



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. 314000 TENANT IMPROVEMENTS FIRST FLOOR CITY-COUNTY BUILDING 210 MARTIN LUTHER KING, JR. BLVD 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

CZARNECKI ENGINEERING, INC.
1121 MARLIN COURT, SUITE B
WAUKESHA, WISCONSIN 53186-1464

Due Date / Time: **THURSDAY, MAY 8, 2014, 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., THURSDAY, MAY 8, 2014

REQUEST FOR BIDS NO. 314000

TENANT IMPROVEMENTS FIRST FLOOR

CITY-COUNTY BUILDING

210 MARTIN LUTHER KING, JR. BLVD MADISON, WISCONSIN

Dane County is inviting Bids for construction services for the renovation of approximately 14,000 S.F. of the first floor of the City-County Building. The area of renovation will provide office space for Planning & Development, Register of Deeds, County Treasurer, County Board, County Clerk and Veteran's Services. 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 Wednesday, April 9, 2014** by downloading it from countyofdane.com/pwbids. Please call Rob Nebel, Assistant Public Works Director, at 608/267-0119, or our office at 608/266-4018, 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 608/266-4018.

A facility tour for Bidders will be held **Tuesday, April 22, 2014 at 10:00 a.m.** at the City-County Building, 210 Martin Luther King, Jr. Blvd, Madison, Wisconsin, starting on the third floor in Room 354. Bidders are strongly encouraged to attend this optional tour in order to bid on the Work.

PUBLISH: TUESDAY, APRIL 8 AND 15, 2014 - WISCONSIN STATE JOURNAL
TUESDAY, APRIL 8 AND 15, 2014 - 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 Tuesday, April 22, 2014 at 10:00 a.m. at the City-County Building, 210 Martin Luther King, Jr. Blvd, Madison, Wisconsin starting on the third floor in Room 354. 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 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 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 Opening]. 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 used.

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. Demolition work described in these Construction Documents as by Owner be accomplished by Owner and will not be included under this Contract. Refer to Section 01 00 00 Alternate Bids.
 - 2. Testing and Balancing.
 - 3. Removal of building materials identified as asbestos-containing materials (ACM) that will be disturbed by renovation work.
 - 4. Relocation of files and furniture, except where noted for Contractor Installation.

5. Doors to be provided by Owner where indicated on A7.0 Door Schedule. Glazing by Contractor.
6. Sealing perimeters of existing exterior windows by Owner.

20. SPECIAL HAZARDS COVERAGE

- A. Not Applicable.

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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: _____

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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

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Name of Bidding Firm: _____

BID FORM

BID NO. 314000

**PROJECT: TENANT IMPROVEMENTS FIRST FLOOR
CITY-COUNTY BUILDING**

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

BASE BID - LUMP SUM:

Work includes construction services for the renovation of approximately 14,000 S.F. of office space on the First Floor of the City-County Building. 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. They further agree to honor the alternate(s) bid for 60 days from date of Award of Contract.

ALTERNATE BID 1 - LUMP SUM:

Complete County Clerk Open Office 106 work between the hours of 4:00PM-7:00 AM.

_____ and _____ /100 Dollars
Written Price

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

ALTERNATE BID 2 – LUMP SUM:

LED Downlights.

_____ and _____ /100 Dollars
Written Price

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

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ALTERNATE BID 3 – LUMP SUM:

Complete grinding associated with CF-1 Retroplate Polished Concrete, Section 03 36 02, between the hours of 4:00 PM-7:00 AM.

_____ and _____ /100 Dollars
Written Price

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

ALTERNATE BID 4 – LUMP SUM:

Deduct price if demolition work were completed by Owner. Refer to Specification 01 00 00, Section 1.5 Alternates for scope of work.

_____ and _____ /100 Dollars
Written Price

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

INFORMATIONAL BID 1 – LUMP SUM:

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

_____ and _____ /100 Dollars
Written Price

\$ _____
Numeric Price

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 17, 2014 with individual phases completed by the dates indicated in Specification 01 00 00 Section 1.2 D. Phasing Plan. Assuming this Work can be started by June 16, 2014, 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:

Page Intentionally Left Blank

(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 _____;

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

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.

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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"/>

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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**

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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

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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. 314000

Authority: Res. _____, [2013-14]

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 Tenant Improvements First Floor Child Support Renovation, City-County Building, 210 Martin Luther King, Jr. Blvd, Madison, Wisconsin [including Alternate Bid[s] X, Y & Z (if applicable)] ("the Project"); and

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

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

1. CONTRACTOR agrees to construct, for the price of \$_____ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the [Bid Form, Quote], [General Conditions of Contract, Conditions of Contract], the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by Dorschner|Associates, Inc. (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Document Index, all of which are made a part hereof and collectively evidence and constitute the Contract.
2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the [General Conditions of Contract, Conditions of Contract], and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the [General Conditions of Contract, 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 [proposal, quote, other] 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

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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:

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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 Engineer that are made after execution of Contract.
- C. Construction Documents are complementary, and what is required by one shall be as binding as if required by all. Intent of Construction Documents is to include all labor, materials and equipment necessary for proper execution of the Work.

2. DEFINITIONS

- A. These terms as used in this Contract are respectively defined as follows:
 - 1. All uses of term "County" in Construction Documents shall mean Dane County.
 - 2. All uses of term "Department" in Construction Documents shall mean Department of Public Works, Highway & Transportation, which is a unit of Dane County government. Department is County agency overseeing Contract with Contractor.
 - 3. Public Works Project Engineer is appointed by and responsible to Department. Public Works Project Engineer has authority to act on behalf of Department and will sign change orders, payment requests and other administrative matters related to projects.
 - 4. Public Works Project Engineer is responsible for supervision, administration and management of field operations involved in construction phase of this Work.
 - 5. Term "Work" includes all labor, equipment and materials necessary to produce project required by Construction Documents.
 - 6. Term "Substantial Completion" is date when project or specified area of project is certified by Architect / Engineer that construction is sufficiently completed, in accordance with Construction Documents, and as modified by any subsequent changes agreed to by parties, so that County may occupy project or specified area of project for use for which it was intended subject to permit approval for occupancy.
 - 7. Contractor is 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 electronically submit Shop Drawings for each submission, until receiving final approval. After final approval, provide five (5) additional copies for distribution as may be required.

- B. Contractor shall submit, on an on-going basis and as directed, Product Data such as brochures that shall contain catalog cuts and specifications of all furnished mechanical and electrical equipment. After Architect / Engineer's approval, one (1) copy shall remain in Architect / Engineer's file, one (1) kept at Department's office and one (1) kept at job site by Contractor for reference purposes.
- C. Samples shall consist of physical examples furnished by Contractor in sufficient size and quantity to illustrate materials, equipment or workmanship, and to establish standards to compare the Work.
 - 1. Submit Samples in sufficient quantity (minimum of two (2)) to permit Architect / Engineer to make all necessary tests and of adequate size showing quality, type, color range, finish, and texture. Label each Sample stating material, type, color, thickness, size, project name, and Contractor's name.
 - 2. Submit transmittal letter requesting approval, and prepay transportation charges to Architect / Engineer's office on samples forwarded.
 - 3. Materials installed shall match approved Samples.
- D. Contractor shall review Shop Drawings and place their dated stamp thereon to evidence their review and approval and shall submit with reasonable promptness and in orderly sequence to cause no delay in the Work or in work of any other contractor. At time of submission, Contractor shall inform Architect / Engineer in writing of any deviation in Shop Drawings or Samples from requirements of Construction Documents. Architect / Engineer will not consider partial lists.
- E. Architect / Engineer will review and approve or reject Shop Drawings with reasonable promptness to cause no delay. Architect / Engineer's approval shall not relieve Contractor from responsibility for errors or omission in Shop Drawings.
- F. Contractor shall not commence any work requiring Shop Drawing, Product Data or Sample submission until Architect / Engineer has approved submission. All such work shall be in accordance with approved Shop Drawings, Product Data and Samples.
- G. Contractor shall keep on site of the Work, 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. Clean interior surface of exterior windows within the project area.

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 Engineer.
- C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.
- D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.
- E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ construction superintendent or foreman, experienced in character of work covered by Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Architect / Engineer and Department.
- F. Remove from project or take other corrective action upon notice from Architect / Engineer or Department for Contractor's employees whose work is considered by Architect / Engineer or Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.
- G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.
- H. Presence and observation of the Work by Architect / Engineer or Public Works Project Engineer shall not relieve Contractor of any obligations.

14. WEATHER CONDITIONS

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

15. PROTECTION OF WORK AND PROPERTY

- A. Contractor shall at all times safely guard County's property from injury or loss in connection with this Contract. Contractor shall at all times safely guard and protect the Work, and adjacent property, from damage. Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in Contract, or by County, or County's duly authorized representative.
- B. Contractor may act 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 Engineer's instructions require any work to be specially tested or approved, Contractor shall give Architect / Engineer and Public Works Project Engineer timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Architect / Engineer shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.
- D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

17. REPORTS, RECORDS AND DATA

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

18. CHANGES IN THE WORK

- A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
1. Unit bid prices previously approved.
 2. 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 Engineer to proceed.

19. EXTRAS

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

20. TIME FOR COMPLETION

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

21. CORRECTION OF WORK

- A. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to inspection of Architect / Engineer and Public Works Project Engineer who shall be judge of quality and suitability of the Work, materials, and processes of manufacture for purposes for which they are used. Should they fail to meet Architect / Engineer's and Public Works Project Engineer's approval they shall be reconstructed, made good, replaced or corrected, by Contractor at Contractor's expense. Immediately remove all rejected material from site.
- B. If Contractor defaults or neglects to carry out the Work in accordance with Construction Documents or fails to perform any provision of Contract, Department may, after ten (10) days' written notice to Contractor and without prejudice to any other remedy County may have, make good such deficiencies. In such case, appropriate Change Order shall be issued deducting from Contractor's payments then or thereafter, cost of correcting such deficiencies, including cost of Architect / Engineer's additional services made necessary by such default, neglect or failure.

22. SUBSURFACE CONDITIONS FOUND DIFFERENT

- A. If Contractor encounters subsurface or latent conditions at site materially differing from those shown on Drawings or indicated in Specifications, Contractor shall immediately give notice to Architect / Engineer and Public Works Project Engineer of such conditions before they are disturbed. Architect / Engineer will thereupon promptly investigate conditions, and if

Architect / Engineer finds that they materially differ from those shown on Drawings or indicated in Specifications, Architect / Engineer will at once make such changes as necessary, any increase or decrease of cost resulting from such changes to be adjusted in manner provided in above Article 18 entitled "Changes in the Work".

23. RIGHT OF 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 Engineer.
- B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.
- C. Progress Reporting:
 - 1. Contractor shall update and publish Construction Schedule on 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 manpower in such quantities and crafts as will eliminate backlog of work.
 - b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
 - c) Reschedule work (yet remain in conformance with Drawings and Specifications).
3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Engineer.

E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Architect / Engineer and Public Works Project Engineer.

25. PAYMENTS TO CONTRACTOR

A. Contractor shall provide:

1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
2. Periodic itemized estimates of work done for purpose of making partial payments thereon.

Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Engineer. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.

- B. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month upon receipt of Application and Certificate for Payment form from Architect / Engineer and approval of Department.
- C. Contractor shall submit for approval first to Architect / Engineer, and then to Public Works Project Engineer all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.
- D. Application and Certificate for Payment for preparatory work and materials delivered and suitably stored at site to be incorporated into the Work at some future period, will be given due consideration. Requesting payment for materials stored off site, may be rejected, however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered, conditional upon submission by Contractor of bills of sale, photographs and such other procedures as will adequately protect County's interest such as

storage in 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.

- E. Payments by County will be due within forty-five (45) days after receipt by Department of Application and Certificate for Payment.
- F. County will retain five percent (5%) of each Application and Certificate for Payment until final completion and acceptance of all the Work covered by Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at site, County will make remaining payments in full if Architect / Engineer and Public Works Project Engineer find that progress of the Work corresponds with Construction Schedule. If Architect / Engineer and Public Works Project Engineer find that progress of the Work does not correspond with Construction Schedule, County may retain up to ten percent (10%) of each Application and Certificate for Payment for the Work completed.
- G. All material and work covered by partial payments made shall become sole property of County, but this provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made, or restoration of any damaged work, or as waiver of right of County to require fulfillment of all of terms of Contract.
- H. County will make final payment within sixty (60) days after final completion of the Work, and will constitute acceptance thereof. Submit Equal Benefits Compliance Payment Certification with final pay request. Payment may be denied if Certification is not included.
- I. County may make payment in full, including retained percentages and less authorized deductions, upon completion and acceptance of each Division where price is stated separately in Contract.
- J. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County, Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

26. WITHHOLDING OF PAYMENTS

- A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation 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, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.
- D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

- A. Making of final payment shall constitute 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 ENGINEER’S AUTHORITY

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

35. ARCHITECT / ENGINEER’S AUTHORITY

- A. Architect / Engineer is retained by, and is responsible to Department acting for County.
- B. Architect / Engineer shall determine amount, quality, acceptability, and fitness of several kinds of work and materials that are provided under this Contract and shall decide all questions that may arise in relation to said work and construction thereof.
- C. Architect / Engineer shall decide meaning and intent of any portion of Specifications and of any Drawings where they may be found obscure or be in dispute.
- D. Architect / Engineer shall provide responsible observation of construction. Architect / Engineer has authority to stop the Work whenever such stoppage may be necessary to insure proper execution of Construction Documents.
- E. Architect / Engineer shall be interpreter of conditions of Construction Documents and judge of its performance.
- F. Within reasonable time, Architect / Engineer shall make decisions on all matters relating to progress of the Work or interpretation of Construction Documents.
- G. Architect / Engineer’s decisions are subject to review by Public Works Project Engineer.

36. 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 Engineer.
- D. Where guarantees or warranties are required in sections of Specifications for periods in excess of one (1) year, such longer terms shall apply; however, Contractor's Performance and Payment Bonds shall not apply to any guarantee or warranty period in excess of one (1) year.

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 effect 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 Engineer, Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements.
 - 2. Secures endorsement from insurance carrier and consent of Surety permitting occupancy of building or use of the Work during remaining period of construction, or, secures consent of Surety.
 - 3. Assumes all costs and maintenance of heat, electricity and water.
 - 4. Accepts all work completed within that portion or unit of the Work to be occupied, at time of occupancy.

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, workman or mechanic employed by Contractor and all subcontractors during billing period including accurate record of number of hours worked by each employee and actual wages paid as stipulated in Wisconsin Statute 66.0903. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County, Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

48. CLAIMS

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

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 48.A.2)b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
 - 1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
 - 2) giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
- d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 each accident single limit, bodily injury and property damage combined with excess coverage over and above general liability in amount not less than \$5,000,000.
- e) Contractor shall either:
 - 1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor's Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
 - 2) Insure activities of subcontractors in Contractor's own policy.
- 4. Scope of Insurance and Special Hazards: Insurance required under Article 48.A.2 hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
- 5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and "Dane County" listed as 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 [project Architect / Engineer, Public Works Project Manager] for approval.

AIA Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	PROJECT:	APPLICATION NO. _____	OWNER'S NO. _____
FROM CONTRACTOR:	VA ARCHITECT:	PERIOD TO: _____	OWNER <input type="checkbox"/>
		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 to receive for payment, or advance payment, on construction shall be submitted to the Commission from AIA Document G702) as amended.

1. ORIGINAL CONTRACT SUM: \$ _____

2. Net change by Change Orders: \$ _____

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

4. TOTAL COMPLETED & STORED TO DATE (Section 4) (Line 3): \$ _____

5. RETAINAGE

a. 10% of Contracted Work (Section 4 + Line 3 Total): \$ _____

b. 10% of Stored Material (Section 4) (Line 3): \$ _____

Total Retainage (Lines 5a + 5b) (Line 5 Total): \$ _____

6. TOTAL EARNED LESS RETAINAGE (Line 3 Less Line 5 Total): \$ _____

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

8. CURRENT PAYMENT DUE (Line 6 Less Line 7): \$ _____

9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 8): \$ _____

The undersigned Contractor certifies that to the best of his 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 payment received from the Owner, and that correct payment orders have been issued.

CONTRACTOR: _____
 Title: _____
 Capacity: _____
 Is authorized to act as contractor on this _____ size of _____
 State: _____
 My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT
I, the undersigned Architect, certify that to the best of my knowledge and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED: \$ _____
(Amount certification if amount certified differs from the amount applied Architect shall prepare on this Application and on all Certificates (Lines 8 and 9) (changed as indicated with the amount certified.)

ARCHITECT: _____
 Title: _____

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

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total Change Order and all previous orders by Owner	\$	\$
Total approved for Month	\$	\$
TOTALS	\$	\$
NET INCREASE by Change Order	\$	\$

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Continuation Sheet

AIA Document G703™ APPLICATION AND CERTIFICATION FOR PAYMENT (containing Contractor's specific certification is included) In full compliance with, amounts set forth in the contract. Bidder Use Caution For Contractors whose contract language for Use differs 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 ON-SITE	G TOTAL COMPLETED AND STORED TO DATE (D+E+F)	H BALANCE TO PAY (G-C)	I RETAINAGE OR VARIANCE BALANCE
			E FROM PREVIOUS APPLICATION (D+E)	F 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 assumed.
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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. 201302599 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: 4/3/2014

DETERMINATION NUMBER: 201401012

EXPIRATION DATE: Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2014. If NOT, You MUST Reapply.

PROJECT NAME: TENANT IMPROVEMENTS FIRST FLOOR CITY-COUNTY BUILDING

PROJECT LOCATION: MADISON CITY, DANE COUNTY, WI

CONTRACTING AGENCY: DANE COUNTY

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

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u>	<u>HOURLY FRINGE BENEFITS</u>	<u>TOTAL</u>
		\$	\$	\$
101	Acoustic Ceiling Tile Installer	30.48	15.90	46.38
102	Boilermaker Future Increase(s): Add \$1.50/hr on 1/01/2015; Add \$1.50/hr. on 01/01/2016	32.05	28.04	60.09
103	Bricklayer, Blocklayer or Stonemason Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.01	17.35	49.36
104	Cabinet Installer	30.48	15.90	46.38
105	Carpenter	30.48	15.90	46.38
106	Carpet Layer or Soft Floor Coverer	30.48	15.90	46.38
107	Cement Finisher	31.58	16.13	47.71
108	Drywall Taper or Finisher	24.80	16.60	41.40
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.07	19.25	53.32
110	Elevator Constructor	42.86	23.84	66.70
111	Fence Erector	24.72	0.00	24.72
112	Fire Sprinkler Fitter	36.07	18.73	54.80
113	Glazier	38.03	13.42	51.45
114	Heat or Frost Insulator	33.68	24.31	57.99
115	Insulator (Batt or Blown)	15.00	9.50	24.50
116	Ironworker	31.25	19.46	50.71
117	Lather	30.48	15.90	46.38

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
118	Line Constructor (Electrical)	38.25	17.31	55.56
119	Marble Finisher	26.89	19.18	46.07
120	Marble Mason	32.01	17.35	49.36
121	Metal Building Erector	22.00	10.00	32.00
122	Millwright	32.11	15.95	48.06
123	Overhead Door Installer	20.95	4.94	25.89
124	Painter	24.50	16.60	41.10
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.98	15.90	46.88
127	Pipeline Fuser or Welder (Gas or Utility)	30.79	19.74	50.53
129	Plasterer	31.03	17.71	48.74
130	Plumber Future Increase(s): Add \$1/hr on 6/1/2014.	36.42	16.87	53.29
132	Refrigeration Mechanic	41.60	16.71	58.31
133	Roofer or Waterproofer	29.40	6.25	35.65
134	Sheet Metal Worker	34.45	22.57	57.02
135	Steamfitter Future Increase(s): Add \$1.70/hr on 6/1/2014.	42.95	17.81	60.76
137	Teledata Technician or Installer Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.25	12.24	34.49
138	Temperature Control Installer	32.94	18.80	51.74
139	Terrazzo Finisher	26.89	19.18	46.07
140	Terrazzo Mechanic	30.20	18.42	48.62
141	Tile Finisher	23.85	17.18	41.03
142	Tile Setter	29.81	17.18	46.99
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	34.48	15.90	50.38
146	Well Driller or Pump Installer	25.32	15.65	40.97
147	Siding Installer	25.92	18.04	43.96

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.16	14.34	43.50
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

TRUCK DRIVERS

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	32.39	18.46	50.85
203	Three or More Axle	18.00	22.88	40.88
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	18.00	22.88	40.88
207	Truck Mechanic	18.00	22.88	40.88

LABORERS

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 Premium Increase(s): Add \$1.00/hr for certified welder; Add \$.25/hr for mason tender	24.21	14.63	38.84
302	Asbestos Abatement Worker	24.36	14.44	38.80
303	Landscaper	21.01	9.37	30.38
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	21.01	13.63	34.64
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased) Premium Increase(s): DOT PREMIUMS: Pay two times the hourly basic rate on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	18.33	13.65	31.98
314	Railroad Track Laborer	23.46	3.30	26.76
315	Final Construction Clean-Up Worker	16.00	0.00	16.00

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

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).	33.42	18.96	52.38
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under).	32.89	18.96	51.85
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.82	18.96	49.78
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Premium Increase(s): Add \$.50/hr for Friction Crane, Lattice Boom or Crane Certification (CCO).	41.65	21.71	63.36
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	37.10	21.57	58.67

507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54
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**HEAVY EQUIPMENT OPERATORS
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK**

CODE	TRADE OR OCCUPATION	Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		
		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Premium Increase(s): Add \$.50/hr for >200 Ton / Add \$1/hr at 300 Ton / Add \$1.50/hr at 400 Ton / Add \$2/hr at 500 Ton & Over.	35.62	18.96	54.58
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over).	36.35	6.95	43.30
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type).	33.42	18.96	52.38
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket).	32.89	18.96	51.85

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	30.82	18.96	49.78
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	24.19	17.89	42.08
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment).	36.34	21.14	57.48
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment). Future Increase(s): Add \$1.60/hr on 06/01/2014; Add \$1.65/hr on 06/01/2015.	32.32	18.55	50.87
516	Fiber Optic Cable Equipment Future Increase(s): Add \$1.75/hr on 02/01/2014.	27.89	17.20	45.09

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	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	35.10	18.40	53.50
105	Carpenter Future Increase(s): Add \$1.25/hr on 6/2/2014. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.68	19.81	53.49
107	Cement Finisher Future Increase(s): Add \$1.87 on 6/1/14; Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	33.51	16.13	49.64
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.82	22.61	55.43
111	Fence Erector	24.72	0.00	24.72
116	Ironworker	31.25	19.46	50.71
118	Line Constructor (Electrical)	38.25	17.31	55.56
125	Pavement Marking Operator	16.00	7.35	23.35
126	Piledriver	30.98	15.90	46.88
130	Plumber	33.75	14.07	47.82
135	Steamfitter	42.45	16.71	59.16
137	Teledata Technician or Installer	21.89	11.85	33.74

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	38.80	20.17	58.97
146	Well Driller or Pump Installer	25.32	15.65	40.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.16	14.34	43.50
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

TRUCK DRIVERS

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	30.00	15.00	45.00
203	Three or More Axle	16.00	7.35	23.35
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	16.00	7.35	23.35
207	Truck Mechanic	16.00	7.35	23.35

LABORERS

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 Premium Increase(s): Add \$.20 for blaster, bracer, manhole builder, caulker, bottomman and power tool; Add \$.55 for pipelayer; Add \$1.00 for tunnel work 0-15 lbs. compressed air; Add \$2.00 for over 15-30 lbs. compressed air; Add \$3.00 for over 30 lbs. compressed air.	25.60	14.62	40.22
303	Landscaper	25.28	11.46	36.74
304	Flagperson or Traffic Control Person	24.70	10.72	35.42
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
314	Railroad Track Laborer	23.46	3.30	26.76

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

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Premium Increase(s): Add \$.25/hr for all >45 Ton lifting capacity cranes	34.62	18.96	53.58
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type).	33.42	18.96	52.38
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket).	32.89	18.96	51.85

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. Future Increase(s): Add \$1.05/hr on 6/2/2014; Add \$1.55/hr on 6/1/2015. Premium Increase(s): Add \$.25/hr for operating tower crane.	35.11	19.45	54.56
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.19	20.94	51.13
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	24.19	17.89	42.08
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	38.80	20.17	58.97
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	34.50	20.04	54.54
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54

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

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.01	17.35	49.36
105	Carpenter	32.93	19.93	52.86
107	Cement Finisher	31.48	15.68	47.16
109	Electrician	31.27	22.81	54.08
111	Fence Erector	24.72	0.00	24.72
116	Ironworker	31.25	19.46	50.71
118	Line Constructor (Electrical)	38.25	17.31	55.56
124	Painter	24.50	16.60	41.10
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.98	15.90	46.88
133	Rofer or Waterproofer	29.40	6.25	35.65
137	Teledata Technician or Installer	21.89	11.85	33.74
143	Tuckpointer, Caulker or Cleaner	35.25	13.15	48.40
144	Underwater Diver (Except on Great Lakes)	38.80	20.17	58.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	34.43	15.24	49.67
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	30.60	14.86	45.46
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	26.78	13.63	40.41
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.86	12.97	37.83
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	12.70	34.45

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
201	Single Axle or Two Axle	30.00	15.00	45.00

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
203	Three or More Axle	17.00	0.00	17.00
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	32.89	18.96	51.85
205	Pavement Marking Vehicle	17.00	0.00	17.00
206	Shadow or Pilot Vehicle	30.00	15.00	45.00
207	Truck Mechanic	17.00	0.00	17.00

LABORERS

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	28.07	13.25	41.32
303	Landscaper Future Increase(s): Add \$1.60/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	29.04	14.63	43.67
304	Flagperson or Traffic Control Person	24.70	10.72	35.42
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	18.31	12.67	30.98
314	Railroad Track Laborer	23.46	3.30	26.76

**HEAVY EQUIPMENT OPERATORS
CONCRETE PAVEMENT OR BRIDGE 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	\$	\$	\$
541	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	36.72	20.40	57.12
542	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	36.22	20.40	56.62

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
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> <p>Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & 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>	35.72	20.40	56.12
544	<p>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.</p>	33.96	19.79	53.75
545	<p>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.</p>	30.32	18.46	48.78
546	Fiber Optic Cable Equipment.	26.69	16.65	43.34

Fringe Benefits Must Be Paid On <u>All</u> 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>
		\$	\$	\$
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	38.80	20.17	58.97
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	38.80	20.17	58.97
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	34.50	20.04	54.54
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	34.50	20.04	54.54

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

Fringe Benefits Must Be Paid On <u>All</u> 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>
		\$	\$	\$
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	35.12	18.46	53.58
552	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	36.22	20.40	56.62

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
553	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.	32.89	18.96	51.85
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler.	33.67	19.48	53.15
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$1.75/hr on 6/1/2014); Add \$1.25/hr on 6/1/2015); Add \$1.30/hr on 6/1/2016); Add \$1.25/hr on 6/1/2017. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.50/hr night work premium. See DOT'S website for details about the applicability of this night work premium at: http://www.dot.wi.gov/business/civilrights/laborwages/pwc.htm .	35.17	20.40	55.57
556	Fiber Optic Cable Equipment.	26.69	16.65	43.34

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.

Consolidated List of Debarred Contractors
Prepared and Issued By
State of Wisconsin
Department of Workforce Development

February 19, 2014

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>
Abel, Mike	See, Abel Electric, Inc					
Abel Electric, Inc	3385 Belmar Rd Green Bay, WI 54313	9/1/12	8/31/15	1	2011	None
Atkins, Scott	See, Freedom Insulation, Inc					
Boecker, Roger	See, R-Way Pumping, 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
Dem/Ex Group, Inc	805 S Adams St Manito, IL 61546	12/1/11	11/30/14	1 and 2	2010	None
Fisher, Ed &/or Fisher, Rhonda	See, Dem/Ex Group, Inc					

<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>
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					
JT Roofing, Inc	350 Tower Dr Saukville, WI 53080	6/1/12	5/31/15	1, 2 and 4	2007 & 2008	None
Jenkins, Richard	See, Castlerock Commercial Construction, Inc					
Ofstie, Darin	See, Precision Excavating and Grading, LLC					
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
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)			
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) ()		

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.

Requester Signature	Date Signed
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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. Coordination
 7. Cutting and Patching
 8. Conferences
 9. Progress Meetings
 10. Submittal Procedures
 11. Proposed Products List
 12. Shop Drawings
 13. Product Data
 14. Samples
 15. Manufacturers' Instructions
 16. Manufacturers' Certificates
 17. Quality Assurance / Quality Control of Installation
 18. References
 19. Interior Enclosures
 20. Protection of Installed Work
 21. Parking
 22. Progress Cleaning
 23. Products
 24. Transportation, Handling, Storage and Protection
 25. Product Options
 26. Substitutions
 27. Starting Systems
 28. Demonstration and Instructions
 29. Contract Closeout Procedures
 30. Final Cleaning
 31. Adjusting
 32. Operation and Maintenance Data
 33. Spare Parts and Maintenance Materials
 34. As-Built Drawings and Specifications

1.2 SUMMARY OF THE WORK

- A. Project Description: Perform the Work as specified and detailed in Construction Documents package. Contractor to provide construction services for a phased renovation of approximately 14,000 square feet of office space on the First Floor of the City-County Building.
- 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. Phasing Plan: Contractor shall submit a schedule to accommodate the below phasing plan including shop drawing submittal review and material procurement.
1. Identify access required to all surrounding occupied spaces for coordination, including adjacent floors.
 2. IT Room 123 will remain operational throughout construction.
 3. Phase 1
 - a. Scope: County Board (CB) and County Clerk (CC) Work Area 108.
 - b. Duration: June 16, 2014 or NTP - Substantial Completion on or before July 3, 2014. Sequence: Copy Room 107 to be completed prior to beginning work at existing Copy Area in Corridor 1006 to provide continuous operation. Open Office 102, 106 and Offices 110-114 will remain occupied during construction. Continuous access shall be provided through either Work Area 108 or Corridor 1006, one path must remain undisturbed while the other is under construction.
 - c. Expedited submittals will be required for early material procurement.
 - d. See Alternate Bid 1.
 4. Phase 2
 - a. Scope: Treasurer
 - b. Duration: June 16, 2014 or NTP – Substantial Completion on or before October 10, 2014. Access and use of the vault will be required during construction, except for the duration noted below. Staff will be relocated offsite for the duration of construction.
 - c. Vault 153 Duration: August 18, 2014 – September 5, 2014.
 - d. Contractor to submit a schedule of adjacent work to be coordinated with Vault 153 reconfiguration and adjacent Concrete Floor Finish.
 5. Phase 3
 - a. Scope: Register of Deeds (ROD), Planning & Development (Planning) and Veteran’s Services (Vets)
 - b. Duration: June 16, 2014 or NTP - Substantial Completion on or before October 17, 2014. Register of Deeds and Planning & Development staff will be relocated offsite for the duration of construction. Veteran’s Services offices will remain occupied.
 6. Phase 4
 - a. Scope: County Clerk (CC) Open Office 106.
 - b. Duration: August 18, 2014 - Substantial Completion on or before August 29, 2014. Sequence: The two Office 106 staff members will be temporarily relocated in Work Area 108 to maintain continuous operation. The two workstations in Open Office 102 will remain occupied and public access must be maintained.
 - c. See Alternate Bid 1.
 7. Corridor 1001
 - a. Scope: Corridor 1001
 - b. Duration: Construction activities to be coordinated to maintain access to occupied spaces.
 8. Restroom Renovation
 - a. Scope: Restrooms 124 and 125.
 - b. Duration: Construction activities to be coordinated with the County and scheduled to minimize disruption to the restroom public access.

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 7:00AM or after 4:00 PM. Refer to Section 01 00 00, 1.5 Alternate Bids for construction activities with significant duration that may be required to occur after hours.
- 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: Complete County Clerk Open Office 106 work between the hours of 4:00PM-7:00 AM. See Section 01 00 00, 1.2. D. Phasing Plan.
 - 2. Alternate Bid 2: LED Downlights, See Electrical.
 - 3. Alternate Bid 3: Complete grinding associated with CF-1 Retroplate polished concrete, section 03 36 02, between the hours of 4:00PM-7:00 AM.
 - 4. Alternate Bid 4: Deduct price if demolition work were to be completed by Owner. Scope of work includes D2.1, D3,1, P1.1, M1.1, and ED1.0 with the following exceptions:
 - a. On sheet ED1.0, removal of panels LP1-4, LP1-4A, LP1-4B, LP1-4C shall remain by Contractor.
 - b. Cleaning of existing ductwork as noted on Drawing M1.1 shall remain the by Contractor.
 - c. Removal of existing VAV air terminal units shall remain by Contractor.
 - d. Removal and relocation of existing thermostats shall remain by Contractor.
- Owner to salvage materials and turn over to contractor where scheduled for reinstallation.

1.6 COORDINATION

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

1.7 CUTTING AND PATCHING

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

1.8 CONFERENCES

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

1.9 PROGRESS MEETINGS

- A. Owner shall schedule and administer meetings throughout progress of the Work at minimum of 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.

1.10 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Construction Documents references.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Construction Documents.
- C. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of completing the Work.
- D. Revise and resubmit submittals as required; identify all changes made since previous submittal.

- E. The Commissioning Authority shall receive a copy of submittals for equipment to be commissioned. The A/E will integrate Commissioning Authority comments prior to returning one reviewed submittal to the Contractor.
- F. The Commissioning Authority will review approved submittals applicable to systems being commissioned for compliance with commissioning needs.
- G. Data for Commissioning:
 - 1. The Commissioning Authority may request documentation necessary for the commissioning process.
 - 2. Refer to Section 01 91 13 Commissioning Requirements.

1.11 PROPOSED PRODUCTS LIST

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

1.12 SHOP DRAWINGS

- A. 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.

1.13 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.

1.14 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product.
- B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for AE's selection. Refer to General Conditions Article 4.

1.15 MANUFACTURERS' INSTRUCTIONS

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

1.16 MANUFACTURERS' CERTIFICATES

- A. When specified in individual Specification sections, submit manufacturers' certificate to Public Works Project Engineer for review, in quantities specified for Product Data.

- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.17 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

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

1.18 REFERENCES

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

1.19 INTERIOR ENCLOSURES

- A. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent distribution of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment. Temporary partitions shall consist of minimum 3/8" plywood panels fastened to wood framework and plastic sheeting.

1.20 PROTECTION OF INSTALLED WORK

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

1.21 PARKING

- A. One (1) parking stall for the general contractor shall be available in the City-County Building underground parking garage.
- B. An additional three (3) parking stalls shall be coordinated for use in the Courthouse driveway. 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 on the West Wilson Street side of the City-County Building.

1.22 PROGRESS CLEANING

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

1.23 PRODUCTS

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

1.24 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

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

1.25 PRODUCT OPTIONS

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

1.26 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.

1.27 STARTING SYSTEMS

- A. Provide written notification prior to start-up of each equipment item or system.
- B. Ensure that each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.28 DEMONSTRATION AND INSTRUCTIONS

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

1.29 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Construction Documents have been reviewed, the Work has been inspected, and the Work is complete in accordance with Construction Documents and ready for 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.

1.30 FINAL CLEANING

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

1.31 ADJUSTING

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

1.32 OPERATION AND MAINTENANCE DATA

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

1.33 SPARE PARTS AND MAINTENANCE MATERIALS

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

1.34 AS-BUILT DRAWINGS AND SPECIFICATIONS

- A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Public Works Project Engineer with original tracings of drawings and prints of specifications in reproducible format, one set of Drawings and Specifications and one set of as-builts drawings in AutoCAD 2010 (or lower) format on CD.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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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

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 Recycling Manager at 608/267-8815, 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 Wisconsin Department of Natural Resources, www.dnr.state.wi.us/org/aw/wm/markets.

1.8 WASTE MANAGEMENT PLAN FORM

A. Contractor Information:

Name: _____

Address: _____

Phone No.: _____ Recycling Coordinator: _____

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)	RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & reused building materials	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ 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 01 91 13

COMMISSIONING REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Summary
- B. Definitions
- C. Coordination
- D. Commissioning Plan
- E. Commissioning Team
- F. Related Requirements
- G. Responsibilities
- H. Equipment/Systems to be Commissioned
- I. Test Equipment
- J. Meetings
- K. Startup, Construction Verification Checklists and Initial Checkout
- L. Submittals
- M. Functional Testing
- N. Documentation, Non-Conformance, and Approval of Tests

1.2 DESCRIPTION

- A. Commissioning: Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The Commissioning process begins at project inception (during the pre-design phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the owner's project requirements.
- B. Commissioning Team: The members of the commissioning team consist of the contracted commissioning agent (CxA), the owner's representative/construction manager (CM), the general contractor (GC), the architect and design engineers, the mechanical contractor (MC), the electrical contractor (EC), the testing and balancing (TAB) contractor, the control contractor (CC), the facility operating staff, and any other installing subcontractors or suppliers of equipment. The contracted commissioning agent is hired by the owner directly. The CxA directs and coordinates the project commissioning activities and the reports to the owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- C. Commissioning shall:
 - 1. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems.
 - 3. Verify that O&M documentation left on site is complete.
 - 4. Verify that the owner's operating personnel are adequately trained.
- D. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.
- B. ASHRAE Guideline 0-2005

1.4 SUMMARY

- A. This section includes general requirements that apply to the implementation of the commissioning process without regard to specific systems, assemblies, and components.

1.5 DEFINITIONS

- A. Acceptance - A formal action, taken by a person with appropriate provider (which may or may not be contractually defined) to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.
- B. Approval - Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the contract documents.
- C. Commissioning Authority (CxA) - The entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process.
- D. Commissioning Status Report - A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the commissioning team during the course of the commissioning process.
- E. Commissioning Plan - An overall plan developed by the commissioning agent that provides the structure, schedule and coordination planning for the commissioning process.
- F. Commissioning Process - A quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.
- G. Commissioning Observation Report - A written document that details activities completed as part of the commissioning process and significant findings from those activities that is continuously updated during the course of a project. Usually it is incorporated into the commissioning plan as an ongoing appendix.
- H. Commissioning Team - The individuals who through coordinated actions are responsible for implementing the commissioning process.
- I. Construction Verification Checklist (CVC) - A form used by the contractor to verify that appropriate components are on-site, ready for installation, correctly installed, and functional. Also see Checklists.
- J. Construction Documents - This includes a wide range of documents, which will vary from project to project, with the owner's needs and with regulations, laws, and countries. Construction documents usually include the project manual (specifications), plans (drawings) and general terms and conditions of the contract.
- K. Contract Documents - This includes a wide range of documents, which will vary from project to project, with the owner's needs and with regulations, laws, and countries. Contract

documents frequently include price agreements, construction management process, sub-contractor agreements or requirements, requirements and procedures for submittals, changes, and other construction requirements, timeline for completion, and the construction documents.

- L. Coordination Drawings - Drawings showing the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.
- M. Control system - A component of environmental, HVAC, security, and fire systems for reporting/monitoring and issuing of commands to/from field devices.
- N. Data logging -The monitoring and recording of flows, currents, status, pressures, etc., of equipment using stand-alone data recorders separate from the control system or the trending capabilities of control systems.
- O. Deficiency - A condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the contract documents.
- P. Factory Testing - Testing of equipment on-site or at the factory, by factory personnel, with or without an owner's representative present.
- Q. Functional Test (FT) - A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems. The test procedures are specified in the Technical Specifications sections of the contract documents. Performance testing covers the dynamic functions and operations of equipment and systems using manual or monitoring methods. Performance testing is the dynamic testing of systems under full operation. Systems are tested under various modes, such as during low cooling loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to respond as the sequences state.
- R. Simulated Condition - Condition that is created for the purpose of testing the response of a system (e.g., raising/lowering the setpoint of a thermostat to see the response in a VAV box).
- S. Simulated Signal - Disconnecting a sensor and using a signal generator to simulate a sensor value for the purpose of testing a full range of conditions.
- T. Startup - The initial starting or activating of dynamic equipment, including completing construction checklists.
- U. Training Plan - A written document that details the expectations, schedule, budget, and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.
- V. Verification - The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.
- W. Trending – The monitoring, by a building management system or other electronic data gathering equipment, and analyzing of the data gathered over a period of time.

1.6 COORDINATION

- A. Project Commissioning Team - The members of the project commissioning team will consist of the commissioning authority and any support personnel, the construction manager, the owner's facility staff (FS) or designee, the general contractor, subcontractors and/or vendors as required, and the architect/ engineer (A/E).
- B. Management - The CxA coordinates the commissioning activities through the construction manager. All members shall work together to fulfill their contracted responsibilities and meet the objectives of the contract documents. Refer to Paragraph 1.06 for additional management details.
- C. Scheduling - The CxA, through the owner or CM, will provide sufficient notice to the contractor for scheduling commissioning activities with respect to the owner's participation. The contractor will integrate all commissioning activities into the overall project schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

1.7 COMMISSIONING PLAN

- A. The CxA will develop the commissioning plan which shall be included in the project schedule when approved by the owner or CM. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
 1. Commissioning during construction begins with an initial commissioning meeting conducted by the CxA where the commissioning process is reviewed with the project commissioning team members.
 2. Three total meetings will be required throughout construction, scheduled by the CxA, through the owner or CM, with necessary parties attending to plan, scope, coordinate, schedule future activities and resolve problems.
 3. Equipment submittals including lighting devices, VAV boxes, plumbing devices and temperature controls is submitted to the CxA, A/E and designer, GC, during normal submittals, including detailed startup procedures.
 4. The construction verification checklists are to be completed by the contractor (or its subcontractors), as installation progresses.
 5. Construction verification checklists, TAB and startup must be completed before scheduling functional testing.
 6. Items of non-compliance in material, installation, or setup shall be corrected at no expense to the owner.
 7. The contractor ensures that the subcontractors' construction checklists are executed and documented and that startup and initial checkout are performed. The CxA verifies that the TAB, construction checklists and startup were completed according to the approved plans. This includes the CxA approving TAB, checklists and startup plans. This also includes witnessing startup of selected equipment. Any testing failure is to be corrected at no additional cost to the owner, and a re-test is to be performed, observed, and documented.
 8. The CxA develops and witnesses equipment and system functional test procedures. The forms and procedures are approved by the owner, CM and A/E.
 9. The performance tests are executed by the contractor under the direction of the CxA with the assistance of the facility staff. All documentation is by the CxA.
 10. The CxA reviews the O&M documentation for completeness and provides comments to O&M manuals.
 11. Commissioning should be completed before substantial completion.

1.8 COMMISSIONING TEAM

- A. Members appointed by contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to,

representatives of each contractor, including project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

- B. Members appointed by owner:
 - 1. CxA - An entity identified by the owner who leads, plans, schedules, and coordinates the commissioning team to implement the commissioning process.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Architect and engineering design professionals.

1.9 RELATED REQUIREMENTS

- A. Section 01 00 00 – Basic Requirements

1.10 RESPONSIBILITIES

- A. The general responsibilities of various parties in the commissioning process are provided in this sub-section. The specific responsibilities are in the Technical Specifications.
- B. All Parties
 - 1. Follow the commissioning plan.
 - 2. Attend initial commissioning meeting and additional meetings as necessary.
- C. Commissioning Authority (CxA)
 - 1. The contractors will provide all tools or the use of tools to start, check-out and test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CxA.
 - a. The CxA will verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 10 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the design documents. When a random sample does not meet the requirement, CxA will report the failure in the "Commissioning Status Report (CSR)."
 - 2. Design Phase
 - a. Review the design documents at 95%.
 - b. Track review comments and ensure they are incorporate into the design documents.
 - c. Create the Commissioning Specification, Construction Verification Checklists, and Preliminary Functional Tests for inclusion into the final review set of design documents.
 - 3. Construction Phase
 - a. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
 - b. Coordinate the commissioning work and, with the GC and owner/CM, help integrate commissioning activities into the master schedule.
 - c. Revise the Construction Phase Commissioning Plan as necessary.
 - d. Plan and conduct a commissioning scoping meeting and 2 other commissioning meetings.
 - e. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor startup and checkout procedures.
 - f. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient

clarity has been obtained, in writing, to be able to write detailed testing procedures.

- g. Review and approve normal contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
- h. Write and distribute construction verification checklists to the general contractor to be printed and maintained.
- i. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- j. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owner/CM of any deficiencies in results or procedures.
- k. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.
- l. Approve construction checklist completion by selected site observation and spot checking.
- m. Recommend approval of air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.
- n. Analyze any performance trend logs and monitoring data to verify performance.
- o. Coordinate, witness, and recommend approval of manual performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
- p. Maintain a master Commissioning Status Report. Provide the owner/ CM with written progress reports and test results with recommended actions.
- q. Review equipment warranties to ensure that the owner's responsibilities are clearly defined.
- r. Provide a final commissioning report (as described in this section).

D. Contractor: Each Contractor and their subcontractors and vendors shall assign representatives with expertise and authority to act on their behalf and schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

- 1. Construction Phase
 - a. Facilitate the coordination of the commissioning and incorporate commissioning activities into the overall project schedule.
 - b. Provide detailed startup procedures
 - c. Include the cost of commissioning in the total contract price.
 - d. Ensure that all subcontractors and vendors execute their commissioning responsibilities according to the contract documents.
 - e. Provide copies of all submittals as required in Section 01 00 00 including all changes thereto.
 - f. Attend and participate in 3 commissioning team meetings held.
 - g. No later than 60 days prior to startup of the first piece of major equipment, meet with the CxA, CM, A/E, and PM and owner to finalize the detailed functional tests/schedule.
 - h. Submit training plan to CxA and Owner prior to scheduling training.
 - i. Provide the training of owner personnel.
 - j. Review and accept construction checklists provided by the commissioning authority.

- k. Complete construction checklists as work is completed and maintain a construction checklists binder including all construction checklists.
 - l. Accomplish commissioning process test procedures.
 - m. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, complete corrective action.
 - n. Cooperate with the CxA for resolution of issues recorded in the “Commissioning Status Report”.
 - o. Prepare O&M manuals, according to the contract documents, including clarifying and updating the original sequences of operation to as-built/as-tested conditions.
- E. Vendors/Subcontractors
- 1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
 - 2. Assist in equipment testing per agreements with subcontractors and/or contractor.
 - 3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
 - 4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project’s scope and budget.
 - 5. Provide requested information regarding equipment sequence of operation and testing procedures.
 - 6. Review construction checklists and test procedures for equipment installed by factory representatives.

1.11 EQUIPMENT/SYSTEMS TO BE COMMISSIONED

- A. The following equipment/systems will be commissioned for this project:
- 1. Hot water control valves.
 - 2. Air terminal units with reheat
 - 3. Air terminal units with reheat and perimeter heat
 - 4. Split system AC Unit
 - 5. Potable water system (including backflow preventers, fixtures, piping cleaning and flushing,)
 - 6. Sanitary drainage/sewer system
 - 7. Storm drainage system
 - 8. Fire protection system (in conjunction with Fire Marshall Division)
 - 9. Fire alarm/detection system (in conjunction with Fire Marshall Division)
 - 10. Lighting systems (interior)
 - 11. HVAC, Test, Adjust, and Balance

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup and initial checkout and required performance testing shall be provided by the contractor for the equipment being tested. This includes, but is not limited to, two-way radios, meters, and data recorders.
- B. Special equipment, tools, and instruments required for testing equipment according to these contract documents shall be included in the contractor’s base bid price and shall be turned over to the owner at Project close-out.

- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration to NIST traceable standards within the past year to an accuracy of 0.5 degree F and a resolution of + or - 0.1 degree F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 – EXECUTION

3.1 MEETINGS

- A. Initial Meeting. Within 10 days of the Notice to Proceed (NTP), the CxA, through the owner/CM, will schedule, plan and conduct an initial commissioning meeting. The contractor and its responsible parties are required to attend.
- B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution, and planning issues.

3.2 STARTUP, CONSTRUCTION CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment/systems to be commissioned, according to Paragraph 1.10 Equipment/Systems To Be Commissioned.
- B. General. Construction verification checklists are important to verify that the equipment and systems are fully connected and operational. It ensures that performance testing (in-depth system checkout) may proceed without unnecessary delays. The construction checklists for a given system must be successfully completed and approved prior to startup and formal performance testing of equipment or subsystems of the given system.
- C. Sensor Calibration Methods
 1. All Sensors-- Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable, are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.5° F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.
 2. Sensors without transmitters-- Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 3. Sensors with transmitters-- Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or

building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

4. Critical Applications-- For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

Tolerances, Standard Applications

Sensor	Required Tolerance (+/-)	Sensor	Required Tolerance (+/-)
Cooling coil, chilled and condenser water temps	0.4F	Flow rates, water	4% of design
AHU wet bulb or dew point	2.0F	Relative humidity	4% of design
Hot water coil and boiler water temp	1.5F	Combustion flue temps	5.0F
Outside air, space air, duct air temps	0.4F	Oxygen or CO2 monitor	0.1 % pts
Watt-hour, voltage & amperage	1% of design	CO monitor	0.01 % pts
Pressures, air, water and gas	3% of design	Natural gas and oil flow rate	1% of design
Flow rates, air	10% of design	Steam flow rate	3% of design
		Barometric pressure	0.1 in. of Hg

5. Valve and Damper Stroke Setup and Check EMS Readout-- For all valve and damper actuator positions checked, verify the actual position against the BAS readout.
6. Closure for heating coil valves (NO) -- Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.
7. Closure for cooling coil valves (NC)-- Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.

D. Execution of Construction Checklists and Startup.

1. Four weeks prior to the scheduled startup, the contractor shall coordinate startup and checkout with the owner, CM, A/E, and CxA. The execution and approval of the construction checklists, startup, and checkout shall be directed and performed by the contractor, subcontractor or vendor. Signatures are required of the applicable subcontractors for verification of completion of their work.
2. The owner/CM, and A/E as necessary, shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, in which case a sampling strategy may be used. The CxA will observe all testing.
3. For lower-level components of equipment, (e.g., sensors, controllers), the CxA shall observe a sampling of the startup procedures.
4. The subcontractors and vendors shall execute startup and provide the CxA and A/E, through the owner/CM, with a signed and dated copy of the completed startup and construction checklists.
5. Only individuals of the contractor (technicians, engineers, tradesmen, vendors, etc.) who have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall check off that item. It is not acceptable for witnessing supervisors to fill out these forms.

- E. Deficiencies, Non-Conformance, and Approval in Master Commissioning Status Report.
 - 1. The contractor shall ensure that the subcontractors clearly list any outstanding items of the initial startup and construction checklist procedures that were not completed successfully.
 - 2. Items that are a deficiency are listed on the Commissioning Status Report. The installing subcontractors or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, shall notify the owner/CM as soon as outstanding items have been corrected, and resubmit an updated startup report with a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA will recommend approval of the execution of the checklists and startup of each system.
 - 3. Items left incomplete, which later cause deficiencies or delays during performance may result in backcharges to the contractor.

3.3 SUBMITTALS

- A. The CxA will provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the request will include the manufacturer and model number, the manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the commissioning authority. All documentation requested by the CxA will be included by the subcontractors in their O&M manual contributions.
- B. The submittals and shop drawings of the commissioned systems shall be submitted directly to Dane County, the A/E and the CxA for concurrent review. The CxA will review this documentation and provide comments directly to Dane County and the A/E for incorporation into the A/E comments.
- C. The CxA will review and approve submittals related to the commissioned equipment for conformance to the contract documents as it relates to the commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance procedures and only secondarily to verify compliance with equipment specifications. The commissioning authority will notify the owner/CM, PM or A/E as requested, of items missing or areas that are not in conformance with contract documents and which require resubmission.
- D. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the contractor, though the CxA will review and approve them.

3.4 FUNCTIONAL TESTING

- A. Requirements. The functional testing shall demonstrate that each system is operating according to the documented design intent and contract documents. Performance testing facilitates bringing the systems from a state of individual substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
- B. Coordination and Scheduling. The contractor shall provide sufficient notice, regarding their completion schedule for the construction checklists and startup of all equipment and systems, and the preliminary functional tests to allow the final functional testing to be scheduled. The

commissioning team shall oversee, witness, and document the performance of all equipment and systems. The CxA in association with the contractor/subcontractors and facility staff shall execute the tests. Performance testing shall be conducted after the construction checklists, and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the CxA before it is used, to verify performance of other components or systems. The air balancing and water balancing shall be completed before performance testing of air or water-related equipment or systems. Testing proceeds from components to sub-systems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems shall be checked.

- C. Development of Test Procedures. Before test procedures are finalized, the contractor shall provide to the A/E and the CxA all requested documentation and a current list of changes affecting equipment or systems, including an updated points list, program code, control sequences, and testing parameters. Using the testing parameters and requirements in the technical specifications, the CxA shall update/develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each contractor/subcontractor or vendor, as appropriate, shall provide assistance to the CxA in developing the final procedures. Prior to finalization, the A/E shall review and concur with the test procedure.
- D. Test Methods.
1. Performance testing and verification may be achieved by manual testing or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CxA may substitute specified methods or require an additional method to be executed other than what was specified, with the approval of the A/E and owner/CM. The CxA will determine which method is most appropriate for tests that do not have a specified method.
 2. Simulated Conditions. Simulating conditions shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
 3. Overridden Values. Overriding sensor values to simulate a condition, such as overriding the outside air temperature reading in a control system to be something other than it really is, is acceptable.
 4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overridden values.
 5. Altering Setpoints. Rather than overriding sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable.
 6. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the test parameters, that the indirect readings through the control system represent actual conditions and responses.
 7. Setup. Each functional test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The contractor/subcontractor(s) assisting the CxA in executing the test shall provide all necessary materials, system modifications, etc., to produce the necessary flows, pressures, temperatures, etc., necessary to execute the test according to the specified conditions. At completion of the test, the contractor/subcontractor(s) shall return all affected equipment and systems to their approved operating settings.
- E. Problem Solving. The burden of responsibility to solve, correct, and retest malfunctions/failures is with the contractor, with A/E approval as required.

3.5 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Documentation. The CxA shall witness and verify/pre-approve the documentation of the results of all performance tests. The CxA shall complete all documentation for performance testing.
- B. Non-Conformance.
1. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form or the Commissioning Status Report.
 2. As tests progress and a deficiency is identified, the CxA shall discuss the deficiency with the commissioning team, and the contractor.
 - a. When there is no dispute on the deficiency and the contractor accepts responsibility to correct it:
 - 1) The CxA will document the deficiency and the contractor's response and intentions. After the functional testing, the CxA will submit the functional tests and indicate the deficiency on the status report. The contractor corrects the deficiency, indicates the connection on the status report certifying that the equipment is ready to be retested and sends it back to the CxA.
 - 2) The contractor shall reschedule the test by coordinating with the CxA; and the test repeated.
 - b. If there is a dispute about a deficiency, regarding whether or not it is a deficiency:
 - 1) The dispute shall be documented on the Commissioning Status Report form with the contractor's response.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with Dane County Public Works. Final acceptance authority is with the owner/CM.
 - 3) The CxA documents the resolution process.
 - 4) Once the interpretation and resolution have been decided, the contractor corrects the deficiency, indicates the response on the status report and provides it to the CxA, through the owner/CM. The contractor shall reschedule the test and the test is repeated until satisfactory performance is achieved.
 3. Cost of retesting a functional test is the contractor's expense.
 4. The contractor shall respond to open items at each commissioning meeting. Discussions shall cover explanations of any disagreement and proposals for their resolutions.
 - a. The CxA maintains the master Status Report until the end of the project.
 - b. Retesting shall not be considered a justified reason for a claim of delay or for a time extension by the contractor.
- C. Failure Due to Manufacturer Defect. If 10% (or three, whichever is greater) of identical pieces of equipment fail to perform to the contract documents (mechanically or substantively) due to a manufacturing defect, not allowing it to meet its submitted performance specification, all identical units may be considered unacceptable by the A/E or CxA. In such case, the contractor shall provide the owner with the following:
1. Within one week of notification from the owner/CM, the contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the owner/CM within two weeks of the original notice.
 2. Within two weeks of the original notification, the contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc., and all proposed solutions. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.
 4. Two examples, where applicable, of the proposed solution shall be installed by the contractor and the A/E shall be allowed to test the installations for up to one week, upon which the A/E will decide whether to accept the solution.
 5. Upon acceptance, the contractor and/or manufacturer shall replace or repair all identical items, at their expense. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Final approval of the performance test by the owner is made after review by the CxA and owner/CM, following recommendations by the A/E.

END OF SECTION

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Construction Verification Checklist

Plumbing Insulation

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable item to verify compliance, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent Date Owner's Representative Date

Notes: _____

5. Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5	6	7	8	9	10	11		
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Piping clean, dry, pressure tested and approved prior to application of insulation.
2. Type and thickness of insulation complies with Specification 22 07 00.
3. Insulation installed with smooth and even surfaces, without the use of filler in voids.
4. Butt joints and longitudinal seams closed tightly with a minimum of 2" lap on jacket seams and 2" tape on butt joints.
5. Staples are at least ¼" from the lap edge on systems operating above 60 degrees F and vapor sealed using self sealing lap if under 50 degrees.
6. Insulation ends are all tapered and sealed.
7. Full-length material used as possible, with no scrap piecing or stretching of insulation utilized.
8. Insulation continuous through sleeves and openings with vapor barriers continuous through all penetrations.
9. Complete vapor barrier provided for all cold water, storm water and piping systems with surface temperatures below 50°F.
10. Exposed fiberglass insulation covered and sealed at all permanent terminations and at end of work day.
11. Piping and direction of flow is labeled every 30 feet and at every wall penetration.

6. Valve, Fitting & Equipment Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below													
				1	2	3	4										
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										

1. Fittings, valves, unions, flanges, couplings and specialties insulated with factory molded or built up insulation of the same thickness as adjoining insulation.
2. Fittings are insulated per specification 22 07 00 (8 oz. glass mesh and mastic on systems less than 50 degrees and breather mastic on systems above 50 degrees.)
3. PVC fitting covers secured with tack fasteners and 1-1/2" band of mastic over ends, throat, seams or penetrations or for systems requiring vapor barrier, vapor barrier mastic.
4. No insulation provided at chrome plated exposed supplies and stops (except where specifically noted), water hammer arrestors, and piping unions and flanges for piping systems not requiring a vapor barrier.

7. Negative Response:

Date	Found By:	Negative Response (resolved if checked)	Date Resolved	Resolution
		<input type="checkbox"/>		

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Construction Verification Checklist

Facilities Water Distribution

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable item to verify compliance, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent

Date

Owner's Representative

Date

Notes: _____

5. Pre-installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below													
				1	2	3	4										
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										

1. All piping, valves, etc. are clean and free of damage prior to installation.
2. All valves provided for installation are of the same manufacturer.
3. Temporary protective coating is provided on cast iron and steel valves during storage.
4. Temporary end caps are provided on piping and fittings until installation.

6. General Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7	8	9			
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

1. Piping is free to expand and contract without noise or damage to hangers, joints, or the building.
2. Piping is installed in a manner to ensure that insulation will not contact adjacent surfaces.
3. Piping is installed with sufficient pitch and arranged in a manner to ensure drainage of entire system.
4. Changes in pipe sizes are made with the proper size reducing fittings, reducing elbow or reducing tees, and no bushings are utilized.
5. Connections between dissimilar pipe materials are made with dielectric fittings.
6. Pipe hanger spacing complies with specification requirements.
7. All equipment requiring maintenance is accessible (valves, strainers, etc.).
8. Piping allows access to equipment that is part of this system or another system.
9. Open pipe ends capped at completion of work day.

7. Valve & Fitting Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5							
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							

1. All valves are in an upright vertical position with handles in a horizontal position.
2. All valves can be fully operated without removal or alteration of handle, including provisions for specified insulation thickness of piping.
3. All valves with screwed ends are installed with “Teflon” tape applied to male end of pipe fitting.
4. Isolation valves provided at all equipment connections, main branches and sub-branches, “T” connections, and as necessary for repairing the system as specified in contract documents.
5. All strainers in piping system have ball valves installed at the tapped screen retainer.

8. Testing Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8				
		100	Cold Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Hot Water above Open Office 147	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Cold Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Hot Water above Breakroom 121	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Piping tested utilizing water pressure of 150 psig for 4 hours.
2. All leaks identified during testing have been repaired and test re-done until no leaks are found.
3. Test conducted with all piping of tested system or section visible during testing. Record initials of pressure test witness here _____.
4. After pressure testing system the system is flushed per Specification 22 11 00.
5. Following initial flush system filled with water and chlorine at 50 PPM and allowed to stand for 24 hours.
6. Chlorine treatment is repeated until the chlorine level after 24 hours is greater than 5 PPM.
7. Following specification prescribed stand times for chlorine treatment system flushed until chlorine levels are at source water levels.
8. 24 hours after final flushing, 5 water samples are taken from the main entrance and remote faucets, and taken to Wisconsin Department of Health Lab for testing and results show the absence of coliform bacteria.

9. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below
------	----------	------------	-------------------------------	---

				1	2	3	4								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. All exposed piping which passes through a wall, ceiling or floor is provided with escutcheon plates.
2. Piping labels and direction of flow is provided per specification requirements.
3. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
4. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.

10. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Facilities Sanitary Sewage

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable item to verify compliance or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Pre-installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below													
				1	2	3											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below										
				1	2	3								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. All piping meets ASTM or CISPI standards and specifications.
2. All piping, etc. is clean and free of damage prior to installation.
3. Temporary protective covering is provided on pipe and fittings during storage.

6. General Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below										
				1	2	3	4	5	6	7	8	9		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

1. Piping is free to expand and contract without noise or damage to hangers, joints, or the building.
2. Piping is installed with sufficient pitch and arranged in a manner to ensure drainage of entire system.
3. Piping is installed per CISPI standards.
4. Interior piping pitched to drain at minimum slope of 1/4" per foot where possible and in no case less than 1/8" per foot for piping 3" and larger.
5. Changes in pipe sizes are made with the proper size reducing fittings, reducing elbow or reducing tees, and no bushings are utilized.
6. All equipment requiring maintenance is accessible (valves, strainers, etc.).
7. Drains and cleanouts level and plumb to finished floor, roof or finished wall.
8. Minimum clearance of 18" provided for all cleanouts and backwater valves.
9. Open pipe ends capped at completion of work day.

7. Testing & Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below										
				1	2	3	4	5	6	7	8	9		

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5	6	7	8	9				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Piping tested utilizing water at 10 feet of water column for 2 hours.
2. All leaks identified during testing have been repaired and test re-done until no leaks exist.
3. Test conducted with all piping of tested system or section visible during testing.
4. Entire testing procedure witnessed by GC, Dane County Rep, or Cx Authority.
5. Piping inlets (fixtures) flushed with high flow of water at completion of project to demonstrate full flow capacity.
6. Blockages removed and necessary repairs made where flow is found to be impeded during flushing test.
7. Piping identification and direction of flow is provided every 30 feet and at each wall penetration.
8. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
9. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.

8. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

Commercial Plumbing Fixtures

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable item to verify compliance, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below										
				1	2	3	4	5	6	7	8	9	10	
		100	S-1 (Breakroom 121)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	S-1 (Open Office 147)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Fixture traps and service stops easily accessible for service.
2. Service stops are heavy duty type with brass stems and screwed or sweat inlet connections.
3. Fixture and carriers secured per manufacturer requirements and level and plumb to finished surface.
4. Rough-in piping is secured to prevent movement of exposed piping.
5. Pipe penetrations covered with escutcheons.

- 6. Openings between walls, floors and fixtures sealed with mildew-resistant silicone sealant same color as fixture.
- 7. Fixtures tested and fully operational.
- 8. Fixture valves adjusted for intended water flow rate to fixtures to eliminate splashing, noise or overflow
- 9. Fixtures and trim cleaned using manufacturer's recommended cleaning methods and materials.
- 10. Barrier free fixtures are installed in compliance with COMM 52, 69 and Federal ADA Accessibility Guidelines.

6. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

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Construction Verification Checklist

HVAC Ductwork Insulation

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable item to verify compliance, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent

Date

Owner's Representative

Date

Notes: _____

5. Ductwork Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9	10	11	
		25	Ductwork east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		50	Ductwork between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		75	Ductwork between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Ductwork between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Ductwork clean, dry, pressure tested and approved prior to application of insulation.
2. Type and thickness of insulation complies with listed specification requirements for given system.
3. Insulation installed with smooth and even surfaces.
4. All required weld pins are installed as Specified
5. Insulation is secured per specification requirements for given insulation type and ductwork width.
6. Insulation seams and joints firmly butted together and covered with 2" tape of same material as jacket.
7. Insulation and vapor barrier continuous through non-rated sleeves.
8. Insulation is butted tightly against the fire stop with butt joints taped in rated construction.
9. Insulation stopped and pointed around access doors and damper operators to allow operation without disturbing insulation or jacket material.
10. Complete vapor barrier provided for all insulated ductwork.
11. Exposed fiberglass insulation covered and sealed at all permanent terminations and at end of work day.

6. Device & Equipment Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions <i>(Check to Confirm)</i> – See Detail Below													
				1	2												
		25	Ductwork east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>												
		50	Ductwork between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>												
		75	Ductwork between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>												
		100	Ductwork between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>												
				<input type="checkbox"/>	<input type="checkbox"/>												
				<input type="checkbox"/>	<input type="checkbox"/>												
				<input type="checkbox"/>	<input type="checkbox"/>												

1. Insulated easily removable galvanized steel metal boxes or insulated easily removable elastomeric insulation sections provided for equipment, devices, labels and access panels per specifications.
2. All control devices are mounted over ductwork insulation.

7. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	Date Resolved	Resolution
		<input type="checkbox"/>		
		<input type="checkbox"/>		
		<input type="checkbox"/>		

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Construction Verification Checklist

HVAC Piping Insulation

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Provide a check in the box in the item is installed as noted, or provide the clarification regarding why the box is not checked.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions <i>(Check to Confirm)</i> – See Detail Below												
				1	2	3	4	5	6	7	8	9	10			
		25	Main routed through project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		50	Branches run out to boxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		75	VAV box piping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	System pressure tested, filled, flushed, and chemicals complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

1. Piping clean, dry, pressure tested and approved prior to application of insulation.
2. Type and thickness of insulation complies with listed specification requirements for given system and pipe size.
3. Insulation installed with smooth and even surfaces, without the use of filler in voids.

4. Butt joints and longitudinal seams closed tightly with a minimum of 2" lap on jacket seams and 2" tape on butt joints.
5. All longitudinal seams stapled as specified.
6. All seams and staples sealed with vapor barrier mastic on systems that require a vapor barrier.
7. Full-length material installed, with no piecing of scraps or stretching of material.
8. Insulation continuous through sleeves and openings with vapor barriers continuous through all penetrations.
9. Complete vapor barrier provided for all piping systems operating below 65°F including at high density inserts at hanger locations.
10. Exposed fiberglass insulation covered and sealed at all permanent terminations and at end of work day.

6. Valve, Fitting & Equipment Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7					
		25	Main routed through project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		50	Branches run out to boxes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		75	VAV box piping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100	System pressure tested, filled, flushed, and chemicals complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. Fittings, valves, unions, flanges, couplings and specialties insulated with factory molded or built up insulation of the same thickness as adjoining insulation.
2. Where temperatures exceed 150°F fittings, valves, unions, flanges, couplings and specialties are covered with fabric reinforcing and mastic. PVC fitting covers may be used where temperatures do not exceed 150° F.
3. PVC fitting covers secured with tack fasteners and 1-1/2" band of mastic over ends, throat, seams or penetrations or for systems requiring vapor barrier, vapor barrier mastic.
4. Equipment access manholes, fittings, nameplates or ASME stamps left un-insulated with insulation beveled and sealed at these locations.
5. Equipment insulation installed with smooth and even surfaces per specifications requirements.
6. No insulation provided at hot water piping inside radiation, convector, or cabinet heater enclosures, steam traps and piping unions for systems not requiring a vapor barrier.
7. Reheat coil piping, fittings and valves (with the exception of unions) up to coil connection are insulated.

7. Negative Response:

Date	Found By:	Negative Response (resolved if checked)	Date Resolved	Resolution

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Construction Verification Checklist

Control Wiring and Devices

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Please check each box to confirm the item is installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

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- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

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 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Wiring Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7					
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. All cabling identified at both ends.
2. A minimum of 5' of cable provided in DDC panel for all electronic input/output devices, sensors, relays and interlocking wiring to allow for termination by the DDC Contractor.
3. All high voltage and low voltage wiring (includes low voltage cable) installed in metal conduit, Electrical Non-metallic Tubing (ENT), or Electrical Metallic Tubing (EMT), as scheduled per specifications.
4. All conduit installed and supported in accordance with electrical sections (Division 26) of this specification and the National Electrical Code.
5. Bushings installed at all conduit terminations.
6. Conduit is a minimum of 1/2 " for low voltage control wiring and pipe fill does not exceed 40%.
7. All equipment requiring maintenance is accessible (valves, junction boxes, etc.).

6. Control Devices Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>							

1. Room thermostats and sensors installed at the location and height indicated on the drawings and aligned with light switches and humidistats.
2. Any room thermostats or sensors mounted on an exterior wall mounted on a thermally insulated sub-base.
3. Where thermostats or sensors are mounted on exterior walls or in any location where air transfer will affect the measured temperature or humidity the conduit and any other opening that will effect the measurement are sealed.
4. Guards provided on thermostats in entrance hallways, other public areas, or in locations where thermostat is subject to physical damage.
5. All control devices and boxes mounted on insulated ductwork are mounted over the insulation.

7. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7	8				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7	8				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
2. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.
3. All wiring is properly labeled with control ID number of circuit within ½” of device and terminal connection.
4. All control devices with the exception of dampers, valves, and terminal unit devices labeled with permanent printed labels that correspond to control drawings.
5. Temperature control wiring and tubing junction and pullboxes identified utilizing spray painted green covers.
6. Pressure and/or differential set points of pressure sensors re-adjusted after final balancing is completed.
7. Threshold settings for current switch adjusted to indicate belt or coupling loss after final balancing.
8. As-built control drawings of all systems served by each local panel provided in a location adjacent to or inside of panel cover. Provide a protective cover or envelope for drawings.

8. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

Hydronic Piping

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Please check each box if item is installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
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- Provide checklist to lead contractor at completion of each work day.

2. Overview:

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3. Contractor CVC Submittal:

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Construction Manager / General Contractor _____

Date _____

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent _____

Date _____

Owner's Representative _____

Date _____

Notes: _____

5. Pre-Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below													
				1	2	3											
		25	Piping east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
		50	Piping between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
		75	Piping between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											
		100	Piping between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>											

1. All piping, valves, etc. are clean and free of damage prior to installation.
2. Temporary protective coating is provided on cast iron and steel valves during storage.
3. Temporary end caps are provided on piping and fittings until installation.

6. Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9	10	11	12

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9	10	11	12
		25	Piping east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		50	Piping between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		75	Piping between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Piping between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Piping is free to expand and contract without noise or damage to hangers, joints, or the building.
2. Piping is installed in a manner to ensure that insulation will not contact adjacent surfaces.
3. Piping is installed with sufficient pitch and arranged in a manner to ensure drainage of entire system, including provision of auxiliary drains as necessary.
4. Changes in pipe sizes are made with the proper size reducing fittings, reducing elbow or reducing tees, and no bushings are utilized.
5. Piping connections at coils provide sufficient clearance such that valve handles will not interfere with adjacent piping insulation.
6. A minimum of two elbows provided in each pipe line prior to a piece of terminal equipment.
7. Pipe hanger spacing complies with Section 23 05 29, including provision of individual hangers within 1' of each horizontal elbow, strainer, valve, etc.
8. All equipment requiring maintenance is accessible (valves, strainers, etc.).
9. Valves are installed from the same manufacturer.
10. Piping is not routed above transformers, panel boards, or switchboards.
11. Piping allows access to equipment that is part of this system or another system.
12. Open pipe ends capped at completion of work day.

7. Valve & Fitting Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5	6	7	8					
		25	Piping east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		50	Piping between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		75	Piping between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100	Piping between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. All valves are provided by the same manufacturer.
2. All valves are in an upright vertical position with handles in a horizontal position.
3. All valves can be fully operated without removal or alteration of handle, including provisions for specified insulation thickness of piping.
4. Drainage valves provided at all low points and downstream of riser isolation valves.
5. Manual air vents are provided at all high points in closed water systems.
6. Isolation valves provided at all equipment connections, main branches and sub-branches, "T" connections, and as necessary for repairing the system as specified in contract documents.
7. All strainers in piping system have ball valves installed at the tapped screen retainer.
8. All ball valves installed in insulated piping are furnished with stem extensions to allow the handles to clear the insulation.

8. Testing and Cleaning Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5								
		25	Piping east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		50	Piping between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		75	Piping between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		100	Piping between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. Piping tested utilizing water at 100 psi for 8 hours.
2. All leaks identified during testing have been repaired and test re-done until satisfactory conditions are accomplished, DSF test report submitted.
3. Test conducted with all piping of tested system or section visible (example: prior to insulation and ceilings).
4. After pressure testing system is cleaned following chemical treatment outlined in 23 25 00.
5. All hydronic system piping is flushed in accordance with Section 23 21 13, and prior to the addition of scale and rust inhibitors.

9. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4									
		25	Piping east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
		50	Piping between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
		75	Piping between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
		100	Piping between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									

1. All exposed piping which passes through a wall, ceiling or floor is provided with escutcheon plates.
2. Piping labels and direction of flow is provided per specification requirements.
3. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
4. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.

10. Negative Response:

Date	Found By:	Negative Response (resolved if checked)	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

Refrigerant Piping

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each applicable box to verify compliance, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Pre-Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below													
				1	2	3	4										
		100	Refrigerant line through Break room 121 and Storage 122	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										

1. All piping, valves, etc. are clean and free of damage prior to installation.
2. All valves are provided from the same manufacturer.
3. Temporary end caps are provided on piping and fittings until installation.
4. Copper pipe is marked "ACR".

6. Piping Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8				
		75	Piping installed through spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Piping is terminated at CRAC and AC-1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Piping is free to expand and contract without noise or damage to hangers, joints, or the building.
2. Piping is installed in a manner to ensure that insulation will not contact adjacent surfaces.
3. Piping is sized appropriately for manufacturer length limitations
4. Changes in pipe sizes are made with the proper size reducing fittings, reducing elbow or reducing tees, and no bushings are utilized.
5. Pipe hanger spacing complies with Section 23 05 29 requirements, including provision of individual hangers within 1' of each horizontal elbow, valve, etc.
6. All equipment requiring maintenance is accessible (valves, etc.).
7. Piping allows access to equipment that is part of this system or another system.
8. All solder joints are Grade 4 or 5 and have a melting point of 1,250° F.

7. Valve & Special Equipment Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6						
		75	Piping installed through spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Piping is terminated at CRAC and AC-1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. All valves are in an upright vertical position with handles in a horizontal position.
2. All valves can be fully operated without removal or alteration of handle, including provisions for specified insulation thickness of piping.
3. Isolation valves provided at all equipment connections, main branches and sub-branches, "T" connections, and as necessary for repairing the system as specified in contract documents.
4. Straight pattern filter dryers without replaceable core provided.
5. Sight glass, filter dryer, TXV, liquid line solenoid valves are installed as detailed.
6. Charging valves with 1/4" SAE brass male flare access ports with finger tight, quick seal caps and 2" long copper extension sections provided.

8. Testing Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4								
		75	Piping installed through spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below													
				1	2	3	4										
		100	Piping is terminated at CRAC and AC-1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										

1. Piping tested utilizing HFC refrigerant and nitrogen at specified pressures and duration as per specification.
2. All leaks identified during testing have been repaired and test re-done until satisfactory conditions are accomplished.
3. Test conducted with all piping of tested system or section visible during testing.
4. Following completion of approved leak tests, piping evacuated in accordance with procedures detailed in specification.

9. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below													
				1	2	3	4	5									
		75	Piping installed through spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
		100	Piping is terminated at CRAC and AC-1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									

1. System charged with type and quantity of refrigerant per charging procedure detailed in specification.
2. Final refrigerant charge recorded and submitted.
3. Piping labels and direction of flow is provided per specification requirements.
4. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
5. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.

10. Negative Response:

Date	Found By:	Negative Response (resolved if checked)	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

HVAC Water Treatment

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check the box to confirm item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent

Date

Owner's Representative

Date

Notes: _____

5. Pre-Treatment Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5								
		100	Hot Water System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. Piping system flushed, filled, vented and started.
2. Piping system and associated equipment are operational.
3. System capacity has been determined and documented.

- 4. Terminal control valves are in the full-open position.
- 5. MSDS sheets are submitted.

6. CLEANING TREATMENT CHECKS

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5	6	7	8					
		100		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

- 1. All pressure tests are completed and leaks were not found.
- 2. All chemicals added to system according to manufacturer recommendations.
- 3. Water filter elements removed from the system before starting circulation.
- 4. Neutralizer agents used on recommendation of system cleaner supplier and approval of Architect/Engineer.
- 5. Cleaning treatment procedures, metrics and circulation durations follow specification requirements for system type.
- 6. Open systems flushed for a minimum of one hour before being drained and re-filled.
- 7. Strainer screens removed, cleaned and replaced after cleaning treatment.
- 8. Low points inspected, sludge removed and flushed with clean water.

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Ductwork and Casings

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check the box to indicate the item is installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor _____
Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent _____
Date _____
Owner's Representative _____
Date

Notes: _____

5. General Ductwork Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5	6	7	8	9				
		25	Ductwork east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Ductwork between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Ductwork between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Ductwork between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Ductwork is clean and free of damage prior to installation.
2. Ductwork is installed in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2nd Edition, 1995.
3. Where two different metal ducts meet, the joint is installed in such a manner that metal ducts do not contact each other by using proper seal or

compound.

4. No reductions to duct to less than six inches in any dimension and/or aspect ratio greater than 8:1 are present.
5. All equipment and systems requiring maintenance are accessible (valves, junction boxes, etc.).
6. All seams, joins and penetrations sealed in accordance with SMACNA seal class "A" standards, except transfer ductwork with pressure classification below 2".
7. All duct openings sealed to maintain duct system cleanliness.
8. Ductwork supported in accordance with SMACNA HVAC Duct Construction Standards, except secure wire method is not utilized.
9. Sheet metal thickness complies with the requirements of Section 23 31 00.

6. Supply Ductwork Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5								
		25	Ductwork east of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		50	Ductwork between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		75	Ductwork between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		100	Ductwork between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. All seams, joins and penetrations sealed in accordance with SMACNA seal class "A", except transfer ductwork with pressure classification below 2".
2. Manual balancing damper installed in each branch duct.
3. Ductwork is pressure tested prior to being insulated.
4. Air craft cable is only utilized on ductwork smaller than 12" diameter and installed double looped at ductwork and support.

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Air Terminal Units

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item is installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

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- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent

Date

Owner's Representative

Date

Notes: _____

5. Model Verification:

Model Information as Submitted <i>(verified upon delivery if checked)</i>					
Air Terminal Units Information					
Manufacturer:		<input type="checkbox"/>	Model Number:		<input type="checkbox"/>
Serial Number:		<input type="checkbox"/>	Size (in):		<input type="checkbox"/>
Max/Min Capacity (cfm/cfm):	/	<input type="checkbox"/>	Air Pressure Drop: (in w.c.)		<input type="checkbox"/>
Comments:					

6. Verification Checklists:

Check if Acceptable <i>(provide comment if unacceptable)</i>	YES	NO	N/A	Comment
A. Physical Checks Upon Delivery				
	Initials _____			Date _____
1. Unit is free from physical damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Openings are sealed with plastic plugs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. The airflow sensing tubing is capped.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. The grommets for the airflow sensing tubing are secure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. The enclosure for the DDC control panel is in the proper location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. All components present.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Installation and startup manual provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Unit tags affixed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Manufacturer's ratings readable/accurate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
B. Hanging				
	Initials _____			Date _____
1. Unit secured as required by manufacturer and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Check if Acceptable (provide comment if unacceptable)	YES	NO	N/A	Comment
2. Unit supported independent from adjacent ductwork.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Unit is level.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. There is adequate clearance (24" minimum) at the damper actuator to replace the actuator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. The piping specialties are accessible for replacement and maintenance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Control valves are installed with uniform body orientation? (valves all open in the same direction)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Unit labeled and is easy to see.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Vibration isolation equipment installed properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Unit openings temporarily sealed to maintain system cleanliness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Ductwork				
	Initials _____			Date _____
1. Minimum of 3' (duct less than 12" round) or 3 duct diameters (ducts greater the 12" round) of straight ductwork present prior to unit inlet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Downstream ductwork free of transitions for sufficient length per manufacturer recommendations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Minimum of 12" of straight ductwork provided between unit and re-heat coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Access door provided upstream of the heating coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. 5' of 1" liner provided immediately downstream of unit outlet or re-heat coil discharge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Thermal insulation properly installed according to specification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Piping				
	Initials _____			Date _____
1. All piping components have been installed (in the correct order) as required by contract document or manufacturer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Piping arranged for ease of unit removal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Units with multiple rows piped for counter flow arrangement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Piping supported as required by specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Piping is clean.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Minimum of three elbow provided in branch line to unit prior to coil connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Unit connected to water supply and return piping using unions or flanges and isolation valves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Drain valve, and vent line provided at coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Piping and valves properly checked and free of leaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Piping insulation is complete and installed as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. All valves and test ports are easily accessible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. Controls Installation				
	Initials _____			Date _____
1. Control panel accessible and labeled properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Check if Acceptable (<i>provide comment if unacceptable</i>)	YES	NO	N/A	Comment
2. Controller and associated devices are readily accessible for servicing and not obstructed by ductwork, piping or electrical conduit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Damper actuator installed and wiring terminated at controller.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Air flow sensing tubing terminated at controller.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Re-heat coil actuator wiring installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Temperature sensor is installed 3 duct diameters downstream of the heating coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Interconnecting wiring is installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Interconnection wiring between units installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Occupancy sensor wiring installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
F. Controls Startup		Initials _____		Date _____
1. Cooling sequence verified and acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Heating sequence verified and acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. All dampers open fully.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. All dampers close tightly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Occupancy override sequence verified and acceptable. (30 minute delay).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Control wiring labeled per specification requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

8. Sensor, Gauge and Actuator Calibration Checklist:

All field-installed sensors, gages and actuators (dampers and valves) associated with this piece of equipment shall be calibrated in accordance with specifications. All test instruments shall have had a certified calibration within the last 12 months. All sensors installed inside of the piece of equipment at the factory with calibration certificate provided need not be field calibrated.

Sensor and Gauge Calibration Check

ATU ID	Sensor/Gauge	Location <i>(check if acceptable)</i>	Test Instrument Value	BAS/Gauge Value	Pass/Fail
	ZONE TEMP		<input type="checkbox"/>		
	SA TEMP		<input type="checkbox"/>		
	AIR FLOW		<input type="checkbox"/>		

Actuator Calibration Check					
ATU ID	Analog Device	Procedure	Signal at Device	Device Status	Pass/Fail
	VOLUME DAMPER	0% Command			
		50% Command			
		100% Command			
	REHEAT VALVE	0% Command			
		50% Command			
		100% Command			

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Construction Verification Checklist

Convectors

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check the each box to indicate the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer's recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Check if Acceptable (<i>provide comment if unacceptable</i>)	YES	NO	N/A	Comment
5. Minimum of three elbow provided in branch line to unit prior to coil connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Unit connected to water supply and return piping using unions or flanges and isolation valves.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Drain valve provided at coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Air vent is installed at the high point of the coil.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Piping and valves properly checked and free of leaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Piping insulation is complete and installed as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. All valves and test ports are easily accessible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Electrical Initials _____ Date _____				
1. All electrical connections are tight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. All electrical components are grounded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Element inspected for damage prior to applying power.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. Controls Installation Initials _____ Date _____				
1. Thermostat wiring installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Thermostat location is appropriate and results in accurate temperature readings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
F. Mechanical Startup Initials _____ Date _____				
1. Protective coverings removed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Unit is clean.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Unit access doors and cover can be opened and closed without damage to unit or wall/ceiling finish.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. All damage to unit finish is repaired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
G. Controls Startup Initials _____ Date _____				
1. Temperature control sequence verified and acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Split System A/C Units

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each item to verify it has been installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

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- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor

Date

Check if Acceptable (provide comment if unacceptable)	YES	NO	N/A	Comment
manufacturer and specifications.				
2. Unit is totally isolated (without rigid contact) from structure, ductwork or other stationary equipment or devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Equipment location coordinated with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Adequate clearance around unit for service.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. All components accessible for maintenance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Unit is level.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Cooling coil drain pan slopes correctly (if applicable).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Shipping bolts have been removed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Unit labeled and is easy to see.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Construction filters provided in unit per specification requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Refrigerant Piping	Initials _____		Date _____	
1. All piping components have been installed (in the correct order) as required by contract document or manufacturer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Piping arranged for ease of unit removal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Piping installation meets all manufacturers' length and sizing recommendations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Piping supported as required by specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Piping is clean.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Piping and valves properly checked and free of leaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Piping insulation is complete and installed as per specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. All valves and test ports are easily accessible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Electrical	Initials _____		Date _____	
1. Local disconnect installed in accessible and visible location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Each motor terminal box is connected with a minimum 12", maximum 36" piece of flexible conduit to a fixed junction box.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. All electrical connections are tight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. All electrical components are grounded.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Element inspected for damage prior to applying power.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. Controls Installation	Initials _____		Date _____	
1. Remote start and stop wiring installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Remote status wiring installed and communication verified.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Test ports installed at all control sensors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
F. Mechanical Startup	Initials _____		Date _____	
1. Unit is clean.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Protective shrouds for fan and belts in place and	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Check if Acceptable (<i>provide comment if unacceptable</i>)	YES	NO	N/A	Comment
secure.				
3. All bent or crushed fins have been combed out.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. System starts and runs without any unusual noise or vibration.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Manufacturer's startup checklist completed and attached.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Final filters installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. All damage to unit finish is repaired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
G. Controls Startup		Initials _____		Date _____
1. Cooling sequence of control verified and acceptable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. The sensor that reports space temperature to the BAS is located next to the control thermostat for the split system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. The control thermostat is located appropriately to not be in direct air flow from the discharge of the unit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

Low Voltage Electrical Power Conductor & Cables

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item is installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

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- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor _____
Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent _____
Date _____
Owner's Representative _____
Date

Notes: _____

5. Conductor & Cable Pulling Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions <i>(Check to Confirm)</i> – See Detail Below												
				1	2	3	4	5	6	7	8	9				
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Conductor and cabling sized to maintain less than a 3% voltage drop for rated length and ampacity of circuit.
2. Conductors and cabling coloring match specification requirements for given voltage, wire gauge, and leg of circuit.
3. Conduits swabbed to remove foreign material prior to pulling cables.

4. All cables pulled though conduit at the same time, with pulling lubricant used to ease pulling tensions.
5. Excess cable provided at each termination and splice point for purpose of multiple terminations or splices to be performed.
6. Cables are extended a minimum of 8 inches beyond outlet box conduit fittings.
7. All branch circuits are furnished and installed with individual accompanying neutral, sized the same as the phase conductors.
8. Emergency power conductors and cabling pulled in separate conduits from normal power systems.
9. Cables not to be terminated within 8 hours to be properly sealed and protected from moisture intrusion until termination.

6. Conductor and Cable Terminations and Splices Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9			
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Installed lugs match the pads on the equipment to which the cable will be mounted.
2. All lug terminations are connected per connection torque valve as recommended by the manufacturer.
3. Splices made only in accessible junction boxes.
4. All conductors and cables cleaned prior to termination.
5. All splices made so that the electrical resistance of the splice does not exceed the equivalent resistance of 2’ of conductor.
6. Solderless spring type pressure connectors with insulating covers used for all wires splices and taps of conductors and cabling 10AWG and smaller.
7. Mechanical or compression connectors used for all wire splices and taps of conductors and cabling 8 AWG and larger.
8. Uninsulated conductors and connectors taped with electrical tape equivalent to 150% of the insulation value of the conductor.
9. Each conductor is identified at each wiring device, connector, or splice point with permanently attached wrap around adhesives.

7. Testing & Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4								
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

1. All exposed conductors and cabling has been visually inspected for physical damage and any damaged conductors and cabling has been replaced.
2. Conductors and cabling jacket and insulation are in good condition.

- 3. All cable terminations have been checked for proper tightness and clearances per specification and manufacturer recommendations and any adjustments necessary have been made.
- 4. All splices and terminations are to be tagged within 2" to 4" of splice or termination and in accordance with specification requirements.

8. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Construction Verification Checklist

Conduit, Raceway & Boxes for Electrical Systems

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

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- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

Construction Manager / General Contractor _____
Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent _____
Date _____
Owner's Representative _____
Date

Notes: _____

5. Conduit & Fittings Pre-installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions <i>(Check to Confirm)</i> – See Detail Below												
				1	2											
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>											
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>											
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>											
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>											

1. Conduits are installed as rigid galvanized. (Provide approval for material variance in negative response section).
2. Conduit sufficiently sized to accommodate cabling and fill requirements of contract document.

6. Conduit & Fittings Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below										
				1	2	3	4	5	6	7	8	9	10	
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Conduit support spacing complies with specification requirements.
2. All conduit supported independently of piping, ductwork, equipment, cable tray or other conduit.
3. Bends in conduit minimized with required bends conforming to specification requirements and no more than an equivalent of three 90 degree bends between boxes.
4. Moisture traps are avoided as much as possible. When unavoidable, a junction box is provided with drain fitting at conduit low point.
5. All equipment requiring maintenance is accessible.
6. Minimum 6" clearance between conduit and piping, and 12" clearance between conduit and heat sources such as flues, steam pipes, and heating appliances is provided.
7. No continuous conduit run exceeds 100' without a junction box.
8. Expansion-deflection joints installed where conduit crosses building expansion joints.
9. Where conduit passes between areas of differing temperatures, listed conduit seals are provided.
10. At end of work day suitable conduit caps or other approved seals provided for incomplete work to protect installed conduit against entrance of dirt and moisture.

7. Raceway Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below										
				1	2	3	4	5	6					
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

1. Raceway and gutter support spacing and methods comply with specification requirements.
2. All raceways supported independently of piping, ductwork, equipment, cable tray or other conduit.
3. Suitable insulating bushings and inserts provided at connections to outlets and corner fittings.
4. All equipment requiring maintenance is accessible.
5. Expansion-deflection joints installed where conduit crosses building expansion joints.
6. At end of work day suitable caps or other approved seals provided for incomplete work to protect installed raceways and gutters against entrance of dirt and moisture.

8. Junction, Pull and Outlet Boxes Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5	6	7	8	9				
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

- Boxes provided in locations as per contract documents, Engineer’s direction or as necessary for splicing and terminations.
- Box type and material in accordance with specification requirements for given application and location.
- No outlet box located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
- All boxes supported independently of conduit, piping, ductwork, equipment, or cable tray.
- No outlet boxes installed back-to-back in walls, and minimum 6” separation between all boxes, except for installations in acoustic walls where a minimum 24” separation between boxes is provided.
- All boxes are accessible, and where installation is inaccessible, 18” by 24” access door has been provided.
- Mounting heights for outlet boxes corresponds with contract document requirements.
- All recessed outlet boxes in finished areas are mounted to the correct depth to accommodate and be flush to final surface finish.
- Knockout closures provided for unused openings.

9. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5	6							
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						

- All penetrations through fire rated wall assemblies have been sealed per specification requirements.
- All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.
- Conduits that penetrate the building envelope are sealed to prevent intrusion of air and moisture and are accessible.
- All splices and terminations are to be tagged within 2” to 4” of splice or termination and in accordance with specification requirements.

- 5. 1/8" nylon pull string provided in all empty conduits, except sleeves and nipples.
- 6. Grounding and bonding of conduits and raceways conform with specification requirements.

10. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

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Construction Verification Checklist

Panelboards

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check the box to verify the item was installed as noted, or provide the requested information for each item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

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Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		

Check if Acceptable (<i>provide comment if unacceptable</i>)	YES	NO	N/A	Comment
5. Conduit feeds are aligned with openings and accommodate seismic motion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Hub and ring connectors are in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Conduits, hubs and rings have been properly bonded to enclosure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Unit is level, plumb and square	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Unit labeled and is easy to see	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Wiring Initials _____ Date _____				
1. Three spare ¾" empty conduits provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Unit is adequately grounded to grounding lug for intended use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Surface mounted or recessed mounted neutral grounded conductor is properly grounded at service equipment per NEC-250.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Through-bus and ground-bus splice connections/kits between unit sections have been installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Proper phasing has occurred in relationship to phase conductors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. All connections are terminated properly per manufacturer recommended torque values.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. All electrical connections are tight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. All cables are permanently labeled relative to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Filler plates installed in unused spaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Startup Initials _____ Date _____				
1. All protective coverings have been removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Unit has been cleaned of all debris and dirt on interior of unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Insulators and supports show no signs of damage or cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Current transformers secured and wired per manufacturer instructions (metering applications ONLY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. All electronic circuit breaker settings have been adjusted to desired setting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Ground-fault-protection (GFP) trip and time delays are set at lowest settings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. All wiring connections verified for acceptable manufacturer recommended torque values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Phase-to-phase, phase-to-ground, and neutral-to-ground, and dielectric tests have been accomplished and results are acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. No hazards or adverse circumstances exist per continuity and high potential tests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Insulation megger test accomplished and results acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Unit energized by authorized personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. All damage to unit finish is repaired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. Testing & Finalization Initials _____ Date _____				

Check if Acceptable <i>(provide comment if unacceptable)</i>	YES	NO	N/A	Comment
1. Overcurrent protective devices have been manually exercised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Solid state circuit breaker self-diagnostics completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Electronic circuit breaker "test set to trip units" test completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Ground-fault-protection (GFP) system tested and certified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Filler plates provided for all unused spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. As-built circuit index provided and attached to interior of unit door	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	Date Resolved	Resolution
		<input type="checkbox"/>		

Construction Verification Checklist

Non-Fusible Disconnect Switch

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

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Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		

Check if Acceptable <i>(provide comment if unacceptable)</i>	YES	NO	N/A	Comment
3. All electrical connections are tight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. All cables are permanently labeled relative to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Enclosed Switches and Circuit Breakers

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

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- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
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Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Mechanical Contractor		

Check if Acceptable (<i>provide comment if unacceptable</i>)	YES	NO	N/A	Comment
2. All connections are terminated properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. All electrical connections are tight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. All cables are permanently labeled relative to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Startup		Initials _____		Date _____
1. All electronic circuit breaker settings have been adjusted to desired setting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Overcurrent protective devices have been manually exercised.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Electronic circuit breaker "test set to trip units" test completed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)	Date Resolved	Resolution
		<input type="checkbox"/>		

Page Intentionally Left Blank

Construction Verification Checklist

Motor Controller

CVC ID:	
Tag ID:	
Spec #:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
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- Check each box to verify the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
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Construction Manager / General Contractor

Date

6. Installation Checks:

Check if Acceptable <i>(provide comment if unacceptable)</i>	YES	NO	N/A	Comment
A. General				
			Initials _____	Date _____
1. Equipment installed per manufacturer's instructions and design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Verify mounting, location and clearances are per plans and specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Check enclosure for dents or other damage. No damage evident.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Inspect doors for proper fit and alignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Equipment properly grounded and bonded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Permanent label(s) affixed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Electrical connections and terminals tightened per the manufacturer's recommended torque values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Wiring installed per manufacturer's instructions and design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Enclosure free of dust, dirt or other foreign debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Motor controller selection appropriate for motor HP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Overload trip range set per manufacturer's instruction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. Overcurrent protection device(s) checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. Fuse continuity checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. Operational indication lights verified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. Spare fuses and lights provided as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. Control interlock(s) complete and verified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Communication with BAS verified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
B. Operational Checks				
			Initials _____	Date _____
1. Insulation resistance testing performed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Continuity testing performed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Motor operates as expected in all modes of operation (Hand/Off/Auto)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Acceptance testing completed per design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Specified sequences of operation and operating schedules have been provided with all variations documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Specified point-to-point checks have been completed and documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Over Current protective devices have been manually exercised.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

7. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	<input type="checkbox"/>	Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Construction Verification Checklist

Interior Lighting

Tag ID:	
Location:	
Spec #:	

1. Instructions:

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- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as "N/A" and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and "N/A" responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer's recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractor's assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification Checklist is submitted for approval.

Construction Manager / General Contractor

Date

Subcontractor	Initials	Date
Electrical Contractor		
Lighting Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent

Date

Owner's Representative

Date

Notes: _____

5. Model Verification:

Model Information as Submitted <i>(verified upon delivery if checked)</i>					
Interior Lighting Information					
Distribution Panel ID:		<input type="checkbox"/>	Panel Location:		<input type="checkbox"/>
Panel Voltage:		<input type="checkbox"/>	System (Circle)	NORMAL / EMERGENCY	<input type="checkbox"/>
Service Area(s):					
Comments:					

6. Representative Lighting Types:

Check all applicable lighting types for this CVC					
Uplighting	<input type="checkbox"/>	Compact Fluorescent	<input type="checkbox"/>	Pendant	<input type="checkbox"/>
Recessed	<input type="checkbox"/>	Downlighting	<input type="checkbox"/>	Track Lighting	<input type="checkbox"/>
Lensed Troffers	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Exit Signs	<input type="checkbox"/>				
Comments:					

7. Verification Checklists:

Check if Acceptable <i>(provide comment if unacceptable)</i>	YES	NO	N/A	Comment
A. General				
			Initials _____	Date _____
1. Lighting fixtures installed per manufacturer's instructions and design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Fixtures provided as specified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. No apparent damage to fixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Switches, and other associated accessories, mounted at the correct height and have covers / escutcheon plates installed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Fixtures properly grounded and bonded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Wiring installed per manufacturer's instructions and design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Fixtures properly supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Adjustable fixtures aimed to provide required light intensity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Occupancy sensors mounted and calibrated per manufacturer's recommendations and design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Internal batteries provided for emergency lighting & exit signs as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Spare materials provided as specified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
B. Operational Checks				
			Initials _____	Date _____
1. Specified point-to-point checks have been completed and documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Lighting switches per the design drawings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Comments:				

8. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>	Date Resolved	Resolution
		<input type="checkbox"/>		

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Construction Verification Checklist

Communications Cabling

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

The Construction Verification Checklist (CVC) serves as documentation that a piece of equipment or system is ready for functional testing with the Commissioning Agent (CxA). The CxA will review all submitted CVC forms for completeness before initiation of the functional testing process.

Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____
 Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____
 Date _____
 Owner's Representative _____
 Date

Notes: _____

5. Cabling Conduit Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2	3	4	5	6	7	8	9				
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Cabling coloring matches specification requirements for given cable type.
2. Conduits swabbed to remove foreign material prior to pulling cables.
3. All cables pulled though conduit at the same time, with pulling lubricant used to ease pulling tensions.
4. Appropriate slack provided in length required by specifications for given cabling type and termination point.

5. All conductors and cabling pulled in separate conduits from normal power, emergency power, security and control systems.
6. Cabling splice free or where splicing is required in rated splicing enclosure.
7. All bend radii conform to manufacturer recommendations for given wire type and gauge.
8. Maximum cable drop length is less than 295' for data and voice UTP cabling (Cat 5e & Cat 6).
9. Pull cord provided in each conduit.

6. Cabling Free Air Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7	8				
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Cabling coloring matches specification requirements for given cable type.
2. Cabling supported via “bridal-type” supports at spacing defined within specifications.
3. All cabling supported independently of piping, ductwork, equipment, cable tray or other conduit.
4. Appropriate slack provided in length required by specifications for given cabling type and termination point.
5. Minimum separations provided for cabling per specifications to minimize EMI.
6. Cabling splice free or where splicing is required in rated splicing enclosure.
7. All bend radii conform to manufacturer recommendations for given wire type and gauge.
8. Maximum cable drop length is less than 295' for data and voice UTP cabling (Cat 5e & Cat 6).

7. Outlet & Equipment Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6						
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Outlets installed at locations and heights specified in contract documents for given outlet type.
2. All outlets are flush to finished surface.
3. All outlets mounted at same height for given outlet type throughout facility.
4. All outlets and outlet terminations labeled in accordance with specification requirements.

5. Equipment racks installed with minimum clearances maintained on all sides and above rack.
6. Telecommunications system and equipment grounded in accordance specification requirements.

8. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6	7					
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. All exposed cabling has been visually inspected for physical damage and any damaged cabling has been replaced.
2. Cabling jacket and insulation are in good condition.
3. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
4. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.
5. All conduit junction boxes are painted and tagged in accordance with specification requirements.
6. All wiring is properly labeled with control ID number of circuit within ½” of device and terminal connection.
7. All outlets labeled with permanent printed labels that correspond to as-built drawings.

9. Testing Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below											
				1	2	3	4	5	6						
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. All copper cabling tested for continuity, pair validity and polarity, and conductor position and results are acceptable per specifications requirements.
2. Category 5e cabling tested in accordance with ANSI/TIA/EIA 568B.1, and resulting propagation delay is less than 498 ns at 10 MHz and the delay skew is less than 44 ns between 1 MHz and 100MHz.
3. Category 6 cabling tested in accordance with ANSI/TIA/EIA 568B.2, and resulting propagation delay is less than 498 ns at 10 MHz and the delay skew is less than 44 ns between 1 MHz and 250 MHz & delay skew between all pairs does not vary by more than ±10 ns.
4. Fiber cabling optical attenuation tested by insertion loss method and maximum attenuation does exceed specification requirements.
5. Fiber cabling tested using optical time domain reflectometer (OTDR) and all cables found to have no discontinuity resulting in reflection or point discontinuity greater than 0.1 dB (single mode) or 0.2 dB (multi mode).
6. Shielded cabling shield and drain wire continuity tested, submitted to the design engineer and commissioning provider and results are acceptable.

10. Negative Response:

Date	Found By:	Negative Response (<i>resolved if checked</i>)		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

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Construction Verification Checklist

Fire Alarm Wiring and Devices

CVC ID:	
Tag ID:	
Location:	

1. Instructions:

- Checklists are organized in groups by installation phase. Each phase is assigned a given responsible contractor which is solely responsible for the construction verification items defined within that group.
- Checklists are to be completed in accordance with the stage of delivery, installation or start-up by the individuals responsible for installation.
- Check each box to verify the item was installed as noted, or provide the requested information for each checklist item.
- If the information requested for a checklist item is not listed or the item does not apply to the given unit or system, list it as “N/A” and provide the reasoning under the negative responses section.
- Explain all discrepancies or negative responses in the negative responses section of the checklist. All discrepancies, negative and “N/A” responses must be defined.
- At the completion of each checklist group the party responsible for completion of the checklist group is to mark that group as complete by the provided checkbox, initial and date the checklist group in the space provided. *Note completion of the checklist group is defined as the complete response to each checklist item within the group including negative responses and the completion of all delivery, installation or start-up tasks related to the equipment for that group.*
- Provide checklist to lead contractor at completion of each work day.

2. Overview:

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Construction Verification Checklist items are to be completed as part of startup and initial checkout.

- This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report.
- This form is not used for documenting checkout and startup procedures. One of similar rigor shall be used.
- Contractors assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.

3. Contractor CVC Submittal:

The equipment indicated above and the systems integral to them are complete and ready for functional testing. The checklist items on the attached page(s) are complete and have been checked off as complete **only by parties having direct knowledge of the event**, as initialed below, respective to each responsible subcontractor. This Construction Verification checklist is submitted for approval.

 Construction Manager / General Contractor _____ Date

Subcontractor	Initials	Date
Mechanical Contractor		
Electrical Contractor		
Controls Contractor		
TAB Contractor		

4. CVC Acceptance:

This Construction Verification Checklist has been reviewed. Its completion is approved with the exceptions noted below.

 Commissioning Agent _____ Date _____ Owner's Representative _____ Date

Notes: _____

5. Conduit & Fittings Pre-installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below												
				1	2											
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>											
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>											
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>											
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>											

1. Conduit type and material in accordance with specification requirements for given application and location.
2. Conduit sufficiently sized to accommodate cabling and fill requirements of contract document.

6. Conduit & Fittings Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5	6	7	8	9				
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Conduit support spacing complies with specification requirements.
2. All conduit supported independently of piping, ductwork, equipment, cable tray or other conduit.
3. Bends in conduit minimized with required bends conforming to specification requirements and no more than an equivalent of three 90 degree bends between boxes.
4. All equipment requiring maintenance is accessible.
5. Minimum 6" clearance between conduit and piping, and 12" clearance between conduit and heat sources such as flues, steam pipes, and heating appliances is provided.
6. No continuous conduit run exceeds 100' without a junction box.
7. Expansion-deflection joints installed where conduit crosses building expansion joints.
8. Where conduit passes between areas of differing temperatures, listed conduit seals are provided.
9. At end of work day suitable conduit caps or other approved seals provided for incomplete work to protect installed conduit against entrance of dirt and moisture.

7. Junction, Pull and Outlet Boxes Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below												
				1	2	3	4	5	6	7	8					
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

1. Boxes provided in locations as per contract documents, Engineer's direction or as necessary for splicing and terminations.
2. Box type and material in accordance with specification requirements for given application and location.
3. All boxes supported independently of conduit, piping, ductwork, equipment, or cable tray.
4. No outlet boxes installed back-to-back in walls, and minimum 6" separation between all boxes, except for installations in acoustic walls where a minimum 24" separation between boxes is provided.
5. All boxes are accessible, and where installation is inaccessible, 18" by 24" access door has been provided.
6. Mounting heights for outlet boxes corresponds with contract document requirements for given device.
7. All recessed outlet boxes in finished areas are mounted to the correct depth to accommodate and be flush to final surface finish.

- Knockout closures provided for unused openings.

8. Conductor and Cabling Conduit Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9	10		
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

- Conductors and cabling coloring match specification requirements for given voltage, wire gauge, and leg of circuit.
- Conduits swabbed to remove foreign material prior to pulling cables.
- All cables pulled though conduit at the same time, with pulling lubricant used to ease pulling tensions.
- 8” wire tail provided at each device termination and 36” wire tail provided at each control panel termination.
- All conductors and cabling pulled in separate conduits from normal power, emergency power, security and control systems.
- Cables not to be terminated within 8 hours to be properly sealed and protected from moisture intrusion until termination.
- Splices made only in accessible junction boxes.
- All conductors and cables cleaned prior to termination.
- All bend radii conform to manufacturer recommendations for given wire type and gauge.
- Pull cord provided in each conduit.

9. Conductor and Cabling Free Air Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (Check to Confirm) – See Detail Below											
				1	2	3	4	5	6	7	8	9			
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

- Conductors and cabling coloring match specification requirements for given voltage, wire gauge, and leg of circuit.
- Cabling supported via “bridal-type” supports at spacing defined within specifications.
- All cabling supported independently of piping, ductwork, equipment, cable tray or other conduit.
- 2’ of service wired looped at 100% to 200% of recommended minimum bend radii at each device termination.
- 8” wire tail provided at each device termination and 36” wire tail provided at each control panel termination.
- Minimum separations provided for cabling per specifications to minimize EMI.
- Cables not to be terminated within 8 hours to be properly sealed and protected from moisture intrusion until termination.

8. All conductors and cables cleaned prior to termination.
9. All bend radii conform to manufacturer recommendations for given wire type and gauge.

10. Device Installation Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below													
				1	2	3	4										
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										

1. Devices installed at locations and heights specified in contract documents for given device type.
2. All devices are flush to finished surface.
3. All devices mounted at same height for given device type throughout facility.
4. All horn and strobe circuits wired independently.

11. Finalization Checklist:

Date	Initials	% Complete	Description of Work Performed	Questions (<i>Check to Confirm</i>) – See Detail Below													
				1	2	3	4	5	6	7	8	9					
		25	East of gridline 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		50	Between gridline 4 and 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		75	Between gridline 3 and 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
		100	Between gridline 1 and 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

1. All exposed conductors and cabling has been visually inspected for physical damage and any damaged conductors and cabling has been replaced.
2. Conductors and cabling jacket and insulation are in good condition.
3. All cable terminations have been checked for proper tightness and clearances per specification and manufacturer recommendations and any adjustments necessary have been made.
4. All penetrations through fire rated wall assemblies have been sealed per specification requirements.
5. All penetrations through non-rated wall assemblies have been sealed per specification requirements for given space type.
6. Conduits that penetrate the building envelope are sealed to prevent intrusion of air and moisture and are accessible.
7. All conduit junction boxes are painted and tagged in accordance with specification requirements.
8. All wiring is properly labeled with control ID number of circuit within ½” of device and terminal connection.
9. All devices labeled with permanent printed labels that correspond to as-built drawings.

12. Negative Response:

Date	Found By:	Negative Response <i>(resolved if checked)</i>		Date Resolved	Resolution
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		
			<input type="checkbox"/>		

Functional Test Procedure

Air Terminal Units w/ Reheat and Perimeter Heat

FT ID:	
Tag ID:	
Location:	

1. General Information:

Date:

Participants:

Name	Organization
#1	
#2	
#3	
#4	

Recorded by:

	Henneman Engineering, Inc.
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2. Objective:

This test is performed to investigate the ability of the air terminal units to maintain space temperatures.

Sampling Set

All sequences for a minimum of 20% of the total units present. However, areas specified as critical in nature are to be tested at a rate of all sequences for 100% of total unit presents.

3. Sequence of Operation

VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT AND PERIMETER RADIATION

Systems consist of:

- Variable air volume terminal
- Hot water reheat coil with 2-way temperature control valve.
- Existing hot water convector with new DDC control valve and actuator
- DDC space sensor.
- Lighting Occupancy Sensor (Sensor provided and installed by electrical contractor)

Provide all line and low voltage wiring for a complete operating system.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the hot water reheat valve and perimeter radiation valve shall modulate open in parallel to maintain space temperature..

The reverse shall occur when space temperature is below setpoint.

The heating coil valves shall be commanded closed whenever the associated AHU is off. Provide a discharge air temperature sensor for monitoring purposes.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).

Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes. When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed and the airflow at heating and cooling minimum flow.

Occupancy sensors will be provided by the Division 26 contractor. Provide wiring from all occupancy sensor contacts to building automation system for space occupied/unoccupied control. When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints as defined by the weekly schedule (grouped or individually). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained regardless of the weekly schedule. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

Where there are multiple occupancy sensors associated with a VAV zone that serves multiple spaces, all occupancy sensors must be “unoccupied” for the air terminal to move to zero airflow setpoint.

4. Test Equipment Used:

Instrument	Accuracy	Calibration Certificate Available?

5. Relevant Trend Data Points:

Space Temperature	Space Temperature Setpoint	Damper Position
HW Valve Position	Unit Discharge Temperature	Air Flow Setpoint
Air Flow		

6. Functional Test Script:

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
Mode 1: Cooling/Heating				
1.1	Over-ride unit into occupied mode.	<input type="checkbox"/> Unit is in occupied mode.	<input type="checkbox"/>	
1.2	Allow system to stabilize for 15 minutes.	<input type="checkbox"/> Record space temperature setpoint.	<input type="checkbox"/>	
		<input type="checkbox"/> Record space temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Record reheat valve position	<input type="checkbox"/>	
		<input type="checkbox"/> Record perimeter valve position	<input type="checkbox"/>	
1.3	Adjust temperature setpoint 10°F higher than the current space temperature.	<input type="checkbox"/> Space changed to heating mode.	<input type="checkbox"/>	
		<input type="checkbox"/> Record space temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Record system temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Record setpoint temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Unit dampers modulated to minimum	<input type="checkbox"/>	
		<input type="checkbox"/> Verify reheat hot water valve and perimeter hot water valve modulated open in parallel after damper reached minimum position.	<input type="checkbox"/>	
		<input type="checkbox"/> Record reheat valve position	<input type="checkbox"/>	
		<input type="checkbox"/> Record perimeter valve position	<input type="checkbox"/>	
1.4	Adjust temperature setpoint 10°F lower than the current space temperature.	<input type="checkbox"/> Space changed to cooling mode.	<input type="checkbox"/>	
		<input type="checkbox"/> Record space temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Record system temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Recorded setpoint temperature.	<input type="checkbox"/>	
		<input type="checkbox"/> Verify hot water reheat and perimeter hot water valves modulate closed in parallel and prior to the air damper modulating open.		
		<input type="checkbox"/> Record reheat valve position	<input type="checkbox"/>	
		<input type="checkbox"/> Record perimeter valve position	<input type="checkbox"/>	
		<input type="checkbox"/> Unit dampers modulated to maintain new setpoint.	<input type="checkbox"/>	
1.5	Return system to normal operation	<input type="checkbox"/> System has stabilized.	<input type="checkbox"/>	
ID	Mode 1 Notes			

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
Mode 2: Unoccupied Cooling/Heating (if applicable)				
2.1	Over-ride unit into unoccupied mode.	<input type="checkbox"/> Unit is in unoccupied mode.	<input type="checkbox"/>	
		<input type="checkbox"/> Unit flow setpoint resets to zero.	<input type="checkbox"/>	
2.2	Allow system to stabilize for 15 minutes.	<input type="checkbox"/> Recorded space temperature setpoint.	<input type="checkbox"/>	
		<input type="checkbox"/> Recorded space temperature.	<input type="checkbox"/>	

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
2.3	Adjust space temperature to read 5 degrees higher than setpoint. .	<input type="checkbox"/> Air terminal modulated to minimum flow to meet unoccupied heating setpoint.	<input type="checkbox"/>	
		Record space temperature.	<input type="checkbox"/>	
		Record system temperature.	<input type="checkbox"/>	
		Record setpoint temperature.	<input type="checkbox"/>	
		Record reheat valve position	<input type="checkbox"/>	
		Record perimeter valve position	<input type="checkbox"/>	
		Verify hot water valve modulated open damper reached minimum position.	<input type="checkbox"/>	
2.4	Adjust temperature setpoint 10°F lower than the current space temperature.	<input type="checkbox"/> Space changed to unoccupied cooling.	<input type="checkbox"/>	
		Verify the reheat valve and perimeter hot water valves modulate closed.		
		Record space temperature.	<input type="checkbox"/>	
		Record system temperature.	<input type="checkbox"/>	
		Record setpoint temperature.	<input type="checkbox"/>	
		Verify the units do no modulate to full cooling.	<input type="checkbox"/>	
2.5	Return system to normal operation	<input type="checkbox"/> System has stabilized.	<input type="checkbox"/>	
ID	Mode 2 Notes			

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
Mode 3: Occupancy Over-ride (occupancy control ONLY)				
Occupancy Sensor Control				
3.1	Over-ride unit into unoccupied mode.	<input type="checkbox"/> Unit is in unoccupied mode.	<input type="checkbox"/>	
3.2	Verify system operation.	<input type="checkbox"/> Minimum airflow setpoint is 0 cfm.	<input type="checkbox"/>	
3.3	Allow system to stabilize for 15 minutes. Enter space to trigger occupancy sensor.	<input type="checkbox"/> Unit status changed to occupied.	<input type="checkbox"/>	
		Recorded occupancy over-ride duration at BAS.	<input type="checkbox"/>	
3.4	Return system to normal operation.	<input type="checkbox"/> System has stabilized.	<input type="checkbox"/>	
ID	Mode 3 Notes			

Return to Pre-Test Conditions	
<input type="checkbox"/>	All system components are returned to pre-test state (power disconnects, HOA switch position, fan

	ON/OFF state, damper position, etc).
<input type="checkbox"/>	All controls parameters are returned to pre-test state (setpoints, schedules, overrides released, etc).
Comments:	

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Functional Test Procedure

Air Terminal Units with Hot Water Reheat

FT ID:	
Tag ID:	
Location:	

1. General Information:

Date:

Participants:

Name	Organization
#1	
#2	
#3	
#4	

Recorded by:

	Henneman Engineering, Inc.
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2. Objective:

This test is performed to investigate the ability of the air terminal units to maintain space temperatures.

Sampling Set

All sequences for a minimum of 20% of the total units present. However, areas specified as critical in nature are to be tested at a rate of all sequences for 100% of total unit presents.

3. Sequence of Operation

VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT

Systems consist of:

- Variable air volume terminal
- Hot water reheat coil with 2-way temperature control valve.
- DDC space sensor.
- Lighting Occupancy Sensor (Sensor provided and installed by electrical contractor)

Provide all line and low voltage wiring for a complete operating system.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the hot water valve shall modulate open to maintain space temperature. If the air terminal has a heating airflow, the hot water control valve and air terminal shall open in parallel.

The reverse shall occur when space temperature is below setpoint. The heating coil valve shall be commanded closed whenever the associated AHU is off. Provide a discharge air temperature sensor for monitoring purposes.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).

Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes. When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed and the airflow at heating and cooling minimum flow.

Occupancy sensors will be provided by the Division 26 contractor. Provide wiring from all occupancy sensor contacts to building automation system for space occupied/unoccupied control. When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints as defined by the weekly schedule (grouped or individually). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained regardless of the weekly schedule. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

Where there are multiple occupancy sensors associated with a VAV zone that serves multiple spaces, all occupancy sensors must be “unoccupied” for the air terminal to move to zero airflow setpoint.

4. Test Equipment Used:

Instrument	Accuracy	Calibration Certificate Available?

5. Relevant Trend Data Points:

Space Temperature	Space Temperature Setpoint	Damper Position
HW Valve Position	Re-heat Coil Status	Unit Discharge Temperature
Air Flow	Air Flow Setpoint	

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units

Return to Pre-Test Conditions	
<input type="checkbox"/>	All system components are returned to pre-test state (power disconnects, HOA switch position, fan ON/OFF state, damper position, etc).
<input type="checkbox"/>	All controls parameters are returned to pre-test state (setpoints, schedules, overrides released, etc).
Comments:	

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Functional Test Procedure

Lighting Controls

FT ID:	
Tag ID:	
Location:	

1. General Information:

Date:

Participants:

Name	Organization
#1	
#2	
#3	
#4	

Recorded by:

	Henneman Engineering, Inc.
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2. Objective:

This test is performed to investigate the ability of the low voltage lighting controls.

Sample all sequences for a minimum of 20% of total units present and at least one area representing each lighting control method used.

3. Test Equipment Used:

Instrument	Accuracy	Calibration Certificate Available?
HOBO Light On/Off Datalogger		

4. Functional Test Script:

ID	Test Procedure <i>(complete if checked)</i>		Expected Result <i>(pass if checked)</i>	Value	Units
Mode 1: Manual Control (if applicable)					
1.1	Using the final as-builts and the lighting table under the results section, systematically check the lighting circuitry by manually flipping the light switches designated for each circuit. (Additional rows provided for use)	<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	
		<input type="checkbox"/>	Fixture is energized when switched.	<input type="checkbox"/>	

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
		Fixture is energized when switched. <input type="checkbox"/>		
		Fixture is energized when switched. <input type="checkbox"/>		
		Fixture is energized when switched. <input type="checkbox"/>		
		Fixture is energized when switched. <input type="checkbox"/>		
ID	Mode 1 Notes			

ID	Test Procedure <i>(complete if checked)</i>	Expected Result <i>(pass if checked)</i>	Value	Units
Mode 3: Occupancy Control (if applicable)				
2.1	Verify occupancy sensor calls on luminaries upon entry of room.	<input type="checkbox"/> Confirmed.	<input type="checkbox"/>	
2.2	Manually operate over-ride switch to OFF position and back to ON position	Switch is operational.	<input type="checkbox"/>	
		Fixtures respond to ON position.	<input type="checkbox"/>	
2.3	Record occupancy sensor time-out setting.	Time-out setting recorded.	<input type="checkbox"/>	
		Verified fixtures de-energized after pre-determined time.	<input type="checkbox"/>	
ID	Mode 3 Notes			

Return to Pre-Test Conditions	
<input type="checkbox"/>	All system components are returned to pre-test state (power disconnects, HOA switch position, fan ON/OFF state, damper position, etc).
<input type="checkbox"/>	All controls parameters are returned to pre-test state (setpoints, schedules, overrides released, etc).
Comments:	

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 03 36 02

SPECIAL CONCRETE FLOOR FINISHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY

- A. This section includes the following.
 - 1. Filling joints, applying smoothing and resurfacing compound, applying Stain, Sealer, and Hardener, and polishing concrete to specified finish level.

1.03 RELATED WORK

- A. Section 09 68 00, Carpet, for Metal Transition Strip.

1.04 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
 - 2. ASTM G23-81, Ultraviolet Light & Water Spray
 - 3. ASTM C805, Impact Strength
- B. American Concrete Institute
 - 1. ACI 302. 1R-89, Guide for Concrete Floor and Slab Construction
- C. Other Test:
 - 1. Reflectivity

1.05 SUBMITTALS

- A. Submit in accordance with general conditions of this contract.
- B. Product data:
 - 1. Submit special concrete finishes manufacturer's specifications and test data.
 - 2. Submit special concrete finishes describing product to be provided, giving manufacturer's name and product name for the specified material proposed to be provided under this section.
 - 3. Submit special concrete finishes manufacturer's recommended installation procedures; which when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
 - 4. Submit special concrete finishes technical data sheet giving descriptive data, curing time, and application requirements.
 - 5. Submit special concrete finishes manufacturer's Material Safety Data Sheet (MSDS) and other safety requirements.
 - 6. Follow all special concrete finishes published manufacturer's installation instructions.
- C. Test Reports:

1. Provide certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Use an experienced installer and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
 2. The special concrete finish manufacturer shall certify applicator.
 3. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.
- B. Manufacturer's Certification:
 1. Provide letter of certification from concrete finish manufacturer stating that installer is certified applicator of special concrete finishes, and is familiar with proper procedures and installation requirements required by the manufacturer.
- C. Mock-ups:
 1. Apply mock-ups of each type finish, to demonstrate typical joints, surface finish, color variation and standard of workmanship.
 - a. Provide 3 (three) 10 square foot on-site mockups that provide 3 (three) varied levels of dye (lightness/darkness or density of color) in the location indicated or if not indicated, as directed by the Architect or Owner Representative.
 - b. Build mock-ups approximately 50 square feet of the selected value noted above in the location indicated or if not indicated, as directed by the Architect or Owner Representative.
 - c. Notify Architect or Owner Representative seven days in advance of dates and times when mock-ups will be constructed.
 - d. Obtain from the Architect or Owner Representative approval of mock-ups before starting construction.
 - e. If the Architect or Owner Representative determines that mock-ups do not meet requirements, demolish and remove them from the site and cast others until mock-ups are approved.
 - f. Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work.
 - g. Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.
- D. Protection:
 1. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.
 - a. All hydraulic powered equipment must be diapered to avoid staining of the concrete.
 - b. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
 - c. No pipe cutting machine will be used on the inside floor slab.
 - d. Steel will not be placed on interior slab to avoid rust staining.
 - e. Acids and acidic detergents will not come into contact with slab.
 - f. All trades informed that the slab must be protected at all times.
- E. Pre-Installation Conference:
 1. Conduct conference at project site prior to commencing installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original containers, with seal's unbroken, bearing manufacturer labels indicating brand name and directions for storage.
- B. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

1.08 PROJECT CONDITIONS

- A. Environmental limitations:
 - 1. Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
 - a. Concrete Floor Flatness rating recommended at least 40, where possible.
 - b. Concrete Floor Levelness rating recommended at least 30, where possible.
 - c. Concrete must be cured a minimum of 45 days or as directed by the manufacturer before application of hardening/sealing system can begin.
 - d. Application of hardening/sealing shall take place 10 days prior to installation of equipment and substantial completion, thus providing a complete, uninhibited concrete slab for application.
- B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.
- C. Refer to Specification Section 01 00 00, 1.5 Alternate Bid 3.

1.09 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 AND MANUFACTURERS

- B. CF-1 Polished Concrete Retroplate, Stained Hardening Sealing Agent
 - 1. Retroplate 99 Satin Finish with Lithochrome Chemstain Classic.
 - 2. Or approved equal.
 - a. Color: Ameripolish Dyes, Patriot Blue or Slate Blue
 - b. Or approved equal.

2.02 RELATED MATERIALS

- A. Neutralizing Agent:

- 1. Tri-sodium Phosphate
- B. Water:
 - 1. Potable

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS:

- A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.
- B. Fill joints with a poly-urea flexible joint filler.
- C. Install trowel-grade concrete repair mortar and high performance underlayment: polymer-modified two-component smoothing and resurfacing compound at irregular areas requiring repair or openings to be patched. Miracote MiraPatch RM1 or approved equal. Submit aggregate for Architect approval to match existing.
- D. Prior to application, verify that floor surfaces are free of construction laitance.

3.02 APPLICATION

- A. CF-1 Sealing, Hardening and Polishing of Concrete Surface
 - 1. Concrete must be in place a minimum of 45 days or as directed by the manufacturer before application can begin.
 - 2. Application is to take place at least 10 days prior to racking and other in-store accessory installation, thus providing a complete, uninhibited concrete slab for application.
 - 3. Only a certified applicator shall apply hardening/sealing system.
 - 4. Applicable procedures must be followed as recommended by the product manufacturer and required to match approved test sample.
 - 5. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.
 - 6. Polish to required sheen level as determined by A/E.

3.03 WORKMANSHIP AND CLEANING:

- A. Remove splatter from adjoining surfaces as needed.
- B. Repair damages to surface caused by cleaning operation.
- C. Remove debris from jobsite.
 - 1. Dispose of materials in separate, closed containers in accordance with local regulations.

3.04 PROTECTION:

- A. Protect finished work until fully cured in accordance with manufacturer's recommendations.

END OF SECTION 03 36 02

SECTION 04 05 19

MASONRY ANCHORAGE AND REINFORCING

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. Single Wythe Wall Reinforcing
- B. Anchors

1.03 RELATED WORK

- A. Section 01 74 19, Recycling
- B. Section 04 10 00, Mortar and Masonry Grout
- C. Section 04 20 00, Unit Masonry

1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
- B. Manufacturer's Literature
 - 1. Manufacturer's product literature for each accessory specified.

1.05 QUALITY ASSURANCE

- A. Provide Engineer approved design calculations for all anchorage and reinforcing.

PART 2 - PRODUCTS

2.01 ACCESSORIES, GENERAL

- A. Materials: Including, but not limited to the following, ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
- B. Provide hot-dipped galvanized accessories unless noted otherwise.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
- C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- D. Adjustable Anchors for Connecting to Structural Concrete or Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

- E. Post-installed Anchors: Torque-controlled expansion anchors.
- F. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.02 REINFORCING, GENERAL

- A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
- B. Provide hot-dipped galvanized reinforcing, ASTM A153, Class B2, unless noted otherwise.
- C. Furnish prefabricated corners and tees.
- D. Concrete masonry walls shall be reinforced at every other bed joint with joint reinforcement.

2.03 SINGLE WYTHE WALL REINFORCING

- A. 9 gauge, ladder type joint reinforcement.
 - 1. Hohmann & Barnard No. 220.
 - 2. Or approved equal.
- B. Wall ties/anchors for anchorage to columns.
 - 1. Hohmann & Barnard 345 VT Flexible tie, 12 gauge, 3/16" wire.
 - 2. Or approved equal.

2.04 FASTENERS

- A. Use predrilled Tapcon fastener at concrete backup, spot welded connection at steel backup.

2.05 MISCELLANEOUS

- A. Compressible Filler:
 - 1. Emseal 20H,
 - 2. Willseal,
 - 3. Or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF ACCESSORIES IN MASONRY

- A. See Section 04 20 00 for installation of accessories.

END OF SECTION 04 05 19

SECTION 04 10 00

MORTAR AND MASONRY GROUT

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. Mortar.
- B. Masonry Grout.

1.03 RELATED WORK

- A. Masonry Accessories: Section 04 05 19.
- B. Unit Masonry: Section 04 20 00.

1.04 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
 - 1. Test Reports: Submit information copies of all test reports in duplicate to the Architect/Engineer.
 - 2. Refer to Section 04 20 00 - Unit Masonry for pre-installation conference requirements.

PART 2 - PRODUCTS

2.01 MORTAR MATERIALS

- A. Portland Cement: ASTM C150, Type 1 or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Aggregate for Mortar: ASTM C144.
 - 1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- D. Water: Potable.
- E. Antifreeze Compounds: Not allowed.
- F. Masons Cement: Not allowed.
- G. Chloride mixtures: Not allowed.
- H. Air entrainment: Not allowed

- I. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Davis Colors; True Tone Mortar Colors.
 - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
 - c. Solomon Colors, Inc.; SGS Mortar Colors.
 - 2. Grout Color: Standard Gray.

2.02 GROUT MATERIALS

- A. Grout: ASTM C476, Slump 8-9 inches.
- B. Aggregate for Grout: ASTM C 404.

2.03 MEASURING AND MIXING

- A. Measure and mix in accordance with ASTM C270.
- B. Mix mortar as required for immediate use only and discard any mixed for a period exceeding 2-1/2 hours.
- C. Mortar Proportions by Volume.

Mortar Type	Parts by Volume (Port.Cem.)	Parts by Volume (Lime)	Aggregate measured in a damp, loose condition
S	1	over 1/4 to 1/2	Not less than 2-1/4 and not more than 3 time the sum of the volumes of the Cement and lime used.

- D. The specific proportions of the mortar materials shall be controlled and accurately maintained during the entire progress of the work.
- E. Thoroughly mix cementitious materials and aggregates with the amount of water to produce satisfactory workability. All mortar shall be machine mixed.
- F. Contractor's Option: Spec Mix, Inc. (licensed manufacturers only) using the same materials and proportions of material specified above.
 - 1. Licensed Manufacturers:
 - a. Wisconsin: Twin City Concrete Products [800-642-3887]
 - b. Quikrete Wisconsin [800-657-0789]
 - c. Tews Company [414-447-8400]
 - 2. Material shall be delivered to jobsite in manufacturer's prepackaged bags indicating manufacturer's name, materials and proportions of materials.
 - 3. Use manufacturer's proprietary dispensing silo.

PART 3 - EXECUTION

3.01 APPLICATION

- A. See Section 04 20 00 for application.

3.02 FIELD QUALITY CONTROL

- A. Determine the water retentivity and compressive strength of mortar in accordance with the test procedures described in ASTM C780
- B. Mix mortar for testing in the laboratory from representative samples of mortar materials and proportions to be used in the construction.
- C. Make compressive strength tests on one set of samples before starting masonry work.

END OF SECTION 04 10 00

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SECTION 04 20 00

UNIT MASONRY

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. Concrete Masonry Units.
- B. Salvaged Reinstalled Glazed Block.

1.03 RELATED WORK

- A. Recycling: Section 01 74 19.
- B. Masonry Anchoring and Reinforcing: Section 04 05 19.
- C. Mortar and Masonry Grout: Section 04 10 00.
- D. Joints Sealants: Section 07 92 00.

1.04 QUALITY ASSURANCE

- A. Masonry Units: From one manufacturer for each kind of unit required.
- B. Prior to commencement of work conduct a pre-installation conference with the Architect/Engineer and Owner Project Representative in accord with the General Conditions of the Contract. Obtain Architect/Engineer acceptance of work before continuing work.
- C. Production and construction of concrete masonry shall be in accordance with the building code requirements for concrete masonry structure, ACI (American Concrete Institute) 530.1, latest edition, and the NCMA technical guide.
- D. Inspected Workmanship stress values were used in design. Appropriate inspection shall be required.

1.05 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
 - 1. Sealant Materials: See Division 07 Section "Joint Sealants."

1.06 PROJECT CONDITIONS

- A. During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
- B. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- C. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

- D. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with such masonry. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
- E. Protect sills, ledges and projections from droppings of mortar.

1.02 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 GENERAL

- A. Fire Performance Characteristics: Where fire-resistance ratings are indicated for unit masonry work, provide materials and construction which are identical to those of assemblies whose fire endurance has been determined by testing in compliance with ASTM E 119 by a recognized testing and inspecting organization or by another means, as acceptable to authority having jurisdiction.

2.02 CONCRETE MASONRY UNITS (CMU)

- A. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" (15-5/8" x 7-5/8" actual), unless otherwise indicated.
- B. Special Shapes: Provide where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
- C. Standard: ASTM C90, Type II, normal weight.
- D. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
- E. Admixtures: As approved by A/E. Calcium chloride or admixtures containing calcium chloride shall not be permitted.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Build walls, partitions to full thickness shown, except single wythe walls to actual thickness, using units of nominal sizes shown or specified.
- B. Provide flush joints on all masonry concealed or which will receive an applied finish.
- C. Fill all collar joints solid with mortar.

- D. Lay all units true to dimensions, plumb and square, and bond and proper anchored with vertical joints aligned plumb and true.
- E. No sight exposed broken, chipped or cracked units allowed. Chips and cracks allowed under ASTM C90 will be allowed at areas not sight exposed.
- F. Build-in grounds, nailing boards, anchors, lintels, flashing, accessories and similar items as required.
- G. Patch masonry work as required for all trades.
- H. Bond or tie with steel ties all intersections of walls, columns and partitions, Incorporate control joint filler and column wrap where detailed.
- I. Take care to wipe masonry work with rough cloth or brush as work progresses to prevent unsightly and unnecessary mortar stains. Do not wait until mortar reaches final set before cleaning.
- J. In laying masonry avoid over-plumbing and pounding of the corners and jambs to fit stretcher units after being set in position. Where an adjustment must be made after the mortar has started to set, remove mortar and replace with fresh mortar.
- K. Cut masonry units with power equipment designed for the purpose.
- L. As necessary, set one course on floor slab as an outline to define various room areas as an aid for roughing-in of pipes, conduits and similar items.
- M. Build all conduits, switch boxes, receptacle boxes, access panels, similar items within partitions and masonry where required.
- N. Set all bucks, blocking, and anchors as required.
- O. No cells or unfinished ends exposed.
- P. Do not allow scaffolding or other objects to bump or rub against masonry.
- Q. Provide minimum of 8 inches solid masonry at all door jambs and at each end of masonry wall panels and at openings.
- R. Bond all intersecting masonry walls together. Where interior exposed masonry walls intersect exterior walls at right angles, install control joint filler and leave joint free of mortar for sealing.
- S. Keep concrete masonry units dry at all times prior to delivery to job site, well off the ground and well covered at the job site and keep exposed walls dry by covering entire walls at the end of each day or shut down period with waterproof material.
- T. Rake out mortar joints where required for application of sealant.
- U. Place horizontal joint reinforcement continuous every 16 inches vertically, except that such reinforcement shall not be continued through control joints. Lap ends and corners a minimum of 6 inches.
 - 1. Use prefabricated "L" and "T" units at corners and intersecting walls.
- V. Construct continuous control joints in the manner and at locations indicated on Project Drawings. Keep control joints in true vertical line and delay sealing as long as work permits in order to allow for maximum action to take place at these joints. Insert rubber control joint material where detailed.

- W. Fill all joints between masonry and structure above solid with mortar except where compressible filler is detailed. Delay grouting or sealing until dead load deflection of structure above has taken place.
- X. When resuming work after stopping, clean exposed surfaces of set masonry, wet lightly (if specified to be wetted) and remove all loose units and mortar before commencing with new work.
- Y. Completely fill jambs and head of hollow metal door frames in masonry walls with grout as specified in 04 10 00.
- Z. Install all angles, lintels, and miscellaneous steel support pieces as shown on drawings.
 - 1. Mason to provide all stainless steel bolts and anchors.

3.01 LAYING CONCRETE MASONRY

- A. Lay in running bond except where otherwise shown.
- B. Double tool all exposed joints of regular concrete masonry units to a slightly concave, densely compacted joint. Cut off concealed joints flush.
- C. Do not lay wet units.
- D. Lay with full mortar coverage on horizontal and vertical face shells as well as web beds.
- E. Where built-in items are to be embedded in cores of units, place a layer of metal lath in joint below and rod mortar or grout into core.

3.02 REINFORCING

- A. Reinforce structural masonry walls as detailed.
- B. Position reinforcing in manner that will prevent movement during placement of grout.
- C. Place grout, as specified in Section 04 10 00, having compressive strength of 3,000 psi, completely filling all voids in inner wythes around reinforcing.
- D. Provide length of reinforcing for lintels to include bearing.
- E. Where grouting of cells occurs, align vertical cells to provide a continuous, unobstructed opening.

3.03 SEALANT

- A. Install sealant joints in control joints at locations indicated:
 - 1. Sealant color at vertical masonry joints to match color of adjacent masonry.
 - 2. Sealant color at horizontal mortar joints to match color of mortar.

3.04 PROTECTION

- A. At the completion of work each day or each shut-down period, cover the top of all unfinished masonry work exposed to the weather with waterproof canvas tarpaulins, securely weighted down in place. Keep these covers in place at all times over unfinished work except while work is in progress.

3.05 CLEANING

- A. Upon completion of the work, fill all holes in exposed mortar joints with fresh mortar and suitably tool.
- B. Protect adjoining work not being cleaned such as glass, wood, finished floors, slabs and similar items during cleaning operations.
- C. After cleaning with water and brush, thoroughly rinse all surfaces by washing off all dirt and mortar particles using clean, low pressure water.
- D. Leave all exposed masonry clean free from mortar and with tight mortar joints.

END OF SECTION 04 20 00

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SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Powder coated chair rail/display rail/ map rail and trim.
- B. Powder coated 1 1/2" dia. steel and bracing/fasteners in Land Records Open Office 147.
- C. Powder coated closure at existing exterior window at Planning Office 138.
- D. Powder coated steel enclosure for roller ball latch body, County Clerk Opening 101.
- E. Metal accessories.

1.03 RELATED WORK

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

1.04 SUBMITTALS:

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

1.05 QUALITY ASSURANCE:

- A. Take field measurements prior to shop drawing preparation and fabrication.
- B. Comply with the provisions of the following except as otherwise indicated;
 - 1. AWS D1.1 Welding
- C. Qualify welding process and welding operators in accordance with the AWS "Standard Qualification Procedure". Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous twelve months. If recertification of welders is required, retesting will be the Contractor's responsibility.

- D. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.06 DELIVERY AND STORAGE:

- A. Package, handle, and store at the jobsite in a manner that will avoid damage or deformation. Damaged material will be rejected.

1.07 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MATERIALS FOR FABRICATIONS:

- A. Flat rolled steel bar stock 1/8th inch thick, 2 inches wide.
- B. Flat rolled steel bar stock 1/8th inch thick, 4 inches wide.
- C. 3 inch schedule 40 steel pipe and steel plate as shown on drawings and as required for stability of partial height walls.
- D. 1 ½" dia. pipe as shown on drawing 12A8.1 and all mounting brackets and accessories.
- E. ¼" Plate steel.
- F. 1/4 inch diameter x 1 ½ inch threaded steel studs.
 - 1. ASTM A283 Specification for Low and Intermediate Tensile Strength. Carbon Steel Plates; Shapes and Bars.
- G. Steel tube as required for overhead support of all-glass walls.
- H. Miscellaneous metals.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Electrodes for Welding: E70XX, comply with AWS code.

2.01 FABRICATIONS

- A. Flat rolled steel bar stock 1/8th inch thick, 2 inches wide.
- B. Flat stock to have headless ¼ inch threaded studs welded 16 inches on center and 2 inches from each end, centered on the width of the flat stock, one side only.
- C. Weld permanent connections wherever possible; use continuous welds where exposed and grind smooth; straighten members after welding.

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

2.02 ACCESSORIES

- A. Epoxy bolt anchorage: HILTI (HY-10 or equal)
- B. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A 47 or cast steel ASTM A 27. Provide bolts, washers and shims as require, hot-dipped galvanized, ASTM A 153.
- C. Non-shrink Grout: Master Builders "Masterflow 928" or L&M Construction Chemicals "Crystex".
- D. Provide zinc-coated fasteners for exterior use where built into exterior walls or where shown on drawings. Select fasteners for the type, grade and class required.
- E. Provide hot-dipped galvanized coating for fasteners less than 1/2" diameter that are in contact with pressure-treated wood.
- F. Bolts and Nuts: Regular hex head type, ASTM A 307, Grade A or Type 304 stainless steel, ASTM A 320. High Strength bolts and nuts, ASTM A 325.
- G. Lag Bolts: Square head type, FS FF-B-561.
- H. Machine Screws: Cadmium plated steel, FS FF-S-92, Security Screws.
- I. Wood Screws: Flat head carbon steel, FS FF-S-111.
- J. Plain Washers: Round, carbon steel, FS FF-W-92.
- K. Concrete Anchorage Devices: Wedge-type expansion bolts, FS FF-S-325, Group II, Type 4, Class 1, zinc coated or stainless steel as shown on the drawings and installed in accordance with manufacturer's recommendations.
 1. Kwik-bolt", Hilti Corporation
 2. "Wej-it", Wej-it Corporation.
- L. Masonry: Sleeve anchors zinc coated or stainless as shown on the drawings.
 1. Rawl Lok/Bolt.
 2. HILTI - Sleeve anchor.

- M. Toggle Bolts: Spring-wing type, FS FF-B-558, Type I, Class I and Style 1 zinc coated or stainless steel as shown on the drawings.
- N. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
- O. TRX Xmount: Anchor point for TRX Suspension trainer, TRXXMOUNT2 or approved equal. Anchors by contractor based on substrate.

2.03 FINISHES

- A. Powder-coat where noted.
 - 1. Provide polyester, powder-coat finish of completed fabrication.
 - 2. Manufacturer: Tiger Drylac or equal.
 - 3. Colors: Selected by Architect from manufacturer's standard, RAL colors.
 - a. Color 1: Inside Room Women 125 and Land Records Open Office 147.
 - b. Color 2: Throughout the remainder of the project
 - 4. Texture/sheen: Smooth texture, sheen to be determined from manufacturer's full range.

PART 2 - EXECUTION

3.01 INSTALLATION

- A. Anchor powder coated flat stock to wall by drilling holes for ¼ inch studs and anchoring with epoxy. Infill existing walls where damaged by demolition to allow for anchoring with epoxy.
- B. Work to be installed per plans and shop drawings.
- C. Immediately following installation, touch up any minor flaws, scratches, or defects with matching texture and paint. Replace any materials damaged beyond an acceptable touch-up.

END OF SECTION 05 50 00

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.
- D. Roller Window Shades, Section 12 24 13.

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 AWWA 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, painted and FAS.

19
20 1.03 RELATED WORK

- 21
22 A. Related Sections: The following sections contain requirements that relate to this section:
23
24 B. Metal Fabrications: Section 05 50 00.
25
26 C. Rough Carpentry: Section 06 10 00.
27
28 D. Door Hardware: Section 08 71 00.
29
30 E. Painting: Section 09 90 00.

31
32 1.04 SUBMITTALS

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

40
41 1.05 Product Data: For each type of component required. Include but not limited to the following:

- 42 1. Manufacturer's data on hardware, accessories, and finishes.
43

44 1.06 QUALITY ASSURANCE

- 45
46 A. Quality Standards: Architectural Woodwork Quality Standards, Guide Specification and Quality
47 Control Program as set forth by the Architectural Woodwork Institute (AWI).
48
49 B. Architectural Woodwork Manufacturer: Experienced in this type of work; successfully completed
50 comparable work.
51
52 C. Deviations from quality, grade, species, and finish specified under AWI Interior Woodwork for
53 Transparent Finish and Interior Woodwork for Paint Finish will be allowed for individual items or
54 components only if specified under separate headings covering such items.
55

1 1.07 DELIVERY, STORAGE AND HANDLING

- 2
- 3 A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage,
- 4 soiling and deterioration.
- 5
- 6 B. Do not deliver finish carpentry materials until painting, wet work, grinding and similar operations
- 7 which could damage, soil or deteriorate woodwork have been completed.
- 8
- 9 C. If finish carpentry materials must be stored in other than installation areas, store only in areas
- 10 meeting requirements specified for installation areas.
- 11 1. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for
- 12 finish carpentry installation areas. Do not install finish carpentry until required temperature
- 13 and relative humidity have been stabilized and will be maintained in installation areas.
- 14 2. Maintain temperature and humidity in installation area as required to maintain moisture
- 15 content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture
- 16 content, from date of installation through remainder of construction period. The fabricator of
- 17 woodwork shall determine optimum moisture content and required temperature and humidity
- 18 conditions.
- 19

20 PART 2 - PRODUCTS

21

22 2.01 MATERIALS, GENERAL

23

- 24 A. Lumber standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber
- 25 and with applicable grading rules of inspection agencies certified by American Lumber Standards
- 26 Committee Board of Review.
- 27
- 28 B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the
- 29 following:
- 30 1. NELMA – Northeastern Lumber Manufacturers Association.
- 31 2. NHLA – National Hardwood Lumber Association.
- 32 3. NLGA – National Lumber Grades Authority.
- 33 4. SPIB - Southern Pine Inspection Bureau.
- 34 5. WCLIB – West Coast Lumber Inspection Bureau.
- 35 6. WWPA – Western Wood Products Association.
- 36
- 37 C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection
- 38 agency evidencing compliance with grading rule requirements and identifying grading agency,
- 39 grade, species, moisture content at time of surfacing, and mill.
- 40
- 41 D. For exposed lumber, furnish pieces with grade stamps applied to ends of back of each piece, or omit
- 42 grade stamps entirely and provide certificates of grade compliance issued by inspection agency.
- 43
- 44 E. INTERIOR
- 45
- 46 F. Interior: AWI 300 Custom Grade.
- 47 1. Species: Book matched, Red Oak, quarter sawn.
- 48 2. Grade: NHLA – FAS.
- 49 3. Texture: S2S2E, (smooth).
- 50
- 51 G. Interior: AWI 300 Custom Grade.
- 52 1. Species: Poplar.
- 53 2. Grade: Paint grade.
- 54 3. Texture: S2S2E, (smooth).
- 55

- 1 H. Interior Plywood and Veneer: AWI 200.
2 1. One side exposed: INT-APA-AC.
3 2. Two sides exposed: INT-APA-AA.
4 3. HPVA HP-1, Premium Grade, Species as is noted on drawings.
5
6 I. Interior Plywood and Veneer: MDF:
7 1. Formadehyde Free.
8 2. Smooth 2 sides.
9 3. Colors and finishes: varied
10
11 2.011 SCHEDULE OF MATERIALS
12
13 A. WD-13: Wood Veneer:
14 1. Stained Quarter sawn Red Oak to match doors.
15
16 B. WB-1: Painted Wood Base.
17 1. Poplar (paint grade)
18 2. Painted to match adjacent wall.
19
20 2.012 ACCESSORIES
21
22 A. Provide nails, screws and other anchoring devices of the proper type, size, material and finish for
23 application to provide secure attachment, concealed where possible, and complying with applicable
24 Federal Specifications.
25 1. Nails, Wire, Brads and Staples: FS FF-N-105.
26 2. Power-Driven Fasteners: CABO NER-272.
27 3. Cedar and Ipe to be fastened with 304 (18-8) or better stainless steel fasteners only.
28
29 B. Where interior finish carpentry materials are exposed in areas of high humidity, provide fasteners
30 and anchorages with hot-dip galvanized coating complying with ASTM A 153 or No. 304 stainless
31 steel.
32
33 C. Glue: Aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry
34 use. Exterior rated for exterior use.
35 D. Rolling Library Ladder
36 1. Custom Service Hardware, Cedarburg, Wisconsin or approved equal. Quite Glide with
37 contemporary wheel, black finish. Provide all roller guides, supports, stops and all
38 components for a complete installation. Custom Ladder, Red Oak.
39 E. Steel Brackets
40 1. For upper shelving and work surfaces: ¼” powder coated steel bracket, 2”Wx14”Dx14”H
41 Hamilton Bracket, Architectural Depot or equal. Confirm loading capacity and spacing prior
42 with architect.
43 a. Color: To be selected by Architect from full line of powder coat finishes.
44
45 F. Coat Hook: Bobrick, SS Clothes Hook B-6727
46
47 G. Sealants: Comply with requirements of Division 7 Section “Joint Sealants” for materials required for
48 sealing work.
49
50 2.013 FABRICATION
51
52 A. Wood Moisture Content: Comply with requirements of specified inspection agencies and
53 manufacturer’s recommendations for moisture content of finish carpentry on relative humidity
54 conditions existing during time of fabrication and in installation areas.
55

- 1 B. Field Dimensions
2 1. Millwork Manufacturer: Responsible for details, dimensions not controlled by job
3 conditions; show on shop drawing all field measurements beyond his control. Contractor,
4 Woodwork Manufacturer: Cooperate to establish, maintain these field dimensions.
5
6 C. Leave all surfaces clean and true and all exposed wood surfaces sanded parallel with grain, free of
7 discernible marks and ready for work under Division 9 Section "Painting".
8
9 D. Cutouts: Make those required for mechanical and electrical items.
10
11 E. Back out or kerf backs of the following members, except members with ends exposed in finished
12 work:
13 1. Standing and running trim wider than 5 inches.
14
15 F. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius.
16
17 G. Ease edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.
18
19 H. Fabricate handrails to match existing handrail sizes and profiles and as indicated on Drawings.
20

21 EXECUTION

22 3.01 EXAMINATION

- 23 A. Examine substrates, with Installer present, for compliance with requirements for installation
24 tolerances and other conditions affecting installation and performance of finish carpentry. Do not
25 proceed with installation until unsatisfactory conditions have been corrected.
26
27
28

29 3.02 PREPARATION

- 30 A. Condition wood materials to average prevailing humidity conditions in installation areas prior to
31 installing.
32
33 B. Examine substrate before installation. Verify that substrate is sound and plumb/level. Proceed with
34 installation only after unsatisfactory conditions have been corrected.
35
36 C. Wood frame walls shall be dry, clean, sound, well-nailed, free of voids, and without offsets at joints.
37 Ensure that nail heads are driven flush with surfaces. Leave no hammer or automated fastener dents
38 or scuffs.
39
40 D. Coordinate woodwork installation with wall flashings and other built-in components.
41
42 E. Prime and backprime exterior wood, including cut ends, for painted, stained and oil finish exposed
43 on the exterior. Comply with requirements for surface preparation and application in Division 9
44 Section "Painting".
45
46

47 3.03 INSTALLATION

- 48 A. Do not use finish carpentry materials that are unsound, warped, improperly treated or finished,
49 inadequately seasoned, or too small to fabricate with proper jointing arrangements.
50 1. Do not use manufactured units with defective surfaces, sizes or patterns.
51
52 B. Install finish carpentry plumb, level, true and aligned with adjacent materials. Use concealed shims
53 where required for alignment.
54
55

- 1 C. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by
2 manufacturer.
3 1. Countersink nails; fill surface flush and sand where face nailing is unavoidable.
4
5 D. Install to tolerance of 1/8 inch in 96 inches for plumb and level. Install adjoining finish carpentry
6 with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal
7 installation.
8
9 E. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim
10 and rails.
11 1. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim
12 and rails.
13
14 F. Finish according to specified requirements.
15 1. Refer to Division 9 Sections for final finishing of finish carpentry.
16

17 3.04 STANDING AND RUNNING TRIM INSTALLATION
18

- 19 A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of
20 lumber available. Do not use pieces less than 24 inches long, except where necessary.
21 1. Stagger joints in adjacent and related standing and running trim.
22 B. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact
23 throughout length of joint.
24 C. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across
25 joints, if required.
26
27 D. Match color and grain pattern across joints.
28
29 E. Drill pilot holes in wood before fastening as required to prevent splitting.
30 1. Fasten to prevent movement or warping.
31 F. Countersink fastener heads on exposed carpentry work and fill holes.
32 G. Stagger nails along the length of long pieces of trim.
33

34 3.05 ADJUSTING
35

- 36 A. Repair damaged or defective work as directed.
37
38 B. Adjust and lubricate hardware for proper operation.
39

40 3.06 CLEANING
41

- 42 A. Clean exposed surfaces.
43
44 B. Clean shop-finished woodwork, touch-up finish as required and remove and refinish damaged or
45 soiled areas of finish.
46
47 C. Protect finish carpentry and maintain conditions necessary to ensure that work will be without
48 damage or deterioration at time of acceptance.
49

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. Countertops.
- C. Work Surfaces (with braces beneath).
- D. 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. Bullet Resistant Composite (Fiberglass): Section 06 82 56.
- E. 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. O'Keefe Incorporated, (715) 425-8981.
 - 10. Stück Wood Works Inc., (414) 351-5595.
 - 11. T. J. Hale Company, (262) 255-5555.
 - 12. Techline, (608) 238-6868.
 - 13. Wood Design Inc., (920) 563-4833.
 - 14. Woodmill Products, Inc., (262) 754-4641.
 - 15. 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.
- 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 COUNTERTOPS

- A. Plastic Laminate: 1-1/2 inches thick 45-47 pound density particle board, NEMA GP50 finish top and edges, and NEMA CL20 backer sheet.
 - 1. Square front edge, back and side splashes. Provide cutouts for built-in fixtures.

2.010 HARDWARE

- A. Pulls:
 - 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. Waste Bin Deflector: Stainless steel sheet metal, type 304, 16 gauge, #4 finish, hemmed edges.
- H. Paper Feed Grommet: Plastic, color to be from manufacturer's full range, inside opening of 1 9/16 inches by 1 3/4 inches by 1 inch deep, 3/8 inch flange at the exterior. To be used at the recycle/waste paper bins.

1. Doug Mockett and Co.; "CP2" or equivalent.
 - I. Keyboard Platform: Doug Mockett & Co., "KP1", adjustable type with non-skid pads and gel wrist pad.
Mouse Support: Doug Mockett & Co., "KPA1".
 - J. Clothes Hook: Bobrick B-6727, stainless steel.
 - K. Thin Client CPU holder
 1. Ergomart Thin Client CPU Holder, finish to be selected from manufacturer's full range.
 - L. Wastebasket/Recycle Bin:
 1. Corridor 1001: Rubbermaid Commercial Untouchable Waste Container or approved equal, size to fit in cabinet. Square, Plastic, 35 gal, gray, Rubbermaid 3958: 19 1/2" x 19 1/2" x 27 5/8".
 2. Rubbermaid 2957 bin or equal, size to fit in drawer and cabinet: 15 1/4"x11"x19 7/8".
- 2.011 WORKMANSHIP
- A. Cabinet parts shall be accurately machined utilizing hardwood dowels for premium quality grade joinery construction. Glue and mechanically fasten all joints for maximum rigidity.
 - B. All cases shall be square, plumb, true and self-supporting.
 - C. Provide removable back panels and closure panels for plumbing access where shown on Project Drawings.

PART 3 - EXECUTION

3.01 DELIVERY

- A. Store and install in a ventilated building not exposed to extreme temperature and/or humidity.

3.02 INSTALLATION

- A. Installation shall be by the manufacturer's authorized representatives using factory trained personnel experienced in the installation of this type of equipment.
- B. Uncrate, set up, place, level, scribe and anchor all cabinets according to manufacturer's recommendations.
- C. Remove and replace tops, backs, panels, shelves and other items necessary to allow other Sections to complete their work of connecting services.
- D. Do all cutting, boring, patching required for the installation of work of other Sections.
- E. Provide all necessary fillers, panels, end panels, scribes required to make complete installation as detailed.
- F. Where casework meets wall surfaces, set with uniform space not to exceed 1/8-inch. Seal all joints with silicone sealant to a slightly concave joint, using backer rod where required. Apply sealant in accord with Section 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 cabinet CB/CC Copy Room	Match exist, vertical surfaces D91-60 Slate Grey, V.I.F.
PLam horizontal surface CC Work	Match exist, 4795-60 Windswept Pewter, V.I.F.
PLam upper cabinets CC and CB	To be selected from manufacturer's full line
PLam break room cabinets, vertical	To be selected from manufacturer's full line
PLam break room horizontal surface	To be selected from manufacturer's full line
PLam ROD & Planning vertical	To be selected from manufacturer's full line (match Iron Ore)
PLam ROD & Planning horizontal surface	To be selected from manufacturer's full line
PLam corridor waste/recycle	To be selected from manufacturer's full line (match Iron Ore)
PLam Treasurer vertical	To be selected from manufacturer's full line
PLam Treasurer horizontal surface	To be selected from manufacturer's full line

Maximum 7 PLam colors.

END OF SECTION 06 41 16

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

- A. Solid surface countertops and caps
- B. Resin Panel

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. Bullet Resistant Composite (Fiberglass): Section 06 82 56.
- D. 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. Resin Panel
 - 1. RP-1: Luminous
 - a. Manufacture Lumicore, or approved equal 3 Form, Inc. or other approved equal.
 - b. 1/4 inch thick transparent, smooth 2 face sides.
 - c. To be chosen from manufacturer's full range.
 - d. Size as indicated on drawings.
 - e. Corners are to be mitered and glued together.
- B. Solid Surface
 - 1. Solid Surface
 - a. Formica, Solid Surfacing
 - b. Or approved equal by: Dupont, Corian; Wilsonart, Solid Surfacing.

- C. Material Selections: refer to 3.04 Finish Schedule for quantity of colors/materials, manufacturer's may differ.
 - D. 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.
 - E. Color Match Differences: Minimal.
 - F. 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

RP-1	To be selected from manufacturer's full line – CC Gate.
SS-1, ROD	To be selected from manufacturer's full line
SS-2	County Clerk – Corian Antracite, V.I.F. to match existing
SS-3, ROD	To be selected from manufacturer's full line
SS-4, CB Workroom	To be selected from manufacturer's full line
SS-5 Planning Counter	To be selected from manufacturer's full line
SS-6 Planning Permit Process	To be selected from manufacturer's full line
SS-7 Planning cap partial height	To be selected from manufacturer's full line
SS-8 Planning SS over files	To be selected from manufacturer's full line
SS-9 Treasurer	To be selected from manufacturer's full line
SS-10 Treasurer	To be selected from manufacturer's full line

Maximum of 6 different SS colors

END OF SECTION 06 61 18

SECTION 06 82 56

BULLET RESISTANT COMPOSITE (FIBERGLASS)

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. Kevlar (Bullet Resistant Composite, Fiberglass) and all components for a complete installation.

1.03 RELATED WORK

- A. Rough Carpentry, Section 06 10 00.
- B. Gypsum Board, Section 09 29 00.

1.04 QUALITY ASSURANCE

- A. Manufacturer shall be a Company that specializes in manufacturing products of the specified type with a minimum of three years experience. Installer shall be a Company that specializes in product type.

1.05 SUBMITTALS

- A. Submit for approval prior to fabrication: samples, test reports, shop drawings (dimensioned profiles including anchorage and finishes), product specifications, test reports (current UL Listing Verification & UL 752 Test Results as provided by Underwriters Laboratories), and printed data in sufficient detail to indicate compliance with the contract documents. Manufacturer's Instructions for installation of TSS Bullet Resistant Fiberglass Panels. All required submittals shall be approved prior to installation.
- B. Prior to installing the bullet resistant material, the contractor shall submit requirements for supports and approve shop drawings.

1.06 REFERENCE

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment & ASTM E119-98-Standard Test Methods for Fire Tests of Building Construction and Materials, NIJ Standard 0108.01- (National Institute of Justice) Standard for Ballistic Resistant Protective Materials, MIL-P-46593A- Numerical simulation of ballistic impact on composite laminates, MIL-STD-622F- V50 Ballistic Test for Armor.

1.07 WARRANTY

- A. All materials shall be warranted against defects for a period of 1 year for the date of receipt at the project site. All workmanship, shall be installed by a certified installer, shall be guaranteed against defects for a period of 1 year from the date of installation. Certificates of warranty shall be provided at project completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of the materials to the project with the manufacturer's Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations set by manufacturer. Do not install products that are under conditions outside these limits.

PART 2 – PRODUCTS

1.01 MANUFACTURERS

- A. To establish the standard of quality, design, and function desired, drawings and specifications are based on product manufactured by: Total Security Solutions, Inc, 170 National Park Drive, Fowlerville, MI 48836, 866-930-7807. Jim Richards.
1. Or approved equal.

1.02 GENERAL SYSTEM SPECIFICATIONS

A. DESIGN

1. Through the design, manufacturing techniques and material application the Bullet Resistant Fiberglass shall be of the "non-ricochet" type. This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

B. BULLET RESISTANT COMPOSITE (FIBERGLASS) MATERIAL

1. Composite Panel Product: TSS Total Armor Ballistic Resistant Fiberglass Panel, shall be TA-3, UL 752/Level 3 (UL Listed), 1/2" nominal thickness, 4.0 LBS/SQ.FT, NIJ 0108.01/Level IIIA. The panels shall be made of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. Fabrication: the technique and materials used shall provide the controlled internal delamination to permit the encapture of the penetrating projectile with Carbide grit edge saw blades. Exposed fasteners shall be non-corrosive.

C. CONTRACT DOCUMENTS

1. Prior to installing the bullet resistant material, the contractor shall verify that all supports have been installed as required and approved by shop drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installing the bullet resistant material, the contractor shall verify that all supports have been installed as required and approved by shop drawings.

3.02 INSTALLATION

- A. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings. Prepare all surfaces per recommendations of manufacturer. Install in accordance with manufacturer's instructions and UL 752. Set all equipment plumb.

- B. Bullet Resistant Fiberglass panels installation using industrial adhesive, mastic, screws and bolts. Method of application shall maintain bullet resistive rating at junctures with adjacent surfaces and other penetrations. Installation tolerance shall not exceed 1/16th of an inch (1.6mm) for squareness, alignment, twist and plumb. Install hardware as specified. Field measurement and installation shall be performed by a factory-trained technician.
- C. All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer shall be 4" (2" on each panel) or a 2" overlap minimum. No rigid high-density material shall be used adjacent to the panel's inner surface, allow 1/4" gap.

3.03 FIELD QUALITY CONTROL

- A. Site test/Inspection
 - 1. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements. Clean product and accessories, removing excess sealant, labels and protective covers.
 - 2. Touch-up, repair or replace damaged products before Substantial Completion.
 - 3. Product Warranty: Applicable warranty shall be issued to owner upon final release of completed project.

END OF SECTION 06 82 56

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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 FSWS 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 04 20 00, Unit Masonry.
- B. Section 06 61 18, Solid Surface.
- C. 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 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.
- B. Re-glazing and reinstallation of Existing Wood Doors.

1.03 RELATED WORK

- A. Finish Carpentry: Section 06 20 00.
- B. Hollow Metal Doors and Frames: Section 08 11 13.
- C. Door Hardware: Section 08 71 00.
- D. Glass and Glazing: Section 08 80 00.
- E. 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: Particleboard or agri-fiber with minimum 40% post-industrial, recycled content as certified by an independent, third party certification agency.
 - 2. Veneer:
 - a. Book matched, Red Oak, quarter sawn.
 - 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 41 26

ALL-GLASS ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. All-glass storefronts.
- B. Related Sections:
 - 1. Division 5 Section "Metal Fabrications" for overhead-steel support for all-glass systems.
 - 2. Division 8 Section "Glazing" for general glass requirements.

1.03 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: All-glass systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Structural Performance: All-glass systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Deflection Limits: Deflection normal to glazing plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller.
- C. Delegated Design: Design all-glass systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.
- C. Shop Drawings: Show fabrication and installation details, including the following:
 - 1. Plans, elevations, and sections.
 - 2. Details of fittings and glazing, including isometric drawings of rail fittings.
 - 3. Anchoring.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

- 1 1. Metal Finishes: 6-inch- long sections of rail fittings.
2
3 E. Qualification Data: For qualified Installer.
4
5 F. Maintenance Data: For all-glass systems to include in maintenance manuals.
6
7 G. Warranty: Sample of special warranty.
8
9 1.06 QUALITY ASSURANCE
10
11 A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved
12 for installation of units required for this Project.
13
14 B. Engineering Responsibility: Prepare data for all-glass systems, including Shop Drawings, based
15 on testing and engineering analysis of manufacturer's standard units in systems similar to those
16 indicated for this Project.
17
18 C. Source Limitations: Obtain all-glass systems from single source from single manufacturer.
19
20 1.07 PROJECT CONDITIONS
21
22 A. Field Measurements: Verify actual locations of walls and other construction contiguous with
23 all-glass systems by field measurements before fabrication and indicate measurements on Shop
24 Drawings.
25
26 1.08 WARRANTY
27
28 A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or
29 replace components of all-glass systems that do not comply with requirements or that fail in
30 materials or workmanship within specified warranty period.
31 1. Failures include, but are not limited to, the following:
32 a. Structural failures including excessive deflection.
33 b. Deterioration of metals, metal finishes, and other materials beyond normal
34 weathering.
35 c. Failure of operating components.
36 2. Warranty Period: Two years from date of Substantial Completion.
37
38 PART 2 - PRODUCTS
39
40 2.01 MANUFACTURERS
41
42 A. Basis-of-Design Product: Subject to compliance with requirements, provide Avanti Systems
43 USA full height single glazed partition system or comparable product by one of the following:
44 1. Infinium butt-glazed Quantum.
45 2. ACI Distribution; a division of Vitro America, Inc.
46 3. Alpha Door & Rail, Inc.
47 4. Arch Aluminum & Glass Co., Inc.
48 5. Oldcastle Glass, Inc.
49 6. Virginia Glass Products Corporation; a subsidiary of Virginia Mirror Company.
50 7. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
51 8. Or submit approved equal components and design for a complete installation with
52 Blumcraft or C.R. Lawrence all glass entrance system narrow header and accessories.
53
54 2.02 MATERIALS: ALL GLASS ENTRANCES AND STOREFRONTS
55

- 1 A. Glass: Refer to 08 80 00. Thickness of laminated glass to be verified by manufacturer and
2 installer for configurations indicated in drawings.
- 3 B. Butt Glaze, dry vertical joints. Submit translucent H sections if required for stability.
- 4 C. Head and Sill Channels: Extruded 1" profile, 2 piece glazing channels with brush seals. Finish
5 to be selected from Anodized Aluminum Satin Finish or powder coated steel RAL color selected
6 by Architect from manufacturer's full line. No sill channel at pass thru transaction counters.
- 7 D. Provide end covers, channel end caps and hardware and accessories for complete installation.
8
- 9 2.03 METAL COMPONENTS
- 10
- 11 A. Fitting Configuration:
- 12 1. Fixed panels with openings as indicated on drawings. Manufacturer to provide
13 acceptable panel opening proportion.
- 14
- 15 B. Rail Fittings:
- 16 1. Material: Aluminum extrusions.
- 17 a. ASTM B 221, 6063-T6 alloy and temper.
- 18 2. Height:
- 19 a. Top Rail: 1 inch height.
- 20 b. Bottom Rail: 1 inch height.
- 21 3. Profile: Square.
- 22 4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.
- 23 5. Accessory Fittings: Match rail-fitting metal and finish.
- 24
- 25 C. Anchors and Fastenings: Concealed.
- 26
- 27 2.04 FABRICATION
- 28
- 29 A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before
30 tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
- 31 1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when
32 glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- 33
- 34 B. Factory assemble components and factory install hardware and fittings to greatest extent
35 possible.
- 36
- 37 2.05 ACCESSORIES
- 38
- 39 A. Glazing Gaskets: ASTM C 864, neoprene or EPDM, or ASTM C 1115, silicone or thermoplastic
40 polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot.
- 41
- 42 PART 3 - EXECUTION
- 43
- 44 3.01 EXAMINATION
- 45
- 46 A. Examine areas and conditions, with Installer present, for compliance with requirements for
47 installation tolerances and other conditions affecting performance of the Work.
- 48
- 49 B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 50
- 51 3.02 INSTALLATION
- 52
- 53 A. Install all-glass systems and associated components according to manufacturer's written
54 instructions.
- 55

- 1 B. Set units level, plumb, and true to line, with uniform joints.
- 2
- 3 C. Maintain uniform clearances between adjacent components.
- 4
- 5 D. Install joint sealants as specified in Division 7 Section "Joint Sealants".
- 6
- 7 3.03 ADJUSTING AND CLEANING
- 8
- 9 A. Adjust all-glass entrance doors and hardware to produce tight fit at contact points and weather stripping.
- 10
- 11
- 12 B. Remove excess sealant and glazing compounds and dirt from surfaces.
- 13
- 14 C. Protect installed products until completion of the project.
- 15
- 16 D. Clean all framing and glass surfaces after installation.
- 17
- 18
- 19
- 20

END OF SECTION 08 41 26

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.

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

- 1 2. Samples of hardware items as may be required. Identify each sample and indicate the location of
2 subsequent installation in the project.
3 3. A copy of the approved hardware schedule and all pertinent templates or template information to each
4 fabricator of material factory-prepared for the installation of hardware.
5

6 1.06 QUALITY ASSURANCE
7

- 8 A. Manufacturers and product numbers listed herein establish a standard of quality. Similar items by other
9 manufacturers may be accepted by prior written approval by the architect in accord with the General Conditions
10 of the Contract. Except where specified in the hardware schedule, furnish products of only one manufacturer
11 for each type of hardware.
12
13 B. Supplier: Hardware Supplier: The hardware supplier shall be a corporate member in good standing of The
14 Door and Hardware Institute (DHI), employing at least one Architectural Hardware Consultant (AHC) who is
15 currently participating in DHI's continuing education program (CEP).
16
17 C. Items of hardware not definitely specified herein but necessary for completion of the Work shall be provided.
18 Such items shall be of type and quality suitable to the service required and comparable to the adjacent hardware.
19 Where size and shape of members is such as to prevent the use of types specified, hardware shall be furnished
20 of suitable types having as nearly as practicable the same operation and quality as the type specified. Sizes
21 shall be adequate for the service required. Include such nuances as strike type, strike lip, raised barrel hinges,
22 mounting brackets, fasteners, shims, and coordination between conflicting products. All doors shall be
23 provided with a stop.
24

25 1.07 REGULATORY REQUIREMENTS
26

- 27 A. Furnish UL listed hardware for all UL labeled openings in conformance with requirements for the class of
28 opening scheduled.
29

30 1.08 DELIVERY, STORAGE AND HANDLING
31

- 32 A. Deliver hardware to the job site in the manufacturer's original containers marked to correspond with the
33 approved hardware schedule for installation location.
34
35 B. Store hardware in dry surroundings and protect against loss and damage.
36

37 PART 2 - PRODUCTS
38

39 2.01 MANUFACTURERS
40

- 41 A. Refer to the Hardware Schedule at the end of this Section.
42

43 2.02 ACCESSORIES
44

- 45 A. Furnish all necessary hardware accessories such as wood or machine screws, bolts, nuts, anchors, toggle bolts,
46 and other fasteners, each of the type, size, material and finish for its intended purpose and each according to the
47 material to which the hardware is being applied.
48
49 B. Keying system will be determined by the Owner's Representative.
50

51 PART 3 - EXECUTION
52

53 3.01 INSTALLATION

- 1 A. Install hardware in accordance with manufacturer's recommendations and instructions.
- 2
- 3 B. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the fire
- 4 rating.
- 5
- 6 C. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
- 7
- 8 D. Remove, cover or protect hardware after fitting until paint or other finish is applied. Permanently install
- 9 hardware after finishing operations are complete.
- 10
- 11 E. Install closers on the room side of corridor doors, stair side of stairways, and interior side of exterior doors.
- 12
- 13 F. Deliver one complete set of installation and adjustment instructions, and tools with the hardware.
- 14
- 15 G. Coordinate security system electrical requirements at doors indicated to have such system.
- 16
- 17 H. Coordinate all Owner Furnished Contractor Installed hardware.
- 18

19 3.02 ADJUSTING

- 20
- 21 A. At final completion, adjust and test all hardware for function and performance and leave in good operating
- 22 condition.
- 23

24 3.03 CLEANING

- 25
- 26 A. Clean all hardware to restore the original finish.
- 27

28 3.04 PROTECTION

- 29
- 30 A. Protect the finished installation until acceptance of the project.
- 31

32 3.05 HARDWARE SCHEDULE

33

34 A. Manufacturers

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

52

53 B. Hardware Sets:

1	<u>SET 01</u>			
2	Opening(s): 108a, 108b , 122			
3	EA	HINGES	EXISTING TO BE SALVAGED AND RE-USED	
4	1 EA	STOREROOM LOCK	EXISTING TO BE SALVAGED AND RE-USED	
5	1 EA	CLOSER	EXISTING TO BE SALVAGED AND RE-USED	
6	1 EA	OVERHEAD STOP	450	630 GLY
7	1 EA	ELECTRIC STRIKE	EXISTING TO BE SALVAGED AND RE-USED	
8	1 EA	DOOR POS SWITCH	1076W	WHT GE
9	1 EA	CARD READER	BY SECTION 28 13 00, SEE DEMO PLAN FOR SALVAGE AND RE-USE	
10	1 SET	SEALS	5050	BLK NGP AT RATED OPENING 122

11
12 SALVAGED HARDWARE FROM OPENING E1006b TO BE REINSTALLED AT 108a.
13 SALVAGED HARDWARE FROM OPENING E1006a TO BE REINSTALLED AT 108b.
14 SALVAGED HARDWARE FROM OPENING E120 TO BE REINSTALLED AT 122.
15

16 **SET 01A**

17	Opening(s): 126, 150a			
18	EA	HINGES	BB1279 NRP	652 HAG
19	1 EA	STOREROOM LOCK	93K D x 14D	626 BES
20	1 EA	OVERHEAD STOP	410	630 GLY
21	1 EA	ELECTRIC STRIKE	6211	630 VON
22	1 EA	DOOR POS SWITCH	1076W	WHT GE
23	1 EA	CARD READER	BY SECTION 28 13 00	

24
25 **SET 02**

26 Not used

27
28 **SET 03**

29 Not used

30
31 **SET 04**

32 Not used

33
34 **SET 05**

35 Opening(s): 117, 118, 130, 131, 133, 134, 135, 136, 137, 138, 140, 149a, 155

36	EA	HINGES	BB1279	652 HAG
37	1 EA	ENTRANCE LOCK	93K AB x 14D	626 BES
38	1 EA	WALL STOP	WS407	630 IVE
39	1 EA	CLOTHES HOOK	B-6727	SS BBK

40
41 **SET 05A**

42 Opening(s): 116, 1008

43	EA	HINGES	BB1279	652 HAG
44	1 EA	ENTRANCE LOCK	93K AB x 14D	626 BES
45	1 EA	WALL STOP	WS407	630 IVE

46
47 **SET 05B**

48 Opening(s): 146, 157

49	EA	HINGES	BB1279	652 HAG
50	1 EA	ENTRANCE LOCK	93K AB x 14D	626 BES
51	1 EA	OVERHEAD STOP	450	630 GLY
52	1 EA	CLOTHES HOOK	B-6727	SS BBK

53

1 **SET 06**

2 Opening(s): 145, 1006a, 1006b

3	EA	HINGES	BB1279	652	HAG
4	1 EA	PASSAGE SET	93K N x 14D	626	BES
5	1 EA	WALL STOP	WS407	630	IVE

6

7 **SET 06A**

8 Opening(s): 120a

9	EA	HINGES	EXISTING TO BE SALVAGED AND RE-USED		
10	1 EA	PASSAGE SET	EXISTING TO BE SALVAGED AND RE-USED		
11	1 EA	WALL STOP	WS407	630	IVE
12	1 EA	FILLER STRIKE	AF-291	SL	DNJ

13

14 SALVAGED HARDWARE FROM OPENING E114 TO BE REINSTALLED AT 120a.

15

16 **SET 06B**

17 Opening(s): 121a

18	EA	HINGES	EXISTING TO BE SALVAGED AND RE-USED		
19	1 EA	PASSAGE SET	EXISTING TO BE SALVAGED AND RE-USED		
20	1 EA	WALL STOP	WS407	630	IVE

21

22 SALVAGED HARDWARE FROM OPENING E108b TO BE REINSTALLED AT 121a.

23

24 **SET 07**

25 Not Used

26

27 **SET 08**

28 Not Used

29

30 **SET 09**

31 Not Used

32

33 **SET 10**

34 Opening(s): 139, 142, 143, 144

35	1 SET	BARN DOOR HDWR	H200A	AL	PEM
36	1 SET	BRACKET	2815	AL	PEM
37	1 EA	FLUSH PULL	94BTB	630	ROC

38

39 **SET 11**

40 Opening(s): 154

41	EA	HINGES	BB1279	652	HAG
42	1 EA	KEYPAD LOCKSET	EXISTING TO BE SALVAGED AND RE-USED		
43	1 EA	CLOSER	1460 CUSH	689	LCN
44	1 SET	SEALS	5050	BLK	NGP

45

46 SALVAGED HARDWARE FROM OPENING E154 TO BE REINSTALLED.

47

48

1 **SET 12**

2 Opening(s): 1000

3	EA	HINGES	EXISTING		
4	2 EA	THRU WIRE HINGE	BB1191 ETW	630	HAG
5	2 EA	SVR EXIT DEVICE	ED4400 x O859 x M94	630	COR
6	2 EA	RIM CYLINDER	AS REQUIRED	626	BES
7	1 EA	POWER SUPPLY	782	GRY	COR
8	1 EA	FILLER PLATE	EF160	CP	DNJ
9	2 EA	FB FILLER PLATE	EF-86	CP	DNJ
10	1 EA	CARD READER	BY SECURITY CONTRACTOR – NARROW PROFILE REQUIRED		
11	-BOLT TO BE REMOVED FROM EXISTING DEAD BOLT. FLUSH BOLTS TO BE REMOVED FROM				
12	INACTIVE LEAF.				

13

14 **SET 13**

15 Not used

16

17 **SET 14**

18 Opening(s): 1001a, 1001b, 1001c

19	5 EA	HINGES	BB1279	652	HAG
20	1 EA	THRU WIRE HINGE	BB1279 ETW	630	HAG
21	1 EA	ELECTRIFIED LOCKSET	9KW3 DEU 14D	626	BES
22	2 EA	CLOSER	1460 CUSH	689	LCN
23	1 SET	AUTO FLUSH BOLTS	2942	630	ROC
24	1 EA	DUST PROOF STRIKE	570	626	ROC
25	1 EA	COORDINATOR	2672 x Mtg Brkts	628	ROC
26	1 EA	CARD READER	BY SECTION 28 13 00		

27

28 **SET 15**

29 Opening(s): 119, 120b

30	EA	HINGES	BB1279	652	HAG
31	1 EA	PASSAGE SET	93K N x 14D	626	BES
32	1 EA	OVERHEAD STOP	450	630	GLY

33

34 **SET 16**

35 Opening(s): 124, 125

36	3 EA	SWING CLEAR HINGES	BB1260	652	HAG
37	1 EA	PUSH PLATE	70C	630	ROC
38	1 EA	PULL PLATE	111 x 70C	630	ROC
39	1 EA	DEAD BOLT	EXISTING TO BE SALVAGED AND RE-USED		
40	1 EA	CLOSER	1460		
41	2 EA	KICK PLATE	10" X 2" LDW	630	ROC
42	1 EA	WALL STOP	WS407	630	IVE
43	1 EA	ANGLE STOP	AS895	626	IVE

44

45 SALVAGED HARDWARE FROM OPENING 124 AND 125 TO BE REINSTALLED.

46

47

1	<u>SET 17</u>			
2	Opening(s): 121b, 121c			
3	EA	HINGES	BB1279	652 HAG
4	1 EA	INSTITUTIONAL LOCK	93K W x 14D	626 BES
5	1 EA	CLOSER	1460 CUSH	689 LCN
6	1 EA	ELECTRIC STRIKE	6211	630 VON
7	1 EA	DOOR POS SWITCH	1076W	WHT GE
8	2 EA	CARD READER	BY SECTION 28 13 00	

9				
10	<u>SET 18</u>			
11	Opening(s): 152, 1009			
12	1 EA	ENTRANCE LOCK	93K AB x 14D	626 BES
13	1 EA	WALL STOP	WS407	630 IVE
14	REMAINDER OF HARDWARE EXISTING			

15				
16	<u>SET 19</u>			
17	Opening(s): 150b, 150c			
18	1 SET	CH PIVOTS	370	626 RIX
19	1 EA	FLUSH PULL	95A	630 ROC
20	1 EA	ROLLER LATCH	RL1152	626 IVE
21	1 EA	OVERHEAD STOP	410	630 GLY

22				
23	<u>SET 20</u>			
24	Opening(s): 101			
25	1 EA	CONTINUOUS HINGE	780-224HD	CLR HAG
26	2 EA	ROLLER LATCH	RL1152	626 IVE
27				
28	CUSTOM HINGE LENGTH			

29				
30	<u>SET 21</u>			
31	Openings(s): 123			
32	EA	HINGES	BB1279	652 HAG
33	1 EA	STOREROOM LOCK	93K D x 14D	626 BES
34	1 EA	OVERHEAD STOP	410	630 GLY

35				
36	<u>SET 22</u>			
37	Opening(s): 149b			
38	2 SET	BARN DOOR HDWR	H200A	AL PEM
39	2 SET	BRACKET	2815	AL PEM
40	2 EA	LOCKING PULLS	LP3301 DBD-ADA	630 ROC
41	2 EA	CYLINDERS	AS REQUIRED	626 BES

42				
43	<u>SET 23</u>			
44	Opening(s): 106			
45	EA	HINGES	BB1279	652 HAG
46	1 EA	PASSAGE SET	93K N x 14D	626 BES
47	1 EA	WALL STOP	WS407	630 IVE
48	1 SET	SEALS	5050	C NGP

49

50

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. All-Glass Entrances and Storefronts, 08 41 26.
- D. 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.

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 06 82 56, Bullet Resistant Composite (Fiberglass)
- C. Section 09 90 00, Painting
- D. Section 09 72 00, Wall Coverings

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. Certaineed "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.

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. When necessary, sand between coats and follow with final coat to provide level 4 smooth surface ready for decoration except in locations noted in section 09 26 13 Gypsum Veneer Plastering.
- 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.
- C. At existing ceilings and walls match textures 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 30 00

TILING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Wall Tile.
- B. Floor Tile.

1.03 RELATED WORK

- A. Gypsum Board: Section 09 29 00, for tile backer board.

1.04 REFERENCES

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

1.05 SUBMITTALS

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

1.07 PROJECT CONDITIONS

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

1.08 EXTRA MATERIALS

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

PART 2 - PRODUCTS

2.01 TILE

- A. WALL TILE
 - 1. WT-1:
 - a. Product: Daltile, Natural Hues™, or approved equal.
 - 1) A blend of 3 different colored tiles to be selected by the Architect from the Manufacturer's full range, all price groups.
 - 2) Installation pattern: The 3 tile blend will be installed in a stack bond configuration where the 3 tile blend will graduate from light to dark.
 - 3) Size: 2 inches by 8 inches.
 - 2. WT-2:
 - a. Reinstall salvaged glazed tile or submit equal product and complete installation to match existing. See drawings for Scope of Work.
- B. FLOOR TILE
 - 1. FT-1:
 - a. Product: Keystones Mosaic Colorbody Porcelain, Dal-Tile, 2x1, or approved equal product by American Olean, Crossville, Interceramics, Terra Green Ceramics, United States Ceramic Tile Company, or approved equal. Linear pattern, 1 color per row, to match existing restroom 125 floor tile.
 - b. (3) colors to be selected by Architect from manufacturer's full line Groups 1&2.
 - 2. FT-2:
 - a. Product: Terrazzo Tile, polished, 24x24, Wausau Tile or approved equal.
 - b. Architect to select color and thickness from manufacturer's full line of Micro or N776.
 - c. Provide Transition Tile if required at jambs, if tile thickness does not match existing adjacent surfaces, field verify existing adjacent floor thicknesses.
 - d. Provide 6" Terrazzo Tile base to match FT-2, joints to align with joints in floor.

2.02 SETTING MATERIALS

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

2.03 ACCESSORIES

- A. Portland Cement: ASTM C 150, type 1.
- B. Sand: ASTM C-144.
- C. Water: Clean and potable.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout: Non-sanded.
 - 1. Color: To be selected by AE from manufacturer's full range of colors.

- F. Acrylic Additive: LATICRETE “1776 Grout Admix Plus”; Chargar Corporation “Acryl 60” or approved equal.
- G. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- H. Provide other materials not specifically described but required for a complete and proper installation.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

A. General

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

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

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

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

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

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

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

- H. Jointing Pattern: Grid pattern.

I. Expansion, Control Joints

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

3.03 CLEANING

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

3.04 PROTECTION

A. Close off work spaces to traffic during installation and at least 48 hours after completion of work.

B. Tiled vertical outside corners shall be protected with board corner strips in areas used as passageways.

END OF SECTION 09 30 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, 3/4" thick x 2' x 2', Reveal edge (tegular), White. UL Classified Noise Reduction Coefficient (NRC) .60, Ceiling Attenuation Class (CAC) 35, Light Reflection Coefficient .82, "BioShield", 15 year warranty against sag, 82% recycled content.
- B. Celotex Brand, "Cashmere".
- C. Or approved equal by Armstrong World Industries, Ecophon Certaineed, or USG.

2.03 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. RF-2 flooring pattern specified herein to be reviewed and approved on site prior to installation.

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, 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 6" high or as indicated on drawings.
 - 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, 6" High or as indicated on drawings.
 - a. Roll stock
 - b. Color: to be selected by architect from manufacturer's full range
- C. RB-3:
 - 1. Material, Rubber, 5/8" Butt Toe Base, 4" High or as indicated on drawings.
 - a. Roll stock
 - b. Color: to be selected by architect from manufacturer's full range.
- D. 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: 18x36
 - d. Style: Fade, 59597; Blur, 59596; Overlay, 59598; Scale, 59595
 - 1) Pattern Variation:
 - a) 5% with 3-inch Scale accents.
 - e. Size: 18"x36"
 - f. Backing: EcorWorx® Tile
 - Or

- g. Carpet Tile
 - h. Manufacturer: Shaw
 - i. Collection: Unearthed
 - j. Style: Mica, 5T014; Jasper, 5T016 Quartz, 5T017
 - 1) Installation Method to be selected by Architect.
 - k. Size: 18"x36"
 - l. Backing: EcorWorx® Tile
 - Or
 - m. Carpet Tile
 - n. Manufacturer: Shaw
 - o. Collection: Beyond the Fold
 - p. Style: Folded, Folded Edge, Expand
 - 1) Installation Method to be selected by Architect.
 - q. Size: 18"x36"
 - r. Backing: EcorWorx® Tile
2. Quick Ship: equivalent product as selected by architect as required to meet the schedule for Phase 1 completion per specification 01 10 00.
 3. Color: Project will include three (3) colorways. These 3 will be as selected by Architect from Manufacturer's full range.
- 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).
 2. Utilize removable LokDots installation where finished concrete floor scheduled below carpet tile.
- 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.
 2. Carpet to Concrete:
 - a. Johnsonite Adapter, CTA-XX-J 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 72 00

WALL COVERINGS

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. Dry Erase Wallcovering

1.03 RELATED WORK

- A. Metal Fabrications: Section 05 50 00.
- B. Paint Section: 09 90 00.
- C. Gypsum Board Section: 09 29 00.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):E84
 - 1. Test Method for Surface Burning Characteristics of Building Materials.
- B. Gypsum Association GA-14-M-97
 - 1. Recommended Levels of Gypsum Board Finish.

1.05 SUBMITTALS

- A. Manufacturer's product data and installation instructions for each type of dry erase wallcovering, adhesive, and accessories required.
- B. Manufacturer's written product data indicating compliance with specified materials required.
- C. Manufacturer's written installation instructions.
- D. Manufacturer's written instructions for recommended maintenance of each type of dry erase wallcovering required.
- E. Samples:
 - 1. 7 x 9 inch (18 x 23 centimeter) samples of each dry erase material required.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Provide each type of dry erase wallcovering required produced by one manufacturer.
- B. Installer: Installation by skilled commercial wallcovering contractor with no less than three years of documented experience installing dry erase wallcovering of the types and extent required.

- C. Composition:
 - 1. Provide non-woven backing, pigmented vinyl capped with dry erase low gloss film.
- D. Surface Burning Characteristics Classification: Provide materials that meet Class I/A rating when tested in accordance with ASTM E84 for flame spread and smoke developed: Class II/B.
- E. Field Samples: Prepare field samples for architect's review and establish requirements for seaming and finish trim.
 - 1. Install sample panel of each type presentation wallcovering specified in area designated by architect.
 - 2. Maintain corrected and approved samples to serve as a standard of performance for the project.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver presentation wallcoverings to the project site in unbroken and undamaged original factory packaging and clearly labeled with the manufacturer's identification label, quality or grade, and lot number.
- B. Store materials in a clean, dry storage area with temperature maintained above 55° F (13° C) with normal humidity.
- C. Store material within original packaging to prevent damage.

1.08 PROJECT CONDITIONS

- A. Ventilation
 - 1. Do not apply presentation wallcoverings when surface and ambient temperatures are outside the temperature ranges required by the wallcovering manufacturer provide ventilation during and following adhesive and joint treatment applications.
 - 2. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 55° F unless required otherwise by manufacturer's instructions.
 - 3. Apply adhesive when substrate surface temperature and ambient temperature is above 55° F and relative humidity is below forty percent.
 - 4. Maintain constant recommended temperature and humidity for at least seventy-two hours prior to and throughout the installation period, and for seventy-two hours after wallcovering installation completion.
 - 5. Provide not less than 80-foot-candles per square foot lighting level measured mid-height at sub-strate surfaces.

1.09 WARRANTY

- A. Submit manufacturer's limited five-year written warranty against manufacturing defects.

1.10 MAINTENANCE

- A. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Walltalkers Wallcoverings manufactured by Koroseal Interior Products, LLC, Fairlawn, Ohio, and distributed by Koroseal Interior Products. Contact sales representative Koreen Pelot at: Koroseal, Madison, WI, 608-301-7658.
- B. Or approved equal.

2.02 MATERIALS

- A. "Walltalkers" "erase•rite": Smooth, color and sheen to be determined from manufacturer's full line.
 - 1. ER50: 49/50 inch (124/127 centimeter) width, 18 ounce per square yard (.61 kilogram per square meter), non-woven backing.
- B. Or approved equal.

2.03 ACCESSORIES

- A. Adhesives: Heavy-duty clear or clay based premixed vinyl adhesive. Sherwin-Williams Heavy Duty Clay Base Adhesive or approved equal.
- B. Substrate Primer/Sealer: White pigmented acrylic base primer/sealer specifically formulated for use with vinyl wallcoverings. Sherwin-Williams R35 Heavy Duty Acrylic Primer Pro 935 or approved equal.
- C. Presentation Starter Kit: Provide one Walltalkers starter kit containing eight dry erase markers, two erasers, ten cleaning towels, and one 8 ounce (.23 kilogram) bottle liquid surface cleaning solution for each room installed with dry erase wallcovering. Or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and installation conditions to ensure surface conditions meet or exceed a Level 4 finish, per GA-214-M-97: Recommended Levels of Gypsum Board Finish, and permanent lighting should be installed and operational.
- B. Test substrate with a suitable moisture meter and verify that moisture content does not exceed four percent.
- C. Verify substrate surface is clean, dry, smooth, structurally sound, and free from surface defects and imperfections that would show through the finished surface.
- D. Evaluate all painted surfaces for the possibility of pigment bleed-through.
- E. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.
- F. Beginning of installation means acceptance of surface conditions.

3.02 INSTALLATION

- A. Acclimate wallcovering in the area of installation a minimum of twenty-four hours before installation.

- B. Read and follow the manufacturer's installation instruction sheet contained in each roll of the dry erase wallcovering.
- C. Examine all materials for pattern, color, quantity and quality, as specified for the correct location prior to cutting.
- D. Adhesive: Apply a uniform coat of heavy-duty pre-mixed clay-based or extra strength clear wallcovering adhesive.
- E. Primer: Use a quality pigmented acrylic wallcovering primer.
- G. Install dry erase wallcovering sheets in exact order as they are cut from bolt. Reverse hang alternate strips (except lined products). Do not crease or bend the wallcovering when handling.
- H. Install dry erase wallcovering horizontally, in the same sequence as cut from the roll, using a level line.
- I. Using a level or straight edge, double cut the seam with a seam-cutting tool (Ex: Double Seam-Cutter or Swedish Knife). Do not score drywall or plasterboard when cutting material.
- J. When covering the entire wall, seam the material out of the main writing and viewing areas of the wall.
- K. Apply wallcovering to the substrate using a wallcovering smoother, wrapped with a soft cloth, to remove air bubbles. Do not use sharp edged smoothing tools. Smooth material on the wall from the middle to the outside edge.
- L. Remove excess adhesive immediately after the wallcovering is applied. Clean entire surface with a warm mild soap solution, and clean soft cloths. Rinse thoroughly with water and let dry before using. Change water often to maintain water clarity.
- M. Stop installation of material that is questionable in appearance and notify the manufacturer's representative for an inspection.

3.04 CLEAN-UP

- A. Upon completion of installation, remove all exposed adhesive immediately using a soft cloth and a warm, mild soap solution and rinse thoroughly with water and dry with clean towel prior to using.
- B. Upon completion of the work, remove surplus materials, rubbish, and debris resulting from the wallcovering installation. Leave areas in neat, clean, and orderly condition.

END OF SECTION 09 72 00

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	Sherwin-Williams 6385 Dover White
PT-2	accent color - Planning Conference Room Low
PT-3	accent color - Planning/ROD
PT-4	Sherwin-Williams 7069 Iron Ore
PT-5	accent color - CB Conference Room
PT-6	accent color - CB Accent
PT-7	accent color - Planning/ROD/Break accent
PT-8	accent color - Planning
PT-9	accent color - Treasurer
PT-10	Off white alternate where PT-1 indicated
PT-11	Sherwin-Williams 7050 Useful Gray
HM Frames (except as noted below)	Sherwin-Williams 7069 Iron Ore

Existing Paint colors in the County Board/County Clerk, paint to match:

Sherwin-Williams 6356 Copper Mountain

Sherwin-Williams 6151 Quiver Tan

HM Frames to match existing, V.I.F.

END OF SECTION 09 90 00

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SECTION 10 10 00

VISUAL DISPLAY BOARDS

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. Tackable panels.

1.03 SUBMITTALS

- A. Submit in accord 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.
- B. Submit samples of each material to be used.
- C. Submit a mock-up of each type of board using materials as they are to be on the project.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver board products only when dry, warm storage space is available at the Project Site.
- B. Acclimatize all board products within the area of installation for a minimum of 72 hours at a temperature of 70 degrees F. before commencement of installation work, during the installation period, and for 48 hours after completion of the installation.

1.05 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 TACKABLE PANELS (WITH ACOUSTIC PROPERTIES)

- A. Performance Requirements
 - 1. Surface Burning Characteristics (ASTM E84):
 - 2. Flamespread: 25 maximum.
 - 3. Smoke Developed: 450 maximum.

- B. Manufacturer: Kinetics Noise Control, Hi-Tack Tackable Panels
 - 1. Thickness: ½-inch.
 - 2. Size: As indicated on drawings up to a maximum of 48"x120" panel.
 - 3. Core: ½-inch thick mineral fiber board with perforated core for improved sound absorption.
 - 4. Edge Detail: Square.
 - 5. Facing: Custom fabric:
 - a. Maharam
 - 1) Color: As selected from fabric manufacturer's full range of colors from the following lines:
 - a) Medium, Crisp Backed, Manner, Parallel, Hum, Abacus Standard, Dialogue or Reply.
 - b. Or approved equal
 - 6. Sound Absorption (ASTM C423): Noise Reduction Coefficient as follows:
 - a. 1/2 inch panel: 0.30, minimum.
 - 7. Mounting Accessories: Manufacturer's recommended Z clips for movable installation.
- C. Or approved equal

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Substrate surfaces shall be clean, dry and free from loose materials. Prime or size and back-up surfaces as recommended by manufacturer.
- B. Install board products in locations and at height as shown on Project Drawings unless otherwise directed by the Construction Manager. All board panels shall be one piece without joints.

3.02 TRIM

- A. Miter trim at all corners. Joints shall be hairline, smooth and in full continuous contact. Do not splice trim sections except in lengths over 24 feet.
- B. Provide the specified accessories, installed and operable on trim sections indicated.
- C. Leave installation clean, undamaged and ready for use by the Owner.

END SECTION 10 10 00

SECTION 10 14 00

INFORMATION SPECIALTIES

PART 1:GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Accessibility Signage.
- B. Pressure Sensitive Graphic Window Films.

1.03 REFERENCES

- A. All signage shall be in strict accord with Wisconsin Enrolled Commercial Building Code.

1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Manufacturer's Literature: Materials description, colors, and application instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Provide protective coverings for identifying devices prior to shipping.
- B. Handle and store to prevent damage and soiling.

PART 2:PRODUCTS

2.01 ADA REQUIRED SIGNAGE

- A. All signage must have tactile/Braille lettering and raised pictograms. Braille must be integral to the sign. Taped on Braille is not acceptable.
 - 1. All Braille to be located at the bottom of the sign.
 - 2. When the word "accessible" is used on a sign or when the symbol for accessibility is used, the word accessible must be included in the Braille text.
- B. Basis of Design: Interior Signs.
 - 1. ADA-Ready™, EmBoss Series™, ASI Sign Systems, Inc.
 - a. ADA Signage
 - 2. Graphics: As indicated on drawings.
 - 3. Sizes: As indicated on drawings.
 - 4. Color: 2, to be selected by Architect from Manufacturer's full line.
- C. Manufacturers
 - 1. ASI Sign Systems.
 - 2. Poblocki Sign Company
 - 3. Best Sign Systems Inc.

4. 2/90 Sign Systems
5. Or approved equal.

- D. Provide proper gender symbol at each door leading to a room designed for handicap use (i.e., toilet rooms with grab bars, etc.).

2.02 PRESSURE SENSITIVE GRAPHIC WINDOW FILMS

- A. Vinyl glass film, 50 micron,
1. Type 1: 3M 7725-314 Dusted Crystal
 2. Type 2: Color and pattern to be selected by A/E for higher transparency with decal cut.
 3. Clear release liner.
 4. Pressure sensitive adhesive.
 5. To give appearance of etched glass as chosen by A/E.
 6. Application locations as indicated on drawings, Cut lettering at designated applications per drawings
- B. Manufacturers.
1. Metamark Signviny
 2. 3M
 3. Or approved equal.

PART 3:EXECUTION

3.01 INSTALLATION

- B. Comply with manufacturer's specifications and recommendations for the installation of identification devices and dedication plaque.
- C. Install devices plumb, level and true to line.

3.02CLEANING

- A. Clean surfaces of identifying devices, dedication plaque and surrounding surfaces.
- B. Remove protective coatings, if any.

3.03SIGNAGE SCHEDULE

- A. ADA Signage to be provided at Rooms, 124 and 125.

END OF SECTION 10 14 00

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 RELATED WORK

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

1.02 WORK INCLUDED

- A. Solid Surface Toilet Partitions –Floor Mounted.
- B. Attachment hardware.

1.03 RELATED WORK

- A. Rough Carpentry: Section 06 10 00 Wall Blocking.
- B. Toilet, Bath and Laundry Accessories: Section 10 28 00.

1.04 REFERENCES

- A. All work shall be in strict accord with Wisconsin Enrolled Commercial Building Code.
- B. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
- C. ADAAG – Americans with Disabilities Act for Accessibility Guidelines.
- D. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Shop drawings showing scale, drawings of plan, all elevations of all compartments, indicate clearly the hardware, and accessories to be furnished.
 - 2. Verify field dimensions.
 - 3. Part of the submittal may consist of standard brochures.
 - 4. Shop drawings that clearly show attachment locations for all blocking and anchorages.
 - 5. Shop drawings that show locations and drilling dimensions.
 - 6. Two sets of color samples.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver compartments in suitable crating or packaging to prevent damage in transit and storage.
- B. Coordinate delivery with progress schedule to reduce period of on-site storage. Store under cover in a dry area.

1.07 FIELD MEASUREMENTS

- A. Verify field measurements are as shown on Drawings, shop drawings and as instructed by the manufacturer.

PART 2 - PRODUCTS

2.01 TOILET PARTITIONS

- A. Floor Mounted.
 - 1. Basis for Design: Champion Partitions, Floor Mounted Restroom Partitions.
- B. Comparable models by:
 - 1. Ampco Products, Inc.
 - 2. American Building Specialties Corp.
 - 3. Or approved equal.

2.02 FEATURES

- A. Material: Solid Surface:
 - 1. Color as selected by A/E from manufacturer's full line.
- B. Fasteners, Anchorages: Manufacturer's standard stainless steel to accommodate solid surface.
 - 1. Through bolts and nuts, stainless steel with tamperproof heads.
- C. Hardware: Material: Stainless steel, complying with ADA standards.
 - 1. Hinges: Manufacturer's standard self closing that can be adjusted to hold door open in any position.
 - 2. Coat Hook: Combination hook and rubber tipped bumper, sized to prevent door from hitting accessories or wall.
 - 3. Latch and keeper: Surface mount designed for emergency access.
 - 4. Door bumper: Rubber tipped as needed at out swinging doors.

2.03 FABRICATION

- A. Panels: Custom 1/2 inch thick panels shall be constructed of solid surface material.
- B. Pilasters: Custom 1" thick pilasters shall be the same construction as panels.
 - 1. The mounting system at the top of the pilaster shall be concealed by trim.
- C. Doors shall be 1/2 inch material of same construction as panels.

2.04 FINISHES

- A. Finish color and pattern selected by A/E from manufacturer's full range.
- B. Stainless Steel: No. 4 polished finish on all exposed hardware.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of all partitions and screens shall be done in compliance with manufacturer's instructions and approved shop drawings.
- B. Evidence of drilling in walls shall be concealed in the finished work.
- C. Install partition components secure, plumb and level.

- D. Attach panels and pilasters to brackets with through bolts and nuts.
- E. Provide 1/2 inch space between wall surface and panels or pilasters.
- F. Anchor pilasters to floor.

3.02 CLEANING

- A. Remove all protective maskings and clean surfaces. Leave them free of soil and imperfections.

3.03 PROTECTION

- A. Field touch-up of finished surfaces will not be permitted. Replace damaged components.

END OF SECTION 10 21 13

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SECTION 10 28 00

TOILET AND BATH ACCESSORIES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Commercial Toilet and Bath Accessories.
- B. Installation of Owner Provided Toilet Accessories.

1.03 RELATED SECTIONS

- A. Rough Carpentry: Section 06 10 00.
- B. Gypsum Board: Section 09 29 00.
- C. Tiling: Section 09 30 00.

1.04 REFERENCES

- A. All work of this section shall be in strict accord with Wisconsin Enrolled Commercial Building Code.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract
 - 1. Manufacturer's technical data.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packaging with seals unbroken and bearing manufacturer's name and product.
- B. Store all materials in secure place to prevent damage.
- C. Remove all damaged materials from project immediately.

PART 2: PRODUCTS

2.01 COMMERCIAL TOILET ACCESSORY MANUFACTURERS

- A. Bobrick Washroom Equipment, Inc.
- B. Kimberly Clark.
- C. Bradley Corporation.
- D. Gamco.

E. McKinney.

F. American Specialties, Inc.

2.02 MANUFACTURED COMMERCIAL UNITS

A. Grab Bars

1. Bobrick B-6806 Series Continuous Grab Bars, lengths as indicated in drawings.
2. Or approved equal.

B. Double Clothes/Robe Hook

1. Bobrick B-6727.
2. Or approved equal.

C. Surface Mounted Paper Towel Dispenser (C-fold or Multifold) with knob latch

1. Bobrick B-2621. Kitchenette towel type to be confirmed with Owner and model modified as required.
2. Or approved equal.

2.03 SEALANT

A. "GE silicone sealant", General Electric Company.

B. "Dow Corning 780", Dow Corning Corporation.

C. "Pecora 826", Pecora Chemical Corporation.

2.04 FASTENERS

A. Provide all fastening devices including screws, bolts, anchors, and backplates.

B. Exposed fasteners shall match finish of accessories.

2.05 FABRICATION

A. Fabricate all toilet and bath accessories of type 302 or 304 stainless steel with satin finish, unless otherwise specified or approved.

B. All accessories shall be by one manufacturer unless otherwise specified or approved.

C. Manufacturer's labels or imprinted name shall not be visible.

PART 3: EXECUTION

3.01 EXAMINATION

A. Examine surfaces and recesses to receive toilet and bath accessories for dimensions, plumbness, blocking, and other conditions that affect installation.

B. Do not proceed until conditions are acceptable.

3.02 INSTALLATION

- A. Install toilet and bath accessories according to manufacturer's direction.
- B. All accessories in any one space shall be of matching design and finish. If discrepancies are found, secure Architect's approval before proceeding.
- C. Set all recessed and semi-recessed accessories with continuous seal of sealant, around entire perimeter of all accessories to prevent moisture from reaching substrate.

3.03 ADJUSTING AND CLEANING

- A. Adjust accessories for proper operation.
- B. Replace damaged or defective items.
- C. Clean and polish accessories after removing labels and protective wrapping.
- D. Delivery accessory keys, service, and parts manual in accordance with the General Conditions of the Contract Closeout.

END OF SECTION 10 28 00

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SECTION 10 44 13

FIRE EXTINGUISHERS AND CABINETS

PART 1:GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Type ABC Fire Extinguishers.
- B. Cabinets.

1.03 RELATED SECTIONS

- A. Gypsum Board: Section 09 29 00.

1.04 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Product Data: Manufacturer's catalog information and specifications edited to indicate specific extinguishers, cabinets and accessories to be provided for this Project. Include rough opening dimensions and certification of U.L. rating.

PART 2:PRODUCTS

2.01 TYPE ABC FIRE EXTINGUISHERS (4A-60BC RATED)

- A. J.L. Industries Cosmic. 10E.
- B. Larsen's MP10.
- C. Potter - Roemer 3010.

2.02 MOUNTING FX-1

- A. J.L. Industries Panorama 1036 stainless steel, recessed, 1-1/2 inch square trim, C70.
- B. Larsen's Gemini approved equal.
- C. Potter - Roemer Buena approved equal.

2.03 MOUNTING FX-2

- A. J.L. Industries Panorama 1017 steel, semi recessed, 3" inch trim, C70.
- B. Larsen's Gemini approved equal.
- C. Potter - Roemer Buena approved equal.

PART 3:EXECUTION

3.01INSTALLATION

- A. Install all items in conformance with manufacturer's directions.
- B. Prepare recesses in wall for fire extinguisher cabinets.
- C. Securely fasten fire extinguisher cabinets to structure, square and plumb.
- D. Mount fire extinguisher cabinets so the top of the extinguisher is not more than 4 feet above the floor.

END OF SECTION 10 44 13

SECTION 10 51 13

LOCKERS

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. Lockers

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. Shop drawings: Indicate installation details relating to anchoring, trim installation and relationship to adjacent surfaces, materials used, quantity and size required
 - 2. Samples: Indicate locker body, door colors.
 - a. Provide 12" x 12" samples of colors and finishes on actual material being used.
- B. Provide manufacturer's written warranty.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle units to prevent damage.
- B. Damaged units will be rejected and replaced at no cost to Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Famous Lockers, Hallowell Premium Locker or approved equal.

2.02 LOCKERS

- A. Material
 - 1. Steel
 - a. Body: 24 gauge.
 - b. Doors: Louvered 16 gauge.
 - c. End and Filler Panels: Finished matching locker color and material.
 - 2. Dimensions: 12" wide x 12" deep x 78" high
 - 3. Tier/Levels: 1.
 - 4. Handle/Latching: Stainless steel recessed handle, 3-point gravity lift type latching.
 - 5. Hinge: 16 gauge piano hinge.
 - 6. Lock: built-in.
 - 7. Quantity: as indicated on drawings.

8. Finish: Manufacturer's standard painted finish, color as selected by Architect from Manufacturer's full range.
9. Warranty: 2 year.

2.03 FABRICATION

- A. Fabricate locker parts square and rigid without warp with the finished faces flat and free of scratches and chips.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify location of units.

3.02 INSTALLATION

- A. Install lockers and accessories per approved plans and manufacturer's instructions plumb rigid installation.
- B. All hardware and installation to be provided by manufacturer.
- C. Anchor lockers to wall studs, wall blocking or furring strips.

3.03 CLEANING

- A. Wipe locker surfaces to remove fingerprints, smudges.
- B. Clean adjacent surfaces soiled by locker installation work.
- C. Replace adjacent surfaces damaged by locker installation work.
- D. Remove all packaging materials.

END OF SECTION 10 51 13

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.

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 117, 118, 120, 130, 131.

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 all exterior windows 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
- 21 1.10 DELIVERY, STORAGE, AND HANDLING
22
- 22 A. Storage and Protection
23
- 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
- 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
- 28 3. Store materials in a dry, secure place. Protect from weather, surface contaminants, corrosion,
29 construction traffic, and all other potential damage.
30
- 30 B. PROJECT / SITE CONDITIONS
31
- 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
- 33 C. SCHEDULING
34
- 34 1. Do not fabricate shades without obtaining field dimensions for each opening.
35
- 35 2. Coordinate construction of surrounding conditions to allow for timely field dimension verification.
36
- 36 3. Manufacturer's standard lead times apply. Reference submittal and schedule accordingly for
37 project timeline.
38
- 38 D. EXTRA MATERIALS
39
- 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
- 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
- 43 PART 2 - PRODUCTS
44
- 44 1.01 MANUFACTURERS
45
- 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.

14
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. West Exterior Openings: Rooms 140, 141, 142, 156, 157.

9 B. South Exterior Openings: Rooms 121, 132, 133, 134, 135, 136, 137, 138 and adjacent portion of the
10 opening in Corridor 1009.

11 C. Interior Openings: Room 150 – blackout fabric.

12

13

14

END OF SECTION 12 24 13

15

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1 **RELATED WORK**

2 Provisions of Division 01 shall govern work under this Section.

3
4 This section applies to all Division 21 Sections of Fire Suppression.

5
6 Section 01 91 13 – Commissioning Requirements

7
8 **REGULATORY REQUIREMENTS**

9 Refer to Division 01 of the Project Manual.

10
11 **Codes and Standards:**

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

14
15 Materials and workmanship shall comply with applicable Codes, local ordinances, industry standards and
16 utility regulations. In case of differences between Codes, and the Contract Documents, the most stringent
17 shall govern.

18
19 **Non-Compliance:**

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

22
23 **Permits, Inspections, and Fees:**

24 Request and obtain permits and inspection appointments.

25
26 Provide fees and charges for approvals, reviews, or other inspections.

27
28 Include copies of the certificates in the Operating and Maintenance Instructions.

29
30 Fees and charges assessed by local utilities for water or other services shall be included in the bid.

31
32 **REFERENCE STANDARDS**

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

34
35 ANSI American National Standards Institute
36 ASME American Society of Mechanical Engineers
37 ASPE American society of Plumbing Engineers
38 ASTM American Society for Testing and Materials
39 AWWA American Water Works Association
40 COMM State of Wisconsin Dept. of Commerce
41 CS Commercial Standards, Products Standards Sections, Office of Engineering Standards Service,
42 NBS
43 EPA Environmental Protection Agency
44 FM Factory Mutual System
45 FS Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
46 IAPMO International Association of Plumbing & Mechanical Officials
47 IEEE Institute of Electrical and Electronics Engineers
48 ISA Instrument Society of America
49 MCA Mechanical Contractors Association
50 MICA Midwest Insulation Contractors Association
51 MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
52 NBS National Bureau of Standards
53 NEC National Electric Code
54 NEMA National Electrical Manufacturers Association
55 NFPA National Fire Protection Association

1 SPS State of Wisconsin Dept. of Safety and Professional Services
2 UL Underwriters Laboratories Inc.

3
4 **QUALITY ASSURANCE**

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

6
7 All products and materials used are to be new, undamaged, clean and in good condition. Existing products
8 and materials are not to be reused unless specifically indicated.

9
10 Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings,
11 or engineering parameters from those indicated on the contract documents, the contractor is responsible for
12 all costs involved in integrating the equipment or accessories into the system and for obtaining the intended
13 performance from the system into which these items are placed.

14
15 **COMMISSIONING**

16 The project will be commissioned by a separate 3rd party commissioning agent.

17
18 See Section 01 91 13 for all commissioning requirements including construction verification checklists,
19 functional performance testing, meetings and on-site verification.

20
21 **ABBREVIATIONS AND SYMBOLS**

22 Key to abbreviations and symbols shall be on the Drawings.

23
24 The following are additional abbreviations used in the Specifications:

25
26 A/E Architect/Engineer
27 GC General Contractor
28 FPC Fire Protection Contractor
29 HC Heating Ventilating and Air Conditioning Contractor
30 EC Electrical Contractor

31
32 **DEFINITIONS**

33 **Furnish:**

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

35
36 **Install:**

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

40
41 **Provide:**

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

43
44 **COORDINATION**

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

50
51 **CONTINUITY OF EXISTING SERVICES**

52 Refer to Division 01 of the Project Manual.

53
54 Do not interrupt or change existing services without prior written approval from the Owner's Project
55 Representative. When interruption is required, coordinate scheduling of down-time with the Owner to

1 minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or
2 changing existing services is to be done during normal working hours.

3
4 **PROTECTION OF FINISHED SURFACES**

5 Refer to Division 01, of the Project Manual.

6
7 **SEALING AND FIRESTOPPING**

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

12
13 **OFF SITE STORAGE**

14 Refer to Division 01 of the Project Manual.

15
16 **SUBMITTALS**

17 Refer to Division 01, of the Project Manual.

18
19 Submit shop drawings with space for approval stamps of GC and A/E.

20
21 Refer to Division 01, of the Project Manual.

22
23 Not more than two weeks after award of contract but before any shop drawings are submitted, contractor to
24 submit the following fire protection system data sheet. List piping material types, ASTM number, schedule
25 or pressure class, joint type, manufacturer and model number where appropriate. List valves, specialties
26 and equipment with manufacturer and model number. The approved fire protection system data sheet(s)
27 will be made available to the Owners Project Representative for their use on this project.

28
29 **FIRE PROTECTION SYSTEM DATA SHEET**

30 <u>Item</u>	<u>Pipe Service/Sizes</u>	<u>Manufacturer/Model No.</u>	<u>Remarks</u>
31 Pipe			
32 Fittings			
33 Hangers & Supports			
34 Sprinkler Heads			
35 Valves			
36 Specialty Valves			
37 Pipe Specialties			
38 Fire Protection Specialties			
39 Fire Protection Equipment			

40
41 Shop drawing submittals are to be bound in a three ring binder, labeled, contain the project manual cover
42 page and a material index list page showing item designation, manufacturer and additional items supplied
43 with the installation. Submit for all equipment and systems as indicated in the respective specification
44 sections, marking each submittal with that specification section number. Mark general catalog sheets and
45 drawings to indicate specific items being submitted and proper identification of equipment by name and/or
46 number, as indicated in the contract documents. Include wiring diagrams of electrically powered
47 equipment.

48
49 Submittals shall be sent to the local Fire Chief or Fire Marshal for review prior to the Architect/Engineer.
50 Include copy of approval letter in submission to Architect/Engineer.

51
52 Submit plans indicating water supply location and size, piping layout and size, sprinkler locations and type,
53 hanger locations and type, equipment locations and type, valve locations and type, occupancy classes,
54 hydraulic reference points, design areas and discharge densities.

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

4
5 Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

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

9

10

11 **Firestop Systems:**

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

17

18 **OPERATING AND MAINTENANCE INSTRUCTIONS**

19 Refer to Division 01 of the Project Manual.

20

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

- 24 • Copies of all approved submittals along with approval letters.
- 25 • Manufacturer's wiring diagrams for electrically powered equipment.
- 26 • Records of tests performed to certify compliance with system requirements.
- 27 • Certificates of inspection by regulatory agencies.
- 28 • Parts lists for equipment and specialties.
- 29 • Manufacturer's installation, operation and maintenance recommendations for equipment and
30 specialties.
- 31 • Valve schedules
- 32 • Warranties
- 33 • Additional information as indicated in the technical specification sections

34

35 **RECORD DRAWINGS**

36 Refer to Division 01 of the Project Manual.

37

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

41

42 **TESTING**

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

44

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

47

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

51

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

54

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

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

3 4 **CLEANING**

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

7
8 Foreign matter shall be blown out, or flushed out, of pipes, tanks, pumps, strainers, motors, devices,
9 switches, and panels.

10
11 Identification plates on equipment shall be free of paint and dirt.

12
13 The Contractor shall leave his portion of the work ready for operation.

14 15 **WARRANTY**

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

17
18 The Contractor shall keep the system in good working order at no expense, unless defects are clearly the
19 result of improper or abnormal usage.

20
21 The Contractor shall submit to the A/E upon request for acceptance of the work, written certification that
22 the entire system has been installed and adjusted for operation in accordance with the Contract Documents.

23 24 25 **PART 2 - PRODUCTS**

26 27 **ELECTRICAL REQUIREMENTS**

28 **General:**

29 Work shall conform to requirements of Division 26.

30
31 Provide wiring diagrams.

32 33 **ACCESS PANELS AND DOORS**

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

37
38 Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12
39 inch by 12 inch for hand access and 24 inch by 24 inch for body access.

40
41 Panels shall be Milcor brand or equivalent.

42
43 Panels shall include concealed hinges, cam type locking devices, and have frame/border type necessary for
44 particular wall or ceiling construction they are installed. Access panels shall be flush mounted, recessed
45 frame type units. Access panels shall be prime coated steel, able to accept field painting for general
46 applications and stainless steel for use in toilet rooms, shower rooms and similar wet areas.

47
48 Refer to Architectural Room Finish Schedule for wall and ceiling surfaces and finishes.

49
50 For non-security applications, panel construction shall utilize 16 gauge frame with not less than 18 gauge
51 hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and
52 shall be key locked for public area applications.

53 54 **PIPE PENETRATIONS**

55 Refer to Division 01 requirements as well as the following.

1 **Fire, Smoke And Fire/Smoke Rated Surfaces:**

2 3M CP 25N/S or CP 25S/L caulk, 3M FS 195 wrap/strip with restricting collar, 3M CS 195 composite
3 sheet, Pipe Shields Inc. Series F fire barrier kits, Proset Systems fire rated floor and wall penetrations,
4 Insta-Foam Products Insta-Fire Seal Firestop Foam or Dow Corning Fire Stop System.

5
6 All fire stopping systems shall be provided by the same manufacturer.

7
8 UL listed or tested by independent testing laboratory, approved by State and Local Code jurisdictions.

9
10 Use product that has a rating not less than rating of wall or floor being penetrated. Reference architectural
11 drawings for identification of fire and/or smoke rated walls and floors.

12
13 Sleeves in concrete to be Schedule 40 steel pipe with integral water stop unless fire stop material used
14 includes a sleeve that is an integral part of rated assembly.

15
16 Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks,
17 firestop mortar or a combination of these products to provide a UL listed system for each application
18 required for this project. Provide mineral wool backing where specified in manufacturer's application
19 detail.

20
21 **Non-Rated Surfaces:**

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

24
25 In exterior wall openings below grade, use modular mechanical type seal consisting of interlocking
26 synthetic rubber links shaped to continuously fill the annular space between the un-insulated pipe and
27 cored opening or a water-stop type wall sleeve.

28
29 At interior partitions where pipe penetrations are sealed, use Tremco Dymonic, Sika Corp. Sikaflex 1a,
30 Sonneborn Sonolastic NPI, or Mameco Vulken 116 urethane caulk to effectively seal. Use galvanized sheet
31 metal sleeves in hollow wall penetrations.

32
33 **EQUIPMENT, PIPING AND VALVE IDENTIFICATION**

34 **Equipment Labels:**

35 After painting and covering, identify equipment, including pumps, tanks, compressors, and control panels.
36 Locate identification conspicuously.

37
38 Identification of equipment shall be by engraved white letters on a black 1/16 inch thick plastic laminate
39 panel, beveled edges, screw mounting, permanently attached to the equipment.

40
41 Minimum size:

42 3/4" x 2 1/2" with 3/8" letters.

43
44 Manufacturers:

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

47
48 **Pipe Identification:**

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

50
51 Printed labels identifying the fluid conveyed and direction of flow shall be attached to pipes in accessible
52 locations, at intervals not to exceed 20 feet, not less than once in each room, at each branch, adjacent to
53 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"
8" to 10"	2½"
10" and larger	3½"

1
2
3
4
5
6
7
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9
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11
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46

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, Terice, 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.

1 Ranges shall be as follows:

2
3 Fire Protection Water:
4 0 to 200 psig
5

6 **PART 3 - EXECUTION**

7 8 **GENERAL**

9 **Coordination Of Work:**

10 Review the complete set of Drawings and Specifications and report discrepancies to the A/E. Obtain
11 written instructions for changes necessary. Coordinate with each trade prior to beginning installation and
12 make provisions to avoid interferences. Changes required caused by neglect to coordinate shall be made
13 without expense to the project.
14

15 Piping shall not be located above electrical panels.
16

17 **Anchor Bolts, Sleeves, and Supports:**

18 These items required for the Work shall be furnished by the FPC for proper installation of his work. They
19 shall be installed (except as otherwise specified) by the trade furnishing and installing the material in which
20 they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade
21 requiring them. Expense resulting from the improper location or installation of anchor bolts, sleeves,
22 inserts and supports shall be paid for by the Contractor for the trade with responsibility for directing their
23 proper location.
24

25 **Adjustments In Locations:**

26 Locations of pipes and equipment, shall be adjusted to accommodate the work interferences anticipated and
27 encountered. Prior to fabrication determine the exact route and location of each pipe (subject to A/E's
28 approval).
29

30 **Right Of Way:**

31 New lines which pitch shall have the right-of-way over those which do not pitch. For example: Gravity
32 drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-
33 way over lines whose elevations can be changed. Notify A/E and other trades of conflicts.
34

35 Offsets, transitions and changes in direction of electrical raceways, pipes, and ducts shall be made to
36 maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.
37

38 **ASBESTOS ABATEMENT**

39 Asbestos abatement shall be by the Owner. If asbestos is encountered, the Owner shall be notified.
40 Asbestos materials shall be removed prior to continuing work.
41

42 **DEMOLITION**

43 Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to
44 be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition
45 to minimize the amount of contamination of the occupied space. Where pipe is removed and not
46 reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with
47 the Owner to minimize disruption to the existing building occupants.
48

49 All pipe, sprinklers, equipment, wiring, associated conduit and similar items demolished, abandoned, or
50 deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All
51 designated equipment is to be turned over to the Owner for his use at a place and time he so designates.
52 Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing
53 before work began.
54

1 **OPENINGS, CUTTING AND PATCHING**

2 Refer to Division 01 requirements.

3
4 Provisions for openings including chases, holes and clearances through walls, floors, and roof, ceilings and
5 partitions shall be made in advance of construction of each part of the building. Openings shall (except for
6 pipe sleeves) be provided by the GC for the respective materials in which openings occur, during the
7 construction of the building with the exception of pipe sleeves. Furnish required opening dimensions and
8 locations.

9
10 If the FPC neglects to inform the GC of his opening requirements before that portion of the building is
11 complete, the FPC shall cut the openings, provide framing and lintels. In the event holes must be cut
12 through reinforced concrete, drill so as to avoid spalling and unnecessary damage or weakening of
13 structural members. No chopping or breaking out is permitted. Before cutting or drilling, the Contractor
14 shall obtain permission from the A/E. Patch adjacent materials and repair damage resulting from the
15 cutting.

16
17 The FPC may perform core drilling for openings in existing walls and floors at the direction of the A/E.
18 Framed openings shall be by the GC.

19
20 **BUILDING ACCESS**

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

24
25 **EQUIPMENT ACCESS**

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

30
31 Accessible ceilings, (i.e. lay-in ceilings) do not require access panels. Provide color coded thumb tacks or
32 screws, depending on surface, for use in accessible ceilings.

33
34 **COORDINATION OF WORK**

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

38
39 Any work that is not coordinated and that interferes with other contractor's work shall be removed or
40 relocated at the installing contractor's expense.

41
42 Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

43
44 Offsets, transitions and changes in direction of electrical raceways, pipes and ducts shall be made as
45 required whether or not indicated on the Drawings.

46
47 Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions.
48 If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

49
50 **PIPING INSTALLATION**

51 **Installation Arrangement:**

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

1 **Connections Different From Those Shown:**

2 Where equipment requiring different arrangement or connections from those shown is used, install the
3 equipment to operate properly and in harmony with the intent of the Drawings and Specifications. When
4 requested by the A/E, submit drawings showing the proposed installation.
5

6 Upon approval of the revisions, make changes in piping, ductwork, supports, insulation, wiring, and
7 panelboards. Provide additional valves, fittings and other additional equipment required for the proper
8 operation of the system resulting from the selection of equipment, including required changes in affected
9 trades. The Contractor shall be responsible for the proper location of rough-in and connections by other
10 trades.
11

12 Changes shall be made at no increase in the Contract amount or additional cost to the other trades.
13

14 **SLEEVES**

15 Provide galvanized sheet metal sleeves for fire rated pipe penetrations through interior and exterior walls to
16 provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction
17 and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration
18 through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing
19 poured concrete walls where penetration is core drilled, pipe sleeve is not required. Grout holes directly
20 around steel pipe.
21

22 In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 3/4 inch above the
23 adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert
24 schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe
25 penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the
26 sleeve that will transfer weight to existing floor structure.
27

28 **PIPE PENETRATIONS**

29 **General:**

30 Coordinate location of building surface penetrations with appropriate contractors. Furnish sleeves, inserts,
31 and devices to be built into structure to contractor performing Work. Prepare Shop Drawings for approval
32 for penetrations of structural elements, including floor slabs, shear walls, and bearing walls. Do not allow
33 penetrations to be made until Shop Drawings are approved.
34

35 **Fire Rated Surfaces:**

36 Install products in accordance with the manufacturer's instructions where pipe penetrates a fire rated
37 surface. When pipe is insulated, use product that maintains integrity of insulation and vapor barrier. Where
38 sleeve must be installed in existing floor, grout area around sleeve to restore floor integrity. In wet area
39 floor penetration, top surface of penetration to be 2 inches above adjacent floor with additional height
40 obtained by means of concrete pad poured integral with floor.
41

42 **Non-Rated Surfaces:**

43 Install escutcheons or floor/ceiling plates where pipe penetrates non-fire rated surfaces in occupied spaces.
44 Size units to accommodate insulation, where applicable. Escutcheons are not required when insulation
45 completely covers wall opening and insulation end is trimmed in a neat manner. Occupied spaces for this
46 Paragraph include only those rooms with finished ceilings and penetration occurs below ceiling.
47

48 Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply
49 sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or
50 insulation is completely blocked.
51

52 Completely seal (or caulk) around pipe penetrations through non-rated, smoke tight corridor walls in
53 healthcare facilities. Refer to architectural drawings for additional information.
54

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

- 2 • Non-fire rated mechanical rooms
- 3 • Isolation rooms
- 4 • Conference rooms
- 5 • Private offices

6

7 **ESCUTCHEON PLATES**

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

11

12 **PAINTING**

13 Refer to Division 09.

14

15 **IDENTIFICATION**

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

19

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

21

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

27

28 Identify valves with signs per NFPA rulings.

29

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

34

35

36

END OF SECTION

1 **DESCRIPTION**

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

5
6 Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord
7 of any truss or joist.

8
9 Fasteners depending on soft lead for holding power or requiring explosive powder actuation will not be
10 accepted.

11
12 Support apparatus and material under all conditions of operation, variations in installed and operating
13 weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

14
15 **DESIGN CRITERIA**

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

18
19 Materials and application of pipe hangers and supports shall be in accordance with NFPA rulings and be
20 UL/FM listed and approved.

21
22 **SUBMITTALS**

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

24
25 Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe
26 size and type of service. Provide details on the working drawings submitted for approval with all pertinent
27 information listed.

28
29
30 **PART 2 - PRODUCTS**

31
32 **MANUFACTURERS**

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

35
36 **STRUCTURAL SUPPORTS**

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

40
41 **PIPE HANGERS AND SUPPORTS**

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

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

45
46 Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Grinnell
47 260.

48
49 **Hangers for Pipe Sizes 4" Through 8":**

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

52
53 Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Grinnell
54 260.

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51

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.

1 **Drilled Fasteners:**

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

4
5 **ANCHORS**

6 Use welding steel shapes, plates, and bars to secure piping to the structure.
7

8 **EQUIPMENT SUPPORT**

9 Support equipment plumb, rigid, and true to line. Examine Drawings, and manufacturer's data to determine
10 how equipment and piping are to be supported, mounted, or suspended. Provide rods, bolts, inserts, pipe
11 stands, brackets and accessories for proper support.
12

13 **Equipment Stands:**

14 Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three
15 coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive
16 atmosphere coatings.
17

18
19 **PART 3 - EXECUTION**

20
21 **INSTALLATION**

22 Size, apply and install supports and anchors in compliance with manufacturers recommendations.
23

24 Secure pipe in place to prevent vibration, maintain proper slope and provide for expansion and contraction.
25

26 Design supports of strength and rigidity to suit loading, service, and manner which do not unduly stress the
27 building construction. Where support is from concrete construction, take care not to weaken concrete or
28 penetrate waterproofing. Fasten supports and hangers to building steel framing wherever practical. Do not
29 use another pipe for support. Do not use perforated iron, chain or wire as hangers.
30

31 Use inserts for suspending hangers from reinforced concrete slabs wherever practical. Where inserts are
32 not practical, provide channels or angles from which to suspend hangers/supports. Fasten structural steel
33 to concrete with expansion bolts.
34

35 Provide expansion anchors in concrete slabs for installation of threaded support rods.
36

37 Provide hangers capable of vertical adjustment after piping is erected. Do not pierce ductwork with hanger
38 rods. On threaded support rods and bolts, weld nuts to rods, peen threads, or provide double set of nuts
39 with lock washers to prevent loosening. Use beam clamps for attaching hangers to structural steel.
40

41 Coordinate hanger and support installation to properly group piping of all trades.
42

43 Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard
44 structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels
45 are used, pipe supporting devices made specifically for use with the channels may be substituted for the
46 specified supporting devices provided that similar types are used and all data is submitted for prior
47 approval.
48

49 Perform welding in accordance with standards of the American Welding Society.
50

51 **HANGER AND SUPPORT SPACING**

52 Support horizontal piping per NFPA 13.
53

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

3
4 Provide galvanized steel supports for steel piping.
5

6 Provide CPVC dipped hangers or provide Unistrut "Uni-Cushion" vinyl strip at galvanized hangers for
7 copper lines.
8

9 Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze
10 hangers.
11

12 Support riser piping independently of connected horizontal piping.
13

14 Adjust hangers to obtain the slope specified in the piping section of these specifications.
15

16 Space hangers for pipe as follows:
17

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"
Copper	3-1/2" through 8"	15'-0"	10'-0"
Steel	1" through 1-1/4"	12'-0"	15'-0"
Steel	1-1/2" through 8"	15'-0"	15'-0"

18
19 Unsupported length from the last hanger and an end sprinkler shall be as follows:
20

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

21
22 **RISER CLAMPS**

23 Support vertical piping with clamps secured to the piping and resting on the building structure or secured
24 to the building structure below at each floor. Use method of securing the vertical risers to the building
25 structure below in stairwell locations.
26

27 **ANCHORS**

28 Install where indicated on the drawings and details. Where not specifically indicated, install anchors at
29 ends of principal pipe runs and at intermediate points in pipe runs. Make provisions for preset of anchors
30 as required to accommodate both expansion and contraction of piping.
31
32
33

END OF SECTION

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1 **DESCRIPTION**

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

4
5 The work under this Section includes, but is not limited to the following:

- 6 • Provide complete, approved automatic sprinkler system(s) to give fire suppression coverage to all
7 areas/rooms part of the building renovation.

8
9 This portion of the project is design build. The contractor shall follow the specifications for type of
10 systems, materials and equipment to use.

11
12 The contractor will be the Engineer of Record and shall prepare, seal and submit drawings and calculations
13 as required to obtain approval and building permit from State, Insurance Company, and local authority.
14 Submit drawings and calculations to all authorities as required.

15
16 These documents, along with local regulations and codes, will be the basis for the Fire Protection design
17 and construction.

18
19 The contractor shall calculate, size and select all systems as defined by the documents. This shall include
20 coordination with other trade contractors.

21
22 **SYSTEM DESCRIPTION**

23 Provide a wet pipe automatic sprinkler piping system for the renovated areas as shown on the fire
24 protection and architectural drawings.

25
26 **DESIGN STANDARDS**

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

29
30 **Design system for the most hydraulically remote area based on the following:**

31

Space Type/ Location:	Occupancy Classification	Density (GPM/Ft ²)	Area (Ft. ²)	Hose (GPM)	Max Vel. (Ft./Sec.)	Duration (Min.)
Common Areas	Light Hazard	0.10	1,500	100	20	60
Office Spaces	Light Hazard	0.10	1,500	100	20	60
Mech. Rooms	Ordinary (Group 1)	0.15	1,500	250	20	90
Storage	Ordinary (Group 1)	0.15	1,500	250	20	90

32
33 **Available water supply data for system design is as follows:**

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

37
38 Contractor shall submit seven (7) copies of hydraulic calculations with shop drawings on standard form
39 specified in NFPA No. 13, Chapter 7, Sections 7-2 through 7-3.5 inclusive and Figures A-7-3.3 and A-7-
40 3.4.

41
42 **QUALITY ASSURANCE**

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

44
45 Fire protection system components shall be rated for a minimum operating pressure of 175 psig.

46
47 To assure uniformity and compatibility of piping components in grooved piping systems, all grooved
48 products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied from the
49 same manufacturer as the grooved components.

1 **SUBMITTALS**

2 **Shop Drawings:**

3 Submit shop drawings of all fire sprinkler system components.

4
5 **Plans:**

6 Submit contractor-prepared plans/drawings.

7
8 Submit per NFPA 13; installation plans, working plans, shop drawings, hydraulic calculations, and
9 manufacturer's data on devices, etc., indicating by model and number to be used for review and approval.
10 Contractor shall obtain the necessary insurance underwriters, State and Local Fire Department approvals
11 prior to submitting shop drawings. Include copy of approval letter in submission to Architect/Engineer.
12

13 Prepare drawings at minimum scale of 1/8" per foot for plans and 1/4" per foot or larger for details. Show
14 all piping, lighting, equipment, ductwork, sprinklers, hangers, roof construction and occupancy of each
15 area, including ceiling and roof heights.
16

17 Installation shall be coordinated with the latest architectural, structural, mechanical, plumbing and electrical
18 drawings.
19

20 Contractor shall submit drawings to Engineer which have been reviewed and stamped "approved" by the
21 authority having jurisdiction. No work shall commence until all approvals have been obtained. Allow
22 sufficient time in the construction schedule for the approvals.
23

24 **As-Built Drawings:**

25 Maintain at the site an up-to-date marked set of as-built drawings which shall be corrected and delivered to
26 the Architect upon completion of the work.
27

28 Furnish the Architect one (1) reproducible print of corrected shop drawings, including plans, revised to
29 show "as built" conditions.
30

31 **COMMISSIONING**

32 The project will be commissioned by a separate 3rd party commissioning agent.
33

34 See Section 01 91 13 for all commissioning requirements including construction verification checklists,
35 functional performance testing, meetings and on-site verification.
36
37

38 **PART 2 - PRODUCTS**

39
40 **PIPE**

41 **Wet Systems:**

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

43
44 Sprinkler piping shall be schedule 40 threaded up to 2" in size.

45
46 Schedule 10 threaded light wall not allowed.
47

48 **FITTINGS**

49 Malleable iron, Class 150, threaded, ANSI B16.3.
50

51 Ductile iron, grooved end, 1000 lb/in² working pressure rating, UL listed or FM approved for automatic
52 sprinkler.
53

54 Ductile or malleable iron, plain end with EPDM gasket, carbon steel bolts or locking lugs UL listed or FM
55 approved for automatic sprinkler, Grinnell "Sock-it".
56

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

1 Carbon steel, Class 150, flanged, ASTM A105.

3 JOINTS

4 Iron Pipe:

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

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

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

11 Rigid Type:

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

20 Flexible Type:

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

26 VALVES

27 Manufacturers:

28 Grinnell, Nibco, TYCO, Victaulic, or Wilkins.

30 Test Drain Valve:

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

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

36 SPRINKLERS

37 Manufacturer:

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

41 General:

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

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

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

55 Types:

56 Refer to Sprinkler Schedule on plans for sprinkler head types and finishes in each area. Provide sprinkler

1 guards in areas where sprinklers may be subject to damage (i.e. mechanical rooms).

2
3 **Finished Areas:**

4 Chrome plated bronze body quick response pendent, concealed, or side-wall sprinklers with glass bulb heat
5 sensor. Semi-recessed and sidewall sprinklers shall have adjustable recessed escutcheon. Design Basis:
6 Victaulic Model V27.

7
8 **Unfinished Areas:**

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

11
12 **Ratings:**

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

15
16 **MISCELLANEOUS EQUIPMENT**

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

19
20
21 **PART 3 - EXECUTION**

22
23 **INSTALLATION**

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

26
27 Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and
28 recommendations. The gasket style and elastomeric material (grade) shall be verified as suitable for the
29 intended service as specified. Gaskets shall be molded and produced by Victaulic. Grooved end shall be
30 clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper
31 gasket sealing. A Victaulic factory-trained field representative shall provide on-site training for
32 contractor's field personnel in the proper use of grooving tools and installation of grooved piping products.
33 Factory-trained representative shall periodically review the product installation. Contractor shall remove
34 and replace any improperly installed products.

35
36 The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the
37 system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any
38 tools to remove bulb protectors.

39
40 **GENERAL**

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

48
49 Maintain piping in clean condition internally during construction.

50
51 Provide clearance for access to valves and piping specialties.

52
53 Install piping so that system can be drained. Where possible, slope to main drain valve. Piping may be
54 installed level (WET SYSTEMS ONLY). Where piping cannot be fully drained, install nipple and cap for
55 drainage of less than 5 gallons or valve/nipple/cap for drainage over 5 gallons.

1 Do not install piping within exterior walls.

2

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

5

6 **VALVES**

7 Properly align piping before installation of valves. Do not support weight of piping system on valve ends.

8 Mount valves in locations which allow access for operation, servicing and replacement. Install all valves

9 with the stem in the upright or horizontal position. Valves installed with the stems down will not be

10 accepted. All system shut-off valves shall have a supervisory switch.

11

12 **GAUGES**

13 Provide a valved pressure gauge in main sprinkler risers.

14

15 **SPRINKLERS**

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

18

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

21

22 **TESTING**

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

24

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

27

28

29

END OF SECTION

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SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

SCOPE

This section includes information common to two or more technical plumbing 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
- Regulatory Requirements
- Reference Standards
- Quality Assurance
- Abbreviations and Symbols
- Definitions
- Coordination
- Electronic Drawings
- Continuity of Existing Services
- Protection of Finished Surfaces
- Sealing and Firestopping
- Off Site Storage
- Submittals
- Specified Materials and Equipment
- Equipment Installation
- Operating and Maintenance Manuals
- Record Drawings
- Training of Owner Personnel
- Testing
- Cleaning
- Commissioning
- Warranty

PART 2 - PRODUCTS

- Electrical Requirements
- Access Panels and Doors
- Pipe Penetrations
- Equipment, Piping, and Valve Identification
- Equipment Accessories

PART 3 - EXECUTION

- General
- Asbestos Abatement
- Demolition
- Openings, Cutting and Patching
- Building Access
- Equipment Access
- Coordination of Work
- Piping Installation
- Sleeves
- Pipe Penetrations
- Escutcheon Plates
- Painting

1 Identification

2
3 **RELATED WORK**

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

5
6 This section applies to all Division 22 sections of plumbing.

7
8 Section 01 91 13 – Commissioning Requirements

9
10 **REGULATORY REQUIREMENTS**

11 **Codes and Standards:**

12 All plumbing work shall conform to the requirements of Wisconsin Administrative Code SPS 382 and SPS
13 384, Wisconsin Uniform Plumbing Code.

14
15 All materials and workmanship shall comply with applicable Codes, local ordinances, industry standards
16 and utility regulations. In case of differences between such Codes, and the Contract Documents, the most
17 stringent shall govern. Promptly notify the A/E in writing of any such difference.

18
19 **Non-Compliance:**

20 Should the Contractor perform any work that does not comply with the above requirements, without having
21 notified the A/E, he shall bear all costs necessary to correct the deficiencies.

22
23 **Permits, Inspections and Fees:**

24 All required, permits, and inspections shall be requested and obtained by the Contractor.

25
26 All fees and charges for approvals, reviews, or other inspections shall be paid by the Contractor.

27
28 All fees and charges assessed by local utilities for water, sewer, gas or other services shall be included in
29 the bid and shall be paid by the Contractor(s).

30
31 **REFERENCE STANDARDS**

32 Standards cited in the Specifications shall be the most recent editions.

33
34 Abbreviations of standards organizations referenced in this and other sections are as follows:

35 ABMA American Boiler Manufacturers Association

36 AMCA Air Movement and Control Association

37 ANSI American National Standards Institute

38 ASME American Society of Mechanical Engineers

39 ASPE American Society of Plumbing Engineers

40 ASSE American Society of Sanitary Engineering

41 ASTM American Society for Testing and Materials

42 AWWA American Water Works Association

43 CISPI Cast Iron Soil Pipe Institute

44 CS Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS

45 EPA Environmental Protection Agency

46 FS Federal Specifications, Superintendent of Documents, U.S. Government Printing Office

47 IAPMO International Association of Plumbing & Mechanical Officials

48 IEEE Institute of Electrical and Electronics Engineers

49 MCA Mechanical Contractors Association

50 MICA Midwest Insulation Contractors Association

51 MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.

52 NBS National Bureau of Standards

53 NEC National Electric Code

54 NEMA National Electrical Manufacturers Association

55 NFPA National Fire Protection Association

56 NSF National Sanitation Foundation

1 PDI Plumbing and Drainage Institute
2 UL Underwriters Laboratories Inc.

3
4 Standards referenced in this section:

5 ACI 614 Recommended Practice for Measuring, Mixing and Placing of Concrete
6 ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
7 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
8 UL1479 Fire Tests of Through-Penetration Firestops
9 UL723 Surface Burning Characteristics of Building Materials

10
11 **QUALITY ASSURANCE**

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

13
14 All products and materials used are to be new, undamaged, clean and in good condition. Existing products
15 and materials are not to be reused unless specifically indicated.

16
17 Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings,
18 or engineering parameters from those indicated on the contract documents, the contractor is responsible for
19 all costs involved in integrating the equipment or accessories into the system and for obtaining the intended
20 performance from the system into which these items are placed.

21
22 **ABBREVIATIONS AND SYMBOLS**

23 Key to abbreviations and symbols shall be on the Drawings.

24
25 The following are additional abbreviations used in the Specifications:

26 A/E Architect/Engineer
27 GC General Contractor
28 PC Plumbing Contractor
29 FPC Fire Protection Contractor
30 HC Heating Ventilating and Air Conditioning Contractor
31 EC Electrical Contractor

32
33 **DEFINITIONS**

34 **Furnish:**

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

36
37 **Install:**

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

41
42 **Provide:**

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

44
45 **COORDINATION**

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

51
52 **ELECTRONIC DRAWINGS**

53 Drawings in electronic format will be made available to successful Plumbing contractor at a non-refundable
54 cost specified under Division 01 of Specifications. If no cost is specified in Division 01, default cost shall
55 be \$75 per drawing. Drawings provided may or may not be updated to reflect Addenda items. Use of
56 Drawings is limited to this Project and may not be forwarded to any other party for any purpose. Use of

1 files will be at Contractor's sole risk and without liability or legal exposure to JDR Engineering, Inc or its
2 employees. Architectural drawings or any other drawings not produced by JDR Engineering will not be
3 provided.

4
5 **CONTINUITY OF EXISTING SERVICES**

6 Refer to Division 01 of the Project Manual.

7
8 Do not interrupt or change existing services without prior approval from Owner, Architect, Engineer or
9 Construction Manager. When interruption is required, coordinate down-time with Owner to reduce
10 disruption to activities. Scope of Work is indicated on Contract Documents or described herein. Unless
11 specifically stated, any work involved in interrupting or changing existing services is to be done during
12 normal working hours.

13
14 **PROTECTION OF FINISHED SURFACES**

15 Refer to Division 01 of the Project Manual.

16
17 Furnish one can of touch-up paint for each different color factory finish to be finished surface of product.
18 Deliver touch-up paint with other "loose and detachable parts" as covered in General Requirements.

19
20 **SEALING AND FIRESTOPPING**

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

25
26 **OFF SITE STORAGE**

27 Refer to Division 01 of the Project Manual.

28
29 **SUBMITTALS**

30 Refer to Division 01, of the Project Manual.

31
32 Submit shop drawings with space for approval stamps of GC and A/E.

33
34 Submit the following plumbing system data sheet for approval by the GC and A/E. List piping material
35 type for each piping service on the project, ASTM number, schedule or pressure class, joint type,
36 manufacturer and model number where appropriate. List valves and specialties for each piping service,
37 fixture and equipment with manufacturer and model number.

38
39 **PLUMBING SYSTEM DATA SHEET**

40 Item Pipe Service/Sizes Manufacturer/Model No. Remarks

41 Pipe

42 Fittings

43 Unions

44 Valves:

45 Ball

46 Balancing

47 Other

48 Hangers & Supports

49 Insulation

50 Plbg. Specialties:

51 Cleanouts

52 Plbg. Fixtures:

53 Sink

54 Faucet

55 Stop/Supplies

56 Waste/Trap

1 Submit manufacturer's color charts where finish color is specified to be selected by Architect/Engineer.
2

3 Shop drawing submittals are to be bound, labeled, contain the project manual cover page and a material
4 index list page showing item designation, manufacturer and additional items supplied with the installation.
5 Submit for all equipment and systems as indicated in the respective specification sections, marking each
6 submittal with that specification section number. Mark general catalog sheets and drawings to indicate
7 specific items being submitted and proper identification of equipment by name and/or number, as indicated
8 in the contract documents. Include wiring diagrams of electrically powered equipment.
9

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

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

14
15 **Firestop Systems:**

16 Contractor shall submit product data for each firestop system. Submittals shall include product
17 characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and
18 procedures for each method of installation applicable to this project. For non-standard conditions where no
19 UL tested system exists, submit manufacturer's drawings for UL system with known performance for which
20 an engineering judgement can be based upon.
21

22 **SPECIFIED MATERIALS AND EQUIPMENT**

23 Design is based on equipment specified by manufacturer and model number as specified on Drawing
24 Schedules. Where certain items are specified by manufacturer or trade name, Contractor's bid shall be
25 based on use of named item. Where one (1) make is described and other makes are listed, comparable
26 models of other named equipment may also be used, provided they meet requirements of Specifications.
27

28 When equipment or accessories used differ in arrangement, configuration, dimensions, ratings, or
29 engineering parameters from those on Drawing schedules, Contractor shall be responsible for costs involved in
30 integrating equipment or accessories into system. Contractor shall be responsible for obtaining original
31 design performance from system into which items are placed, regardless of whether manufacturer/model is
32 specified equivalent or substitute.
33

34 If Contractor wishes to use items other than those named in Specifications in base bid, request for approval
35 of substitution must be made in writing to A/E at least 14 days prior to opening of bids. Include complete
36 technical and descriptive data with request. If approved, an Addendum will be issued notifying bidders of
37 approval. Request for approval will be considered only if requested by prime bidding Contractor.
38

39 **EQUIPMENT INSTALLATION**

40 Drawings show general arrangement and location of equipment and appurtenances. It is Contractor's
41 responsibility to install equipment in a location and manner that allows for proper service and maintenance
42 access to equipment. Work shall generally conform to requirements shown on Drawings. However,
43 location of equipment may require field adjustments to obtain required service space. DO NOT SCALE
44 OFF PLANS to determine proper location of equipment. Because of scale of Drawings, it is not possible to
45 indicate exact routing of piping, and offsets, fittings and accessories required to provide proper service
46 access to equipment. Contractor shall route and install ductwork and piping to provide required service
47 access to equipment.
48

49 If, during construction phase of Project, contractor feels inadequate space exists, or equipment locations
50 must be substantially modified to provide proper service and maintenance access, prior to installing
51 equipment, contractor shall notify engineer in writing, outlining general concerns and proposed
52 modifications. Equipment installed without providing manufacturer's required maintenance and service
53 clearance shall be considered defective. Contractor shall remove and relocate piping, ductwork and
54 equipment, to provide required service clearances at contractor's expense.
55

1 **OPERATING AND MAINTENANCE INSTRUCTIONS**

2 Refer to Division 01 of the Project Manual.

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

- 7 • Copies of all approved shop drawings.
- 8 • Manufacturer's wiring diagrams for electrically powered equipment
- 9 • Records of tests performed to certify compliance with system requirements
- 10 • Certificates of inspection by regulatory agencies
- 11 • Parts lists for fixtures, equipment, valves and specialties.
- 12 • Manufacturer's installation, operation and maintenance recommendations for fixtures,
13 equipment, valves and specialties.
- 14 • Valve schedules
- 15 • Warranties
- 16 • Additional information as indicated in the technical specification sections

17
18 **RECORD DRAWINGS**

19 Refer to Division 01 of the Project Manual.

20
21 Maintain Record Drawings on daily basis to be turned over at completion of Project.

22
23 **TRAINING OF OWNER PERSONNEL**

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

27
28 Provide a total of 2 hours of training (minimum) over a total of 1 training session. Coordinate with Owner
29 at least 2 weeks prior to scheduling training systems.

30
31 **TESTING**

32 Provide materials, labor, and equipment required for testing.

33
34 Notify Inspector(s) one day prior to the time when the test is ready to be performed.

35
36 After testing, submit in writing the time, date, name and title of the person approving the test. This shall also
37 include the description and what portion of the system has been tested. The person approving the test shall sign the
38 submittal.

39
40 Records shall be maintained of testing that has been completed, and shall be made available at the job site.

41
42 Upon completion of the work, records and certifications approving testing requirements shall be submitted.

43
44 Defective work or material shall be replaced or repaired, and the test repeated. Repairs shall be made with new
45 materials.

46
47 **CLEANING**

48 Keep the premises broom clean and free of surplus materials, rubbish and debris.

49
50 After fixtures and equipment have been installed, remove stickers, rust stains, labels, and temporary covers.

51
52 Foreign matter shall be blown out, or flushed out, of pipes, tanks, pumps, strainers, motors, devices,
53 switches, fixtures, and panels.

54
55 Boilers and water heaters shall be cleaned, drained, flushed and recleaned until free of oil and debris.

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

2
3 Leave the work in a condition ready for operation.

4
5 **COMMISSIONING**

6 The project will be commissioned by a separate 3rd party commissioning agent.

7
8 See Section 01 91 13 for all commissioning requirements including construction verification checklists,
9 functional performance testing, meetings and on-site verification.

10
11 **WARRANTY**

12 Warrant that work shall function for one year immediately following acceptance of the system(s).

13
14 Keep the system in good working order at no expense, unless defects are clearly the result of improper or abnormal
15 usage.

16
17 Submit for acceptance of the work, written certification that the entire system has been installed and
18 adjusted for operation in accordance with the Contract Documents.

19
20
21 **PART 2 – PRODUCTS**

22
23 **ELECTRICAL REQUIREMENTS**

24 **General:**

25 Work shall conform to requirements of Division 26.

26
27 Power wiring shall be provided by the EC. Control wiring shall be provided by the PC. Plumbing
28 Contractor shall provide wiring diagrams for use by the Electrical Contractor.

29
30 **ACCESS PANELS AND DOORS**

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

34
35 Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12
36 inch by 12 inch for hand access and 24 inch by 24 inch for body access.

37
38 Panels shall be Milcor brand or equivalent.

39
40 Panels shall include concealed hinges, cam type locking devices, and have frame/border type necessary for
41 particular wall or ceiling construction they are installed. Access panels shall be flush mounted, recessed
42 frame type units. Access panels shall be prime coated steel, able to accept field painting for general
43 applications and stainless steel for use in toilet rooms, shower rooms and similar wet areas.

44
45 Refer to Architectural Room Finish Schedule for wall and ceiling surfaces and finishes.

46
47 For non-security applications, panel construction shall utilize 16 gauge frame with not less than 18 gauge
48 hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and
49 shall be key locked for public area applications.

50
51 **PIPE PENETRATIONS**

52 Refer to Division 01 requirements as well as the following.

53
54 **Fire, Smoke And Fire/Smoke Rated Surfaces:**

55 3M CP 25N/S or CP 25S/L caulk, 3M FS 195 wrap/strip with restricting collar, 3M CS 195 composite
56 sheet, Pipe Shields Inc. Series F fire barrier kits, Proset Systems fire rated floor and wall penetrations,
57 Insta-Foam Products Insta-Fire Seal Firestop Foam or Dow Corning Fire Stop System.

1 All fire stopping systems shall be provided by the same manufacturer.
 2
 3 UL listed or tested by independent testing laboratory, approved by State and Local Code jurisdictions.
 4
 5 Use product that has a rating not less than rating of wall or floor being penetrated. Reference architectural
 6 drawings for identification of fire and/or smoke rated walls and floors.
 7
 8 Sleeves in concrete to be Schedule 40 steel pipe with integral water stop unless fire stop material used
 9 includes a sleeve that is an integral part of rated assembly.
 10
 11 Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks,
 12 firestop mortar or a combination of these products to provide a UL listed system for each application
 13 required for this project. Provide mineral wool backing where specified in manufacturer's application detail.
 14

15 **Non-Rated Surfaces:**

16 Stamped steel, chrome plated, hinged, split ring escutcheons or floor/ceiling plates for covering openings in
 17 occupied spaces.
 18

19 In exterior wall openings below grade, use modular mechanical type seal consisting of interlocking
 20 synthetic rubber links shaped to continuously fill the annular space between the un-insulated pipe and cored
 21 opening or a water-stop type wall sleeve.
 22

23 At interior partitions where pipe penetrations are sealed, use Tremco Dymonic, Sika Corp. Sikaflex 1a,
 24 Sonneborn Sonolastic NPI, or Mameco Vulken 116 urethane caulk to effect seal. Use galvanized sheet
 25 metal sleeves in hollow wall penetrations.
 26

27 **EQUIPMENT, PIPING AND VALVE IDENTIFICATION**

28 **Equipment Labels:**

29 After painting and covering, identify equipment, including pumps, tanks, compressors, and control panels.
 30 Locate identification conspicuously.
 31

32 Identification of equipment shall be by engraved white letters on a black 1/16 inch thick plastic laminate
 33 panel, beveled edges, screw mounting, permanently attached to the equipment.
 34

35 Minimum size:
 36 3/4" x 2 1/2" with 3/8" letters.
 37

38 Manufacturers:

39 Setonply ® Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by
 40 W. H. Brady.
 41

42 **Pipe Identification:**

43 Pipe identification shall conform to ANSI A13.1 "Scheme for Identification of Piping Systems".
 44

45 Printed labels identifying the fluid conveyed and direction of flow shall be attached to pipes in accessible
 46 locations, at intervals not to exceed 20 feet, not less than once in each room, at each branch, adjacent to
 47 each access door or panel, at each valve and where exposed piping passes through walls and floors.
 48

Outside Diameter of Pipe Covering	Minimum Size of Letters
up to 1 1/4"	1/2"
1 1/2" to 2"	3/4"
2 1/2" to 6"	1 1/2"

49 Manufacturers:

50 EMED Co., Seton Name Plate Company, or W. H. Brady.
 51

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

3
4 **Valve Tags:**

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

8
9 The following prefixes shall be used:
10 PLBG - Plumbing

11
12 **Manufacturers:**

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

14
15 **Valve Charts:**

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

18
19 Valve number Size
20 Manufacturer Type of valve
21 Type of service Location

22
23 Furnish a typewritten chart indicating equipment or areas served by each numbered valve and incorporate
24 in Operating and Maintenance Manuals.

25
26 **EQUIPMENT ACCESSORIES**

27 Provide equipment accessories, connections, and incidental items.

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

31
32
33 **PART 3 – EXECUTION**

34
35 **GENERAL**

36 **Coordination Of Work:**

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

41
42 Piping shall not be located above electrical panels.

43
44 **Anchor Bolts, Sleeves, and Supports:**

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

51
52 **Adjustments In Locations:**

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

56

1 **Right Of Way:**

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

5
6 Offsets, transitions and changes in direction of electrical raceways, pipes, and ducts shall be made to
7 maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.

8
9 **ASBESTOS ABATEMENT**

10 Asbestos abatement shall be by the Owner. If asbestos is encountered, the Owner shall be notified.
11 Asbestos materials shall be removed prior to continuing work.

12
13 **DEMOLITION**

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

19
20 All pipe, fixtures, equipment, wiring, associated conduit and similar items demolished, abandoned, or
21 deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All
22 designated equipment is to be turned over to the Owner for his use at a place and time he so designates.
23 Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing
24 before work began.

25
26 **OPENINGS, CUTTING AND PATCHING**

27 Refer to Division 01 of the Project Manual.

28
29 Provisions for openings including chases, holes and clearances through walls, floors, and roof, ceilings and
30 partitions shall be made in advance of construction of each part of the building. Openings shall be provided
31 by the GC for the respective materials in which openings occur, during the construction of the building
32 with the exception of pipe sleeves. The PC shall furnish to the GC opening dimensions and locations.

33
34 If the PC neglects to inform the GC of his opening requirements before that portion of the building
35 construction is complete, the PC shall cut the openings and provide framing and lintels. In the event holes
36 must be cut through reinforced concrete, avoid spalling and unnecessary damage or weakening of structural
37 members. No chopping or breaking out is permitted. Before cutting or drilling, obtain permission from the
38 A/E. Patch adjacent materials and repair damage resulting from the cutting.

39
40 The PC may perform core drilling for openings in existing walls and floors at the direction of the A/E.
41 Framed openings shall be by the GC.

42
43 Patch interior trench excavation to match existing slab-on-grade with concrete: 3500 PSI at 28 days, 3"
44 slump, 3/4" maximum aggregate size, 5.5 bags of cement per cubic yard.

45
46 **BUILDING ACCESS**

47 Arrange for necessary openings in building to allow for admittance of all apparatus. When building access
48 was not previously arranged and must be provided by Contractor, restore opening to original condition after
49 the apparatus has been brought into building. Coordinate with Architect/Engineer.

50
51 **EQUIPMENT ACCESS**

52 Install piping, conduit, fixtures, and accessories to permit access to equipment for maintenance. Coordinate
53 exact location of wall and ceiling access panels and doors with General Contractor, making sure access is
54 available for equipment and specialties. Where access is required in plaster walls or ceilings, furnish and
55 install access doors required. Coordinate for installation of access doors utilizing General Contractor and
56 other appropriate on-site subcontractor for access door installation.

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

3 4 **COORDINATION OF WORK**

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

8
9 Any work that is not coordinated and that interferes with other contractor's work shall be removed or
10 relocated at the installing contractor's expense.

11
12 Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

13
14 Offsets, transitions and changes in direction of electrical raceways, pipes and ducts shall be made as
15 required to maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.
16 Furnish and install all traps, air vents, sanitary vents, etc., as required to effect the offsets, transitions and
17 changes in direction.

18
19 New lines which pitch shall have the right-of-way over those which do not pitch. For example: Gravity
20 drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-
21 way over lines whose elevations can be changed. Notify A/E and other trades of any conflicts.

22
23 Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions.
24 If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

25 26 **PIPING INSTALLATION**

27 **General:**

28 Expansion and contraction of piping shall be provided for by expansion loops, bends, swing joints, or
29 expansion joints to prevent damage to connections, piping, equipment of the building.

30
31 Unions or flanges shall be installed on all by-passes, ahead of all traps, adjacent to screw connection
32 valves, and at all connections to equipment, whether or not shown on drawings.

33 34 **Installation Arrangement:**

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

39 40 **Connections Different From Those Shown:**

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

44
45 If the proposed installation is approved, make all incidental changes in piping, ductwork, supports,
46 insulation, wiring, panelboards, etc. Provide any additional motors, controllers, valves, fittings and other
47 additional equipment required for the proper operation of the system resulting from the selection of
48 equipment, including all required changes in affected trades. The Contractor shall be responsible for the
49 proper location of rough-in and connections by other trades.

50
51 All changes shall be made at no increase in the Contract amount or additional cost to the other trades.

52 53 54 **SLEEVES**

55 Provide galvanized sheet metal sleeves for pipe penetrations through interior and exterior walls to provide a
56 backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish.

1 Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall
2 is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing poured concrete
3 walls where penetration is core drilled, pipe sleeve is not required.

4
5 Pipe sleeves are not required in existing poured concrete walls where penetrations are core drilled.

6
7 Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated
8 pipe to run through sleeve), cast in place.

9
10 In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 1 inch above the
11 adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert
12 schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe
13 penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the
14 sleeve that will transfer weight to existing floor structure.

15
16 For floor penetrations through existing floors in mechanical and wet locations, core drill opening and
17 provide 1-1/2" x 1-1/2" x 1/8" galvanized steel angles fastened to floor surrounding the penetration or
18 group of penetrations to prevent water from entering the penetration. Provide urethane caulk between
19 angles and floor and fasten angles to floor a minimum of 8" on center. Seal corners water tight with
20 urethane caulk. Or, core drill sleeve openings large enough to insert schedule 40 sleeve and grout area
21 around sleeve with hydraulic setting non-shrink grout/cement.

22
23 Pipe sleeves are not required in cored floor pipe penetrations through existing floors that are not located in
24 mechanical rooms, food service areas or wet locations listed above.

25 26 **PIPE PENETRATIONS**

27 **General:**

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

32 33 **Fire Rated Surfaces:**

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

39 40 **Non-Rated Surfaces:**

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

45
46 In exterior wall openings below grade, place water-stop type wall sleeve before concrete pour or core drill
47 opening after pour. Assemble rubber links to proper size for pipe and tighten in place in accordance with
48 manufacturer's instructions.

49
50 Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply
51 sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or
52 insulation is completely blocked.

1 **ESCUTCHEON PLATES**

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

5
6 **PAINTING**

7 Refer to Division 09.

8
9 All exposed steel support structures (all metal surfaces located both inside and outside the building) shall
10 be painted after installation with one coat of a compatible metal primer coat and two coats of a finish coat
11 of paint for the application. Color shall be gray unless otherwise specified.

12
13 **IDENTIFICATION**

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

17
18 Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

19
20 Identify interior piping not less than once every 30 feet, not less than once in each room, adjacent to each
21 access door or panel, and on both side of the partition where accessible piping passes through walls or
22 floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel
23 against a light background or white enamel against a dark background.

24
25 Identify all exterior buried piping for entire length with underground warning tape except for sewer piping
26 which is routed in straight lines between manholes or cleanouts. Place tape 6"-12" below finished grade
27 along entire length of pipe. Extend tape to surface at building entrances, meters, hydrants and valves.
28 Where existing underground warning tape is broken during excavation, replace with new tape identifying
29 appropriate service and securely spliced to ends of existing tape.

30
31 Identify valves with brass tags bearing a system identification and a valve sequence number. Identify
32 medical gas and vacuum valves with brass tags and wall or cabinet mounted color coded engraved
33 nameplate with the following "(Type of Gas) Shutoff Valve for (Location or Zone)". Valve tags are not
34 required at a terminal device unless the valves are greater than ten feet from the device, located in another
35 room or not visible from device. Provide a typewritten valve schedule and pipe identification schedule
36 indicating the valve number and the equipment or areas supplied by each valve and the symbols used for
37 pipe identification; locate schedules in mechanical room and in each Operating and Maintenance manual.
38 Schedule in mechanical room to be framed under clear plastic.

39

40

41

END OF SECTION

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**SECTION 22 05 14
PLUMBING SPECIALTIES**

PART 1 - GENERAL

SCOPE

This section includes specifications for backflow preventers, hose bibs, water hammer arrestors and other miscellaneous plumbing specialties. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Quality Assurance
- Submittals

PART 2 - PRODUCTS

- General
- Air Admittance Valves

PART 2 - EXECUTION

- Installation

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

- Section 01 91 13 – Commissioning Requirements
- Section 22 05 00 – Common Work Results for Plumbing
- Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment
- Section 22 07 00 – Plumbing Insulation
- Section 22 11 00 – Facility Water Distribution
- Section 22 13 00 – Facility Sanitary Sewerage
- Section 22 40 00 – Plumbing Fixtures

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 22 05 00 and Division 01 of the Project Manual.

Plumbing products requiring approval by the State of Wisconsin Dept. of Commerce must be approved or have pending approval at the time of shop drawing submission.

SUBMITTALS

Submit product data sheets in accordance with Division 01 and Section 22 05 00.

Submit and pay all fees to State of Wisconsin for reduced pressure zone backflow prevention device review. Submit State approval of reduced pressure zone backflow prevention device with product data sheets in accordance with Division 01 and Section 22 05 00.

PART 2 - PRODUCTS

GENERAL

Refer to Plumbing Equipment Schedule for specific model numbers and sizing information regarding the plumbing fittings and specialties specified herein.

AIR ADMITTANCE VALVES

Valves shall be manufactured by Oatey or Studor.

1 ASSE 1050, mechanical air admittance valve for 1-1/4 inch to 2 inch pipe sizes with screen and conical
2 diaphragm/cap. Furnish wall recess box with grille when indicated on drawings.

3

4

5

PART 3 - EXECUTION

6

INSTALLATION

Air Admittance Valves:

9 Install in an exposed location and in accordance with manufacturer's instructions and State Code
10 requirements.

11

12 Perform a final test of the air admittance valve installed in the system. Perform test in the presence of the
13 Plumbing Inspector. Pressure shall hold for minimum of 5 minutes.

14

15

16

END OF SECTION

1 **DESIGN CRITERIA**

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

4
5 Piping connected to pumps, compressors, or other rotating or reciprocating equipment is to have vibration
6 isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment,
7 whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the
8 100 pipe diameter/3 support distance.

9
10 Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord
11 of any truss or joist.

12
13 **General:**

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

15
16 Design supports of strength and rigidity to suit loading, service, and manner which do not unduly stress the
17 building construction. Where support is from concrete construction, take care not to weaken concrete or
18 penetrate waterproofing. Fasten supports and hangers to building steel framing wherever practical. Do not
19 use another pipe for support. Do not use perforated iron, chain or wire as hangers.

20
21 Use inserts for suspending hangers from reinforced concrete slabs wherever practical. Where inserts are
22 not practical, provide channels or angles from which to suspend hangers/supports. Fasten structural steel
23 to concrete with expansion bolts.

24
25 Provide expansion anchors in concrete slabs for installation of threaded support rods.

26
27 Provide hangers capable of vertical adjustment after piping is erected. Do not pierce ductwork with hanger
28 rods. On threaded support rods and bolts, weld nuts to rods, peen threads, or provide double set of nuts
29 with lock washers to prevent loosening. Use beam clamps for attaching hangers to structural steel.

30
31 On piping insulated with vapor barrier covering, use protection shield to cover bottom one-half of insulated
32 pipe. Shield to be a minimum of 12" long and of 16 gauge galvanized steel.

33
34 Exception:

35 For insulated drain pipe, the pipe may rest on the hanger and the insulation to wrap around the
36 hanger and pipe.

37
38 Submit anchor drawings for approval upon request.

39
40 Hangers, supports, and support methods other than those specified shall not be used without obtaining
41 approval on method of support by the Structural Engineer prior to installing piping systems. Submit
42 support method arrangement, pipe weight and spacing scheme for approval.

43
44 **Hanger and Support Spacing:**

45 Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

46
47 Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

48
49 Use hangers with 1-1/2 inch minimum vertical adjustment.

50
51 Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze
52 hangers.

53
54 Support riser piping independently of connected horizontal piping.

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

2

3 Space hangers for pipe as follows:

4

Pipe Material	Pipe Size	Max. Horiz. Spacing	Max. Vert. Spacing
Cast Iron	2" and larger	5'-0"	15'-0"
Copper	1/2" through 3/4"	5'-0"	10'-0"
Copper	1" through 1-1/4"	6'-0"	10'-0"
Copper	1-1/2" through 2-1/2"	8'-0"	10'-0"
Copper	3"	10'-0"	10'-0"
Copper	4" and larger	12'-0"	10'-0"
Steel	1/2" through 1-1/4"	7'-0"	15'-0"
Plastic	Drain and Vent	4'-0"	10'-0"

5

6 **SUBMITTALS**

7 Submit data in accordance with Section 22 05 00 and Division 01 of the Project Manual.

8

9 Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe
10 size and type of service.

11

12 Submit anchor drawings to the A/E for approval upon request.

13

14

15 **PART 2 - PRODUCTS**

16

17 **MANUFACTURERS**

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

20

21 **PIPE HANGERS AND SUPPORTS**

22 **Overhead Supports:**

23 Adjustable clevis hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line Figure B3100.

24

25 Adjustable J hook hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line figure B3690.

26

27 Adjustable band hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line Figure B3172.

28

29 **Multiple or Trapeze Hangers:**

30 Where several pipes are running parallel and pitching in the same direction, strut style support may be
31 used. Steel channel, 12-gauge thickness, Dura-Green epoxy coating or electro-plated, B-Line B11. Restrain
32 individual pipes with B-Line B2000 series or Vibraclamp series strut clamps.

33

34 **Wall Support:**

35 Carbon steel welded bracket with hanger. B-Line 3068 Series, Grinnell 194 Series.

36

37 Perforated, epoxy painted finish, 16-12 gauge, min., steel channels securely anchored to wall structure,
38 with interlocking, split-type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-
39 2000 series clamps, Grinnell type PS 200 H with PS 1200 clamps.

40

41 When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion
42 material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line
43 B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series,
44 Grinnell PS 1400 series.

45

1 **Vertical Support:**

2 Riser clamp, steel, Dura-Green epoxy coating or electro-plated, B-Line Figure B3373.

3

4 Riser clamp, flexible sleeve with stainless steel band, Proset PS #33.

5

6 **Floor Support:**

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

8

9 **Copper Pipe Supports:**

10 All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or
11 polyvinylchloride coated. Where steel channels are used, provide isolation collar between
12 supports/clamps/fasteners and copper piping.

13

14 **PIPE HANGER RODS**

15 **Steel Hanger Rods:**

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

18

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

20

21 Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed
22 the limits indicated.

23

Maximum Load (Lbs.) (650°F Maximum Temp.)	Rod Diameter (inches)
610	3/8
1130	1/2
1810	5/8
2710	3/4

24

25 **BEAM CLAMPS**

26 MSS SP-69 Types 19 & 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick
27 with a retaining ring and threaded rod of 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup
28 point set screw. B-Line B3036L/B3034, Grinnell 86/92.

29

30 MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable
31 for rod sizes to 1-1/2 inch diameter. B-Line B3054, Grinnell 228.

32

33 **CONCRETE INSERTS**

34 **Poured in Place:**

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

38

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

41

42 **Drilled Fasteners:**

43 Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating, minimum tension load
44 of 3200 pounds. Use drill bit of same manufacturer as anchor.

45

46 Manufactured By:

47 Hilti, Powers/Rawl, Redhead.

48

1 **ANCHORS**

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

3

4 **EQUIPMENT SUPPORT**

5 Examine Drawings, and manufacturer's data to determine how equipment, fixtures, and piping are to be
6 supported, mounted or suspended. Support all equipment plumb, rigid, and true to line. Provide rods,
7 bolts, inserts, pipe stands, brackets and accessories for proper support.

8

9

10

PART 3 - EXECUTION

11

12 **INSTALLATION**

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

14

15 Install supports to provide for free expansion of the piping system. Support all piping from the structure
16 using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and
17 wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

18

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

20

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

26

27 Size and install hangers and supports, except for riser clamps, for installation on the exterior of piping
28 insulation. Where a vapor barrier is not required, hangers may be installed either on the exterior of pipe
29 insulation or directly on piping.

30

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

32

33 **STRUCTURAL SUPPORTS**

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

37

38 **RISER CLAMPS**

39 Support vertical piping with clamps secured to the piping and resting on the building structure or secured
40 to the building structure below at each floor.

41

42 **CONCRETE INSERTS**

43 Select size based on the manufacturer's stated load capacity and weight of material that will be supported.
44 Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
45 Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch size. Where
46 concrete slabs form finished ceiling, provide inserts that are flush with the slab surface.

47

48 **ANCHORS**

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

52

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SECTION 22 07 00
PLUMBING INSULATION

PART 1 - GENERAL

SCOPE

This Section includes insulation specifications for plumbing systems. Included are the following requirements:

PART 1 – GENERAL

Scope
Related Work
Description
Quality Assurance
Definitions
Submittals

PART 2 – PRODUCTS

Acceptable Manufacturers
Insulation and Jackets

PART 3 - EXECUTION

General
Installation
Pipe Insulation Schedule

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

Section 01 91 13 – Commissioning Requirements
Section 22 05 00 - Common Work Results for Plumbing
Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
Section 22 11 00 - Facility Water Distribution
Section 22 13 00 - Facility Sanitary Sewerage

DESCRIPTION

Furnish and install insulating materials, fittings, finishes, and accessories specified for piping and related equipment. The following types of insulation are specified in this Section:

- Pipe insulation

Install insulation materials 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 Engineer.

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 22 05 00 and Division 01 of the Project Manual.

Label insulating products delivered to construction site with the manufacturer's name and description of materials.

DEFINITIONS

Concealed:

Shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. Other areas, including walk-through tunnels, shall be considered as exposed.

1 **Exposed to weather:**

2 Located outdoors, either on grade, on a wall, or on a roof, in location where sun, wind, rain, snow and other
3 elements will come in contact with it.

4
5 **Unconditioned spaces:**

6 Unheated or non-cooled attics, utility tunnels and crawl spaces where ambient temperatures may rise above
7 90 degrees F, or drop below 50 Degrees F. Ducts in these instances are considered to be located outside of
8 building thermal envelope.

9
10 **SUBMITTALS**

11 Submit data in accordance with Section 22 05 00 and Division 01 of the Project Manual

12
13 Include manufacturer's data for the following:

- 14 • Pipe insulation

15
16 Submittal shall include the following information:

17
18 Manufacturer's technical data sheets for each product with the following information:

- 19 • Density
- 20 • Thermal characteristics
- 21 • Temperature limitations
- 22 • Jacket type
- 23 • Materials of composition
- 24 • Material safety data sheets

25
26 Schedule of all insulating materials to be used including:

- 27 • Application / intended use of each insulation type
- 28 • Insulation type and thickness
- 29 • Jacket type
- 30 • Fastening methods and adhesive type

31
32
33 **PART 2 - PRODUCTS**

34
35 **ACCEPTABLE MANUFACTURERS**

36 Armstrong, Halstead, Johns-Manville, Knauf, or Owens-Corning.

37
38 **INSULATION AND JACKETS**

39 **Glass Fiber:**

40 Manville Micro-Lok meeting ASTM C547; rigid molded, non-combustible, "K" Value: 0.23 at 75 F,
41 maximum service temperature: 850 F, with vapor Retarder Jacket: AP-T Plus White Kraft paper
42 reinforced with glass fiber yarn and bonded to aluminum foil, secure with self-sealing longitudinal laps and
43 butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed.

44
45
46 **PART 3 - EXECUTION**

47
48 **GENERAL**

49 Application of insulation to piping equipment shall be done in accordance with the manufacturer's
50 installation recommendations. Where thickness of insulation is not specified, use thickness recommended
51 by manufacturer or required by applicable Codes.

52
53 Insulation shall be applied in as warm an environment as possible, and in no instance below 25° F.

54
55 No pipe shall be covered until after it has been installed, inspected, tested and approved.

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INSTALLATION

All pipe insulation shall be installed with joints butted firmly together. All valves and fittings shall be insulated with mitered sections of insulation equal in density and thickness to the adjoining insulation, or with insulating cement equal in thickness to the adjoining insulation, or with "Zeston" type, premolded PVC fittings installed in accordance with the manufacturer's instructions. Fittings are to be finished with 8 oz. glass mesh and mastic (use breather mastic on systems operating above 50°F except where Zeston PVC covers are used). Jackets on pipe insulation may be stapled using outward clinch staples spaced 3" apart at least ¼" in from the lap edge on systems operating at 60°F and above; below 50°F the laps are to be vapor sealed using self-sealing lap, lap-seal tape gun or adhesive such as Armstrong 520. All insulation ends are to be tapered and sealed regardless of service.

On all piping insulated with vapor barrier covering, use protection shield to over bottom one-half of insulated pipe. Shield to be minimum of 12" long and 16 gauge galvanized steel. Provide half-round, 12" long, hanger block at the bottom half of the pipe in place of the fiberglass pipe insulation. The hanger blocks shall be molded cork or calcium silicate pipe insulation of the same thickness as the adjoining fiberglass pipe insulation. The vapor barrier jacket shall be continuous through the hanger location.

Vapor barrier jackets shall be applied with a continuous, unbroken vapor seal. Pipe hangers shall be sized large enough to be installed over the outer surfaces of the insulation.

Exception:
For insulated drain pipe, the pipe may rest directly on the hanger and the insulation to wrap around the hanger and pipe.

- Omit insulation for:
- Unions and flanges.
 - Vents to atmosphere, discharges from safety and relief valves and drain pipes.

Provide finished edges at all access doors and end.

PIPE INSULATION SCHEDULE

Provide insulation on new and remodeled piping.

Minimum Insulation Thickness:

SYSTEMS	PIPE SIZE			
	1" or less	1-1/4" to 2"	2-1/2" to 4"	5" and up
Domestic Cold Water	1/2"	1/2"	1"	1"
Domestic Hot Water	1"	1"	1-1/2"	1-1/2"
Domestic Hot Water Return	1"	1"	1-1/2"	---

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SECTION 22 11 00
FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

SCOPE

This section contains specifications for plumbing pipe and pipe fittings for this project. Included are the following topics:

PART 1 – GENERAL

- Scope
- Related Work
- Description
- Quality Assurance
- Submittals

PART 2 – PRODUCTS

- Water Distribution Pipe and Fittings
- Valves
- Unions and Flanges
- Dielectric Couplings

PART 3 – EXECUTION

- Water Piping System
- Testing

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

- 01 91 13 – Commissioning Requirements
- 22 05 00 – Common Work Results for Plumbing
- 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
- 22 05 14 - Plumbing Specialties

DESCRIPTION

Provide a domestic water distribution system including hot and cold water supply piping, hot water return piping, tempered water piping, pure water piping, valves, fittings, hardware, and specialties. Connect to plumbing fixtures, specialties, and equipment.

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 22 05 00 and Division 01 of the Project Manual.

Order all pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

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.

1 **SUBMITTALS**

2 Submit valve product data sheets in accordance with Section 22 05 00 and Division 01 of the Project
3 Manual.

4
5 Include materials of construction, dimensional data, ratings/capacities/ranges, approvals, test data, and
6 identification as referenced in this section and/or on the drawings.

7
8
9 **PART 2 - PRODUCTS**

10
11 **WATER DISTRIBUTION PIPE AND FITTINGS**

12 **Above Ground:**

13 Copper tube, Type L, hard temper, ASTM B88; with wrought copper fittings, ANSI B16.22. Join using
14 lead free flux, ASTM B813, and solder, ASTM B32.

15
16 **VALVES**

17 **Manufacturer:**

18 Valves throughout the project shall be by one manufacturer, unless otherwise specified.

19
20 Standard valves are based on Nibco models. Equivalent style valves as manufactured by Apollo, Crane,
21 DeZurik, Gustin-Bacon, Grinnell, Hammond, Jenkins, Lunkenheimer, Milwaukee Valve, Stockham,
22 Victaulic, or Watts are acceptable. Valves shall be of standard dimensions, comparable to the number
23 specified.

24
25 Balancing valves are based on Bell & Gossett models. Equivalent style valves by Armstrong, Flowset,
26 Nibco, Taco, or Victaulic/TA Hydronics are acceptable.

27
28 **Shutoff Valves:**

29 Except as otherwise specified, all shutoff valves 2-1/2 inch and smaller shall be ball valves and shutoff
30 valves 3 inch and larger shall be butterfly valves, unless required otherwise by local Water Utility
31 specifications.

32
33 **Ball Valves:**

34 Bronze, two piece full port ball valves with bronze body, solder or threaded ends, chromium plated brass or
35 stainless steel ball, reinforced Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-
36 shock WOG, Nibco model T/S-585-70. Include handle extension for insulated piping, NIB-SEAL by
37 Nibco.

38
39 Bronze, two piece full port ball valves with bronze body, solder or threaded ends, stainless steel ball, reinforced
40 Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-shock WOG, Nibco model T/S-
41 585-70-66. Include handle extension for insulated piping, NIB-SEAL by Nibco.

42
43 Bronze, three piece full port ball valves with bronze body, solder or threaded ends, stainless steel ball, reinforced
44 Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-shock WOG, Nibco model T/S-
45 595-66. Include handle extension for insulated piping, NIB-SEAL by Nibco.

46
47 **Balancing Valves:**

48 1/2" thru 2":

49 Bronze body balancing valve with sweat or threaded ends, calibrated brass orifice, integral adjustment knob
50 with calibrated scale, memory stop indicator, drain tapping and differential pressure metering connections,
51 Bell & Gossett "Circuit Setter".

52
53 Ametal® brass copper alloy, y-pattern, globe type balancing valve with soldered or threaded ends, EPDM
54 o-ring seals, 4-turn digital readout hand wheel with locking, tamper-proof setting, and differential pressure
55 metering connections, separate shutoff valve not required, 300 psi at 250 deg F. Victaulic/Tour &
56 Andersson Series 786, 787 & 78K balancing valves with Victaulic Series 799 or 79V Koil-Kit™ coil pack

1 consisting of Victaulic Series 78U union port fitting, Series 78Y strainer/ball valve or Series 78T union/ball
2 valve combination, and flexible hoses to complete terminal hookup at coil outlet.

3
4 **UNIONS AND FLANGES**

5 **Unions:**

6 Bronze, solder connection, Nibco figure 733.

7
8 **Flanges:**

9 Cast copper alloy, class 125, MSS SP-106, Nibco figure 741.

10
11 **DIELECTRIC COUPLINGS**

12 Steel casing, zinc electroplated, with inert thermoplastic lining, various end types, Clearflow, style 47 by
13 Victaulic.

14
15 Dielectric flanges 2" and larger; with iron female pipe thread to copper solder joint or brass female pipe
16 thread end connections, non-asbestos gaskets and pressure rating of not less than 175 psig at 180 degrees
17 Fahrenheit. Watts Regulator Company, Lochinvar, Wilkins, Epco Sales, Inc.

18
19
20 **PART 3 - EXECUTION**

21
22 **WATER PIPING SYSTEM**

23 Piping shall be pitched to drain entire system; install drain valves at low points. Provide unions at
24 equipment and valves. Provide offsets and transition fittings as required. Avoid dips or depressions in pipe
25 runs.

26
27 No water piping shall be installed in exterior walls, unless adequately protected from freezing. Two inch
28 insulation shall be installed on back and sides of chase, front shall be open to room heat, covered only by
29 finished wall material.

30
31 Install unions, couplings, or flanges at all final equipment connections and as required to facilitate removal
32 of equipment.

33
34 Install dielectric couplings at every connection between copper pipe and other metals. Use dielectric
35 unions for connecting copper and steel piping.

36
37 Provide backflow devices as required by Code on water connections to HVAC equipment and other
38 equipment.

39
40 Extend hot water piping from water heater and connect to all fixtures and equipment as required.

41
42 Hot water and cold water lines shall be kept at least 6 inches apart whenever possible.

43
44 **Valve Installation:**

45 Install shutoff valves with stem vertical. Exception; the stem may be horizontal if a vertical installation
46 would not allow access to the valve handle

47
48 All valves with screwed ends shall be installed using "Teflon" tape applied on male portion of piping
49 fitting.

50
51 Each individual fixture or piece of equipment shall have an independent shut-off valve adjacent to fixture
52 in addition to the required branch shut-off. Where valves are installed in walls an access panel shall be
53 provided.

54
55 **Branches:**

56 Valve shut-off full size of branch for each branch take-off to supply stack or fixture group.

1 **Drains:**
2 Provide valved drains at low points of systems as required or directed. All piping shall be arranged to drain
3 through valved drains.

4
5 **Flushing Mains and Branch Piping:**
6 Upon completion of the water distribution system, test all valves to insure their full opening and flush out
7 the system progressively by opening drain valves and building outlets and permitting the flow to continue
8 from each until the water runs clear.

9
10 **Pipe Insulation:**
11 Provide pipe insulation for all domestic water piping per Section 22 07 00.

12
13 **Sterilization of Water Distribution System:**
14 As soon as the water distribution system has been flushed out as above specified, it shall be sterilized in
15 accordance with the requirements of the local Health Department/Water Utility or in the absence of such,
16 by the following method:

17
18 Introduce chlorine or a solution of calcium or sodium hypochlorite, filling the lines slowly and
19 applying the sterilizing agent at a rate of 50 parts per million of chlorine, as determined by residual
20 chlorine tests at the ends of the lines. Open and close all valves and hydrants while the system is
21 being chlorinated.

22
23 After the sterilizing agent has been applied for 24 hours, test for residual chlorine at the ends of
24 the lines. If less than 5 PPM as indicated, repeat the sterilization process.

25
26 When tests show at least 5 PPM of residual chlorine flush out the system until all traces of the
27 chemical used are removed.

28
29 **Samples**
30 After disinfecting the water distribution system, take water samples to check for bacteria. Take 5 water
31 samples from remote faucets, plus the main entrance. Send the samples to the Wisconsin Department of
32 Health Lab to sample for a safe water supply system.

33
34 **TESTING**
35 Refer to Division 01, "Starting of Systems" and Section 22 05 00.

36
37 Hydro-statically pressure test water piping to 150 psig for 4 hours. No decrease in pressure is allowed.
38 Provide pressure gauge with shutoff and a bleeder valve at the highest point of the system tested. Inspect
39 joints in system under test. No leaks allowed.

40
41 Do not conceal pipe until satisfactorily tested.

42
43 Testing with air will not be allowed.

44
45
46 **END OF SECTION**

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SECTION 22 13 00
FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

SCOPE

This section contains specifications for plumbing pipe and pipe fittings for this project. Included are the following topics:

PART 1 – GENERAL

- Scope
- Related Work
- Description
- Quality Assurance
- Submittals

PART 2 – PRODUCTS

- Above Ground Pipe and Fittings
- Drains and Cleanouts

PART 3 - EXECUTION

- Drain and Vent Piping System
- Pipe Joints
- Cleanouts
- Traps
- Testing

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

- 01 91 13 – Commissioning Requirements
- 22 05 00 – Common Work Results for Plumbing
- 22 05 14 – Plumbing Specialties
- 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

DESCRIPTION

Interior sanitary waste and vent and acid drain and vent piping systems including branches, drains, cleanouts, stacks, fittings and hardware.

Work under this section shall commence from 5 feet outside the building wall with connections to sanitary building sewer lateral(s).

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 22 05 00 and Division 01 of the Project Manual.

Order all pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

SUBMITTALS

Submit data in accordance with Section 22 05 00 and Division 01 of the Project Manual.

1 Schedule from the contractor indicating the ASTM, or CISPI specification number of the pipe being
2 proposed along with its type and grade, and sufficient information to indicate the type and rating of fittings
3 for each service.

4
5 Include materials of construction, dimensional data, ratings/capacities/ranges, approvals, test data, and
6 identification as referenced in this section and/or on the drawings.

7 8 9 **PART 2 - PRODUCTS**

10 11 **ABOVE GROUND PIPE AND FITTINGS**

12 Cast iron, no-hub, service weight, ASTM A888, CISPI 301, with rubber gasket couplings, ASTM C564,
13 and stainless steel clamp, CISPI 310. Pipe and fittings shall be marked with the collective trademark of the
14 Cast Iron Soil Pipe Institute or receive prior approval of the engineer. Piping and fittings shall be
15 manufactured by AB&I, Charlotte, or Tyler.

16
17 PVC, Schedule 40, Type I, ASTM D-1785, and PVC drain-waste-vent fittings, ASTM D-2665, with
18 solvent weld joints, ASTM D2855. Solid wall PVC only.

19 20 **Optional Materials for Piping 2" and Smaller:**

21 Copper drainage tube, Type DWV, ASTM B-306; wrought copper and cast brass drainage fittings with
22 soldered joints.

23
24 Galvanized steel pipe, ASTM A53 or A120; galvanized cast iron threaded DWV fittings ANSI B16.4 and
25 ANSI B16.12.

26 27 **DRAINS AND CLEANOUTS**

28 Drains and cleanouts manufactured by J.R. Smith, Josam, MIFAB, Sioux Chief, Wade, Watts, or Zurn.

29
30 Refer to Plumbing Drain and Cleanout Schedule.

31 32 33 **PART 3 - EXECUTION**

34 35 **DRAIN AND VENT PIPING SYSTEM**

36 Connect all drain and vent piping to each fixture and piece of equipment and install all required piping as
37 shown on drawings. Provide all necessary fittings and hardware to make required offsets and transitions.

38
39 Changes in direction of drainage piping shall be made by the appropriate use of 45 degree wyes, long or
40 short sweep 1/4 bends, 1/6, 1/8, 1/16 bends or combination.

41
42 Fittings to be installed to make for the least possibility of stoppage. All horizontal drainage piping less than
43 3 inches shall be pitched a minimum of 1/4 inch per foot of run. Pitch drainage piping 3 inch and larger a
44 minimum of 1/8" per foot of run.

45
46 Connect to all drains, fixtures and equipment as required.

47 48 **PIPE JOINTS**

49 Install cast iron pipe and fittings, hubless pattern, as recommended by CISPI standards 301, 310, and in
50 their publication "Installation Suggestions for Cast Iron No-Hub Pipe and Fittings".

51
52 Prepare PVC pipe ends as recommended by manufacturer. Use a P-70 type primer (for PVC) and a PVC
53 solvent cement appropriate to the pipe size and temperature range.

54
55 Soldered joints shall be as described in Section 22 05 00.

1 **CLEANOUTS**

2 Provide and install cleanouts as shown on plans and as required by Code.

3

4 **TRAPS**

5 Trap all fixtures and equipment. Trap seals shall be standard depth, except when deep seals are required by
6 Code. Traps shall be set true and level and located within the limits of the Code requirements. A trap shall
7 not be used as a separator, interceptor or other type of device to retain solids. All traps above grade shall be
8 provided with approved screw-type cleanout plugs.

9

10 Traps shall be protected during construction and sealed to prevent foreign matter from entering. Provide
11 adjustable expansion plug, plastic cap, or approved equivalent.

12

13 **TESTING**

14 Refer to Testing paragraph of Section 22 05 00.

15

16 Hydro-statically pressure test all piping to 10 feet of water column pressure for 2 hours. No leaks allowed.
17 Provide mint test of entire system as required by local inspector.

18

19

20

END OF SECTION

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SECTION 22 40 00
PLUMBING FIXTURES

PART 1 - GENERAL

SCOPE

This section includes specifications for plumbing fixtures, faucets and trim for this project. Included are the following topics:

PART 1 – GENERAL

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

PART 2 – PRODUCTS

- General
- Manufacturers

PART 2 - EXECUTION

- Installation

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

- Section 01 91 13 – Commissioning Requirements
- Section 22 05 00 – Common Work Results for Plumbing
- Section 22 05 14 – Plumbing Specialties
- Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment
- Section 22 11 00 – Facility Water Distribution
- Section 22 13 00 – Facility Sanitary Sewerage

DESCRIPTION

Furnish and install plumbing fixtures with traps, drains, stops, faucets, flush valves, carriers and hardware.

REFERENCE STANDARDS

- ANSI A112.6.1M-88 Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- ANSI A112.18.1-94 Finished and Rough Brass Plumbing Fixture Fittings.

QUALITY ASSURANCE

Substitution of Materials: Refer to 22 05 00 and Division 01 of the Project Manual.

Plumbing products requiring approval by the State of Wisconsin Dept. of Commerce must be approved or have pending approval at the time of shop drawing submission.

SUBMITTALS

Submit product data sheets in accordance with Division 01 and Section 22 05 00.

Include data concerning sizes, utility sizes, rough in-dimensions, capacities, materials of construction, ratings, weights, trim, finishes, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1 **PART 2 - PRODUCTS**

2
3 **GENERAL**

4 Fixtures must conform to general requirements given below and to specified requirements for each type.

5
6 Stainless steel fixtures shall conform to ANSI A112.19.3.

7
8 Fixtures shall be installed so that parts are accessible for repairs when fixtures are in place. Manufacturer's
9 trademark or name shall be visible on fixtures.

10
11 Faucets, traps, exposed fittings and trim shall be polished chrome plated unless otherwise specified.
12 Provide polished chrome plated nipples at all lavatories.

13
14 Exposed piping penetrating walls, floors or ceilings shall have chrome plated escutcheons, or flanges of
15 sufficient depth to seal the opening.

16
17 Fixture stops shall be heavy duty commercial grade, slow compression angle valves with 1/2" inlet and 3/8"
18 or 1/2" chrome plated flexible riser.

19
20 Traps shall be semi-cast 17-gauge brass, chrome plated, with cleanout and escutcheon. Sink traps shall be
21 1-1/2" minimum.

22
23 **MANUFACTURERS**

24 Stainless steel sinks shall be manufactured by Advance-Tabco, Elkay, or Just.

25
26 Manual faucets shall be manufactured by American Standard, Chicago Faucet, Kohler, Moen Commercial,
27 Speakman, Symmons, T&S Brass, Sloan (Polaris), or Zurn.

28
29 Heavy duty stops and supplies shall be manufactured by Chicago Faucet, Dearborn, EBC, Kohler, McGuire, T&S
30 Brass, or Zurn.

31
32 Traps shall be semi-cast 17 gauge brass, chrome plated, with cleanout and escutcheon as manufactured by
33 Dearborn, EBC, Keeney, Kohler, McGuire, or Zurn.

34
35 Supply, drain and trap insulating kits shall be manufactured by Brocar, EBC, McGuire, Plumberex, or Truebro.

36
37 Drinking water filter and faucet shall be manufactured by Aqua-Pure as scheduled on drawings.

38
39 Hot water dispenser and faucet shall be manufactured by Insinkerator as scheduled on drawings.

40
41 **Fixtures:**

42 See Plumbing Fixture Schedule on drawings for type, manufacturer, and model for fixtures.

43
44
45 **PART 3 - EXECUTION**

46
47 **INSTALLATION**

48 Install plumbing fixtures in accordance with manufacturer's instructions. Set level and plumb. Secure in
49 place to counters, floors and walls providing solid bearing and secure mounting. Bolt fixture carriers to
50 floor and wall. Secure rough-in fixture piping to prevent movement of exposed piping.

51
52 Install each fixture with trap easily removable for servicing and cleaning. Install fixture stops in readily
53 accessible location for servicing. Individual supplies to fixtures shall be provided with support to prevent
54 movement.

- 1 Install barrier free fixtures in compliance with COMM 52, 69 and Federal ADA Accessibility Guidelines.
2 Install barrier free lavatory traps parallel and adjacent to wall and supplies and stops elevated to avoid
3 contact by wheelchair users.
4
5 Seal joints between countertop, wall, floor and fixtures with G.E. Silicone caulk; white, clear or color to
6 match fixture with colored caulk by fixture manufacturer.
7
8 Each fixture shall have a stop valve installation to control the fixture. Stop valves shall be heavy duty type
9 with brass stems and screwed or sweat inlet connections. Compression type inlets are not acceptable.
10
11 Cover pipe penetrations with escutcheons. Exposed traps, stops, piping and escutcheons to be chrome
12 plated brass, same items in concealed locations may be of rough brass finish.
13
14 After installation, fixtures shall be protected to prevent scratching or other damage during construction.
15
16 Prior to acceptance, fixtures shall be cleaned with compounds recommended by the respective
17 manufacturer.
18
19
20

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SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

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

1.02 GENERAL PROVISIONS

- A. In general, the work includes: Electrical work and the kindred materials and operations as indicated on the drawings and as specified in the following articles of Section 26 05 00, 26 09 23, 26 20 00, 26 51 13, 27 10 00, 28 13 00 and 28 31 00.

- B. Job Information: Obtain at building including:

- 1. Conditions affecting this Section of the Work.
- 2. Accessibility
- 3. Storage space.

1.03 GENERAL REQUIREMENTS

- A. This Section of the Specifications applies to all electrical work. The General Conditions, Supplementary Conditions, Summary of the Work, Instructions to Bidders and all Sections of the Conditions of the Contract form a part of these specifications and the Contractor shall consult them in detail. Electrical work indicated in other Sections of the Specifications to be done by the Electrical Contractor shall be included in the Work of this Section.

1.04 DEFINITIONS

- A. Certain terms used herein; on the drawings; and in the contract documents, shall be defined as follows:
- B. Provide: Furnish and install complete and ready for service.
- C. Exposed: Exposed to view in any room, hallway, passageway, or outside.
- D. Approval: The approval of the Architect in writing or by signed rubber stamp applied to drawings, illustrations, etc.

1.05 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. These specifications and attendant drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material necessary for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

- 1 1.06 DRAWINGS
- 2 A. The Electrical drawings do not attempt to show the complete details of building construction which affect
3 the electrical installation. The Contractor shall refer to the architectural, civil, structural and mechanical
4 drawings for additional details which affect the proper installation of this work. The Contractor is
5 cautioned that diagrams showing electrical connections and/or circuiting are diagrammatic only and must
6 not be used for obtaining lineal runs of wire to conduit. Wiring diagrams do not necessarily show the
7 exact physical arrangement of the equipment.
- 8 1.07 MATERIAL AND EQUIPMENT
- 9 A. All material and equipment shall be new and of the quality used for the purpose in good commercial
10 practice, and shall be standard product of reputable manufacturers. Each major component of equipment
11 shall have the manufacturer's name, catalog number, and capacity or rating on a nameplate, securely
12 affixed on the equipment in a conspicuous place.
- 13 1.08 SUBSTITUTION AND APPROVAL OF MATERIAL
- 14 A. See Instructions to Bidders.
- 15 B. Such requests shall be accompanied by three copies of all necessary illustrations, cuts, drawings and
16 descriptions of material proposed for substitution and shall fully describe all points in which it differs
17 from the articles specified. Two copies will be retained by the Architect and one copy returned to the
18 Contractor with approval or revisions indicated thereon.
- 19 1.09 DAMAGE TO OTHER WORK
- 20 A. The Electrical Contractor will be held rigidly responsible for all damages to the work of his own or any
21 other trade resulting from the execution of his work. It shall be the Contractor's responsibility to
22 adequately protect his work at all times. All damages resulting from his operations shall be repaired or
23 the damaged portions replaced by the party originally performing the work, (to the entire satisfaction of
24 the Architect), and all cost thereof shall be borne by the Contractor responsible for the damage.
- 25 1.10 COOPERATION WITH OTHER TRADES
- 26 A. This Contractor shall completely cooperate with all other trades in the matter of planning and executing
27 of the work. Every reasonable effort shall be made to prevent conflict and interferences as to space
28 requirements, dimensions, locations, openings, sleeving or other matters which tend to delay or obstruct
29 the work of any trade.
- 30 1.11 NEGLIGENCE
- 31 A. Should the Contractor fail to provide materials, templates, etc., or other necessary information causing
32 delay or expense to another party, he shall pay the actual amount of the damages to the party who
33 sustained the loss.
- 34 1.12 FIELD CHANGES
- 35 A. Should any change in drawings or specifications be required to comply with local regulations and/or field
36 conditions, the Contractor shall refer same to Architect for approval before any work which deviates
37 from the original requirements of the drawings and specifications is started. In the event of
38 disagreements as to the necessity of such changes, the decision of the Architect shall be final.
- 39

1 1.13 CUTTING AND PATCHING IN NEW CONSTRUCTION

2 A. As necessary and with approval to permit the installation of conduit or any part of the work under this
3 branch. Any cost caused by defective or ill-timed work shall be by the party responsible therefor.
4 Patching of holes, openings, etc. resulting from the work of this branch shall be furnished by this
5 contractor.

6 B. See Division 1 for additional requirements.

7 C. See also "Demolition, Renovation, and Disposition of Existing Equipment" in this Section.

8 1.14 COMPLETION DATES

9 A. This Contractor shall be in a position to meet all completion dates established by the Architect and shall
10 furnish all labor of all classes required to meet such schedules and completion dates.

11 1.15 STANDARDS, CODES AND PERMITS

12 A. All work shall be installed in accordance with National, State and Local electrical codes, laws,
13 ordinances and regulations. Comply with all applicable OSHA regulations.

14 B. All materials shall have a U.L. label where a U.L. standards and/or test exists.

15 C. Prepare and submit to all authorities having jurisdiction, for their approval, all applications and working
16 drawings required by them.

17 D. Secure and pay for all permits and licenses required.

18 1.16 CLEAN-UP

19 A. This Contractor shall at all times keep the premises free from excessive accumulation of waste material
20 or rubbish resulting from his work, including tools, scaffolding and surplus materials, and he shall leave
21 his work broom clean or its equivalent.

22 B. In case of dispute, Architect may order the removal of such rubbish and charge the cost to the responsible
23 contractor as determined by the Architect. At the time of final clean-up all fixtures and equipment shall
24 be thoroughly cleaned and left in proper condition for their intended use.

25 1.17 TESTS

26 A. The Contractor shall provide all instrumentation, labor and conduct all tests required by the Architect.
27 All tests shall be made before any circuit or item of equipment is permanently energized. Circuits shall
28 be phased out and loads shall be distributed as evenly as possible on all phases. All phase conductors
29 shall be entirely free from grounds and short circuits. All instrumentation and personnel required for
30 testing shall be provided by the Contractor and all tests shall be conducted in the presence of the
31 Architect or his authorized representative.

32 B. System Tests:

33 1. The following tests are required prior to energization of the electrical system:

34 a. Secondary feeders shall have an insulation resistance test utilizing a megger applying a
35 test potential of 500 volts DC minimum.

36 b. Establish secondary phase to ground voltages.

37 c. Establish proper phase relationship and motor rotation.

- 1 2. The following tests are required under normal load condition:
- 2 a. Record secondary phase to phase and phase to ground voltages and phase currents at all
- 3 major equipment, apparatus, and on all secondary feeders. Voltage readings shall be
- 4 taken at line side terminals of distribution centers and panelboards.
- 5 b. Confirm proper phase relationship and motor rotation.
- 6 c. Confirm load balance at distribution centers and panels. Rebalance load if necessary
- 7 such that the minimum unbalance between phases shall not exceed 7-1/2%.
- 8 d. Confirm operation of all electrically operated apparatus, such as circuit breakers,
- 9 transfer switches, etc., by exercising same under load.
- 10 e. Record all settings and calibrations of circuit breakers, transfer switches, transformers,
- 11 meters, timing devices, etc.

12 C. Records:

- 13 1. All test data obtained by the E.C. or manufacturer/supplier shall be recorded and filed with the
- 14 maintenance manual as part of permanent job records. Test data shall include identification of
- 15 instruments employed (field test only), condition of test (time, date, weather, etc.), parameters of
- 16 test, personnel conducting test, and any pertinent information or conditions noted during the test.

17 1.18 SHOP DRAWINGS

- 18 A. Submit to Engineer for review, copies of manufacturer's shop drawings and/or equipment brochure
- 19 depicting:

- 20 1. Lighting Fixtures
- 21 2. Panelboards
- 22 3. Occupancy Sensors
- 23 4. Fire Alarm System Devices
- 24 5. Telecommunications Equipment and Cabling
- 25 6. Wiring Devices
- 26 7. Card Readers
- 27 8. Lighting Controls
- 28 9. Other materials at the request of the Engineer

- 29 B. See Section 01300.

- 30 C. Shop drawings shall bear the Contractor's stamp indicating approval.

- 31 D. Any equipment fabrication prior to shop drawing review shall be at the Contractor's risk.

32 1.19 WORKMANSHIP

- 33 A. The installation of all work shall be made so that its several component parts will function as a workable
- 34 system complete with all accessories necessary for its operation, and shall be left with all equipment
- 35 properly adjusted and in working order. The work shall be executed in conformity with the best accepted
- 36 standard practice of the trade so as to contribute to efficiency and appearance. It shall also be executed
- 37 so that the installation will conform and adjust itself to the building structure, its equipment and its usage.

38 1.20 DRAWINGS OF OTHER TRADES

- 39 A. The Contractor shall consult the drawings of the work for the various other trades; field layouts of the
- 40 parties performing the work of the other trades; their shop drawings, and he shall be governed
- 41 accordingly in laying out his work.

1 B. Specifically examine shop drawings to confirm voltage, current characteristics, and other wiring
2 requirements for utilization equipment. Bring any discrepancies to the attention of the A/E.

3 1.21 FIELD MEASUREMENTS

4 A. The Contractor shall take all field measurements necessary for his work and shall assume the full
5 responsibility for their accuracy.

6 1.22 STRUCTURAL INTERFERENCES

7 A. Should any structural interferences prevent the installation of the outlets, running of conduits, etc., at
8 points shown on drawings, the necessary minor deviation therefrom, as determined by the Architect, may
9 be permitted. Minor changes in the position of the outlets or equipment if decided upon before any work
10 has been done by the Contractor shall be made without additional charge.

11 1.23 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

12 A. Before submitting a bid, the Contractor shall visit the site and familiarize himself with all features of the
13 building and site which may affect the execution of his work. No extra payment will be allowed for the
14 failure to obtain this information. If in the opinion of the Contractor there are omissions or errors in the
15 plans or specifications, the Contractor shall clarify these points with the Architect before submitting his
16 bid. In lieu of written clarification by addendum, resolve all conflicts in favor of the greater quantity or
17 better quality.

18 1.24 GUARANTEE

19 A. The Contractor shall unconditionally guarantee his work and all components thereof, excluding lamps,
20 for a period of one year from the date of his final payment. He shall remedy any defects in workmanship
21 and repair or replace any faulty equipment which shall appear within the guarantee period to the entire
22 satisfaction of the Architect at no additional charge.

23 1.25 TEMPORARY WIRING AND SERVICE

24 A. No temporary electrical service is required on this project. The existing electrical distribution system in
25 the Dane County City-County Building shall provide any power required for construction.

26 B. All contractors shall provide and maintain their own extension cords and additional lamps as required to
27 perform his work properly. Contractors requiring temporary connections to 3 phase power service and
28 single phase feeders for other than lighting and small fractional horsepower motorized tools shall make
29 arrangement with the Electrical Contractor. Contractors requiring lighting outside of the building shall
30 make their own arrangements with the Electrical Contractor and pay all costs for installation,
31 maintenance and removal. Contractors requiring electrical equipment over one HP, including welders,
32 hoists, heaters and coolers shall make their own arrangements for such service beyond the main switch
33 and shall pay all costs thereof.

34 C. No permanent electrical equipment or wiring shall be used for temporary connections, unless authorized
35 by this Section, upon signed order and with approval by the Architect in behalf of the Owner. Such
36 approvals shall not shorten guarantee period.

37 D. Electrical energy to be paid for by owner.

38 1.26 ELECTRICAL SERVICE

39 A. The existing electrical service in the Dane County City-County Building shall remain as is.

- 1 1. The building has a 208Y/120-volt, 3-phase, 4-wire service for general lighting and receptacle
2 loads.
- 3 2. The building also has a 480-volt electrical service that is used for large HVAC loads.
- 4 3. Refer to the electrical drawings for partial one line riser diagrams and the work involved on the
5 project.

6 1.27 BRANCH CIRCUIT WIRING

- 7 A. See plans for general arrangement of circuits, conduit runs, and ratings of branch circuits and special
8 circuits.
- 9 B. Provide everything necessary to comply with the general scheme shown, including all types of control.
- 10 C. Circuit numbers as shown on plans are for contractor to plan his wiring and for estimating purposes.
11 These numbers are not necessarily consecutive numbers of the panelboard breakers. Balanced load on
12 bus is to be the determining factor in arrangement of circuits. Balance loading to within 7 1/2%.
- 13 D. Minimum size of lighting system branch circuit conductors to be #12 AWG.
- 14 E. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond outlet box conduit
15 fitting.
- 16 F. 120 volt circuit home runs greater than 50 feet in length shall have #10 AWG minimum size between
17 panel and first receptacle or fixture outlet.
- 18 **G. The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All
19 branch circuits shall be furnished and installed with an individual accompanying neutral, sized the
20 same as the phase conductors.**

21 1.28 MOTOR WIRING

- 22 A. Unless otherwise indicated on the drawings or elsewhere in these specifications, all motors shall be
23 furnished by others.
- 24 B. Motors shall be set in place by others and the associated motor starters and controllers shall be turned
25 over to this Contractor for erection and line voltage power wiring.
- 26 C. Any contractor supplying starters and controllers that are not part of this contract shall index same and
27 provide this Contractor with instructions as to proper location in sufficient time to permit the installation
28 of a concealed raceway system.
- 29 D. Where this Contractor is required to provide control wiring, the Contractor supplying the controllers shall
30 provide all necessary and required wiring diagrams for proper installation.
- 31 E. Low voltage (less than 115 volts) control wiring shall be by others, unless noted elsewhere in the
32 specifications except that this Contractor shall extend circuit to associated transformers, wire and connect
33 to same.
- 34 F. This Contractor shall examine the plans and specifications of other sections and shall include in his bid
35 all control wiring, as referenced to be performed by Section 16001.
- 36 G. Required disconnect switches furnished by other sections shall be installed by Section 16001.
37 Furthermore, this Contractor shall provide all disconnect switches required by code that are not furnished
38 by other sections.

39

1 1.29 SPECIAL OUTLETS

2 A. General: Furnish and install outlets, wiring and receptacles accordingly, at locations required by
3 equipment serviced or otherwise as directed. Extend wiring to outlets on equipment and make final
4 connection.

5 1.30 IDENTIFICATION

6 A. General:

- 7 1. Materials and equipment installed under this Section shall be clearly identified as listed below.
- 8 2. Locate identification conspicuously.
- 9 3. Terminology to be approved by Architect.
- 10 4. See plans for any additional items to be identified.
- 11 5. Loads such as motors shall be described by function rather than by the system of arbitrary number
12 as shown on electrical plans.
- 13 6. Use abbreviations sparingly.

14 B. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely screwed or riveted to the
15 following equipment. Size 1" x 4" with 3/8" high letters; unless space available dictates differently.

- 16 1. Each panelboard, contactor, time switch, starter or disconnect switch. Locate on inside cover of
17 panels.
- 18 2. Each feeder at all accessible locations.
- 19 3. Each end of empty conduit runs to indicate the intended use of the conduit and the location of
20 opposite end. Use room numbers that are permanently assigned.

21 C. Typewritten Directory: Each panelboard both new and existing shall be provided with a typewritten
22 directory attached to the inside of panel door and covered with clear plastic indicating load served and
23 rooms served by each protective device in the respective panel. Spares and spaces shall be clearly
24 identified.

25 D. Switch Station:

- 26 1. All key switches shall be engraved indicating controlled item.
- 27 2. All remote switches shall be engraved indicating controlled item.

28 E. Conductor Identification:

- 29 1. Identify each conductor at each wiring device, connector or splice point with permanently attached
30 wrap-around adhesive markers as manufactured by Brady Co. or 3M.
- 31 2. This identification shall include branch circuit number, control circuit, or any other appropriate
32 number or lettering that will expedite future tracing and trouble shooting.

33 1.31 LOCATIONS OF OUTLETS AND WIRING DEVICES

34 A. Outlets:

- 35 1. Locations of outlets and electrical equipment on the drawings are approximate only. Unless
36 otherwise indicated on the drawings or established in the specifications, the exact locations of
37 electrical outlets shall be established in the field by directive from the Architect. Generally,
38 outlets shall be located as required for proper installation of equipment served and otherwise
39 locations shall be established by construction or code requirements and such as to be coordinated
40 with equipment of other trades.
- 41 2. This Section shall consult with the Architect and refer to all details, sections, elevations and
42 equipment plans and the plans of other trades for exact location.

- 1 3. The Architect reserves the right to make reasonable changes in the location of outlets, apparatus or
2 equipment up to the time of roughing in. Such changes as directed shall be made by the
3 Contractor without additional compensation.
- 4 4. Dimensions taken by scale shall not be used to establish rough-in locations.
- 5 B. Wiring Devices:
- 6 1. The approximate location of wiring devices are indicated on the drawings; the specific location
7 shall be determined in accordance with "Location of Outlets" of these specifications and as
8 follows.
- 9 2. This Section is referred to equipment plans, equipment shop drawings, elevation drawings and
10 other detail or dimensional drawings, and he shall consult with the Architect before installation of
11 proceeding with any work dependent upon this information.
- 12 3. Generally, wiring devices shall be located as follows:
- 13 a. Wall receptacles shall generally be centered 15" above the finished floor and 6" above
14 surface of built-in counters and tables where same abuts wall and 4" above
15 backsplashes if counters are so equipped.
- 16 b. Special purpose receptacles shall be located as required by equipment served.
- 17 c. Switches shall be centered 48" above finished floor on latch side of door opening with
18 edge of plate not more than 12" from door frame, except as noted on the drawings.
- 19 d. In hazardous areas, the location of wiring devices shall be established by Code
20 requirements which shall take precedence over conflicting information on the drawings
21 or included herein.

22 1.32 TELEPHONE SYSTEM

- 23 A. Refer to the electrical specification section 27 10 00 – Telecommunication Distribution System for
24 detailed information on the telephone system.
- 25 B. Dane County is currently using a VOIP (voice over internet protocol) telephone system so all telephone
26 cabling will be using same cabling used for data.
- 27 C. Telephone instruments, switching equipment, and other accessories shall be furnished and installed by
28 the Owner (Dane County)
- 29 D. This Contractor shall supply all required cabling, jacks, conduit, sleeves, and service fittings for the
30 telephone system.
- 31 E. All conduits shall be complete with fish wire by this Contractor, and all telephone outlets shall be fed by
32 a minimum 1" conduit.
- 33 F. All telephone boxes shall be two gang boxes with one gang plaster cover.
- 34 G. Verify all phone locations with the Architect in the field.

35 1.33 DEMOLITION, RENOVATION AND DISPOSITION OF EXISTING EQUIPMENT

- 36 A. This Contractor shall note that portions of the existing building will remain in service during portions of
37 the construction period. Areas of the building will be vacated as required to facilitate construction. This
38 Contractor shall proceed with the completion of his work in such a manner as to cause the least possible
39 interference with the Owner's operation. All work required in the existing building shall be done in a
40 manner and time acceptable to the Owner.
- 41 B. Outages and other work rendering existing equipment inoperative shall be held to a minimum - prior
42 arrangements for each shall be made with the Owner and shall be acceptable as to time and duration.

- 1 C. Electrical equipment in conflict with construction shall be removed and/or relocated as indicated on the
2 drawings, as directed or required. This Contractor shall remove all electrical equipment released from
3 service as a result of construction, and no equipment removed shall be reused, except as specifically
4 directed on the drawings or elsewhere herein. All electrical equipment removed during construction shall
5 be presented to the Owner for his acceptance or rejection. Materials rejected by the Owner become the
6 Contractor's property and shall be removed from the site.
- 7 D. This Contractor shall be responsible for the work of other trades as may be necessary to facilitate the
8 installation of electrical work in the existing building. Such work necessary that is normally done by
9 other trades and is not covered as a part of other divisions of the work shall be done under the direction
10 and at the expense of the Electrical Contractor. This work shall include but is not limited to cutting,
11 patching, and all work necessary and required to leave existing building in condition acceptable to the
12 Architect.
- 13 E. Any existing circuits or equipment not shown on the drawings and which are logically expected to be
14 continued in service and which may be interrupted or disturbed during construction shall be reconnected
15 in an approved manner. In addition, any existing circuit or equipment which may require relocations or
16 rerouting, as a result of construction, shall be considered a part of the work of this branch and shall be
17 done by this contractor with no additional compensation.
- 18 F. All coring that is required for electrical work shall be by this Contractor.
- 19 G. All new conduit and wiring shall be concealed where possible to do so without extensive cutting and
20 patching. All exposed work shall be run in wiremold and installed only where approved by Architect.
21 Routing shall be subject to Architects approval. Make use of all standard wiremold colors to match
22 surfaces as closely as possible.
- 23 H. All ballasts and lamps removed during the project, unless part of fixtures claimed by the Owner, become
24 the Contractor's property and he shall dispose of them in accordance with applicable DNR and EPA
25 regulations.

26 1.34 SEALING AND FIREPROOFING

- 27 A. Sealing and fireproofing of openings between conduit, cable tray, wireway, trough, cablebus, busduct,
28 etc. and fire rated surfaces shall be the responsibility of the contractor whose work penetrates the
29 opening.
- 30 B. Sealing and fireproofing shall use materials and methods complying with ASTM E814 requirements
31 appropriate to the rating of the material penetrated.
- 32 C. Materials by Dow-Corning, 3M, Specified Technologies, Inc., and Chase-Foam are acceptable if in
33 accordance with (B) above.
- 34 D. Submit manufacturer's penetration details to authority having jurisdiction. Details shall confirm
35 method's compliance with ASTM E814.
- 36 E. Include copies of penetration details in Project Operation and Maintenance Manuals.

37 1.35 ALTERNATE BIDS

- 38 A. See Section 01030 for descriptions of alternates required.

39 END OF SECTION 26 05 00

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SECTION 26 09 23

OCCUPANCY SENSOR LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.01 SCOPE

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

1.02 GENERAL PROVISIONS

- A. In general, the work includes:

1. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.
2. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 16.
3. Contractor must submit data sheets on sensors, control units and all junction boxes and mounting accessories, including all wiring diagrams.

1.03 EQUIPMENT QUALIFICATION

- A. Products supplied shall be from a manufacturer that has been continuously involved in the manufacturing of occupancy sensors for a minimum of five (5) years.
- B. All components shall be UL listed, offer a five (5) year warranty and meet all state and local applicable codes requirements.

1.04 SYSTEM DESCRIPTION

- A. The objective of this section is to ensure the proper installation of the occupancy sensor based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.
- B. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.
- C. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The suppliers obligation shall include repair or replacement, and testing without charge to the owner, all or in parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

1.05 SUBMITTALS

- A. Manufacturer shall substantiate conformance to this specification by supplying the necessary documents, performance data, and wiring diagrams. Any deviations to this specification must be clearly stated by letter and submitted.

- 1 B. Submit a lighting plan clearly marked by manufacturer showing proper product, location, and orientation
2 of each sensor.
- 3 C. Submit any interconnection diagrams per major sub-system showing proper wiring.
- 4 D. Submit standard catalog literature which includes performance specifications indicating compliance to
5 the specification.
- 6 1.06 SYSTEM OPERATION
- 7 A. It shall be the contractor's responsibility to make all proper adjustments to assure owner's satisfaction
8 with the occupancy system.

9 PART 2 - PRODUCTS

10 2.01 ACCEPTABLE MANUFACTURERS

- 11 A. The Watt Stopper, Inc.
- 12 B. Or Equivalent Devices by the Following Manufacturers
- 13 1. Hubbell
- 14 2. Leviton
- 15 3. Sensor Switch

16 2.02 SYSTEM OPERATION

- 17 A. All products shall be Watt Stopper product numbers:
- 18 1. Ceiling Sensors: W-500A, W-1000A, W-2000A, W-2000H, W-PIR, DT-100L, CI-100, CI-200.
- 19 2. Wall Sensors: WI-120A, WI-277A, WS-120, WS-277, WM-120, WM-277.
- 20 3. Power and Slave Packs: A-120E, A-277E, S-120/277.
- 21 4. Low Temperature: CB-100, CB-200.
- 22 B. Wall switch sensors shall be capable of detection of motion at desk top level up to 300 square feet, and
23 gross motion up to 1,000 square feet.
- 24 C. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1,000 watts at 277
25 volts, and shall have 180 degree coverage capability.
- 26 D. Bi-level wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1,000 watts
27 to 277 volts.
- 28 E. Passive Infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier
29 configuration, with grooves-in to eliminate dust and residue build-up.
- 30 F. Passive Infrared and Dual Technology sensors shall have fully automatic operation, offer daylighting
31 footcandle adjustment control and be able to accommodate dual level lighting.
- 32 G. All sensors shall be capable of operating normally with electronic ballast, PL lamp systems, and rated
33 motor loads.
- 34

- 1 H. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction
2 shall occur in coverage due to the cycling of air conditioner or heating fans.
- 3 I. All sensors shall have readily accessible, user adjustable controls for time delay and sensitivity. Controls
4 shall be recessed to limit tampering.
- 5 J. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is
6 utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is
7 replaced. This control shall be recessed to prevent tampering.
- 8 K. Ultrasonic operating frequency shall be crystal controlled to within plus or minus 0.005% tolerance to
9 assure reliable performance and eliminate sensor cross talk. Sensors using multiple frequencies are not
10 acceptable.
- 11 L. All sensors shall provide a method of indication to verify that motion is being detected during testing and
12 that the unit is working.
- 13 M. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally
14 Closed, and Common outputs for use with HVAC control, Data Logging, and other control options.
15 Sensors utilizing separate components to achieve this function are not acceptable.
- 16 N. All sensors shall have no leakage current to load in manual or in Auto/Off mode for safety purposes and
17 shall have voltage drop protection.
- 18 O. The Contractor shall certify in writing that installed sensors comply with the specified California Energy
19 Commission criteria for ultrasonic sound.
- 20 P. All sensors shall have UL rated, 94V-0 plastic enclosures.
- 21 2.03 CIRCUIT CONTROL HARDWARE - CU
- 22 A. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to
23 mount on external J boxes and be integrated self-contained unit consisting internally of load switching
24 control relay and a transformer to provide low-voltage power to a minimum of two (2) sensors.
- 25 B. Relay Contacts shall have ratings of:
- 26 1. 13A - 120 VAC Tungsten
27 2. 20A - 120 VAC Ballast
28 3. 20A - 277 VAC Ballast
- 29 2.04 CONTROL WIRING
- 30 A. Control wiring between sensors and controls units shall be Class II, 18-24 AWG stranded U.L.
31 Classified, PVC insulated or Teflon jacketed cable approved for use in plenums, where applicable.
32

1 PART 3 - EXECUTION

2 3.01 INSTALLATION

3 A. It shall be the contractor's responsibility with the suppliers assistance to locate and aim sensory in the
4 correct location required for complete and proper volumetric coverage within the range of coverage(s) of
5 controlled areas. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely
6 cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any
7 location within in the room(s). The locations and quantities of sensors shown on the drawings are
8 diagrammatic and indicate only rooms which are to be provided with sensors. The contractor shall
9 provide additional sensors if required to properly and completely cover the respective room.

10 B. It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory
11 authorized representative, at the owner's facility, to verify placement of sensors and installation criteria.

12 C. Proper judgement must be exercised in executing the installation in the available space and to overcome
13 local difficulties due to space limitations or interference of structural components. The contractor shall
14 also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the
15 operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems,
16 or;

17 END OF SECTION 26 09 23

SECTION 26 20 00

BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

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

1.02 REFERENCES

- A. National Electrical Manufacturer's Association (NEMA).
- B. Underwriters Laboratories, Inc. (UL).
- C. American Society for Testing and Materials (ASTM).
- D. National Fire Protection Association (NFPA).

1.03 SUBMITTALS

A. Product Data

- 1. Submit for disconnects, motor starters, panelboards, circuit breakers, overcurrent protective devices, transformers, and mini-power centers.
- 2. Product data sheets with printed installation instructions.

B. Shop Drawings:

- 1. Submit for motor starters.
- 2. Show enclosure dimensions, nameplate nomenclature, electrical ratings, and thermal unit schedule.
- 3. Wiring diagrams and schematics.

C. Approval of equipment supplied in this section is contingent upon Contractor verification of available fault current from electric utility.

- 1. Notify ENGINEER if available fault current is higher than specified equipment.

D. Submit in accordance with Section 01340.

E. Operation and Maintenance (O&M) Data:

- 1. Maintenance data for materials and products for inclusion in Operating and Maintenance specified in Section 01730.
- 2. Submit in accordance with Section 01340 and 01730.

F. Test Results:

- 1. Report of field tests and observations certified by Contractor.

1.04 QUALITY ASSURANCE

- A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

- 1 1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
- 2 2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

3 B. Regulatory Requirements:

- 4 1. National Electrical Code: Components and installation shall comply with NFPA 70.
- 5 2. Local codes and ordinances.

6 PART 2 - PRODUCTS

7 2.01 ELECTRICAL METALLIC TUBING (EMT)
8 INTERMEDIATE METALLIC CONDUIT (IMC)
9 GALVANIZED RIGID STEEL CONDUITS (GRS)

10 A. Manufacturers:

- 11 1. Allied Steel
- 12 2. Omega
- 13 3. Wheatland
- 14 4. Columbia

15 B. Manufacturer's standard lengths and size.

16 C. Protected inside and out by hot-dipped galvanized or electrogalvanized coating.

17 D. Minimum size: 3/4 inch, except as follows:

- 18 1. Conduit for lighting switch legs containing switched conductors only may be 1/2 inch.
- 19 2. As noted on drawings.

20 E. Do not use aluminum conduit.

21 2.02 PLASTIC CONDUIT (PVC)

22 A. Manufacturers:

- 23 1. Carlon.
- 24 2. Genova.
- 25 3. Certainteed.

26 B. Standard lengths and sizes.

27 C. Schedule 40 or 80, heavy wall rigid plastic (PVC) conduit manufactured to NEMA TC2 standards, UL
28 listed, and as required by NEC.

29 D. Rated for 90EC cable.

30 E. Minimum size: 2" inches.

31 2.03 FLEXIBLE CONDUIT

32 A. Manufacturers:

- 33 1. Triangle PWC, Inc.
- 34 2. Anaconda

35

- 1 3. Flexsteel
- 2 4. American Flexible Conduit
- 3 B. Galvanized flexible steel.
- 4 C. Standard conduit sizes.
- 5 D. Minimum Size: 1/2 inch.

6 2.04 LIQUIDTIGHT FLEXIBLE CONDUIT

- 7 A. Manufacturers:
 - 8 1. O-Z/Gedney Company
 - 9 2. American Flexible Conduit
 - 10 3. Flex-Guard, Inc.
 - 11 4. Liquatite
 - 12 5. Anaconda
- 13 B. Galvanized flexible steel.
- 14 C. Standard conduit sizes.
- 15 D. Minimum Size: 1/2 inch.
- 16 E. Heavy wall PVC jacket.

17 2.05 FITTINGS

- 18 A. Manufacturers:
 - 19 1. Appleton Electric Company.
 - 20 2. Steel City, American Electric.
 - 21 3. Oz-Gedney Co.
- 22 B. Steel or malleable iron, zinc galvanized or cadmium plated.
- 23 C. Do not use set screw or indentor type fittings.
- 24 D. Do not use aluminum or die cast fitting.
- 25 E. EMT IMC and GRS Connectors and Couplings:
 - 26 1. Threaded.
 - 27 2. Gland compression type.
 - 28 3. Insulated throat.
 - 29 4. Rain and concrete type.
- 30 F. Flexible Conduit Connectors and Couplings:
 - 31 1. Threaded.
 - 32 2. Insulated throat.
 - 33 3. Grounding type.
 - 34 4. Gland compression type.

- 1 G. Liquidtight Flexible Conduit Fittings:
- 2 1. Liquidtight.
- 3 2. Insulated throat.
- 4 3. Threaded.
- 5 4. Gland compression type.
- 6 5. Grounding type.
- 7 H. Expansion Joints:
- 8 1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.
- 9 2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.
- 10 I. Seals:
- 11 1. Wall entrance, Appleton Type FSK or FSC.
- 12 J. Drain Fittings:
- 13 1. Automatic Drain Breather:
- 14 a. Explosionproof.
- 15 i. Safe for Class I, Groups C and D.
- 16 b. Capable of passing minimum 25 cc water/minimum and minimum 0.05 cubic foot
- 17 air/minimum at atmospheric pressure.
- 18 2. Condensate Drain:
- 19 a. Conduit outlet body, Type T.
- 20 b. Threaded, galvanized plug with 3/16 inch drilled holed through plug.

21 2.06 SURFACE METAL RACEWAY

- 22 A. Manufacturers:
- 23 1. Wiremold Co.
- 24 2. Hubbell Co.
- 25 3. Steel City, American Electric
- 26 B. General:
- 27 1. Wiremold Series 500 series or equal.
- 28 2. Base and cover section to accommodate pulling conductors through raceway.
- 29 3. capable of being over painted.
- 30 4. Full complement of fitting must be available.
- 31 C. The use of surface raceways shall be minimized on the project. Surface raceway shall only be used
- 32 where installing new devices on existing walls that are not being furred out or where conduit cannot be
- 33 installed in an existing wall
- 34 D. Any use of surface raceway shall be approved by the Architect prior to installation.

35 2.07 WIRES, CABLES, AND CONNECTORS

- 36 A. Manufacturers:
- 37 1. Wire and Cable:
- 38 a. Continental

- 1 b. Southwire.
- 2 c. Rome Cable.
- 3 d. Houston Wire and Cable.
- 4 e. Beldon.
- 5 f. Dekoron.
- 6 g. Royal
- 7 h. South
- 8 i. General
- 9 2. Connectors:
- 10 a. Burndy.
- 11 b. Thomas and Betts.
- 12 c. Blackburn, American Electric.
- 13 3. Electrical Tape:
- 14 a. 3M Scotch Brand.
- 15 b. Plymouth.
- 16 c. or equal.
- 17 B. Copper wire only.
- 18 C. 600 v insulation (ASTM standard compounds) and color code conductors for low voltage (secondary
- 19 feeders and branch circuits) as required by NEC.
- 20 1. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for branch circuit and feeder
- 21 conductors size No. 8 AWG and smaller.
- 22 2. Type XHHW-2 Stranded: Single conductor for branch circuits, feeders and service conductors
- 23 larger than No. 8 AWG.
- 24 3. Provide grounding conductor with same insulation as circuit conductors when run with circuit
- 25 conductors.
- 26 4. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for 120 v control wiring and
- 27 No. 14 AWG minimum for graphic indication, nonshielded instrumentation and other control
- 28 wiring operating at less than 120 v unless otherwise noted on Drawings.
- 29 a. Provide high density polyethylene jacketed multi-wire cable assemblies in underground
- 30 conduit or duct.
- 31 D. Joints, Taps, and Splices:
- 32 1. Joints, Taps, and Splices in Conductors No. 10 AWG and Smaller: UL listed compression spring-
- 33 type solderless connectors with plastic cover.
- 34 2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless two or four-bolt
- 35 compression type connectors of type that will not loosen under vibration or normal strains.
- 36 3. Terminations: Compression-type crimp lugs.
- 37 2.08 BOXES
- 38 A. Manufacturer:
- 39 1. Interior Outlet Boxes:
- 40 a. Appleton Electric Company.
- 41 b. Raco.
- 42 c. Steel City, American Electric.
- 43

- 1 2. Weatherproof Outlet Boxes:
 - 2 a. Appleton Electric Company.
 - 3 b. Crouse-Hinds Company.
 - 4 c. O-Z/Gedney company.
 - 5 d. Perfect-Line, American Electric.
- 6 3. Junction and Pull Boxes:
 - 7 a. Hoffman Engineering Company.
 - 8 b. Keystone Columbia, Inc.
 - 9 c. Electromate.
- 10 B. Outlet Boxes - Flush Mounted:
 - 11 1. Wall Outlets: Square corner, galvanized masonry type with internally mounted ears or 4-inches square with raised cover having square corners and internally mounted ears.
 - 12 2. Ceiling Lighting Fixture Outlet Boxes: 4-inch square galvanized box with raised cover set flush with finished surface, complete with 3/8 inch fixture stud.
- 13 C. Outlet Boxes - Surface Mounted:
 - 14 1. General Use: 4-inches square with raised device cover.
 - 15 2. Weatherproof: Cast galvanized with threaded hub.
 - 16 3. Safety outlet enclosure - Tay Mac Co. - Verify outlet configuration.
 - 17 4. Hazardous Locations: Cast galvanized approved for classification of area.
- 18 D. Junction and Pull Boxes:
 - 19 1. Fabricate from code gauge galvanized steel, with covers held in-place by corrosion resistant machine screws.
 - 20 2. Size as required by code for number of conduits and conductors entering and leaving box.
 - 21 3. Provide with welded seams where applicable, and equipment with corrosion resistant nuts, bolts, screws, and washers.
 - 22 4. Finish with rust inhibiting primer.
- 23 2.09 FIRE RATED THROUGH FLOOR FITTINGS
- 24 A. Manufacturers:
 - 25 1. Hubbell Electric Co.
 - 26 2. Square D.
 - 27 3. Steel City, American Electric.
- 28 B. Rating:
 - 29 1. Floor fittings requiring penetration of floor slab listed by UL and have UL fire rating of 2 hours.
- 30 C. Floor Service Pedestal:
 - 31 1. Painted textured aluminum surface.
 - 32 2. 2 to 8 gangs of service capacity and suitable for:
 - 33 a. Duplex receptacles 15 or 20-amp.
 - 34 b. Single twist lock receptacle 20-or 30-amp.
 - 35 c. Communication/data outlet (2/gang).
- 36
- 37
- 38
- 39
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- 1 d. 1-inch ID protective bushing for cables.
- 2 e. Furniture feed plate suitable for 3/4-inch flexible metal conduit connection.
- 3 D. Junction Boxes in Ceiling Space Below Floor:
- 4 1. Suitable to accommodate separate services of power and communications.
- 5 2. Code approved for plenum space when applicable.
- 6 E. Raceways through Floor:
- 7 1. Provide separation of power and low voltage.
- 8 2. For 2-inch core holes:
- 9 a. 3/4 inch raceway for communication.
- 10 b. 1/2 inch raceway for power.
- 11 c. Heat Transfer: .11 square inch of copper cross section maximum for both.
- 12 3. For 3-inch core holes:
- 13 a. 1-1/4 inch raceway for communication.
- 14 b. 1/2 inch raceway for power.
- 15 c. Heat Transfer: .16 square inch of copper cross section maximum for both.
- 16 F. Abandonment Plates:
- 17 1. Maintain same UL listed fire rating.
- 18 2. Packaged, identified, and turned over to OWNER.

19 2.10 WIRING DEVICES

- 20 A. Manufacturers:
- 21 1. Hubbell Wiring Device Division.
- 22 2. Pass and Seymour, Inc.
- 23 3. Leviton
- 24 4. Cooper Wiring Devices
- 25 B. Fabricated Devices:
- 26 1. Factory-fabricated, specification grade wiring devices in type, color, and electrical rating for
- 27 service indicated. Ivory color or as selected by ENGINEER OR OWNER.
- 28 2. Wiring devices of one manufacturer.
- 29 3. See Drawing symbol schedule for identification of device type.
- 30 C. Switches:
- 31 1. General Use Lighting Switches: 20 amp toggle, equal to Hubbell No. 1221-I series.
- 32 2. Switches controlling equipment, operation of which is not evident from switch position, shall
- 33 include flush neon pilot light in conjunction with proper switch. Each switch shall be complete
- 34 with engraved plate to identify equipment being controlled (white letters on black, 1/8 inch high
- 35 minimum).
- 36 D. Receptacles:
- 37 1. General use duplex receptacles: NEMA No. 5-20R, grounding type, 20 amp Hubbell No. 5362
- 38 Specification Grade.
- 39 2. Special purpose receptacles as shown on Drawings and schedules.
- 40

- 1 3. Receptacles supplied from standby emergency system to have red face.
- 2 4. GFI receptacles shall be Hubbell GFR5352IA
- 3 E. Wiring Device Plates and Covers:
- 4 1. Wall plates for wiring devices with ganging and cut-outs as indicated, provided with metal screws
- 5 for securing plates to devices, screw heads colored to match finish of plate.
- 6 2. Plates for Flush Mounted Devices: Equal to Sierra P line specifications grade Type No. 430
- 7 brushed stainless steel.
- 8 3. Telephone outlet configuration to match telephone outlet jack or cable.
- 9 4. Device plates for surface mounted Type FS or FD boxes to be Type FSK galvanized steel.
- 10 5. Device plates for surface mounted, 4-inch square bossed to be ½ inch raised galvanized steel
- 11 covers.
- 12 6. Weatherproof outlet enclosure for exterior devices or devices in damp locations to be marked
- 13 galvanized gray cast malleable with gasketed lift cover plate as shown on Drawings. Suitable for
- 14 wet locations while in use. Enclosure must be gasketed. Provide Intermatic WP1010MC,
- 15 WP1010HMC, or WP1030MC with appropriate mounting base(s) and inserts.

16 2.11 MOTOR AND CIRCUIT DISCONNECTS

- 17 A. Manufacturers:
- 18 1. Eaton/Cutler-Hammer
- 19 2. Siemens
- 20 3. Square D
- 21 4. Allen Bradley
- 22 5. General Electric
- 23 B. Enclosed Circuit Breaker Construction:
- 24 1. Dual cover interlock.
- 25 2. External trip indication.
- 26 3. Provisions for control circuit interlock.
- 27 4. Padlock provisions for padlock in Off position.
- 28 5. Handle attached to box, not cover.
- 29 6. Handle position indicates On, Off or Tripped.
- 30 7. Provisions for insulated or groundable neutral.
- 31 C. Safety Switches:
- 32 1. NEMA heavy duty Type HD.
- 33 2. Dual cover interlock.
- 34 3. Visible blades.
- 35 4. Provisions for control circuit interlock.
- 36 5. Pin type hinges.
- 37 6. Tin plated current carrying parts.
- 38 7. Quick make and break operator mechanism.
- 39 8. Handle attached to box, not cover.
- 40 9. Handle position indication, On in up position and Off in down position.
- 41 10. Padlock provisions for up to 3 padlocks in Off position.
- 42 11. UL listed lugs for type and size of wire specified.

- 1 12. Spring reinforced fuse clips for Class R fuses.
- 2 13. Provisions for insulated or groundable neutral.
- 3 14. UL listed short circuit rating 200,000 RMS amp with Class R fuses.
- 4 D. Enclosures:
- 5 1. Indoor: NEMA 1 code gauge steel with rust inhibiting primer and baked enamel finish.
- 6 2. Outdoor: NEMA 3R code gauge zinc coated steel with baked enamel finish.
- 7 2.12 FUSES
- 8 A. Manufacturers:
- 9 1. Bussmann
- 10 2. Gould Shawmut
- 11 3. Littlefuse
- 12 4. Brush
- 13 B. 250 v. Fuses:
- 14 1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp
- 15 interrupting rating.
- 16 a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection
- 17 for motor, transformer, welder, feeder, and main service protection.
- 18 C. 600v Fuses:
- 19 1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp
- 20 interrupting rating.
- 21 a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection
- 22 for motor, transformer, welder, feeder and main service protection.
- 23 2. Class L, bolt-in 601 to 6,000 amps, 200,000-amp interrupting rating.
- 24 a. Gould Shawmut A48Y, time delay for overload and short circuit protection for motor,
- 25 transformer, feeder, and main service protection.
- 26 3. Class CC, fast acting, single element, 1/10 to 30 amps, 200,000-amp interrupting rating.
- 27 a. Gould Shawmut ATDR, UL listed for motor control circuits, lighting ballasts, control
- 28 transformers, and street lighting fixtures.
- 29 D. Spare Fuses:
- 30 1. 10%, minimum of 3, of each type and rating of installed fuses.
- 31 2.13 PANELBOARDS
- 32 A. Manufacturers:
- 33 1. Square D only to match building standard.
- 34 B. Panelboard Ratings:
- 35 1. UL listed short circuit rating (integral equipment rating):
- 36 a. Up to 240 v: 10,000 RMS symmetrical amp minimum.
- 37 b. Up to 480 v. 14,000 RMS symmetrical amp minimum.
- 38 c. As shown on Drawings.
- 39 C. Panelboard Construction:

1. Main breaker or main lugs only, per panelboard schedule.
2. Molded case circuit breakers.
3. Terminals:
 - a. UL listed for type or wire specified.
 - b. Anti-turn solderless compression type.
4. Bussing:
 - a. Distributed phase sequence type.
 - b. 225 amps, 98% conductivity hard drawn copper or as shown on panelboard schedule or Drawings.
 - c. Copper.
 - d. Mounting hardware behind usable space.
5. Gutters adequate for wire size used, 4-inch minimum.
6. Boxes:
 - a. Code gauge galvanized steel.
 - b. Without knockouts.
7. Fronts:
 - a. Panel front cover shall have piano hinge to allow access to wiring gutters without removal of panel trim. Hinged trim held in place with screw fasteners. Door shall be built into trim, which allows access to breakers as well as to hinged trim screw fasteners. Breaker access door shall have the following features:
 - i. Concealed piano hinge.
 - ii. Flush stainless steel cylinder tumbler type locks with spring loaded door pulls.
 - iii. Locks keyed alike.
 - iv. Rust inhibiting primer, baked enamel finish.
 - v. Dead front safety type.
 - vi. Concealed hinges and trim clamps..
 - vii. Circuit Directory:
 - viii. Suitable for complete descriptions.
 - ix. Clear plastic cover.
8. Typewritten card inside panel door.
9. Special features as shown on Drawings.
10. Code gauge steel.
11. Engraved laminated nameplate in accordance with Section 26 05 00.

2.14 MOLDED CASE CIRCUIT BREAKERS

- A. Manufacturers:
 1. Square D
- B. Permanent Trip Circuit Breakers:
 1. Lighting Panel Circuit Breakers:
 - a. Thermal and magnetic protection.
 - b. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
 - c. Bolt-on type unless otherwise noted on Drawings.
 - d. Quick make and break toggle action.
 - e. Handle trip indication.

- 1 f. Handle position indication, On, Off, and Tripped centered.
- 2 g. UL listed for type of wire specified.
- 3 h. UL listed short circuit rating (integrated equipment rating).
- 4 i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
- 5 ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.
- 6 i. UL SWDL switching duty on 120 v. circuits for switched circuits.
- 7 j. Switch neutral common trip per NEC 514-5 for fuel pumps.
- 8 2. Power Panel Circuit Breakers:
- 9 a. Thermal and magnetic protection.
- 10 b. Magnetic protection only in combination with motor starters and motor circuit
- 11 protectors (MCP).
- 12 c. Single magnetic trip adjustment.
- 13 d. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
- 14 e. Push-to-trip test button.
- 15 f. Bolt-on type.
- 16 g. Quick make and break toggle action.
- 17 h. Handle trip indication.
- 18 i. Handle position indication, On, Off, and Tripped centered.
- 19 j. UL listed for type of wire specified.
- 20 k. UL listed short circuit rating (integrated equipment rating).
- 21 i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
- 22 ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.

23 2.15 GROUND-FAULT CIRCUIT INTERRUPTER RECEPTACLES (GFCI)

- 24 A. Ratings:
- 25 1. 120 vac.
- 26 2. 20 amp.
- 27 B. Tripping Requirement:
- 28 1. UL Class A.
- 29 C. Construction:
- 30 1. Shallow depth.
- 31 2. Line and load terminal screws.
- 32 3. Noise suppression.
- 33 4. Feed through.
- 34 5. Standard duplex wall plates shall fit.
- 35 6. NEMA 5-20R configuration.
- 36 D. Meet requirements of UL 943 ground-fault circuit interrupters.

37 2.16 GROUNDING AND BONDING

- 38 A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings,
- 39 and quantities indicated are in excess of NEC requirements, more stringent requirements and greater size,
- 40 rating, and quantity indications govern.

- 1 B. Conductor Materials: Copper.
- 2 C. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- 3 D. Equipment Grounding Conductor: Green insulated.
- 4 E. Grounding Electrode Conductor: Stranded cable.
- 5 F. Bare Copper Conductors:
 - 6 1. Solid Conductors: ASTM B3.
 - 7 2. Assembly of Stranded Conductors: ASTM B8.
 - 8 3. Tinned Conductors: ASTM B33.
- 9 G. Ground Bus: Bar annealed copper bars of rectangular cross section.
- 10 H. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bar copper wire, terminated with copper

11 ferules.
- 12 I. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inches thick and 2 inches wide, except as

13 indicated.
- 14 J. Connector Products
 - 15 1. General: Listed and labeled as grounding connectors for materials used.
 - 16 2. Pressure Connectors: High-conductivity-plated units.
 - 17 3. Bolted Clamps: Heavy-duty units listed for application.
 - 18 4. Exothermic Welded Connections: Provide in kit form and select for specific types, sizes, and

19 combinations of conductors and other items to be connected.

20 PART 3 - EXECUTION

21 3.01 GENERAL

- 22 A. Install products in accordance with NEC, manufacturer's instructions, applicable standards, and

23 recognized industry practices to ensure products serve intended function.

24 3.02 CONDUITS AND CONDUIT FITTINGS

- 25 A. Complete conduit installation prior to installing cables.
- 26 B. Unless specifically indicated otherwise on Drawings, use rigid galvanized steel conduit for general

27 wiring.
- 28 C. Provide watertight conduit system where installed in wet places, underground or where buried in

29 masonry or concrete.
- 30 D. EMT conduit may be used for conduit sizes up to 4 inches.
- 31 E. Conduit shall be run concealed except exposed surface conduit may be installed where noted on

32 Drawings or where concealment found to be impractical or impossible, and only with approval of

33 ENGINEER.
- 34 F. Continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes.

- 1 G. Enter and secure to boxes ensuring electrical continuity from point of service to outlets.
- 2 H. Conduit runs extending through areas of different temperature or atmospheric conditions or partly
3 indoors and partly outdoors shall be sealed, drained, and installed in manner preventing drainage of
4 condensed or entrapped moisture into cabinets, motors or equipment enclosures.
- 5 I. Run conduits within concrete structures parallel to each other and spaced on center of at least three times
6 conduit trade diameter with minimum 2-inch concrete covering. Conduits over 1 inch may not be
7 installed in slab without approval of ENGINEER.
- 8 J. Run exposed conduits parallel to or at right angles with lines of building.
- 9 K. Route conduit runs above suspended acoustical ceilings not interfering with tile panel removals.
- 10 L. Secure conduit in-place with not less than 1 malleable corrosionproof alloy strap or hanger per 8 feet of
11 conduit.
- 12 1. Do not use perforated strapping.
- 13 M. Connections to Motors and Equipment Subject to Vibration:
- 14 1. Flexible steel conduit not over 3 feet long or where exposed in mechanical and utility areas and
15 not subjected to moisture, dirt, and fumes.
- 16 2. Liquidtight flexible conduit not over 3 feet long where exposed in finished areas or where subject
17 to moisture, dirt, fumes, oil, corrosive atmosphere, exposed or concealed, with connectors to
18 ensure liquidtight, permanently grounded connection. Locate where least subject to physical
19 abuse.
- 20 N. Use double lock nuts and insulated bushings with threads fully engaged.
- 21 O. Connectors at fixture bodies and boxes shall be rigidly secured with galvanized lock nut and bushing.
- 22 P. Cap conduits after installation to prevent entry of debris.
- 23 Q. Install conduit expansion fittings complete with bonding jumper in following locations.
- 24 1. Conduit runs crossing structural expansion joint.
- 25 2. Conduit runs attached to two separate structures.
- 26 3. Conduit runs where movement perpendicular to axis of conduit may be encountered.
- 27 R. Install 4 feet-0 inch to 6 feet-0 inch flexible steel conduit drops from independent junction box mounted
28 above ceiling and accessible from below ceiling to recessed ceiling mounted equipment. Allow for
29 positioning of equipment to tile increments.
- 30 S. Negotiate beams and changes in ceiling heights with LB conduit fittings on outside corners and ells on
31 inside corners. Arrange bends and offsets in parallel conduits to present neat symmetrical appearance.
- 32 T. In precast areas, run conduits in insulation space or in floor topping without crossing conduits, using 3/4
33 in. maximum conduit size.
- 34 U. Core drill through reinforced concrete with approval of ENGINEER.
- 35 V. Split, crushed or scarred conduit not acceptable.
- 36 W. Do not route over boiler, incinerator or other high temperature equipment.
- 37 X. Flexible metal conduit can only be used for final connections to motors, transformers, or to light fixtures

1 above suspended ceilings.

2 3.03 SURFACE METAL RACEWAY

3 A. Mount to surface with No. 8 flathead fasteners or approved support clips.

4 B. Do not pinch wires.

5 C. Remove metal burrs and sharp edges.

6 D. Provide bushing.

7 E. Install in accordance with manufacturer's recommendations.

8 F. Provide covers where two lengths come together.

9 3.04 WIRE AND CABLE

10 A. Run wire and cable in conduit unless otherwise indicated on Drawings.

11 B. On branch circuits, use standard colors.

12 C. Each tap, joint or splice in conductors No. 8 AWG and larger shall be taped with 2 half-lap layers of
13 vinyl plastic electrical tape and finish wrap of color coding tape, where required by code.

14 D. Run ground wire with power circuits; conduit shall not be grounding path.

15 E. Color Coding: Conductors for lighting and power wiring as indicated below.

16	<u>Phase</u>	<u>208/120v</u>	<u>480/277v</u>
17	A	Black	Brown
18	B	Red	Orange
19	C	Blue	Yellow
20	Neutral	White	Gray
21	Ground	Green	Green

22 3.05 BOXES

23 A. Install knockout closures to cap unused knockout holes where blanks have been removed.

24 B. Locate boxes to ensure accessibility of electrical wiring.

25 C. Secure boxes rigidly to subsurface upon which being mounted or solidly embed boxes in concrete or
26 masonry. Do not support from conduit.

27 D. Do not burn holes, use knockout punches or saw.

28 E. Provide outlet box accessories as required for each installation such as mounting brackets, fixture study,
29 cable clamps, and metal straps for supporting outlet boxes compatible with outlet boxes being used and
30 meeting requirements of individual wiring situations.

31 F. Location of outlets and equipment shown on Drawings is approximate. Verify exact location.

32 G. Minor modification in location of outlets and equipment is considered incidental up to distance of 10 feet

1 with no additional compensation, provided notification of modification is given prior to roughing in of
2 outlet.

3 H. Flush outlets shall have edges or plaster flush with finished wall or ceiling surfaces so plates can be
4 drawn tightly to wall or ceiling surfaces.

5 I. Mounting heights:

6 1. Shall conform to ADA guidelines.

7 2. In general, unless otherwise shown on Drawings:

8 a. Switches: 48 inches above floor to top of box.

9 b. AC Receptacles and Telephone Outlets: 15 inches above floor to bottom of box or 6
10 inches above counters, counter backsplashes in finished areas; 48 inches to top of box
11 above floor in unfinished areas.

12 c. Wall Bracket Lighting Fixtures: 8 inches above mirrors or 6 feet-6 inches above floor.

13 d. Pushbuttons: 48 inches above floor to top of box.

14 e. Motor Starters and Disconnect Switches: 60 inches above floor.

15 i. Thermostats: 48 inches above floor.

16 f. Bells and Horns: 8 feet-0 inches above floor.

17 g. Clocks: 8 ft.-0 inches above floor.

18 h. Fire Alarm visual signals 80" above floor.

19 i. Emergency Battery Units: 8 ft. - 0 inches above floor or 12" below ceiling.

20 J. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall,
21 minimum 12 inches.

22 K. Where emergency switches occur adjacent to normal light switches, install in separate boxes in
23 accordance with NEC and device plate color coding separation.

24 L. Light Fixture Outlet Boxes:

25 1. Securely mount with approved type bar hangers spanning structural members to support weight of
26 fixture.

27 2. Do not support from conduit.

28 3. Equip with 3/8-inches fixture stud and tapped fixture ears.

29 3.06 FIRE RATED THROUGH FLOOR FITTINGS

30 A. Spacing and location as noted on Drawing.

31 B. Install in accordance with manufacturer's instructions.

32 3.07 WIRING DEVICES

33 A. Do not install devices until wiring is complete.

34 B. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or
35 otherwise. Make circuit connections by using wire connectors and pigtails.

36 C. Install gasket plates for devices or system components having light emitting features such as switch with
37 pilot light and dome lights. Where installed on rough textured surfaces, seal with black self-adhesive
38 polyfoam.

- 1 D. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box
2 connection or as shown on Drawings.
- 3 E. Wrap wiring devices with insulating tape.
- 4 F. Install emergency switches which occur adjacent to normal light switches in separate boxes to maintain
5 systems isolation in accordance with NEC.
- 6 3.08 MOTOR STARTERS
- 7 A. Examine area to receive motor starters to ensure adequate clearance for starter installation.
- 8 B. Anchor firmly to wall or structural surface.
- 9 3.09 MOTOR AND CIRCUIT DISCONNECTS.
- 10 A. Locate disconnect switches as shown on Drawings and required by NEC.
- 11 B. Provide control circuit interlock as required by NEC.
- 12 3.10 OVERCURRENT PROTECTIVE DEVICES.
- 13 A. Install fuses just prior to energizing equipment.
- 14 B. Locate circuit breakers as shown on Drawings.
- 15 C. Install GFCI receptacles as required by NEC.
- 16 3.11 PANELBOARDS
- 17 A. Flush or surface mount as specified on drawings and schedules.
- 18 B. Support panel cabinets independently to structure with no weight bearing on conduits.
- 19 C. Install recessed panelboards to allow cover to be drawn tight against wall to provide neat appearance.
- 20 D. Install panelboards so top breaker is not higher than 6 feet-0 inches above floor.
- 21 E. Adjacent panel cabinets shall be same size and mounted in horizontal alignment.
- 22 F. Install typewritten directory in each panelboard, accurately indicating rooms or equipment being served
23 after final circuit changes have been made to balance circuit loads.
- 24 G. Install four spare 1 inch conduits from top of each flush mounted panelboard to area above ceiling for
25 future use. On flush mounted panelboards located on first and higher level floors, provide two spare 1
26 inch conduits from bottom of panelboard to ceiling area of floor below for future use.
- 27 3.12 GROUNDING AND BONDING
- 28 A. Application
- 29 1. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and
30 quantities of equipment grounding conductors, except where larger sizes or more conductors are
31 indicated.

- 1 a. Install separate insulated equipment grounding conductors with circuit conductors.
2 Raceway may be used as equipment ground conductor where feasible in non-hazardous
3 areas and permitted by NEC for lighting circuits. Install insulated equipment ground
4 conductor in nonmetallic raceways unless designated for telephone or data cables.
- 5 2. Underground Conductors: Bare tinned, stranded copper except otherwise indicated.
- 6 3. Signal and Communications: For telephone, alarm, instrumentation and communication systems,
7 provide #4 AWG minimum green insulated copper conductor in raceway from grounding
8 electrode system to each terminal cabinet or central equipment location.
- 9 4. Ground separately derived systems required by NEC to be grounded in accordance with NEC
10 paragraph 250-26.
- 11 5. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to grounding electrode as
12 indicated in addition to separate equipment grounding conductor run with supply branch circuit.
13

- 1 6. Connections to Lighting Protection System: Bond grounding conductors or grounding conductor
2 conduits to lighting protection down conductors or grounding conductors in compliance with
3 NFPA 78.
- 4 B. Installation
- 5 1. General: Ground electrical systems and equipment in accordance with NEC requirements except
6 where Drawings or Specifications exceed NEC requirements.
- 7 2. Ground Rods:
 - 8 a. Locate minimum of one-rod length from each other and at least same distance from any
9 other grounding electrode.
 - 10 b. Interconnect ground rods with bare conductors buried at least 24 inches below grade.
 - 11 c. Connect bare-cable ground conductors to ground rods by means of exothermic welds
12 except as otherwise indicated.
 - 13 d. Make connections without damaging copper coating or exposing steel.
 - 14 e. Use 3/4-inch by 10-foot ground rods except as otherwise indicated.
 - 15 f. Drive rods until tops are 6 inches below finished floor or final grade except as
16 otherwise indicated.
- 17 3. Metallic Water Service Pipe:
 - 18 a. Provide insulated copper ground conductors, sized as indicated, in conduit from
19 building main service equipment, or ground bus, to main metallic water service
20 entrances to building.
 - 21 b. Connect ground conductors to street side of main metallic water service pipes by means
22 of ground clamps.
 - 23 c. Bond ground conductor conduit to conductor at each end.
- 24 4. Braided-Type Bonding Jumpers:
 - 25 a. Use elsewhere for flexible bonding and grounding connections.
- 26 5. Route grounding conductors along shortest and straightest paths possible without obstructing
27 access or placing conductors where they may be subjected to strain, impact, or damage, except as
28 indicated.
- 29 C. Connections
- 30 1. General: Make connections to minimize possibility of galvanic action or electrolysis. Select
31 connectors, connection hardware, conductors, and connection methods so metals in direct contact
32 will be galvanically compatible.
 - 33 a. Use electroplated or hot-tin-coated materials to assure high conductivity and make
34 contact points closer in order of galvanic series.
 - 35 b. Make connections with clean bare metal at points of contact.
 - 36 c. Aluminum to steel connections: stainless steel separators and mechanical clamps.
 - 37 d. Aluminum to galvanized steel connections: tin-plated copper jumpers and mechanical
38 clamps.
 - 39 e. Coat and seal connections involving dissimilar metals with inert material such as red
40 lead paint to prevent future penetration of moisture to contact surfaces.
- 41 2. Exothermic Welded Connections:
 - 42 a. Use for connections to structural steel and for underground connections except those at
43 test wells.
 - 44 b. Install at connections to ground rods and plate electrodes.
 - 45 c. Comply with manufacturer's written recommendations.
 - 46 d. Welds that are puffed up or that show convex surfaces indicating improper cleaning are
47 not acceptable.

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SECTION 26 51 13

LIGHTING

PART 1 - GENERAL

1.01 SCOPE

- 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. Section Includes:

1. Interior lighting fixtures.
2. Exterior lighting fixtures.
3. Lamps.
4. Ballasts.
5. Emergency lighting units.

1.03 REFERENCES

- A. American National Standards Institute (ANSI):

1. C78 Series - Lamps.
2. C82.2-84 - Fluorescent Lamp Ballasts.
3. C82.4-85 - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
4. ANSI C2-90 - National Safety Code.

- B. Institute of Electrical and Electronics Engineers (IEEE):

1. C62.41-91 - IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

- C. National Fire Protection Association (NFPA):

1. 70-93 - National Electric Code.

- D. Underwriters Laboratory (UL):

1. 844-90 - UL Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.
2. 924-90 - UL Standard for Safety Emergency Lighting and Power Equipment.
3. 935-84 - UL Standard for Safety Florescent-Lamp Ballast.
4. 1092 (P) - UL Standard for Safety Proposed First Edition of the Standard for Process Control Equipment.
5. 1570-88 - UL Standard for Safety Florescent Lighting Fixtures.
6. 1571-91 - UL Standard for Safety Incandescent Lighting Fixtures.
7. 1572-91 - UL Standard for Safety High Intensity Discharge Lighting Fixtures.
8. 1573-85 - UL Standard for Safety Stage and Studio Lighting Units.
9. 1574-87 - UL Standard for Safety Track Lighting Systems.
10. UL 773-87 - UL Standard for Safety Plug-In, Locking Type Photo controls for Use with Area Lighting.

- 1 1.04 DEFINITIONS
- 2 A. Fixture: Complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts
3 required to distribute light, position and protect lamps, and connect lamps to power supply. Internal
4 battery powered exit signs and emergency lighting units also include battery and means for controlling
5 and recharging battery. Emergency lighting units are available with and without integral lamp heads and
6 lamps.
- 7 B. Luminaire: Fixture.
- 8 C. Average Life: Time after which 50% will have failed and 50% will have survived under normal
9 conditions.
- 10 1.05 SUBMITTALS
- 11 A. Product Data:
- 12 1. Describe fixtures, lamps, ballasts, poles, emergency lighting units, and accessories. Arrange
13 product data for fixtures in order of fixture designation. Include data on features and accessories
14 and following information:
15 Outline drawings of fixtures indicating dimensions and principal features.
16 Electrical ratings and photometric data with specified lamps and certified results of
17 independent laboratory tests.
18 Data on batteries and chargers of emergency lighting units.
- 19 B. Shop Drawings: Detail nonstandard fixtures and indicating dimensions, weights, methods of field
20 assembly, components, features, and accessories.
- 21 C. Miscellaneous:
- 22 1. For substitutes only, product certifications signed by manufacturers of lighting fixtures certifying
23 that their fixtures comply with specified requirements.
24 2. Coordination drawings for fixtures that require coordination with other equipment installed in
25 same space.
- 26 D. Submit in accordance with Division 1.
- 27 1.06 QUALITY ASSURANCE
- 28 A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized
29 Testing Laboratory (NRTL).
- 30 1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
31 2. Terms "listed" and "labeled" shall be as defined in National Electric Code, Article 100.
- 32 B. Regulatory Requirements:
- 33 1. National Electric Code: Components and installation shall comply with NFPA 70.
34 2. Comply with ANSI C2, "National Electrical Safety Code".
- 35 C. Coordinate fixtures mounting hardware and trim with ceiling tile.
36

- 1 1.07 WARRANTY
- 2 A. Requirements:
- 3 1. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to
- 4 weathering.
- 5 2. Color Retention: Warranty against fading, staining, chalking due to effects of weather and solar
- 6 radiation.

7 PART 2 - PRODUCTS

8 2.01 FIXTURES, GENERAL

- 9 A. Comply with requirements specified in Articles below and lighting fixture schedule.

10 2.02 FIXTURE COMPONENTS, GENERAL

- 11 A. Metal Parts: Free from burrs, sharp corners, and edges.

- 12 B. Sheet Metal Components: Steel, except as indicated. Form and support components to prevent warping
- 13 and sagging.

- 14 C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under
- 15 operating conditions. Arrange to permit relamping without use of tools. Arrange doors, frames, lenses,
- 16 diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating
- 17 position.

- 18 D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

- 19 1. White surfaces: 85%.
- 20 2. Specular Surfaces: 83%.
- 21 3. Diffusing Specular Surfaces: 75%.
- 22 4. Laminated Silver Metallized Film: 90%.

- 23 E. Exterior Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform
- 24 in use. Provide filter/breather for enclosed fixtures.

- 25 F. Exterior Exposed Hardware Material: Stainless steel.

- 26 G. Lenses, Diffusers, Covers, and Globes: 100% virgin acrylic plastic or water white, annealed crystal glass
- 27 except as indicated.

- 28 1. Plastic: Highly resistant to yellowing and other changes due to aging, exposure to heat and UV
- 29 radiation.

- 30 2. Lens Thickness: 0.125 inches, minimum.

- 31 H. Photoelectric Relay: UL 773.

- 32 1. Contact Relays: Single-throw, arranged to fail in the "on" position and factory set to turn light
- 33 unit on at 1.5 to 3 footcandles and off at 4.5 to 10 footcandles with 15 seconds minimum time
- 34 delay.

- 35 2. Relay Mounting: In fixture housing.

36 2.03 SUSPENDED FIXTURE SUPPORT COMPONENTS

- 37 A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as

- 1 fixture.
- 2 B. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy arranged to mount single fixture.
3 Finish same as fixture.
- 4 C. Rod Hangers: 3/16-inch diameter cadmium plated, threaded steel rod.
- 5 D. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded
6 attachment, cord, and locking-type plug.

7 2.04 FLUORESCENT FIXTURES

8 A. Fixtures: Conform to UL 1570.

9 B. Ballasts: All fluorescent ballasts shall be electronic type and shall meet the following specs:

- 10 1. UL Listed (Class P) sound rating A and CSA certified.
- 11 2. Comply with EMI and RFI limits set by the FCC (CFR 47 part 18) or NEMA and not interfere
12 with normal electrical equipment.
- 13 3. Meet any applicable standards set forth by ANSI.
- 14 4. Be potted or conformal coated in a metallic case and not contain PCBs.
- 15 5. Provide normal rated lamp life as stated by lamp manufacturers (i.e. rated life at 3 hour burn time
16 per start).
- 17 6. Provide independent test results from an approved testing laboratory for all of the specifications
18 below. This is required for all submitted ballasts.
- 19 7. Nominal power factor of .90 or higher.
- 20 8. Total harmonic distortion of less than 10% at 120 or 277 volts (universal voltage).
- 21 9. Ballast factor 0.70 through 1.2, as shown on the lighting fixture schedule.
- 22 10. Frequency of operation shall be 40 kHz - 50 kHz and units shall operate without visible flicker.
- 23 11. Ballast efficiency factor shall meet Consortium of Energy Efficiency (www.cee1.org)
24 specifications (adopted by Focus on Energy program).
- 25 12. Multi-lamp ballasts shall operate in parallel so that when one lamp burns out, the other lamps will
26 continue to operate at full light output.
- 27 13. Ballasts shall carry a minimum 5 year warranty with a \$10 replacement labor allowance.
- 28 14. Ballasts shall not be affected by lamp failure.
- 29 15. Ballasts shall be a standard production item.
- 30 16. Ballasts shall be marked with manufacturer's name, part number, supply voltage, power
31 factor, open circuit voltage, current draw for each lamp type and UL Listing.
- 32 17. Ballasts shall withstand line transients as defined in IEEE 587, Category A.
- 33

34 C. Acceptable ballast manufacturer's names and product lines are as follows:

- 35 1. Osram Sylvania – Quicktronic High Efficiency and Quicktronic PROstart.
- 36 2. GE Lighting – Ultramax and UltraStart.
- 37 3. Maxlite – High Efficiency Ballast.
- 38 4. Advance – Optanium.
- 39 5. Universal Lighting Technologies – F32T8.
- 40
- 41 6. Manufacturer names are used to develop quality and performance requirements only. All
42 manufacturers and their products shall meet the system performance requirements and this
43 entire specification.

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D. Compact Fluorescent Ballasts (Electronic)

- 1. Ballasts shall be high power factor, class P, with voltage rating matching the branch circuit voltage.
- 2. Ballast factor shall be 0.85 or higher.
- 3. Ballast shall have lamp fault shut-off circuitry to prevent starting of a faulty lamp.
- 4. Cold-weather ballast must reliably start and operate the lamp in ambient temperatures down to 0°F for the rated life of the lamp.

E. Dimming Ballasts (Fluorescent)

- 1. Ballast shall provide continuous, flicker-free dimming from 100% to 5%.
- 2. Ballast shall have Total Harmonic Distortion of less than 10%.
- 3. Ballast power factor shall be greater than 0.95.
- 4. Ballast factor shall be 0.85 or higher for T8 lamps, 0.95 or higher for T5 lamps.
- 5. Ballast shall be high frequency electronic type and operate lamps at a frequency above 25kHz for T5 lamps.
- 6. Ballast shall have built-in inrush current limiting circuitry, maximum of 7 amps for 120 volts and 3 amps for 277 volts.
- 7. Ballast shall have internal fusing.
- 8. Ballast shall have ultra-quiet operation.
- 9. Operating temperature shall not exceed 75° C on the case during normal operation.
- 10. Minimum lamp starting temperature shall be 10°C / 50° F.

2.05 INCANDESCENT FIXTURES

- A. Conform to UL 1571.

2.06 FIXTURES FOR HAZARDOUS LOCATIONS

- A. Conform to UL 844 or provide units that have Factory Mutual Engineering and Research Corporation (FM) certification for indicated class and division of hazard.

2.07 TRACK LIGHTING SYSTEMS

- A. Conform to UL 1574. Provide components, including track, fittings, and fixtures from same manufacturer, and as recommended by manufacturer for intended purpose.
- B. Stage and Studio Lighting Equipment: Conform to UL 1573.

2.08 EXIT SIGNS

- A. Conform to UL 924.
 - 1. Sign Colors: Conform to local code.
- B. Self-Powered Exit Signs (Battery Type): Integral automatic high/low trickle charger in self-contained power pack.
 - 1. Battery: Sealed, maintenance-free, nickel cadmium type with special project warranty.

2.09 LAMPS

- A. Conform to ANSI C78 series applicable to each type of lamp.

- 1 2.10 FINISH
- 2 A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs,
3 holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project
4 warranty period and replace with new fixtures.
- 5 B. Other Parts: Manufacturer's standard finish.
- 6 C. Verify and provide light fixture finishes as selected by ARCHITECT for all light fixture types. Include
7 colored finish selection tables with product submittals. Upon request submit actual material finish
8 swatches for A/E review.

9 PART 3 - EXECUTION

10 3.01 INSTALLATION

- 11 A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to
12 manufacturer's printed instructions and approved submittals.
- 13 B. Support For Recessed and Semirecessed Fixtures: Units may be supported from suspended ceiling
14 support system. Install ceiling system support rods or wires at minimum of four rods or wires per fixture
15 located not more than 6 inches from fixture corners.
- 16 1. Fixtures Smaller Than Ceiling Grid: Install minimum of four rods or wires for each fixture and
17 locate at corner of ceiling grid where fixture is located. Do not support fixtures by ceiling
18 acoustical panels.
- 19 2. Fixtures of Sizes Less Than Ceiling Grid: Center in acoustical panel. Support fixtures
20 independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- 21 3. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near
22 each fixture corners.
- 23 C. Support for Suspended Fixtures: Brace pendants and rods that are 4 feet long or longer to limit swinging.
24 Support stem mounted single-unit suspended fluorescent fixtures with twin-stem hangers. For
25 continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit
26 length of chassis, including one at each end.
- 27 D. Lamping: Lamp units according to manufacturer's instructions.

28 3.02 GROUNDING

- 29 A. Ground fixtures and metal poles according to Section 26 20 00.

30 3.03 FIELD QUALITY CONTROL

- 31 A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- 32 B. Give 7-day notice of dates and times for field tests.
- 33 C. Verify normal operation of each fixture after fixtures have been installed and circuits have been
34 energized with normal power source.
- 35 D. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation.
- 36 1. Duration of supply.
- 37 2. Low battery voltage shut-down.
- 38 3. Normal transfer to battery source and retransfer to normal.

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SECTION 27 10 00

TELECOMMUNICATIONS DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.01 SCOPE

A. The basic scope of this project is as follows:

1. Remove abandoned cables back to origin.
2. Provide new cables and patch panels.
3. Provide all certification and testing of the equipment and cabling as required.

B. Section Includes: Equipment, materials, labor, and services to provide telephone and data distribution system including, but not limited to:

1. Raceway and boxes
2. Telephone and data cabling terminations
3. Telecommunications outlets
4. Terminal blocks/cross-connect systems
5. System testing
6. Documentation and submissions

C. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.

D. Work not included:

1. The following work will be done by others:
 - a. Off-site services.
 - b. Providing data concentrators, hubs, servers, computers, and other active devices.

1.02 REFERENCES

A. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards:

1. ANSI/NECA/BICSI-568 -- Standard for Installing Commercial Building Telecommunications Cabling
2. ANSI/TIA/EIA Standards
 - a. ANSI/TIA/EIA-568-B.1 -- Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
 - b. ANSI/TIA/EIA-568-B.2 -- Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components
 - c. ANSI/TIA/EIA-568-B.3 -- Optical Fiber Cabling Components Standard
 - d. ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces
 - e. ANSI/TIA/EIA-606(A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

- 1 f. ANSI/TIA/EIA-607(A) -- Commercial Building Grounding and Bonding Requirements
- 2 for Telecommunications
- 3 g. ANSI/TIA/EIA-526-7 -- Measurement of Optical Power Loss of Installed Single-Mode
- 4 Fiber Cable Plant
- 5 h. ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed
- 6 Multimode Fiber Cable Plant
- 7 i. ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications
- 8 Cabling Standard

9 B. Install cabling in accordance with the most recent edition of BICSI® publications:

- 10 1. BICSI -- Telecommunications Distribution Methods Manual
- 11 2. BICSI -- Cabling Installation Manual
- 12 3. BICSI -- LAN Design Manual
- 13 4. BICSI -- Customer-Owned Outside Plant Design Manual

14 C. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of
15 the specifications as if herein repeated or hereto attached. If the contractor should note items in the
16 drawings or the specifications, construction of which would be code violations, promptly call them to the
17 attention of the owner's representative in writing. Where the requirements of other sections of the
18 specifications are more stringent than applicable codes, rules, regulations, and ordinances, the
19 specifications shall apply.

20 1.03 PERMITS, FEES, AND CERTIFICATES OF APPROVAL

21 A. As prerequisite to final acceptance, supply to the owner certificates of inspection from an inspection
22 agency acceptable to the owner and approved by local municipality and utility company serving the
23 project.

24 1.04 SYSTEM DESCRIPTION

25 A. Telecommunications cabling system generally consists of one telecommunications outlet in each
26 workstation, wall telephones in common and mechanical areas and telecommunications rooms (TRs)
27 located on each floor.

- 28 1. For this project, the telecommunications rooms are existing.
- 29 2. The equipment room (ER) is currently existing and is located on the 5th Floor of the City-County
30 Building.

31 B. The typical work area consists of a single-gang plate with three standards compliant work area outlets.

- 32 1. Each work area outlet consists of one (1) four-pair data Category 6 cable or above, installed from
33 work area outlet to the TR. Terminate data cables on rack mounted modular patch panels located
34 in the appropriate TR.

35 1.05 SUBMITTALS

36 A. Submit to the engineer/designer shop drawings, product data (including cut sheets and catalog
37 information), and samples required by the contract documents. Submit shop drawings, product data, and
38 samples with such promptness and in such sequence as to cause no delay in the work or in the activities
39 of separate contractors. The engineer/designer will indicate approval of shop drawings, product data, and
40 samples submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted
41 shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's
42 legitimate firm name.

43

- 1 1. By submitting shop drawings, product data, and samples, the contractor represents that he or she
2 has carefully reviewed and verified materials, quantities, field measurements, and field
3 construction criteria related thereto. It also represents that the contractor has checked,
4 coordinated, and verified that information contained within shop drawings, product data, and
5 samples conform to the requirements of the work and of the contract documents. The
6 engineer/designer remains responsible for the design concept expressed in the contract documents
7 as defined herein.
- 8 2. The engineer's/designer's approval of shop drawings, product data, and samples submitted by the
9 contractor shall not relieve the contractor of responsibility for deviations from requirements of the
10 contract documents, unless the contractor has specifically informed the engineer/designer in
11 writing of such deviation at time of submittal, and the engineer/designer has given written
12 approval of the specific deviation. The contractor shall continue to be responsible for deviations
13 from requirements of the contract documents not specifically noted by the contractor in writing,
14 and specifically approved by the engineer in writing.
- 15 3. The engineer's/designer's approval of shop drawings, product data, and samples shall not relieve
16 the contractor of responsibility for errors or omissions in such shop drawings, product data, and
17 samples.
- 18 4. The engineer's/designer's review and approval, or other appropriate action upon shop drawings,
19 product data, and samples, is for the limited purpose of checking for conformance with
20 information given and design concept expressed in the contract documents. The
21 engineer's/designer's review of such submittals is not conducted for the purpose of determining
22 accuracy and completeness of other details such as dimensions and quantities, or for substantiating
23 instructions for installation or performance of equipment or systems, all of which remain the
24 responsibility of the contractor as required by the contract documents. The review shall not
25 constitute approval of safety precautions or of construction means, methods, techniques,
26 sequences, or procedures. The engineer's/designer's approval of a specific item shall not indicate
27 approval of an assembly of which the item is a component.
- 28 B. Perform no portion of the work requiring submittal and review of shop drawings, product data, or
29 samples, until the engineer/designer has approved the respective submittal. Such work shall be in
30 accordance with approved submittals.
- 31 C. Submit shop drawings, product data, and samples as a complete set within thirty (30) days of award of
32 contract.
 - 33 1. For initial submission and for resubmission required for approval, submit four (4) copies of each
34 item. The engineer/designer will only return two copies. Make reproductions as required for your
35 use and distribution to subcontractors.
 - 36 2. Illegible submittals will not be checked by the engineer.
- 37 D. General: Submit the following:
 - 38 1. Bill of materials, noting long lead time items
 - 39 2. Optical loss budget calculations for each optical fiber run
 - 40 3. Project schedule including all major work components that materially affect any other work on the
41 project
- 42 E. Shop drawings: Submit the following:
 - 43 1. Backbone (riser) diagrams.
 - 44 2. System block diagram, indicating interconnection between system components and subsystems.
 - 45 3. Interface requirements, including connector types and pin-outs, to external systems and systems or
46 components not supplied by the contractor.
 - 47 4. Fabrication drawings for custom-built equipment.
 - 48

- 1 F. Product Data -- Provide catalog cut sheets and information for the following:
- 2 1. Wire and cable
- 3 2. Outlets, jacks, faceplates, and connectors
- 4 3. All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings
- 5 4. Terminal blocks and patch panels
- 6 G. Project record drawings:
- 7 1. Submit project record drawings at conclusion of the project and include:
- 8 a. Approved shop drawings
- 9 b. Plan drawings indicating locations and identification of work area outlets, nodes,
- 10 telecommunications rooms (TRs), and backbone (riser) cable runs
- 11 c. Telecommunications rooms (TRs) and equipment room (ER and/or MC) termination
- 12 detail sheets.
- 13 d. Cross-connect schedules including entrance point, main cross-connects, intermediate
- 14 cross-connects, and horizontal cross-connects.
- 15 e. Labeling and administration documentation.
- 16 f. Warranty documents for equipment.
- 17 g. Copper certification test result printouts and diskettes.
- 18 (a.) Optical fiber power meter/light source test results.

19 1.06 QUALITY ASSURANCE

- 20 A. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type
- 21 and size.
- 22 B. Upon request by the engineer/designer, furnish a list of references with specific information regarding
- 23 type of project and involvement in providing of equipment and systems.
- 24 C. Equipment and materials of the type for which there are independent standard testing requirements,
- 25 listings, and labels, shall be listed and labeled by the independent testing laboratory.
- 26 D. Where equipment and materials have industry certification, labels, or standards (i.e., NEMA - National
- 27 Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with
- 28 standards.
- 29 E. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment
- 30 and materials of the same type shall be a product of the same manufacturer throughout.
- 31 F. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes
- 32 toward the owner and engineer/designer.

33 1.07 WARRANTY

- 34 A. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and
- 35 workmanship for a period of not less than fifteen (15) years from date of acceptance by the owner. The
- 36 owner shall deem acceptance as beneficial use.
- 37 B. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit
- 38 these warranties on each item in list form with shop drawings. Detail specific parts within equipment
- 39 that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved
- 40 in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

- 1 1.08 DELIVERY, STORAGE, AND HANDLING
- 2 A. Protect equipment during transit, storage, and handling to prevent damage, theft, soiling, and
3 misalignment. Coordinate with the owner for secure storage of equipment and materials. Do not store
4 equipment where conditions fall outside manufacturer's recommendations for environmental conditions.
5 Do not install damaged equipment; remove from site and replace damaged equipment with new
6 equipment.
- 7 1.09 SEQUENCE AND SCHEDULING
- 8 A. Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for
9 conformance to specific job completion dates. As a minimum, dates are to be provided for bid award,
10 installation start date, completion of station cabling, completion of riser cabling, completion of testing
11 and labeling, cutover, completion of the final punch list, start of demolition, owner acceptance, and
12 demolition completion.
- 13 1.10 USE OF THE SITE
- 14 A. Use of the site shall be at the owner's direction in matters in which the owner deems it necessary to place
15 restriction.
- 16 B. Access to building wherein the work is performed shall be as directed by the owner.
- 17 C. The owner will occupy the premises during the entire period of construction for conducting his or her
18 normal business operations. Cooperate with the owner to minimize conflict and to facilitate the owner's
19 operations.
- 20 D. Schedule necessary shutdowns of plant services with the owner, and obtain written permission from the
21 owner. Refer to article - CONTINUITY OF SERVICES herein.
- 22 E. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and
23 operations of the owner.
- 24 1.11 CONTINUITY OF SERVICES
- 25 A. Take no action that will interfere with, or interrupt, existing building services unless previous
26 arrangements have been made with the owner's representative. Arrange the work to minimize shutdown
27 time.
- 28 B. Owner's personnel will perform shutdown of operating systems. The contractor shall give three (3) days'
29 advance notice for systems shutdown.
- 30 C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material,
31 and equipment necessary for prompt restoration of interrupted service.

32 PART 2 - PRODUCTS

33 2.01 MANUFACTURERS

- 34 A. Hubbell, Ortronics, Panduit
- 35 1. Or any other approved equivalent manufacturer that meets the performance requirements of this
36 specification. Category 6 performance is standard.
- 37 2. Contractor shall be a certified installer.

- 1 B. Berk-Tek
- 2 C. Belden
- 3 D. Mohawk
- 4 E. Commscope
- 5 F. Superior Essex
- 6 G. Optical Cable Corporation
- 7 2.02 FABRICATION
- 8 A. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional
- 9 aspects of equipment and its installation.
- 10 2.03 SUITABILITY
- 11 A. Provide products that are suitable for intended use, including, but not limited to environmental,
- 12 regulatory, and electrical.
- 13 2.04 STATION CABLE
- 14 A. VOICE TELECOMMUNICATIONS STATION CABLE
- 15 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four
- 16 individually twisted-pairs, which meet or exceed the mechanical and transmission performance
- 17 specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.
- 18 a. Listed Type CMP (as required in the NEC 2011).
- 19 B. DATA STATION CABLE (Copper)
- 20 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four
- 21 individually twisted-pairs, which meet or exceed the mechanical and transmission performance
- 22 specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.
- 23 a. Listed Type CMP (as required in the NEC 2011).
- 24 2.05 WORK AREA OUTLETS
- 25 A. VOICE/DATA WORK AREA OUTLETS (Copper only)
- 26 1. Single-gang mounting plate with four (4) openings containing the following devices:
- 27 a. Voice Outlet - 8-pin modular, Category 6, unkeyed, white, pinned to T568A standards.
- 28 b. Data Outlet - 8-pin modular, Category 6, unkeyed, blue, pinned to T568A standards.
- 29 2. The device color of outlets and jacket color for cabling that will be used on the project shall be
- 30 coordinated with the Dane County Information Technology (IT) Department prior to the
- 31 beginning of any work. It is intended that the Dane County standard being maintained.
- 32 B. WALL VOICE OUTLETS
- 33 1. Single-gang stainless steel faceplate with six-conductor jack and wall telephone mounting lugs
- 34 C. DATA ONLY WORK AREA OUTLET
- 35 1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, blue data jack, pinned to T568A
- 36 standards
- 37

- 1 D. VOICE ONLY WORK AREA OUTLET
- 2 1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, white telephone jack, pinned to
- 3 T568A standards
- 4 2.06 PATCH PANELS
- 5 A. 19 in. rack mountable, 24-port 8-pin modular to insulation displacement connector (IDC) meeting
- 6 Category 6 performance standards, and pinned to either T568 (A or B) standards. Typical examples of
- 7 IDC connections are the 110, BIX, and Krone.

8 PART 3 - EXECUTION

9 3.01 PRE-INSTALLATION SITE SURVEY

- 10 A. Prior to start of systems installation, meet at the project site with the owner's representative and
- 11 representatives of trades performing related work to coordinate efforts. Review areas of potential
- 12 interference and resolve conflicts before proceeding with the work. Facilitation with the General
- 13 Contractor will be necessary to plan the crucial scheduled completions of the equipment room and
- 14 telecommunications closets.
- 15 B. Examine areas and conditions under which the system is to be installed. Do not proceed with the work
- 16 until satisfactory conditions have been achieved.
- 17 C. The contractor shall be responsible for meeting with the Owner's (Dane County) Information
- 18 Technology staff prior to the start of any installation to coordinate the work to be installed as part of this
- 19 project. It is the design intent to maintain any cabling or installation standards that are currently in use
- 20 by Dane County.
- 21 1. Failure to perform this meeting may cause work to be removed and reinstalled if not deemed
- 22 acceptable by Dane County.

23 3.02 HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS

- 24 A. Be responsible for safekeeping of your own and your subcontractors' property, such as equipment and
- 25 materials, on the job site. The owner assumes no responsibility for protection of above named property
- 26 against fire, theft, and environmental conditions.

27 3.03 PROTECTION OF OWNER'S FACILITIES

- 28 A. Effectively protect the owner's facilities, equipment, and materials from dust, dirt, and damage during
- 29 construction.
- 30 B. Remove protection at completion of the work.

31 3.04 INSTALLATION

- 32 A. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as
- 33 part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading,
- 34 setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting
- 35 wiring of system components, equipment alignment and adjustment, and other related work whether or
- 36 not expressly defined herein.
- 37 B. Install materials and equipment in accordance with applicable standards, codes, requirements, and
- 38 recommendations of national, state, and local authorities having jurisdiction, and National Electrical
- 39 Code® (NEC) and with manufacturer's printed instructions.

- 1 C. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall
2 pressure when installing cables.
- 3 1. Where manufacturer does not provide bending radii information, minimum-bending radius shall
4 be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable
5 to the engineer and the owner.
- 6 D. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or
7 galvanized rigid conduit (GRC) sleeves and shall be firestopped after installation and testing, utilizing a
8 firestopping assembly approved for that application.
- 9 E. Install station cabling to the nearest telecommunications room (TR), unless otherwise noted.
- 10 F. Installation shall conform to the following basic guidelines:
- 11 1. Use of approved wire, cable, and wiring devices
12 2. Neat and uncluttered wire termination
- 13 G. Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support
14 cables installed above removable ceilings.
- 15 H. Install adequate support structures for 10 foot of service slack at each TR.
- 16 I. Support riser cables every three (3) floors and at top of run with cable grips.
- 17 1. Limit number of four-pair data riser cables per grip to fifty (50)
- 18 J. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings
19 or noted below:
- 20 K. Provide overvoltage protection on both ends of cabling exposed to lightning or accidental contact with
21 power conductors.
- 22 3.05 GROUNDING
- 23 A. Grounding shall conform to ANSI/TIA/EIA 607(A) - Commercial Building Grounding and Bonding
24 Requirements for Telecommunications, National Electrical Code®, ANSI/NECA/BICSI-568 and
25 manufacturer's grounding requirements as minimum.
- 26 B. Bond and ground equipment racks, housings, messenger cables, and raceways.
- 27 C. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system
28 via #6 AWG green insulated copper grounding conductor.
- 29 3.06 LABELING
- 30 A. Labeling shall conform to ANSI/TIA/EIA-606(A) standards. In addition, provide the following:
- 31 1. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.
32 2. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the
33 following locations:
- 34 a. Inside receptacle box at the work area.
35 b. Behind the communication closet patch panel or punch block.
36 c. Use labels on face of data patch panels. Provide facility assignment records in a
37 protective cover at each telecommunications closet location that is specific to the
38 facilities terminated therein.

- 1 d. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-
- 2 606(A) standard color codes for termination blocks.
- 3 e. Mount termination blocks on color-coded backboards.
- 4 f. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
- 5 g. Label cables, outlets, patch panels, and punch blocks with room number in which outlet
- 6 is located, followed by a single letter suffix to indicate particular outlet within room,
- 7 i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number.
- 8 h. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn
- 9 these drawings over to the owner two (2) weeks prior to move in to allow the owner's
- 10 personnel to connect and test owner-provided equipment in a timely fashion.
- 11 i. Three (3) sets of as-built drawing shall be delivered to the owner within four (4) weeks
- 12 of acceptance of project by the owner. A set of as-built drawings shall be provided to
- 13 the owner in magnetic media form (3.5" floppy disks) and utilizing CAD software that
- 14 is acceptable to the owner. The magnetic media shall be delivered to the owner within
- 15 six (6) weeks of acceptance of project by owner.

16 3.07 TESTING

- 17 A. Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level Iie
- 18 or higher field testers.
- 19 B. Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded,
- 20 and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper
- 21 termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.
- 22 1. Perform testing of copper cables with tester meeting ANSI/TIA/EIA-568-B.1 requirements.

23 **Category 6 Test Parameters:**

24

25

Category 6 Cable Permanent Link Test						
Frequency	TIA/EIA 568B.2-1 Insertion Loss Attenuation	TIA/EIA 568B.2-1 NEXT Worst Pair to Pair	TIA/EIA 568B.2-1 PSNEXT Worst Case Loss	TIA/EIA 568B.2-1 ELFEXT Worst Pair to Pair Loss	TIA/EIA 568B.2-1 PSELFEXT Loss	TIA/EIA 568B.2-1 Return Loss
Mhz	Max. dB	dB	dB	DB	dB	dB
1.00	1.9	65.0	62.0	64.2	61.2	19.1
4.00	3.5	64.1	61.8	52.1	49.1	21.0
8.00	5.0	59.4	57.0	46.1	43.1	21.0
10.00	5.5	57.8	55.5	44.2	41.2	21.0
16.00	7.0	54.6	52.2	40.1	37.1	20.0
20.00	7.9	53.1	50.7	38.2	35.2	19.5
25.00	8.9	51.5	49.1	36.2	33.2	19.0
31.25	10.0	50.0	47.5	34.3	31.3	18.5
62.50	14.4	45.1	42.7	28.3	25.3	16.0
100.00	18.6	41.8	39.3	24.2	21.2	14.0
200.00	27.4	36.9	34.3	18.2	15.2	11.0
250.00	31.1	35.3	32.7	16.2	13.2	10.0

- 26
- 27 C. Propagation Delay
- 28 1. The maximum propagation delay determined in accordance with the ANSI/TIA/EIA –568B.2 for a
- 29 Permanent Link configuration shall be less than 498-ns measured at 10MHz. (Note: In
- 30 determining the permanent link propagation delay, the propagation delay contribution of
- 31 connecting hardware is assumed to not exceed 2.5 ns from 1 MHz to 250MHz).
- 32

- 1 D. Delay Skew
- 2 1. For all frequencies from 1 MHz to 250 MHz, Category 6 cable propagation delay skew shall not
3 exceed 44ns/100m at 20 degrees C, 40 degrees C, and 60 degrees C. In addition, the propagation
4 delay skew between all pairs shall not vary more than +/- 10ns from the measured value at 20
5 degrees C when measured at 40 degrees C and 60 degrees C. Compliance shall be determined
6 using a minimum 100m of cable.
- 7 E. In order to establish testing baselines, cable samples of known length and of the cable type and lot
8 installed shall be tested. The cable may be terminated with an 8-position Category 6 Modular plug (8-
9 pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be
10 calculated based on this test and be utilized during the testing of the installed cable plant. This
11 requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type
12 under test.
- 13 F. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacement
14 and changes as are necessary, and shall then repeat the test or tests which disclosed faulty or defective
15 material, equipment or installation method, and shall make additional tests as the Engineer deems
16 necessary at no additional expense to the project or user agency.
- 17 G. Where any portion of system does not meet the specifications, correct deviation and repeat applicable
18 testing at no additional cost to the owner.

19 3.08 FIELD QUALITY CONTROL

- 20 A. Employ job superintendent or project manager during the course of the installation to provide
21 coordination of work of this specification and of other trades, and provide technical information when
22 requested by other trades. This person shall maintain current RCDD® (Registered Communications
23 Distribution Designer) registration and shall be responsible for quality control during installation,
24 equipment set-up, and testing.
- 25 B. At least 30 percent of installation personnel shall be BICSI Registered Telecommunications Installers.
26 Of that number, at least 15 percent shall be registered at the Technician Level, at least 40 percent shall be
27 registered at the Installer Level 2, and the balance shall be registered at the Installer Level 1.
- 28 C. Installation personnel shall meet manufacturer's training and education requirements for implementation
29 of extended warranty program.

30

31

END OF SECTION 27 10 00

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SECTION 28 13 00

ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.01 SCOPE

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

1.02 RELATED WORK

- A. See Section 08710 DOOR HARDWARE.

1.03 SUMMARY

- A. Provide a complete operating card access system compatible with the Continental Access system installed in the Dane County City/County Building. This work shall include power supplies, outlet boxes, cables and wiring as shown on the drawings and as specified herein.
- B. Coordinate all work with Section 08710.

1.04 INTEGRATION

- A. Materials are available from Innovative Systems, Inc., 9880 South Ridgeview Drive, Oak Creek, Wisconsin 53154.
- B. Contact Jim Holtz at 414-761-7350, extension 112.
- C. Materials shall be purchased from a source with the capabilities to completely integrate the functions and components with the existing building access control system so they operate as an efficient, simple to operate system.

1.05 SUBMITTALS

- A. General: Data sheets on all equipment being provided as well as recommended cable types. Internal control cabinet drawings showing internal block diagram connections shall be provided. Wiring diagrams showing typical field wiring connections as well as single line floor plan indicating equipment locations as well as cabling routings and quantities.
- B. Product Data: Submit product data, including manufacturer's product sheet, for specified products.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage and accessories. Include cabling diagrams, wiring diagrams, station installation details and equipment cabinet details.
- D. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics.
 - 2. Manufacturer's Instructions: Manufacturer's installation instructions.

- 1 E. Closeout Submittals: Submit the following:
- 2 1. Operation and Maintenance Data: Operation and maintenance data for installed products in
3 accordance with Division 1 Closeout Submittals. Include troubleshooting guide, wiring terminal
4 identification and equipment parts list.
- 5 2. Warranty: Warranty documents specified herein.
- 6 F. Project Closeout
- 7 1. The contractor shall furnish manufacturer's manuals of the completed system including individual
8 specifications sheets, schematics, inter-panel and intra-panel wiring diagrams.
- 9 a. All information necessary for the proper maintenance and operation of the system must
10 be included.
- 11 b. Provide four copies.
- 12 2. Demonstrate proper function to Owner and Fire Department.
- 13 3. Operating manuals and users' guides shall be provided at the time of the training.

14 1.06 WARRANTY

- 15 A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document
16 executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation
17 of, other rights Owner may have under Contract Documents.
- 18 1. Warranty Period: 3 years commencing on the Date of Substantial Completion.
- 19 2. All materials and installation shall be guaranteed to be free of defects in material and
20 workmanship for one year after final acceptance of installation and tests.

21 1.07 INSTALLATION STANDARDS

- 22 A. The system shall be installed in accordance with the 2011 NEC.
- 23 B. The completed system shall be in compliance with state and local electrical codes.
- 24 C. All wiring shall test free from grounds and shorts.

25 PART 2 - PRODUCTS

26 2.01 POWER SUPPLY

- 27 A. Provide an Altronix SMP7PMCTXS.
- 28 1. 115 VAC input.
- 29 2. 12VDC/24VDC selectable output.
- 30 3. 6 ampere continuous supply current output.
- 31 4. Filtered and electronically regulated outputs.
- 32 5. Short circuit and thermal overload protection.
- 33 6. Built-in charger for battery backup.
- 34 7. AC input and DC output LED indicators.
- 35 8. AC fail supervision (form C contact rated 1A at 28VDC)
- 36 9. In NEMA 1 enclosure.
- 37

1 2.02 ACCESS CONTROLLER

2 A. Provide a Continental Access CICP2800 Access Controller capable of controlling 16 doors, with the
3 following features:

CardAccess Compatability	CA3000 v.2.9 (and higher)
Card Capacity	200K/Base 4M Memory/5-digit Cards 650K/Full 20M Memory/19-digit Cards
Card Reader Capacity	Sixteen, Max. (Eight standard onboard.) Eight Reader Expansion via Plug-in PCB
Database RAM with Expansion	4M / 20M
485 Data Rate	460.8 K Baud
Learns all Card Technologies	Yes
Keypad Capacity	Eight/Sixteen - Wiegand Format ONLY
Number of Doors	Sixteen, Max.
Output Relays - Form C	16 plus Console
Relay Circuit Protect Current Limit	All Relays - 2.5 Amp PTC
Relay Expansion	48 using I/O Expander for 72 total
Diagnostic LED Indicators	4 Indicators: 12V Transmit/Receive; AC Power; System Processing; Low-Battery
Address Switch	BCD rotary switches
Downloadable Firmware	Loaded to FLASH Memory 2 sec. or less
Communication with Host and Downstream Panels	Ethernet 10/100Base-T (Host with Plug-in Module) or EIA232 Board. For Repeat Comm., Full Duplex EIA485 (Downstream Panel; Plug-In Module)
Auxillary Ports	I ² C (RJ12 cable included with I/O Expander.)
Reader Power	800mA @12V for each Eight-Reader Board Eight Terminal Blocks with 100 mA outputs @ 5V
Power Supply Voltage	Switchable 120VAC/240 VDC, 120W Nominal
Backup Power	Two 12AH Batteries, Max. (1-12AH Battery Supplied)
Dimensions	24.18"H x 16.13"W x 5"D
Listings	UL294

4 B. Provide interface components to link to existing adjacent Continental Access Controllers via RS422
5 cabling.

6 C. System must be compatible with existing Dane County proximity cards.

7 2.03 CARD READERS

8 A. Provide Indala Linear FP4551A card readers where shown with the following features:

9 Operating Temperature	-31° to +149°F (-35° to +65°C)
10 LED Indicator	Tri-color standard (red, green, amber)
11 Audio Tone	Standard, independently controllable (not tied to LED)
12 Output Formats	Wiegand, ABA Track II Magnetic Stripe, and Serial TTL (requires use 13 of BIL 232/422 Module)
14 Frequency	125kHz (excitation)
15 Read Time (26-bit)	200 ms (from read to data output)
16 Security	Various levels (configurable) FlexSecur™
17 Programming	Factory or filed programmable via FlexPass ProxSmith Programmer 18 and Toolkit

1	Color	Black
2	Other Features	Self Test, QuickFlash, WatchDog
3	Listings	UL294

4 2.04 ELECTRIC STRIKES

5 A. To be furnished by the Hardware Section: wired by this Section. Coordinate voltage and other
6 requirements.

7 2.05 PROXIMITY CARDS

8 A. Furnished by owner.

9 PART 3 - EXECUTION

10 3.01 INSTALLATION

11 A. Cabling Requirements

- 12 1. Wiring may be run concealed, free air. See following article.
- 13 2. Verify cable types with the Manufacturer.
- 14 3. Provide 120V AC outlet.
- 15 4. All cables shall be plenum rated.

16 B. Locate equipment in existing electrical closet.

17 3.02 FREE AIR WIRING

18 A. All wiring shall be run "free-air", in conduit or in surface raceway. "Free-air" wiring is allowed where it
19 can be completely concealed. If wiring cannot be concealed, it shall be installed in wire mold in finished
20 areas and in conduit in unfinished areas.

21 B. Where installed "free-air", comply with the following:

- 22 1. Cable shall run at right angles and be kept clear of other trades work.
- 23 2. Cables shall be supported according to code utilizing bridle rings anchored to ceiling concrete,
24 piping supports or structural steel beams. Rings shall be designed to maintain cables bend to
25 larger than the minimum bend radius (typically 4 x cable diameter).
- 26 3. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If
27 cable "sag" at mid-span exceeds 12-inches, another support shall be used.
- 28 4. Cable shall never be laid directly on the ceiling grid.
- 29 5. Cables shall not be attached to or supported by, existing cabling, plumbing or steam piping,
30 ductwork, ceiling supports or electrical or communications conduit.
- 31 6. A coil of 2 feet in each cable shall be placed in the ceiling at each "free-air" wired device. These
32 "service loops" shall be secured at the last cable support before the cable reaches the device and
33 shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
- 34 7. Devices wired with conduit shall be provided with an 8-inch wire tail at each device box
- 35 8. To reduce or eliminate EMI, the following minimum separation distances from $\leq 480V$ Power lines
36 shall be adhered to:
 - 37 a. Twelve (12) inches from power lines of $<5\text{-kVa}$.
 - 38 b. Eighteen (18) inches from high voltage lighting (including fluorescent).
 - 39 c. Thirty-nine (39) inches from power lines of 5-kVa or greater.
 - 40 d. Thirty-nine (39) inches from transformers and motors.
- 41 9. All cable shall be free of tension at both ends. In cases where the cable must bear some stress,
42 Kellum grips shall be used to spread the strain over a longer length of cable.

- 1 10. Manufacturers minimum bend radius specifications shall be observed in all instances. Care should
2 be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over
3 tightened as to compress the cable jacket. No sharp burrs should remain where excess length of
4 the cable tie has been cut.
- 5 11. All vertical cable extensions to devices located below the finished ceiling shall be in conduit.
- 6 C. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the
7 cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel
8 jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of
9 substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may
10 move or wear in a manner to pose a hazard to the cable, shall not be used.
- 11 D. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where
12 mechanical assistance is used, care shall be taken to insure that the maximum tensile load for the cable as
13 defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of
14 pulling tension, use of a “break-away” or other approved method.
- 15 3.03 LOCAL CODE AUTHORITY SUBMITTALS
- 16 A. This Contractor is responsible for making required submittals to the Madison Fire Department.
- 17 B. Pay any fees required for review.
- 18 3.04 MANUFACTURER’S INSTRUCTIONS
- 19 A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product
20 catalog installation instructions, and product carton instructions for installation.
- 21 3.05 EXAMINATION
- 22 A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under
23 other sections, are acceptable for product installation in accordance with manufacturer’s instructions.
- 24 3.06 SYSTEM STARTUP
- 25 A. Power shall only be applied to the system after re-checking for proper grounding of the system and
26 measuring all loops for lack of shorts, grounds, and open circuits.
- 27 B. System supplier shall be responsible for coordinating all hardware programming of the system with the
28 Dane County. Coordinate all door functions with each tenant representative and Dane County.
29 Cardholder data base programming shall be by Dane County.
- 30 3.07 COMMISSIONING
- 31 A. After all work is completed and prior to requesting acceptance test, Contractor shall conduct a final
32 inspection and pre-test all equipment and system features. Each building shall be acceptance tested
33 individually when completed. Contractor shall correct any deficiencies discovered as the result of the
34 inspection and pre-test of all contractor installed equipment and materials.
- 35 B. Contractor shall submit a request for the acceptance test in writing to the Project Representative no less
36 than fourteen days prior to the requested test date. The request for acceptance test shall be accompanied
37 by a certification from Contractor that all work is complete and has been pre-tested, and that all
38 corrections have been made.
- 39 C. During acceptance test, Contractor shall demonstrate all equipment and system features to the State’s
40 Project Representative and Tenant. Contractor shall remove covers, open wiring connections, operate
41 equipment, and perform other reasonable work as requested by the Project Representative.

1 D. Any portions of the work found to be deficient or not in compliance with the Project Drawing and
2 Specifications will be rejected. The Project Representative will prepare a list of any such deficiencies
3 observed during the acceptance test. Contractor shall promptly correct all deficiencies. Upon correction
4 of deficiencies, Contractor shall submit a request in writing to the Project Representative for another
5 acceptance test.

6 E. If, at the conclusion of the acceptance test, all work is found to be acceptable and in compliance with the
7 Project Drawings and Specifications, the Project Representative will issue a Certificate of Substantial
8 Completion to Contractor.

9

10

END OF SECTION 28 13 00

SECTION 28 31 00

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The building (Dane County City-County Building) in Madison has a complete fire alarm system in place. This project will provide a renovated fire alarm system with new devices in the area of remodeling only. The areas outside the scope of work shall remain as is.
- B. The existing fire alarm system within the City/County building is a Simplex 2120 fire alarm control panel that was installed in the early 1980's.
- C. Under a recent project completed in 2007, the fire alarm control panel was upgraded to be a SimplexGrinnell 4100U fire alarm control panel. All new fire alarm devices shall be intelligent, addressable devices that are compatible with the 4100U fire alarm control panel currently installed.
- D. The contractor shall be aware the building does meet the definition of high-rise construction and all fire alarm devices shall contain the ability for digital voice communications. Therefore, speaker/strobe devices will be used instead of horn/strobe devices. Provide any necessary power extender (NAC) panels for the visual notification devices as required.
- E. Provide wiring as required to incorporate these new devices into the existing SimplexGrinnell 4100U fire alarm control panel. Coordinate this work with the Madison sales office of SimplexGrinnell.
- F. The Contractor shall be aware that most of the building will remain occupied during construction of this remodeled area.
 - 1. The Contractor shall be responsible for turning off/turning on the fire alarm system to allow for work to be performed. Also, the Contractor shall be responsible for contacting Dane County building maintenance staff at any time when the fire alarm system is down. This will allow for an announcement to be made to all building occupants.
 - 2. All testing shall be done during non-occupied hours.
 - 3. Extreme care should be taken on the part of the Contractor to reduce or eliminate nuisance tripping of the fire alarm smoke detectors during construction. Extensive nuisance tripping of the fire alarm system cannot be tolerated due to the high volume of occupants in the building.

1.02 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA No. 70 - National Electric Code (NEC).
 - b. NFPA No. 101 - Life Safety Code.
 - 2. Wisconsin Enrolled Building Commercial Building Code 2002.
 - 3. Underwriters Laboratories, Inc.
 - 4. Local codes and ordinances.
- B. Reference Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA No. 72
 - 2. National Electrical Manufacturer's Association (NEMA).

1 C. System equipment to be of one manufacturer and supported by factory trained, established service
2 organization of equipment manufacturer who shall stock parts for equipment supplied.

3 D. Equipment must be manufactured by firm actively manufacturing fire alarm systems for minimum of 10
4 years.

- 5 E. Manufacturer's Services:
- 6 1. Manufacturer's representative factory trained service engineer for equipment specified herein shall
7 be present at job site to supervise final adjustment of system after installation complete, equipment
8 startup, and training of OWNER'S personnel for system operation.
 - 9 2. Manufacturer shall direct services to system and equipment operation, maintenance,
10 troubleshooting, and equipment and system related areas.

11 1.03 SUBMITTALS

- 12 A. Shop Drawings to include:
- 13 1. Data sheets and equipment description.
 - 14 2. Bill of materials listing components.
 - 15 3. Component wiring diagrams.
 - 16 4. System wiring and interconnection diagrams showing all devices – not a typical diagram.
- 17 B. Operation and Maintenance (O & M) Data: Submit in accordance with Division 1. Provide electronic
18 record drawings in Autocad Version 2002 or newer on CD.
- 19 C. Field quality control test results.

20 1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- 21 A. Receive equipment at job site, verify applicable components and quantity delivered per invoice.
- 22 B. Handle equipment to prevent internal components damage, breakage, denting, and scoring enclosure and
23 finish.
- 24 C. Do not install damaged equipment.
- 25 D. Store equipment in clean, dry space and protect from dirt, fumes, water, construction debris, and physical
26 damage.
- 27 E. After installation, protect from damage by Work of other trades.

28 PART 2 - PRODUCTS

29 2.01 GENERAL

30 A. Use of manufacturer's name and model or catalog number is for purpose of establishing standard of
31 quality, general configuration, and operating characteristics desired only.

32 2.02 ACCEPTABLE MANUFACTURERS

- 33 A. SimplexGrinnell
- 34 B. Due to the existence of the existing SimplexGrinnell fire alarm control panel, no other manufacturers will
35 be accepted.

1 2.03 SYSTEM OPERATION

2 A. The system operation for the existing SimplexGrinnell 4100U fire alarm control panel shall remain as is
3 with no modifications. This equipment was recently installed

4 2.04 FIRE ALARM CONTROL PANEL

5 A. The fire alarm control panel is an existing SimplexGrinnell 410U addressable FACP. This equipment
6 will remain in place and the fire alarm system shall be extended to the areas of remodeling with
7 compatibility with this fire alarm control panel.

8 2.05 SMOKE DETECTION

9 A. Smoke detectors shall be Photoelectric type, SimplexGrinnell True Alarm Analog Sensing 4098 series.

- 10 1. Analog addressable.
- 11 2. Light scattering principle.
- 12 3. UL magnet test feature.
- 13 4. Remote test by control panel command.
- 14 5. Dual alarm and power LED.
- 15 6. Adjustable sensitivity via panel command.
- 16 7. Mounts on 4" octagon or 4" square box with square to round ring.

17 B. Duct smoke detector shall be SimplexGrinnell addressable True Alarm Photoelectric Sensor 4098-9755.

- 18 1. Analog addressable.
- 19 2. For air velocity between 300 and 4000 feet per minute.
- 20 3. Sampling tube as required for duct width dimensions.

21 C. Isolation module:

- 22 1. Automatically isolate wire-to-wire short circuit from SLC loop.
- 23 2. Provide one for each 20 addressable/intelligent devices.
- 24 3. Amber LED shall flash to indicate activation.
- 25 4. Mount on 4 inch square or 4 inch square box with 2 gang ring.

26 2.06 HEAT DETECTION

27 A. Heat detector shall be SimplexGrinnell E-Series Electronic Heat Detector 4098 series

- 28 1. Analog addressable fixed plus rate of rise.
- 29 2. Dual thermistors.
- 30 3. Self restoring.
- 31 4. Mount on 4" octagon or 4" square box with square to round ring.

32 2.07 MODULES:

33 A. Monitor module

- 34 1. Monitor contact closing devices (Class B).
- 35 2. Addressable.
- 36 3. Mounts on 4" square or 4" square with 2 gang ring.

37

- 1 B. Control module
- 2 1. Addressable.
- 3 2. DPDT relay contact rated at 3.0A, 30VDC, 0.5A 110VAC.
- 4 3. Mount on 4" square or 4" square with 2 gang ring.
- 5 4. Must be located with 3' of device being controlled.
- 6 C. Isolation module
- 7 1. Automatically isolate wire-to-wire short circuit from SLC loop.
- 8 2. Provide one for each 20 addressable/intelligent devices (Maximum of 25 devices per module).
- 9 3. Amber LED shall flash to indicate activation.
- 10 4. Mount on 4" square or 4" square with 2 gang ring.

11 2.08 PULL STATIONS

- 12 A. Pull station shall be a SimplexGrinnell 4099-9003
- 13 1. Double action, Push operation, English
- 14 2. Addressable.
- 15 3. Lexan construction.
- 16 4. Key reset.
- 17 5. Within ADA 5lb. pull force.
- 18 6. Includes Braille text on station handle.
- 19 7. Bi-color LED visible through handle of station.
- 20 8. Mount on 4" square with 1 gang ring.

21 2.09 NOTIFICATION DEVICES - SIGNALS

- 22 A. Speaker/Strobe unit shall be Wheelock Series ET70 addressable speaker/visual notification devices.
- 23 1. Speaker
- 24 a. High quality voice or tone reproduction with tamps for 1/4, 1/2 , 1 or 2 watts at 25 or
- 25 70.7 VRMS.
- 26 2. Strobe
- 27 a. 15/75cd, 75cd, or 110cd strobe as required (synchronized) (See plans for candela
- 28 requirements).
- 29 3. Mounts on 4" square or 4" square with 1- or 2-gang ring.
- 30 4. All devices shall be wall-mounted wherever possible. However, where required due to existing
- 31 conditions, ceiling mounted speaker/strobe devices shall be allowed to be used.

- 32 B. Strobe unit shall be Wheelock Series RSS visual notification devices mounted to RSSP plates.
- 33 1. 15/75cd, 75cd, or 110cd strobe as required (synchronized) (See plans for candela requirements).
- 34 2. Mounts on 4" square box or 4" square with 1- or 2-gang ring.

- 35 C. All notification devices shall be white.

37 2.10 NOTIFICATION APPLIANCE CIRCUIT PANEL

- 38 A. Notification Appliance Circuit Panel (NAC) shall be SimplexGrinnell 4009 Series
- 39 1. Provides four, power-limited NACs with general alarm operation, available as Class B or Class A,
- 40 each rated 2 A (expandable to eight NACs)

- 1 a. Includes 8 A power supply/charger
- 2 b. Follows coded or non-coded alarm input

3 2.11 MAGNETIC DOOR HOLDERS

- 4 A. Door holder shall be LCN 404SE (Furnished and installed by General Contractor):
- 5 1. Closer holder combination
- 6 2. 24V DC solenoid

7 2.12 FLOW, PRESSURE AND TAMPER SWITCHES

- 8 A. Wire and install in accordance with requirements of other specification sections and wire as specified in
- 9 this section. Provide necessary monitor modules and circuits. Wire and install outdoor sprinkler alarm
- 10 bell. Flow, pressure, tamper switches and sprinkler alarm bell furnished by others.

11 2.13 SLAVE FAN RELAY

- 12 A. Slave fan relay shall be SimplexGrinnell model 4090-9002 Relay IAM

13 PART 3 - EXECUTION

14 3.01 INSPECTION

- 15 A. Examine areas and conditions under which fire alarm system to be installed and notify ENGINEER in
- 16 writing of conditions detrimental to proper and timely completion of Work.

17 3.02 INSTALLATION

- 18 A. Installation of the Fire Alarm/Life Safety System shall be in strict compliance with manufacturer's
- 19 recommendations. Consult the manufacturer's Control Panel and Peripheral Equipment installation
- 20 manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system
- 21 installation.

22 B. Power Requirements:

- 23 1. The Fire Alarm Control Panel (FACP) and/or Notification Appliance Circuit (NAC) panels shall
- 24 be connected to a separate 20 ampere, 120 volt dedicated branch circuit labeled as FIRE ALARM.
- 25 2. The Control Panel Cabinet shall be grounded securely using a copper grounding conductor.
- 26 3. Conduit shall enter into the Fire Alarm Control panel backbox only at those areas of the back box
- 27 which have factory conduit knockouts.
- 28 4. All field wiring shall be completely supervised. In the event of a primary power failure,
- 29 disconnected standby battery, removal of any internal modules, or any open circuits in the field
- 30 wiring: an audible and visual trouble signal will be activated until system and its associated field
- 31 wiring are restored to normal condition.

- 32 C. Cables must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed
- 33 in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.

- 34 D. SLC loops shall be loaded to no more than 75% of their capacity.

- 35 E. Install wiring in accordance with Section 16001 and shall be in accordance with the NEC, NFPA 72
- 36 1999, local and state codes, as shown on the drawings, and as recommended by the major equipment
- 37 manufacturer. See Article 3.06 FREE AIR CABLING for further requirements.

- 38 1. SLC loop shall be 2 #16 shielded FPLR or FPLP cable as required.

- 1 2. Signal circuit wiring shall be 2 conductor #14 or 2 conductor #12 FPLR or FPLP cable as
2 required. 2#14 or 2#12 THHN is acceptable if signal circuits are enclosed in listed raceway.
3 Synchronization modules shall be utilized to provide audio and visual synchronization over 2
4 conductors. Consult loading chart for proper wire gauge and wire length to insure against
5 excessive DC voltage drop. A minimum of 20.5V DC must be available at the last signal of a
6 NAC under full alarm condition.
- 7 3. Provide 2 #14 from control panel or door holder power supply to door holders.
- 8 F. Provide all fire alarm system wiring drops to devices within raceways and junction boxes. Where
9 existing conditions prohibit fishing existing walls, so as to avoid excessive cutting and restoration
10 metallic wiremold finished to match existing wall surface shall be permitted where allowed by
11 OWNER/ENGINEER, routing subject to OWNER/ENGINEER approval. Install conduit in accordance
12 with Section 16001 and as shown on Drawings.
- 13 G. All fire detection and alarm system devices, control panels and remote annunciators shall be flush
14 mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- 15 H. Smoke detectors shall not be installed prior to the system programming and test period. If construction is
16 ongoing during this period, measures shall be taken to protect smoke detectors from contamination and
17 physical damage. Ref: NFPA 72, 1999 2-3.6.1.3.
- 18 I. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may
19 be exposed in unfinished areas if approved by Owner/Engineer before installation. All system junction
20 boxes shall be as manufactured by system supplier or painted red and stenciled with fire alarm system
21 designation.
- 22 J. All fire detection and alarm system devices shall be flush mounted when located in finished areas and
23 may be surface mounted when located in unfinished areas if approved by Owner/Engineer before
24 installation.
- 25 K. All conductor identification shall be labeled in accordance with 16001 at all accessible locations
26 including at control panel, junction boxes and at devices for future tracing and maintenance.
- 27 L. Provide concealed 3/4" conduit and wire to telephone terminal board from main fire alarm control panel.
- 28 M. Coordinate connections with supplier of central station network system.
- 29 N. Provide concealed 3/4" conduit and wire to security panel for monitoring of trouble, supervisory and
30 system alarm.
- 31 O. Provide elevator recall and elevator shunt trip using addressable control modules. Utilizing detector
32 auxiliary contacts is not acceptable and violates NFPA 72, 1999 3-9.2.1. Provide Elevator shunt trip
33 power supervision for integrity per NFPA 72, 1999 3-9.4.4.
- 34 3.03 ADJUSTMENT AND CLEANING
- 35 A. Clean system equipment and enclosure of dirt and debris.
- 36

- 1 3.04 FIELD QUALITY CONTROL
- 2 A. Provide the service of a NICET certified, Level II minimum, factory-trained technician authorized by the
- 3 manufacturer of the fire alarm equipment to technically supervise and participate during all of the
- 4 adjustments and test for the system.
- 5 B. System shall test free from grounds, opens, and short circuits.
- 6 C. Upon completion of installation of fire alarm equipment, CONTRACTOR shall provide ENGINEER
- 7 with signed written statement substantially in form as follows.
- 8 D. "The undersigned having been engaged as the CONTRACTOR on the "DANE COUNTY CITY-
- 9 COUNTY BUILDING" confirms the fire alarm equipment was installed in accordance with wiring
- 10 diagrams, instructions, and directions provided to us by the manufacturer."

11 3.05 WARRANTY

- 12 A. All work performed and all material and equipment furnished under this contract shall be from defects
- 13 and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of
- 14 maintenance, labor and materials required to correct any defect during this one year period shall be
- 15 included in the submittal bid.

16 3.06 FREE AIR WIRING

- 17 A. All wiring shall be run "free-air", in conduit or in surface raceway. "Free-air" wiring is allowed where it
- 18 can be completely concealed. If wiring cannot be concealed, it shall be installed in wiremold in finished
- 19 areas and in conduit in unfinished areas.
- 20 B. Where installed "free-air", comply with the following:
 - 21 1. Cable shall run at right angles and be kept clear of other trades work.
 - 22 2. Cables shall be supported according to code utilizing bridle rings anchored to ceiling concrete,
 - 23 piping supports or structural steel beams. Rings shall be designed to maintain cables bend to
 - 24 larger than the minimum bend radius (typically 4 x cable diameter).
 - 25 3. Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If
 - 26 cable "sag" at mid-span exceeds 12-inches, another support shall be used.
 - 27 4. Cable shall never be laid directly on the ceiling grid.
 - 28 5. Cables shall not be attached to or supported by, existing cabling, plumbing or steam piping,
 - 29 ductwork, ceiling supports or electrical or communications conduit.
 - 30 6. A coil of 2 feet in each cable shall be placed in the ceiling at each "free-air" wired fire alarm
 - 31 device. These "service loops" shall be secured at the last cable support before the cable reaches the
 - 32 device and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
 - 33 7. Devices wired with conduit shall be provided with an 8-inch wire tail at each device box and 36-
 - 34 inch wire tails at the FACP and FAAP.
 - 35 8. To reduce or eliminate EMI, the following minimum separation distances from ≤480V Power lines
 - 36 shall be adhered to:
 - 37 a. Twelve (12) inches from power lines of <5-kVa.
 - 38 b. Eighteen (18) inches from high voltage lighting (including fluorescent).
 - 39 c. Thirty-nine (39) inches from power lines of 5-kVa or greater.
 - 40 d. Thirty-nine (39) inches from transformers and motors.
 - 41 9. All cable shall be free of tension at both ends. In cases where the cable must bear some stress,
 - 42 Kellem grips shall be used to spread the strain over a longer length of cable.
 - 43

- 1 10. Manufacturers minimum bend radius specifications shall be observed in all instances. Care should
2 be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over
3 tightened as to compress the cable jacket. No sharp burrs should remain where excess length of
4 the cable tie has been cut.
- 5 11. All vertical cable extensions to fire alarm devices located below the finished ceiling shall be in
6 conduit.
- 7 C. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the
8 cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel
9 jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of
10 substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may
11 move or wear in a manner to pose a hazard to the cable, shall not be used.
- 12 D. All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where
13 mechanical assistance is used, care shall be taken to insure that the maximum tensile load for the cable as
14 defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of
15 pulling tension, use of a "break-away" or other approved method.
- 16 3.07 DEPARTMENT OF COMMERCE SUBMITTALS
- 17 A. This Contractor is responsible for making required Department of Commerce or City of Madison Fire
18 Department submittals.
- 19 B. Pay any Department of Commerce or City of Madison Fire Department fees for reviewing submittal.
20 These fees should be included in the contractors bid.
- 21 C. Make submittal after engineering review has been obtained for shop drawings.
- 22 D. Incorporate any Department of Commerce or City of Madison Fire Department comments into shop
23 drawings and as-builts.

24 END OF SECTION 28 31 00