance of sound attenuators.

Submit manufacturer's color charts where finish color is specified to be selected by the Architect/Engineer.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS

MANUAL VOLUME DAMPERS

Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.

Dampers must be constructed in accordance with SMACNA Fig. 2-12, Fig. 2-13, and notes relating to these figures, except as modified below.

Reinforce all blades to prevent vibration, flutter, or other noise. Construct dampers in multiple sections with mullions where width is over 48 inches. Use rivets or tack welds to secure individual components; sheet metal screws will not be accepted. Provide operators with locking devices and damper position indicators for each damper; use an elevated platform on insulated ducts. Provide end bearings or bushings for all volume damper rods penetrating ductwork constructed to a 3" w.c. pressure class or above.

TURNING VANES

Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

Construct turning vanes and runners for square elbows in accordance with SMACNA Fig. 2-3 and Fig. 2-4 except use only airfoil type vanes. Construct turning vanes for short radius elbows and elbows where one dimension changes in the turn in accordance with SMACNA Fig. 2-5 and Fig. 2-6.

FLEXIBLE DUCT

Manufacturers: Anco Products, Clevaflex, Thermaflex, Flexmaster or approved equal.

Factory fabricated, UL 181 listed as a class 1 duct, and having a flame spread of 25 or less and a smoke developed rating of 50 or under in accordance with NFPA 90A.

Suitable for pressures and temperatures involved but not less than a 180°F service temperature and ±2 inch pressure class, depending on the application.

Duct to be composed of polyester film, aluminum laminate or woven and coated fiberglass fabric bonded permanently to corrosion resistant coated steel wire helix. Two-ply, laminated, and corrugated aluminum construction may also be used.

Where duct is specified to be insulated, provide a minimum 1 inch fiberglass insulation blanket with maximum thermal conductance of 0.23 K (75 degrees F.) and vapor barrier jacket of polyethylene or metalized reinforced film laminate. Maximum perm rating of vapor barrier jacket to be 0.1 perm.

DUCT LINING

Manufacturer: Manville, Owens-Corning, Knauf, or approved equal.

1 inch thick, flexible, mat faced insulation made from inorganic glass fibers bonded with a thermosetting resin with thermal conductivity of .25 Btu inch / hour sq.ft. deg F.

Meet erosion testing per UL 181 or ASTM C 1071 for 5000 fpm maximum air velocity. ASTM C 411 maximum operating temperature rating of 250 deg F. ASTM E84 flame spread less than 25 and smoke developed less than 50.

Meet requirements of ASTM C 1338 and ASTM G21 for fungi resistance.

Install liner using adhesive conforming to ASTM C 916.

DUCT FLEXIBLE CONNECTIONS

Material to be fire retardant, be UL 214 listed, and meet the requirements of NFPA 90A.

Connections to be a minimum of 3 inches wide, crimped into metal edging strip, and air tight. Connections to have adequate flexibility and width to allow for thermal expansion/contraction, vibration of connected equipment, and other movement.

Use coated glass fiber fabric for all applications. Material for inside applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with neoprene, air and water tight, suitable for temperatures between -10°F and 200°F, and have a nominal weight of 30 ounces per square yard. Material used for outdoor applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with Hypalon, air and water tight, suitable for temperatures between -10°F and 250°F, and have a nominal weight of 26 ounces per square yard.

PART 3 - EXECUTION

MANUAL VOLUME DAMPERS

Install manual volume dampers in each branch duct and for each grille, register, or diffuser as far away from the outlet as possible while still maintaining accessibility to the damper. Install so there is no flutter or vibration of the damper blade(s).

TURNING VANES

Install turning vanes in all rectangular, mitered elbows in accordance with SMACNA standards and/or manufacturer's recommendations.

Install double wall, airfoil, 2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity less than 2000 fpm. Install double wall, airfoil, 4-1/2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity 2000 fpm or greater.

If duct size changes in a mitered elbow, use single wall type vanes with a trailing edge extension. If duct size changes in a radius elbow or if short radius elbows must be used, install sheetmetal turning vanes in accordance with SMACNA Figure 2-5 and Figure 2-6.

FLEXIBLE DUCT

Flexible duct may only be used for final connections of air inlets and outlets at diffuser, register, and grille locations. Where flexible duct is used, it shall be the minimum length required to make the final connections, but no greater than 5 feet in length, and have no more than one (1) 90 degree bend.

Secure inner jacket of flexible duct in place with stainless steel metal band clamp. Secure insulation vapor barrier jacket in place with steel or nylon draw band. Sheetmetal screws and/or duct tape will not be accepted.

Flexible duct used to compensate for misalignment of main duct or branch duct will not be accepted.

Individual sections of flexible ductwork shall be of one piece construction. Splicing of short sections will not be accepted.

Flexible ductwork used as transfer duct shall be sized for a maximum velocity of 300 fpm.

Penetration of any partition, wall, or floor with flexible duct will not be accepted.

DUCT LINING

Apply lining to the following ductwork:

- All new transfer ductwork

Install liner in compliance with the latest edition of NAIMA's Fibrous Glass Duct Liner Standard. Locate longitudinal joints at the corners of duct only. Cut and fit to assure lapped, compressed joints. Coat all transverse and longitudinal joints and edges with adhesive. Provide metal nosing on leading edge where lined duct is preceded by unlined duct. Adhere liner to duct with full coverage area of adhesive. Additionally secure liner to duct using mechanical fasteners spaced as recommended by the liner manufacturer without compressing liner more than 1/8" with the fasteners.

DUCT FLEXIBLE CONNECTIONS

Install at all duct connections to rotating or vibrating equipment, including air handling units (unless unit is internally isolated), fans, or other motorized equipment in accordance with SMACNA Figure 2-19. Install thrust restraints to prevent excess strain on duct flexible connections at fan inlets and outlets; see Related Work.

END OF SECTION

SECTION 23 34 00

HVAC FANS

PART 1 - GENERAL

SCOPE

This section includes specifications for fans that are not an integral part of a manufactured device. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS

- General
- Ceiling Exhaust Fans

PART 3 - EXECUTION

- Installation

RELATED WORK

- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 05 13 - Common Motor Requirements for HVAC Equipment
- Section 23 05 48 - Vibration Control

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

AMCA 203	AMCA Fan Application Manual - Troubleshooting
AMCA 210	Laboratory Method of Testing Fans for Rating
AMCA 300	Reverberant Room Method for Sound Testing of Fans
NFPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Include dimensions, capacities, fan curves, materials of construction, ratings, weights, motors and drives, sound power levels, appropriate identification and vibration isolation for all equipment. Sound power levels to be based on tests performed in accordance with AMCA Standard 300.

Submit color selection charts for equipment where applicable.

Fan curves shall indicate the relationship of CFM to static or total pressure for various fan speeds. Brake horsepower, recommended selection range, and limits of operation are to also be indicated on the curves. Indicate operating point on the fan curves at design air quantity and indicate the manufacturer's recommended drive loss factor for the specific application. Tabular fan performance data is not acceptable.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Tested and certify all fans in accordance with the applicable AMCA test code.

Each fan and motor combination shall be capable of delivering 110% of air quantity scheduled at scheduled static pressure. The motor furnished with the fan shall not operate into the motor service factor when operating under these conditions.

Consider drive efficiency in motor selection according to manufacturer's published recommendation or according to AMCA Publication 203, Appendix L.

Where inlet and outlet ductwork at any fan is changed from that shown on the drawings, provide any motor, drive and/or wiring changes required due to increased static pressure or baffling necessary to prevent uneven airflow or improve mixing.

All internal insulation and other components exposed to the airstream are to meet the flame spread and smoke ratings contained in NFPA 90A.

PART 2 - PRODUCTS

GENERAL

Use fan size, class, type, arrangement, and capacity as scheduled.

Furnish complete with motors, wheels, drive assemblies, bearings, vibration isolation devices, and accessories required for specified performance and proper operation. All single phase motors to have inherent thermal overload protection.

Provide variable pitch sheaves for drives 3 hp and smaller, fixed pitch sheaves for drives 5 hp and larger. Design all drives for 150% of motor rating.

Use OSHA approved belt guards that totally enclose the entire drive. Construct guards of expanded metal to allow for ventilation; provide tachometer openings at shaft locations.

Statically and dynamically balance all fans so they operate without objectionable noise or vibration.

Use AMCA Type A spark resistant construction for all fans handling flammable or explosive vapors.

All fans handling grease laden vapors shall meet the requirements of UL 762 and NFPA 96.

Provide a corrosion resistant coating on all surfaces exposed to fume and other corrosive exhaust air. Coating to be as scheduled.

CEILING EXHAUST FANS

Carnes, Greenheck, Cook, or approved equal.

Centrifugal blower wheel, steel housing with acoustical lining, integral exhaust grille, adjustable mounting brackets to allow for any ceiling thickness, permanently lubricated motor, integral junction box with permanently lubricated and thermally protected motor factory wired.

Provide grille discharge as indicated on the drawings.

For ventilation applications, furnish fan with line voltage thermostat to Division 26 Electrical Contractor. Electrical Contractor to install thermostat, power to fan, and line voltage control wiring to thermostat.

PART 3 - EXECUTION

INSTALLATION

Install as shown on the drawings, as detailed, and according to manufacturer's installation instructions.

Install thrust restraints in accordance with the requirements of Section 23 05 48.

END OF SECTION

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SECTION 23 37 13

GRILLES, DIFFUSERS, AND REGISTERS

PART 1 - GENERAL

SCOPE

This section includes specifications for air terminal equipment. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Submittals
- Design Criteria

PART 2 - PRODUCTS

- Manufacturers
- Square Ceiling Diffusers
- Side-Wall Registers and Grilles

PART 3 - EXECUTION

- Installation

RELATED WORK

- Section 23 31 00 – Metal Ducts
- Section 23 33 00 - Air Duct Accessories
- Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- UL 181 - Factory-Made Air Ducts and Connectors.
- ARI-ADC Standard 880

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SUBMITTALS

Refer to Division 01 of the Project Manual.

Furnish submittal information including, but not limited to, the following:

- Manufacturer's name and model number
- Identification as referenced in the documents
- Capacities/ratings
- Materials of construction
- Sound ratings
- Dimensions
- Finish
- Color selection charts where applicable
- Manufacturer's installation instructions

All other appropriate data

DESIGN CRITERIA

All performance data shall be based on tests conducted in accordance with Air Diffusion Council (ADC) Test Code 1062 GRD 84.

PART 2 - PRODUCTS

MANUFACTURERS

All new grilles must match existing grilles.

Manufacturers: Carnes, Krueger, Titus, Metal-Aire, and E.H. Price.

Acceptable manufacturers for specific products are listed under each item.

SQUARE CEILING DIFFUSERS

Carnes SKTA or equal.

Aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type appropriate to installation.

Directional blow pattern as shown on the drawings and/or as scheduled.

One-piece construction louver cones with no corner joints.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

SIDE-WALL REGISTERS AND GRILLES

Carnes model R series or equal

Aluminum (Steel) unless otherwise indicated, with frame type appropriate to installation.

Double deflection type blade supply registers and supply grilles allow deflection adjustment in all direction.

Opposed blade volume control damper supply registers, operable from face.

Fixed blade (45 degree) core return and exhaust registers and grilles. Return grilles shall be provided with integral filter.

Register and grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

Screw holes on surface counter sunk to accept recessed type screws.

PART 3 - EXECUTION

INSTALLATION

Install grilles, registers and diffusers as shown on drawings and according to manufacturer's instructions.

Furnish diffusers with equalizing grids where it is not possible to maintain minimum 2 duct diameter straight duct into diffuser. Equalizing grids shall consist of individually adjustable vanes designed for equalizing airflow into diffuser neck and providing directional control of airflow.

Unless otherwise indicated, size ductwork drops to diffusers or grilles to match unit collar size.

Seal connections between ductwork drops and diffusers/grilles airtight.

Where diffusers, registers and grilles cannot be installed to avoid seeing inside duct, paint inside of duct with flat black paint to reduce visibility.

END OF SECTION

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SECTION 23 81 46

WATER SOURCE HEAT PUMPS

PART 1 - GENERAL

SCOPE

This section contains specifications for all water source heat pumps units for this project. Included are the following requirements:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Quality Assurance
- Design Criteria
- Shop Drawings
- Warranty

PART 2 -PRODUCTS

- Manufacturers
- General
- Unit Cabinet
- Fans and Motors
- Refrigeration System
- Unit Controls and Safety Controls
- Unit Electrical
- Unit Filter Section
- Accessories
- Controls
- Hose Kit

PART 3 - EXECUTION

- Installation
- Manufacturer's DDC Points List

RELATED WORK

Refer to Division 01 of Project Manual.

Section 23 21 13 – Hydronic Piping

Section 23 05 23.10 – HVAC General Duty Valves and Piping Specialties

Section 23 05 29 - Hangers, Supports for HVAC Equipment

Section 23 05 13 - Common Motor Requirements for HVAC Equipment

Section 23 05 48 - Vibration Control

Section 23 09 23 – HVAC Controls

Section 23 09 93 - Sequence of Operation for HVAC Controls

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Refer to Division 01 of Project Manual.

DESIGN CRITERIA

ARI 320 - Water Source Heat Pump Equipment

ANSI/UL 559 - Standard for Heat Pumps

CSA C22.2 No. 186.1 Central Forced Air Unitary Heat Pumps with or without Electric Resistance Heat. The units shall be furnished complete with all controls, piping connections, filters, etc. as required for a complete installation.

SHOP DRAWINGS

Submit shop drawings for all equipment specified under this section. Include data concerning sizes, dimensions, weights, cooling and heating capacities, materials of construction, ratings, electrical data, wiring diagrams, controls and options. Shop drawings shall indicate all water, drain and electrical rough-in connections and the manufacturers installation requirements, instructions, installation recommendations and maintenance and repair data.

WARRANTY

Unit shall be provided with a one year manufacturer's warranty on parts and labor, and an extended warranty which shall include coverage of the refrigeration system and compressor for an extended time period from the end of the standard 1 year coverage through the 5th year.

PART 2 – PRODUCTS

MANUFACTURERS: Carrier 50PS or approve equal.

GENERAL

Units shall be designed to operate throughout an extended range of entering fluid temperature, 25°F to 110°F. All equipment in this section with a nominal capacity of 134,000 BTUH Total Cooling or lower must be listed in the current AHRI Applied Equipment Directory under the AHRI Standard ISO-13256-1, GLHP Rating. Equipment with an AHRI listing only for the WLHP Rating shall not be allowed. All equipment in this section with a nominal capacity greater than 134,000 BTUH Total Cooling shall be rated in accordance to AHRI Standard ISO-13256-1, GLHP Rating with published submittal performance from the manufacturer. All equipment in this section must meet or exceed the national standard minimum 13.4 EER and 3.1 COP as listed in ASHRAE 90.1-2007 for the AHRI-ISO-13256-1, GLHP Rating. All units shall be listed with Underwriters Laboratories (UL), NRTL or Canadian Standards Association (CSA). All units shall have ARI-13256-1 labels, and UL or NRTL or CSA labels.

Unit shall include integral unit cabinet, micro-electronic unit control processor, high efficiency compressor, water-to-refrigerant coil, thermostatic expansion valve, filter dryer, refrigerant access ports, air-to-air refrigerant coil and motor and fan assembly.

Units shall be completely factory assembled and tested, piped, internally wired fully charged with refrigerant and oil and shipped in one piece. All units shall be factory run tested.

UNIT CABINET

Units shall have the air flow arrangement as shown on the plans. If units with these arrangements are not used, the contractor supplying the water source heat pumps is responsible for any extra costs incurred by other trades and must submit mechanical drawings showing ductwork requirements and changes or relocation of any other mechanical or electrical system. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service.

All units shall have stainless steel drain pans to comply with this project's IAQ requirements. Galvanized drain pans shall not be allowed.

All water source heat pumps shall be fabricated from heavy gauge corrosion resistant sheet metal. Units 70,000 BTUH or smaller shall have Galvalume Plus sheet metal with a clear acrylic coating. Units 72,000 BTUH and larger shall have G90 galvanized sheet metal. All interior surfaces shall be lined with 1/2 inch thick, multi density acoustic insulation. All insulation must meet NFPA 90A and be certified to meet the GREENGUARD Indoor Air Quality Standard for Low Emitting Products. One blower access panel and

two compressor compartment access panels shall be removable with supply and return air ductwork in place.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be FPT fittings and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. Water connections which protrude through the cabinet shall not be allowed.

FANS AND MOTORS (0.5 Ton to 6.0 Ton)

Units with a nominal rating of 70,000 BTUH Total Cooling and under shall have a direct-drive centrifugal fan. The fan motor shall be 3-speed, permanently lubricated, PSC type with thermal overload protection. The fan motor shall be isolated from the fan housing by torsionally flexible isolation.

Units with a nominal rating of 72,000 BTUH Total Cooling and above shall have a belt drive fan assembly. The assembly shall include a forward curved fan wheel, housing, solid steel fan shaft encased in ball bearings, fan pulley and adjustable motor sheave. The motor shall have internal thermal overload protection. The motor shall be mounted on an adjustable base for proper belt tension.

The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. External static pressure rating of the unit shall be based on a wet coil. Ratings based on a dry coil shall NOT be acceptable.

The unit fan assembly shall have the ability to discharge on the right side, left side or on the end. The discharge must also be capable of being changed to any of these locations in the field.

The Unit return air opening shall have the ability to be located on either side of the unit, including the same side of the unit as the discharge.

REFRIGERATION SYSTEM

Units shall use R-410A refrigerant. Units that use R-22 refrigerant shall not be allowed.

All units shall have a factory sealed and fully charged refrigerant circuit with the following components. All units with a nominal rating of 72,000 BTUH Total Cooling and above shall have two independent refrigerant circuits each with the following components:

Hermetic compressor(s): Hermetic rotary, reciprocating, and scroll compressors shall be specifically designed for R-410A refrigerant and shall be internally sprung with thermal overload protection. Compressors shall have double external isolation from the base pan: each compressor shall be mounted on rubber isolators and the rubber isolators shall be located on mounting rails in an insulated compartment to minimize sound transmission. Reciprocating compressors shall require a discharge gas muffler.

A refrigerant metering thermal expansion valve.

Baked polyester enamel coated (rated at 1,000 hour salt spray protection equivalent or better) finned tube refrigerant to air heat exchanger not exceeding 14 fins per inch. Refrigerant to air heat exchangers shall utilize enhanced aluminum fins and rifled copper tube construction rated to withstand 450 PSIG refrigerant working pressure. All air coils shall have non-ferrous aluminum end plates.

Reversing valve. Reversing valves shall be four-way solenoid activated refrigerant valves which shall fail to the heating operation should the solenoid fail to function. Reversing valves which fail to the cooling operation shall not be allowed.

A fully insulated, coaxial (tube in tube) refrigerant to water heat exchanger. Refrigerant to water heat exchangers shall be of copper inner water tube and steel outer refrigerant tube design rated to withstand 450 PSIG working refrigerant pressure and 400 PSIG working water pressure.

Safety controls including both a high pressure and low pressure switch. Temperature sensors shall not replace these safety switches. All Horizontal units shall have a high level condensate sensor mounted within the primary drain pan. See the controls section of this specification for additional information.

Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

Activation of any safety device shall prevent compressor operation via a lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable. Refer to solid state safety circuit below.

Hanging brackets shall be provided for horizontal units having a capacity of 70,000 Btu/hr or less. The unit compressor(s) shall be internally isolated to provide quiet operation. Compressor motors shall include internal thermal overload protection.

UNIT SAFETY CONTROLS

All units shall have a solid-state UPM safety control circuit with the following features:

- Anti-short cycle time delay on compressor operation.
- Brown out/Surge/Power Interruption protection.
- Low Pressure Switch 90 second bypass timer.
- Shutdown on high or low refrigerant pressure safety switch inputs, and shutdown for the optional freezestat or optional high level condensate sensor.
- Alarm output which closes for 24VAC remote fault indication.
- Alarm output selectable for constant output for general alarm notification, or pulse output for annunciation of the specific fault alarm
- Reset unit at thermostat or disconnect.
- Automatic intelligent reset. Unit shall automatically reset the unit after a safety shut down and restart the unit after the anti-short cycle timer and random start timer expire. Should a fault re-occur within 60 minutes after reset, then a permanent lockout will occur.
- Ability to defeat time delays for servicing.
- A light emitting diode (LED) to indicate safety alarms. The LED shall annunciate the following alarms: high refrigerant pressure, low refrigerant pressure, low water temperature, a high level of condensate in the drain pan, or brown out/surge/ power interruption. The LED will display each fault condition as soon as the fault occurs. If a permanent lockout occurs, then the fault LED will display the type of fault until the unit is reset.
- UL listed, CUL listed, and RFI, ESD, and transient protected.
- All control and power wiring shall be numbered and all wiring shall be connected to numbered wiring terminals.

UNIT ELECTRICAL

A control box shall be located within the unit and shall contain a transformer, controls for the compressor, reversing valve and fan motor operation and shall have a terminal block for low voltage field wiring connections. The transformer shall be rated for a minimum 50 VA for single compressor units and 75 VA for dual compressor units. All units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volts.

ACCESSORIES

Each unit shall be provided with a water supply and return hose kit consisting of two hoses, each two feet long with a metal braided jacket. The hose assembly shall be a section of hose that includes a separable adapter fitting. A male pipe thread shall be provided at both ends of the hose assembly. The hose kit working pressure shall be rated for a minimum of 225 PSI. The hose kits shall be smoke and fire rated in accordance with UL, ANSI and ASTM Standards and shall have maximum ratings of 50 for smoke developed and 25 for flame spread.

Freeze Protection: A freezestat shall sense the leaving water temperature of the unit and shall activate the lockout circuit when water temperature drops below 35 °F. Refrigerant temperature sensors or pressure switches shall not be acceptable.

Non-Fused Disconnect Switch: For all units rated 70,000 BTUH and smaller, provide a factory mounted and wired non-fused disconnect switch with lock out, tag out provisions.

Voltage Monitor: Where indicated on the heat pump schedule for three phase voltage units, a voltage monitor shall activate the lockout circuit when a phase loss, phase reversal, or phase imbalance occurs. An LED shall indicate that the phase monitor is functioning and a separate LED shall indicate when a fault has occurred.

Extra quiet construction: additional closed cell rubber insulation on the base pan of the compressor compartment.

CONTROLS

Section 23 09 23 contractor(s) will provide a DDC controller for each heat pump. Heat pump factory controls shall be compatible with Section 23 09 23 furnished controller. Heat pump manufacturer is expected to coordinate with Section 23 09 23 contractor(s). Refer to Section 23 09 93 for required list of controls points.

HOSE KIT

All units 120,000 BTUH and below shall be connected with hoses. The hoses shall be 2 feet long, braided stainless steel, fire rated hoses complete with adapters. Non fire rated hoses are not acceptable. Optional ball valves with P/T ports shall be included for each unit.

PART 3 – EXECUTION

INSTALLATION

Install the units in accordance with manufacturer's instructions and recommendations.

Coordinate installation of units with architectural, mechanical, and electrical work.

Each unit shall be supplied fully charged with refrigerant and oil.

Install all factory furnished components and accessories as required for a complete installation.

Provide complete unit start-up and check-out to insure that unit is installed and operating in accordance with the manufacturer's instructions and recommendations.

Provide flexible duct connections at the unit supply discharge and return air inlet.

Adjust fan speeds or sheaves as required to obtain design air volumes.

Suspend the units from the roof/floor structure above using threaded hanger rod and spring vibration isolators or provide floor stand. Install the units level.

END OF SECTION

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SECTION 23 82 00

HEATING AND COOLING TERMINAL UNITS

PART 1 - GENERAL

SCOPE

This section includes specification for heating and cooling terminal equipment using water and/or steam as the source. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS

- Electric Heaters

PART 3 - EXECUTION

- Installation
- Electric Heaters

RELATED WORK

Section 23 05 13 - Common Motor Requirements for HVAC Equipment
Section 23 09 93 – Sequence of Operations for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

ARI 210 Standard for Unitary Air-Conditioning Equipment
ARI 410 Standard for Forced-Circulation Air-Cooling and Air-Heating Coils
CS 140

QUALITY ASSURANCE

Refer to Division 01 of the Project Manual.

SHOP DRAWINGS

Refer to Division 01 of the Project Manual.

Include dimensions, capacities, materials of construction, ratings, weights, wiring diagrams, and appropriate identification for all equipment in this section. Include color selection chart where applicable.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Forced Circulation Coils: Ratings certified in accordance with ARI 410.

Electrical Equipment and heaters shall be UL listed for the service specified.

Electrical components and work must be in accordance with National Electrical Code.

PART 2 - PRODUCTS

ELECTRIC BASEBOARD RADIATION

Manufacturers: Vulcan, Berko, Markel, or approved equal.

Use corrosion resistant heating elements, designed and spaced for even distribution of air across the heating element, and installed to prevent noise of expansion and contraction.

Provide units with necessary overheat protection, reset devices, air flow interlock switch, contactors, transformers, local non-fused disconnect switch that is prewired, and other controls as may be required by codes.

Construct baseboard housing 14 gauge steel, completely finished back with a baked enamel finish in one of the manufacturer's standard colors, selected by Architect.

PART 3 - EXECUTION

INSTALLATION

Install units in accordance with manufacturer's installation instructions.

After installation, provide protective covers to prevent accumulation of dirt on units during balance of construction.

ELECTRIC BASEBOARD RADIATION

Install units where indicated on the drawings and details.

Refer to section 23 09 14 for control requirements.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

The electrical work included in all other divisions is the responsibility of the contractor performing the division 26 work unless noted otherwise.

SCOPE

The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Regulatory Requirements
- Quality Assurance
- Continuity of Existing Services and Systems
- Protection of Finished Surfaces
- Approved Electrical Testing Laboratories
- Sleeves and Openings
- Sealing and Fire Stopping
- Intent
- Omissions
- Submittals
- Project/Site Conditions
- Work Sequence and Scheduling
- Work by Other Trades
- Offsite Storage
- Salvage Materials
- Certificates and Inspections
- Operating and Maintenance Data
- Record Drawings

PART 2 - PRODUCTS

- Identification
- Sealing and Fire Stopping

PART 3 - EXECUTION

- Cutting and Patching
- Building Access
- Equipment Access
- Coordination
- Sleeves and Openings
- Sealing and Fire Stopping
- Housekeeping and Clean Up
- Owner Training

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 07 84 00 – Fire Stopping

REFERENCE STANDARDS

Abbreviations of standards organizations referenced in this and other sections are as follows:

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
EPA	Environmental Protection Agency
ETL	Electrical Testing Laboratories, Inc.
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
UL	Underwriters Laboratories Inc.
DSPS	Wisconsin Department of Safety and Professional Services

REGULATORY REQUIREMENTS

All work and materials are to conform in every detail to applicable rules and requirements of the Wisconsin State Electrical Code (SPS 316), the National Electrical Code (NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA).

All Division 26 work shall be done under the direction of a currently licensed State of Wisconsin Master Electrician.

QUALITY ASSURANCE

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space, and for obtaining the performance from the system into which these items are placed.

Manufacturer references used herein are intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

All materials shall be listed by and shall bear the label of an approved electrical testing laboratory. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system shall be so labeled.

CONTINUITY OF EXISTING SERVICES AND SYSTEMS

No outages shall be permitted on existing systems except at the time and during the interval specified by the Owner. Any outage must be scheduled when the interruption causes the least interference with normal business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.

PROTECTION OF FINISHED SURFACES

Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

APPROVED ELECTRICAL TESTING LABORATORIES

The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:

Underwriters Laboratories Inc.

Electrical Testing Laboratories, Inc.

SLEEVES AND OPENINGS

Refer to Division 1, General Requirements, Sleeves and Openings.

SEALING AND FIRE STOPPING

Sealing and fire stopping of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the sleeve, structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 Fire Stopping.

INTENT

The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.

If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, or most closely fits the project intent. Refer to the General Conditions of the Contract for further clarification.

It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

All sizes as given are minimum except as noted.

Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.

Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

OMISSIONS

No later than ten (10) days before bid opening, the Contractor shall call the attention of the A/E to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

SUBMITTALS

Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

On request from the A/E, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

The submittals must be approved before fabrication is authorized.

PROJECT/SITE CONDITIONS

Install Work in locations shown on drawings, unless prevented by project conditions.

Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Owner before proceeding.

Tools, materials and equipment shall be confined to areas designated by the Owner.

WORK SEQUENCE AND SCHEDULING

Install work in phases to accommodate user agency's occupancy requirements. During the construction period coordinate electrical schedule and operations with Owner's Construction Representative.

WORK BY OTHER TRADES

Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.

Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

SALVAGE MATERIALS

No materials removed from this project shall be reused unless specifically noted. All materials removed shall become the property of and shall be disposed of by the Contractor.

CERTIFICATES AND INSPECTIONS

Obtain and pay for all required State installation inspections in accordance with the Wisconsin Administrative Code. Deliver originals of these certificates to the Owner's Project Representative.

This contractor is responsible for coordination of electrical inspection.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

1. Manufacturer's wiring diagrams for electrically powered equipment.

RECORD DRAWINGS

The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.

Daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.

The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.

At completion of the project, the Contractor shall submit the marked-up record drawings to the Architect/Engineer prior to final payment.

PART 2 - PRODUCTS

IDENTIFICATION

See Electrical section 26 05 53 – Identification for Electrical Systems.

SEALING AND FIRE STOPPING

FIRE AND/OR SMOKE RATED PENETRATIONS:

Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 “Fire Stopping”.

NON-RATED PENETRATIONS:

Conduit Penetrations:

At conduit penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

PART 3 - EXECUTION

CUTTING AND PATCHING

Refer to Division 1, General Requirements, Cutting and Patching.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS

Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish the access doors to the General Contractor and reimburse the General Contractor for installation of those access doors.

COORDINATION

The Contractor shall cooperate with other trades and DFD in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the DFD, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed heating units installed in/on architectural surfaces.

Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

SLEEVES AND OPENINGS

Conduit penetrations in existing concrete floors: Core drill openings.

Where penetrating conduit weight is supported by floor, provide manufactured product or structural bearing collar designed to carry load.

SEALING AND FIRE STOPPING

FIRE AND/OR SMOKE RATED PENETRATIONS:

Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 Fire Stopping.

NON-RATED PENETRATIONS:

At all interior walls and exterior walls, conduit penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the sleeve or cored opening and the conduit is completely blocked.

HOUSEKEEPING AND CLEAN UP

The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

OWNER TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 00.

END OF SECTION

SECTION 26 05 02

ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

SCOPE

The project also includes disconnect and removal of selected existing power distribution equipment designated to be replaced. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

PART 2 - PRODUCTS

Materials and Equipment

PART 3 - EXECUTION

Examination

Preparation

Demolition and Extension of the Existing Electrical Work

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

PART 2 - PRODUCTS

MATERIALS AND EQUIPMENT

Materials and equipment for patching and extending work as specified in the individual Sections.

PART 3 - EXECUTION

EXAMINATION

Verify field measurements and circuiting arrangements as shown on Drawings.

Verify that abandoned wiring and equipment serve only abandoned facilities.

Demolition Drawings are based on casual field observation and/or existing record documents. Report discrepancies to the Architect/Engineer and Owner Field Representative before disturbing existing installation.

Beginning of demolition means installer accepts existing conditions.

PREPARATION

Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations and follow the safe working practice requirements of NFPA 70E.

DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

Demolish and extend existing electrical work to meet all requirements of these specifications.

If certain raceways and boxes are abandoned but not scheduled for removal, those items must be shown on the "As Built Drawings".

Remove, relocate, and extend existing installations to accommodate new construction.

Remove abandoned wiring to source of supply.

Provide revised typed circuit directory in panelboards that have circuits removed.

Remove exposed abandoned conduit. Cut conduit flush with walls and floors, and patch surfaces.

Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit and wiring servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

Disconnect and remove abandoned distribution equipment.

Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

Repair adjacent construction and finishes damaged during demolition and extension work.

Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. This includes the extension of the circuit from the last active device to the next device in the system to be activated.

END OF SECTION

SECTION 26 05 04

CLEANING, INSPECTION, AND TESTING OF ELECTRICAL EQUIPMENT

PART 1 - GENERAL

SCOPE

The work under this section includes the required cleaning, repair, adjustment, calibration, maintenance and testing of electrical equipment, as specified herein. This applies only to new electrical and existing electrical equipment being furnished, modified, worked on or serviced by this contractor for this project. Included are the following topics:

PART 1 - GENERAL

Scope
Related Work

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

General Inspection and Cleaning of All Equipment
Grounding Systems
Panelboards
Cables
Light Fixtures
Occupancy Sensors
Battery Pack Emergency Lighting

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

Inspect for physical damage and abnormal mechanical and electrical conditions.

Any item found to be out of tolerance, or in any other way defective as a result of the required inspection or testing, shall be reported to the Owner. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.

Compare equipment nameplate information with the latest single line diagram and report any discrepancies.

Verify proper auxiliary device operation and indicators.

Check tightness of accessible bolted electrical joints. Use torque wrench method.

Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.

Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.

Clean All Equipment:

Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, bus ducts, MCC's, fire alarm panels, communication/data panels, security panels, etc.

Loosen attached particles and vacuum them away.

Wipe all insulators with a clean, dry, lint free rag.

Clean insulator grooves.

Inspect equipment anchorage.

Inspect equipment and bus alignment.

Check all heater elements for operation and control.

Lubricate nonelectrical equipment per manufacturer's recommendations.

GROUNDING SYSTEMS

Inspect the ground system for adequate termination at all devices.

PANELBOARDS

Torque all the connections per the manufacturers spec. Verify phase wires, color coding, separate neutral and mechanical bonding. Verify circuit breaker operation. Verify the directory.

CABLES

600 Volt cable:

Visually inspect cables, lugs, connectors and all other components for physical damage and proper connections.

Check all cable connectors for tightness (with a torque wrench) and clearances. Torque test conductor terminations to manufacturer's recommendations.

LIGHT FIXTURES

Check the bonding and proper lamping. Verify that recessed fixtures are installed with hold down clips.

Confirm operation of the fixture with the proper switch or sensor.

OCCUPANCY SENSORS

Confirm operation of the sensor per the manufacturers spec.

BATTERY PACK EMERGENCY LIGHTING

Verify the operation per the manufacturers spec and run all of the diagnostic steps. Confirm proper grounding and location.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 - GENERAL

SCOPE

The work under this section includes furnishing and installing required wiring and cabling systems including pulling, terminating and splicing. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- References
- Submittals
- Project Conditions

PART 2 - PRODUCTS

- General
- Building Wire
- Wiring Connectors

PART 3 - EXECUTION

- General Wiring Methods
- Wiring Installation in Raceways
- Wiring Connections and Terminations
- Field Quality Control
- Wire Color
- Branch Circuits
- Construction Verification Items

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 26 05 33 – Raceway and Boxes for Electrical Systems.

Section 26 05 53 – Identification for Electrical Systems.

REFERENCES

Wisconsin Administrative Code SPS 316 - Electrical

SUBMITTALS

Submit product data: Provide for each cable assembly type.

Submit factory test reports: Indicate procedures and values obtained.

Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

PROJECT CONDITIONS

Verify that field measurements are as shown on Drawings.

Conductor sizes are based on copper.

Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 - PRODUCTS

GENERAL

All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.

All conductors shall be copper.

BUILDING WIRE

Description: Single conductor insulated wire 90 degree C.

Insulation: Type THHN/THWN-2, XHHW-2 insulation.

WIRING CONNECTORS

Split Bolt Connectors: Not acceptable.

Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment terminals. Not approved for splicing.

Twist Type Wire Connectors: Solderless twist type spring connector (wire-nut) with insulating cover for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller. The manufacturer's wire fill capacity must be followed.

All wire connectors used in underground or exterior pull boxes or hand holes shall be gel filled twist connectors or a connector designed for damp and wet locations. Gel filled twist type connectors can be used for copper conductor sizes 6 AWG and smaller for site lighting applications. The manufacturer's wire fill capacity must be followed.

Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps. Connector must be installed with a crimper tool listed for use with the manufacturer and type of compression connector.

Insulation Piercing Connectors: Molded insulated body, copper teeth, wrench tightened, UL 486B Listed. May be used only for connection of a tap conductor in run and tap type applications when main conductor is 8 AWG and larger.

PART 3 - EXECUTION

GENERAL WIRING METHODS

All wire and cable shall be installed in conduit.

Do not use wire smaller than 12 AWG for power and lighting circuits.

All phase, neutral and ground conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductors for 20 ampere, 120 volt branch circuit home runs longer than 100 feet (30 m), and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet (61 m).

Make conductor lengths for parallel conductors equal.

Splice only in junction or outlet boxes.

Identify ALL low voltage wire, 600V and lower, per section 26 05 53.

Neatly train and lace wiring inside boxes, equipment, and panelboards.

WIRING INSTALLATION IN RACEWAYS

Pull all conductors into a raceway at the same time. Use Listed water or silicone based wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary. Wax based lubricants are not allowed. Pulling lubricant is not required for low friction type products where the cable manufacturer recommends that cables be pulled without lube.

Completely and thoroughly swab raceway system before installing conductors.

Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

In high ambient spaces, mechanical rooms, utility rooms and exterior exposed conduit, 90 degree C conductors shall be utilized.

WIRING CONNECTIONS AND TERMINATIONS

Splice only in accessible junction boxes.

Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.

All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.

Use solderless twist type spring connectors (wire nuts) with insulating covers for wire splices and taps, 10 AWG and smaller.

Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of the wiring.

Thoroughly clean wires before installing lugs and connectors.

At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

FIELD QUALITY CONTROL

Field inspection and testing will be performed under provisions of Section 26 05 04.

Additional testing as follows shall be performed if aluminum conductors are used:

Feeders terminated with aluminum conductors shall be tested with a thermal imager and recorded.

Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.

Test procedures shall meet NETA guidelines.

Test results and report shall be provided to the engineer and included in O&M manual under AL conductors/ tests.

Contractor shall correct all deficiencies reported in the test report.

WIRE COLOR

General:

Solid colored insulation is required for all THHN/THWN-2 wire. For other wire types use colored wire or identify wire with colored tape at all terminals, splices and boxes. Wire shall be colored as indicated below.

In existing facilities, use existing color scheme.

Switch legs shall be the same color as their associated circuit, except for the second switch leg used for dual-level switching. The second switch leg shall be the next phase color, e.g. if the first switch leg is brown (277/480V phase A), the second switch leg shall be orange (277/480V phase B).

Traveler conductors run between 3 and 4 way switches shall be colored pink or purple.

Neutral Conductors: White for 120/208V and 120/240V systems, Gray for 277/480V systems. Where there are two or more neutrals in one conduit, each shall be individually identified with a different stripe.

Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.

Feeder Circuit Conductors: Each phase shall be uniquely color coded.

Ground Conductors: Green colored insulation for THHN/THWN-2 wire. For other wire types use green colored wire or identify wire with green tape at both ends and at all access points, such as panelboards, motor starters, disconnects and junction boxes. When isolated grounds are required, contractor shall provide green with yellow tracer.

BRANCH CIRCUITS

The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All single-phase branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE

The work under this section includes grounding electrodes and conductors, equipment grounding conductors, and bonding. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- References
- Regulatory Requirements

PART 2 - PRODUCTS

- Mechanical Connectors
- Compression Connectors
- Conductors

PART 3 - EXECUTION

- Examination
- General
- Less Than 600 Volt System Grounding
- Field Quality Control
- Identification and Labeling

All hardware, cables and related termination and support hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in this and related sections.

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

REFERENCES

Wisconsin Administrative Code SPS 316 - Electrical
ANSI/IEEE 142 (Latest edition) - Recommended Practice for Grounding of Industrial and Commercial Power Systems
UL 467 Electrical Grounding and Bonding Equipment
IEEE 837 - IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding
ANSI J-STD-607-B - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
TIA/EIA-606-A - Administration Standard for Commercial Telecommunications Infrastructure

REGULATORY REQUIREMENTS

Conform to requirements of NFPA 70.

Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 - PRODUCTS

MECHANICAL CONNECTORS

The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.

Split bolt connector types are NOT allowed. Exception: the use of split bolts is acceptable for grounding of wire-basket type cable tray, and for cable shields/straps of medium voltage cable.

The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

CONDUCTORS

Material: Stranded copper (aluminum not permitted).

Branch Circuit Equipment Grounds shall be increased in size when routed with phase conductors increased in size due to voltage drop calculations.

PART 3 - EXECUTION

GENERAL

Install Products in accordance with manufacturer's instructions.

Terminate each grounding conductor on its own terminal lug. Sharing a single lug by multiple conductors is not allowed.

LESS THAN 600 VOLT ELECTRICAL SYSTEM GROUNDING

Equipment Grounding Conductor: Provide separate, insulated equipment grounding conductor within each raceway. Terminate each end on suitable lug, bus, enclosure or bushing. Provide a ground wire from each device to the respective enclosure.

Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

FIELD QUALITY CONTROL

Inspect grounding and bonding system conductors and connections for tightness and proper installation.

IDENTIFICATION AND LABELING

Label Grounds at point of termination.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE

The work under this sections includes conduit and equipment supports, straps, clamps, steel channel, etc., and fastening hardware for supporting electrical work. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Submittals
- Quality Assurance

PART 2 - PRODUCTS

- Material

PART 3 - EXECUTION

- Installation

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS

Product Data: Provide data for support channel.

QUALITY ASSURANCE

Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

MATERIAL

Support Channel: Steel, Galvanized, Enameled or other corrosion resistant.

Hardware: Corrosion resistant.

Minimum sized threaded rod for supports shall be 3/8" for trapezes and single conduits 1-1/4" and larger, and 1/4" for single conduits 1" and smaller.

Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when rigid steel conduit is installed on the interior or exterior surface of any exterior building wall.

PART 3 - EXECUTION

INSTALLATION

Fasten hanger rods, conduit clamps, outlet, junction and pull boxes to building structure using pre-cast insert system, preset inserts, beam clamps, expansion anchors, or spring steel clips (interior metal stud walls only).

Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction. If nail-in anchors are used, they must be removable type anchors.

Powder-actuated fasteners are not permitted. Compressed-air power-actuated fasteners may ONLY be used for the installation of separate ceiling wires required for support of conduits and aircraft cable hung light fixtures.

File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.

Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not fasten to suspended ceiling grid system.

Support wires that are installed in addition to the ceiling grid support wires to provide secure support for raceways, cables assemblies, boxes, cabinets, and fittings shall be secured at both ends (e.g. the ceiling structure at the top and the ceiling grid at the bottom) per NEC 300.11(A).

Support wires shall be identified per specification section 26 05 53.

Do not drill structural steel members unless approved by A/E.

Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

Furnish and install all supports as required to fasten all electrical components required for the project.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE

This section describes the products and execution requirements relating to furnishing and installing raceways and boxes and related systems as part of a raceway system for electrical, communications, and other low-voltage systems for the project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- References
- Submittals

PART 2 - PRODUCTS

- General
 - Electrical Metallic Tubing (EMT) and Fittings
 - Flexible Metal Conduit (FMC) and Fittings
 - Liquidtight Flexible Metal Conduit (LFMC) and Fittings
 - Conduit Supports
 - Pull and Junction Boxes
 - Outlet Boxes
 - Outlet Box Extenders

PART 3 - EXECUTION

- Conduit Sizing, Arrangement, and Support
- Conduit Installation
- Conduit Installation Schedule
- Coordination of Box Locations
- Pull and Junction Box Installation
- In Grade Handholes and Boxes
- Outlet Box Installation

RELATED WORK

Applicable provisions of Division 1 govern work under this section.

Section 26 05 26 – Grounding and Bonding for Electrical Systems

Section 26 05 29 – Hangers and Supports for Electrical Systems.

Section 26 27 02 – Equipment Wiring Systems.

Section 26 27 26 – Wiring Devices.

REFERENCES

Wisconsin Administrative Code SPS 316 - Electrical

SUBMITTALS

Surface Raceway System - submit product data and catalog sheets for all components.

Boxes - provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 - PRODUCTS

GENERAL

All steel fittings and conduit bodies shall be galvanized.

No cast metal or split-gland type fittings permitted.

Mogul-type condulets larger than 2 inch (50 mm) not permitted except as approved or detailed.

All conduit covers must be fastened to the conduit body with screws and be of the same manufacture.

C-condulets shall not be used in lieu of pull boxes.

All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

Conduit: Steel, galvanized tubing.

Fittings: All steel, set screw type. No push-on or indenter types permitted.

Conduit Bodies: All steel threaded conduit bodies.

FLEXIBLE METAL CONDUIT (FMC) AND FITTINGS

Conduit: steel, galvanized, spiral strip.

Fittings and Conduit Bodies: All steel, galvanized, or malleable iron (except as allowed in specification 26 51 13).

LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) AND FITTINGS

Conduit: flexible, steel, galvanized, spiral strip with an outer Liquidtight, nonmetallic, sunlight-resistant jacket.

Fittings and Conduit Bodies: ANSI/NEMA FB 1, compression type. There shall be a metallic cover/insert on the end of the conduit inside the connector housing to seal the cut conduit end.

CONDUIT SUPPORTS

See section 26 05 29.

PULL AND JUNCTION BOXES

Interior Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.

Interior Sheet Metal Boxes larger than 12 inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover.

Box extensions and adjacent boxes within 48 inches of each other are not allowed for the purpose of creating more wire capacity.

Junction boxes 6 inch-by-6 inch or larger size shall be without stamped knock-outs.

Wireways shall not be used in lieu of junction boxes.

OUTLET BOXES

Sheet Metal Outlet Boxes: galvanized steel, with stamped knockouts.

Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 3/8 inch male fixture studs where required.

Cast Boxes: Cast ferrous alloy or aluminum, deep type, gasketed cover, threaded hubs.

OUTLET BOX EXTENDERS

Outlet Box Extenders: Non Metallic, adjustable depth.

PART 3 - EXECUTION

CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

Size power conductor raceways for conductor type installed. Conduit size shall be 1/2 inch (16 mm) minimum except all homerun conduits shall be 3/4 inch (21 mm), or as specified elsewhere. Caution: Per the NEC, the allowable conductor ampacity is reduced when more than three current-carrying conductors are installed in a raceway. Contractor must take the NEC ampacity adjustment factors into account when sizing the raceway and wiring system.

Size communications and other low-voltage systems raceways as follows:

Communications, including Outlet Box: 1 inch minimum. Conduit used for single device locations (e.g. Wireless Access Point, Video Surveillance Camera, and Wall mounted telephone) may be 3/4 inch minimum.

Control, security, signal, video, and other low-voltage applications: 3/4 inch minimum.

Fire Alarm: 1/2 inch minimum.

Arrange conduit to maintain 6'-8" clear headroom and present a neat appearance.

Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

Maintain minimum 6 inch (150 mm) clearance between conduit and piping. Maintain 12 inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay-in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers.

Group conduit in parallel runs where practical and use conduit rack (lay-in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.

Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.

Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, other conduits, etc., unless so approved or detailed.

Conceal all conduits except where noted on the drawings or approved by the Architect/Engineer. Contractor shall verify with Architect/Engineer all surface conduit installations except in mechanical rooms.

Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.

For indoor conduits, no continuous conduit run shall exceed 100 feet (30 meters) without a junction box.

All conduits installed in exposed areas shall be installed with a box offset before entering box.

CONDUIT INSTALLATION

Cut conduit square; de-burr cut ends.

Conduit shall not be fastened to the corrugated metal roof deck.

Bring conduit to the shoulder of fittings and couplings and fasten securely.

Terminate all conduit (except for terminations into conduit bodies) using conduit hubs, or connectors with one locknut, or utilize double locknuts (one each side of box wall).

Provide bushings for the ends of all conduit not terminated in box walls.

Provide insulated bushings where raceways contain 4 AWG or larger conductors.

Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch (50 mm) size unless sweep elbows are required.

Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.

Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.

Install expansion-deflection joints where conduit crosses building expansion joints. Note: expansion-deflection joints are not required where conduit crosses building control joints if the control joint does not act as an expansion joint.

Where communication cabling is to be installed in conduit to the wiring hub (e.g. Telecom Room), multiple conduits may be consolidated into fewer, larger conduits. Capacity of shared conduits shall equal the capacity of the individual conduits unless otherwise noted.

Ground and bond conduit under provisions of Section 26 05 26.

Identify conduit under provisions of Section 26 05 53.

CONDUIT INSTALLATION SCHEDULE

Conduit other than that specified below for specific applications shall not be used.

- Concealed in Concrete Block Walls: Electrical metallic tubing, PVC conduit.
- Concealed Dry Interior Locations: Rigid metal conduit, Intermediate metal conduit, Electrical metallic tubing, and PVC conduit (Ground conductor).
- Interior Building Grounding Electrode Conductor: Schedule 80 PVC.
- Exposed Dry Interior Locations: Rigid metal conduit, Intermediate metal conduit, Electrical metallic tubing.
- Motor and equipment connections: Liquidtight flexible metal conduit (LFMC) (all locations). Minimum length shall be one foot (300 mm); maximum length shall be three feet (900 mm). Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.
- Light fixtures: Refer to specification section 26 51 13.

COORDINATION OF BOX LOCATIONS

Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

No outlet, junction, or pull boxes shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.

Conduit and boxes shall not be fastened to the metal roof deck. If conduit and boxes are required to be located and installed on roof decks, the conduit and boxes are required to be spaced minimum 1-5/8 inch off the lowest part of the metal roof decking material, per NEC 300.4 (E).

It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.

In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Architect/Engineer and install outlet as instructed by the Architect/Engineer.

The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.

Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24 inch (600 mm) access doors. Boxes must be installed within 12" from edge of the access door.

Locate and install to maintain headroom and to present a neat appearance.

Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

PULL AND JUNCTION BOX INSTALLATION

Pull boxes and junction boxes shall be minimum 4 inches square (100 mm) by 2 1/8 inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit, minimum junction box size shall be 4 11/16 inches square by 2 1/8 inches deep.

Where used with raceway(s) containing conductors of 4 AWG or larger, pull box shall be sized as required unless otherwise noted on the drawings.

Where used with raceway(s) containing conductors on systems over 600V, pull box shall be sized per NEC 314 Part IV unless otherwise noted as larger on the drawings.

Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install access panels in non-accessible ceilings where boxes are installed. All boxes are to be readily-accessible.

Provide Pull and Junction boxes for communications and other low voltage applications (a) in any section of conduit longer than 100 feet, (b) where there are bends totaling more than 180 degrees between pull points or pull boxes and (c) wherever there is a reverse bend in run. Locate boxes on straight section of raceway (e.g. do not use boxes in place of raceway bends).

Support pull and junction boxes independent of conduit.

OUTLET BOX INSTALLATION

Do not install boxes back-to-back in walls. Provide minimum 6 inch (150 mm) separation, except provide minimum 24 inch (600 mm) separation in acoustic-rated walls.

Power:

Recessed (1/4 inch maximum) outlet boxes in masonry, concrete, tile construction, or drywall shall be minimum 4 inch square, with device rings. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes. A single gang box can be used in drywall and masonry, for a single device location, when a single conduit enters box.

Shallow 4 inch square by 1 1/2 inch deep boxes can be used as device boxes for power provided the box and plaster ring is sized for installed device and conductors.

Low Voltage:

Recessed (1/4 inch maximum) outlet boxes in masonry, concrete, tile construction or drywall shall be minimum 4 11/16 inch square by 2 1/8 inch deep with single gang device ring (unless noted otherwise on drawings). Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.

Provide knockout closures for unused openings.

Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches (300 mm) of box.

Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide non-metallic barriers to separate wiring of different voltage systems.

Install boxes in walls without damaging wall insulation.

Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

Ceiling outlets shall be 4 inch square, minimum 2 1/8 inch (54 mm) deep except that concrete boxes and plates will be approved where applicable. Position outlets to locate luminaires as shown on reflected ceiling plans.

In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminaire, to be accessible through luminaire ceiling opening.

Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

Surface wall outlets shall be 4 inch (100 mm) square with raised covers for one and two gang requirements. For three gang or larger requirements, use gang boxes with non-overlapping covers.

Outlet Box Extender applications:

Provide box extenders for boxes that are set too far back in the wall due to un-anticipated wall finishes. Outlet Box Extenders will NOT be allow for installations where the EC has not accommodated for wall finishes that were expected prior to installation. Place the box extender over the existing box face to make the box face flush with the wall finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE

The work under this section includes the products and execution requirements relating to labeling of power, control, and signal wiring. Further, this section includes the installation of labels, nameplates, and directories for electrical junction boxes, wiring devices, and electrical equipment. Included are the following topics:

PART 1 - GENERAL

Scope
Related Work
Submittals

PART 2 - PRODUCTS

Materials

PART 3 - EXECUTION

General
Junction and Pullbox Identification
Communication Conduit Labeling
Power, Control and Signal Wire Identification
Wiring Device Identification
Support Wire Identification
Panelboard Directories

RELATED WORK

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

Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables

SUBMITTALS

Include schedule for nameplates.

Prior to installation, the Contractor shall provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used. Samples shall be mounted on 8 1/2" x 11" sheets annotated, explaining their purposed use.

PART 2 - PRODUCTS

MATERIALS

Labels: All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED.

All wiring labels shall be white/transparent vinyl or vinyl-cloth, self-laminating, wraparound type. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.

Tape (wiring phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.

Nameplates: Engraved three-layer laminated plastic. Normal system shall use nameplates with black letters on white background, emergency system (NEC 700) shall use white letters on red background, legally required standby system (NEC 701) shall use white letters on blue background, and optional standby system (NEC 702) shall use white letters on yellow background.

Adhesive type labels not permitted except for identification of wires, wiring devices (device plates), 8" square and smaller junction boxes, and control devices.

See Junction and Pullbox Identification and Wiring Device Identification sections for allowed usage of permanent marker.

PART 3 - EXECUTION

GENERAL

Where mixed voltages are used in one building (e.g. 4160 volt, 480 volt, 208 volt) each switch, switchboard, junction box, equipment, etc., on each system shall be labeled for voltage in addition to other requirements listed herein.

All branch circuit and power panels shall be identified with the same symbol used in circuit directory in main distribution center.

Clean all surfaces before attaching labels with the label manufacturer's recommended cleaning agent. Install all labels firmly as recommended by the label manufacturer. Labels shall be installed plumb and neatly on all equipment.

Install nameplates parallel to equipment lines. Secure nameplates to equipment fronts using screws, rivets or manufacturer approved adhesive or cement.

Embossed tape will not be permitted for any application.

JUNCTION AND PULLBOX IDENTIFICATION

Junction and pullbox identification shall include:

Provide circuit numbers and source panel designations for power wiring junction boxes. Other system junction boxes shall be identified as shown on details or approved shop drawings.

Where exposed, junction boxes larger than 8" square shall utilize engraved nameplates with ½" minimum letter height. Identify system source(s) and load(s) served.

Where exposed, 8" square and smaller junction boxes shall utilize machine generated, adhesive labels.

Where located above an accessible ceiling, junction boxes may be neatly identified using a permanent marker.

COMMUNICATION CONDUIT LABELING

All conduits installed between Telecommunication Equipment Rooms shall be clearly labeled in accordance with ANSI/TIA/EIA-606. Both ends of the conduits shall be labeled.

All labels shall be mechanical, no hand written labels.

The label shall indicate the location of the far end of the conduit run and a unique conduit number. (i.e. TR-1A-01 or Room #216 - 01).

POWER, CONTROL AND SIGNAL WIRE IDENTIFICATION

Provide wire labels on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control and signal wiring.

All wiring shall be labeled within 2 to 4 inches of terminations. Each end of a wire or cable shall be labeled as soon as it is terminated including wiring used for temporary purposes.

WIRING DEVICE IDENTIFICATION

Wall switches, receptacles, occupancy sensors, wall dimmers, device plates and box covers, poke-through fittings, access floor boxes, photocells, and time clocks shall be identified with circuit numbers and source (ex. Panel ABC-3). In exposed areas, identifications should be made inside of device covers, unless directed otherwise. Use machine-generated adhesive labels, or neatly hand-written permanent marker.

SUPPORT WIRE IDENTIFICATION

Support wires that are installed in addition to the ceiling grid support wires to provide secure support for raceways, cables assemblies, boxes, cabinets, and fittings shall be distinguishable from the ceiling grid support wires per NEC 300.11(A). This identification shall be either approximately 6 inches of fluorescent orange paint, or orange tape flags 3/4 inches high-by-2 inches wide (minimum) within 12 inches of the bottom of the support wires.

PANELBOARD DIRECTORIES

Typed directories for panels must be covered with clear plastic, and have a metal frame. Room number on directories shall be Owner's numbers, not Plan numbers unless Owner so specifies.

END OF SECTION

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SECTION 26 27 02

EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

SCOPE

The work under this section includes electrical connections to equipment specified under other Divisions and/or Sections, or furnished by Owner, including, but not limited to:

- HVAC motors
- Misc. Equipment

Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- References
- Submittals
- Coordination

PART 2 - PRODUCTS

- Cords and Caps
- Other Products

PART 3 - EXECUTION

- Inspection
- Preparation
- Installation
- HVAC Connections
- Equipment Connection Schedule

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.

Section 26 05 33 – Raceway and Boxes for Electrical Systems.

REFERENCES

Wisconsin Administrative Code SPS 316 - Electrical

SUBMITTALS

Product Data: Provide data for cord and wiring devices.

COORDINATION

Coordinate all equipment requirements with the various contractors and the Owner. Review the complete set of drawings and specifications to determine the extent of wiring, starters, devices, etc., required.

PART 2 - PRODUCTS

CORDS AND CAPS

Straight-blade Attachment Plug: NEMA WD 1.

Locking-blade Attachment Plug: NEMA WD 5.

Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.

Cord Construction: Oil-resistant thermoset insulated multi-conductor flexible cord with identified equipment grounding conductor, suitable for hard usage in damp locations.

Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

OTHER PRODUCTS

Refer to related sections for other product requirements.

PART 3 - EXECUTION

INSPECTION

Verify that equipment is ready for electrical connection, wiring, and energizing.

PREPARATION

Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

INSTALLATION

Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.

Provide a green equipment ground conductor for all installed equipment wiring.

Make conduit connections to equipment using flexible PVC-coated metal conduit.

Install pre-finished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.

Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

Make wiring connections in control panel or in wiring compartment of pre-wired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where indicated.

Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

HVAC CONNECTIONS

Provide all power wiring including all circuitry carrying electrical energy from panelboard or other source through starters, and disconnects to motors or to packaged control panels. Packaged control panels may include disconnects and starters and overcurrent protection. Provide all wiring between packaged control panels and motors.

Contractor shall verify with mechanical contractor the electrical requirements including voltages, horsepower, disconnecting means, starters and variable frequency drives for motors and equipment prior to ordering circuit breakers, disconnects and starters.

Unless otherwise specified, all electrical motors and control devices such as aqua-stats, float and pressure switches, fan powered VAV boxes, switches, electro-pneumatic switches, solenoid valves and damper motors requiring mechanical connections shall be furnished and installed and wired by the Contractor supplying the devices.

Each motor terminal box shall be connected with a minimum 12", maximum 36" piece of flexible PVC-coated metal conduit to a fixed junction box. Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.

Check for proper rotation of each motor.

EQUIPMENT CONNECTION SCHEDULE
As indicated on the drawings.

END OF SECTION

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SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

SCOPE

This section describes the products and execution requirements relating to furnishing and installing wiring devices and related systems for the project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Submittals
- Operation and Maintenance Data

PART 2 - PRODUCTS

- Wall Switches
- Receptacles
- Occupancy Sensors
- Device Plates and Box Covers

PART 3 - EXECUTION

- Installation
- Field Quality Control
- Occupancy Sensors
- Adjusting

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS

Provide product data showing model numbers, configurations, finishes, dimensions, and manufacturer's instructions.

For occupancy sensor shop drawings, the manufacturer's actual layout of occupancy sensors and the wiring diagrams shall be provided.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS

WALL SWITCHES

General: Heavy duty use toggle switch, rated 20 amperes and 120/277 volts AC. Switches shall be UL20 Listed and meet Federal Specification WS-896. All switches shall be heavy duty Specification Grade.

Handle: Ivory made of nylon or high impact resistant material.

Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP: All switches shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with separate green ground screw. Switches shall be as follows:

- Hubbell 1221*,
- Leviton 1221-S*,

Pass & Seymour CSB20AC1-*,
or approved equal. (* indicates color selection).

RECEPTACLES

General Requirements: NEMA Type 5-20R, ivory nylon or high impact resistant face. Receptacles shall be UL498 Listed and meet Federal Specification WC-596. All duplex receptacles shall be heavy duty Specification Grade, 20 amp rated.

Generally, all receptacles shall be duplex convenience type unless otherwise noted.

All receptacles installed in bathrooms, kitchens, and within 6 feet of the outside edge of sinks shall be GFCI type.

All receptacles installed in outdoor locations, garages, rooftops, and in other damp or wet locations shall be GFCI type with a weather-resistant (WR) rating.

Convenience and Straight-blade Receptacles: All receptacles shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be as follows:

Hubbell 5362*,
Leviton 5362-S*,
Pass & Seymour PS5362*,
or approved equal. (* indicates color selection).

GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A. GFCI receptacles shall be as follows:

Hubbell GFR5362*TR,
Leviton N7899-*,
Pass & Seymour 2095*,
or approved equal. (* indicates color selection).

Specific-use Receptacle Configuration: As indicated on drawings.

OCCUPANCY SENSORS

General Requirements: All occupancy sensors shall be hardwired type; battery type shall not be permitted.

Sensors shall use either passive infrared, or if dual technology, passive infrared and passive acoustic sensing or passive infrared and ultrasonic sensing for detecting room occupancy.

Sensitivity shall be user adjustable or self-adjusting type.

The delay timer shall be adjusted within a range of 6 to 30 minutes by the contractor in the field. The sensor shall have a test mode for performance testing.

The test LED shall indicate motion.

Line voltage sensors are acceptable, especially in exposed ceiling areas where all wiring shall be installed in conduit, including low voltage cabling if power packs are used. Provide power pack as required for low voltage sensors.

Occupancy sensors and power packs shall have five year warranties.

Wall Mounted (Wall Switch Type): The unit shall fit in/on a standard single gang switch box.

Rated capacity: 600 watts minimum at 120 volts, 60 Hz; 1000 watts minimum at 277 volts, 60 Hz.

The sensor shall have two switches where dual-level lighting is required. The switch shall have manual override for positive OFF and automatic ON.

The area of coverage shall be approximately 180 degrees by 35-40 feet.

Ceiling Mounted: The unit shall fit in/on a standard octagon box. All ceiling mounted sensors shall be installed to a box with ring and box support.

The coverage area shall be 360 degrees by approximately 15 feet radius when mounted at 9 foot height. The sensor shall have provisions, such as masking, to block out problem areas.

Ceiling/Corner Mounted: The unit shall fit in/on a standard octagon box. All ceiling mounted sensors shall be installed to a box with ring and box support.

The coverage area shall be 90 degrees or greater by approximately 40 feet radius when mounted at 9 foot height. The sensor shall have provisions, such as masking, to block out problem areas.

Power Packs: Provide power packs as required for low voltage sensors. Rated capacity shall be 20 amps at 120 or 277 volts for fluorescent lamps.

The unit shall fit on a standard octagon box. All power packs shall be installed onto a supported box.

Low voltage cabling shall be plenum rated or installed in conduit in plenum-rated areas.

DEVICE PLATES AND BOX COVERS

Decorative Cover Plate: Nylon.

Surface Cover Plate: Raised galvanized steel.

PART 3 - EXECUTION

INSTALLATION

See plans for device mounting heights.

Install wall switches with OFF position down.

Install convenience receptacles with grounding pole matching existing.

Install box for low voltage outlet at the same height as adjacent convenience receptacles. Locate boxes for information outlet as close as practical to duplex power outlet, approximately 2-inches apart.

Install specific-use receptacles at heights shown on Contract Drawings.

Install decorative plates on switch, receptacle, and blank outlets in finished areas.

Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

Install devices and wall plates flush and level.

Receptacles shall have a bonding conductor from grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not approved.

FIELD QUALITY CONTROL

Inspect each wiring device for defects.

Operate each wall switch and sensor with circuit energized, and verify proper operation.

Verify that each receptacle device is energized.

Test each receptacle device for proper polarity.

Test each GFCI receptacle device for proper operation.

OCCUPANCY SENSORS

Power packs used in return air plenum ceiling areas shall be installed in an approved enclosure or UL listed for return air plenum.

Provide a minimum of 4' of coiled cable for ceiling-mounted sensors.

Occupancy sensors shall be installed at locations indicated on the manufacturer's submittal layout drawings. Sensors shall be located to prevent false "ON" tripping of the lights.

Sensitivity Test: After the sensor has been energized for at least 15 minutes, walk to the middle of the room (if conference room) or sit at the normal desk position (if an office). Make no motion for 20 seconds. Move one arm up and down slowly. The test LED should blink.

Time Delay Test: Set the time delay for 10 minutes. Walk into the room to activate the sensor then leave room. Sensor must turn lights off at approximately 10 minutes. Walk into the room again to reactivate the lights. Lights should activate within 1 second.

ADJUSTING

Adjust devices and wall plates to be flush and level.

Mark all conductors with the panel and circuit number serving the device with a machine generated label, at the device, and on the back of the device cover.

END OF SECTION

SECTION 26 51 13

INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 - GENERAL

SCOPE

The work under this section includes interior luminaires and accessories, exit signs, lamps, and ballasts. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Submittals
- Operation and Maintenance Data
- Extra Material

PART 2 - PRODUCTS

- Interior Luminaires and Accessories
- Lamps
- Fluorescent Ballasts

PART 3 - EXECUTION

- Installation
- Adjusting and Cleaning
- Interface with Other Products
- Field Quality Control
- All Fixture Connections Including Master-Slave

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 26 27 26 - Wiring Devices

REFERENCE STANDARDS

RoHS - Restriction of Hazardous Substances. Council of the European Union (EC) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

LM-79-08 (or latest) - IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.

LM-80-08 (or latest) - IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.

TM-21-11 (or latest) - IES Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources.

NEMA SSL 1-2010 (or latest) - Electronic Drivers for LED Devices, Arrays, or Systems.

SUBMITTALS

Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance data for each luminaire type.

For each luminaire type, submit luminaire information including catalog cuts with highlighted catalog numbers and required accessories:

- Luminaire:
 - Manufacturer and catalog number.
 - Type (identification) as indicated on the plans and schedule.
- Ballast:
 - Manufacturer and catalog number.
 - Type (Programmed Start, etc.), Ballast Factor, THD, etc.
 - Quantity per fixture.

- Lamps:
 - Manufacturer, catalog number, and wattage
 - Quantity per fixture

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

EXTRA MATERIAL

Provide three (3) percent of each lamp type, but not less than one (1) of each type.

Provide one (1) ballast of each type.

PART 2 - PRODUCTS

INTERIOR LUMINAIRES AND ACCESSORIES

See the Lighting Fixture Schedule on the drawings for type of fixtures and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Fixtures manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated fixtures, and meet the intent of the design.

Luminaire shall be certified by a Nationally Recognized Testing Laboratory (UL, ETL, or IEC).

Provide lighting fixtures with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.

Fluorescent T8 lamps and ballasts shall be listed on CEE high-performance qualifying product list and approved by Focus-On-Energy.

LAMPS

General Use Incandescent Lamps and Incandescent Reflector Lamps are prohibited. Use LED or compact fluorescent retrofit lamps in lieu of incandescent or halogen for specialty fixtures. LED retrofit lamps shall be:

- Rated for the voltage of the incandescent lamp they are replacing.
- Dimmable where required as indicated on the plans.
- Rated for the fixture in which they are being installed. Verify whether the fixture is enclosed and whether the retrofit lamp is rated for enclosed fixtures and the temperatures that will be encountered.
- Lamps shall provide delivered footcandles equal to or greater than the footcandles provided by an equivalent incandescent lamp.
- Lamps shall have an average rated life of 25,000 hours, minimum.
- Lamp color temperature shall be nearly equal to the incandescent lamp it is replacing.

Four Foot Fluorescent Lamps: High Performance T8 Lamps:

- Minimum 3000 initial lumens and minimum of 2820 mean lumens.
- Minimum 30,000 hour rated life at three-hour starts using programmed-start ballasts.
- Color Rendering Index (CRI) of 80 or higher.
- 4100°K color temperature.
- Lamps shall be suitable for use with instant start ballasts and occupancy sensors.
- Lamps shall meet Toxicity Characteristic Leaching Procedure (TCLP) requirements for low mercury as defined by the EPA.
- Mean system efficacy equal to 88 MLPW minimum using programmed-start ballasts.

Acceptable lamp manufacturers and catalog numbers are (or equal):

GE - F32T8/XL/SPX41/HL/ECO

OSRAM/SYLVANIA - F032/841/XPS/ECO3
 PHILIPS - F32T8/ADV85/ALTO
 STANDARD PRODUCTS - F32T8/841/XL31

Manufacturer names and catalog numbers are used to develop quality and performance requirements only. Lamps manufactured by others will be accepted provided they meet or exceed the specifications.

FLUORESCENT BALLASTS

All fluorescent ballasts shall be electronic type and shall meet the following specs:

- UL Listed (Class P) sound rating A and CSA certified.
- Comply with EMI and RFI limits set by the FCC (CFR 47 part 18) or NEMA and not interfere with normal electrical equipment.
- Meet any applicable standards set forth by ANSI.
- Be potted or conformal coated in a metallic case and not contain PCBs.
- Provide normal rated lamp life as stated by lamp manufacturers (i.e. rated life at 3 hour burn time per start).
- Provide independent test results from an approved testing laboratory for all of the specifications below. This is required for all submitted ballasts.
- Nominal power factor of .90 or higher.
- Total harmonic distortion of less than 10% at 120 or 277 volts (universal voltage).
- Ballast factor 0.70 through 1.2, as shown on the lighting fixture schedule.
- Frequency of operation shall be 40 kHz - 50 kHz and units shall operate without visible flicker.
- Ballast efficiency factor shall meet Consortium of Energy Efficiency (www.cee1.org) specifications (adopted by Focus on Energy program).
- 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.
- Ballast Efficiency Factor (BEF) shall be as shown in the table below:

Number of Lamps	Low (BF ≤ 0.85)	Normal (0.85 < BF ≤ 1)	High (BF > 1.0)
PROGRAMMED-START BALLASTS (T8 lamps)			
1	≥ 2.84	≥ 2.84	≥ 2.95
2	≥ 1.48	≥ 1.47	≥ 1.51
3	≥ 0.97	≥ 1.00	≥ 1.00
4	≥ 0.76	≥ 0.75	≥ 0.75

- Ballasts shall carry a minimum 5 year warranty with a \$10 replacement labor allowance.
- Ballasts shall not be affected by lamp failure.
- Ballasts shall be a standard production item.
- 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.
- Ballasts shall withstand line transients as defined in IEEE 587, Category A.
- **SYSTEM PERFORMANCE:** System performance for programmed-start ballasts shall be as follows:

1. Programmed-Start, Low Ballast Factor (BF = 0.71)

Lamps	Nominal Lamp Watts	System Input (Watts @ Univ Volt)
1 – F32T8	32	25

2 – F32T8	32	47
3 – F32T8	32	73
4 – F32T8	32	93

2. Programmed-Start, Normal Ballast Factor (BF = 0.88)

Lamps	Nominal Lamp Watts	System Input (Watts @ Univ Volt)
1 – F32T8	32	31
2 – F32T8	32	60
3 – F32T8	32	88
4 – F32T8	32	118

Acceptable ballast manufacturer's names and product lines are as follows:

Osram Sylvania – Quicktronic High Efficiency and Quicktronic PROstart.

GE Lighting – Ultramax and UltraStart.

Maxlite – High Efficiency Ballast.

Advance – Optanium.

Universal Lighting Technologies – F32T8.

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.

PART 3 - EXECUTION

INSTALLATION

Verify ceiling types with Architectural plans or with existing ceilings. Verify specified fixtures are compatible with specified ceiling type(s) prior to ordering fixtures.

Install in accordance with manufacturer's instructions.

Install suspended luminaires using aircraft cable, or pendants supported from swivel hangers. Heavy duty chain supports may be used where indicated on the fixture schedule. Provide aircraft cable, pendants, or chain lengths required to suspend luminaire at indicated height. All aircraft cables or pendant supported luminaires shall have an independent support to structure at all cable or pendant support locations. When chain is used, tie-wrap the fixture whip to the chain.

Support luminaires larger than 2 x 4 foot (600 x 1 200 mm) size independent of ceiling framing.

Provide independent support for all fixtures over 50 lbs.

Locate ceiling luminaires as indicated on reflected ceiling plan.

Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

The Contractor shall install fixture supports as required. Fixture installations with fixtures supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all lighting fixtures adequately, providing extra steel work for the support of fixtures if required. Any components necessary for mounting fixtures shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.

Install recessed luminaires to permit removal from below.

Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

Install code required hardware to secure recessed grid-supported luminaires in place.

Install wall mounted luminaires and exit signs at height as scheduled. Use pendants supported from swivel hangers in exposed ceiling/structure locations where necessary to mount exit signs at the specified height.

Install accessories furnished with each luminaire.

Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

Bond fixtures and metal accessories to branch circuit equipment grounding conductor.

Install specified lamps in each luminaire and exit sign.

All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the fixture with special care so that they do not become dusty and are not soiled in the operation.

Lamps installed in fixtures using dimming ballasts shall be burned in at 100% rated output by the contractor for a minimum of 100 hours as recommended by the ballast manufacturer.

All new lamps shall be operational at the Substantial Completion of the project.

ADJUSTING AND CLEANING

Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.

Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.

Touch up luminaire finish at completion of work.

INTERFACE WITH OTHER PRODUCTS

Interface with air handling accessories furnished and installed under Division 23.

Provide controls as indicated on the plans. Refer to section 26 27 26 - Wiring Devices. Controls shall be compatible with the fixtures/ballasts/drivers being installed.

FIELD QUALITY CONTROL

Operate each luminaire after installation and connection. Inspect for proper connection and operation.

ALL FIXTURE CONNECTIONS INCLUDING MASTER-SLAVE

Direct box or conduit connections for surface and recessed fixtures: Use flexible metal conduit from a J-box for recessed lay-in light fixtures. Flexible metal conduit shall be 3/8" (10 mm) minimum diameter and six foot (1.8 m) maximum length. Flexible whip between master and slave fixtures may be supported off of the ceiling grid wires. Conduit length shall allow movement of the fixture for maintenance purposes. Minimum wire size shall be #18 AWG for single fixture or master-slave fixture.

The flexible connectors shall be steel or die-cast, galvanized, snap-in type with locknut, clamp type with locknut, or snap-in connector including those used on the master-slave unit.

END OF SECTION

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SECTION 27 05 53

IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

Applicable provisions of Division 0 and 1 shall govern work of this Section.

Included are the following topics:

PART 1 - GENERAL

SCOPE
RELATED WORK
SUBMITTALS

PART 2 - PRODUCTS

GENERAL
EQUIPMENT ROOM AND FITTINGS
CABLE AND TERMINATION HARDWARE
MISCELLANEOUS

PART 3 - EXECUTION

GENERAL
EQUIPMENT ROOM AND FITTINGS
HORIZONTAL CABLE AND TERMINATION HARDWARE
ABANDONED CABLE

SCOPE

This Section describes the general, product and execution requirements relating labeling of all communications cabling, terminations and related sub-systems for the Project.

Unless specifically included in this Section, requirements for labeling of pathway items – Junction and Pull Boxes, Communication Conduit, Surface Raceway, and Cable Tray – are covered in the respective Division 26 and/or 27 Sections covering those items.

Provide all labeling as detailed in this and related Sections.

RELATED WORK

Section 26 05 53 - Identification for Electrical Systems; re. Labeling of conduit, boxes, etc.

Section 26 05 26 - Grounding and Bonding for Electrical Systems

Section 27 10 00 - Structured Cabling

SUBMITTALS

Refer to Section

PART 2 - PRODUCTS

GENERAL

All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED unless specifically exempted by the language of this Section.

Labels and markings shall be physically and chemically resistant to damage that would affect readability.

Embossed tape will not be permitted for any application.

Labels shall match hardware layout and design, and shall be as large as possible while fitting properly.

Refer to Part 3 for labeling formats and content.

EQUIPMENT ROOM AND FITTINGS

Backboard

Adhesive Label or Stencil.

Character height shall be 2-inch (minimum).

Equipment Racks and Cabinets

Adhesive Label.

Character height shall be 1-inch (minimum).

CABLE AND TERMINATION HARDWARE

Cable Labels

Labels shall be White Vinyl or other appropriate substrate and incorporate a clear lamination which, when label is wrapped around cable, covers printed part of label. Flag type labels are not allowed.

Labels shall be of adequate size to accommodate circumference of cable(s) being marked and properly self-laminate over full extent of printed area of label.

- Labels on larger cables (e.g. Copper Backbone) may be wrapped with clear non-removable tape.

Telecommunications Outlet

Telecommunications Outlet labels that are placed in recessed label holders shall be white paper on which outlet information is added.

Modular Patch Panel

Paper inserts integral to patch panel, Adhesive labels or factory-screened numbering.

MISCELLANEOUS

None

PART 3 - EXECUTION

GENERAL

Clean surfaces before attaching labels with the label manufacturer's recommended cleaning agent.

Install labels firmly as recommended by the label manufacturer.

Install labels square and neatly on all equipment.

Position labels as to be visible and not obscured by termination hardware or other cabling.

Lettering shall be 10-point or larger unless noted otherwise.

EQUIPMENT ROOM AND FITTINGS

General

Designators for communications equipment rooms shall be coordinated with the user agencies.

Backboard

Label Backboards with room designator.

Position label on wall adjacent to entry door.

Equipment Racks and Cabinets:

Label each Equipment Rack and/or Cabinet with a unique alpha character starting at "A".

Position labels at top of rack. Label may be center, left or right for best visibility.

Equipment Enclosures:

Label each Equipment Enclosure with designation for Telecommunications Enclosure.

HORIZONTAL CABLE AND TERMINATION HARDWARE

General

Label all Telecommunications Outlets, Patch Panels, Termination Blocks, and Cables.

This is inclusive of each voice, data, video, or fiber optic outlet, or any configuration thereof, as identified on the Drawings.

Label each component using a unique code identifying the link.

Telecommunications Outlet

Telecommunications Outlet identification shall be based on - or result in - a logical numbering sequence in each Work Area. Labeling plans that results in random TO numbering are not acceptable.

Label Telecommunications Outlets on the faceplate and, if applicable, on the base or frame of the TO which is permanently attached to its mounting.

Where outlet faceplates incorporate recessed label holders, labels shall be positioned beneath clear plastic covers which are part of the faceplate assembly. Where no such label holders are present (e.g. on existing to remain outlets or wall-mounted telephone-only outlets) protect the faceplate labels with a clear over-laminate.

Labels shall be White background with Black lettering. Lettering size shall be as large as practicable (up to 16-point) to fit properly on the outlet label. No lettering shall be smaller than 12-point.

Where there is a distinction between "Voice" and "Data", number each media type separately. Where there is no distinction between horizontal cabling that may be used for "Voice", "Data", "CATV", "IPTV", etc., number the media types sequentially.

HC-###X

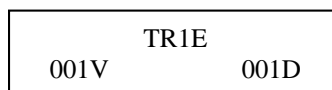
where: HC = Horizontal cross-connect identifier serving that location

= a sequential number assigned to that port starting at 001

X = an alpha character identifying cable type. V = Voice, D = Data, C = Coax/CATV, S = Security, F = Fiber Optic

For example: "1A-001D" represents the first data jack served from the Horizontal Cross-connect identified as "TR1E" for that building. A voice outlet at the same location would be labeled as "TR1A-001V".

Faceplate labels can use common HC identifiers on each label strip. For example, the jacks in the above example sharing common label strip may be represented by:



Horizontal Cable

Code used to label Horizontal Cables shall be same as identified for Telecommunications Outlet above.

Label each Horizontal Cable at the Horizontal Cross-connect (e.g. Modular Patch Panel or Termination Block) and at the Telecommunications Outlet. If applicable, label cables at an intermediate interconnect such as a Consolidation Point in a Zone Cabling installation. Position labels within 4-inches of each cable end.

Modular Patch Panels

Label each Patch Panel and port at horizontal cross-connect with unique identifying code. Code shall identify Outlet ID that corresponds with each jack/connector position.

Horizontal Cross-connect (location) identifier is not required on modular patch panels.

Equipment Rack identifier is not required on modular patch panels.

Modular Patch Panel labeling format shall be as follows:

- Label each Modular Patch Panel with its designator "PP". This is a number starting at "01". Panels are to be numbered be from Top (of Rack) to Bottom.
- Label each jack position sequentially with its designator "##". A numerical value of 01 - 48 is typical starting at the top left and counting from Left-to-Right and Top-to-Bottom. Use of factory-screened numbering is preferred

ABANDONED CABLE

Remove all abandoned cable. Cable designated for possible future use shall not be considered abandoned.

END OF SECTION

SECTION 27 10 00

STRUCTURED CABLING

PART 1 - GENERAL

SCOPE

This section describes the products and execution requirements relating to furnishing and installation of Telecommunications Cabling and Termination Components and related sub-systems as part of a Structured Cabling System for the project. The project will include category 6 cable to locations in the existing Fen Oak Building. The Cat 6 will support data cabling. The project has TWO (2) IT closets and no fiber requirements. All installation to be closely coordinated with Dane County IT personnel.

Included are the following topics:

PART 1 – GENERAL

- Scope
- Related Work
- Regulatory and Standards References
- Design Intent
- Work Sequence
- Submittals
- Cooperation
- Project Record Documents
- Quality Assurance
- Delivery, Storage and Handling
- Drawings

PART 2 – PRODUCTS

- Horizontal Permanent Link
- Voice Terminated Field
- Telecommunications Outlet
- Modular Patch Panel
- Horizontal Jumper Management

PART 3 – EXECUTION

- General
- Cable Installation
- Telecommunications Outlet
- Cable Termination
- Identification and Labeling
- Testing and Acceptance
- Documentations
- As-Built Construction Drawings
- Warranty

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

- Section 26 05 00 – Common Work Results For Electrical
- Section 26 05 33 – Raceway and Boxes for Electrical Systems
- Section 26 05 26 – Grounding and Bonding for Electrical Systems
- Section 26 05 29 – Hangers and Supports for Electrical Systems
- Section 26 05 53 – Identification for Electrical Systems
- Section 27 05 53 – Identification for Communications Systems

REGULATORY AND STANDARDS REFERENCES

All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the Wisconsin Electrical Code and present manufacturing standards.

All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

Other applicable standards are as follows:

- ANSI/IEEE C2 - National Electrical Safety Code
- NFPA 70- 2008 - National Electrical Code
- SPS Chapter 316 – Wisconsin Dept. of Safety and Professional Services Electrical Code
- TIA/EIA Standards, 568-B.2 (Category 6), 568-B.3, 569-B, 606A, and J-STD-607-B (with exceptions) including all applicable Addenda.
- ANSI/TIA-568C.0, -568-C.1, -568-C.2, -569B, -606A and ANSI-J-STD-607-B (with exception)
- IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- ICEA publication S-80-576-2002
- TIA Fiber Optic Test Procedures (FOTPs) as noted.

DESIGN INTENT

General

The Structured Cabling System is based on a hierarchy of cables and termination locations.

All cables and related termination, support and grounding hardware, bonding, shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following sections.

Provide all labor and materials necessary to construct the system as described herein. This includes - but is not limited to - furnishing and installing cable, cable supports, racking and termination components, termination, testing, labeling, and documentation.

Horizontal Cabling

Horizontal Cabling System links the Telecommunications Outlet (TO) in the work area to the Horizontal Cross-connect serving that area. This “Permanent Link” includes 4-Pair Unshielded Twisted Pair (UTP) Copper Cables, terminated as specified in this document.

There shall be no distinction between Horizontal Cables designated for “DATA” and “VOICE” (Telephone) applications.

Horizontal Cables for network-type Security devices (e.g. IP Video Surveillance Camera), if applicable, are considered “Data” cables for the purpose of this specification.

Performance of the Horizontal Permanent Link (cable + termination hardware) shall Exceed TIA Category 6.

Termination Hardware for Horizontal Cabling shall be rack-mounted Patch Panel.

WORK SEQUENCE

During the construction period, coordinate telecommunications schedule and operations with GC, Owner’s Representative and Owner. Extended disruption of service to building occupants shall be scheduled around normal working hours. Related premium time shall be included in the bid.

SUBMITTALS

Under the provisions of Section 26 05 00 and Division 1, prior to the start of work, submit:

Certification documents confirming contractor status as active participant in Installers Program operated by Manufacturer of Cabling or Termination Components used.

Manufacturer's Data covering all products proposed indicating construction, materials, ratings, and all other parameters identified in Part 2 (Products) below.

Manufacturer's installation instructions.

Upon request by the Engineer, one (1) two-foot section of each cable type to be utilized for final approval by the Engineer. This two-foot section shall have the manufacturer's cable markings visible. Upon request, samples from every reel sent to the site shall be provided.

Prior to installation, provide samples of all label types planned for the Project. These samples shall include examples of the lettering to be used. Mount samples on 8 1/2" x 11" sheets and mark to indicate their proposed use.

Prior to system tests, submit Test Plan per Part 3.

Group Submittals to include complete documentation of related systems, products and accessories in a single submittal. Where applicable, mark dimensions in units to match those specified.

Submittals shall be original catalog sheets, photocopies, or electronic format (ADOBE Portable Document format ".pdf") thereof. Facsimile (fax) sheets shall not be accepted.

The Engineer shall review the Submittals and annotate them indicating approvals and shall return (2) sets of submittals to the contractor.

Work shall not proceed without the Engineer's approval of the submitted items.

If materials are furnished as specified no further qualifications are necessary. However, if the Contractor wishes to substitute another manufacturer and/or catalog number, the following information shall be submitted to the Engineer:

A complete description of the material which the contractor proposes to substitute (shop drawings, illustrations, catalog data, performance characteristics, etc.), and

The reason for the substitution identifying any benefit to the Owner.

The Engineer shall approve or decline all substitutions of material. No substituted materials shall be installed except by written approval from the Engineer.

COOPERATION

Cooperate with other trades and personnel in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check the location of electrical outlets with respect to Division 27 outlets and equipment before installing.

PROJECT RECORD DOCUMENTS

Submit record documents under the provisions of Specification Section 26 05 00 and Part 3 of this section.

QUALITY ASSURANCE

The manufacturer(s) of cabling and connectivity components shall be a company specializing in and having a minimum of five years documented experience in producing products similar to those specified in this and related sections.

The contractor shall have been in this line of business for a minimum of five (5) years and have successfully completed (4) projects 50% of magnitude of the magnitude specified by these documents.

Contractor shall have necessary certifications to provide for Guarantees as specified herein.

Contractor shall be an active participant in Installers Program operated by Manufacturer of Cabling or Termination Components used. Contractor shall be participant in this program at time of Bidding and remain so throughout project.

Contractor shall have on the project team at a minimum one (1) certified Installer trained by the manufacturer(s) of the cabling, hardware and accessories installed under this project.

At least (1) member of each test team shall be factory trained/certified in use of the test equipment. The project foreman shall have been factory trained in the use of the test equipment.

DELIVERY, STORAGE AND HANDLING

Store cable according to manufacturer's recommendations as minimum. In addition, store cable in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 4 degrees C., move cable to a heated (10 degrees C. minimum) location.

If the contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner. If necessary, cable shall be stored off site at the contractor's expense.

DRAWINGS

It shall be understood that the electrical and communication details and drawings provided with the bid documents are diagrammatic. They are included to show intent and to aid the Contractor in bidding the job. The Contractor shall make allowance in their bid to cover whatever work is required to comply with the intent of the plans and specifications.

The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

Prior to submitting the bid, the Contractor shall call the attention of the Engineer to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted, within ten (10) days prior to the Bid Due Date.

PART 2 - PRODUCTS

HORIZONTAL PERMANENT LINK

General

All cabling for this project is permitted to be non-plenum rated.

The Horizontal (Station) Cable System is based on the installation of 4-pair, Un-shielded Twisted Pair (UTP) copper cables from the Telecommunications Outlet to the Horizontal Cross-connect (wiring hub). The combined cable and termination hardware is referred to as the "Permanent Link".

Refer to the Floor plan Drawings(s) which identify the location of the Horizontal Cross-connect and Telecommunications Outlet (TO) locations.

Cable and Termination Components (Jack, Patch Panel) are specified to function as a System. The compatibility of the Cable to be installed with the proposed termination components shall be recognized and documented by the Termination Component Manufacturer.

Cable, Component and Permanent Link performance shall exceed the TIA/EIA Category 6 criteria as defined by the referenced TIA/EIA documents. Minimally compliant Category 6 cabling and termination hardware is not acceptable for installation on this project.

The performance of the Permanent Link, of which 4-pair horizontal cable and termination components are a part, shall exceed minimal compliance with the referenced TIA standards. Category 6 installations shall provide minimum margins in the installed Permanent Link as follows:

NEXT	3 dB
PSNEXT	3 dB
RL	2 dB

Cable and connecting components that comprise the “Permanent Link” shall meet or exceed the requirements for “DTE Power via the MDI” to provide at least 25 W at the Powered Device as defined by the IEEE 802.3at-2009 “Power over Ethernet Plus (PoE+)” standard.

Horizontal Cable

Horizontal Cables shall be constructed of individually twisted pairs with 24-AWG insulated solid copper conductors.

All Cables and Termination hardware shall be technically compliant with and installed in accordance with the referenced TIA/EIA documents and perform as required to provide the Permanent Link margins stated herein.

All cables shall be suitable for installation in the environment defined.

Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.

Pairs of all 4-pair cables shall be unshielded and shall be identified by a banded color code in which conductor insulation is marked with a dominant color and banded with a contrasting color. By pair number, the pair colors or dominant band are:

- Pair 1: Tip - White/Blue; Ring - Blue (or Blue/White)
- Pair 2: Tip - White/Orange; Ring - Orange (or Orange/White)
- Pair 3: Tip - White/Green; Ring - Green (or Green/White)
- Pair 4: Tip - White/Brown; Ring - Brown (or Brown/White)

Cable Rating: CMR (or approved substitutes as defined by the NEC).

Cable Jacket color shall be GREEN.

Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages that incorporate a rotating reel.

Cable performance shall be as required to meet the criteria defined in the Article “Horizontal Permanent Link” above.

Horizontal Cable Termination

Refer to Part 1 article “DESIGN INTENT” for termination hardware type(s).

Termination hardware performance shall be as required to meet the criteria defined in the Article “Horizontal Permanent Link” above.

VOICE TERMINATION FIELD

Configuration for Backbone Cabling

The Voice Termination will consist of the AT&T Demarcation Point that is located in the First Floor Data Closet. This contractor shall extend a 25-pair cable from the Demarcation to a new Voice Termination

Field located in Server Room 230. The contractor shall assist the Agency IT personnel and AT&T with the cutover of the existing lines.

Block mounting shall be as follows:

Horizontal Cross-connect – wall-mounted

Main Cross-connect – wall-mounted

Each horizontal row of the cross-connect block must be capable of terminating one (1) twenty-five pair binder group (Backbone Cables). Backbone blocks shall be segregated clearly identifying their function.

Blocks shall maintain Category 6 performance or better per the referenced EIA/TIA documents.

Five (5) Pair Termination Clips (e.g. C5) shall be used in the termination of Voice Backbone Cable.

Modular-to-110 Patch Cord

Construction:

24 AWG stranded copper twisted pairs.

Unshielded (UTP)

8-Position, 8-Conductor (8P8C) Modular Plug at one end and 110-type connector at other end. 110-type connector width shall match pair count.

Modular Plugs shall:

Be pinned EIA/TIA T-568A

Be a Snag-less design

Size of the Modular Plug and Boot/Strain-relief shall allow for patch cords to be positioned in adjacent ports of Modular Patch Panel.

110-type connectors shall be designed to ensure proper orientation of plug when connecting to termination block.

Cable jacket material shall be PVC and be marked with manufacturer's name and cable type. Jacket color(s) shall be as indicated in Part 3.

TELECOMMUNICATIONS OUTLET

General

Station cables shall each be terminated at their designated workstation location in the connector types described in the sub-sections below. Included are Modular Jacks. These connector assemblies shall snap into a mounting frame. The combined assembly is referred to as the Telecommunications Outlet (TO).

All Telecommunications Outlets and the associated Jacks shall be of the same manufacturer throughout the project.

TO mounting configurations shall be as follows:

Flush where new or existing boxes are in place.

Mounted on Modular Furniture (base panel) - Modular Furniture Type shall be defined prior to construction.

The Telecommunications Outlet Frame shall accommodate:

A minimum of four (4) Modular Jacks, Fiber Optic Connectors and/or Coaxial Connectors when installed on a wall-mounted assembly.

A minimum of four (4) Modular Jacks, Fiber Optic Connectors and/or Coaxial Connectors when installed on a Floor-mounted assembly.

A minimum of four (4) Modular Jacks when installed on modular furniture. Design shall accommodate bend radius of installed cables.

The outlet frame shall incorporate a mechanism for adjusting the surface plate to a plumb position.

Connectors shall be flush with the frame/faceplate.

The same orientation and positioning of Jacks and Connectors shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each TO type for review by the Engineer.

Wall Mount Outlet Faceplates shall incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.

Unused jack positions shall be fitted with a removable blank inserted into the opening.

Faceplate of the TO shall be constructed of High Impact Plastic.

Faceplate Color shall (1) match other utilities in the building or (2) when installed in Surface Raceway (if applicable), match the color of the Raceway.

All Jacks and Connectors will be fitted with a dust cover.

4-pair Copper Connector (Modular Jack)

Connector type for 4-pair UTP cabling shall be an 8-pin, 8-conductor (8P8C) Modular Jack.

The interface between the jack and the 4-pair cable shall be a 110-Style block or other insulation-displacement type contact. Termination components shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination

Modular Jacks shall be pinned per TIA T568A standard

Modular Jacks shall be UL verified and listed.

Modular Jack spring wire contacts shall have a minimum of 50 micro-inches of gold plating.

Modular Jack color shall be as indicated on drawing schedules.

Modular Jack performance shall be as required to meet the criteria defined in the Article "Horizontal Permanent Link" above.

MODULAR PATCH PANEL

Patch Panels shall be a Modular to 110-type connector system incorporate Modular Jacks meeting the specifications for the Telecommunications Outlet detailed in the Section above.

Jack color is not applicable unless noted otherwise.

Modular Patch Panel shall be rack-mounted.

Modular Patch Panel configuration shall not exceed 48 ports (2 rows of 24 ports each) in a 2 RU panel. Panels which are modular shall be fully populated (all ports occupied by jacks) and be provided in increments of no less than 12-jacks.

Modular Patch Panel cable termination shall:

Have the ability to seat and cut 8 conductors (4 pairs) at a time and shall have the ability of terminating 22-through 26-gauge plastic insulated, solid and stranded copper conductors.
Be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
Include color coded designation strips or other markings to identify conductor position.

Modular Patch Panels shall incorporate cable support and/or strain relief mechanisms to secure cables at the termination block and to ensure that all manufacturers minimum bend radius specifications are adhered to.

Modular Patch Panel performance shall be as required to meet the criteria defined in the Article "Horizontal Permanent Link" above.

HORIZONTAL JUMPER MANAGEMENT

Equipment Rack shall be equipped with Horizontal Jumper Management Hardware as to allow an orderly routing of twisted pair, optical fiber and coaxial jumpers from the patch panels to the customer provided network equipment. Jumper management hardware shall be as follows:

Panels shall be painted steel or plastic (3.5" panel), have a minimum of five (5) Jumper distribution rings (1.75" x 3.75" minimum dimension).

PART 3 - EXECUTION

GENERAL

Refer to Project Drawings which indicate Telecommunications Outlet locations, major cable routes and termination location(s) within the building.

Furnish and install all cables, connectors, hardware and equipment as shown on drawings and as specified above.

It is the contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified.

The contractor will be responsible for identifying and reporting to the owner's representative any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway or other hardware must be repaired by the Contractor. Repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor-damaged ceiling tiles are to be replaced by the contractor to match color, size, style and texture.

Where unacceptable conditions are found, the Contractor shall bring this to the attention of the Owner's Representative immediately. A written resolution will follow to determine the appropriate action to be taken.

Beginning installation means contractor accepts existing conditions.

Should it be found by the Engineer that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings with the respect or regard to the quality, value of materials, appliances or labor used in the work, it shall be rejected and replaced by the Contractor and all work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

All cables, termination components and support hardware shall be furnished, installed, tested and documented by the Contractor unless noted otherwise.

CABLE INSTALLATION

General

Install all cables in continuous lengths from endpoint to endpoint. No splices shall be allowed unless noted otherwise.

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.

Pull all cable by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure 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.

Complete all work using qualified personnel utilizing state-of-the-art equipment and techniques. During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit, as well as to feed cable and operate pulling machinery.

Pull cable in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed. If any installed cable is kinked to a radius less than recommended dimension it shall be replaced by the contractor with no additional cost to the project.

All wiring shall be run "free-air", in conduit, in a secured metal raceway or in modular furniture as designated on the plan drawings. All cable shall be free of tension at both ends.

Avoid abrasion and other damage to cables during installation.

Pulling Lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.

Manufacturer's minimum bend radius specifications shall be observed in all instances.

A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

Protection of cable from foreign materials:

Provide adequate physical protection during construction to prevent foreign material application or contact with any cable type.

Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited, to overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.

Overspray of paint on any cable, cable jacket or cable termination component will not be accepted.

It shall be the Contractor's responsibility to replace any component in its entirety affected by a foreign material. This shall be at no additional cost to the project. Cleaning of the cables with chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the affected cable.

Should the manufacturer and/or warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced.

Horizontal (Station) Cable Installation

Locate Telecommunications Outlets as identified on the Project Drawings.

Route Horizontal Cabling on each Floor to the Telecommunications Room (TR) on that floor or to the designated TR if on another floor.

The maximum station cable drop length for Data and Voice UTP (Category 5e or Category 6) shall not exceed 295-feet (90-meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and must include any slack required for the installation and termination.

The Contractor is responsible for installing station cabling in a fashion as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints should be identified and reported to the Engineer prior to installation.

Changes to the plan shall be approved by the Engineer.

Where installed free-air, installation shall consider the following:

Cable shall run at right angles and be kept clear of other trades work.

Support cables according to code utilizing "J-Hook" or "Bridal Ring" supports anchored to ceiling concrete, or structural steel beams. Cable support devices shall be designed to maintain cables bend to larger than the minimum bend radius.

J-Hooks shall incorporate a metal wire or other type closure to retain the cables.

Bridal Rings shall be equipped with "saddles" to maintain the required bend radius.

Space supports at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6-inches, another support shall be used.

Do not place cable directly on the ceiling grid or attach cable in any manner to the ceiling grid wires.

Do not attach cables to existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit.

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.

Protect cable sheaths from damage from sharp edges. Where a cable passes over a sharp edge, provide a bushing or grommet to protect the cable.

Place a coil of 4 feet in each cable shall in the ceiling at the last support (e.g. J-Hook, Bridal Ring, etc.) before the cables enter a fishable wall, conduit, surface raceway or box. At any location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15-feet of slack shall be left in each station cable under 250-feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

At all Telecommunication Rooms, provide approximately 10-feet of slack in each station cable under 250-feet in length to allow for changes in the telecommunication room layout without re-cabling. These "service loops" shall be secured to the ladder rack, with "J" hooks, or "D" rings above the equipment, racks, and patch panels and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

Minimum separation distances between communications wires and cables, and any electric light, power, Class 1, non-powered fire alarm, or medium power network-powered broadband communications circuit shall comply with NEC Article 800.

In addition, to reduce or eliminate EMI, the following minimum separation distances shall be adhered to:

Twelve (12) inches from power lines < 5 kVA.

Thirty-nine (39) inches from power lines \geq 5 kVA.

Thirty-nine (39) inches from transformers and motors.

Eighteen (18) inches from high voltage lighting (including fluorescent).

All openings shall be sleeved and firestopped per prevailing code and building construction ratings upon completion of cable installation.

Within the equipment room in which Data Cabling is to be terminated, use only Hook and Loop(e.g. "Velcro") ties from room entry to the point of termination. This is to facilitate the addition of future cables.

Grounding

Where a cable incorporates metal armor, strength elements or other metallic elements (not including conductors), Bond those elements to an approved ground using a #6 AWG solid copper conductor. Cable grounding hardware and method shall be per manufacturer's recommendations.

TELECOMMUNICATIONS OUTLET

General

Information Outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on Surface Raceway and in modular furniture.

Mount outlets level.

Position any outlets to be added where these conditions are not met at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Engineer. Refer to project drawings for nominal height. Where not shown, default mounting height (from finished floor to center line of outlet) in new installation shall be as follows:

Standard Voice & Data Outlet	16-inches
Outlet for Wall-Mounted Telephone	46-inches.

CABLE TERMINATION

General

At the Telecommunications Rooms, position all Data Cables on termination hardware in sequence of the Outlet I.D. starting with the lowest number. Exceptions to the sequencing of terminations are allowed only with the permission of the project manager and A/E.

Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by the Engineer prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

Cable Termination - Data UTP

Install Data Patch Panel(s) in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.

Size Data Patch panels to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.

At Information Outlets and Data Patch Panels, ensure that the twists in each cable pair are preserved to within 0.5-inch of the termination for Data cables. The cable jacket shall be removed only to the extent required to make the termination.

IDENTIFICATION AND LABELING

Refer to Section 26 05 53 "Identification for Electrical Systems" for Identification and Labeling guidelines for this Project.

Label all Backbone and Horizontal Cable, Outlet Faceplates, and Termination components (e.g. Voice Termination Blocks & Modular Patch Panel).

Prior to installation, provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used.

TESTING AND ACCEPTANCE

General

Prior to testing, provide a summary of the proposed test plan for each cable type including equipment to be used, set-up, test frequencies or wavelengths, results format, etc. The method of testing shall be approved by the Engineer. Failure to provide the above information shall be grounds for the Owner/Engineer to reject any and all Documentation of Results on related testing and to require a repeat of the affected test.

Visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. Provide to the Engineer with a written certification that this inspection has been made.

Conduct acceptance testing according to a schedule coordinated with the owner's representative.

Representatives of the Owner may be in attendance to witness the test procedures. Provide a minimum of one (1) week advance notice to allow for such participation.

Supply all equipment and personnel necessary to conduct the acceptance tests.

All equipment used in testing shall be maintained and calibrated per manufacturer's guidelines. Provide documentation of equipment calibration.

Document all tests. Refer to the Article "DOCUMENTATION" below which details requirements.

Perform tests related to connected equipment of others only with the permission and presence of Contractor involved.

All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the expense of the contractor. The applicable tests shall then be repeated.

Should it be found by the Engineer that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings, with the respect or regard to the quality, amount of value of materials, appliances or labor used in the work, it shall be rejected and replaced by the

Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

Horizontal 4-pair Copper Cabling

General

Testing shall be from the Telecommunications Outlet to the Data Patch Panel (or Wiring Block) at the TR on which the cables are terminated.

The cabling must pass all the specified requirements including margins. Conditional passing test results passes that are within the measurements accuracy of the test equipment (.e.g. “*PASS”) are not acceptable.

When the TO is located on/in the wall behind modular furniture, a patch cord may be inserted into the TO to allow the furniture to be returned to its normal location. Cable testing, in this case, will be done with the patch cord. If the cable test fails only due to the length of the patch cord, the owner will accept the cable as passing.

Horizontal “Station” cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and Wire Map (Conductor Position on the Modular Jack).

Any defective, split or mis-positioned pairs shall be corrected.

Additional testing of Cabling Systems rated at TIA Category 6 and higher shall be performed to confirm proper functioning and performance.

Performance Testing

Testing of the Transmission Performance of station cables shall include the following:

- Length
- Attenuation
- Pair to Pair NEXT Loss
- PSNEXT Loss
- Pair to Pair ELFEXT Loss (Equal Level Far End Cross-talk)
- PSEFEXT Loss
- Propagation Delay
- Delay Skew
- Return Loss

Cables shall be tested to the maximum frequency defined by the standards covering that performance category. Transmission Performance Testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify "PASS" on each cable and display the specified parameters - comparing test values with standards based "templates" integral to the unit. Test method shall document all parameters specified by the standard including margins over minimal compliance.

Performance testing shall be per ANSI/TIA-568-C.2 Permanent Link test configuration and procedures

Where margin(s) over compliance with the identified standard(s) is specified, the contractor shall field verify that the necessary margins are met and take corrective actions necessary to remedy out-of-spec links.

The maximum length of station cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.

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 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. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.

In the event results of the tests are not satisfactory, the Contractor shall make changes as 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.

Special Considerations

Where Cabling is terminated in a Modular Plug at the device location (e.g. Video Surveillance Camera or Wireless Access Point), use one of the following methods:

Use Modular-Jack to Modular Jack adapter cord.

or

Use tester configured with Channel Test head at "plug end". This method must be supported by the test equipment manufacturer.

DOCUMENTATION

General

Upon completion of the installation, provide project documentation to the Engineer for review.

Documentation shall include the items detailed in the sub-sections below. Provide approved test results and documentation in Operations and Maintenance Manuals.

Submit documentation of Test Results in electronic form for review and distribution. Where documentation provided in electronic form requires unique software (other than Adobe Acrobat Reader) for viewing test results, provide one (1) copy of such software. The software shall run on a MICROSOFT Windows-based personal computer supplied by the Owner. Software shall include license if applicable. Provide final documentation on CD-ROM. Interim documentation may be submitted to the Engineer for review via email, FTP, CD-ROM or other electronic means.

Name file(s) and records shall use building, route or other cable identifiers that match labeling formats used. Prefix file name with the project number.

Provide test results and describe the conduct of the tests including the date of the tests, the equipment used and the procedures followed. At the request of the Engineer, provide copies of the original test results.

Submit Documentation within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.).

This is inclusive of all test result and *draft* as-built drawings. Draft drawings may include annotations done by hand.

Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

The Engineer may request that a 10% random field re-test be conducted on the cable system at no additional cost to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

Test Data - Copper Media

Test results shall include a record of test frequencies, cable type, conductor pair and cable (or Outlet) I.D., measurement direction, test equipment type, model and serial number, date, reference setup, and crew member name(s).

Submit Test Results for each Horizontal Link in electronic form a) in the native format of the test instrument (e.g. .flw for Fluke, .sdf for Agilent or Ideal, etc.) and b) summarized in a fashion that includes a graphical display of all test parameters.

The summary shall document the worst-case margin over minimal TIA "Category" compliance for the cables tested. The summary shall be in Adobe Acrobat .pdf format.

Submit Test Results for each Backbone Copper Cable in electronic form a) in the native format of the test instrument and b) summarized in a fashion that includes a graphical display of all test parameters. The summary shall be in Adobe Acrobat .pdf format.

Cross-Connect Data

Provide the necessary assistance to allow Owner and/or Telephone Service Provider personnel to make the necessary connections to establish telephone service on the new cable system. These activities include, but are not limited to (1) a general wiring overview and (2) detailed cross connect documentation (relating TO I.D., Room Number and Riser pair). The latter shall be in the form of an electronic format database (MS Excel or convertible format).

AS-BUILT CONSTRUCTION DRAWINGS

Provide Record Drawings which denote as-built information.

Include cable routes and outlet locations.

Identify Telecommunications and other low-voltage Outlet locations by their sequential number as defined elsewhere in these documents. Numbering, icons and drawing conventions used shall be consistent throughout all documentation provided.

The Owner - through the Consultant - will provide floor plans in paper and electronic (*AutoCAD* .dwg) formats on which as-built construction information can be added. These documents will be modified accordingly by the contractor to denote as-built information as defined above and returned to the Consultant for acceptance. This information shall be supplied to the Consultant/Engineer no later than four (4) weeks prior to the scheduled occupancy of the affected floors.

Annotate the base drawings and return to the A/E in hard copy (same plot size as originals) and electronic (*AutoCAD* .dwg) form.

Identify each drawing submitted by the Contractor as part of the Project Documentation as an "As-built" drawing and include a) the contractor name and/or logo, and b) the date of the drawing.

Retain all fonts, color, layer, Model Space/Paper Space conventions established in the base drawings by the Contractor in preparation of the As-built drawings.

Prior to generation of the drawings, provide a sample file and test plot to the Engineer for review and approval.

All documentation, including hard copy and electronic forms shall become the property of the owner.

WARRANTY

See Division 1, GENERAL CONDITIONS, and GENERAL REQUIREMENTS - Guarantee Documents for general requirements.

Minimum Warranty period for Structured Cable System sub-systems shall be as follows:

Horizontal Copper Permanent Link – 15 years. Warranty shall be direct from manufacturer(s) of cabling and connecting components to Owner.

Warranty shall include all labor, material, and travel time.

Provide Warranty certification of the Horizontal Copper Permanent Link by the manufacturer(s) of cabling and connecting components as part of system documentation.

END OF SECTION

**SECTION 28 13 00
ACCESS CONTROL**

PART 1 GENERAL

Applicable provisions of Conditions of the Contract for Small Projects shall apply to all work under this Section.

PART 1 - GENERAL

- Scope
- Related Work
- Design Requirements
- Submittals
- General
- System Features
- Product Availability
- Qualifications

PART 2 - PRODUCTS

- Wire and Cable
- Lightning Protection
- Power Supplies
- Controller
- Proximity Card Reader
- Proximity Key Cards
- Associated Equipment
- Warranty

PART 3 - EXECUTION

- System Startup
- Owner's Instructions
- Commissioning
- Preparation
- Installation
- Workmanship
- Equipment Pre-Test
- Wire and Cable
- Wire and Cable Terminations
- Conduit and Raceway Installation
- Penetrations
- Fire Rated Doors and Frames
- Grounding
- Power to Security Equipment
- Cutting and Patching
- Plywood Backing
- Spare Parts

SCOPE

Under Alternate Bid #2, provide a complete operating Card Access system. The card access system shall be fully compatible with Dane County Tridium Vykon Security JACE SEC-1-601 access control system (hereafter referred to as Vykon 601). The System shall include proximity card readers, controllers, wiring, and all other equipment necessary for the complete specified operation with the Vykon 601 System.

The contractor shall be responsible for providing final working drawings based on the information described in the drawings and his field observations. Contract documents indicate design intent and do not show all details required for a complete system. The contractor shall make their own determination of installation requirements.

RELATED WORK

Section 08 71 00 – Door Hardware

Section 26 05 00 – Common Work Results for Electrical
Section 26 05 29 - Hangers and Supports for Electrical Systems
Section 26 05 33 - Raceway and Boxes for Electrical Systems
Section 26 05 53 - Identification for Electrical Systems

DESIGN REQUIREMENTS

Project drawings represent the level of system design to be provided by Contractor. Contractor shall provide all additional system design work required, including but not limited to:

- Conduit layout and sizing.
- Wire and cable layout and sizing.
- Point-to-point wiring and equipment hook-up information.
- Equipment mounting details.
- Design of equipment cabinets.
- Other detailed design work required.

Contractor's design shall conform to all applicable codes and ordinances. All electrical design, including sizing and placement of conduit, raceways and conductors shall be in accordance with current adopted edition of NFPA 70: National Electrical Code unless local codes establish more stringent requirements.

SUBMITTALS

Submit product data:

- Card reader
- Controllers
- Associated Equipment
- Request to Exits
- Door Contacts

Submit the following information:

- Maintenance agreements
- Qualifications
- Proposed installation schedule

GENERAL

All products provided by Contractor shall be new and unused, and shall be of manufacturer's current and standard production.

Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.

Drawings and specifications indicate major system components and may not show every component, connector, module or accessory that may be required to support the operation specified. Contractor shall provide all components and labor needed for complete and satisfactory operation without additional cost to the Owner.

SYSTEM FEATURES

The Access Control System shall be comprised of; master access control modules with network connectivity; two door expansion units connected to master control modules via an RS-485 and power trunk; card readers, door status devices, request to exit devices, emergency door releases and electronic locking hardware that in turn are connected to either master access control modules or expansion modules; power supplies and back up batteries which support the electronic locking hardware as required.

The Contractor shall include all Ethernet network wiring required to create a control LAN/WAN that shall connect all network devices as indicated on the riser diagram.

PRODUCT AVAILABILITY

Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include

such considerations into his proposed Hard Schedule.

QUALIFICATIONS

Contractor: Company specializing in installing products as specified in this section with a minimum of five (5) years documented experience. Any system proposed shall be in operation in a non-test environment. Provide a list of installations of similar size with bid documents.

Contractor shall prove their ability to install and maintain similar systems.

Contractor shall be a factory-authorized integrator with full authority to install and maintain the Tridium Vykon Security system.

Contractor shall show evidence that they can provide the necessary maintenance support for the proposed system. This should include:

1. Identification of adequate staffing to meet stated response time to minimize system down time.
2. List recent customer references that have had similar systems installed in a similar environment.
3. Specify which office(s) shall be responsible for maintaining the system.
4. Identify the number of technicians in the supporting office who have been factory trained on installation and maintenance.
5. Submit an organizational diagram indicating the key technical staff proposed for the project including Project Manager, Application Engineer, etc.

The contractor/installer of the selected system is solely responsible for all equipment, software, etc., and third-party contractors used in any and all capacities, as they relate to meeting all codes, OSHA requirements, compatibility, etc. The installer shall assume all responsibilities in meeting these requirements, laws, compatibility needs, etc.

Certain products specified may only be available through factory-authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

PART 2 - PRODUCTS

WIRE and CABLE

Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.

All cables shall comply with equipment manufacturer recommendations for wire and cable.

All cables shall be plenum rated where required and specifically designed for their intended use.

Comply with all applicable codes and ordinances.

SURGE SUPPRESSOR

Surge suppression shall be provided between each electrified locking hardware device and the access control system controlling relay/power source. One suppressor shall be installed at the electronic locking hardware and one at the power source controlling relay.

- Capacitor/Transzorb (DC power): Honeywell NC-S4, Diteck DTK-ESS or approved equal.

Where system devices are susceptible to power surges or stray voltages additional surge suppression shall be provided.

- Card Reader Surge Suppressor: Diteck DTK-4LVLP-CR or approved equal.
- Door Status Sensor: Diteck DTK-2MHLP series or approved equal.
- Request to Exit Device: Diteck DTK-2MHLP series or approved equal.

POWER SUPPLIES

Provide UL listed power supplies. Power supplies shall include battery powered uninterruptible supply system. Provide battery backup sufficient to operate all system components including controllers, locks, request-to-exit devices, and data communications equipment associated with the security system for a minimum of four hours.

Power supplies for electronic locking hardware shall be either wall mount or rack mount units depending on the

application and available mounting source. Wall wart transformers shall not be allowed for either direct power to field devices or to a power supply distribution panel. Direct, hardwired 120VAC to open frame or like transformer mounted in an enclosure is the preferred method. Line cord connections to a duplex or like outlet for rack mount power supplies shall be deemed acceptable.

CONTROLLER

Controllers shall be Tridium Vykon Security JACE SEC-1-601 access control system. The controller shall be connected to the server by network connection.

The controller shall provide for additional multiple inputs and outputs for monitored devices and controlled devices. Additional input and output board shall be supplied as necessary.

The controller cabinet shall be supplied with a key lockable door (all controllers keyed alike). Provide a tamper switch to supervise the status of the access doors and activate an immediate alarm condition at the assigned CPU. After the door is opened, the switch shall be capable of an override position to clear the tamper condition. Closing the door shall automatically re-arm the switch.

PROXIMITY CARD READER

The proximity reader shall be as manufactured by HID Corporation 125kHz proximity type - (no substitutes). The reader shall be connected in the Wiegand output format. Any other protocol is not acceptable. Use of a Wiegand-Prox Star Coupler to interface with the controller is not acceptable.

Each card reader shall be labeled under the front cover plate. Labeling shall include the card reader name/number and the controller to which it is connected. If used, RM-4 junction boxes shall identify the associated reader and controller.

Two LED's, panel mounted with the following status indications shall be provided:

- Solid Red – Door locked, ready for new card.
- Alternating Red/Green – door unlocked or in alarm
- An audible tone shall indicate that an access card was read.

Construction: Card reader shall be sealed, waterproof, weather resistant and tamper-proof. The card reader shall be designed to operate properly within relative humidity range of 0% to 100% condensing and within a temperature range -50°F to +180°F. Material shall be Lexan or equal.

Mounting: Card reader shall be designed to be mounted and operated on or behind any surface including metallic surfaces and glass. The mounting height of all proximity card readers shall fall within ADA guidelines.

Tamper Resistance: Physical damage shall not allow access to any circuitry, which would allow the system to be compromised. Transmission of any frequency (or set of frequencies) into the card reader at any power level shall not compromise the system.

General: Card reader shall connect to controller via cable as specified by the manufacturer. All required power shall come from controller via cable. As a minimum, card reader shall detect card codes when a card is within 4" of its surface.

Diagnostics: Card reader and line integrity shall be monitored continuously and shall alarm if failure is detected.

PROXIMITY KEY CARDS

Proximity key cards as manufactured by HID Corporation to match key cards currently used with the Dane County access control system. All equipment installed under this contract shall be compatible with this card type.

Provide (100) access cards.

ASSOCIATED EQUIPMENT

Approved input and output devices shall include:

DOOR STATUS SENSORS:

Door status sensors shall be either integral to the electronic locking hardware (latch bolt monitoring – 9 LBM) or through stand-alone devices (magnetic contacts).

All stand-alone door status sensors shall be of the magnetic reed type and obtained from GE Security or approved equal.

- 1" Diameter Steel Door Recessed Sensor (DPDT): 1076D
- 1" Diameter Steel Door Recessed Sensor (N/O): 1078W
- ¾" Diameter Steel Door Recessed Sensor (N/O): 1078C
- Press fit rare earth magnet: 1840-N
- Roller Plunger (hinge side of door only – N/O): 3008
Use only where a recessed sensor will not function properly. Prior approval must be obtained before installation.
- Commercial Steel Door Surface mounted Sensor (N/O): 1045
Use only where a recessed sensor will not function properly. Prior approval must be obtained before installation.

Sensors of the recessed type shall adhere to the following installation standards:

- When installed at the top of the door the sensor shall not be installed no closer than 2" and no further than 10" from the latch side of the door.
- When installed on the latch side surface of the door the sensor shall not be installed closer than 2" of either the bottom or top of the door.
- When a recessed sensor is utilized at the top of an aluminum door where the door has a recessed channel an 1840-N or similar magnet shall be used. The construction of field expedient assemblies to utilize a standard press fit magnet will not be allowed.

Sensors of the plunger type shall adhere to the following installation standards:

- A plunger sensor shall only be used when a recessed sensor cannot be utilized on the latch side or top of a door.
- Plunger sensors shall only be used on the hinge side of a door.
- A plunger sensor shall be installed no closer than 2" from the bottom or top of the door.
- A plunger sensor shall have sufficient spacers applied to cause the switch to operate when the door has moved no further than 5" from the closed position.

Sensor of the surface mount type shall adhere to the following installation standards:

- A surface mounted switch shall be installed no closer than 1" and no further than 3" from the latch side of the door.
- Armored cable shall be installed to protect the integrity of the cable where accessible by human or mechanical contact.

All door status sensors shall have an end of line supervision device installed at the device within 12" of the sensor.

REQUEST-TO-EXIT MOTION DETECTORS:

Request to exit devices, when applicable, may be either motion, wireless, button or integral to the electrified lockset.

- Passive Infrared Motion: Bosch DS150i/DS151i or approved equal.
- Wireless: Linear DXR-71 or DXR-702 (Receivers), DXT-41, DXT-42 or DXT-21 (Transmitters) or approved equal.
- Button: Momentary push button, SPDT, 4amps @ 28VDC or equal. Unit shall include a mountable enclosure to support wiring terminations.
- Integral to Lockset: specific to electronic locking hardware.

All RTE devices shall be electronically wired as normally open circuits (NO) to allow for T-Tapping or parallel circuit

connections for multiple REX devices on a single door.

WARRANTY

Contractor warrants that all work furnished (material and labor) under this contract will be of good quality, free from faults and defects, and in conformance with the Project Drawings and Specifications.

Contractor shall provide a parts and labor guarantee on all work. Unless otherwise specified herein, Contractor's guarantee shall be for a period of one year from date of acceptance, except where any specific guarantees from a supplier or equipment manufacturer extends for a longer time.

Contractor's guarantee shall cover all costs associated with troubleshooting, repair and replacement of defective work, including costs of labor, transportation, lodging, materials and equipment.

Guarantee shall not cover any damage to material or equipment caused by accident, misuse, unauthorized modification or repair by Client, or acts of god.

Contractor shall promptly respond to Client's requests for service during the guarantee period. Contractor shall provide repair service as soon as reasonably possible upon request from Client, but in no case shall service response exceed 8 hours from time of request.

PART 3 - EXECUTION

PREPARATION

Contractor shall order all required parts and equipment upon notification of award of the work.

Contractor shall verify power where required.

INSTALLATION

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

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

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

Line and low voltage electrical connections to system devices specified or shown on the control diagrams shall be furnished and installed by the Contractor in accordance with these specifications.

All electrical control wiring and power wiring to the control panels shall be the responsibility of the Contractor.

All wiring shall be in accordance with the Project Electrical Specifications (Division 26), the National Electrical Code and any applicable local or state codes. All access control system wiring shall be installed in the conduit types specified in the Project Electrical Specifications (Division 26) unless otherwise allowed by the National Electrical Code or applicable local codes. Where free-air cable wiring is permitted, it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

Any devices, such as door status contacts and electronic locking hardware, which are applied to fire rated door assemblies shall be installed in a manner which maintains the fire rating of the assembly. All penetrations to the fire door assembly must conform to the manufacturer's specifications and local building code. The installing contractor shall provide documentation indicating the fire rating of the assembly has been maintained and is in conformance with local building code.

WORKMANSHIP

Perform work with persons experienced and qualified to produce workmanship specified.

Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.

Maintain quality control over suppliers and Subcontractors.

EQUIPMENT PRE-TEST

All equipment shall be bench tested prior to delivery to job site and prior to installation. Bench test per manufacturers installation instructions.

WIRE and CABLE

Design, layout, size, and plan new wire and cable runs as required. It is the responsibility of Contractor to calculate the electrical load for each circuit and size the cabling conductors appropriately to facilitate a fully functioning system.

All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.

Avoid splicing conductors. All splices shall be made in junction boxes (except at equipment). Splices shall be made with an approved crimp connection.

Identify all wire and cable at terminations and at every junction box. Identification shall be made as specified in Section 26 05 53.

WIRING

GENERAL REQUIREMENTS

Install low voltage power and access system component wiring in conduit in the following locations regardless of local building code allowances.

- Mechanical rooms.
- Electrical rooms.
- Vertical risers (exception: fire rated continuous closet like a telephone closet).
- Open Areas where the wiring will be exposed to view or tampering.

Conceal conduit within finished shafts, ceilings and wall as required. Install exposed conduit parallel with or at right angles to the building walls

Tag all equipment, panels, cables, conduits, junction boxes, etc., as called out in the "Identification" section of this specification and as shown on the drawings. Where identification is not provided on the drawings the Contractor shall provide, at a minimum, identification tags on all cabling at both ends of the cable and shall provide documentation of the cable tag numbering with description of the cable use in a spread sheet format.

Perform installation of all devices in the manner specified by each manufacturer. Aside from product submittal requirements, provide manufacturer's installation instructions for verification when requested.

Where Class 2 wires are in concealed and accessible locations including ceiling return air plenums, approved cables not in raceway may be used provided that:

- Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
- All cables shall be UL listed for application, i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose.

Do not install Class 2 wiring in conduit containing Class 1 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).

Where Class 2 wiring is run exposed, wiring to be run parallel along a surface or perpendicular to it, and NEATLY tied at 3m intervals.

All wire-to-device connections shall be made at a terminal block, terminal strip or with a crimped connector where the device has a wiring harness. All wire-to-wire connections shall be at a terminal block or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

All unused conductors shall be capped by use of a crimp connector or wire nut. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

ETHERNET NETWORK REQUIREMENTS

Wired network communication shall be via channels consisting of Category 5E or Category 6 network cable.

Communication conduits or cabling shall not be installed closer than 2m from high power transformers or run parallel within six feet of electrical high power cables. Care shall be taken to route the cable as far from interference generating devices as possible.

Ethernet network wiring shall be installed as shown on riser diagram.

There shall be no power wiring, in excess of 30 VAC rms, run in conduit with communications wiring.

Recommended CAT 5E and CAT 6 Ethernet wiring guidelines shall be followed and in no case shall the distance between any Ethernet switch, NAC or other Ethernet LAN device exceed 100 meters.

Ethernet wiring shall be installed and rated for communications to 1 GB.

CONDUIT AND FITTINGS

Conduit for Control Wiring, Control Cable and Transmission Cable: Electrical metallic tubing (EMT) with compression fittings, cold rolled steel, zinc coated or zinc-coated rigid steel with threaded connections.

Outlet Boxes (Dry Location): Galvanized drawn steel suited to each application, in general, four inches square or octagon with suitable raised cover.

Outlet Boxes (Exposed to Weather): Threaded hub cast aluminum or iron boxes with gasket device plate.

Pull and Junction Boxes: Size according to number, size, and position of entering raceway as required by National Electrical Codes. Enclosure type shall be suited to location.

Plug or cap all unused conduit openings and stub-ups. Do not use caulking compound.

Route all conduit to clear beams, plates, footings and structure members. Do not route conduit through column footings or grade beams.

Use expanding silicone firestop material where conduit is run between floors and through walls of fireproof shaft.

Cap open ends of conduits until conductors are installed.

Where conduit is attached to vibrating or rotating equipment, flexible metal conduit with a minimum length of 18 inches and maximum length of 36 inches shall be installed and anchored in such a manner that vibration and equipment noise will not be transmitted to the rigid conduit.

Where exposed to the elements or in damp or wet locations, waterproof 1 flexible conduit shall be installed. Installation shall be as specified for flexible metal conduit.

Provide floor, wall, and ceiling plates for all conduits passing through walls, floors or ceilings. Use prime coated cast iron, split-ring type plates, except with polished chrome-plated finish in exposed finished spaces.

PENETRATIONS

Do not penetrate any roof, flashing, exterior wall, or parapet without prior approval from A/E Representative.

FIRE RATED DOORS and FRAMES

Do nothing to modify a UL. rated door or frame that would void the UL. label or fire rating.

GROUNDING

Provide grounding of equipment as required by equipment manufacturer.

POWER TO SECURITY EQUIPMENT

Provide power to all equipment from a new 120VAC circuit dedicated for access system use from the existing emergency system. All panel circuit breakers will be labeled "*Security Equipment - Do Not Operate*" or equivalent. If not available, connect to an emergency panel dedicated branch circuit. If not available, connect to a dedicated branch circuit.

All plug-in transformers shall be located within locked security control panels. Secure all low-voltage plug-in transformers to outlet with screw or strap. Clearly label all transformers to identify purpose and use.

Batteries shall be separated from access control equipment. Mount batteries in separate locked security enclosures.

CUTTING and PATCHING

Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the work.

EQUIPMENT ENCLOSURE PLYWOOD BACKING

Contractor is responsible for providing plywood backing at all panel locations where not already present or where there is insufficient room remaining on existing plywood backing to permit proper panel installation.

IDENTIFICATION

Wire Tags:

- All multi-conductor cables, including those for all I/O devices, in all pull boxes and terminal strip cabinets shall be uniquely tagged at both ends. Keep a catalog of wire identification in electronic spread sheet form for submittal to the owner at the project's completion.
- Provide wire Tags as per Division 26.

Conduit Tags:

- Provide tagging or labeling of conduit so that it is always readily observable which conduit was installed or used in implementation of this Work.

SYSTEM STARTUP

Power shall only be applied to the system after re-checking for proper grounding of the system and measuring all loops for lack of shorts, grounds, and open circuits.

It is the responsibility of this contractor to ensure the proper installation and performance of the peripheral devices as specified in this section and to coordinate the start-up and testing of the access control system with the Division 08 Door Hardware installer to ensure the networks and attached devices are functioning properly. Once all devices are installed, programmed, configured and powered, this contractor shall notify the Division 08 Door Hardware installer to schedule a start-up plan. During the start-up, all devices shall be checked for proper communication and function, network connectivity as may be required and network traffic to ensure proper performance. The contractor shall correct any devices or performance found to be defective.

The system tests, conducted jointly by this contractor and the Division 08 Door Hardware installer shall provide the following:

- Complete end-to-end test and verification for each connected input and output. This includes verification of all point data in graphic displays as may be required and if applicable.

- Complete functional test of sequences of operation including global control sequences.

System supplier shall be responsible for coordinating all hardware programming of the system with Dane County security personnel. Coordinate all door functions with each tenant representative and Dane County security personnel. **Cardholder data base programming shall be by the Dane County security personnel.**

OWNER'S INSTRUCTIONS

Contractor shall closely schedule and coordinate his activities with Owner's Representatives.

Coordinate with the owner all operating, and monitoring functions which shall be included within the programming.

Buildings and rooms must be able to be secured at all times.

COMMISSIONING

This Contractor shall verify that all peripheral devices are ready for operation. This inspection shall verify that the following items have been properly installed.

- Network connections.
- Power connections.
- Proper power supply voltage and types.
- Electrical installation conforms to local code authorities.
- Point to point check of all digital I/O for continuity and correct execution of the functional operation.

Submit an Inspection Log, which enumerates the above in a check list form for all devices. Indicate corrective action for non-conforming or defective products and/or product installations.

This Contractor shall perform all necessary testing, de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications. This Contractor and the Division 08 contractor are to coordinate the checkout of the system such that each Division has a representative present during the entire system checkout.

This Contractor shall perform tests to verify proper performance of components and sequences of operation. Repeat tests until proper performance results are obtained. This testing shall include a point-by-point log to validate 100% of the input and output points of the IACS operation. The Division 08 contractor shall have a representative present during system checkout by this Contractor.

Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in presence of Owner's Representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner's Representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.

System Acceptance: Satisfactory completion is when this contractor has successfully performed all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

In conjunction with the work of other trades, thoroughly test all equipment and systems in a dynamic mode simulating all operating sequences including safety unlocks and emergency fire mode where required.

SPARE PARTS

Not included in the scope of this contract.

END OF SECTION