

RFB NO. 317034



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. 317034 INFORMATION MANAGEMENT OFFICE REMODEL CITY-COUNTY BUILDING 210 MARTIN LUTHER KING JR. BLVD. MADISON, WISCONSIN

Due Date / Time: **TUESDAY, JANUARY 23, 2018 / 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:

RYAN SHORE, PROJECT MANAGER
TELEPHONE NO.: 608/266-4475
FAX NO.: 608/267-1533
E-MAIL: SHORE@COUNTYOFDANE.COM

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DRAWINGS

Plot drawings on 24" x 36" (ARCH D)

GENERAL

G100 COVER SHEET, INDEX OF DRAWINGS AND SYMBOLS &
ABBREVIATIONS

ARCHITECTURAL

A203 PARTIAL THIRD FLOOR PLAN AND DEMOLITION PLAN
A205 PARTIAL FIFTH FLOOR PLAN AND DEMOLITION PLAN
A303 PARTIAL THIRD FLOOR REFLECTED CEILING PLANS
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ELECTRICAL

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E303 PARTIAL THIRD FLOOR PLAN - LIGHTING
E305 PARTIAL FIFTH FLOOR PLAN - LIGHTING
E400 DETAILS
E401 ELECTRICAL SCHEDULES

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DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive
Joseph T. Parisi

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

Commissioner / Director
Gerald J. Mandli

BEST VALUE CONTRACTING APPLICATION

CONTRACTORS / LICENSURE APPLICANTS

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

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

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

EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to pre-qualify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor / subcontractor provides sufficient documentation to demonstrate one or more of the following:
 - apprentices are not available in a specific geographic area;
 - the applicable apprenticeship program is unsuitable or unavailable; or
 - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possess all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for any project or obtain the same through the use of responsible, pre-qualified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Will your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
3	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Will your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
5	Will your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
6	Does your firm acknowledge that it must pay all craft employees on public works projects the wage rates and benefits required under Section 66.0903 of the Wisconsin Statutes?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
7	Will your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
8	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
9	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
10	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
11	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
12	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
13	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than \$10,000?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
14	Is your firm Executive Order 108 precertified with the State of Wisconsin?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
15	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Is your firm exempt from being pre-qualified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
17	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also pre-qualified with the County or become so ten days prior to commencing work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
18	Contractor has been in business less than one year?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
19	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
20	Not applicable. My firm does not intend to work on Best Value Contracts. Note: Best Value Contracting is required to bid on most Public Works Contracts (if unclear, please call Jan Neitzel Knox 608-266-4029).	Yes: <input type="checkbox"/> No: <input type="checkbox"/>

SIGNATURE SECTION

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

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

Signature

Date

Printed or Typed Name and Title

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

REMEMBER!

Return all to forms and attachments, or questions to:

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

**DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY & TRANSPORTATION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WI 53713**

APPENDIX A

APPRENTICEABLE TRADES

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

INSTRUCTIONS TO BIDDERS

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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, January 9, 2017 at 10:00 a.m. at the City-County Building, 210 Martin Luther King Jr Blvd, starting in Room 524. 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 available to all Bidders, irrespective of category of work to be bid on, in order that all Bidders may be familiar with work of other trades as they affect their bid.

3. INTERPRETATION

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

4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)

- A. Before award of Contract can be approved, Owner shall be satisfied that Bidder involved meets following requirements:
 - 1. Has completed at least one (1) project of at least fifty percent (50%) of size or value of Division of work being bid and type of work completed is similar to that being bid. If greater magnitude of experience is deemed necessary, other than size or value of work, such requirements will be described in appropriate section of Specifications.
 - 2. Maintains permanent place of business.
 - 3. Can be bonded for terms of proposed Contract.
 - 4. Has record of satisfactorily completing past projects and supplies list of no more than five (5) most recent, similar projects, with architect or engineer's and owner's names, addresses and telephone numbers for each project. Submit to Public Works Project Engineer with Bid. 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) business 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) business 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) calendar 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 ten (10) business days of 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 ten (10) business days 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 may solicit bids from this ESB listing: pdf.countyofdane.com/commissions/2013-2015_Targeted_Business_Directory.pdf.
- G. **ESB Certification.** All contractors, subcontractors and suppliers seeking ESB certification must complete and submit Emerging Small Business Report 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) business 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 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. Wisconsin Statute 77.54 (9m) allows building materials that become part of local unit government facilities to be exempt from sales & use tax. Vendors & materials suppliers may not charge Bidders sales & use tax on these purchases. This does not include highways, streets or roads. Any other Sales, Consumer, Use & other similar taxes or fees required by law shall be included in Bid.
- 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 or emailed 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. Not Applicable.

16. INFORMATIONAL BIDS

- A. Not Applicable.

17. UNIT PRICES

- A. Not Applicable.

18. COMMENCEMENT AND COMPLETION

- A. Successful Bidder shall commence work when schedule and weather permit, but no later than stated in Bid Form. Contractor shall pursue the Work regularly and continuously at reasonable rate to insure completion of the Work within time stated in Bid.
- B. Should it be found impossible to complete the Work on or before time specified for completion, written request may be submitted for extension of time setting forth reasons believed to justify granting of such request. Refer to Article 20 of General Conditions of Contract, titled "Time for Completion".

19. WORK BY OWNER

- A. This work will be accomplished by Owner or will be let under separate contracts and will not be included under this Contract:
 - 1. Asbestos abatement

20. SPECIAL HAZARDS COVERAGE

- A. If hazardous materials abatement work is required by Construction Documents, successful Bidder shall provide necessary Pollution Insurance that specifically includes coverage for hazardous materials abatement work as called for under "Insurance" in Supplementary Conditions.

FORM A

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

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

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

BIDDER INFORMATION

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE NO.: _____

CONTACT PERSON: _____

EMAIL ADDRESS: _____

FORM B

Page ___ of ___

DANE COUNTY

(Copy this Form as necessary to provide complete information)

EMERGING SMALL BUSINESS REPORT - INVOLVEMENT

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

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

ESB NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NO & EMAIL.: _____

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

FORM C

Page ___ of ___

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

(Copy this Form as necessary to provide complete information)

COMPANY NAME: _____

PROJECT NAME: _____

BID NO.: _____ BID DUE DATE: _____

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

FORM D

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

I, _____, _____ of
Name Title

_____ certify to best of my knowledge and
Company

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

Bidder's Signature

Date

Name of Bidding Firm: _____

BID FORM

BID NO. 317034

**PROJECT: INFORMATION MANAGEMENT OFFICE REMODEL
CITY COUNTY BUILDING**

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

**NOTE: WISCONSIN STATUTE 77.54 (9M) ALLOWS FOR NO SALES & USE TAX ON
THE PURCHASE OF MATERIALS FOR COUNTY PUBLIC WORKS PROJECTS.**

BASE BID - LUMP SUM:

Dane County is inviting Bids for construction services to remodel the Department of Information Management computer server room and 3rd floor offices. 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.

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

Addendum No(s). _____ through _____

Dated _____

Dane County Information Management Division must have this project completed by December 30,, 2018. Assuming this Work can be started by March 12, 2018, what dates can you commence and complete this job?

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

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

(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

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

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 sixty (60) calendar 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: _____

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

BID CHECK LIST:

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

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

BIDDERS SHOULD BE AWARE OF THE FOLLOWING:

DANE COUNTY VENDOR REGISTRATION PROGRAM

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

www.danepurchasing.com/registration

DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION

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

www.countyofdane.com/pwht/BVC_Application.aspx

EQUAL BENEFITS REQUIREMENT

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

www.danepurchasing.com/partner_benefit.aspx

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 bid, application or proposal for a contract or agreement 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.nlrb.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.

Include this completed Certification with your bid, application or proposal.

COUNTY OF DANE

PUBLIC WORKS CONSTRUCTION CONTRACT

Contract No. _____ Bid No. 317034

Authority: 2017 RES - _____

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

WITNESSETH:

WHEREAS, COUNTY, whose address is c/o Assistant Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide Information Management Office Remodel ("the Project"); and

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

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

1. CONTRACTOR agrees to construct, for the price of \$ _____ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, General Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by _____ (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Table of Contents, all of which are made a part hereof and collectively evidence and constitute the Contract.

2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the General Conditions of Contract and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the General Conditions of Contract.

3. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force or any other reserve component of the military forces of the United States, or political beliefs. Such equal opportunity shall include, but not be limited to, the following: employment,

upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

4. CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) business 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) business days prior to commencing Work under 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

Sample

AIA[®] Document A310[™] – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

BOND AMOUNT:

PROJECT:

(Name, location or address, and Project number, if any)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner 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. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this _____ day of _____

_____	<i>(Contractor as Principal)</i>	_____	<i>(Seal)</i>
<i>(Witness)</i>	_____	_____	<i>(Title)</i>
	<i>(Surety)</i>	_____	<i>(Seal)</i>
<i>(Witness)</i>	_____	_____	<i>(Title)</i>

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

AIA[®] Document A312[™] – 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status 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 Section 16

CONTRACTOR AS PRINCIPAL

Company: _____
(Corporate Seal)

SURETY

Company: _____
(Corporate Seal)

Signature: _____

Name _____
and Title: _____

(Any additional signatures appear on the last page of this Performance Bond.)

Signature: _____

Name _____
and Title: _____

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

AIA Document A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

§ 1 The Contractor and 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 when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. 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;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

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

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

§ 5.3 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 a 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 Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right 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, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven 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 Section 5.4, and the Owner refuses the payment 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.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, 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. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .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 Section 5; and
- .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.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 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, successors and assigns.

§ 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 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 a declaration of 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.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **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.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 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

SURETY

Company: _____

(Corporate Seal)

Company: _____

(Corporate Seal)

Signature: _____
Name and Title: _____
Address _____

Signature: _____
Name and Title: _____
Address _____

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

AIA Document A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

CONSTRUCTION CONTRACT

Date:

Amount:

Description:

(Name and location)

BOND

Date:

(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

SURETY

Company: *(Corporate Seal)*

Signature: _____

Name _____
and Title: _____

Signature: _____

Name _____
and Title: _____

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

§ 1 The Contractor and 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, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 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 Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 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 the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 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.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, 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.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 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 Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. 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.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(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 _____

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

EQUAL BENEFITS COMPLIANCE PAYMENT CERTIFICATION FORM

PURPOSE

25.016(8) of the Dane County Ordinance requires that each contractor receiving payment for contracted services must certify that he or she has complied fully with the requirements of Chapter 25.016 “Equal Benefits Requirement” of the Dane County Ordinances. Such certification must be submitted prior to the final payment on the contract.

This form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

CERTIFICATION

I, _____ certify that
Printed or Typed Name and Title

Printed or Typed Name of Contractor

has complied fully with the requirements of Chapter 25.016 of the Dane County Ordinances “Equal Benefits Requirements”.

Signed _____

Date _____

For questions on this form, please contact Chuck Hicklin at 608-266-4109 or your contract representative at Dane County.

GENERAL CONDITIONS OF CONTRACT

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1. CONSTRUCTION DOCUMENTS

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

2. DEFINITIONS

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

3. ADDITIONAL INSTRUCTIONS AND DRAWINGS

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

4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

5. CUTTING AND PATCHING

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

6. CLEANING UP

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

7. USE OF SITE

- A. Contractor shall provide County and Architect / Engineer access to the Work under all circumstances.

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

8. MATERIALS AND WORKMANSHIP

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

9. CONTRACTOR'S TITLE TO MATERIALS

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

10. "OR EQUAL" CLAUSE

- A. Whenever equipment or materials are identified on Drawings or in Specifications by reference to manufacturer's or vendor's name, trade name, catalog number, and other identifying information, it is intended to establish standards; and any equipment or material of other manufacturers and vendors which will perform adequately duties imposed by general design will be considered equally accepted provided equipment or material so proposed is, in opinion of Architect / Engineer, of equal substance and function. Architect / Engineer and Department shall provide written approval before Contractor may purchase or install it.

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

11. PATENTS AND ROYALTIES

- A. If Contractor uses any design, device or material covered by letters, patent or copyright, it is mutually agreed and understood, that, without exception, contract prices shall include all royalties or costs arising from use of such design, device or materials, in any way involved in the Work.
- B. Contractor shall indemnify and save harmless County from any and all claims for infringement by reason of use of such patent or copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify County for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during prosecution of the Work or after completion of the Work.

12. SURVEYS, PERMITS, REGULATIONS AND TAXES

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

13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE

- A. Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and superintendence necessary to execute, complete and deliver the Work within specified time. Contractor agrees to secure at their own expense all personnel necessary to carry out the Work. Such personnel shall not be deemed County employees nor shall they have or be deemed to have any direct contractual relationship with County.
- B. Performance of any work necessary after regular working hours, on Sundays or Legal Holidays shall be without additional expense to County. Performance of any work at site at other than normal working hours must be coordinated with Public Works Project Manager.
- C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.
- D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.
- E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ construction superintendent or foreman, experienced in character of work covered by Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Architect / Engineer and Department.
- F. Remove from project or take other corrective action upon notice from Architect / Engineer or Department for Contractor's employees whose work is considered by Architect / Engineer or Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.

- G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.
- H. Presence and observation of the Work by Architect / Engineer or Public Works Project Manager shall not relieve Contractor of any obligations.

14. WEATHER CONDITIONS

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

15. PROTECTION OF WORK AND PROPERTY

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

16. INSPECTION AND TESTING OF MATERIALS

- A. Authorized representatives and agents of County government shall have access at all times to the Work wherever it is in preparation or progress and Contractor shall provide facilities for such access and for inspection.
- B. Should it be considered necessary or advisable at any time before final acceptance of the Work to make examination of work already completed, by removing or tearing out same, Contractor shall upon request, promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any aspect, due to fault of Contractor or subcontractors thereof, Contractor shall assume all expenses of such examination and of satisfactory reconstruction. Contractor will be reimbursed for such examination and replacement in accordance with Article 18 - A.3., of these General Conditions of Contract if such work is found to meet requirements of Contract.
- C. If Specifications, Architect / Engineer's, or Public Works Project Manager's instructions require any work to be specially tested or approved, Contractor shall give Architect / Engineer and Public Works Project Manager timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Architect / Engineer shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection

services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.

- D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

17. REPORTS, RECORDS AND DATA

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

18. CHANGES IN THE WORK

- A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
1. Unit bid prices previously approved.
 2. Agreed lump sum based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) Add to cost under (2), fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit and any other general expense.
 - h) On that portion of the Work under (2) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense.
 - i) Department may require correct amount of costs with supporting vouchers; Contractor shall keep and present in such form as directed.
 3. Cost-plus work, with not-to-exceed dollar limit, based on actual cost of:
 - a) Labor, including foremen, and all fringe benefits that are associated with their wages.
 - b) Materials entering permanently into the Work.
 - c) Ownership or rental cost of construction tools and equipment during time of use on extra work. Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment.
 - d) Power and consumable supplies for operation of power equipment.
 - e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
 - f) Social Security and old age and unemployment contributions.
 - g) To cost under (3), there shall be added fixed fee to be agreed upon but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force.

Fee shall be compensation to cover cost of supervision, overhead, bond, profit, and any other general expense.

- h) On that portion of the Work under (3) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense.
 - i) Contractor shall keep and present, in such form as directed, correct amount of cost together with such supporting vouchers as may be required by Department.
- B. If Contractor claims that by any instructions given by Architect / Engineer, Department, by drawings or otherwise, regarding performance of the Work or furnishing of material under Contract, involves extra cost, Contractor shall give Department written notice of cost thereof within two (2) weeks after receipt of such instructions and in any event before proceeding to execute work, unless delay in executing work would endanger life or property.
- C. No claim for extra work or cost shall be allowed unless it was done in pursuance of written Change Order from Architect / Engineer and approved by Department, as previously mentioned, and claim presented with payment request submitted after changed or extra work is completed.
- D. Negotiation of cost for change in the Work shall not be cause for Contractor to delay prosecution of the Work if Contractor has been authorized in writing by Public Works Project Manager to proceed.

19. EXTRAS

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

20. TIME FOR COMPLETION

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

21. CORRECTION OF WORK

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

22. SUBSURFACE CONDITIONS FOUND DIFFERENT

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

23. RIGHT OF DEPARTMENT TO TERMINATE CONTRACT

- A. In event that any provisions of this Contract are violated by Contractor or by any subcontractors, County may serve written notice upon Contractor and Surety of its intention to terminate Contract, such notice to contain reasons for such intention to terminate Contract, and unless within ten (10) business 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) business 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) business days from date of mailing to such Surety of notice of termination, County may take over the Work and prosecute same to completion by contract, or by force account, at expense of Contractor; Contractor and Surety shall be liable to County for any excess cost occasioned County thereby, and in such event County may take possession of and utilize in completing the Work, such materials and equipment as may be on the Work site and therefore necessary.

24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

- A. Contractor shall be responsible for Construction Schedule and coordination. Immediately after execution and delivery of Contract and before making first payment, Contractor shall notify all subcontractors to furnish all required information to develop Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
1. List of construction activities;
 2. Start, finish and time required for completion of each activity;
 3. Sequential relationships between activities;
 4. Identify all long lead-time items, key events, meetings or activities such as required submittals, fabrication and delivery, procurement of materials, installation and testing;
 5. Weekly definition of extent of work and areas of activity for each trade or Subcontract; and
 6. Other information as determined by Public Works Project Manager.
- B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.
- C. Progress Reporting:

1. Contractor shall update and publish Construction Schedule on monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by explanation of reasons for revision; and shall be subject to approval by Department.
 2. Failure of Contractor to keep Schedule in updated format shall result in County hiring firm specializing in construction schedule development and deducting those costs associated with updating process from payments due Contractor.
 3. Contractor shall submit show actual percentage of each activity completed, estimated future progress, and anticipated completion time.
- D. Responsibility for timely completion requires:
1. Contractor and subcontractors understand that performance of each is interdependent upon performance of others.
 2. Whenever it becomes apparent from current schedule, that phasing or progress completion dates will not be met, Contractor must take some or all following actions at no additional cost to County:
 - a) Increase construction labor in such quantities and crafts as will eliminate backlog of work.
 - b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
 - c) Reschedule work (yet remain in conformance with Drawings and Specifications).
 3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Manager.
- E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Architect / Engineer and Public Works Project Manager.

25. PAYMENTS TO CONTRACTOR

- A. Contractor shall provide:
1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
 2. Periodic itemized estimates of work done for purpose of making partial payments thereon.
- B. Submit these estimates for approval first to Architect / Engineer, then to Public Works Project Manager. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.
- C. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month upon receipt of Application and Certificate for Payment form from Architect / Engineer and approval of Department.
- D. Contractor shall submit for approval first to Architect / Engineer, and then to Public Works Project Manager all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.

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

26. WITHHOLDING OF PAYMENTS

- A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation sum of money deemed reasonably sufficient to pay any and all such lawful

claims until satisfactory evidence is furnished that all liabilities have been fully discharged; whereupon, payment to Contractor shall be resumed in accordance with terms of this Contract, but in no event shall these provisions be construed to impose any obligations upon County to either Contractor or Contractor's Surety.

- B. In paying any unpaid bills of Contractor, County shall be deemed agent of Contractor, and any payment so made by County, shall be considered as payment made under Contract by County to Contractor and County shall not be liable to Contractor for any such payment made in good faith.
- C. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of lawful demands of subcontractors, laborers, workers, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.
- D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

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

28. PAYMENTS BY CONTRACTOR

- A. Contractor shall pay following not later than fifth (5th) business 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) business days before start of subcontractor's work. If subcontractors are changed or added, Contractor shall notify Department in writing.
- C. Contractor shall be as fully responsible to County for acts and omissions of subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for acts and omissions of persons directly employed by Contractor.

- D. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to Contractor by terms of General Conditions of Contract and other Construction Documents insofar as applicable to work of subcontractors and to give Contractor same power as regards terminating any subcontract that Department may exercise over Contractor under any provision of Construction Documents.
- E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and County.
- F. Contractor shall insert in all subcontracts, Articles 26, 33, 43 and 45, respectively entitled: “Withholding of Payments”, “Subcontracts”, “Affirmative Action Provision and Minority / Women / Disadvantaged Business Enterprises”, and “Minimum Wages”, and shall further require all subcontractors to incorporate physically these same Articles in all subcontracts.

34. PUBLIC WORKS PROJECT MANAGER’S AUTHORITY

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

35. ARCHITECT / ENGINEER’S AUTHORITY

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

36. STATED ALLOWANCES

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

37. ESTIMATES OF QUANTITIES

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

38. LANDS AND RIGHTS-OF-WAY

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

39. GENERAL GUARANTEE

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

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

40. CONFLICTING CONDITIONS

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

41. NOTICE AND SERVICE THEREOF

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

42. PROTECTION OF LIVES AND HEALTH

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

43. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES

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

accord with Chapter 19 of Dane County Code of Ordinances. Such plan must be filed within fifteen (15) business days of effective date of this Contract and failure to do so by said date shall constitute ground for immediate termination of Contract by County.

Contractor shall also, during term of this Contract, provide copies of all announcements of employment opportunities to County's Contract Compliance Office, and shall report annually number of persons, by race, sex and handicap status, who apply for employment, and, similarly classified, number hired and number rejected.

3. Contact Dane County Contract Compliance Officer at Dane County Contract Compliance Office, 210 Martin Luther King, Jr. Blvd., Room 421, Madison, WI 53703, 608/266-4114.
4. In all solicitations for employment placed on Contractor's behalf during term of this Contract, Contractor shall include statement to affect Contractor is "Equal Opportunity Employer". Contractor agrees to furnish all information and reports required by County's Contract Compliance Officer as same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and provision of this Contract.

B. Minority / Women / Disadvantaged / Emerging Small Business Enterprises.

1. Chapter 19.508 of Dane County Code of Ordinances is official policy of Dane County regarding utilization of, to fullest extent of, Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs) Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs).
2. Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. List of subcontractors will be required of low bidder as stated in this Contract. List shall indicate which are MBEs / WBEs / DBEs / ESBEs and percentage of subcontract awarded, shown as percentage of total dollar amount of bid.

44. COMPLIANCE WITH FAIR LABOR STANDARDS

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

45. DOMESTIC PARTNERSHIP BENEFITS

- A. Contractor agrees to provide same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or cash equivalent if such benefit cannot reasonably be provided. Contractor agrees to make available for County inspection Contractor's payroll records relating to employees providing services on or under this Contract or subcontract. If any payroll records of Contractor contain any false, misleading or fraudulent information, or if Contractor fails to comply with provisions of Chapter 25.016,

Dane County Ordinances, contract compliance officer may withhold payments on Contract; terminate, cancel or suspend Contract in whole or in part; or, after due process hearing, deny Contractor right to participate in bidding on future County contracts for period of one year after first violation is found and for period of three years after second or subsequent violation is found.

46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE

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

47. MINIMUM WAGES

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

Determination is not required for this Work, use “Dane County, Wisconsin Contractor Wage Affidavit”. Forms of such affidavits are included in Supplementary Conditions.

48. CLAIMS

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

49. ANTITRUST AGREEMENT

- A. Contractor and County recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by County. Therefore, Contractor hereby assigns to County any and all claims for such overcharges as to goods and materials purchased in connection with this Contract, except as to overcharges which result from antitrust violations commencing after price is established under this Contract and any change order thereto.

50. INSURANCE

- A. Contractor Carried Insurance:
 - 1. Contractor shall not commence work under this Contract until Contractor has obtained all insurance required under this Article and has provided evidence of such insurance to Risk Manager, 425 City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703. Contractor shall not allow any subcontractor to commence work until insurance required of subcontractor has been so obtained and approved. Company providing insurance must be licensed to do business in Wisconsin.
 - 2. Worker’s Compensation Insurance:
 - a) Contractor shall procure and shall maintain during life of this Contract, Worker’s Compensation Insurance as required by statute for all of Contractor’s employees engaged in work at site of project under this Contract and, in case of any such work sublet, Contractor shall require subcontractor similarly to provide Worker’s Compensation Insurance for all of latter’s employees to be engaged in such work unless such employees are covered by protection afforded by Contractor’s Worker’s Compensation Insurance.
 - b) If any claim of employees engaged in hazardous work on project under this Contract is not protected under Worker’s Compensation Statute, Contractor shall provide and shall cause each subcontractor to provide adequate Employer’s Liability Insurance for protection of such of Contractor’s employees as are not otherwise protected.
 - 3. Contractor’s Public Liability and Property Damage Insurance:
 - a) Contractor shall procure and maintain during life of this Contract, Contractor’s Public Liability Insurance and Contractor’s Property Damage Insurance in amount not less than \$1,000,000 bodily injury, including accidental death, to any one person, and subject to same limit for each person, in amount not less than \$1,000,000 on account of one accident, and Contractor’s Property Damage Insurance in amount not less than \$1,000,000 or combined single limit of at least \$1,000,000 with excess coverage over and above general liability in amount not less than \$5,000,000. Contractor shall add “Dane County” as additional insured for each project.
 - b) Contractor’s Public Liability and Property Damage Insurance shall include Products, Completed Operation, and Contractual Liability under Insurance Contract.

“Contractor shall in all instances save, defend, indemnify and hold harmless County and Architect / Engineer against all claims, demands, liabilities, damages or any other costs which may accrue in prosecution of the Work and that Contractor will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as result of Contractor’s operations” and each shall be listed as additional insured on Contractor’s and sub-contractors’ insurance policies.

- c) Obligations of Contractor under Article 50.A.2.b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
 - 1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
 - 2) Giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
- d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 each accident single limit, bodily injury and property damage combined with excess coverage over and above general liability in amount not less than \$5,000,000.
- e) Contractor shall either:
 - 1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor’s Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
 - 2) Insure activities of subcontractors in Contractor’s own policy.
- 4. Scope of Insurance and Special Hazards: Insurance required under Article 50.A.2 & 50.A.3. hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
- 5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and “Dane County” listed as additional insured. Such certificates shall also contain (substantially) following statement: “Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) business days written notice has been received by Risk Manager.”

B. Builder’s Risk:

- 1. County shall provide Builder’s Risk insurance coverage for its insurable interests in construction or renovation projects with completed value of \$500,000 or less. Therefore, if project completed value is more than \$500,000, Contractor shall obtain and maintain in force, at its own expense, Builder’s Risk Insurance on all risks for amount equal to full completed value of covered structure or replacement value of alterations or additions. Any deductible shall not exceed \$25,000 for each loss. Policy shall include occupancy clause and list Dane County as loss payee.

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.

SUPPLEMENTARY CONDITIONS

1. APPLICATION & CERTIFICATE FOR PAYMENT

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



Application and Certificate for Payment

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

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. AIA Document G703™, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	\$	
2. NET CHANGE BY CHANGE ORDERS	\$	
3. CONTRACT SUM TO DATE (Line 1 + 2)	\$	
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)	\$	
5. RETAINAGE:		
a. _____% of Completed Work (Column D + E on G703)	\$	
b. _____% of Stored Material (Column F on G703)	\$	
Total Retainage (Lines 5a + 5b, or Total in Column I of G703)	\$	
6. TOTAL EARNED LESS RETAINAGE	\$	
<i>(Line 4 minus Line 5 Total)</i>		
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$	
<i>(Line 6 from prior Certificate)</i>		
8. CURRENT PAYMENT DUE	\$	
9. BALANCE TO FINISH, INCLUDING RETAINAGE	\$	
<i>(Line 3 minus Line 6)</i>		

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

CONTRACTOR:

By: _____ Date: _____

State of: _____

County of: _____

Subscribed and sworn to before me this _____ day of _____

Notary Public:

My commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

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

AMOUNT CERTIFIED

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

ARCHITECT:

By: _____ Date: _____

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

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

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

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Continuation Sheet

AIA Document G702™-1992, Application and Certificate for Payment, or G732™-2009, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached. In tabulations below, amounts are in US dollars. Use Column I on Contracts where variable retainage for line items may apply.

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

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED <i>(Not in D or E)</i>	G TOTAL COMPLETED AND STORED TO DATE <i>(D+E-F)</i>	H BALANCE TO FINISH <i>(C-G)</i>	I RETAINAGE <i>(if variable rate)</i>
			FROM PREVIOUS APPLICATION <i>(D-E)</i>	THIS PERIOD				
<p>CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.</p> <p>AIA Document G703™ – 1992. Copyright © 1963, 1965, 1966, 1967, 1970, 1978, 1983 and 1992 by The American Institute of Architects. All rights reserved. WARNING: This AIA® Document is protected by U.S. Copyright Law and International Treaties. Unauthorized reproduction or distribution of this AIA® Document, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law. Purchasers are permitted to reproduce ten (10) copies of this document when completed. To report copyright violations of AIA Contract Documents, e-mail The American Institute of Architects' legal counsel, copyright@aia.org.</p>								
<p>10-1204504</p>								

2. CONTRACTOR WAGE AFFIDAVIT

- A. 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 in form as hereinafter set forth in this section. Affidavit affirms that all persons employed by contractor or by any of contractor's subcontractors on such contract have been paid no less than minimum wages established under Dane County Ordinances, Chapter 40, Subchapter II (Minimum Wage Ordinance) and in effect at date of execution of contract, that full payment of wages earned has been made, and that no rebates either directly or indirectly have been made. Form of such affidavit is included in this section.
- B. Form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

3. INSURANCE

- A. **Contractor Carried Insurance.** In order to protect itself and the County, Contractor shall not commence work under this Contract until obtaining all required insurance and the County has approved such insurance. Contractor shall not allow any subcontractor to commence work on subcontract until insurance required of subcontractor has been so obtained and approved.
1. **Pollution Insurance Policy**
Contractor shall procure and maintain during life of this Contract, Pollution Insurance Policy in amount of at least \$1,000,000 per occurrence, \$5,000,000 aggregate.

4. ASBESTOS DISPOSAL PROCEDURES

- A. Asbestos disposal requires strict adherence to federal, state and local regulations and requirements.
- B. Chapter 41.80(4) of Dane County Ordinances prohibits disposal of any toxic substance at Dane County Landfill without prior written permission.
- C. Any violation of disposal regulations and requirements will result in being prohibited from using Dane County Landfill for asbestos waste disposal and will result in fines according to limits set in Chapter 41 (Solid Waste Management) of Dane County Ordinances.
- D. Please refer to, but do not use, attached **sample** Asbestos Disposal Permit. You will not be allowed to dispose of asbestos waste without submitting **official** Asbestos Disposal Permit, only available from Dane County Solid Waste Engineer.
- E. For complete information on asbestos disposal procedures or if you should have any questions, contact Dane County Solid Waste Engineer at 608/267-0120.

ASBESTOS DISPOSAL PERMIT



DANE COUNTY RODEFELD LANDFILL
7102 U.S. HIGHWAY 12 & 18
MADISON, WISCONSIN
608/838-9555

PLEASE TYPE OR PRINT LEGIBLY

1. TO BE FILLED OUT BY ASBESTOS GENERATOR (SOURCE):

COMPANY NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

CONTACT NAME: _____ WORK PHONE: _____

SIGNATURE: _____ HOME PHONE: _____

2. TO BE FILLED OUT BY REMOVAL CONTRACTOR:

COMPANY NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

CONTACT NAME: _____ WORK PHONE: _____

PROJECT SUPERVISOR'S NAME: _____

PROJECT SUPERVISOR'S SIGNATURE: _____

ASBESTOS HANDLING:

NON-BULKY ITEMS

DOUBLE WRAPPED? Y _____ N _____

WETTED? Y _____ N _____

SEALED? Y _____ N _____

NO. OF BAGS: _____

APPROX. VOLUME: _____ CU.YDS.

BULKY ITEMS

DOUBLE WRAPPED? Y _____ N _____

WETTED? Y _____ N _____

SEALED? Y _____ N _____

NO. OF BAGS: _____

APPROX. VOLUME: _____ CU.YDS.

PROJECT AND MATERIAL DESCRIPTION: _____

SOURCE OF BAGS / PLASTIC WRAP:

COMPANY NAME: _____

ADDRESS: _____

CITY, STATE, ZIP: _____

SPECIFY THICKNESS: _____ MILS

**I AGREE TO ADHERE TO ALL TERMS AND CONDITIONS OF THIS PERMISSION.
IF I AM SIGNING IN A REPRESENTATIVE CAPACITY, I ASSERT THAT I AM
AUTHORIZED TO BIND MY PRINCIPAL IN ALL RESPECTS.**

NAME: _____ SIGNATURE: _____

DATED THIS _____ DAY OF _____, 20__

3. TO BE FILLED OUT BY WASTE HAULER:

COMPANY NAME: _____

CONTACT NAME: _____ WORK PHONE: _____

DRIVER'S NAME: _____ DATE: _____

DRIVER'S SIGNATURE: _____
(upon delivery)

4. TO BE FILLED OUT BY LANDFILL SUPERVISOR / ATTENDANT:

DATE OF DISPOSAL: _____ TRANSACTION NO.: _____

WEIGHT: _____ COPY GIVEN TO TRANSPORTER? Y _____ N _____

DISCREPANCIES: _____

NAME: _____ SIGNATURE: _____

DISPOSAL COORDINATES: _____ E to _____ E, _____ N to _____ N

ELEVATION Base: _____ Top: _____

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. Change Procedures
 6. Alternates
 7. Lump Sum Allowances for Work
 8. Coordination
 9. Cutting and Patching
 10. Conferences
 11. Progress Meetings
 12. Job Site Administration
 13. Submittal Procedures
 14. Proposed Products List
 15. Shop Drawings
 16. Product Data
 17. Samples
 18. Manufacturers' Instructions
 19. Manufacturers' Certificates
 20. Quality Assurance / Quality Control of Installation
 21. References
 22. Interior Enclosures
 23. Protection of Installed Work
 24. Parking
 25. Staging Areas
 26. Occupancy During Construction and Conduct of Work
 27. Protection
 28. Progress Cleaning
 29. Products
 30. Transportation, Handling, Storage and Protection
 31. Product Options
 32. Substitutions
 33. Starting Systems
 34. Demonstration and Instructions
 35. Contract Closeout Procedures
 36. Final Cleaning
 37. Adjusting
 38. Operation and Maintenance Data
 39. Spare Parts and Maintenance Materials

40. As-Built and Record 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
- B. Work by Owner:
 - 1. Test & removal of any asbestos containing materials.
- C. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy.

1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow work by Contractors or Subcontractors and access by Owner.
- B. Coordinate utility outages and shutdowns with Owner.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit one (1) original copies with “wet” signatures 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.
- D. Submit Applications for Payment to Architect / Engineer for initial approval. Architect / Engineer will forward approved copies to Owner who will also approve & process for payment.

1.5 CHANGE PROCEDURES

- A. Change Order Forms: Dane County Contract Change Order, Form 014-32-20 (latest issue).
- B. Contractor's costs for Products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from contingency allowance.

1.6 ALTERNATES

- A. Alternates quoted on Bid Form shall be reviewed and accepted or rejected at Owner's option.
- B. Coordinate related work and modify surrounding work as required.

C. Schedule of Alternates: there are no alternates proposed for this project.

1.7 COORDINATION

- A. Coordinate scheduling, submittals, and work of various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work that are indicated diagrammatically on Drawings.
- D. Contractor shall provide Public Works Project Engineer with work plan that ensures the Work will be completed within required time of completion.
- E. Public Works Project Manager may choose to photograph or videotape site or workers as the Work progresses.

1.8 CUTTING AND PATCHING

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

1.9 CONFERENCES

- A. There will be pre-bid conference for this project; see Instructions to Bidders.
- B. Owner will schedule a preconstruction conference after Award of Contract for all affected parties.
- C. Contractor shall submit Construction Schedule at pre-construction meeting.
- D. When required in individual Specification section, convene a pre-installation conference at project site prior to commencing work of Section.

1.10 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at minimum of one (1) per week with Public Works Project Manager.

- B. Preside at meetings, record minutes, and distribute copies within two (2) business days to those affected by decisions made.
- C. Attendance at progress meetings by General Contractor, subcontractors, or their authorized representative, is mandatory.
- D. Contractors shall give verbal reports of progress on the Work, discuss schedule for upcoming period and present all conflicts, discrepancies or other difficulties for resolution.
- E. Day & time of progress meetings to be determined at pre-construction meeting.

1.11 SUBMITTAL PROCEDURES

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

1.12 PROPOSED PRODUCTS LIST

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

1.13 SHOP DRAWINGS

- A. Submit number of copies that Contractor requires, plus three (3) copies that shall be retained by Public Works Project Manager.

1.14 PRODUCT DATA

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

1.15 SAMPLES

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

1.16 MANUFACTURERS' INSTRUCTIONS

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

1.17 MANUFACTURERS' CERTIFICATES

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

1.18 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

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

1.19 REFERENCES

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

1.20 INTERIOR ENCLOSURES

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

1.21 PROTECTION OF INSTALLED WORK

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

1.22 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel. Parking shall not be available at the Work site.
- B. All contractors and their employees shall cooperate with General Contractor and others in parking of vehicles to avoid interference with normal operations and construction activities.
- C. Do not obstruct existing service drives and parking lots with equipment, materials and / or vehicles. Keep accessible for Owner's use at all times.

1.23 STAGING AREAS

- A. Coordinate staging areas with Public Works Project Manager prior to starting the Work.
- B. On-site space for use as staging areas and storage of materials is limited and will be apportioned among various Contractors as their needs dictate with due regard for storage requirements of each Contractor. Each Contractor shall be responsible for safety of equipment and materials that are stored on site.

1.24 OCCUPANCY DURING CONSTRUCTION AND CONDUCT OF WORK

- A. Smoking is prohibited on Dane County property.
- B. Owner reserves right at any time to dismiss from premises any Contractor or construction personnel that do not uphold requirements of this Section.
- C. Owner shall not be held liable for any lost time, wages, or impacts to construction schedule by any Contractor or construction personnel dismissed for failure to uphold requirements of this Section.
- D. Areas of existing facility will be occupied during period when the Work is in progress. Work may be done during normal business hours (8:00 am to 4:30 pm), but confer with Owner, schedule work and store materials so as to interfere as little as possible with normal use of premises. Work performed on Saturday shall be by permission of Owner. Notify Owner when coring or similar noise making work is to be done and obtain Owner's written approval of schedule. If schedule is not convenient for Owner, reschedule and resubmit new times for Owner approval. Coring of floor along with other noisy work may have to be done on second and third shifts.
- E. Work shall be done and temporary facilities furnished so as not to interfere with access to any occupied area and so as to cause least possible interference with normal operation of facility or any essential service thereof.
- F. Contractor shall, at all times, provide approved, safe walkways and facility entrances for use by Owner, employees and public.

- G. Contractor shall provide adequate protection for all parts of facility, its contents and occupants wherever the Work under this Contract is to be performed.
- H. Each Contractor shall arrange with Owner to make necessary alterations, do new work, make connections to all utilities, etc., at such times as will not cause interruption of utility services to facility. Contractor doing this work shall protect, cap, cut off and / or replace and relocate existing pipes, electrical work and other active utilities encountered which may interfere with new construction work.
- I. New work in extension of existing work shall correspond in all respects with that to which it connects or similar existing work unless otherwise indicated or specified.
 - 1. Existing work shall be cut, altered, removed or replaced as necessary for performance of Contract obligations.
 - 2. Work remaining in place, damaged or defaced by reason of work done under this Contract shall be restored equal to its condition at time of Award of Contract.
 - 3. If removal of work exposes discolored or unfinished surfaces or work out of alignment, such surfaces shall be refinished or materials replaced as necessary to make continuous work uniform and harmonious.
- J. Contractor is not responsible for providing & maintaining temporary toilet facilities.

1.25 PROTECTION

- A. Contractor shall protect from damage / injury all trees, shrubs, hedges, plantings, grass, mechanical, electrical & plumbing equipment, walks and driveways and pay for any damage to same resulting from insufficient or improper protection.

1.26 PROGRESS CLEANING

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

1.27 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.

1.28 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

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

1.29 PRODUCT OPTIONS

- A. Where definite material is specified, it is not intentional 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 Public Works Project Manager for approval at least seven (7) business days prior to Bid Due Date.
- B. Products and materials that are not specified, but have been approved for use by Public Works Project Manager shall be identified in addenda to all bidding contractors.
- C. Requests for material or product substitutions submitted after Bid Due Date may be considered. Owner reserves right to approve or reject substitutions based on Specification requirements and intended use.

1.30 SUBSTITUTIONS

- A. Public Works Project Manager shall consider requests for Substitutions only within fifteen (15) calendar days after date of Public Works Construction Contract.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
- C. Submit three (3) copies of requests for Substitution for consideration. Limit each request to one (1) proposed Substitution.
- D. Substitutions shall not change contract price established at Bid Due Date.

1.31 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.

1.32 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.

- C. Owner may choose to photograph or videotape demonstration session; demonstration and demonstrator shall be to level of satisfaction of Owner.

1.33 CONTRACT CLOSEOUT PROCEDURES

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

1.34 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.

1.35 ADJUSTING

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

1.36 OPERATION AND MAINTENANCE MANUAL

- A. Provide two (2) bound, hard-copy operation and maintenance manuals that include all systems, materials, products, equipment, mechanical and electrical equipment and systems supplied and installed in the Work. Provide electronic version of operation and maintenance manual also.

1.37 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.

1.38 AS-BUILT AND RECORD 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 Architect / Engineer with original marked up redlines of Construction Documents' drawings and specifications that shall include all Addendums, Change Orders, Construction Bulletins, on-site changes, field corrections, etc. These are project As-Built Drawings & Specifications.
- B. Architect / Engineer shall update original Construction Documents to include all Addendums & any other changes including those provided by Contractor in As-Built

Drawings & Specifications. These updates are project Record Drawings & Specifications.

- C. Architect / Engineer shall furnish Public Works Project Manager with Record Drawings as detailed in Professional Services Agreement.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT, DISPOSAL & RECYCLING

PART 1 GENERAL

1.1 SUMMARY

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

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

1.2 WASTE MANAGEMENT GOALS

- A. Dane County requires that as many waste materials as possible produced as result of this project be salvaged, reused or recycled in order to minimize impact of construction waste on landfills and to minimize expenditure of energy and cost in fabricating new materials. Additional information may be found in Dane County Green Building Policy, Resolution 299, 1999-2000.

1.3 CONSTRUCTION AND / OR DEMOLITION WASTE MANAGEMENT

- A. All construction and demolition waste suitable for recycling may go to Dane County Construction & Demolition Recycling Facility located at 7102 US Hwy 12, Madison, located across from Yahara Hills Golf Course. This facility can receive mixed loads of construction and demolition waste. For complete list of acceptable materials see www.countyofdane.com/pwht/recycle/CD_Recycle.aspx.
- B. Dane County Landfill, also at 7102 US Hwy 12, Madison, must receive all other waste from this project. www.countyofdane.com/pwht/recycle/landfill.aspx.

1.4 WASTE MANAGEMENT PLAN

- A. Contractor shall develop Waste Management Plan (WMP) for this project. Dane County's Special Projects & Materials Manager may be contacted with questions. 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.

B. Contractor shall complete WMP and include cost of recycling / reuse in Bid. WMP will be submitted to Public Works Project Manager within fifteen (15) business days of Bid Due 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.

1.5 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.

1.6 RECYCLING

A. These materials may be recycled at Dane County Construction & Demolition Recycling Facility:

1. Wood.
2. Wood Pallets.
3. PVC Plastic (pipe, siding, etc.).
4. Asphalt & Concrete.
5. Bricks & Masonry.
6. Vinyl Siding.
7. Cardboard.
8. Metal.
9. Unpainted Gypsum Drywall.
10. Shingles.

B. These materials can be recycled elsewhere in Dane County area:

1. Fluorescent Lamps.
2. Foam Insulation & Packaging (extruded and expanded).
3. Carpet Padding.
4. Barrels & Drums.

C. All materials must be recycled at WDNR permitted waste processing facilities that adhere to all State Statutes.

1.7 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.

- C. Mixed loads of recycled materials are allowed only per instructions at www.countyofdane.com/pwht/recycle/CD_Recycle.aspx.

1.8 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

- A. Refer to www.countyofdane.com/pwht/recycle/CD_Recycle.aspx for information on Dane County Construction & Demolition Recycling Facility.
- B. Web site www.countyofdane.com/pwht/recycle/categories.aspx lists current information for Dane County Recycling Markets. Contractors can also contact Allison Hackner at 608/266-4990, or local city, village, town recycling staff listed at site www.countyofdane.com/pwht/recycle/contacts.aspx. Statewide listings of recycling / reuse markets are available from UW Extension at <https://www.uwgb.edu/shwec/>.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

WASTE MANAGEMENT PLAN FORM



Contractor Name: _____

Address: _____

Phone No.: _____ Recycling Coordinator: _____

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

WASTE MANAGEMENT PLAN FORM

Glass	_____ cu. yds. _____ tons	_____ 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: _____

SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

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

1.03 RELATED WORK

- A. Resilient Flooring, Section 09 65 00.
- B. Recycling, Section 01 74 19.

1.04 SUBMITTALS

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

1.05 DEFINITIONS

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

1.06 QUALITY ASSURANCE

- A. Comply with governing codes and regulations.

1.07 RECORD DRAWINGS

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

1.08 SAFETY

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

1.09 PERMITS

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

1.010 DISCONNECTION OF SERVICES

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

1.011 REMOVAL/SALVAGING OF ITEMS

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

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

PART 2 - PRODUCTS

2.01 EQUIPMENT

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

PART 3 - EXECUTION

3.01 GENERAL

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

3.02 PROTECTION OF EXISTING WORK AND FACILITIES

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

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

3.03 DEMOLITION

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

3.04 RECYCLING

- A. Transport and dispose all demolition waste in accordance with local, state, and federal guidelines and Section 01 74 19 Recycling.

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 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, and map rail.
- B. Metal Drip Pan.
- C. Metal accessories.
- D. Wall supports.

1.03 RELATED WORK

- A. Painting, Section: 09900
- B. Rough Carpentry, Section: 06600
- C. Finish Carpentry, Section: 06700

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 at partial height walls for stability.
- D. ¼" Plate steel.
- E. 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.
- F. Miscellaneous metals.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Electrodes for Welding: E70XX, comply with AWS code.
- I. Metal Drip Pan, see fabrications section.

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.
- H. Metal drip pan to be fabricated with structure reinforcing hemmed edges and fully welded corners and joints to make a lightweight, durable spill containment pan. Provide all accessories for suspension from ceiling. Slope to drain. Provide outlet and flexible tube routed below the access floor to the floor drain. Minimum 2" vertical hemmed edge. Fabricate with aluminum sheet .040 inch thick. 70 percent; 3-coat fluoropolymer finish, at ceiling installation provide finished bottom face. Field verify final dimensions.

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.

2.03 FINISHES

- A. Powder-coat where noted.
1. Provide polyester, powder-coat finish of completed fabrication.
 2. Manufacturer: Tiger Drylac or equal.
 3. Color: Selected by Architect from manufacturer's standard, RAL colors.
 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 plaster wall by drilling holes for ¼ inch studs and 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 41 16

PLASTIC LAMINATE CLAD CASEWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Base, Wall and Custom Storage Cabinets and associated Partitions and Shelving.
- B. Hardware.

1.03 RELATED WORK

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

1.04 REFERENCES

- A. Plastic Laminate: National Electrical Manufacturers Association (NEMA) Publication No. LD3-1991.
- B. Fiberboard Core: ANSI A208.2.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Product Data: Manufacturer's catalog information edited to indicate specific products and related accessories to be provided for this Project.
 - 2. Shop Drawings: Show layout of casework, typical details of construction, and finish selections.
 - a. Locate rough-in for services required and show methods of compensating for minor variations in actual job conditions within specified tolerances.
 - b. Include details of fastening to all other work, countertop layout for each location, details of countertop construction including backsplash, endsplash, and edge details, plastic laminate selections previously made by Architect/Engineer and type of core substrate material.
 - c. Field measure for all countertops.
 - d. Indicate all hardware and keying schedule.

1.06 QUALITY ASSURANCE

- A. Quality Standards: Perform work in accordance with Architectural Woodwork Quality Standards (current edition), Guide Specification and Quality Control Program as set forth by the Architectural Woodwork Institute (AWI).

- B. ANSI/BHMA A156.9 – Cabinet Hardware.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver casework items only when proper storage conditions will be available. Store casework in protected area until ready for installation.
- B. Maintain optimum humidity and temperature conditions after receipt of materials.
- C. Store in manner to allow free circulation of air around all items.
- D. Maintain temperature of casework storage areas between 50 to 75 degrees Fahrenheit.

PART 2 - PRODUCTS

2.01 CASEWORK

- A. AWI Section 400, Custom grade.

2.02 MANUFACTURERS

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

2.03 BASE AND CUSTOM STORAGE CABINETS

- A. Bottoms, Sides and Sub-top: 3/4-inch 45-47 pound density particle board.
 1. Finish where not exposed: 8 to 11 mil melamine resin overlay.
- B. Back Panel: 3/8-inch 45-47 pound density particle board.
 1. Finish: 8 to 11 mil melamine resin overlay to match cabinet interior.
 2. Non-Exposed Side Finish: 8 to 11 mil melamine resin overlay to match.
 3. If back exposed, provide 3/4-inch material, finished to match.
- C. Top of Base, Custom Storage Cabinet: Full framed wood. Provide full sub-top and 6 inch spreaders between all drawers and door/drawer.

- D. Back panels rabbeted into sides top and bottom. Secure with hot melt glue or glue and mechanical fasteners.
- E. Provide finished end panels at all exposed end locations. Ends adjacent to appliances shall be considered as exposed ends.

2.04 DOOR/DRAWER CONSTRUCTION AND EDGING

- A. Door/Drawer Fronts: 3/4-inch thick core.
- B. Exposed Edges, Endsplashes:
 - 1. Finished to match exposed face.
- C. Laminate face/balancer to core with PVA rigid adhesives, under pressure, nor natural setting process. Heat process or contact adhesive not allowed.
- D. Door/Drawer/Cabinet Body Edges: 1 mm PVC thru-color, acid resistant hot melt applied.

2.05 PLASTIC LAMINATE SURFACING

- A. Manufacturers: Wilsonart , Arpa, Formica, Lamin-Art, Nevamar, or approved equal.
- B. Exposed Exterior Surfaces (except countertops): NEMA GP28, 0.028 inch thick, standard vertical grade.
- C. Interior Surfaces/Backing Sheets: NEMA CL20, 0.020 inch thick, standard cabinet liner grade if applicable.
- D. Colors:
 - 1. Horizontal Surface Plastic Laminate color to be selected from manufacturer's full range.
 - 2. Vertical Surface Plastic Laminate color to be selected from manufacturer's full range.
- E. Contrasting text where indicated on drawings.

2.06 DRAWERS

- A. Backs, Sides, Fronts: 1/2-inch thick, medium density fiberboard with melamine overlay.
- B. Dovetail/dado fronts and backs, secure with glue.
- C. Bottoms: 3/8-inch thick.
- D. Rabbet bottoms into sides, front and back; staple and glue.
- E. Drawer fronts screwed on from drawer inside.
- F. Reinforcement: 1/2 inch thick under-bottom stiffeners, one at 24 inch drawers, two at 36 inch drawers, four at 48 inch drawers.

2.07 SHELVES

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

B. Shelves over 27 inches long: 1 inch thick 45-47 pound density particle board. Provide additional bracket supports at long space shelving.

C. Finish: Finished to match faces.

D. Edging: Material to match the shelf.

2.08 BASES

A. Two, continuous, 4 inch high by 1-1/2 inch thick lumber, or 4 inch high by 3/4 inch exterior grade plywood, 2 foot on center. See drawings for base dimension.

B. Provide two positioning strips to cabinet bottom for concealed fastening.

2.09 HARDWARE

A. Pulls:

1. 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.

E. Steel Brackets

1. For upper shelving and work surfaces: Hafele, Hebggo bracket, approved equal by A&M Hardware or approved equal.

a. Color: To be selected by Architect from full line of powder coat finishes.

Hardware finish: 626 (US26D) Brushed Chrome.

2.010 WORKMANSHIP

A. Cabinet parts shall be accurately machined utilizing hardwood dowels for premium quality grade joinery construction. Glue and mechanically fasten all joints for maximum rigidity.

B. All cases shall be square, plumb, true and self-supporting.

C. Provide removable back panels and closure panels for plumbing access where shown on Project Drawings.

PART 3 - EXECUTION

3.01 DELIVERY

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

3.02 INSTALLATION

A. Installation shall be by the manufacturer's authorized representatives using factory trained personnel experienced in the installation of this type of equipment.

- B. Uncrate, set up, place, level, scribe and anchor all cabinets according to manufacturer's recommendations.
- C. Remove and replace tops, backs, panels, shelves and other items necessary to allow other Sections to complete their work of connecting services.
- D. Do all cutting, boring, patching required for the installation of work of other Sections.
- E. Provide all necessary fillers, panels, end panels, scribes required to make complete installation as detailed.
- F. Where casework meets wall surfaces, set with uniform space not to exceed 1/8-inch. Seal all joints with silicone sealant to a slightly concave joint, using backer rod where required. Apply sealant in accord with Section 07 92 00.
- G. Cabinets with surfaces having machine or tool marks will be rejected.
- H. All finishes must be smooth, uniform in color and match approved sample.
- I. Prior to final inspection, examine installation of the work of this Section. Repair or replace all defects found. Leave installation clean, undamaged and ready for use.

3.02 FINISH SCHEDULE

PLam cabinets To be selected from manufacturer's full line

END OF SECTION 06 41 16

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SECTION 06 61 18

SOLID SURFACE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Solid surface countertop.

1.03 RELATED WORK

- A. 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

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

3
4 1.08 SPECIAL INSTRUCTIONS

- 5
6 A. Do not deliver components to project site until spaces are ready for installation.

7
8 1.09 ENVIRONMENTAL CONDITIONS

- 9
10 A. Installation spaces must be maintained at normal occupancy temperature and humidity levels for
11 minimum 72 hours prior to and continuously following installation.

12
13 1.010 ENVIRONMENTAL REQUIREMENTS

- 14
15 A. Recycled content: Provide products manufactured from recycled content as specified, to be measured
16 and documented according to the LEED Green Building Rating System.

- 17 1. Solid surface: Minimum 50% post-consumer recycled content.

- 18
19 B. Low-Emitting Materials, Field applied Paints and Coatings: Interior paints and coatings applied on-
20 site must meet the limitations and restrictions concerning chemical components set by the following
21 standards:

- 22 1. "All Other Architectural Coatings, Primers and Undercoats: South Coast Air Quality
23 Management District (SCAQMD) Rule #1113, Architectural Coatings", rules in effect on
24 January 1, 2004.

- 25
26 C. Low-Emitting Materials, Adhesives, and Sealants: Materials used on the interior of the building
27 (defined as inside the weatherproofing system and applied on site) must not exceed the following
28 requirements.

- 29 1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management (SCAQMD)
30 Rule # 1168, requirements in effect on July 1, 2005, and rule amendment date January 7,
31 2005.

- 32 2. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36, requirements in
33 effect on October 19, 2000.

34
35 PART 2 - PRODUCTS

36
37 2.01 MATERIALS

38
39 A. Solid Surface

- 40 1. Solid Surface-1, color to be selected by Architect.

- 41 a. Formica, Solid Surfacing

- 42 b. Or approved equal by: Dupont, Corian; Wilsonart, Solid Surfacing.

- 43
44 B. No cracked, chipped, broken, stained, or defective material will be accepted.

- 45 1. Materials fabricated to thickness and size shown on drawings.

- 46 a. All sizes to be field verified.

- 47
48 C. Color Match Differences: Minimal.

- 49
50 D. Adhesives: Use manufacturer's recommended adhesives, and installation instructions. See product
51 fabrication manuals for application techniques and surface preparation.

52
53 2.02 FABRICATION

54

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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. Stone Masonry Section 04 40 00.
- B. Hollow Metal Doors and Frames Section 08 11 13.

1.04 SUBMITTALS

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

1.05 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 SEALANT

- A. Sealant for Locations Except as Specified in the Subsequent Paragraphs: PECORA Dynatrol I-XL, Degussa Sonneborn Sonolastic NP-1, TREMCO Dymonic, or other acceptable, one part polyurethane.
 - 1. Comparable means both quality and color options.
 - 2. VOC content limit: 100 g/L, less water and less exempt compounds.
- B. Horizontal Joint Sealant: PECORA NR-200 Urexpan, Sonolastic SL2, TREMCO THC-900, or other acceptable 2-part self-leveling polyurethane.
 - 1. Comparable means both quality and color options.

2.02 SEALANT ACCESSORIES

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

PART 3 - EXECUTION

3.01 JOINT PREPARATION

- 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. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

3.03 PROTECTION

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

END OF SECTION 07 92 00

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. Steel 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. Fire-Rated Doors: Comply with NFPA 80 "Standard for Fire Doors and Windows." and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
- C. ANSI A250.3 Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
- D. ANSI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.
- E. ANSI A250.5 Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors.
- F. ANSI A250.8 Nomenclature for Standard Steel Doors and Steel Door Frames.
- G. ANSI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- H. ANSI/DHI A115 Specifications for Hardware Preparations in Standard Steel Doors and Frames.
- I. ANSI/DHI A115.1G Installation Guide for Doors and Hardware.
- J. SDI-105-92 Recommended Erection Instructions for Steel Frames.

- K. SDI-106 Recommended Standard Door Type Nomenclature.
- L. SDI-111 Recommended Standard Details Steel Doors and Frames.
- M. SDI-117-93 Manufacturing Tolerances Standard Steel Doors and Frames.
- N. SDI-122-90 Installation and Troubleshooting Guide for Standard Doors and Frames.
- O. ASTM E119 Methods for Fire Tests of Building Construction and Materials.
- P. ASTM A240/A240M Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel.
- Q. ASTM A366 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
- R. ASTM A568 Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements.
- S. ASTM A569 Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- T. ASTM A620 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Drawing Quality, Special Killed.
- U. NFPA-101-94: Life Safety Code.
- V. NFPA 251: Fire Tests of Building Construction and Materials.
- W. NFPA 252: Fire Tests of Door Assemblies.
- X. UL 9: Fire Tests of Door Assemblies.
- Y. UL 10B: Fire Tests of Door Assemblies.
- Z. UL 263: Fire Tests of Building Construction and Materials.

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.
- C. Fire-Rated Door Assemblies: Label, testing and installation of opening protectives shall be in accordance with Wisconsin Building Code Section 715.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.07 DELIVERY, STORAGE, AND HANDLING

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

1.08 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Amweld Building Products
- B. Benchmark Commercial Doors
- C. Ceco Door Products
- D. Curries Company
- E. Deansteel Manufacturing Co.
- F. Fenestra, Inc.
- G. Kewaunee Corporation
- H. Krieger Steel Products
- I. Mesker Door, Inc.

- J. Pioneer Industries, Inc.
- K. Precision Metals, Inc.
- L. Republic Builder Products
- M. Security Metal Products Corp.
- N. Steelcraft
- O. Trussbuilt, Inc.
- P. Williamsburg Steel Products Co
- Q. Or approved equal.

2.02 MATERIALS

- A. Steel: Commercial quality, level, cold-rolled steel conforming to ASTM A366, free of scale and surface defects. Commercial quality hot rolled and pickled steel conforming to ASTM A569 may be used as option for interior frames. Gauges are as follows:
 - 1. Interior Frames: 16-gage.
 - 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 weatherstripping.
- B. Provide proper Underwriters' Laboratory (UL) labels. Labeled doors shall have equal labeled frames.
- C. 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 HOLLOW 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.
- J. Where required frames to be prepped for electric strike.
- K. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install steel frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.
 - 1. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 2. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with self-tapping screws.
 - 3. Fill heads of fasteners with body putty, grind smooth and touch-up prime.
- C. Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.

- e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
- f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
- g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

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

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

- A. Wood Doors

1.03 RELATED WORK

- A. Hollow Metal Doors and Frames: Section 08 11 13.
- B. Door Hardware: Section 08 71 00.
- C. Glass and Glazing: Section 08 80 00.
- D. Painting: Section 09 90 00, for re-finishing of planed and cut surfaces.

1.04 REFERENCES

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

1.05 SUBMITTALS

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

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the "on-site care" recommendations of National Wood Window and Door Association (WDMA) pamphlet "Care and Finishing Wood Doors" and with manufacturer's instructions.
 1. Provide protective coverings for doors at the factory prior to shipping. Use heavy paper cartons or poly bags and mark with identification required for proper installation.
- B. Deliver and store within enclosed building only after humidity contributing work is completed and relative humidity is less than 50%. Stack doors laid flat, level and off floor, in dry, clean, well ventilated space.
- C. Do not drag doors across one another.

1.07 WARRANTY

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 MANUFACTURED UNITS

- A. Non-labeled Interior Wood Veneer Solid Core Doors: AWI type PC-5/7, Custom Grade.
 - 1. Core: Particleboard or agri-fiber with minimum 40% post-industrial, recycled content as certified by an independent, third party certification agency.
 - 2. Veneer: Book matched, Red Oak, Rift Cut.
 - 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, Algoma custom stain RA-17257, 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 00

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SECTION 08 31 13

ACCESS DOORS AND FRAMES

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 SUMMARY

- A. This section includes the following:
 - 1. Access doors and frames.
- B. Related sections include the following:
 - 1. Division 23 Section "Duct Accessories" for duct access doors.

1.03 SUBMITTALS

- A. Submit in accord with the General Conditions of the Contract.
 - 1. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following
 - a. Method of attaching door frames to surrounding construction.
 - b. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, and special trim.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.05 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. 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.
 - 2. "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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Access Doors:
 - a. Bar-Co, Inc. Div.; Alfab, Inc.
 - b. Cesco Products.

- c. J. L. Industries, Inc.
- d. Karp Associates, Inc.
- e. Milcor Limited Partnership.

2.02 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with A60 zinc-iron-alloy (galvannealed); stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.03 PAINT

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."
- B. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- C. Shop Primer for Metallic-Coated Steel: Organic zinc-rich primer complying with SSPC-Paint 20 and compatible with topcoat.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

2.04 ACCESS DOORS AND FRAMES

- A. Flush Access Doors and Trimless Frames: Fabricated from metallic-coated steel sheet.
 - 1. Locations: Various locations and surfaces, assembly to be manufactured for specific applications.
 - 2. Sizes: 18" x 18" or as shown in drawings.
 - 3. Door: Sheet metal, gauged to door size, minimum 20 gauge metal set flush with surrounding finish surfaces.
 - 4. Frame: To be manufactured specifically for the surrounding material for flush/integral installation, minimum 16 gauge metal flange.
 - a. Drywall bead for gypsum board.
 - b. Other as needed.
 - 5. Hinges:
 - a. Spring-loaded concealed pin type.
 - 6. Latch:
 - a. Screwdriver-operated cam latch.

- 1 b. Key operated security lock.
- 2
- 3 2.05 FABRICATION
- 4
- 5 A. General: Provide access door assemblies manufactured as integral units ready for installation.
- 6
- 7 B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials
- 8 with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam
- 9 marks, roller marks, rolled trade names, or roughness.
- 10
- 11 C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces.
- 12 Furnish attachment devices and fasteners of type required to secure access panels to types of
- 13 supports indicated.
- 14
- 15 D. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge
- 16 trim for gypsum board securely attached to perimeter of frames.
- 17
- 18 E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when
- 19 closed.
- 20
- 21 F. All access doors to be fabricated and properly installed in such a manner as to maintain the fire
- 22 rating of the assembly into which it is placed.
- 23
- 24 2.06 FINISHES, GENERAL
- 25
- 26 A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for
- 27 recommendations for applying and designating finishes.
- 28
- 29 B. Finish metal fabrications after assembly.
- 30
- 31 2.07 METALLIC-COATED STEEL FINISHES
- 32
- 33 A. Galvanizing of Steel Shapes and Plates: Hot-dip galvanize items indicated to comply with
- 34 applicable standard listed below:
- 35 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
- 36 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- 37
- 38 B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and
- 39 other contaminants. For galvanized surfaces, apply, after cleaning, a conversion coating suited
- 40 to the organic coating to be applied over it. For metallic-coated surfaces, clean welds,
- 41 mechanical connections, and abraded areas, and apply galvanizing repair paint specified below
- 42 to comply with ASTM A 780.
- 43 1. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel,
- 44 complying with SSPC-Paint 20.
- 45
- 46 C. Factory Priming for Field-Painted Finish: Apply shop primer immediately after cleaning and
- 47 pre-treating.
- 48
- 49 PART 3 - EXECUTION
- 50
- 51 3.01 INSTALLATION
- 52
- 53 A. Install according to manufacturer's instructions.
- 54 1. Doors to be installed plumb/level/square as surfaces require.
- 55 2. Maintain even gap between frame and door.
- 56

1 3.02 ADJUSTING AND CLEANING

2

3 A. Adjust doors and hardware after installation for proper operation.

4

5 B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

6

7 C. Remove all packaging material upon completion.

8

9

10

END OF SECTION 08 31 13

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. Hollow Metal Doors and Frames: Section 08 11 13.
- B. Flush Wood Doors: Section 08 14 16.

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. Reinstalled salvaged hardware is included in the scope of the work.
 - 2. Samples of hardware items as may be required. Identify each sample and indicate the location of subsequent installation in the project.

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

1.06 QUALITY ASSURANCE

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

1.07 REGULATORY REQUIREMENTS

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

1.08 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 ACCESSORIES

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

PART 3 - EXECUTION

3.01 INSTALLATION

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

3.02 ADJUSTING

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

3.03 CLEANING

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

3.04 PROTECTION

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

3.05 HARDWARE SCHEDULE

- A. Manufacturers
 - 1. Hinges
 - a. Approved Equals: Hager Hinge Co. HAG
Stanley
McKinney
 - 2. Lockset
 - a. Approved Equals: Best Access Systems BES
Provide 7-pin cylinders to match existing. Coordinate with Best Access Systems for keying of project, No Substitutions. Best Access Systems is indicated in this specification as a basis of design, Marshall Best Security Corporation to accept Best Access System Core is an acceptable equal.
 - 3. Door Closers
 - a. Approved Equals: Stanley Security Solutions STA
LCN, Model 4040
Sargent, Model 351
 - 4. Kickplate
 - Rockwood Mfg. Co ROC
 - 5. Biometric Hand Readers
 - Schlage Recognition Systems SCH
 - 6. Electric Strikes
 - Von Duprin VON
 - a. Approved Equals: HES
Folger Adams
 - 7. Door Position Switch
 - Locknetics LCK
 - 8. Clothes Hook
 - Bobrick BBK

B. Hardware Sets:

SET 01

Opening(s): OFFICES 327, 328

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

SET 01A – EXISTING DOORS TO BE REUSED

Opening(s): OFFICES 329, 333, 334, 335

3	EA	HINGES	existing		
1	EA	ENTRANCE LOCK	93K AB x 14D	626	BES
1	EA	WALL STOP	WS407	630	IVE
1	EA	CLOTHES HOOK	B-6727	SS	BBK

SET 02

Opening(s): 3010a

3	EA	HINGES	BB1279	652	HAG
1	EA	PUSH PLATE	70C	630	ROC
1	EA	PULL	BF111HD	630	ROC
1	EA	WALL STOP	WS407	630	IVE
REINSTALL SALVAGED AUTOMATIC ENTRANCE OPERATOR					
2	EA	ACTUATOR	AS REQUIRED		

SET 04E

Opening(s): 528b, 530

	EA	HINGES	BB1279 NRP	630	HAG
2	EA	SPRING HINGE	1150	630	HAG
		<i>INACTIVE LEAF</i>			
1	EA	THROUGH WIRE HINGE	ETW-4	630	HAG
		<i>INACTIVE LEAF</i>			
1	EA	STOREROOM LOCK	93K D x 14D	626	BES
1	PR	AUTO FLUSH BOLT	FB31P	626	IVE
1	EA	COORDINATOR	CORXX x FLXX	628	IVE
		w/MOUNTING BRACKETS AS NEEDED			
2	EA	WALL STOP	WS407	630	IVE
1	EA	CLOSER (ACTIVE LEAF)	4110	689	LCN
2	EA	ELECTRIC STRIKE	6223	630	VON
1	EA	DOOR POS SWITCH	1076W	WHT	GE
1	EA	CARD READER	BY SECTION 28 13 00		

PROVIDE SEALS FOR CLEAN AGENT FIRE PROTECTION SYSTEM

1	EA	THRESHOLD	413S	MIL	HAG
2	EA	SWEEP	750SN	CLR	HAG
1	SET	SEALS	5050	BLK	HAG
1	EA	MEETING EDGE SEAL	5070	BLK	HAG

SET 09

Opening(s): 1310b

	EA	HINGES	BB1279 NRP	652	HAG
1	EA	STOREROOM LOCK	93K D x 14D	626	BES
1	EA	AUTOMATIC OPERATOR	STANLEY MAGIC FORCE		STANLEY
2	EA	ACTUATOR	AS REQUIRED		
1	EA	ELECTRIC STRIKE	6211	630	VON
1	EA	DOOR POS SWITCH	1076W	WHT	GE
1	EA	CARD READER	BY SECTION 28 13 00		

OPERATIONAL DESCRIPTION: DOOR NORMALLY CLOSED AND LOCKED. USE OF ACTUATOR TO ACTIVATE AUTOMATIC OPERATOR FROM THE PUSH SIDE ALLOWED AT ALL TIMES. FROM THE PULL SIDE, USE OF AUTHORIZED CREDENTIAL IN THE CARD READER SHALL UNLOCK ELECTRIC STRIKE AND ALLOW USE OF ACTUATOR FOR AUTOMATIC OPERATOR. IN THE EVENT OF A FIRE OR POWER OUTAGE, THE ELECTRIC STRIKE SHALL BECOME LATCHED AND THE AUTOMATIC OPERATOR SHALL DEACTIVATE, CLOSING AND LATCHING THE DOOR.

SET 10

Opening(s): 325, 528a

	EA	HINGES	BB1279 NRP	652	HAG
1	EA	STOREROOM LOCK	93K D x 14D	626	BES
1	EA	CLOSER	4010/4110	689	LCN
1	EA	WALL STOP	WS407	630	IVE
1	EA	ELECTRIC STRIKE	6211	630	VON
1	EA	DOOR POS SWITCH	1076W	WHT	GE
1	EA	CARD READER	BY SECTION 28 13 00		

PROVIDE SEALS AT DOOR 528a FOR CLEAN AGENT FIRE PROTECTION SYSTEM

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 92 00.
- B. Flush Wood Doors: Section 08 14 00.
- C. Information Specialties: Section 10 14 00.

1.04 REFERENCES

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

1.05 QUALITY ASSURANCE

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

1.05 SUBMITTALS

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

1.06 DELIVERY, STORAGE AND HANDLING

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

1.07 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers/Suppliers:

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

2.02 GLASS

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

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

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

1.03 RELATED WORK

- A. Section 09 90 00 Painting.
- B. 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.
 - 2. Texture finish sample.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site with manufacturer's labels intact and legible.

- B. Handle materials with care to prevent damage.
- C. Deliver fire-rated material bearing testing agency label and required fire classification numbers.
- D. Storage
 - 1. Store materials inside under cover, stack flat, off floor.
 - 2. Stack wallboard so that long lengths are not over short lengths.
 - 3. Avoid overloading floor system.
 - 4. Store adhesives in dry area, provide protection against freezing at all times.

1.07 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 MATERIALS

- A. Gypsum Board: ASTM C 36, long edges tapered; in lengths as long as practical to keep number of end joints to absolute minimum.
 - 1. Regular Gypsum Board.
 - 2. Water Resistant Wallboard: 5/8-inch thick.
 - 3. Cementitious Backer Board: Aggregated, Portland cement board with woven, glass fiber, mesh facing; complying with ANSI A118.9.
 - a. Manufacturer: USG, Durock Interior Tile Backer Board or approved equal.
 - b. Thickness: 1/2 inch.
 - 4. Veneer Plaster Base: USG Imperial Gypsum Base, 5/8-inch thick.

5. Fire Rated 1 Inch thick gypsum wall board panels, supplied in nominal 24 inch widths type SLX.
6. Fire Rated Face Layer: 5/8 inch Gypsum Board:
 - a. American Gypsum; Types AGX-1, AG-C
 - b. Certaineed Gypsum; ProRoc Type C
 - c. Georgia Pacific Gypsum; Type S
 - d. USG; Type C, FRX-G, IP-X2, IPC-AR, SCX, or WRC.
 - e. Or approved equal.

B. Accessories

1. Metal Trim: USG No. 200-A.
2. L-shaped Metal Trim for Veneer Plaster: USG No. 801-B.
3. Metal Reveal Molding: Fry Reglet DRM-625-75.
4. Metal 'Z' Reveal Molding, 1/4" wide: Fry Reglet DRMZ-625-25.
5. Metal 'Z' Reveal Molding, 1" wide: Fry Reglet DRMZ-100-100.
6. Expansion Joints: USG No. 093.
7. Drywall Screws for Metal Framing: 1" Type S-12 or Type S bugle head.
8. Outside Corner Reinforcement: USG No. 104, 1-1/8" x 1-1/8" corner bead.
9. Acoustical Sealant: Equal to Tremco "Tremflex 834" or Pecora "Acoustic and Insulation Sealant", low VOC formulation.
 - a. VOC content less than 50 g/l.
10. Tie Wire: No. 18 SWG, steel wire.
11. Steel runner channel brackets: 25 MSG galvanized steel.
12. Corner angles: 25 MSG galvanized steel.
13. Sound Attenuation Blanket: U.S. Gypsum Thermafiber, or approved equal, 3" for an STC of 49.

C. Metal Studs/Resilient Furring Channels.

1. Unless indicated otherwise, use 25-gage for partitions up to 12'-0" high, use 20-gage for partitions over 12'-0" high.
2. Unless indicated otherwise, use 20-gage studs at door jambs, head.
3. Track gauge shall be same gauge as nested studs.
4. 2 1/2 inch wide by 1 1/2 inches deep C-H studs 24 inch on center. Fabricated from minimum 25 MSG galvanized steel.

D. Suspension System

1. Chicago Metallic 640 system
 - a. Hanger Wire: 8-gage, annealed.
 - b. Carrying Channels: 1-1/2 inch cold rolled steel.
 - c. Screws: USG 1-inch type S.
 - d. Furring Channels: USG metal furring channel, attached with USG furring channel clips.
2. Chicago Metallic 650 System complying with UL Design No. D502.
 - a. Hanger clips: 18 gauge galvanized steel.
 - b. Hanger wire: No. 12 SWG galvanized steel.
 - c. Carrying Channels: 16 gauge 1 1/2 inch cold rolled.
 - d. Furring Cross Channel: 16 gauge 7/8 inch where required.
 - e. Wall Molding: 26 gauge steel channel 1 11/16 inch deep with 15/16 inch flanges.
3. Or approved equal.

E. Drywall Finishing Accessories

1. Joint Compounds: Ready mixed type.
2. Joint Reinforcement: USG Perf-A-Tape or approved equivalent.

F. Patching Materials at Plaster

1. Setting-Type Joint Compounds, Base Coat: USG Sheetrock, "Durabond" or approved equal.
 - a. Low shrinkage, chemically setting compounds rated for interior and exterior use.
 - b. Suitable for heavy fills and areas of high humidity.
 - c. Compatible for use over Portland cement plaster.
 2. Setting-Type Joint Compounds, Finish Coat: USG Sheetrock, Lightweight "Easy Sand" or approved equal.
 - a. Low shrinkage, chemically setting compounds rated for interior and exterior use.
 - b. Suitable for heavy fills and areas of high humidity.
 - c. Compatible for use over Portland cement plaster.
- G. Texture Finish Materials
1. Ceilings: USG Spray Fine Sand Texture Finish or approved equal.
 2. Walls (Painted Only): USG Spray Fine Sand Texture Finish, or approved equal.
 - a. To match existing, adjacent plaster texture.
 3. Walls, Patching at Existing Plaster: USG Spray Fine Sand Texture Finish, or approved equal.
 - a. To match existing, adjacent plaster texture.
- H. Veneer Plaster Finishes
1. One Coat System: USG Imperial Finish Plaster or approved equal.

PART 3 - EXECUTION

3.01 GYPSUM BOARD

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

3.02 METAL STUDS

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

- D. At curved surfaces, space studs and framing members 8 inches on center maximum.

3.03 ONE HOUR RATED ASSEMBLY

- A. Base layer: 1 inch thick gypsum board
 - 1. Vertical edges inserted into "H" section of C-H studs. Free edge of end panels attached to long leg of "J" runners with 1 5/8 inch long Type S heads steel screws spaced not greater than 12 inches on center.
- B. Steel C-H Studs:
 - 1. 24 inch on center, floor to deck. Top and bottom, free edge at adjoining surface, in "J" channel.
- C. Face layer: 5/8 inch Gypsum Board
 - 1. Applied vertically and attached to studs with 1inch Type S steel screws spaced 12inches on center along edges and in the field of the boards.

3.04 CEILING SUSPENSION SYSTEM

- A. Suspend carrying channels with 8-gage hanger wires spaced 48 inches on center, within 6 inches of ends.
- B. Install carrying channels 48 inches on center and within 6 inches of walls. Provide 1 inch clearance between channel ends and abutting walls, partitions.
- C. At splices, interlock flanges, overlap ends 12 inches, and secure with 16-gage double standard tie wire at each end.
- D. Erect furring channels at right angles to carrying channels, spaced 24 inches on center and within 6 inches of walls. Provide 1-inch clearance between channel ends and abutting walls, partitions.
- E. Secure to carrying channels with clips, or, saddle tie with 16-gage double standard tie wire. At splices nest channels at least 8 inches, securely wire tie at each end.
- F. Install additional cross reinforcing to restore lateral stability of suspension system at openings that interrupt carrying or furring channels.
- G. Apply wallboard of maximum practical length with long dimension at right angles to furring channels. Position and stagger end joints over channel web. Fit ends and edges closely, but not forced together.
- H. Fasten board to channels with 1-inch Type S screws spaced 12 inches on center in field of board, along abutting ends, edges.
- I. Comply with UL Design No. D502 requirements at fire rated assembly.

3.05 EXPANSION JOINTS

- A. At Ceilings: 50'-0" on center each way maximum.
- B. At Walls: 30'-0" on center maximum.
- C. Provide at intersections with exposed masonry construction.

3.06 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.

3.07 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.

3.08 JOINT TREATMENT APPLICATION

- A. Mix joint compound in accordance with manufacturer's recommendations.
- B. Apply compound in thin uniform layer to all joints, angles to be reinforced. Apply reinforcing tape centered over joint, seated into compound. Follow immediately with thin skim coat or embed tape. Fold and embed tape in interior angles to provide true angle.
- C. When embedding coat is thoroughly dry, apply second coat of compound, filling board taper flush with surface. Cover tape, feather out slightly beyond tape.
- D. On joints with no taper, cover tape, feather out at least 4 inches on either side of tape.
- E. No second coat is required on interior angles.
- F. When second coat is thoroughly dry, spread finish coat evenly over and extend slightly beyond second coat. Feather to a smooth, uniform finish.
- G. Over taped edges, do not allow finish coat to protrude beyond plane of surface. Apply finish coat to cover tape, taping compound at taped angles to provide true angle. When necessary, sand between coats and follow with final coat to provide smooth surface ready for decoration.
- H. Do not abrade adjacent face-paper surfaces.
- I. Gypsum substrate where located behind dry erase wallcoverings must meet level 4 requirements: All joints and interior angles have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free from tool marks and ridges.

3.09 FINISHING FASTENERS

- A. Apply compound to fastener depressions. Follow with minimum of two additional coats leaving depressions level with surface.

- B. Do not abrade adjacent face-paper surfaces.

3.010 FINISHING BEAD AND TRIM

- A. Apply first coat to beads, trim. Properly feather out from ground to plane of surface. Embed flanges of corner reinforcement with compound.
- B. When embedding coat is thoroughly dry, apply second coat in same manner as first-coat, extending compound slightly beyond onto face of board.
- C. When second coat is thoroughly dry, apply finish coat extending compound slightly beyond second coat, properly feathering from ground to plane of surface. Sand finish coat as necessary to provide a level 4 flat smooth surface, ready for decoration. See specification section 09 72 00, Wall Coverings and provide surface required by manufacturer's recommendation.
- D. Do not abrade adjacent face-paper surfaces.

3.011 PATCHING AT PLASTER

- A. Mix setting-type compound in accordance with manufacturer's recommendations.
- B. Remove unsound and loose plaster.
 - 1. Enlarge cracks and fill with initial application of base coat.
- C. Apply patching compounds in thin uniform layers to all existing plaster damaged by selective demolition.
- D. Apply base coat over existing substrates. Substrates to be free of dust, residue and other contaminants.
- E. When base coat is thoroughly dry, apply second coat of compound, filling area to within 1/8" of adjacent surfaces.
- F. When second coat is thoroughly dry, spread finish coat evenly over and extend slightly beyond second coat and sides of patch.
- G. Do not allow finish coat to protrude beyond plane of existing surfaces. Feather out at sides of patch area.
 - 1. Apply finish coat to completely cover base coat and to provide true angles and smooth surface.
 - 2. When necessary, sand between coats and follow with additional final coats to provide smooth surface.
 - 3. Sand surface smooth and ready for decoration.

3.012 VENEER PLASTER

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

3.013 ACOUSTIC SEALANT

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

3.014 TEXTURE FINISH

- A. Apply texture finish in accord with manufacturer's printed instructions.
- B. Provide uniform texture over entire surface.

3.015 ADJUST AND CLEAN

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

- B. Fill cracks with compound and finish smooth and flush.

END OF SECTION 09 29 00

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

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

1.03 RELATED WORK

- A. Fire Suppression: Division 21.
- B. Heating, Ventilating and Air Conditioning: Division 23.
- C. Electrical: 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 Base.
- B. Resilient Flooring.
- C. Accessories.
- D. Subfloor Preparation.

1.03 RELATED WORK

- A. Selective Structure Demolition: Section 02 41 19.
- B. Carpet (vinyl and metal reducers): Section 09 68 00.

1.04 QUALITY ASSURANCE

- A. Provide each type of resilient flooring and accessories from a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
- B. Installers Qualifications: Installer experienced (minimum of 2 years) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to the product manufacturer.
- C. Materials: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials.
 - 1. Comply with applicable regulations regarding VOC (volatile organic compound) content of adhesives.

1.05 SUBMITTALS

- A. Submit in accordance with the General Conditions of the Contract.
 - 1. Manufacturer's technical data for each type of resilient flooring and accessory.
 - a. Data indicating adhesive and accessories meet VOC requirements.
 - 2. Manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.
 - 3. Submit samples of metal edge strips.
 - 4. Two copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened containers with labels indicating brand names, colors and patterns, and quality designations legible and intact.
- B. Store and protect materials in accordance with manufacturer's recommendations.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65 degrees F and maximum temperature of 90 degrees F in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Subsequently, maintain minimum temperature of 55 degrees F in areas where work is completed.
- B. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.
- C. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
- D. Do not install resilient flooring over concrete slabs until they have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's recommended bond and moisture test.
- E. Close areas to traffic and to other work until flooring is firmly set. Tile shall have 72 hours with no traffic.
- F. Where solvent based adhesives are used, provide safety sparkproof fans when natural ventilation is not adequate.

1.08 WARRANTY

- A. Provide current, detailed manufacturer's warranty for each flooring product as applicable including limited wear, defect and conductivity.
- B. Provide manufacturer's standard one-year 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. 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.

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.

PART 2 - PRODUCTS

2.01 RESILIENT FLOOR

- A. Johnsonite is used as the basis of design. Armstrong, or approved equal.
- B. RF-1 Product:
 - 1. Style Name/Number: Johnsonite, Microtone, HNSP-LB8 Vortex. Confirm color with architect.
 - 2. Hammered Texture Speckled Rubber Flooring Tile
 - 3. Passes ASTM F1344 Standard Specification for Rubber Floor Tile
 - 4. Manufactured from a homogeneous composition of 100% synthetic rubber
 - 5. Thickness; 0.080" (2mm)
 - 6. Nominal Dimensions: 24"x24"
 - 7. ASTM F 1514 Standard Test Method for Measuring Heat Stability by Color Change: $\Delta \Sigma \leq 8$
 - 8. ASTM D 2240 Standard Test Method for Rubber Property—Durometer Hardness: Not less than 85 Shore A
 - 9. ASTM D 3389 Standard Test Method for Coated Fabrics Abrasion Resistance: < 1.00 gram weight loss
 - 10. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring: Exceeds Federal Standards and A.D.A. requirements for slip-resistant.
 - 11. ASTM F 970, Standard Test Method for Static Load Limit – passes at 250 PSI.
 - 12. ASTM E 648, Standard Test method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source – Class 1.

2.02 RESILIENT WALL BASE

- A. General: Rubber, cove base, top set, roll stock.
 - 1. Height: 6" where required to match existing adjacent base.
 - 2. Colors: Armstrong 61 Graphite Grey and Johnsonite 40 Black. Confirm with architect.
- B. Manufacturers: Armstrong (colors to be selected from manufacturers' full range) or approved equal by:
 - 1. Flexco.
 - 2. Freudenberg Building Systems, Nora.
 - 3. Johnsonite.
 - 4. Roppe.

2.03 ACCESSORIES

- A. Adhesives: As recommended by Johnsonite to meet site conditions.
 - 1. Rubber Floor Tile
 - a. Johnsonite #965 Flooring and Tread Adhesive
 - b. Johnsonite #975 Two-Part Urethane Adhesive
 - c. Johnsonite #996 Two-Part Epoxy Adhesive
 - d. Refer to manufacturer's installation instructions
- B. Adhesive for Wall Base: W.W. Henry "595 Cove Base Adhesive", zero-VOCs; W.F. Taylor "2035 Cove Base Adhesive" or "2040 Premium Cove Base Adhesive", GreenGuard certified; PL Adhesives & Sealants "Cove Base Adhesive"; Bostik Findley, Durabond "D-740 Multipurpose Wall Adhesive".
 - 1. Low-VOC type: VOC content less than 100 g/l.
- C. Concrete Slab Primer: Non-staining, low-VOC type, equal to W.F. Taylor Co. "Envirotec Healthguard" #2006, as approved by flooring and underlayment manufacturers.

- D. Patching, Leveling, Underlayments: The leveling materials must be portland cement based and provide a minimum 3,500 PSI compressive strength (ASTM C 109) and sufficient bond to existing subfloor surface.
 - 1. Ardex, Laticrete, Duralox, Mapei, or equivalent, approved by flooring manufacturer.
 - 2. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation as recommended by flooring manufacturer.
- E. Metal Edge Strip: Similar to Ceramic Tile Company CTC1132CTA.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The subfloor must be prepped to meet meets the requirements as described in the manufacturer's installation instructions.
 - 1. Rough up smooth epoxy surfaces to accommodate resilient flooring manufacturer's installation requirements.
- B. A clean non-burnished concrete surface free from any paint, wax, oil, grease, and film forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds is required. The surface should not have any alkaline salts, laitance, mold, mildew, residual adhesive, chemical adhesive removers or anything that may prevent appropriate products bonding to it. If not then the general contractor should provide the mechanical means to remove them. This could be dustless diamond grinding (DiamaBrush), bead-blast or similar with a suitable HEPA vacuum attachment. Review and comply with all relevant local, state and federal regulations.
- C. Clean out and fill or repair any dormant saw cuts and cracks with an appropriate product following the manufacturers written usage instructions. For any expansion (moving) joints, use an industry standard expansion joint assembly.
- D. When required, use a leveler following the manufacturers written instructions. The surface should be free of dust, solvents, paint, wax, varnish, oil, grease, asphalt, old adhesives, and other extraneous materials that may interfere with the bond. These should be completely removed by mechanical means only. Dustless diamond grinding or bead blasting are the preferred method to remove contaminates and bond breakers, as it also helps to level the concrete.
- E. Perform mat bond tests in each major area (1 per ~1,000 sq. ft.) This should consist of the proposed subfloor preparation, mitigation and leveling or smoothing products. Do not proceed with installation until all the results of the bond test are acceptable.
- F. Prime the subfloor prior to using a suitable leveler, as approved by the resilient flooring manufacturer.
- G. Vacuum floors immediately prior to installing the flooring to remove all loose particles. If required, only use water based sweeping compounds. Do not use any wax or oil based compounds that leave behind a residue that may interfere with the adhesive bond.
- H. Perform moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well as to ascertain presence of curing compound. Do not use curing compounds on concrete subfloors.
- I. Do not allow resilient flooring work to proceed until subfloor surfaces are satisfactory. Indicate adverse conditions of any type by letter.

3.02 PREPARATION

- A. Comply with ASTM F 710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring, and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.
 - 1. Concrete floors with steel troweled (slick) finish shall be properly roughened (sanded) to ensure suitable adhesion.
 - 2. Concrete floors with curing, hardening and/or breaking compounds shall be abraded with mechanical methods only to remove compounds.
 - a. Do not use chemicals for removal.
 - b. Do not use wax or oil based sweeping compounds.
- B. Sand or grind subfloors to remove mortar, paint, other surface irregularities.
- C. Where filling, patching, leveling is required of thickness exceeding 1/8-inch apply latex type underlayment in two or more applications. Apply compound in accordance with manufacturer's printed instructions.
- D. Remove all debris, sand, and other materials which would result in lack of adhesion and/or star cracking.

3.03 INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient tile flooring.
- B. Resilient Rubber Floor Tile:
 - a. Install with Johnsonite adhesive specified for the site conditions and follow adhesive label for proper use.
 - b. Do not Quarter Turn tile.
 - c. Roll the flooring in both directions using a 100 pound three-section roller.
- C. Install resilient flooring, including but not limited to the following, in accordance with the manufacturer's installation instructions.
 - 1. Do not mix manufacturing batches of a color within the same area.
 - 2. Do not install resilient flooring over building expansion joints.
 - 3. Do not install defective or damaged resilient flooring.
 - 4. Layout resilient flooring to provide ~equal size at perimeter. Adjust layout as necessary to reduce the amount of resilient flooring which is cut to less than half full width.
 - 5. Lay resilient flooring with arrows in the same direction (excluding borders).
 - 6. Install resilient flooring without voids at seams. Lay seams together without stress.
 - 7. Cut/scribe resilient flooring neatly at perimeter and obstructions.
 - 8. Extend resilient flooring into reveals, closets, and similar openings.
 - 9. Remove excess adhesive immediately.
- D. Install reducer strips at exposed edges.

3.04 WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required.
- B. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Cut no shorter than full wall length.

- C. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
 - 1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - 2. Adhesive shall cover a minimum of 90 percent of ribbed back of base.
 - 3. Leave 1/4 inch uncovered space at top edge of base to prevent oozing.
 - 4. Roll base firmly, roll back toward starting point.

3.05 CLEANING

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - a. Remove adhesive and other blemishes from exposed surfaces.
 - b. Sweep and vacuum surfaces thoroughly.
 - c. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. No traffic for 24 hours after installation.
- E. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.
- F. Wait 72 hours after installation before performing initial cleaning.

3.06 PROTECTION

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

END OF SECTION 09 65 00

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

- g. Weight: 20 oz tufted weight
- h. Dye Method: 100% solution dyed
- i. Fiber: eco solution q nylon
- j. Protective treatment: ssp shaw soil protection
- k. Or approved equal.

B. Characteristics: All carpet shall be same mill run throughout.

2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining pressure sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 - 1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when calculated according to 40CFR 59, Subpart D (EPA Method 24).
- C. Transitional Mouldings:
 - 1. Carpet to Resilient Floor:
 - a. Johnsonite Adapter, CTA-XX-A or approved equal.
 - 1) Height: confirm with selected products. 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. At 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

SECTION 09 69 00
ACCESS FLOORING

PART 1 - GENERAL

1.1 Related Documents

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

1.2 Section Includes

- A. Work of this section includes, but is not limited to: access floor panel system, floor coverings, ramps, handrails understructure and various electrical, data and communication accessories and cutouts in floor panels.
- B. Critical Environment Cleaning

1.3 Related Sections

- A. Concrete sealer shall be compatible with pedestal adhesive, see Division 9.
- B. See Division 26: Grounding and Bonding for Electrical Systems for connection to ground of access flooring understructure and moisture detection system.

1.4 References

- A. CISCA (Ceilings & Interior Systems Construction Association) - "Recommended Test Procedures for Access Floors" shall be used as a guideline when presenting load performance product information.

1.5 Quality Assurance

- A. Performance Certification Product tests shall be witnessed and certified by independent engineering and testing laboratory based in the U.S. with a minimum of five years experience testing access floor components in accordance CISCA "Recommended Test Procedures for Access Floors".
- B. Installer Qualifications: Installer who is approved by the access flooring manufacturer for installation of the type of access flooring being installed.
 - 1. Data Clean Corporation contact: Randall Miller, 224.220.9338, rmiller@dataclean.com
 - 2. Or approved equal
- C. Fabrication and install access flooring to comply with NFPA 75 requirements for raised flooring.

1.6 Country-of-Origin and Product Marking

- A. Access floor materials shall comply with the provisions outlined in FAR Subpart 25.2 – Buy American Act – Construction Materials.
- B. Floor panels shall be permanently marked with manufacturer's name, product identification, manufacturing date and country-of-origin. Removable Product ID stickers are not acceptable.

1.7 Performance Requirements

- A. Design Load: Panel supported on actual understructure system shall be capable of supporting a point load of 1000 lbs. applied on a one square inch area at any location on the panel without experiencing permanent set in excess of 0.010 inches as defined by CISCA. The loading method used to determine design (allowable) load shall be in conformance with CISCA Concentrated Load test method but with panel tested on actual understructure instead of steel blocks.
- B. Safety Factor: Panel supported on actual understructure system shall withstand a point load of no less than (2) two times its design load rating on a one square inch area anywhere on the panel without failure when tested in accordance with CISCA A/F, Section 2, "Ultimate Loading". Failure is defined as the point at which the system will no longer accept the load.
- C. Ultimate Load: Panel supported on actual understructure system shall be capable of supporting a point load of at least 2000 lbs. applied through a load indenter on a one square inch area at any location on the panel without

failure (i.e. minimum safety factor if 2) when tested in accordance with CISCA A/F, Section 2, "Ultimate Loading".

- D. Rolling Load: Panel supported on actual understructure system shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches when tested in accordance with CISCA A/F Section 3, "Rolling Loads". Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.

CISCA Wheel 1: Size: 3" dia x 1 13/16" wide Load: 800 lbs. Passes: 10

CISCA Wheel 2*: Size: (A) 6" dia x 2" wide Load: 600 lbs. Passes: 10,000

(B) 10" dia. X 4" wide

**Note: For loads up to 1500 lbs., specify Wheel 2 (A). For loads greater than 1500 lbs., specify Wheel 2 (B).*

- E. Impact Load: Panel and supporting understructure (the system) shall be capable of supporting an impact load of 150 lbs. dropped from a height of 36 inches onto a one square inch area (using a round or square indenter) at any location on the panel when tested in accordance with CISCA A/F, Section 8, "Drop Impact Load Test".
- F. Panel Drop Test: Panel shall be capable of being dropped face up onto to a concrete slab from a height of 36", after which it shall continue to meet all load performance requirements as previously defined.
- G. Panel Cutout: Panel with an 8" diameter interior cutout supported on actual understructure shall be capable of maintaining its design load strength with a minimum safety factor of 2 anywhere on the panel without the use of additional supports.
- H. Flammability: System shall meet *Class A* Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.
- I. Combustibility: All components of the access floor system shall qualify as non-combustible by demonstrating compliance with requirements of ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.
- J. Recycled Content: Panel and understructure system shall be required to have a minimum post-consumer recycled content of 18% and a minimum total recycled content of 49%.
- K. Axial Load: Pedestal support assembly shall provide a 6000 lb. axial load without permanent deformation when tested in accordance with CISCA A/F, Section 5, "Pedestal Axial Load Test".
- L. Overturning Moment: Pedestal support assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated concrete surface when tested in accordance with CISCA A/F, Section 6, "Pedestal Overturning Moment Test".
- M. Stringer Concentrated Load: Stringer shall be capable of withstanding a concentrated load of 450 lbs. placed in its midspan on a one square inch area using a round or square indenter without exceeding a permanent set of 0.010" after the load is removed when tested in accordance with CISCA A/F, Section 4, "Stringer Load Testing".

1.8 Design Requirements:

- A. Access floor system, where indicated on the design documents, shall consist of modular and removable fully encased cementitious filled welded steel panels supported on all four edges by structural steel members which are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern.
- B. Panel shall be easily removed by one person with a suction cup lifting device and shall be interchangeable except where cut for special conditions.
- C. Quantities, finished floor heights (FFH) and location of accessories shall be as specified on the contract drawings.
- D. Ramps and handrails shall be provided and meet minimum clear dimensions indicated on drawings and provide a fully compliant installation meeting current requirements by ICC/ANSI A117.1 and International Building Code. Both ramps indicated on drawings are to meet all accessibility requirements.

1.9 Delivery, Storage and Handling

- A. Deliver access flooring components in original, unopened packages, clearly labeled with manufacturer's name and item description.
- B. Handle and store packages in a manner which avoids overloading building structure.
- C. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20% to 80%. All floor panels shall be stored at ambient temperature between 50° to 90° F for at least 24 hours before installation begins. All areas of installation shall be enclosed and maintained at ambient temperature between 50° to 90° F and at relative humidity levels between 20% to 80%, and shall remain within these environmental limits throughout occupancy.

1.10 Submittals

- A. Shop drawings with complete layout of access flooring system including ramps with field verified dimensions. Include details of handrail attachment and direction for removal of section where noted for maintenance access. Provide sections with notes on fasteners, materials, edge conditions, accessories and understructure. Indicate cutouts in floor panels and coordinate with all trades including workpoint and coordinated location within the containment isle.
- B. Detail sheets, for each proposed product type, which provide the necessary information to describe the product and its performance.
- C. Test reports, certified by an independent testing laboratory with a minimum of five years experience testing access floor components in accordance with CISCA Recommended Test Procedures, certifying that component parts perform as specified.
- D. Manufacturer's installation instructions and guidelines.
- E. Manufacturer's Owner Manual outlining recommended care and maintenance procedures.
- F. Warranty.
- G. For each type of flooring and exposed finish indicated submit samples in the form of manufacturer's sample.

1.11 Extra Materials

- A. Furnish extra materials that match products installed, packaged with protective covering protected for storage and identified with labels clearly describing contents.
 - 1. Standard field panels: no less than 2% or 10 panels with pedestals and stringers. One perforated panel of each type.

PART 2 - PRODUCTS

2.1 Manufacturers

- A. Access floor system shall be as manufactured by Tate Access Floors, Inc. and shall consist of ConCore® 1000 access floor panel supported by a bolted stringer understructure system.
 - 1. Approved equal by ASM Modular Systems, Inc.
 - 2. Or approved equal
- B. Access floor manufacture shall be ISO9001: 2000 certified demonstrating it has a robust and well documented quality management system with continuous improvement goals and strategies.
- C. Access floor manufacturer's facilities shall be ISO14001:2004 certified demonstrating that they maintain an environmental management system.
- D. Access floor manufacturer's facilities shall be OHSAS 18001:2007 certified demonstrating that they maintain an Occupational Health and Safety Management system.

2.2 Support Components

Pedestals:

- A. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater. Zinc electroplating shall be prohibited on all pedestal components, including head plate, threaded rod, adjustment nut, pedestal tube, base plate, and all fasteners.

- B. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
- C. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
- D. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 7" or greater and Types 1A, 2B and 3B square tube bases only). Note: This prevents the assembly from inadvertently losing its leveling adjustment when panels are removed from the installation during use.
- E. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.

Stringers:

- A. Stringers shall support each edge of panel.
- B. Steel stringer shall have conductive galvanized coating. Zinc electroplating shall be prohibited on stringers and stringer fasteners.
- C. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.
- D. Stringer grid shall be 4' stringers in a basketweave configuration ensuring maximum lateral stability in all directions. (Also available in 2' x 4' and 2' x 2' grid patterns)

2.3 Panel Components

Floor Panels:

- A. Panels shall consist of a top steel sheet welded to a formed steel bottom pan filled internally with a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.
- B. Floor panels shall be protected from corrosion by electro-deposited epoxy paint. The use of zinc electroplating shall be prohibited.
- C. Cementitious fill material shall be totally encased within the steel welded shell except where cut for special conditions. Note: This greatly reduces the potential for dust in the environment from exposed cement materials.
- D. Perforated Airflow Panels: Perforated steel airflow panels designed for static loads of [800] [1000] lbs. shall be interchangeable with standard field panels and shall have 25% open surface area with the following air distribution capability:
 - 1. Panel without damper: 746 cfm at 0.1-inch of H₂O (static pressure).
 - 2. Panel with damper at 100% open position: 515 cfm at 0.1-inch of H₂O (static pressure).
- E. Perforated Directional Airflow Panels: Perforated steel airflow panels designed for static loads of [800] [1000] lbs. shall be interchangeable with standard field panels and shall have 25% open surface area with the following air distribution capability without a damper: 765 cfm at 0.1-inch of H₂O (static pressure). The panel shall be equipped with directional vanes for angular air flow across the entire face of a typical 78" high IT rack, providing a rack Total Air Capture (TAC) index of 93%. Perforated panels shall have the following load bearing capacities:
 - 1. Design Load: Panel supported on actual understructure shall be capable of supporting a safe working or design load of [800] [1000] lbs. placed on a one square inch area, using a round or square indenter, at any location on the panel without yielding.
 - 2. Safety Factor: (2) Times Design Load
 - 3. Impact load: 150 lbs.
- F. Grate Airflow Panels: Die cast aluminum grate panels designed for static and rolling loads shall be interchangeable with standard field panels. Grate panels shall have 56% open area with the following air

distribution capability without a damper: 2096 cfm at 0.1-inch of H₂O (static pressure). Grate panels shall have the following load bearing capacities:

1. Design Load: Panel supported on actual understructure shall be capable of supporting a safe working or design load of 1000 lbs. placed on a one square inch area, using a round or square indenter, at any location on the panel without yielding.
2. Safety Factor: (2) Times Design Load
3. Rolling Load: Grate panel and supporting understructure shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches. Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.

Wheel 1: Size: 3" dia x 1 13/16" wide Load: 1000 lbs. Passes: 10

Wheel 2: Size: 6" dia x 2" wide Load: 800 lbs. Passes: 10,000

4. Impact load: 100 lbs.

G. Directional Airflow Panels: Welded steel airflow panel designed for static and rolling loads shall be interchangeable with standard field panels. Directional airflow panels shall have 68% open area with the following air distribution capability without a damper: 2594 CFM at 0.1-inch of H₂O (static pressure). The panel shall be equipped with directional vanes equipped with pressure equalizing perforation for even flow and also produces an angular air flow across the entire face of a typical 78" high IT rack, providing a rack Total Air Capture (TAC) index of 93%. Directional airflow panels shall have the following load bearing capacities, and shall be installed with all four perimeter edges fully supported on a steel roll formed stringer:

1. Design Load: Directional airflow panel supported on actual understructure shall be capable of supporting a safe working or design load of 2500 lbs. placed on a one square inch area, using a round or square indenter, at any location on the panel without yielding.
2. Safety Factor: (2) two Times Design Load
3. Rolling Load: Directional airflow panel supported on actual understructure shall be capable of withstanding the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches. Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.

Wheel 1: 3" dia x 1 13/16" wide Load: 2000 lbs. Passes: 10

Wheel 2: 10" dia x 4" wide Load: 2000 lbs. Passes: 10,000

4. Impact Load: 200 lbs.

2.4 Accessories

A. Air sealing grommet shall be installed in the interior or on the edge of a factory placed cutout located in the one of the two following position in the panel.

OPTION A (Interior Cutout)

1. 4.075" from the left edge of the panel
2. 7.375" from the top and bottom edge of the panel
 - a) The cutout in the panel shall measure 6.75"x9.25" and shall be a punched penetration, saw cutting is not acceptable
 - b) The cutout location shall allow the air sealing grommet to be located in such a way that regardless of rack position or overall dimensions, that the unit will be position beneath the rack allowing for cable penetrations to enter the rack footprint.

OPTION B (Perimeter Edge Cutout)

1. The flange shall align with the left edge of the panel
2. 7.75" from the top edge and bottom edge of the panel

- a) The cutout in the panel shall measure 7.875"x9.25" and shall be a punched penetration, saw cutting is not acceptable.
- B. Provide manufacturer's standard steps, ramps, fascia plate, perimeter support, and grommets where indicated on the contract drawings.
- C. Provide 2 panel lifting devices.
- D. When applicable provide manufacturer's standard underfloor air systems components (including, grilles, diffusers and perforated floor panels) where indicated on the contract drawings.
- E. Service cutouts: Fabricate cutouts in floor panels to accommodate cable penetrations, service outlets and other penetrations. Provide reinforcement or additional support as needed. Field verify and coordinate all cutouts. Fit with manufacturer's standard grommet or plastic molding with tapered top flange.
- F. Provide vertical closures (fascia) where underfloor cavity is not enclosed by abutting walls. Provide manufacturer's standard metal closure plates with finish selected from manufacturer's full range by architect.
- G. Ramps: Manufacturer's standard ramp construction with width and slope indicated not steeper than 1:12 with non-slip raised disc runner or vinyl floor covering. Flooring to be selected by architect from manufacturer's full range.

2.5 Finishes

- A. Provide factory-applied floor coverings laminated by manufacturer to top of floor panels. Type, color and pattern shall be selected by architect from manufacturer's full range.
- B. High-pressure laminate floor covering shall meet requirements of NEMA LD3, and shall conform with Grade HDM (1/16"/ 1.5mm).
- C. High-pressure laminate floor coverings shall have an edge condition that is integral to the tile. Separate edge trim pieces are not acceptable.
- D. Surface to Ground Resistance of Standard High Pressure Laminate Anti-Static Covering: Average test values shall be within the range of 1,000,000 ohms (1.0×10^6) to 20,000 megaohms (2.0×10^{10} ohms), as determined by testing in accordance with the test method for conductive flooring specified in Chapter 3 of NFPA 99, but modified to place one electrode on the floor surface and to attach one electrode to the understructure. Resistance shall be tested at 500 volts.

2.6 Fabrication Tolerances

- A. Floor panel flatness measured on a diagonal: +/- 0.035"
- B. Floor panel flatness measured along edges: +/- 0.025"
- C. Floor panel width or length of required size: +/- 0.010"
- D. Floor panel squareness tolerance: +/- 0.015"

PART 3 – EXECUTION

3.1 Preparation

- A. Examine structural subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until structural floor surfaces are level, clean, and dry as completed by others.
- B. Concrete sealers, if used, shall be identified and proven to be compatible with pedestal adhesive. Verify that adhesive achieves bond to slab before commencing work.
- C. Verify dimensions on contract drawings, including level of interfaces including abutting floor, ledges and doorsills.
- D. The General Contractor shall provide clear access, dry subfloor area free of dust, construction debris and other trades throughout installation of access floor system.
- E. Area to receive and store access floor materials shall be enclosed and maintained at ambient temperatures between 35° to 95° F and relative humidity levels between 20 to 80%. At least 24 hrs. before installation

begins, all floor panels shall be stored at ambient temperatures between 50° to 90° F and relative humidity levels between 20% to 80% and shall remain within these environmental limits throughout occupancy.

3.2 Installation

- A. Pedestal locations shall be established from approved shop drawings so that mechanical and electrical work can be installed without interfering with pedestal installation.
- B. Coordinate location of mechanical and electrical work in under-floor cavity to prevent interference with access flooring pedestals.
- C. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system. All traffic on access floor shall be controlled by access floor installer. No traffic but that of access floor installers shall be permitted on any floor area for 24 hours to allow the pedestal adhesive to set. Access floor panels shall not be removed by other trades for 72 hours after their installation.
- D. Floor system and accessories shall be installed under the supervision of the manufacturer's authorized representative and according to manufacturer's recommendations.
- E. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.
- F. Access floor installer shall keep the subfloor broom clean as installation progresses.
- G. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system where required.
- H. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls, and cutouts.
- I. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.
- J. Finished floor shall be level, not varying more than 0.062" in 10 feet or 0.125" overall.
- K. Inspect system prior to application of floor covering and replace any floor panels that are cracked, broken and structurally damaged and do not comply with specified requirements.
- L. Acceptance: General contractor shall accept floor in whole or in part prior to allowing use by other trades.
- M. Install accessories according to Manufacturer's recommendations.

3.3 Critical Environment Cleaning

- A. Provide critical environmental cleaning at all areas with new raised floors and areas of existing raised floor in the area of work within the dust protection.
- B. Underfloor Plenum: HEPA vacuum raised floor surface to remove loose particulate prior to removing floor tiles to HEPA vacuum subfloor. HEPA vacuum subfloor slab. HEPA vacuum and wipe clean stringers, pedestal heads and large mechanical components.
- C. Equipment and Environment: HEPA vacuum, damp wipe and spot scrub of racks, stand-alone equipment, CRACs, overhead cable trays prior to Owner migration.
- D. Floor Surfaces: HEPA vacuum all floor surfaces and areas beneath racks. Damp mop per manufacturer's recommendation.

End of Section 09 69 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 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.

- 1 2. If manufacturer to be used is different from that of color chips furnished, prepare and submit
2 two approximately 6 inch square, properly labeled samples of each color and sheen required
3 on properly prepared paint-out cards or hardboard.
4
- 5 3. Prepare and repaint an area of each designated interior surface to requirements specified
6 herein, with specified paint or coating showing selected color, gloss/sheen, texture and
7 workmanship to MPI Repainting Manual standards for review and approval by Owner and
8 A/E. When approved, interior surface shall become acceptable standard of finish quality and
9 workmanship for similar on-site repainting work.
10

11 1.05 QUALITY ASSURANCE
12

- 13 A. Master Painters Institute (MPI) Standards:
14 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products
15 List."
16
17 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting
18 Specification Manual" for products and paint systems indicated.
19 a. For areas to be renovated, comply with requirements in "MPI Maintenance
20 Repainting Manual".
21

22 1.06 DELIVERY, STORAGE AND HANDLING
23

- 24 A. Do not deliver materials to site until having received all written approvals of submitted information
25 and samples.
26
27 B. Deliver materials to job site in original, new and unopened packages and containers bearing
28 manufacturer's name and label.
29
30 C. Store materials not in actual use in tightly covered containers.
31
32 D. Take all precautions to ensure that workers and work areas are adequately protected from fire
33 hazards and health hazards resulting from handling, mixing and application of paints.
34
35 E. Remove rags and waste from storage areas daily.
36

37 1.07 PROJECT CONDITIONS
38

- 39 A. Apply water-base paints only when temperatures of surfaces to be painted and surrounding air
40 temperatures are between 50 and 95 degrees F.
41
42 B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air
43 temperatures are between 45 degrees F. and 95 degrees F.
44
45 C. Do not apply paint when relative humidity exceeds 85%; at temperatures less than 5 degrees F.
46 above the dew point; or to damp or wet surfaces.
47

48 1.08 SEQUENCING AND SCHEDULING
49

- 50 A. Schedule cleaning and painting so that contaminants from cleaning process will not fall onto
51 newly-painted surfaces.
52

53 1.09 EXTRA MATERIALS
54

1 A. Furnish extra materials described below that are from same production run (batch mix) as materials
2 applied and that are packaged for storage and identified with labels describing contents.

3
4 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color
5 applied.

6
7 1.010 ENVIRONMENTAL REQUIREMENTS

8
9 A. Low-Emitting Materials, Field applied Paints and Coatings: Interior paints and coatings applied on-
10 site must meet the limitations and restrictions concerning chemical components set by the following
11 standards:

12 1. Topcoat Paints, Green Seal Standard GS-11, Paints: First Edition, May 20, 1993.

13 2. Anti-Corrosive and Anti-Rust Paints: Green Seal Standard GS-03, Anti-Corrosive Paints",
14 Second Edition, January 7, 1997. For applications on ferrous metal substrates.

15 3. "All Other Architectural Coatings, Primers and Undercoats: South Coast Air Quality
16 Management District (SCAQMD) Rule #1113, Architectural Coatings", rules in effect on
17 January 1, 2004.

18
19 PART 2 - PRODUCTS

20
21 2.01 MANUFACTURERS

22
23 A. AFM Safecoat.

24
25 B. Benjamin Moore & Co.

26
27 C. Cabot.

28
29 D. ICI/Dulux.

30
31 E. PPG Architectural Finishes, Inc.

32
33 F. Sherwin Williams Company.

34
35 G. U-C Coatings Corp.

36
37 H. Target Coatings

38
39 I. Diamond Vogel Paint

40
41 J. Or approved equal.

42
43 2.02 MATERIALS

44
45 A. Use the materials of the same manufacturer for each system.

46
47 B. Sherwin Williams systems are called out in the system schedules to establish quality and dry mil
48 thickness of finished installation for all systems. A different manufacturer may be used for color
49 selection. Any manufacturer noted above may be used as long as quality and color requirements are
50 met.

51
52 1. Proprietary names used to designate colors or materials are not intended to imply that
53 products of named manufacturers are required to exclusion of equivalent products of other
54 manufacturers.

55

1 C. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint
2 materials manufacturers.

3
4 D. Material Compatibility:

- 5
6 1. Provide materials for use within each paint system that are compatible with one another and
7 substrates indicated, under conditions of service and application as demonstrated by
8 manufacturer, based on testing and field experience.
9
10 2. For each coat in a paint system, provide products recommended in writing by manufacturers
11 of topcoat for use in paint system and on substrate indicated.
12

13 E. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply
14 with the following limits for VOC content, exclusive of colorants added to a tint base, when
15 calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical
16 restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or
17 finishing shop:
18

- 19 1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
20 2. Non-flat Paints and Coatings: VOC content of not more than 150 g/L.
21 3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight
22 of total aromatic compounds (hydrocarbon compounds containing one or more benzene
23 rings).
24 4. Restricted Components: Paints and coatings shall not contain any of the following:
25
26 a. Acrolein.
27 b. Acrylonitrile.
28 c. Antimony.
29 d. Benzene.
30 e. Butyl benzyl phthalate.
31 f. Cadmium.
32 g. Di (2-ethylhexyl) phthalate.
33 h. Di-n-butyl phthalate.
34 i. Di-n-octyl phthalate.
35 j. 1,2-dichlorobenzene.
36 k. Diethyl phthalate.
37 l. Dimethyl phthalate.
38 m. Ethylbenzene.
39 n. Formaldehyde.
40 o. Hexavalent chromium.
41 p. Isophorone.
42 q. Lead.
43 r. Mercury.
44 s. Methyl ethyl ketone.
45 t. Methyl isobutyl ketone.
46 u. Methylene chloride.
47 v. Naphthalene.
48 w. Toluene (methylbenzene).
49 x. 1,1,1-trichloroethane.
50 y. Vinyl chloride.
51

52 F. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
53

54 2.03 PRIMERS/SEALERS
55

- 1 A. Interior Latex Primer/Sealer: MPI #50.
2
3 2.04 METAL PRIMERS
4
5 A. Rust-Inhibitive Primer (Water Based): MPI #107.
6
7 2.05 LATEX PAINTS
8
9 A. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).
10
11 B. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).
12
13 C. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).
14
15 D. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).
16
17 2.06 EQUIPMENT
18
19 A. Provide all brushes, rollers, ladders, scaffolding, and other equipment of any kind to properly
20 execute each type of work.
21
22 PART 3 - EXECUTION
23
24 3.01 EXAMINATION
25
26 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for
27 maximum moisture content and other conditions affecting performance of work.
28
29 B. Maximum Moisture Content of Substrates:
30 1. Gypsum Board: 12 percent.
31 2. Concrete: Must be cured a minimum of 45 days.
32
33 C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes
34 and primers.
35
36 D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are
37 dry.
38 1. Beginning coating application constitutes Contractor's acceptance of substrates and
39 conditions.
40
41 3.02 PREPARATION
42
43 A. Perform preparation and cleaning procedures in accord with paint manufacturer's instructions and as
44 specified for each particular substrate condition.
45 1. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and
46 similar items in place and not to be finish-painted, or provide surface-applied protection prior
47 to surface preparation and painting operations.
48 a. After completing painting operations, use workers skilled in the trades involved to
49 reinstall items that were removed. Remove surface-applied protection if any.
50 b. Do not paint over labels of independent testing agencies or equipment name,
51 identification, performance rating, or nomenclature plates.
52
53 2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and
54 grease prior to mechanical cleaning.

- 1 3. Remove dirt, rust, scale, moisture, scuffed surfaces, or conditions otherwise detrimental to
2 formation of a durable paint film.
- 3
- 4 B. Gypsum Board: Fill minor irregularities with patching material and sand to smooth level surfaces
5 taking care not to raise nap of paper.
- 6
- 7 C. Existing Ferrous Metal
- 8
- 9 1. Spot remove failed, damaged or rough existing paint to bare metal by means of stripping as
10 indicated above. If existing metal surface is not smooth, sand or wire brush.
- 11 a. Sand edges of existing paint to a feather edge.
- 12 2. Remove dirt and grease with mineral spirits or solvent recommended by paint manufacturer
13 and clean cloths.
- 14
- 15 D. Ferrous Metal
- 16
- 17 1. Remove dirt and grease with mineral spirits or solvent recommended by paint manufacturer
18 and clean cloths.
- 19 2. Where not galvanized, shop coat of primer will exist on surface. If prime coat is not smooth,
20 sand to bare metal and re-prime.
- 21
- 22 3.03 APPLICATION
- 23
- 24 A. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse
25 humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- 26
- 27 B. Do work under adequate illumination and dust-free conditions.
- 28
- 29 C. Apply paints according to manufacturer's written instructions.
- 30 1. Use applicators and techniques suited for paint and substrate indicated.
- 31 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
32 Before final installation, paint surfaces behind permanently fixed equipment or furniture with
33 prime coat only.
- 34 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged
35 items to match exposed surfaces.
- 36
- 37 D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same
38 material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient
39 difference in shade of undercoats to distinguish each separate coat.
- 40
- 41 E. Materials
- 42 1. Do not open containers until required for use.
- 43 2. Stir materials thoroughly and keep at uniform consistency during application.
- 44
- 45 F. Coats
- 46 1. Number specified is minimum.
- 47 2. Touch up suction spots between coats.
- 48 3. If undercoats or other conditions show through topcoat, apply additional coats until cured
49 film has a uniform paint finish, color, and appearance.
- 50 4. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush
51 marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines
52 and color breaks.
- 53 5. Refinish surfaces affected by refitting work.
- 54
- 55 3.04 COLOR SEPARATION

- 1
2 A. An average of one or two wall colors will be used per room. Ceilings generally will be a different
3 color than walls. Finished closets will usually be same as adjoining rooms.
4
5 B. Job painted metal items such as diffusers, grilles and registers will generally be same color as
6 adjacent surface.
7
8 C. Hardwood generally will be the same color stain throughout.
9
- 10 3.05 CLEANING
- 11
12 A. During the progress of this work, remove from the site all discarded paint materials, rubbish, cans
13 and rags at the end of each work day.
14
15 B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove
16 spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise
17 damage finished surfaces.
18
- 19 3.06 PROTECTION
- 20
21 A. Protect work of other trades, whether to be painted or not, against damage by painting and finishing
22 work. Correct damage by cleaning, repairing or replacing.
23
24 B. Provide "wet paint" signs to protect newly-painted finishes. Remove temporary protective
25 wrappings, after completion of painting operations.
26
27 C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted
28 surfaces.
29
- 30 3.07 SCHEDULE OF INTERIOR WORK
- 31
32 A. In addition to obvious surfaces, the following do not require painting or finishing.
33 1. Do not include painting when factory-finishing or installer-finishing is specified for such
34 items as (but not limited to) acoustic materials, finished mechanical and electrical equipment
35 including light fixtures and distribution cabinets.
36 2. Painting is not required on surfaces such as walls or ceilings in concealed areas and generally
37 inaccessible areas, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
38 3. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and
39 similar finished materials will not require finish painting, unless otherwise indicated.
40 4. Moving parts of operating units, mechanical and electrical parts, such as valve and damper
41 operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish
42 painting, unless otherwise indicated.
43 5. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory
44 Mutual, or any equipment identification, performance rating, name or nomenclature plate.
45 6. N/A indicates system not applicable to this Project.
46
47 B. Walls and Ceilings
48 1. Paint all rooms. Paint patched walls from 90 degree corner and patched ceilings complete.
49 2. Do not apply next coat until previous is thoroughly dry.
50 3. Provide final coat which is solid and even in color, free from runs, laps, sags, brush marks,
51 air bubbles and excessive roller stipple and worked into crevices, joints and similar areas.
52
53 C. Electrical Panel Box Covers and Doors
54 1. Remove, paint and reinstall after paint is dry.
55

1 SECTION 10 14 00
2
3 INFORMATION SPECIALTIES
4

5 PART 1: 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 as though
10 repeated herein.
11

12 1.02 WORK INCLUDED
13

- 14 A. Pressure Sensitive Graphic Window Films.
15

16 1.03 SUBMITTALS
17

- 18 A. Submit in accordance with the General Conditions of the Contract.
19 1. Manufacturer's Literature: Materials description, colors, and application instructions.
20

21 1.04 DELIVERY, STORAGE AND HANDLING
22

- 23 A. Handle and store to prevent damage and soiling.
24

25 PART 2: PRODUCTS
26

27 2.01 PRESSURE SENSITIVE GRAPHIC WINDOW FILMS
28

- 29 A. Vinyl glass film, 50 micron
30 1. Basis of Design: 3M 7725-314 Dusted Crystal
31 2. Color and pattern to be selected by A/E
32 3. Clear release liner.
33 4. Pressure sensitive adhesive.
34 5. To give appearance of etched glass as chosen by A/E.
35 Application locations as indicated on drawings, See A700.
36
37 B. Manufacturers.
38 1. Metamark Signviny
39 2. 3M
40 3. Or approved equal.
41

42 PART 3: EXECUTION
43

44 3.01 INSTALLATION
45

- 46 A. Comply with manufacturer's specifications and recommendations for the installation.
47

48 3.02 CLEANING
49

- 50 A. Clean surfaces of identifying devices, dedication plaque and surrounding surfaces.
51
52

END OF SECTION 10 14 00

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SECTION 10 44 13

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 WORK INCLUDED

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

1.03 RELATED SECTIONS

- A. Gypsum Board: Section 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 1017 semirecessed, 2-1/2 inch return, C70.
- B. Larsen's Gemini G2409-R3 semirecessed, 2-1/2 inch return, comparable door.
- C. Potter - Roemer Buena 7122 semirecessed, 2-1/2 inch return comparable door.

2.03 MOUNTING FX-3

- A. Surface Mounted Kidde Fire Extinguisher Hanger, model to accommodate extinguisher. Or approved equal manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

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

END OF SECTION 10 44 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 1.10 DELIVERY, STORAGE, AND HANDLING
- 22 A. Storage and Protection
- 23 1. Do not deliver items to the project until all concrete, masonry, plaster, painting and other wet
- 24 work has been completed and is dry.
- 25 2. Deliver shades to project in protective packaging, uniquely labeled to identify each shade for each
- 26 opening. Schedule delivery to prevent delays to completion of work, but to minimize on-site
- 27 storage time.
- 28 3. Store materials in a dry, secure place. Protect from weather, surface contaminants, corrosion,
- 29 construction traffic, and all other potential damage.
- 30 B. PROJECT / SITE CONDITIONS
- 31 1. Shade system shall not be installed until the building is operating in ambient temperature and
- 32 humidity ranges consistent with that intended for buildings ultimate use.
- 33 C. SCHEDULING
- 34 1. Do not fabricate shades without obtaining field dimensions for each opening.
- 35 2. Coordinate construction of surrounding conditions to allow for timely field dimension verification.
- 36 3. Manufacturer’s standard lead times apply. Reference submittal and schedule accordingly for
- 37 project timeline.
- 38 D. EXTRA MATERIALS
- 39 1. The manufacturer shall make available to the end user a method of ordering new equipment for
- 40 expansions, replacement, or parts to be used as spares twenty-four hours a day, seven days a week.
- 41 2. The manufacturer must make available new or remanufactured parts for a minimum period of ten
- 42 years from the final date of commissioning.
- 43 PART 2 - PRODUCTS
- 44 1.01 MANUFACTURERS
- 45 A. To establish the standard of quality, design, and function desired, drawings and specifications are

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

6 1.02 GENERAL SYSTEM SPECIFICATIONS

7 A. OPERATION

- 8 1. Manual.

9 1.03 ROLLER SHADES

10 A. MOUNTING

- 11 1. Roller shade brackets shall allow for symmetrical light gaps as small as $\frac{3}{4}$ " 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 $\pm 3/8$ " 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. Beige/Pearl Gray. 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. Exterior Openings: Open Office 325, Office 327, Office 328, Office 329, Office 333, Office 334,
9 Office 335. Field verify existing openings, typical approximate rough opening is 6'-2" high.

10

11

12

END OF SECTION 12 24 13

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

2
3 **REGULATORY REQUIREMENTS**

4 Refer to Division 01 of the Project Manual.

5
6 **Codes and Standards:**

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

9
10 Materials and workmanship shall comply with applicable Codes, local ordinances, industry standards and
11 utility regulations. In case of differences between Codes, and the Contract Documents, the most stringent
12 shall govern.

13
14 **Non-Compliance:**

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

17
18 **Permits, Inspections, and Fees:**

19 Request and obtain permits and inspection appointments.

20
21 Provide fees and charges for approvals, reviews, or other inspections.

22
23 Include copies of the certificates in the Operating and Maintenance Instructions.

24
25 Fees and charges assessed by local utilities for water or other services shall be included in the bid.

26
27 **REFERENCE STANDARDS**

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

29

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

55

1 **QUALITY ASSURANCE**

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

3

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

6

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

11

12 **ABBREVIATIONS AND SYMBOLS**

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

14

15 The following are additional abbreviations used in the Specifications:

16

17	A/E	Architect/Engineer
18	GC	General Contractor
19	PC	Plumbing Contractor
20	FPC	Fire Protection Contractor
21	HC	Heating Ventilating and Air Conditioning Contractor
22	EC	Electrical Contractor

23

24 **DEFINITIONS**

25 **Furnish:**

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

27

28 **Install:**

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

32

33 **Provide:**

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

35

36 **COORDINATION**

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

42

43 **CONTINUITY OF EXISTING SERVICES**

44 Refer to Division 01 of the Project Manual.

45

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

50

51 **PROTECTION OF FINISHED SURFACES**

52 Refer to Division 01, of the Project Manual.

53

1 **SEALING AND FIRESTOPPING**

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

6
7 **OFF SITE STORAGE**

8 Refer to Division 01 of the Project Manual.

9
10 **SUBMITTALS**

11 Refer to Division 01, of the Project Manual.

12
13 Submit shop drawings with space for approval stamps of GC and A/E.

14
15 Refer to Division 01, of the Project Manual.

16
17 Not more than two weeks after award of contract but before any shop drawings are submitted, contractor to
18 submit the following fire protection system data sheet. List piping material types, ASTM number, schedule
19 or pressure class, joint type, manufacturer and model number where appropriate. List valves, specialties and
20 equipment with manufacturer and model number. The approved fire protection system data sheet(s) will be
21 made available to the Owners Project Representative for their use on this project.

22
23 **FIRE PROTECTION SYSTEM DATA SHEET**

24	Item	Pipe Service/Sizes	Manufacturer/Model No.	Remarks
25	Pipe			
26	Fittings			
27	Hangers & Supports			
28	Sprinkler Heads			
29	Valves			
30	Specialty Valves			
31	Pipe Specialties			
32	Fire Protection Specialties			
33	Fire Protection Equipment			

34
35 Shop drawing submittals are to be bound in a three ring binder, labeled, contain the project manual cover
36 page and a material index list page showing item designation, manufacturer and additional items supplied
37 with the installation. Submit for all equipment and systems as indicated in the respective specification
38 sections, marking each submittal with that specification section number. Mark general catalog sheets and
39 drawings to indicate specific items being submitted and proper identification of equipment by name and/or
40 number, as indicated in the contract documents. Include wiring diagrams of electrically powered equipment.

41
42 Submittals shall be sent to the local Fire Chief or Fire Marshal for review prior to the Architect/Engineer.
43 Include copy of approval letter in submission to Architect/Engineer.

44
45 Submit plans indicating water supply location and size, piping layout and size, sprinkler locations and type,
46 hanger locations and type, equipment locations and type, valve locations and type, occupancy classes,
47 hydraulic reference points, design areas and discharge densities.

48
49 Submit hydraulic calculations for water supply and sprinkler systems. Include summary sheet and detailed
50 work sheets. Describe characteristics of water supply and location of effective point used in calculations.
51 Include graph illustration of water supply, hose demand, sprinkler demand.

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

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

5

6 **Firestop Systems:**

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

12

13 **OPERATING AND MAINTENANCE INSTRUCTIONS**

14 Refer to Division 01 of the Project Manual.

15

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

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

30

31 **RECORD DRAWINGS**

32 Refer to Division 01 of the Project Manual.

33

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

37

38 **TRAINING OF OWNER PERSONNEL**

39 Instruct Owner's personnel in the proper operation, maintenance and testing of systems and equipment
40 provided as part of this project. Include not less than 4 hours of instruction, using the Operating and
41 Maintenance manuals and record drawings during this instruction. Videotape all instructions and provide
42 Owner with copy.

43

44 **TESTING**

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

46

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

49

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

53

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

3
4 Upon completion of the work, records and certifications approving testing requirements shall be submitted.

5
6 Defective work or material shall be replaced or repaired, and the test repeated. Repairs shall be made with
7 new materials.

8
9 **CLEANING**

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

12
13 Foreign matter shall be blown out, or flushed out, of pipes, tanks, pumps, strainers, motors, devices,
14 switches, and panels.

15
16 Identification plates on equipment shall be free of paint and dirt.

17
18 The Contractor shall leave his portion of the work ready for operation.

19
20 **WARRANTY**

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

22
23 The Contractor shall keep the system in good working order at no expense, unless defects are clearly the
24 result of improper or abnormal usage.

25
26 The Contractor shall submit to the A/E upon request for acceptance of the work, written certification that
27 the entire system has been installed and adjusted for operation in accordance with the Contract Documents.

28
29
30 **PART 2 - PRODUCTS**

31
32 **ELECTRICAL REQUIREMENTS**

33 **General:**

34 Work shall conform to requirements of Division 26.

35
36 Provide wiring diagrams.

37
38 **ACCESS PANELS AND DOORS**

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

42
43 Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12
44 inch by 12 inch for hand access and 24 inch by 24 inch for body access.

45
46 Panels shall be Milcor brand or equivalent.

47
48 Panels shall include concealed hinges, cam type locking devices, and have frame/border type necessary for
49 particular wall or ceiling construction they are installed. Access panels shall be flush mounted, recessed
50 frame type units. Access panels shall be prime coated steel, able to accept field painting for general
51 applications and stainless steel for use in toilet rooms, shower rooms and similar wet areas.

52
53 Refer to Architectural Room Finish Schedule for wall and ceiling surfaces and finishes.

1 For non-security applications, panel construction shall utilize 16 gauge frame with not less than 18 gauge
2 hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and
3 shall be key locked for public area applications.

4 5 **PIPE PENETRATIONS**

6 Refer to Division 01 requirements as well as the following.

7 8 **Fire, Smoke And Fire/Smoke Rated Surfaces:**

9 3M CP 25N/S or CP 25S/L caulk, 3M FS 195 wrap/strip with restricting collar, 3M CS 195 composite
10 sheet, Pipe Shields Inc. Series F fire barrier kits, Proset Systems fire rated floor and wall penetrations,
11 Insta-Foam Products Insta-Fire Seal Firestop Foam or Dow Corning Fire Stop System.

12
13 All fire stopping systems shall be provided by the same manufacturer.

14
15 UL listed or tested by independent testing laboratory, approved by State and Local Code jurisdictions.

16
17 Use product that has a rating not less than rating of wall or floor being penetrated. Reference architectural
18 drawings for identification of fire and/or smoke rated walls and floors.

19
20 Sleeves in concrete to be Schedule 40 steel pipe with integral water stop unless fire stop material used
21 includes a sleeve that is an integral part of rated assembly.

22
23 Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks,
24 firestop mortar or a combination of these products to provide a UL listed system for each application
25 required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

26 27 **Non-Rated Surfaces:**

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

30
31 In exterior wall openings below grade, use modular mechanical type seal consisting of interlocking
32 synthetic rubber links shaped to continuously fill the annular space between the un-insulated pipe and cored
33 opening or a water-stop type wall sleeve.

34
35 At interior partitions where pipe penetrations are sealed, use Tremco Dymonic, Sika Corp. Sikaflex 1a,
36 Sonneborn Sonolastic NPI, or Mameco Vulken 116 urethane caulk to effectively seal. Use galvanized sheet
37 metal sleeves in hollow wall penetrations.

38 39 **EQUIPMENT, PIPING AND VALVE IDENTIFICATION**

40 **Equipment Labels:**

41 After painting and covering, identify equipment, including pumps, tanks, compressors, and control panels.
42 Locate identification conspicuously.

43
44 Identification of equipment shall be by engraved white letters on a black 1/16 inch thick plastic laminate
45 panel, beveled edges, screw mounting, permanently attached to the equipment.

46
47 Minimum size:

48 3/4" x 2 1/2" with 3/8" letters.

49
50 Manufacturers:

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

53 54 **Pipe Identification:**

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

1
2 Printed labels identifying the fluid conveyed and direction of flow shall be attached to pipes in accessible
3 locations, at intervals not to exceed 20 feet, not less than once in each room, at each branch, adjacent to
4 each access door or panel, at each valve and where exposed piping passes through walls and floors.
5

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

6
7 **Manufacturers:**
8 EMED Co., Seton Name Plate Company, or W. H. Brady.

9
10 **Stencils:**
11 Not less than 1 inch high letters/numbers for marking pipe and equipment.

12
13 **Valve Tags:**
14 Identify each valve by means of 1½" diameter brass tag fastened to body of valve with copper or brass
15 chain. Identification number shall be stamped thereon with letters a minimum of ½" high. System
16 identification abbreviation shall be stamped with letters a minimum of ¼" high.

17
18 The following prefixes shall be used:
19 SPKR - Sprinklers

20
21 **Manufacturers:**
22 EMED Co., Seton Name Plate Company, or W. H. Brady.

23
24 **Valve Charts:**
25 Furnish three charts listing each valve. Two charts shall be delivered to A/E. An additional chart shall be
26 framed behind glass and hung in location selected by Owner. Charts shall show the following:

27
28 Valve number Size
29 Manufacturer Type of valve
30 Type of service Location

31
32 Furnish typewritten chart indicating equipment or areas served by each numbered valve and incorporate in
33 Operating and Maintenance Manuals.

34 **EQUIPMENT ACCESSORIES**

35 Provide equipment accessories, connections, and incidental items.
36 Install piping connecting to pumps and other equipment without strain at the piping connection. If requested
37 by the A/E, remove the bolts in these flanged connections, or disconnect piping, to demonstrate that piping
38 has been properly connected.
39

40 **GAUGES**

41 **Acceptable Manufacturers:**
42 American, Taylor, Trerice, U.S. Gauge, Weiss, or Winters Instruments.

43 **Pressure Gauges:**

44
45 Industrial quality with phosphor bronze bourdon tube, brass socket, 3½ inch dial face, bronze bushed
46 movement, aluminum case with black finish, white background, black figures readable by person standing
47 on floor.
48
49

1 Ranges shall be as follows:
2

3 Fire Protection Water:
4 0 to 200 psig
5
6

7 **PART 3 - EXECUTION**

8 9 **GENERAL**

10 **Coordination Of Work:**

11 Review the complete set of Drawings and Specifications and report discrepancies to the A/E. Obtain
12 written instructions for changes necessary. Coordinate with each trade prior to beginning installation and
13 make provisions to avoid interferences. Changes required caused by neglect to coordinate shall be made
14 without expense to the project.
15

16 Piping shall not be located above electrical panels.
17

18 **Anchor Bolts, Sleeves, and Supports:**

19 These items required for the Work shall be furnished by the FPC for proper installation of his work. They
20 shall be installed (except as otherwise specified) by the trade furnishing and installing the material in which
21 they are to be located. Location of anchor bolts, sleeves, inserts and supports shall be directed by the trade
22 requiring them. Expense resulting from the improper location or installation of anchor bolts, sleeves, inserts
23 and supports shall be paid for by the Contractor for the trade with responsibility for directing their proper
24 location.
25

26 **Adjustments In Locations:**

27 Locations of pipes and equipment, shall be adjusted to accommodate the work interferences anticipated and
28 encountered. Prior to fabrication determine the exact route and location of each pipe (subject to A/E's
29 approval).
30

31 **Right Of Way:**

32 New lines which pitch shall have the right-of-way over those which do not pitch. For example: Gravity
33 drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-
34 way over lines whose elevations can be changed. Notify A/E and other trades of conflicts.
35

36 Offsets, transitions and changes in direction of electrical raceways, pipes, and ducts shall be made to
37 maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.
38

39 **ASBESTOS ABATEMENT**

40 Asbestos abatement shall be by the Owner. If asbestos is encountered, the Owner shall be notified.
41 Asbestos materials shall be removed prior to continuing work.
42

43 **DEMOLITION**

44 Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to
45 be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition
46 to minimize the amount of contamination of the occupied space. Where pipe is removed and not
47 reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with
48 the Owner to minimize disruption to the existing building occupants.
49

50 All pipe, sprinklers, equipment, wiring, associated conduit and similar items demolished, abandoned, or
51 deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All
52 designated equipment is to be turned over to the Owner for his use at a place and time he so designates.
53 Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing
54 before work began.
55

1 **OPENINGS, CUTTING AND PATCHING**

2 Refer to Division 01 requirements.

3
4 The FPC may perform core drilling for openings in existing walls and floors at the direction of the A/E.
5 Framed openings shall be by the GC.

6
7 **BUILDING ACCESS**

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

11
12 **EQUIPMENT ACCESS**

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

17
18 Accessible ceilings, (i.e. lay-in ceilings) do not require access panels. Provide color coded thumb tacks or
19 screws, depending on surface, for use in accessible ceilings.

20
21 **COORDINATION OF WORK**

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

25
26 Any work that is not coordinated and that interferes with other contractor's work shall be removed or
27 relocated at the installing contractor's expense.

28
29 Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

30
31 Offsets, transitions and changes in direction of electrical raceways, pipes and ducts shall be made as
32 required whether or not indicated on the Drawings.

33
34 Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions.
35 If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

36
37 **PIPING INSTALLATION**

38 **Installation Arrangement:**

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

42
43 **Connections Different From Those Shown:**

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

47
48 Upon approval of the revisions, make changes in piping, ductwork, supports, insulation, wiring, and
49 panelboards. Provide additional motors, controllers, valves, fittings and other additional equipment
50 required for the proper operation of the system resulting from the selection of equipment, including required
51 changes in affected trades. The Contractor shall be responsible for the proper location of rough-in and
52 connections by other trades.

53
54 Changes shall be made at no increase in the Contract amount or additional cost to the other trades.

1 **SLEEVES**

2 Provide galvanized sheet metal sleeves for fire rated pipe penetrations through interior and exterior walls to
3 provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction
4 and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration
5 through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing
6 poured concrete walls where penetration is core drilled, pipe sleeve is not required. Grout holes directly
7 around steel pipe.
8

9 In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 3/4 inch above the
10 adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert
11 schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe
12 penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve
13 that will transfer weight to existing floor structure.
14

15 **PIPE PENETRATIONS**

16 **General:**

17 Coordinate location of building surface penetrations with appropriate contractors. Furnish sleeves, inserts,
18 and devices to be built into structure to contractor performing Work. Prepare Shop Drawings for approval
19 for penetrations of structural elements, including floor slabs, shear walls, and bearing walls. Do not allow
20 penetrations to be made until Shop Drawings are approved.
21

22 **Fire Rated Surfaces:**

23 Install products in accordance with the manufacturer's instructions where pipe penetrates a fire rated
24 surface. When pipe is insulated, use product that maintains integrity of insulation and vapor barrier. Where
25 sleeve must be installed in existing floor, grout area around sleeve to restore floor integrity. In wet area
26 floor penetration, top surface of penetration to be 2 inches above adjacent floor with additional height
27 obtained by means of concrete pad poured integral with floor.
28

29 **Non-Rated Surfaces:**

30 Install escutcheons or floor/ceiling plates where pipe penetrates non-fire rated surfaces in occupied spaces.
31 Size units to accommodate insulation, where applicable. Escutcheons are not required when insulation
32 completely covers wall opening and insulation end is trimmed in a neat manner. Occupied spaces for this
33 Paragraph include only those rooms with finished ceilings and penetration occurs below ceiling.
34

35 In exterior wall openings below grade, place water-stop type wall sleeve before concrete pour or core drill
36 opening after pour. Assemble rubber links to proper size for pipe and tighten in place in accordance with
37 manufacturer's instructions.
38

39 Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply
40 sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or
41 insulation is completely blocked.
42

43 Completely seal (or caulk) around pipe penetrations through non-rated, smoke tight corridor walls in
44 healthcare facilities. Refer to architectural drawings for additional information.
45

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

- 47 • IT rooms with chemical fire suppression system.
48

49 **ESCUTCHEON PLATES**

50 Provide plates on pipes passing through finished floors, walls and ceilings, with outside diameter to cover
51 sleeve opening and inside diameter to fit snugly around pipe. Set tight to building surface. Escutcheon
52 plates shall be chromium plated metal.
53

54 **PAINTING**

55 Refer to Division 09.

1
2
3
4
5
6
7
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9
10
11
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13
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17
18
19
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21
22
23

IDENTIFICATION

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

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

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

Identify valves with signs per NFPA rulings.

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

END OF SECTION

1
2 **DESCRIPTION**

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

6
7 Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord
8 of any truss or joist.

9
10 Fasteners depending on soft lead for holding power or requiring explosive powder actuation will not be
11 accepted.

12
13 Support apparatus and material under all conditions of operation, variations in installed and operating
14 weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

15
16 **DESIGN CRITERIA**

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

19
20 Materials and application of pipe hangers and supports shall be in accordance with NFPA rulings and be
21 UL/FM listed and approved.

22
23 **SUBMITTALS**

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

25
26 Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe
27 size and type of service. Provide details on the working drawings submitted for approval with all pertinent
28 information listed.

29
30
31 **PART 2 - PRODUCTS**

32
33 **MANUFACTURERS**

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

36
37 **STRUCTURAL SUPPORTS**

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

41
42 **PIPE HANGERS AND SUPPORTS**

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

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

46
47 Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Grinnell
48 260.

49
50 **Hangers for Pipe Sizes 4" Through 8":**

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

1 Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Grinnell
2 260.

3

4 **Multiple or Trapeze Hangers:**

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

7

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

10

11 **Wall Support:**

12 Carbon steel welded bracket with hanger. B-Line 3060 Series, Grinnell 190 Series.

13 Steel channels with pipe clamps.

14

15 **Vertical Support:**

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

18

19 **Floor Support:**

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

21

22 **Copper Pipe Supports:**

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

28

29 **PIPE HANGER RODS**

30 **Steel Hanger Rods:**

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

33

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

35

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.

36

37 **BEAM CLAMPS**

38 MSS SP-69 Types 19 & 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick
39 with a retaining ring and threaded rod of 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup
40 point set screw. B-Line B3036L/B3034, Grinnell 86/92.

41

42 MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable
43 for rod sizes to 1-1/2 inch diameter. B-Line B3054, Grinnell 228.

44

45 **CONCRETE INSERTS**

46 **Poured in Place:**

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

50

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

3
4 **Drilled Fasteners:**

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

7
8 **ANCHORS**

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

10
11 **EQUIPMENT SUPPORT**

12 Support equipment plumb, rigid, and true to line. Examine Drawings, and manufacturer's data to determine
13 how equipment and piping are to be supported, mounted, or suspended. Provide rods, bolts, inserts, pipe
14 stands, brackets and accessories for proper support.

15
16 **Equipment Stands:**

17 Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three
18 coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive
19 atmosphere coatings.

20
21
22 **PART 3 - EXECUTION**

23
24 **INSTALLATION**

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

26
27 Secure pipe in place to prevent vibration, maintain proper slope and provide for expansion and contraction.

28
29 Design supports of strength and rigidity to suit loading, service, and manner which do not unduly stress the
30 building construction. Where support is from concrete construction, take care not to weaken concrete or
31 penetrate waterproofing. Fasten supports and hangers to building steel framing wherever practical. Do not
32 use another pipe for support. Do not use perforated iron, chain or wire as hangers.

33
34 Use inserts for suspending hangers from reinforced concrete slabs wherever practical. Where inserts are not
35 practical, provide channels or angles from which to suspend hangers/supports. Fasten structural steel to
36 concrete with expansion bolts.

37
38 Provide expansion anchors in concrete slabs for installation of threaded support rods.

39
40 Provide hangers capable of vertical adjustment after piping is erected. Do not pierce ductwork with hanger
41 rods. On threaded support rods and bolts, weld nuts to rods, peen threads, or provide double set of nuts
42 with lock washers to prevent loosening. Use beam clamps for attaching hangers to structural steel.

43
44 Coordinate hanger and support installation to properly group piping of all trades.

45
46 Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural
47 shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used,
48 pipe supporting devices made specifically for use with the channels may be substituted for the specified
49 supporting devices provided that similar types are used and all data is submitted for prior approval.

50
51 Perform welding in accordance with standards of the American Welding Society.

52
53 **HANGER AND SUPPORT SPACING**

54 Support horizontal piping per NFPA 13.

- 1
 2 Provide vertical support at each floor level as the pipe passes through the floor. For piping that does not
 3 pass through the floor, provide adequate support to stabilize the vertical portion of the piping.
 4
 5 Provide galvanized steel supports for steel piping.
 6
 7 Provide CPVC dipped hangers or provide Unistrut "Uni-Cushion" vinyl strip at galvanized hangers for
 8 copper lines.
 9
 10 Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze
 11 hangers.
 12
 13 Support riser piping independently of connected horizontal piping.
 14
 15 Adjust hangers to obtain the slope specified in the piping section of these specifications.
 16
 17 Space hangers for pipe as follows:
 18

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"

- 19
 20 Unsupported length from the last hanger and an end sprinkler shall be as follows:
 21

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

22
 23 **RISER CLAMPS**

24 Support vertical piping with clamps secured to the piping and resting on the building structure or secured to
 25 the building structure below at each floor. Use method of securing the vertical risers to the building
 26 structure below in stairwell locations.
 27

28 **ANCHORS**

29 Install where indicated on the drawings and details. Where not specifically indicated, install anchors at ends
 30 of principal pipe runs and at intermediate points in pipe runs. Make provisions for preset of anchors as
 31 required to accommodate both expansion and contraction of piping.
 32
 33
 34

END OF SECTION

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SECTION 21 10 00
WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

SCOPE

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

PART 1 – GENERAL

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

PART 2 – PRODUCTS

- Pipe
- Fittings
- Joints
- Sprinklers
- Miscellaneous Equipment

PART 3 – EXECUTION

- Installation
- General
- Gauges
- Sprinklers
- Testing

RELATED WORK

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

- Section 21 05 00 – Common Work Results for Fire-Suppression
- Section 21 05 29 – Hangers and Supports for Fire-Suppression Piping and Equipment
- Section 21 22 00 – Clean-Agent Fire-Extinguishing System

REFERENCE STANDARDS

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

Local and State Codes and Regulations.

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

- NFPA 13 - Sprinkler Systems
- NFPA 75 - Protection of Information Technology Equipment

Local Fire Department requirements.

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

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 all components for a complete wet pipe automatic sprinkler system for remodeled spaces
7 as shown on drawings, and all necessary components to make a complete, operational, and
8 approved system.
- 9 • Provide complete, approved automatic sprinkler system(s) to give fire suppression coverage to all
10 areas/rooms, including electrical rooms, elevator shafts, and elevator equipment rooms.

11
12 This portion of the project is design build. The contractor shall follow the specifications for type of
13 systems, materials and equipment to use.

14
15 The contractor will be the Engineer of Record and shall prepare, seal and submit drawings and calculations
16 as required to obtain approval and building permit from State, Insurance Company, and local authority.
17 Submit drawings and calculations to all authorities as required.

18
19 These documents, along with local regulations and codes, will be the basis for the Fire Protection design
20 and construction.

21
22 The contractor shall calculate, size and select all systems as defined by the documents. This shall include
23 coordination with other trade contractors including wiring of flow switch(es) and supervisory switch(es).
24 All calculations, sizes, and system layouts shall include provisions for future additions.

25
26 **SYSTEM DESCRIPTION**

27 Connect to the combination fire protection/domestic water supply service provided by the PC. Provide a
28 cross connection control device and include a shutoff valve and flow switch on main riser. Provide a wet
29 pipe automatic sprinkler riser, cross main, and branch piping to connect to sprinkler heads in all spaces of
30 the addition. Provide a fire department connection (coordinate location with local Fire Marshall). See Fire
31 Protection Drawings for location of main, riser, and Fire Department Connection.

32
33 Provide pre-fabricated modular pipe covering system to conceal pipes which would otherwise be exposed
34 along cell fronts, in dormitory, and other areas where exposed piping is required to be concealed for
35 security.

36
37 **DESIGN STANDARDS**

38 Sprinkler system shall be designed and hydraulically calculated by the Contractor to provide densities as
39 listed below. Hydraulically calculate the system based on Light Hazard Occupancy in general areas.

40
41 **Design system for the most hydraulically remote area based on the following:**

Space Type/ Location:	Occupancy Classification	Density (GPM/Ft ²)	Area (Ft. ²)	Hose (GPM)	Max Vel. (Ft./Sec.)	Duration (Min.)
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

42
43
44 **Available water supply data for system design is as follows:**

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

1 Contractor shall submit seven (7) copies of hydraulic calculations with shop drawings on standard form
2 specified in NFPA No. 13, Chapter 7, Sections 7-2 through 7-3.5 inclusive and Figures A-7-3.3 and A-7-
3 3.4.

4 5 **QUALITY ASSURANCE**

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

7
8 Fire protection system components shall be rated for a minimum operating pressure of 175 psig.

9
10 To assure uniformity and compatibility of piping components in grooved piping systems, all grooved
11 products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied from the
12 same manufacturer as the grooved components.

13 14 **SUBMITTALS**

15 **Shop Drawings:**

16 Submit shop drawings of all fire sprinkler system components.

17 18 **Plans:**

19 Submit contractor-prepared plans/drawings.

20
21 Submit per NFPA 13; installation plans, working plans, shop drawings, hydraulic calculations, and
22 manufacturer's data on devices, etc., indicating by model and number to be used for review and approval.
23 Contractor shall obtain the necessary insurance underwriters, State and Local Fire Department approvals
24 prior to submitting shop drawings. Include copy of approval letter in submission to Architect/Engineer.

25
26 Prepare drawings at minimum scale of 1/8" per foot for plans and 1/4" per foot or larger for details. Show
27 all piping, lighting, equipment, ductwork, sprinklers, hangers, roof construction and occupancy of each
28 area, including ceiling and roof heights.

29
30 Installation shall be coordinated with the latest architectural, structural, mechanical, plumbing and electrical
31 drawings.

32
33 Contractor shall submit drawings to Engineer which have been reviewed and stamped "approved" by the
34 authority having jurisdiction. No work shall commence until all approvals have been obtained. Allow
35 sufficient time in the construction schedule for the approvals.

36 37 **As-Built Drawings:**

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

40
41 Furnish the Architect one (1) reproducible print of corrected shop drawings, including plans, revised to
42 show "as built" conditions.

43 44 45 **PART 2 - PRODUCTS**

46 47 **PIPE**

48 **Wet Systems:**

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

50
51 Sprinkler piping shall be schedule 40 threaded up to and including 2" in size.

52
53 Schedule 10 threaded light wall not allowed (2" and under).

54 55 **FITTINGS**

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

1
2 Ductile iron, grooved end, 300 lb/in2 working pressure rating, UL listed or FM approved for automatic
3 sprinkler.

4
5 Ductile or malleable iron, plain end with EPDM gasket, carbon steel bolts or locking lugs UL listed or FM
6 approved for automatic sprinkler, Grinnell "Sock-it".

7
8 Carbon steel, butt-welded, class 150, ASTM A234.

9
10 Carbon steel, Class 150, flanged, ASTM A105.

11
12 Fittings used on galvanized piping shall have galvanized finish.

13 14 **JOINTS**

15 **Iron Pipe:**

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

17
18 Mechanical coupling, EPDM gasket, UL listed or FM approved for automatic sprinkler.

19 20 **Rigid Type:**

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

28 29 **Flexible Type:**

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

34 35 **SPRINKLERS**

36 **Manufacturer:**

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

39 40 **General:**

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

43
44 Select fusible link or glass bulb temperature rating to not exceed maximum ambient temperature rating
45 allowed under normal conditions at installed location. Provide ordinary temperature (165 degree) fusible
46 link or glass bulb type except at skylights, sealed display windows, unventilated attics and roof spaces, over
47 cooking equipment, adjacent to diffusers, unit heaters, uninsulated heating pipes or ducts, mechanical
48 rooms, storage rooms, or where otherwise indicated.

49
50 Provide quantity of spare heads as noted below and 1 wrench for each type of head and each temperature
51 range installed. Provide 6 spare heads per 300 or less installed heads, 12 per 1000 or less and 24 for more
52 than 1000. Provide steel cabinet for storage of heads and wrenches.

53 54 **Types:**

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

1
2 Finished Areas:
3 Chrome plated bronze body quick response pendent, concealed, or side-wall sprinklers with glass bulb heat
4 sensor. Semi-recessed and sidewall sprinklers shall have adjustable recessed escutcheon. Concealed
5 sprinklers shall have adjustable cover plates. Cover plates shall match ceiling color. 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. Plain bronze, upright or pendent open sprinkler for dry system. Design Basis: Victaulic Model
11 V27 or V36.
12

13 **Ratings:**

14 See sprinkler ratings indicated on Sprinkler Schedule on plans. Use higher temperature-rated sprinkler
15 heads in areas near heat sources, elevator equipment rooms, and elevator shafts.
16

17 **MISCELLANEOUS EQUIPMENT**

18 Provide other equipment and accessories, not listed, but required for a complete sprinkler system in
19 accordance with NFPA and FM requirements.
20

21
22 **PART 3 - EXECUTION**
23

24 **INSTALLATION**

25 Install sprinkler system in accordance with requirements of NFPA 13 and local regulations of the fire
26 marshal.
27

28 Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and
29 recommendations. The gasket style and elastomeric material (grade) shall be verified as suitable for the
30 intended service as specified. Gaskets shall be molded and produced by Victaulic. Grooved end shall be
31 clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper
32 gasket sealing.
33

34
35 A Victaulic factory-trained field representative shall provide on-site training for contractor's field personnel
36 in the proper use of grooving tools and installation of grooved piping products. Factory-trained
37 representative shall periodically review the product installation. Contractor shall remove and replace any
38 improperly installed products.
39

40 The sprinkler bulb protector must remain in place until the sprinkler is completely installed and before the
41 system is placed in service. Remove bulb protectors carefully by hand after installation. Do not use any
42 tools to remove bulb protectors.
43

44 **GENERAL**

45 Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of
46 window, doorway, stairway or passageway. Where interferences develop in the field, offset or reroute
47 piping as required to clear such interferences. Coordinate locations of fire protection piping with piping,
48 ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult
49 drawings for exact location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures and grilles
50 before installing piping. All exposed overhead piping shall be installed above the bottom chord of roof
51 joists.
52

53 Maintain piping in clean condition internally during construction.

54
55 Provide clearance for access to valves and piping specialties.
56

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

4
5 Do not install piping within exterior walls.

6
7 Do not route piping above transformers, panelboards, or switchboards, including the required service space
8 for this equipment, unless the piping is serving this equipment.

9
10 **GAUGES**

11 Provide a valved pressure gauge in main sprinkler risers.

12
13 **SPRINKLERS**

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

16
17 Sprinklers shall be centered in all ceiling panels and tiles. A 1” tolerance for sprinkler placement is
18 acceptable.

19
20 **TESTING**

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

22
23 Hydro-statically pressure test the fire sprinkler system piping as required in NFPA 13. Keep records of all
24 testing for submission in Operation and Maintenance Manuals.

25
26
27

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SECTION 21 22 00
CLEAN-AGENT FIRE-EXTINGUISHING SYSTEMS

PART 1 - GENERAL

SCOPE

This specification outlines the requirements for a clean agent fire suppression system utilizing HFC-125 (or equal) as the fire extinguishing agent and with a conventional detection and control system. The work described in this specification includes all engineering, labor, materials, equipment and services necessary, and required, to complete and test the suppression and detection system.

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Requirements
- Quality Assurance
- Operation and Maintenance
- Warranty

PART 2 - PRODUCTS

- System Description and Operation
- Materials and Equipment
- Electrical Requirements
- System and Control Wiring

PART 3 – EXECUTION

- System Inspection and Checkout
- Training Requirements
- Acceptance Tests
- System Inspections

RELATED WORK

- Section 21 05 00 – Common Work Results for Fire-Suppression
- Section 21 10 00 – Water-Based Fire-Suppression Systems
- Section 21 05 29 – Hangers and Supports for Fire-Suppression Piping and Equipment

REFERENCE STANDARDS

The design, equipment, installation, testing and maintenance of the clean agent System shall be in compliance and accordance with the applicable requirements set forth in the latest edition of the following codes, standards, and third party approval agencies:

- NFPA No. 2001 - Clean Agent Fire Extinguishing Systems
- NFPA No. 70 - National Electrical Code
- NFPA No. 72 - National Fire Alarm Code

- Factory Mutual Approval Guide
- Underwriters Laboratory Listings

- Requirements of the Authority Having Jurisdiction (AHJ)

1 **REQUIREMENTS**

2 The clean agent system installation shall be made in accordance with the drawings, specifications and
3 applicable standards. Should a conflict occur between the drawings and specifications, the specifications
4 shall prevail.

5
6 **Exclusions:**

7 The work listed below shall be provided by others, or under other sections of this specification:

- 8 • 120 VAC power supply to the system control panel.
- 9 • Interlock wiring and conduit for shutdown of HVAC, dampers and/or electric power supplies,
10 relays or shunt trip breakers.
- 11 • Connection to local/remote fire alarm systems, listed central alarm station(s).

12
13 **QUALITY ASSURANCE**

14 **Manufacturer:**

15 The manufacturer of the clean agent system hardware and detection components shall have a minimum of
16 10 years experience in the design and manufacture of similar types of suppression systems and who refer to
17 similar installations providing satisfactory service.

18
19 The name of the manufacturer, part numbers and serial numbers shall appear on all major components.

20
21 All devices, components and equipment shall be the products of the same manufacturer.

22
23 All devices, components and equipment shall be new, standard products of the manufacturer's latest design
24 and suitable to perform the functions intended.

25
26 All devices and equipment shall be U.L listed or FM approved.

27
28 Locks for all cabinets shall be keyed alike.

29
30 **Installer:**

31 The installing contractor shall be trained by the supplier to design, install, test and maintain a clean agent
32 system.

33
34 The installing contractor shall employ a Wisconsin Licensed "Designer of Engineering Systems" and a
35 Wisconsin Certified "Master Electrician" experienced in special hazards, design, and installation, who will
36 be responsible for this project.

37
38 The installing contractor shall be an experienced firm regularly engaged in the installation of automatic
39 clean agent, or similar, fire suppression systems in strict accordance with all applicable standards.

40
41 The installing contractor must have a minimum of five (5) years experience in the design, installation and
42 testing of clean agent, or similar, fire suppression systems. A list of systems of a similar nature and scope
43 shall be provided on request.

44
45 The installing contractor shall show evidence that his company carries a minimum \$2,000,000.00 liability
46 and completed operations insurance policy. These limits shall supersede limits required in the general
47 conditions of the specifications.

48
49 The installing contractor shall be an authorized stocking distributor of the clean agent system equipment so
50 that immediate replacement parts are available from inventory.

1 **Submittals:**

2 The installing contractor shall submit the following design information and drawings for approval prior to
3 starting work on this project:

- 4 • Field installation layout drawings having a scale of not less than 1/8"=1'-0" (1:100m) detailing the
5 location of all agent storage tanks, pipe runs including pipe sizes and lengths, control panel(s),
6 detectors, manual pull stations, abort stations, audible and visual alarms, etc.
- 7 • Auxiliary details and information such as maintenance panels, door holders, special sealing
8 requirements and equipment shutdowns.
- 9 • Separate layouts, or drawings, shall be provided for each level, (i.e.; room, underfloor, and above
10 ceiling) and for mechanical and electrical work.
- 11 • A separate layout or drawing, shall show isometric details of agent storage containers, mounting
12 details and proposed pipe runs and sizes.
- 13 • Electrical layout drawings shall show the location of all devices and include point-to-point conduit
14 runs and a description of the method(s) used for detector mounting.
- 15 • Provide an internal control panel wiring diagram which shall include power supply requirements
16 and field wiring termination points.
- 17 • Complete hydraulic flow calculations shall be provided for all engineered Clean Agent systems.
18 The individual sections of pipe to be used, as shown on the isometrics, must be identified and
19 included in the calculation. Total agent discharge time must be shown and detailed by zone.
- 20 • Provide calculations for the battery stand-by power supply taking into consideration the power
21 requirements of all alarms, initiating devices and auxiliary components under full load conditions.
- 22 • A complete sequence of operation shall be submitted detailing all alarm devices, shutdown
23 functions, remote signaling, damper operation, time delay and agent discharge for each zone or
24 system.

25
26 Submit drawings, calculations and system component data sheets for approval to the local Fire Prevention
27 Agency, owners Insurance Underwriter, and all other Authorities Having Jurisdiction before starting
28 installation. Submit approved plans to the Architect/Engineer for record.

29
30 **As-Built Drawings:**

31 Upon completion of each system, the installing contractor shall provide four (4) copies of system "As-Built"
32 drawings to the owner. The drawings shall show actual installation details including all equipment locations
33 (i.e.: control panel(s), agent container(s), detectors, alarms, manuals and aborts, etc.) as well as piping and
34 conduit routing details. Show all room or facilities modifications, including door and/or damper installations
35 completed. One (1) copy of reproducible engineering drawings shall be provided reflecting all actual
36 installation details.

37
38 **OPERATION AND MAINTENANCE**

39 Prior to final acceptance, the installing contractor shall provide complete operation and maintenance
40 instruction manuals, four (4) copies for each system, to the owner. All aspects of system operation and
41 maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written
42 description of the system design, sequence of operation and drawing(s) illustrating control logic and
43 equipment used in the system. Checklists and procedures for emergency situations, troubleshooting
44 techniques, maintenance operations and procedures shall be included in the manual.

45
46 **WARRANTY**

47 All system components furnished, and installed under this contract, shall be guaranteed against defects in
48 design, materials and workmanship for the full warranty period which is standard with the manufacturer, but
49 in no case less than one (1) year from the date of system acceptance.

1 **PART 2 – PRODUCTS**

2
3 **SYSTEM DESCRIPTION AND OPERATION**

4 The system shall be a clean agent system utilizing HFC-125 as the fire extinguishing agent.

5
6 The system shall provide a minimum design concentration of 8.7% (or current NFPA 2001 standards), by
7 volume, in all areas and/or protected spaces, at the minimum anticipated temperature within the protected
8 area. Per NFPA 2001, the system design shall not exceed a maximum exposure limit concentration level of
9 11.5% (or current NFPA 2001 standards), by volume, unless provisions for room evacuation, before agent
10 release, are provided. All personnel should be able to leave the protected space prior to the discharge or at
11 least within 5 minutes of the commencement of discharge.

12
13 The system shall be complete in all ways. It shall include all mechanical and electrical installation, all
14 detection and control equipment, agent storage containers, agent, system actuation equipment, discharge
15 nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary
16 devices and controls, shutdowns, alarm interface, caution/ advisory signs, functional checkout and testing,
17 training and all other operations necessary for a functional U.L. Listed and/or F.M. Approved clean agent
18 system.

19
20 Provide owner with an optional inspection proposal for two (2) inspections during the first year of service.
21 Inspections shall be made at 6 month intervals commencing when the system is first placed into normal
22 service.

23
24 The general contractor shall be responsible for sealing and securing the protected spaces against agent loss
25 and/or leakage during the 10 minute "hold" period.

26
27 The system(s) shall be actuated by a combination of ionization and/or photoelectric detectors installed in
28 accordance with the guidelines stated in NFPA 72.

29
30 Detectors shall be wired in Sequential Detection method of operation, standard Cross-Zoned detection, or
31 single detector release. No other detection / wiring arrangements will be acceptable.

32
33 Automatic operation of each protected area shall be as follows:

- 34
- 35 • Actuation of one (1) detector, within the system, shall:
 - 36 • Illuminate the "ALARM" lamp on the control panel face.
 - 37 • Energize an alarm bell and/or an optional visual indicator.
 - 38 • Transfer sets of 5 Amp rated auxiliary contacts which can perform auxiliary system functions such
39 as:
 - 40 ○ Operate door holder/closures on access doors.
 - 41 ○ Transmit a signal to a fire alarm system.
 - 42 ○ Shutdown HVAC equipment.

43 Actuation of a 2nd detector, within the system, shall:

- 44
- 45 • Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
 - 46 • Energize a pre-discharge horn or horn/strobe device.
 - 47 • Shut down the HVAC system and/or close dampers.
 - 48 • Start time-delay sequence (not to exceed 60 seconds).
 - 49 • System abort sequence is enabled at this time.

50 After completion of the time-delay sequence, the clean agent system shall activate and the following shall
51 occur.

- 52
- 53 • Illuminate a "RELEASE" lamp on the control panel face.
 - 54 • Shutdown of all power to high-voltage equipment.
 - Energize visual indicator(s) outside the hazard in which the discharge occurred.

1
2 The system shall be capable of being actuated by manual discharge devices located at each hazard exit.
3 Operation of a manual device shall duplicate the sequence description above except that the time delay and
4 abort functions SHALL be bypassed. The manual discharge station shall be of the electrical actuation type
5 and shall be supervised at the main control panel.
6
7 **MATERIALS AND EQUIPMENT**
8 **General Requirements:**
9 The clean agent system materials and equipment shall be standard products of the supplier's latest design
10 and suitable to perform the functions intended. When one or more pieces of equipment must perform the
11 same function(s), they shall be duplicates produced by one Manufacturer.
12
13 All devices and equipment shall be U.L. Listed and/or F.M. Approved.
14
15 **Agent Storage and Distribution:**
16 Each system shall have its own supply of clean agent.
17
18 The system design can be modular, central storage, or a combination of both design criteria utilizing a fast
19 acting rupture disc valve. The valve shall contain a scored, non-fragmenting, rupture disc to provide
20 immediate total discharge of the agent.
21
22 Systems shall be designed in accordance with the manufacturer's guidelines.
23
24 Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and
25 fittings required to install the system.
26
27 The clean agent shall be stored in Agent Storage Containers. Containers shall be super-pressurized, with
28 dry Nitrogen, to an operating pressure of 360 psi @ 70° F (25 bar @ 21° C). Containers shall be of high-
29 strength alloy steel construction and conform to NFPA 2001.
30
31 Containers shall be actuated by parallel wired Gas Cartridge Actuators through a Agent Release Module,
32 located at each agent storage container. A maximum of six (6) agent release modules, are supported by a
33 single panel.
34
35 Each container shall have a pressure gauge and low pressure switch to provide visual and electrical
36 supervision of the container pressure. The low pressure switch shall be wired to the control panel to
37 provide an audible and visual "Trouble" alarm in the event the container pressure drops below 288 psi (19
38 bar). The pressure gauge shall be color coded to provide an easy, visual indication of container pressure.
39
40 Each container shall have a pressure relief provision that automatically operated when the internal
41 temperature exceed 150° F (66° C).
42
43 Engineered discharge nozzles shall be provided, within the manufacturer's guidelines, to distribute the agent
44 throughout the protected spaces. The nozzles shall be designed to provide proper agent quantity and
45 distribution.
46
47 Nozzles shall be available in NPT sizes ¼" – 2.0" (8mm- 50mm). Each size shall be available in
48 180° and 360° distribution patterns.
49
50
51
52
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54

1
2 Distribution piping, and fittings, shall be installed in accordance with the manufacturer's requirements,
3 NFPA 2001 and approved piping standards and guidelines. All distribution piping shall be installed by
4 qualified individuals using good, accepted practices and quality procedures. All piping shall be adequately
5 supported and anchored at all directional changes and nozzle locations.

6
7 All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill
8 varnish and cutting oils before assembly.

9
10 All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread ONLY.

11 12 **ELECTRICAL REQUIREMENTS**

13 **Control Panel:**

14 The control system, and its components, shall be UL listed and FM approved for releasing service and be
15 suitable for Deluge/Pre-action sprinkler service.

16
17 The control system shall perform all functions necessary to operate the system detection, actuation and
18 auxiliary functions, as outlined.

19
20 The control system shall be capable of providing 7AH or 40AH battery standby power supplies.

21
22 The control system shall be microprocessor based with hardware and software integration designed to
23 guarantee reliability.

24
25 The control system shall support Cross Zoned, Sequential, Single Detector Release and Manual Release
26 detection/actuation methods.

27
28 The control system shall provide the following capabilities and functions:

- 29 • Three (3) Class B (Style Y) notification appliance circuits rated for 2.0 amps @ 24 VDC.
 - 30 • Up to two (2) Style B initiating device circuits capable of sequential alarm, cross-zone, or single
31 detector release operation with an overall system capacity of 50 detectors maximum.
 - 32 • Three (3) Style B initiating device circuits capable of monitoring closed contact devices.
 - 33 • Optional Class A module that converts all five initiating device circuits to Style D wiring and
34 operation.
 - 35 • Optional Class A module that converts all five output circuits to Style Z (3 NAC, 2 Releasing).
 - 36 • Ten (10) Status LEDs plus alpha-numeric display for troubleshooting: AC normal; alarm; pre-
37 discharge; release; supervisory; trouble; panel silenced; abort; release disabled; and ground fault.
 - 38 • Programmable pre-discharge and discharge timers.
 - 39 • Resettable and continuous auxiliary output power.
 - 40 • Five (5) optional Abort types.
 - 41 • Intelligent Transistor protection to prevent noise spikes and microprocessor failure from
42 inadvertently activating release outputs.
 - 43 • A dedicated Disarm switch for release outputs.
 - 44 • Dedicated alarm and trouble contacts programmable for alarm, trouble, pre-discharge, discharge,
45 abort, supervisory or water flow functions, depending on panel configuration.
 - 46 • Two (3) Form "C" relays, rated at 2 amps, are provided on the panel board. Installation of up to
47 two (2) optional CRM4 Relay Module (P/N 10-2204) will provide up to eight (8) additional 2 amp
48 relays.
 - 49 • Multiple input power source - 120 VAC or 240 VAC.
 - 50 • 4.0 amp @ 24 VDC power supply to operate high current draw horns and strobes.
 - 51 • Available in either Red or Gray finish.
- 52
53
54

1 **Detector Bases:**

2 The detector bases shall be selected according to their operational characteristics and size of base.

3 **Manual Release (Electric):**

4 The electric manual release switch shall be a dual action device which provides a means of manually
5 discharging the clean agent system when used in conjunction with the Control System.

- 6 • The Manual Release switch or Manual Pull station shall be a dual action device requiring two
7 distinct operations to initiate a system actuation.
- 8 • Manual actuation shall bypass the time delay and abort functions, shall cause the system to
9 discharge and shall cause all release and shutdown devices to operate in the same manner as if the
10 system had operated automatically.
- 11 • A Manual Release or Manual Pull switch shall be located at each exit from the protected hazard
12 and shall have an advisory sign provided at each location.

13
14 **Abort Station:**

15 The optional Abort Station shall be the "Dead Man" type and shall be located next to each manual switch.

- 16 • "Locking" or "Keyed" abort stations shall not be permitted.
- 17 • The Abort Station shall be supervised and shall indicate a trouble condition at the Control Panel, if
18 depressed, and no alarm condition exists.
- 19 • The Abort Station shall be located adjacent to each manual station and can be furnished
20 independent from the Manual Release Switch or in combination with a Manual Release Switch.

21
22 **Audible and Visual Alarms:**

23 Alarm audible and visual signal devices shall operate from the Control Panel.

24
25 A Strobe device shall be placed outside, and above, each exit door from the protected space. Provide an
26 advisory sign at each light location.

27
28 **Caution and Advisory Signs:**

29 Provide signs, as required, to comply with NFPA 2001 and the recommendations of the equipment supplier:

- 30 • Entrance sign: One (1) required at each entrance into a protected space.
- 31 • Manual Discharge sign: One (1) required at each manual discharge station.
- 32 • Flashing Light sign: One (1) required at each flashing light over each exit from a protected space.

33
34 **SYSTEM AND CONTROL WIRING**

35 All system wiring shall be furnished and installed by the fire protection contractor.

36
37 All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept
38 separate from all other building wiring.

39
40 All system components shall be securely supported independent of the wiring. Runs of conduit and wiring
41 shall be straight, neatly arranged, properly supported, installed parallel and perpendicular to walls and
42 partitions.

43
44 The sizes of the conductors shall be those specified by the manufacturer. Color coded wire shall be used.
45 All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so
46 noted on the system drawings), and crosses between conductors. Final terminations between the control
47 panel and the system field wiring shall be made under the direct supervision of a factory trained
48 representative.

49
50 All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the
51 National Electrical Code (NEC), Article 725, and Article 760, except as otherwise permitted for limited
52 energy circuits, as described in NFPA 72 -1993 edition. Wiring installation shall meet all local, state,
53 province and/or country codes.

1 The complete system electrical installation, and all auxiliary components, shall be connected to earth
2 ground in accordance with the National Electrical Code.

3 4 5 **PART 3 – EXECUTION**

6 7 **SYSTEM INSPECTION AND CHECKOUT**

8 After the system installation has been completed, the entire system shall be checked out, inspected and
9 functionally tested by qualified, trained personnel, in accordance with the manufacturer's recommended
10 procedures and NFPA standards.

11
12 All containers and distribution piping shall be checked for proper mounting and installation.

13
14 All electrical wiring shall be tested for proper connection, continuity and resistance to earth.

15
16 The complete system shall be functionally tested, in the presence of the owner or his representative, and all
17 functions, including system and equipment interlocks, must be operational at least five (5) days prior to the
18 final acceptance tests.

- 19 • Each detector shall be tested in accordance with the manufacturers recommended procedures, and
20 test values recorded.
- 21 • All system and equipment interlocks, such as door release devices, audible and visual devices,
22 equipment shutdowns, local and remote alarms, etc. shall function as required and designed.
- 23 • Each control panel circuit shall be tested for trouble by inducing a trouble condition into the
24 system shall be tested for trouble by inducing a trouble condition into the system.

25 26 **TRAINING REQUIREMENTS**

27 Prior to final acceptance, the installing contractor shall provide operational training to each shift of the
28 owners personnel. Each training session shall include system Control Panel operation, manual and
29 (optional) abort functions, trouble procedures, supervisory procedures, auxiliary functions and emergency
30 procedures.

31 32 **ACCEPTANCE TESTS**

33 At the time "As-Built" drawings and maintenance/operations manuals are submitted; the installing
34 contractor shall submit a "Test Plan" describing procedures to be used to test the control system(s). The
35 Test Plan shall include a step-by-step description of all tests to be performed and shall indicate the type and
36 location of test apparatus to be employed. The tests shall demonstrate that the operational and installation
37 requirements of this specification have been met. All tests shall be conducted in the presence of the owner
38 and shall not be conducted until the Test Plan has been approved.

39
40 The tests shall demonstrate that the entire control system functions as designed and intended. All circuits
41 shall be tested: automatic actuation, solenoid and manual actuation, HVAC and power shutdowns, audible
42 and visual alarm devices and manual override of abort functions. Supervision of all panel circuits,
43 including AC power and battery power supplies, shall be tested and qualified.

44
45 A room pressurization test shall be conducted, in each protected space, to determine the presence of
46 openings, which would affect the agent system concentration levels. The test(s) shall be conducted using
47 the Retro-Tec Corp. Door Fan system, or equivalent, with integrated computer program. All testing shall be
48 in accordance with NFPA 2001, current edition.

1 If room pressurization testing indicates that openings exist which would result in leakage and/or loss of the
2 extinguishing agent, the installing contractor shall be responsible for coordinating the proper sealing of the
3 protected space(s) by the general contractor or his sub-contractor or agent. The general contractor shall be
4 responsible for adequately sealing all protected space(s) against agent loss or leakage. The installing
5 contractor shall inspect all work to ascertain that the protected space(s) have been adequately and properly
6 sealed.

7
8 THE SUPPRESSION SYSTEM INSTALLING CONTRACTOR AND THE GENERAL
9 CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUCCESS OF THE ROOM
10 PRESSURIZATION TESTS. If the first room pressurization test is not successful, in accordance
11 with these specifications, the installing contractor shall direct the general contractor to determine,
12 and correct, the cause of the test failure. Then the suppression system installing contractor shall
13 conduct one additional room pressurization test, at no additional cost to the owner or general
14 contractor. Additional test required, until a successful test is obtained, will be at the owner or
15 general contractor's expense. Copies of successful test results shall be submitted to the owner for
16 record.

17
18 Upon acceptance by the owner, the completed system(s) shall be placed into service.

19 **SYSTEM INSPECTIONS**

20 The installing contractor shall provide, as an optional contract with the owner, two (2) inspections of each
21 system installed under this contract, during the one-year warranty period. The first inspection shall be at the
22 six month interval, and the second inspection at the 12 month interval, after system acceptance. Inspections
23 shall be conducted in accordance with the manufacturer's guidelines, and the recommendations of NFPA
24 2001.

25
26
27 Documents certifying satisfactory system(s) operation shall be submitted to the owner upon completion of
28 each inspection.

29
30
31 **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
- 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
- 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
- Identification

1 **RELATED WORK**

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

3
4 This section applies to all Division 22 sections of plumbing.

5
6 **REGULATORY REQUIREMENTS**

7 **Codes and Standards:**

8 All plumbing work shall conform to the requirements of Wisconsin Administrative Code SPS 382 and SPS
9 384, Wisconsin Uniform Plumbing Code.

10
11 All materials and workmanship shall comply with applicable Codes, local ordinances, industry standards
12 and utility regulations. In case of differences between such Codes, and the Contract Documents, the most
13 stringent shall govern. Promptly notify the A/E in writing of any such difference.

14
15 **Non-Compliance:**

16 Should the Contractor perform any work that does not comply with the above requirements, without having
17 notified the A/E, he shall bear all costs necessary to correct the deficiencies.

18
19 **Permits, Inspections and Fees:**

20 All required, permits, and inspections shall be requested and obtained by the Contractor.

21
22 All fees and charges for approvals, reviews, or other inspections shall be paid by the Contractor.

23
24 All fees and charges assessed by local utilities for water, sewer, gas or other services shall be included in
25 the bid and shall be paid by the Contractor(s).

26
27 **REFERENCE STANDARDS**

28 Standards cited in the Specifications shall be the most recent editions.

29
30 Abbreviations of standards organizations referenced in this and other sections are as follows:

- 31 ANSI American National Standards Institute
- 32 ASME American Society of Mechanical Engineers
- 33 ASPE American Society of Plumbing Engineers
- 34 ASSE American Society of Sanitary Engineering
- 35 ASTM American Society for Testing and Materials
- 36 AWWA American Water Works Association
- 37 AWS American Welding Society
- 38 CISPI Cast Iron Soil Pipe Institute
- 39 CS Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS
- 40 EPA Environmental Protection Agency
- 41 FS Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
- 42 IAPMO International Association of Plumbing & Mechanical Officials
- 43 IEEE Institute of Electrical and Electronics Engineers
- 44 ISA Instrument Society of America
- 45 MCA Mechanical Contractors Association
- 46 MICA Midwest Insulation Contractors Association
- 47 MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
- 48 NBS National Bureau of Standards
- 49 NEC National Electric Code
- 50 NEMA National Electrical Manufacturers Association
- 51 NFPA National Fire Protection Association
- 52 NSF National Sanitation Foundation
- 53 PDI Plumbing and Drainage Institute
- 54 UL Underwriters Laboratories Inc.

- 1 Standards referenced in this section:
2 ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
3 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
4 UL1479 Fire Tests of Through-Penetration Firestops
5 UL723 Surface Burning Characteristics of Building Materials
6

7 **QUALITY ASSURANCE**

8 Substitution of Materials: Refer to Division 01 of the Project Manual.
9

10 All products and materials used are to be new, undamaged, clean and in good condition. Existing products
11 and materials are not to be reused unless specifically indicated.
12

13 Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings,
14 or engineering parameters from those indicated on the contract documents, the contractor is responsible for
15 all costs involved in integrating the equipment or accessories into the system and for obtaining the intended
16 performance from the system into which these items are placed.
17

18 **ABBREVIATIONS AND SYMBOLS**

19 Key to abbreviations and symbols shall be on the Drawings.
20

21 The following are additional abbreviations used in the Specifications:

22	A/E	Architect/Engineer
23	GC	General Contractor
24	PC	Plumbing Contractor
25	FPC	Fire Protection Contractor
26	HC	Heating Ventilating and Air Conditioning Contractor
27	EC	Electrical Contractor

28

29 **DEFINITIONS**

30 **Furnish:**

31 Supply and deliver to Project site ready for unpacking, assembly and installation.
32

33 **Install:**

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

38 **Provide:**

39 Furnish and install, such that product is fully functional for intended use.
40

41 **COORDINATION**

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

48 **CONTINUITY OF EXISTING SERVICES**

49 Refer to Division 01 of the Project Manual.
50

51 Do not interrupt or change existing services without prior approval from Owner, Architect, Engineer or
52 Construction Manager. When interruption is required, coordinate down-time with Owner to reduce
53 disruption to activities. Scope of Work is indicated on Contract Documents or described herein. Unless
54 specifically stated, any work involved in interrupting or changing existing services is to be done during
55 normal working hours.
56

1 **PROTECTION OF FINISHED SURFACES**

2 Refer to Division 01 of the Project Manual.

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

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.

13 **OFF SITE STORAGE**

14 Refer to Division 01 of the Project Manual.

16 **SUBMITTALS**

17 Refer to Division 01, of the Project Manual.

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

21 Submit the following plumbing system data sheet for approval by the GC and A/E. List piping material
22 type for each piping service on the project, ASTM number, schedule or pressure class, joint type,
23 manufacturer and model number where appropriate. List valves and specialties for each piping service,
24 fixture and equipment with manufacturer and model number.

26 **PLUMBING SYSTEM DATA SHEET**

27 Item	27 Pipe Service/Sizes	27 Manufacturer/Model No.	27 Remarks
28 Pipe			
29 Fittings			
30 Unions			
31 Valves:			
32 Ball			
33 Butterfly			
34 Balancing			
35 Check			
36 Other			
37 Hangers & Supports			
38 Insulation			
39 Plbg. Specialties:			
40 Plbg. Fixtures:			
41 Sink			
42 Faucet			
43 Stop/Supplies			
44 Waste/Trap			

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

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

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

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

5
6 **Firestop Systems:**

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

12
13 **SPECIFIED MATERIALS AND EQUIPMENT**

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

18
19 When equipment or accessories used differ in arrangement, configuration, dimensions, ratings, or
20 engineering parameters from those on Drawing schedules, Contractor shall be responsible for costs involved in
21 integrating equipment or accessories into system. Contractor shall be responsible for obtaining original
22 design performance from system into which items are placed, regardless of whether manufacturer/model is
23 specified equivalent or substitute.

24
25 If Contractor wishes to use items other than those named in Specifications in base bid, request for approval
26 of substitution must be made in writing to A/E at least 14 days prior to opening of bids. Include complete
27 technical and descriptive data with request. If approved, an Addendum will be issued notifying bidders of
28 approval. Request for approval will be considered only if requested by prime bidding Contractor.

29
30 **EQUIPMENT INSTALLATION**

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

39
40 If, during construction phase of Project, contractor feels inadequate space exists, or equipment locations
41 must be substantially modified to provide proper service and maintenance access, prior to installing
42 equipment, contractor shall notify engineer in writing, outlining general concerns and proposed
43 modifications. Equipment installed without providing manufacturer's required maintenance and service
44 clearance shall be considered defective. Contractor shall remove and relocate piping, ductwork and
45 equipment, to provide required service clearances at contractor's expense.

46
47 **OPERATING AND MAINTENANCE INSTRUCTIONS**

48 Refer to Division 01 of the Project Manual.

49
50 Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for
51 each system or type of equipment. In addition to the data indicated in the General Requirements, include
52 the following information:

- 53 • Copies of all approved shop drawings.
- 54 • Manufacturer's wiring diagrams for electrically powered equipment
- 55 • Records of tests performed to certify compliance with system requirements
- 56 • Certificates of inspection by regulatory agencies

- 1 • Parts lists for fixtures, equipment, valves and specialties.
- 2 • Manufacturer's installation, operation and maintenance recommendations for fixtures,
- 3 equipment, valves and specialties.
- 4 • Valve schedules
- 5 • Lubrication instructions, including list/frequency of lubrication
- 6 • Warranties
- 7 • Additional information as indicated in the technical specification sections

8

9 **RECORD DRAWINGS**

10 Refer to Division 01 of the Project Manual.

11

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

13

14 **TRAINING OF OWNER PERSONNEL**

15 Instruct Owner's personnel in proper operation and maintenance of systems and equipment provided as part

16 of Project, using Operating and Maintenance manuals during instruction. Demonstrate startup and

17 shutdown procedures for equipment. Training shall be during normal working hours.

18

19 **TESTING**

20 Provide materials, labor, and equipment required for testing.

21

22 Notify Inspector(s) one day prior to the time when the test is ready to be performed.

23

24 After testing, submit in writing the time, date, name and title of the person approving the test. This shall

25 also include the description and what portion of the system has been tested. The person approving the test

26 shall sign the submittal.

27

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

29

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

31

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

33 new materials.

34

35 **CLEANING**

36 Keep the premises broom clean and free of surplus materials, rubbish and debris.

37

38 After fixtures and equipment have been installed, remove stickers, rust stains, labels, and temporary covers.

39

40 Foreign matter shall be blown out, or flushed out, of pipes, tanks, pumps, strainers, motors, devices,

41 switches, fixtures, and panels.

42

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

44

45 Leave the work in a condition ready for operation.

46

47 **WARRANTY**

48 Warrant that work shall function for one year immediately following acceptance of the system(s).

49

50 Keep the system in good working order at no expense, unless defects are clearly the result of improper or

51 abnormal usage.

52

53 Submit for acceptance of the work, written certification that the entire system has been installed and

54 adjusted for operation in accordance with the Contract Documents.

1
2
3 **PART 2 – PRODUCTS**

4 **ELECTRICAL REQUIREMENTS**

5 **General:**

6 Work shall conform to requirements of Division 26.

7 Power wiring shall be provided by the EC. Control wiring shall be provided by the PC. Plumbing
8 Contractor shall provide wiring diagrams for use by the Electrical Contractor.

9
10 **ACCESS PANELS AND DOORS**

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

14
15 Access panels shall be of size required to provide adequate access to equipment. Minimum size shall be 12
16 inch by 12 inch for hand access and 24 inch by 24 inch for body access.

17
18 Panels shall be Milcor brand or equivalent.

19
20 Panels shall include concealed hinges, cam type locking devices, and have frame/border type necessary for
21 particular wall or ceiling construction they are installed. Access panels shall be flush mounted, recessed
22 frame type units. Access panels shall be prime coated steel, able to accept field painting for general
23 applications and stainless steel for use in toilet rooms, shower rooms and similar wet areas.

24
25 Refer to Architectural Room Finish Schedule for wall and ceiling surfaces and finishes.

26
27 For non-security applications, panel construction shall utilize 16 gauge frame with not less than 18 gauge
28 hinged door panel. Door locks shall be screwdriver operated for panels in general location applications and
29 shall be key locked for public area applications.

30
31 **PIPE PENETRATIONS**

32 Refer to Division 01 requirements as well as the following.

33
34 **Fire, Smoke And Fire/Smoke Rated Surfaces:**

35 3M CP 25N/S or CP 25S/L caulk, 3M FS 195 wrap/strip with restricting collar, 3M CS 195 composite
36 sheet, Pipe Shields Inc. Series F fire barrier kits, Proset Systems fire rated floor and wall penetrations,
37 Insta-Foam Products Insta-Fire Seal Firestop Foam or Dow Corning Fire Stop System.

38
39 All fire stopping systems shall be provided by the same manufacturer.

40
41 UL listed or tested by independent testing laboratory, approved by State and Local Code jurisdictions.

42
43 Use product that has a rating not less than rating of wall or floor being penetrated. Reference architectural
44 drawings for identification of fire and/or smoke rated walls and floors.

45
46 Sleeves in concrete to be Schedule 40 steel pipe with integral water stop unless fire stop material used
47 includes a sleeve that is an integral part of rated assembly.

48
49 Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks,
50 firestop mortar or a combination of these products to provide a UL listed system for each application
51 required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

52
53 **Non-Rated Surfaces:**

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

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

4
5 **EQUIPMENT, PIPING AND VALVE IDENTIFICATION**

6 **Equipment Labels:**

7 After painting and covering, identify equipment, including pumps, tanks, compressors, and control panels.
8 Locate identification conspicuously.

9
10 Identification of equipment shall be by engraved white letters on a black 1/16 inch thick plastic laminate
11 panel, beveled edges, screw mounting, permanently attached to the equipment.

12
13 Minimum size:
14 3/4" x 2 1/2" with 3/8" letters.

15
16 Manufacturers:

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

19
20 **Pipe Identification:**

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

22
23 Printed labels identifying the fluid conveyed and direction of flow shall be attached to pipes in accessible
24 locations, at intervals not to exceed 20 feet, not less than once in each room, at each branch, adjacent to
25 each access door or panel, at each valve and where exposed piping passes through walls and floors.

26

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"

27
28 Manufacturers:

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

30
31 Stencils:

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

33
34 **Valve Tags:**

35 Identify each valve by means of 1 1/2" diameter brass tag fastened to body of valve with copper or brass
36 chain. Identification number shall be stamped thereon with letters a minimum of 1/2" high. System
37 identification abbreviation shall be stamped with letters a minimum of 1/4" high.

38
39 The following prefixes shall be used:
40 PLBG - Plumbing

41
42 Manufacturers:

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

44
45 **Valve Charts:**

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

48 Valve number Size
49 Manufacturer Type of valve
50 Type of service Location

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

3
4 **EQUIPMENT ACCESSORIES**

5 Provide equipment accessories, connections, and incidental items.

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

9
10
11 **PART 3 – EXECUTION**

12
13 **GENERAL**

14 **Coordination of Work:**

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

19
20 Piping shall not be located above electrical panels.

21
22 **Anchor Bolts, Sleeves, and Supports:**

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

29
30 **Adjustments In Locations:**

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

34
35 **Right Of Way:**

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

39
40 Offsets, transitions and changes in direction of electrical raceways, pipes, and ducts shall be made to
41 maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.

42
43 **ASBESTOS ABATEMENT**

44 Asbestos abatement shall be by the Owner. If asbestos is encountered, the Owner shall be notified.
45 Asbestos materials shall be removed prior to continuing work.

46
47 **DEMOLITION**

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

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

6 7 **SURFACE RESTORATION**

8 Completely restore the surface of all disturbed areas to a like condition of the surface prior to the work.
9 Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary
10 deposit of excavated earth. Remove all surplus material, tools and equipment.

11 12 **OPENINGS, CUTTING AND PATCHING**

13 Refer to Division 01 of the Project Manual.

14
15 Provisions for openings including chases, holes and clearances through walls, floors, and roof, ceilings and
16 partitions shall be made in advance of construction of each part of the building. Openings shall be provided
17 by the GC for the respective materials in which openings occur, during the construction of the building
18 with the exception of pipe sleeves. The PC shall furnish to the GC opening dimensions and locations.

19
20 If the PC neglects to inform the GC of his opening requirements before that portion of the building
21 construction is complete, the PC shall cut the openings and provide framing and lintels. In the event holes
22 must be cut through reinforced concrete, avoid spalling and unnecessary damage or weakening of structural
23 members. No chopping or breaking out is permitted. Before cutting or drilling, obtain permission from the
24 A/E. Patch adjacent materials and repair damage resulting from the cutting.

25
26 The PC may perform core drilling for openings in existing walls and floors at the direction of the A/E.
27 Framed openings shall be by the GC.

28
29 Patch interior trench excavation to match existing slab-on-grade with concrete: 3500 PSI at 28 days, 3"
30 slump, 3/4" maximum aggregate size, 5.5 bags of cement per cubic yard.

31 32 **BUILDING ACCESS**

33 Arrange for necessary openings in building to allow for admittance of all apparatus. When building access
34 was not previously arranged and must be provided by Contractor, restore opening to original condition after
35 the apparatus has been brought into building. Coordinate with Architect/Engineer.

36 37 **EQUIPMENT ACCESS**

38 Install piping, conduit, fixtures, and accessories to permit access to equipment for maintenance. Coordinate
39 exact location of wall and ceiling access panels and doors with General Contractor, making sure access is
40 available for equipment and specialties. Where access is required in plaster walls or ceilings, furnish and
41 install access doors required. Coordinate for installation of access doors utilizing General Contractor and
42 other appropriate on-site subcontractor for access door installation.

43
44 Accessible ceilings, (i.e. lay-in ceilings) do not require access panels. Provide color coded thumb tacks or
45 screws, depending on surface, for use in accessible ceilings.

46 47 **COORDINATION OF WORK**

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

51
52 Any work that is not coordinated and that interferes with other contractor's work shall be removed or
53 relocated at the installing contractor's expense.

54
55 Verify that all devices are compatible for the type of construction and surfaces on which they will be used.
56

1 Offsets, transitions and changes in direction of electrical raceways, pipes and ducts shall be made as
2 required to maintain proper room and pitch of sloping lines whether or not indicated on the Drawings.
3 Furnish and install all traps, air vents, sanitary vents, etc., as required to effect the offsets, transitions and
4 changes in direction.

5
6 New lines which pitch shall have the right-of-way over those which do not pitch. For example: Gravity
7 drains shall normally have right-of-way. Lines whose elevations cannot be changed shall have the right-of-
8 way over lines whose elevations can be changed. Notify A/E and other trades of any conflicts.

9
10 Provide appropriate sections of work with required wall, roof and floor opening locations and dimensions.
11 If Contractor neglects to coordinate information, openings shall be the responsibility of Contractor.

12 **PIPING INSTALLATION**

13 **General:**

14 Expansion and contraction of piping shall be provided for by expansion loops, bends, swing joints, or
15 expansion joints to prevent damage to connections, piping, and equipment of the building.

16
17
18 Unions or flanges shall be installed on all by-passes, ahead of all traps, adjacent to screw connection
19 valves, and at all connections to equipment, whether or not shown on drawings.

20 **Installation Arrangement:**

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

25 **Connections Different From Those Shown:**

26
27 Where equipment requiring different arrangement or connections from those shown is used, install the
28 equipment to operate properly and in harmony with the intent of the Drawings and Specifications. When
29 requested by the A/E, submit drawings showing the proposed installation.

30
31
32 If the proposed installation is approved, make all incidental changes in piping, ductwork, supports,
33 insulation, wiring, panelboards, etc. Provide any additional motors, controllers, valves, fittings and other
34 additional equipment required for the proper operation of the system resulting from the selection of
35 equipment, including all required changes in affected trades. The Contractor shall be responsible for the
36 proper location of rough-in and connections by other trades.

37
38 All changes shall be made at no increase in the Contract amount or additional cost to the other trades.

39 **SLEEVES**

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

45
46
47 Pipe sleeves are not required in existing poured concrete walls where penetrations are core drilled.

48
49 Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated
50 pipe to run through sleeve), cast in place.

51
52 In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 1 inch above the
53 adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert
54 schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe
55 penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the
56 sleeve that will transfer weight to existing floor structure.

1
2 For floor penetrations through existing floors in mechanical and wet locations listed below, core drill
3 opening and provide 1-1/2" x 1-1/2" x 1/8" galvanized steel angles fastened to floor surrounding the
4 penetration or group of penetrations to prevent water from entering the penetration. Provide urethane caulk
5 between angles and floor and fasten angles to floor a minimum of 8" on center. Seal corners water tight
6 with urethane caulk. Or, core drill sleeve openings large enough to insert schedule 40 sleeve and grout area
7 around sleeve with hydraulic setting non-shrink grout/cement.

8
9 Pipe sleeves are not required in cored floor pipe penetrations through existing floors that are not located in
10 mechanical rooms, food service areas or wet locations listed above.

11 **PIPE PENETRATIONS**

12 **General:**

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

17 **Fire Rated Surfaces:**

18
19 Install products in accordance with the manufacturer's instructions where pipe penetrates a fire rated
20 surface. When pipe is insulated, use product that maintains integrity of insulation and vapor barrier. Where
21 sleeve must be installed in existing floor, grout area around sleeve to restore floor integrity. In wet area
22 floor penetration, top surface of penetration to be 2 inches above adjacent floor with additional height
23 obtained by means of concrete pad poured integral with floor.

24 **Non-Rated Surfaces:**

25
26 Install escutcheons or floor/ceiling plates where pipe penetrates non-fire rated surfaces in occupied spaces.
27 Size units to accommodate insulation, where applicable. Escutcheons are not required when insulation
28 completely covers wall opening and insulation end is trimmed in a neat manner. Occupied spaces for this
29 Paragraph include only those rooms with finished ceilings and penetration occurs below ceiling.

30
31 In exterior wall openings below grade, place water-stop type wall sleeve before concrete pour or core drill
32 opening after pour. Assemble rubber links to proper size for pipe and tighten in place in accordance with
33 manufacturer's instructions.

34
35 Install galvanized sheet metal sleeve in hollow wall penetrations to provide backing for sealant. Apply
36 sealant to both sides of penetration in a manner that annular space between pipe sleeve and pipe or
37 insulation is completely blocked.

38
39 Completely seal (or caulk) around pipe penetrations through non-rated, smoke tight corridor walls in
40 healthcare facilities. Refer to architectural drawings for additional information.

41 **ESCUTCHEON PLATES**

42
43 Provide plates on pipes passing through finished floors, walls and ceilings, with outside diameter to cover
44 sleeve opening and inside diameter to fit snugly around pipe. Set tight to building surface. Escutcheon
45 plates shall be chromium plated metal.

46 **PAINTING**

47
48 Refer to Division 09.

49
50 All exposed steel support structures (all metal surfaces located both inside and outside the building) shall
51 be painted after installation with one coat of a compatible metal primer coat and two coats of a finish coat
52 of paint for the application. Color shall be gray unless otherwise specified.

1 **IDENTIFICATION**

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

5
6 Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

7
8 Identify interior piping not less than once every 30 feet, not less than once in each room, adjacent to each
9 access door or panel, and on both side of the partition where accessible piping passes through walls or
10 floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel
11 against a light background or white enamel against a dark background.

12
13 Identify all exterior buried piping for entire length with underground warning tape except for sewer piping
14 which is routed in straight lines between manholes or cleanouts. Place tape 6"-12" below finished grade
15 along entire length of pipe. Extend tape to surface at building entrances, meters, hydrants and valves.
16 Where existing underground warning tape is broken during excavation, replace with new tape identifying
17 appropriate service and securely spliced to ends of existing tape.

18
19 Identify valves with brass tags bearing a system identification and a valve sequence number. Identify
20 medical gas and vacuum valves with brass tags and wall or cabinet mounted color coded engraved
21 nameplate with the following "(Type of Gas) Shutoff Valve for (Location or Zone)". Valve tags are not
22 required at a terminal device unless the valves are greater than ten feet from the device, located in another
23 room or not visible from device. Provide a typewritten valve schedule and pipe identification schedule
24 indicating the valve number and the equipment or areas supplied by each valve and the symbols used for
25 pipe identification; locate schedules in mechanical room and in each Operating and Maintenance manual.
26 Schedule in mechanical room to be framed under clear plastic.

27
28
29

END OF SECTION

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1
2 Piping connected to pumps, compressors, or other rotating or reciprocating equipment is to have vibration
3 isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment,
4 whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the
5 100 pipe diameter/3 support distance.

6
7 Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord
8 of any truss or joist.

9
10 **General:**

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

12
13 Design supports of strength and rigidity to suit loading, service, and manner which do not unduly stress the
14 building construction. Where support is from concrete construction, take care not to weaken concrete or
15 penetrate waterproofing. Fasten supports and hangers to building steel framing wherever practical. Do not
16 use another pipe for support. Do not use perforated iron, chain or wire as hangers.

17
18 Use inserts for suspending hangers from reinforced concrete slabs wherever practical. Where inserts are not
19 practical, provide channels or angles from which to suspend hangers/supports. Fasten structural steel to
20 concrete with expansion bolts.

21
22 Provide expansion anchors in concrete slabs for installation of threaded support rods.

23
24 Provide hangers capable of vertical adjustment after piping is erected. Do not pierce ductwork with hanger
25 rods. On threaded support rods and bolts, weld nuts to rods, peen threads, or provide double set of nuts
26 with lock washers to prevent loosening. Use beam clamps for attaching hangers to structural steel.

27
28 On piping insulated with vapor barrier covering, use protection shield to cover bottom one-half of insulated
29 pipe. Shield to be a minimum of 12" long and of 16 gauge galvanized steel.

30
31 Exception:

32 For insulated drain pipe, the pipe may rest on the hanger and the insulation to wrap around the
33 hanger and pipe.

34
35 Submit anchor drawings for approval upon request.

36
37 Hangers, supports, and support methods other than those specified shall not be used without obtaining
38 approval on method of support by the Structural Engineer prior to installing piping systems. Submit support
39 method arrangement, pipe weight and spacing scheme for approval.

40
41 **Hanger and Support Spacing:**

42 Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

43
44 Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

45
46 Use hangers with 1-1/2 inch minimum vertical adjustment.

47
48 Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze
49 hangers.

50
51 Support riser piping independently of connected horizontal piping.

52
53 Adjust hangers to obtain the slope specified in the piping section of these specifications.

1 Space hangers for pipe as follows:
2

Pipe Material	Pipe Size	Max. Horiz. Spacing	Max. Vert. Spacing
Cast Iron	2" and larger	5'-0"	15'-0"
Copper	1/2" through 3/4"	5'-0"	10'-0"
Copper	1" through 1-1/4"	6'-0"	10'-0"
Copper	1-1/2" through 2-1/2"	8'-0"	10'-0"
Copper	3"	10'-0"	10'-0"
Copper	4" and larger	12'-0"	10'-0"
Steel	1/2" through 1-1/4"	7'-0"	15'-0"
Steel	1-1/2" through 6"	10'-0"	15'-0"
Plastic	Drain and Vent	4'-0"	10'-0"

3

4 **SUBMITTALS**

5 Submit data in accordance with Section 22 05 00 and Division 01 of the Project Manual.

6

7 Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe
8 size and type of service.

9

10 Submit anchor drawings to the A/E for approval upon request.

11

12

13

PART 2 - PRODUCTS

14

15 **MANUFACTURERS**

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

18

19 **PIPE HANGERS AND SUPPORTS**

20 **Overhead Supports:**

21 Adjustable clevis hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line Figure B3100.

22

23 Adjustable J hook hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line figure B3690.

24

25 Adjustable band hanger, steel, Dura-Green epoxy coating or electro-plated, B-Line Figure B3172.

26

27 **Multiple or Trapeze Hangers:**

28 Where several pipes are running parallel and pitching in the same direction, strut style support may be used.
29 Steel channel, 12-gauge thickness, Dura-Green epoxy coating or electro-plated, B-Line B11. Restrain
30 individual pipes with B-Line B2000 series or Vibraclamp series strut clamps.

31

32 **Wall Support:**

33 Carbon steel welded bracket with hanger. B-Line 3068 Series, Grinnell 194 Series.

34

35 Perforated, epoxy painted finish, 16-12 gauge, min., steel channels securely anchored to wall structure, with
36 interlocking, split-type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000
37 series clamps, Grinnell type PS 200 H with PS 1200 clamps.

38

39 When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion
40 material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line
41 B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series,
42 Grinnell PS 1400 series.

43

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 adjusting
17 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

5

PART 3 - EXECUTION

6

7 **INSTALLATION**

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

9

10 Install supports to provide for free expansion of the piping system. Support all piping from the structure
11 using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and
12 wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

13

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

15

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

20

21 Size and install hangers and supports, except for riser clamps, for installation on the exterior of piping
22 insulation. Where a vapor barrier is not required, hangers may be installed either on the exterior of pipe
23 insulation or directly on piping.

24

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

26

27 **STRUCTURAL SUPPORTS**

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

31

32 **RISER CLAMPS**

33 Support vertical piping with clamps secured to the piping and resting on the building structure or secured to
34 the building structure below at each floor.

35

36 **CONCRETE INSERTS**

37 Select size based on the manufacturer's stated load capacity and weight of material that will be supported.

38 Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

39 Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch size. Where
40 concrete slabs form finished ceiling, provide inserts that are flush with the slab surface.

41

42 **ANCHORS**

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

46

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END OF SECTION

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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 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 **PVC Fitting Covers and Jackets:**

46 White PVC film, gloss finish one side, semi-gloss other side, FS LP-535D, Composition A, Type II, Grade
47 GU. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet
48 radiation, in kitchens or food processing areas or installed outdoors. Jacket thickness to be .02 inch (20
49 mil).

1 **PART 3 - EXECUTION**

2
3 **GENERAL**

4 Application of insulation to piping equipment shall be done in accordance with the manufacturer's
5 installation recommendations. Where thickness of insulation is not specified, use thickness recommended
6 by manufacturer or required by applicable Codes.

7
8 Insulation shall be applied in as warm an environment as possible, and in no instance below 25° F.

9
10 No pipe shall be covered until after it has been installed, inspected, tested and approved.

11
12 **INSTALLATION**

13 All pipe insulation shall be installed with joints butted firmly together. All valves and fittings shall be
14 insulated with mitered sections of insulation equal in density and thickness to the adjoining insulation, or
15 with insulating cement equal in thickness to the adjoining insulation, or with "Zeston" type, premolded
16 PVC fittings installed in accordance with the manufacturer's instructions. Fittings are to be finished with 8
17 oz. glass mesh and mastic (use breather mastic on systems operating above 50°F except where Zeston
18 PVC covers are used). Jackets on pipe insulation may be stapled using outward clinch staples spaced 3"
19 apart at least 1/4" in from the lap edge on systems operating at 60°F and above; below 50°F the laps are to
20 be vapor sealed using self-sealing lap, lap-seal tape gun or adhesive such as Armstrong 520. All insulation
21 ends are to be tapered and sealed regardless of service.

22
23 On all piping insulated with vapor barrier covering, use protection shield to over bottom one-half of
24 insulated pipe. Shield to be minimum of 12" long and 16 gauge galvanized steel. Provide half-round, 12"
25 long, hanger block at the bottom half of the pipe in place of the fiberglass pipe insulation. The hanger
26 blocks shall be molded cork or calcium silicate pipe insulation of the same thickness as the adjoining
27 fiberglass pipe insulation. The vapor barrier jacket shall be continuous through the hanger location.

28
29 Vapor barrier jackets shall be applied with a continuous, unbroken vapor seal. Pipe hangers shall be sized
30 large enough to be installed over the outer surfaces of the insulation.

31
32 Exception:

33 For insulated drain pipe, the pipe may rest directly on the hanger and the insulation to wrap around
34 the hanger and pipe.

35
36 Omit insulation for:

- 37 • Unions and flanges.
- 38 • Vents to atmosphere, discharges from safety and relief valves and drain pipes.

39
40 Provide finished edges at all access doors and end.

41
42 **PIPE INSULATION SCHEDULE**

43 Provide insulation on new and remodeled piping.

44
45 **Minimum Insulation Thickness:**

46

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"	---
Non-Potable Cold Water	1/2"	1/2"	1"	---

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48
49 **END OF SECTION**

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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.

- 22 05 00 – Common Work Results for Plumbing
- 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

DESCRIPTION

Provide a domestic water distribution system including hot and cold water supply piping, hot water return piping, tempered 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.

SUBMITTALS

Submit valve product data sheets in accordance with Section 22 05 00 and Division 01 of the Project Manual.

1 Include materials of construction, dimensional data, ratings/capacities/ranges, approvals, test data, and
2 identification as referenced in this section and/or on the drawings.

3 4 5 **PART 2 - PRODUCTS**

6 7 **WATER DISTRIBUTION PIPE AND FITTINGS**

8 **Above Ground:**

9 Copper tube, Type L, hard temper, ASTM B88; with wrought copper fittings, ANSI B16.22. Join using
10 lead free flux, ASTM B813, and solder, ASTM B32.

11
12 Wrought copper, ANSI B16.22 or cast bronze, ANSI B16.18 fittings, copper tube dimensioned grooved
13 ends (flaring of tube and fitting ends to IPS dimensions is not permitted), joined with mechanical
14 couplings, synthetic rubber gasket seal, Victaulic style 607 QuickVic™ Installation Ready stab-on design,
15 for direct 'stab' installation onto roll grooved copper tube without prior field disassembly and no loose
16 parts.

17 18 **VALVES**

19 **Manufacturer:**

20 Valves throughout the project shall be by one manufacturer, unless otherwise specified.

21
22 Standard valves are based on Nibco models. Equivalent style valves as manufactured by Apollo, Crane,
23 DeZurik, Gustin-Bacon, Grinnell, Hammond, Jenkins, Lunkenheimer, Milwaukee Valve, Stockham,
24 Victaulic, or Watts are acceptable. Valves shall be of standard dimensions, comparable to the number
25 specified.

26
27 Balancing valves are based on Bell & Gossett models. Equivalent style valves by Armstrong, Flowset,
28 Nibco, Taco, or Victaulic/TA Hydronics are acceptable.

29 30 **Shutoff Valves:**

31 Except as otherwise specified, all shutoff valves 2-1/2 inch and smaller shall be ball valves and shutoff
32 valves 3 inch and larger shall be butterfly valves, unless required otherwise by local Water Utility
33 specifications.

34 35 **Ball Valves:**

36 Bronze, two piece full port ball valves with bronze body, solder or threaded ends, chromium plated brass or
37 stainless steel ball, reinforced Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-
38 shock WOG, Nibco model T/S-585-70. Include handle extension for insulated piping, NIB-SEAL by
39 Nibco.

40
41 Bronze, two piece full port ball valves with bronze body, solder or threaded ends, stainless steel ball, reinforced
42 Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-shock WOG, Nibco model T/S-
43 585-70-66. Include handle extension for insulated piping, NIB-SEAL by Nibco.

44
45 Bronze, three piece full port ball valves with bronze body, solder or threaded ends, stainless steel ball, reinforced
46 Teflon seats and seals, blowout proof stem design, rated at 600 PSI non-shock WOG, Nibco model T/S-
47 595-66. Include handle extension for insulated piping, NIB-SEAL by Nibco.

48 49 **Butterfly Valves:**

50 Ductile iron butterfly valve, polyimid coated, EPDM elastomer coated disc, extended neck, grooved ends,
51 300 psi WOG pressure rated, Nibco GD 4765. Include lever handle through 6-inch size and gear operator
52 for 8 inch and larger size.

53
54 Cast bronze butterfly valve, EPDM elastomer coated ductile iron disc, copper tube dimensioned grooved
55 ends, 300 psi maximum pressure rated, Victaulic Series 608. Include lever handle through 6-inch size.

1 **Check Valves:**
2 3" and Smaller:
3 Bronze body, Class 125, Y-pattern, swing type, check valve with solder ends, all bronze internal
4 components and renewable seat and disc, Nibco model S-413-B.

5
6 2" and Smaller:
7 Bronze body, ASTM B62, in-line lift type, spring, Buna-N disc, 250 psig WOG rating. Nibco 480

8
9 **Balancing Valves:**

10 1/2" thru 2":
11 Bronze body balancing valve with sweat or threaded ends, calibrated brass orifice, integral adjustment knob
12 with calibrated scale, memory stop indicator, drain tapping and differential pressure metering connections,
13 Bell & Gossett "Circuit Setter".

14
15 Ametal® brass copper alloy, y-pattern, globe type balancing valve with soldered or threaded ends, EPDM
16 o-ring seals, 4-turn digital readout hand wheel with locking, tamper-proof setting, and differential pressure
17 metering connections, separate shutoff valve not required, 300 psi at 250 deg F. Victaulic/Tour &
18 Andersson Series 786, 787 & 78K balancing valves with Victaulic Series 799 or 79V Koil-Kit™ coil pack
19 consisting of Victaulic Series 78U union port fitting, Series 78Y strainer/ball valve or Series 78T union/ball
20 valve combination, and flexible hoses to complete terminal hookup at coil outlet.

21
22 2-1/2" thru 16":
23 Ductile iron body, y-pattern, globe type balancing valve with flanged or grooved ends, EPDM o-ring seals,
24 multiple-turn digital readout hand wheel with locking, tamper-proof setting, and differential pressure
25 metering connections, separate shutoff valve not required, 350 psi at 250 deg F. Victaulic/Tour &
26 Andersson Series 788 and 789.

27
28 **Gauge Valves:**

29 1/4" Size:
30 Bronze body, rising stem gauge/globe valve with renewable seat and disc and malleable iron hand-wheel,
31 Nibco T-235. Valve shall be rated for 300 PSI non-shock WOG.

32
33 **UNIONS AND FLANGES**

34 **Unions:**

35 Bronze, solder connection, Nibco figure 733.

36
37 **Flanges:**

38 Cast copper alloy, class 125, MSS SP-106, Nibco figure 741.

39
40 **DIELECTRIC COUPLINGS**

41 Steel casing, zinc electroplated, with inert thermoplastic lining, various end types, Clearflow, style 47 by
42 Victaulic.

43
44 Dielectric flanges 2" and larger; with iron female pipe thread to copper solder joint or brass female pipe
45 thread end connections, non-asbestos gaskets and pressure rating of not less than 175 psig at 180 degrees
46 Fahrenheit. Watts Regulator Company, Lochinvar, Wilkins, Epcos Sales, Inc.

47
48
49 **PART 3 - EXECUTION**

50
51 **WATER PIPING SYSTEM**

52 Piping shall be pitched to drain entire system; install drain valves at low points. Provide unions at
53 equipment and valves. Provide offsets and transition fittings as required. Avoid dips or depressions in pipe
54 runs.

1 No water piping shall be installed in exterior walls, unless adequately protected from freezing. Two inch
2 insulation shall be installed on back and sides of chase, front shall be open to room heat, covered only by
3 finished wall material.

4
5 Install unions, couplings, or flanges at all final equipment connections and as required to facilitate removal
6 of equipment.

7
8 Install dielectric couplings at every connection between copper pipe and other metals. Use dielectric
9 unions for connecting copper and steel piping.

10
11 Provide backflow devices as required by Code on water connections to HVAC equipment and other
12 equipment.

13
14 Hot water and cold water lines shall be kept at least 6 inches apart whenever possible.

15
16 **Grooved Joints:**

17 Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and
18 recommendations. Grooved couplings, fittings and valves shall be of the same manufacturer. Grooving
19 tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material
20 (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced
21 by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections and roll
22 marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative
23 shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application
24 of groove, and installation of grooved piping products. Factory trained representative shall periodically
25 inspect the product installation. Contractor shall remove and replace any improperly installed products.

26
27 **Mechanically Formed Tee Fittings:**

28 Form mechanically extracted collars in continuous operation of consisting of drilling pilot hole out of tube
29 surface to form collar, having height of not less than 3 times thickness of tube wall. Use adjustable
30 collaring device. Notch and dimple branch tube.

31
32 To form couplings, anneal end of tubing to be expanded, insert expander and reform tube to accept size
33 OD. Socket expansion shall be at least 3 times base tube wall thickness in depth.

34
35 Braze joints and couplings in accordance with American Welding Society "lap joint" weld, and Copper
36 Development Association copper tube handbook using BCup filler metal. Soft solder joints will not be
37 permitted with mechanical tee fittings joints.

38
39 **Hot Water Re-Circulating System:**

40 Install return system including check valves, balancing valves, and pumps. Pitch and grade all lines as
41 required to ensure satisfactory circulation.

42
43 Adjust each balancing valve and set position stop. Balance system to minimum flow in return piping
44 branches needed to maintain even supply water temperature and to provide continuous circulation
45 throughout building. Provide balancing report along with O&M manual submittals. Test and demonstrate
46 to A/E upon request.

47
48 **Valve Installation:**

49 Install shutoff valves with stem vertical. Exception; the stem may be horizontal if a vertical installation
50 would not allow access to the valve handle

51
52 All valves with screwed ends shall be installed using "Teflon" tape applied on male portion of piping
53 fitting.

1 Each individual fixture or piece of equipment shall have an independent shut-off valve adjacent to fixture
2 in addition to the required branch shut-off. Where valves are installed in walls an access panel shall be
3 provided.

4

5 **Branches:**

6 Valve shut-off full size of branch for each branch take-off to supply stack or fixture group.

7

8 **Drains:**

9 Provide valved drains at low points of systems as required or directed. All piping shall be arranged to drain
10 through valved drains.

11

12 **Flushing Mains and Branch Piping:**

13 Upon completion of the water distribution system, test all valves to insure their full opening and flush out
14 the system progressively by opening drain valves and building outlets and permitting the flow to continue
15 from each until the water runs clear.

16

17 **Pipe Insulation:**

18 Provide pipe insulation for all domestic water piping per Section 22 07 00.

19

20 **Sterilization of Water Distribution System:**

21 As soon as the water distribution system has been flushed out as above specified, it shall be sterilized in
22 accordance with the requirements of the local Health Department/Water Utility or in the absence of such,
23 by the following method:

24

25 Introduce chlorine or a solution of calcium or sodium hypochlorite, filling the lines slowly and
26 applying the sterilizing agent at a rate of 50 parts per million of chlorine, as determined by residual
27 chlorine tests at the ends of the lines. Open and close all valves and hydrants while the system is
28 being chlorinated.

29

30 After the sterilizing agent has been applied for 24 hours, test for residual chlorine at the ends of
31 the lines. If less than 5 PPM as indicated, repeat the sterilization process.

32

33 When tests show at least 5 PPM of residual chlorine flush out the system until all traces of the
34 chemical used are removed.

35

36 **Samples**

37 After disinfecting the water distribution system, take water samples to check for bacteria. Take 5 water
38 samples from remote faucets, plus the main entrance. Send the samples to the Wisconsin Department of
39 Health Lab to sample for a safe water supply system.

40

41 **TESTING**

42 Refer to Division 01, "Starting of Systems" and Section 22 05 00.

43

44 Hydro-statically pressure test water piping to 150 psig for 4 hours. No decrease in pressure is allowed.
45 Provide pressure gauge with shutoff and a bleeder valve at the highest point of the system tested. Inspect
46 joints in system under test. No leaks allowed.

47

48 Do not conceal pipe until satisfactorily tested.

49

50 Testing with air will not be allowed.

51

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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

- Underground Pipe Fittings
- Above Ground Pipe and Fittings
- Drains and Cleanouts

PART 3 - EXECUTION

- Drain and Vent Piping System
- Pipe Joints
- Plenum Ceiling Spaces
- Cleanouts
- Traps
- Testing

RELATED WORK

Requirements of Division 01 shall govern work under this Section.

- 22 05 00 – Common Work Results for Plumbing
- 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.

9 **PART 2 - PRODUCTS**

10 **UNDERGROUND PIPE AND FITTINGS**

11 Cast iron, no-hub, service weight, ASTM A888, CISPI 301, with rubber gasket couplings, ASTM C564,
12 and stainless steel clamp, CISPI 310. Pipe and fittings shall be marked with the collective trademark of the
13 Cast Iron Soil Pipe Institute or receive prior approval of the engineer. Piping and fittings shall be
14 manufactured by AB&I, Charlotte, or Tyler.

15
16 Cast iron soil pipe, bell and spigot, service weight, coated, ASTM A74, with rubber gaskets, ASTM C564.
17 Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or
18 receive prior approval of the engineer. Piping and fittings shall be manufactured by AB&I, Charlotte, or
19 Tyler.

20
21
22 PVC, Schedule 40, Type I, ASTM D-1785, and PVC drain-waste-vent fittings, ASTM D-2665, with
23 solvent weld joints, ASTM D2855. Solid wall PVC only.

24 **ABOVE GROUND PIPE AND FITTINGS**

25 Cast iron, no-hub, service weight, ASTM A888, CISPI 301, with rubber gasket couplings, ASTM C564,
26 and stainless steel clamp, CISPI 310. Pipe and fittings shall be marked with the collective trademark of the
27 Cast Iron Soil Pipe Institute or receive prior approval of the engineer. Piping and fittings shall be
28 manufactured by AB&I, Charlotte, or Tyler.

29
30
31 PVC, Schedule 40, Type I, ASTM D-1785, and PVC drain-waste-vent fittings, ASTM D-2665, with
32 solvent weld joints, ASTM D2855. Solid wall PVC only.

33 **Optional Materials for Piping 2" and Smaller:**

34 Copper drainage tube, Type DWV, ASTM B-306; wrought copper and cast brass drainage fittings with
35 soldered joints.

36
37
38 Galvanized steel pipe, ASTM A53 or A120; galvanized cast iron threaded DWV fittings ANSI B16.4 and
39 ANSI B16.12.

40 **DRAINS AND CLEANOUTS**

41 Drains and cleanouts manufactured by J.R. Smith, Josam, MIFAB, Sioux Chief, Wade, Watts, or Zurn.

42
43 Refer to Plumbing Drain and Cleanout Schedule.

44 **PART 3 - EXECUTION**

45 **DRAIN AND VENT PIPING SYSTEM**

46 Connect all drain and vent piping to each fixture and piece of equipment and install all required piping as
47 shown on drawings. Provide all necessary fittings and hardware to make required offsets and transitions.

48
49
50 Changes in direction of drainage piping shall be made by the appropriate use of 45 degree wyes, long or
51 short sweep 1/4 bends, 1/6, 1/8, 1/16 bends or combination.

1 Fittings to be installed to make for the least possibility of stoppage. All horizontal drainage piping less than
2 3 inches shall be pitched a minimum of 1/4 inch per foot of run. Pitch drainage piping 3 inch and larger a
3 minimum of 1/8" per foot of run.
4

5 When running drain piping below a footing and parallel to it, piping shall be in all cases be at least one foot
6 greater in distance away from footing than below its bottom. Where possible, run sewers at centerpoint
7 between two parallel footings and maintain above-mentioned distances at a minimum. When running drain
8 piping under a footing, disturb as little of the soil under footing as possible. Provide concrete fill under all
9 footings where excavations wider than 18" are required.

10
11 When running drain piping through a footing, provide a steel pipe sleeve with 2" thick minimum
12 compressible wrap.
13

14 Connect to all drains, fixtures and equipment as required.
15

16 **PIPE JOINTS**

17 Install cast iron pipe and fittings, hubless pattern, as recommended by CISPI standards 301, 310, and in
18 their publication "Installation Suggestions for Cast Iron No-Hub Pipe and Fittings".
19

20 Prepare PVC pipe ends as recommended by manufacturer. Use a P-70 type primer (for PVC) and a PVC
21 solvent cement appropriate to the pipe size and temperature range.
22

23 Soldered joints shall be as described in Section 22 05 00.
24

25 **PLENUM CEILING SPACES**

26 PVC piping shall not be installed in spaces used as air plenums. Review HVAC drawings and
27 specifications to determine exact locations of areas used as air plenums.
28

29 **CLEANOUTS**

30 Provide and install cleanouts as shown on plans and as required by Code.
31

32 **TRAPS**

33 Trap all fixtures and equipment. Trap seals shall be standard depth, except when deep seals are required by
34 Code. Traps shall be set true and level and located within the limits of the Code requirements. A trap shall
35 not be used as a separator, interceptor or other type of device to retain solids. All traps above grade shall be
36 provided with approved screw-type cleanout plugs.
37

38 Traps shall be protected during construction and sealed to prevent foreign matter from entering. Provide
39 adjustable expansion plug, plastic cap, or approved equivalent.
40

41 **TESTING**

42 Refer to Testing paragraph of Section 22 05 00.
43

44 Hydro-statically pressure test all piping to 10 feet of water column pressure for 2 hours. No leaks allowed.
45 Provide mint test of entire system as required by local inspector.
46
47

48 **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 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 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.
ANSI A112.19.1-90	Enameled Cast Iron Plumbing Fixtures.
ANSI A112.19.2M-82	Vitreous China Plumbing Fixtures.

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 Vitreous china fixtures shall conform to ANSI A112.19.2M.

7
8 Enameled cast iron fixtures shall conform to ANSI A112.19.1M.

9
10 Stainless steel fixtures shall conform to ANSI A112.19.3.

11
12 Fixtures shall be installed so that parts are accessible for repairs when fixtures are in place. Manufacturer's
13 trademark or name shall be visible on fixtures.

14
15 Faucets, traps, exposed fittings and trim shall be polished chrome plated unless otherwise specified.
16 Provide polished chrome plated nipples at all lavatories.

17
18 Exposed piping penetrating walls, floors or ceilings shall have chrome plated escutcheons, or flanges of
19 sufficient depth to seal the opening.

20
21 Fixture stops shall be heavy duty commercial grade, slow compression angle valves with 1/2" inlet and 3/8"
22 or 1/2" chrome plated flexible riser.

23
24 Traps shall be semi-cast 17-gauge brass, chrome plated, with cleanout and escutcheon. Sink traps shall be
25 1-1/2" minimum.

26
27 **MANUFACTURERS**

28 Vitreous china and enameled cast iron fixtures shall be manufactured by American-Standard, Kohler,
29 Sloan, Toto, or Zurn. Fixture color shall be white unless specified otherwise.

30
31 Carriers for wall-mounted fixtures shall be manufactured by J.R. Smith, Josam, MIFAB, Wade, Watts, or
32 Zurn.

33
34 Stainless steel sinks shall be manufactured by Advance-Tabco, Elkay, or Just.

35
36 Manual faucets shall be manufactured by American Standard, Chicago Faucet, Kohler, Moen Commercial,
37 Speakman, Symmons, T&S Brass, Sloan (Polaris), or Zurn.

38
39 Electronic sensor operated faucets shall be manufactured by Bradley, Chicago Faucet, Kohler, Sloan,
40 Speakman, or Zurn.

41
42 Heavy duty stops and supplies shall be manufactured by Chicago Faucet, Dearborn, EBC, Kohler,
43 McGuire, T&S Brass, or Zurn.

44
45 Lavatory drains shall be offset type, 1-1/4" size, with flat grid strainer, manufactured by Dearborn, EBC,
46 Keeney, Kohler, McGuire, or Zurn.

47
48 Traps shall be semi-cast 17 gauge brass, chrome plated, with cleanout and escutcheon as manufactured by
49 Dearborn, EBC, Keeney, Kohler, McGuire, or Zurn.

50
51 Supply, drain and trap insulating kits shall be manufactured by Brocar, EBC, McGuire, Plumberex, or
52 Truebro.

53
54 **Fixtures:**

55 See Plumbing Fixture Schedule on drawings for type, manufacturer, and model for fixtures.

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PART 3 - EXECUTION

INSTALLATION

Install plumbing fixtures in accordance with manufacturer’s instructions. Set level and plumb. Secure in place to counters, floors and walls providing solid bearing and secure mounting. Bolt fixture carriers to floor and wall. Secure rough-in fixture piping to prevent movement of exposed piping.

Install each fixture with trap easily removable for servicing and cleaning. Install fixture stops in readily accessible location for servicing. Individual supplies to fixtures shall be provided with support to prevent movement.

Install barrier free fixtures in compliance with COMM 52, 69 and Federal ADA Accessibility Guidelines. Install barrier free lavatory traps parallel and adjacent to wall and supplies and stops elevated to avoid contact by wheelchair users.

Seal joints between countertop, wall, floor and fixtures with G.E. Silicone caulk; white, clear or color to match fixture with colored caulk by fixture manufacturer.

Each fixture shall have a stop valve installation to control the fixture. Stop valves shall be heavy duty type with brass stems and screwed or sweat inlet connections. Compression type inlets are not acceptable.

Cover pipe penetrations with escutcheons. Exposed traps, stops, piping and escutcheons to be chrome plated brass, same items in concealed locations may be of rough brass finish.

Set floor mounted water closets, floor mounted service sinks; counter mounted lavs and sinks; lav and sink faucets and drains with full setting bed of flexible non-staining plumber's putty. Cover exposed water closet bolts with bolt covers.

After installation, fixtures shall be protected to prevent scratching or other damage during construction.

Prior to acceptance, fixtures shall be cleaned with compounds recommended by the respective manufacturer.

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SECTION 23 05 00
COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

SCOPE

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

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Continuity of Existing Services
- Protection of Finished Surfaces
- Sleeves and Openings
- Sealing and Firestopping
- Equipment Furnished By Others
- Provisions for Future
- Submittals
- Off Site Storage
- Certificates and Inspections
- Operating and Maintenance Data
- Record Drawings
- Commissioning

PART 2 - PRODUCTS

- Access Panels and Doors
- Identification
- Sealing and Firestopping

PART 3 - EXECUTION

- Demolition
- Concrete Work
- Cutting and Patching
- Building Access
- Equipment Access
- Coordination
- Identification
- Lubrication
- Sleeves
- Sealing and Firestopping

RELATED WORK

Section 23 05 13 - Common Motor Requirements for HVAC.
Section 23 33 00 - Air Duct Accessories.

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

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

AABC	Associated Air Balance Council
ADC	Air Diffusion Council
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers

1	ASTM	American Society for Testing and Materials
2	CGA	Compressed Gas Association
3	IEEE	Institute of Electrical and Electronics Engineers
4	ISA	Instrument Society of America
5	MCA	Mechanical Contractors Association
6	MICA	Midwest Insulation Contractors Association
7	MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
8	NBS	National Bureau of Standards
9	NEBB	National Environmental Balancing Bureau
10	NEC	National Electric Code
11	NEMA	National Electrical Manufacturers Association
12	NFPA	National Fire Protection Association
13	SMACNA	Sheet Metal and Air Conditioning Contractors' National Association. Inc.
14	UL	Underwriters Laboratories Inc.
15	ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
16	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
17	UL1479	Fire Tests of Through-Penetration Firestops
18	UL723	Surface Burning Characteristics of Building Materials

19
20 **QUALITY ASSURANCE**

21 Refer to Division 1, General Conditions, Equals and Substitutions.

22
23 Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings,
24 or engineering parameters from those indicated on the contract documents, the contractor is responsible for
25 all costs involved in integrating the equipment or accessories into the system and for obtaining the
26 performance from the system into which these items are placed. This may include changes found necessary
27 during the testing, adjusting, and balancing phase of the project.

28
29 **CONTINUITY OF EXISTING SERVICES**

30 Do not interrupt or change existing services without prior written approval from County Facilities
31 Personnel. When interruption is required, coordinate the down-time with Facilities to minimize disruption
32 to their activities. Unless specifically stated, all work involved in interrupting or changing existing services
33 is to be done during normal working hours.

34
35 **PROTECTION OF FINISHED SURFACES**

36 Refer to Division 1, General Requirements, Protection of Finished Surfaces.

37
38 Furnish one can of touch-up paint for each different color factory finish which is to be the final finished
39 surface of the product. Deliver touch-up paint with other "loose and detachable parts" as covered in the
40 General Requirements.

41
42 **SLEEVES AND OPENINGS**

43 Refer to Division 1, General Requirements, Sleeves and Openings.

44
45 **SEALING AND FIRESTOPPING**

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

50
51 **EQUIPMENT FURNISHED BY OTHERS**

52 None.

53
54 **PROVISIONS FOR FUTURE**

55 None.

56
57 **SUBMITTALS**

58 Refer to Division 1, General Conditions, Submittals.

59
60 Submit for all equipment and systems as indicated in the respective specification sections, marking each
61 submittal with that specification section number. Mark general catalog sheets and drawings to indicate
62 specific items being submitted and proper identification of equipment by name and/or number, as indicated
63 in the contract documents.

64

1 Before submitting electrically powered equipment, verify that the electrical power and control requirements
2 for the equipment are in agreement with the motor starter schedule on the electrical drawings. Include a
3 statement on the shop drawing transmittal to the architect/engineer that the equipment submitted and the
4 motor starter schedule are in agreement or indicate any discrepancies.

5
6 Include wiring diagrams of electrically powered equipment.

7
8 Provide electronic (PDF) copies of shop drawings for electronic distribution.

9
10 **OPERATION AND MAINTENANCE DATA**

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

13
14 **OFF SITE STORAGE**

15 Ductwork, metal for making ductwork, duct lining, sleeves, pipe/pipe fittings and similar rough-in material
16 will not be accepted for off site storage. For material that can be stored off site, no material will be
17 accepted for off site storage unless shop drawings for that material have been approved.

18
19 **CERTIFICATES AND INSPECTIONS**

20 Refer also to Division 1, General Conditions, Permits, Regulations, Utilities and Taxes.

21
22 Obtain and pay for all required State installation inspections except those provided by the
23 Architect/Engineer in accordance with Wis Adm Code Section ILHR 50.12. Deliver originals of these
24 certificates to the Division Project Representative. Include copies of the certificates in the Operating and
25 Maintenance Instructions.

26
27 **OPERATING AND MAINTENANCE INSTRUCTIONS**

28 Refer to Division 1, General Requirements, Operating and Maintenance Instructions.

29
30 Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for
31 each system or type of equipment. In addition to the data indicated in the General Requirements, include
32 the following information:

- 33
34
- 35 • Copies of all approved shop drawings.
 - 36 • Manufacturer's wiring diagrams for electrically powered equipment
 - 37 • Records of tests performed to certify compliance with system requirements
 - 38 • Certificates of inspection by regulatory agencies
 - 39 • Temperature control record drawings and control sequences
 - 40 • Parts lists for manufactured equipment
 - 41 • Valve schedules
 - 42 • Lubrication instructions, including list/frequency of lubrication done during construction
 - 43 • Warranties
 - 44 • Additional information as indicated in the technical specification sections

45 Also, provide electronic (PDF) copy of Operation and Maintenance Manual on "thumb" drive or DVD.

46
47 **TRAINING OF OWNER PERSONNEL**

48 Instruct County Facility Personnel in the proper operation and maintenance of systems and equipment
49 provided as part of this project; video tape all training sessions. Include not less than 2 hours of instruction,
50 using the Operating and Maintenance manuals during this instruction. Demonstrate startup and shutdown
51 procedures for all equipment. All training to be during normal working hours.

52
53 **RECORD DRAWINGS**

54 Refer to Division 1, General Requirements, Record Drawings.

55
56 In addition to the data indicated in the General Requirements, maintain temperature control record
57 drawings on originals prepared by the installing contractor/subcontractor. Include copies of these record
58 drawings with the Operating and Maintenance manuals.

59
60 **COMMISSIONING**

61 This project will not be commissioned.
62
63
64

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3 **PART 2 - PRODUCTS**
4

5 **ACCESS PANELS AND DOORS**

6 **LAY-IN CEILINGS:**

7 Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Section 09500 are
8 sufficient; no additional access provisions are required unless specifically indicated.

9 **PLASTER WALLS AND CEILINGS:**

10 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general
11 applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver
12 operated cam latch for general applications, key lock for use in public areas, UL listed for use in fire rated
13 partitions if required by the application. Use the largest size access opening possible, consistent with the
14 space and the equipment needing service; minimum size is 12" by 12".

15 **IDENTIFICATION**

16 **STENCILS:**

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

18 **SNAP-ON PIPE MARKERS:**

19 Cylindrical self-coiling plastic sheet that snaps over piping insulation and is held tightly in place without
20 the use of adhesive, tape or straps. Not less than 1 inch high letters/numbers and flow direction arrows for
21 piping marking. W. H. Brady, Seton, Marking Services, or equal.

22 **ENGRAVED NAME PLATES:**

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

26 **VALVE TAGS:**

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

30 **SEALING AND FIRESTOPPING**

31 **FIRE AND/OR SMOKE RATED PENETRATIONS:**

32 **Manufacturers:**

33 3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or approved equal.

34 All firestopping systems shall be provided by the same manufacturer.

35 **Submittals:**

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

41 **Product:**

42 Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the
43 Department of Commerce.

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

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

1 NON-RATED PENETRATIONS:
2

3 Pipe Penetrations:

4 At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane
5 caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood
6 partitions where sleeve is not required use urethane caulk in annular space between pipe insulation and wall
7 material.
8

9 Duct Penetrations:

10 Where shown or specified, pack annular space with fiberglass batt insulation or mineral wool insulation.
11 Provide 4" sheet metal escutcheon around duct on both sides of partition or floor to cover annular space.
12
13

14 **PART 3 - EXECUTION**
15
16

17 **DEMOLITION**

18 Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to
19 be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition
20 to minimize the amount of contamination of the occupied space. Where pipe or duct is removed and not
21 reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with
22 the user agency to minimize disruption to the existing building occupants.
23

24 All pipe, wiring and associated conduit, insulation, ductwork, and similar items demolished, abandoned, or
25 deactivated are to be removed from the site by the Contractor. All piping and ductwork specialties are to
26 be removed from the site by the Contractor unless they are dismantled and removed or stored by the user
27 agency. All designated equipment is to be turned over to the user agency for their use at a place and time
28 so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to
29 that existing before work began.
30

31 **CUTTING AND PATCHING**

32 Refer to Division 1, General Requirements, Cutting and Patching.
33

34 **BUILDING ACCESS**

35 Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the
36 building access was not previously arranged and must be provided by this contractor, restore any opening
37 to its original condition after the apparatus has been brought into the building.
38

39 **EQUIPMENT ACCESS**

40 Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance and
41 service. Coordinate the exact location of wall and ceiling access panels and doors with the General
42 Contractor, making sure that access is available for all equipment and specialties. Access doors in general
43 construction are to be furnished by the Mechanical Contractor and installed by the General Contractor.
44

45 Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which
46 do not require access panels.
47

48 **COORDINATION**

49 Verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not
50 limited to, diffusers, register, grilles, and recessed or semi-recessed heating and/or cooling terminal units
51 installed in/on architectural surfaces.
52

53 Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated
54 and that interferes with other contractor's work shall be removed or relocated at the installing contractor's
55 expense.
56

57 Cooperate with the test and balance agency in ensuring Section 23 05 93 specification compliance. Verify
58 system completion to the test and balance agency (flushing, pressure testing, chemical treatment, filling of
59 liquid systems, proper pressurization and air venting of hydronic systems, clean filters, clean strainers, duct
60 and pipe systems cleaned, controls adjusted and calibrated, controls cycled through their sequences, etc.),
61 ready for testing, adjusting and balancing work. Install dampers, shutoff and balancing valves, flow
62 measuring devices, gauges, temperature controls, etc., required for functional and balanced systems.
63 Demonstrate the starting, interlocking and control features of each system so the test and balance agency
64 can perform its work.

1 **IDENTIFICATION**

2 Identify equipment in mechanical equipment rooms by stenciling equipment number and service with one
3 coat of black enamel against a light background or white enamel against a dark background. Use a primer
4 where necessary for proper paint adhesion. Do not label equipment such as cabinet heaters and ceiling fans
5 in occupied spaces.

6
7 Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

8
9 Identify piping not less than once every 20 feet, not less than once in each room, adjacent to each access
10 door or panel, and on both side of the partition where exposed piping passes through walls, floors or roofs.
11 Place flow directional arrows at each pipe identification location. Use one coat of black enamel against a
12 light background or white enamel against a dark background for stenciling, or provide snap-on pipe
13 markers as specified in Part 2 – Products.

14
15 Identify valves with brass tags bearing a system identification and a valve sequence number. Valve tags
16 are not required at a terminal device unless the valves are greater than ten feet from the device or located in
17 another room not visible from the terminal unit. Provide a typewritten valve schedule indicating the valve
18 number and the equipment or areas supplied by each valve; locate schedules in each mechanical room and
19 in each Operating and Maintenance manual. Schedules in mechanical rooms to be framed under clear
20 plastic.

21 Use engraved name plates to identify control equipment.

22
23
24 **LUBRICATION**

25 Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is
26 operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the
27 manufacturer's instructions until the work is accepted by DFD. Maintain a log of all lubricants used and
28 frequency of lubrication; include this information in the Operating and Maintenance Manuals at the
29 completion of the project.

30
31 **SLEEVES**

32
33 **PIPE SLEEVES:**

34 Provide galvanized sheet metal sleeves for pipe penetrations through interior and exterior walls to provide a
35 backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and
36 finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration
37 through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall.

38
39 Pipe sleeves are not required in interior non-rated drywall, plaster or wood partitions and sleeves are not
40 required in existing poured concrete walls where penetrations are core drilled.

41
42 Pipe sleeves are not required in cored floor pipe penetrations through existing floors that are not located in
43 mechanical rooms, food service areas or wet locations listed above.

44
45 **DUCT SLEEVES:**

46 Duct sleeves are not required in non-rated partitions or floors.

47
48 **SEALING AND FIRESTOPPING**

49
50 **FIRE AND/OR SMOKE RATED PENETRATIONS:**

51 Install approved product in accordance with the manufacturer's instructions where pipes penetrate a
52 fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the
53 insulation and vapor barrier.

54
55 Where firestop mortar is used to infill large fire-rated floor openings that could be required to support
56 weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any
57 substantial weight.

58
59 **NON-RATED PARTITIONS:**

60 At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to
61 both sides of the penetration in such a manner that the annular space between the pipe sleeve or cored
62 opening and the pipe or insulation is completely blocked.

1 Duct penetrations through non-rated partitions shall require sheet metal escutcheons with fiberglass or
2 mineral wool insulation fill for spaces that include laboratories, clean rooms, animal rooms, kitchens, cart
3 wash rooms, janitor closets, cart wash rooms, toilet rooms, mechanical rooms, conference rooms, private
4 consultation rooms, and where noted on drawings elsewhere.

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SECTION 23 05 15
PIPING SPECIALTIES

PART 1 - GENERAL

SCOPE

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

PART 1 - GENERAL

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

PART 2 - PRODUCTS

- Test Wells
- P/T (Pressure/Temperature) Test Plugs
- Hose Connection Caps
- Strainers
- Air Vents

PART 3 - EXECUTION

- Test Wells
- P/T (Pressure/Temperature) Test Plugs
- Strainers
- Air Vents

RELATED WORK

- Section 23 21 13 - Hydronic Piping
- Section 23 05 23 - General-Duty Valves for HVAC Piping
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 07 00 - HVAC Insulation

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

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

OPERATION AND MAINTENANCE DATA

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

DESIGN CRITERIA

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

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PART 2 - PRODUCTS

TEST WELLS

Similar to thermometer sockets except with a brass cap that thread into the inside of the test well to prevent dirt from accumulating. Secure cap to body with a short chain. Furnish with extension necks, where appropriate, to accommodate the pipeline insulation.

P/T (PRESSURE/TEMPERATURE) TEST PLUGS

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

HOSE CONNECTON CAPS

Hose connection caps shall be pressure rated for 150 psig at 180 deg F.

STRAINERS

Manufacturers: Armstrong, Hoffman, Illinois, Keckley, Metraflex, Mueller Steam, or Sarco.

WATER SYSTEMS:

Y type; cast iron body; stainless steel screens; bolted or threaded screen retainer tapped for a blowoff valve; threaded body in sizes through 2 inch and rated at not less than 175 psi WOG; flanged body in sizes over 2 inch and rated at not less than 125 psi WOG at 240°F. Screen to be 20 mesh for line sizes 2 inch and less, 0.125 inch perforations for line sizes 2-1/2 inch through 4 inch, and 0.25 inch perforations for line sizes 5 inch and larger.

STEAM SYSTEMS (15 PSIG AND LOWER):

Y type; cast iron body; stainless steel screens; bolted or threaded screen retainer tapped for a blow off valve; threaded in sizes through 2 inch and rated at not less than 250 psi at 400°F; flanged in sizes over 2 inch and rated at not less than 125 psi at 350°F. Screen to be 20 mesh for line sizes 2 inch and less, 0.050 inch perforations for line sizes over 2 inch.

AIR VENTS

MANUAL KEY TYPE VENTS:

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

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

MANUAL BALL VALVE VENTS:

Provide 1/4" ball valves for manual venting of air handling unit coils and where indicated elsewhere on drawings and details. Reference specifications section 23 05 23.

AUTOMATIC VENTS:

Thrush Model 720, Bell and Gossett Model 107, Watson McDaniel Model AV813W

Cast iron body with nonferrous internal parts, designed to vent air automatically with float principle without allowing air to enter the system, rated at not less than 125 psig at 220°F.

PART 3 - EXECUTION

TEST WELLS

Install in piping systems as indicated on the drawings and/or details wherever provisions are needed for inserting a thermometer at a later date.

P/T (PRESSURE/TEMPERATURE) TEST PLUGS

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

STRAINERS

Install all strainers where indicated on the project details, allowing sufficient space for the screens to be removed. Rotate screen retainer where required by the installation so blowdown can remove accumulated dirt from the strainer body.

- 1 **WATER SYSTEMS:**
2 Install a ball valve for blowdown in the tapped screen retainer; valve to be the same size as the tapping.
3
- 4 **STEAM SYSTEMS - LOW PRESSURE (15 PSIG AND LOWER):**
5 Install a gate valve for blowdown in the tapped screen retainer; valve to be the same size as the tapping,
6 suitable for system pressure (reference section 23 05 23).
7
- 8 **AIR VENTS**
9
- 10 **MANUAL KEY TYPE VENTS:**
11 Install at all high points where air may collect and not be carried by the system fluid. Use a soft Type L
12 copper "pigtail" so the vent can be positioned for venting and collecting any water that might escape.
13
- 14 **MANUAL BALL VALVE VENTS:**
15 Install on air handling coils and where indicated elsewhere as shown on drawings and details.
16
- 17 **AUTOMATIC VENTS:**
18 Install on the top of air separators on systems using bladder type expansion tanks. Install at other locations
19 as indicated on the drawings or details. All locations to have a ball valve installed upstream of the vent for
20 maintenance purposes.
21
- 22
23
- END OF SECTION

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SECTION 23 05 23
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

SCOPE

This section includes valve specifications for all HVAC systems except where indicated under Related Work. Included are the following topics:

PART 1 - GENERAL

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

PART 2 - PRODUCTS

- Manufacturers
- Water System Valves
 - Gate Valves
 - Ball Valves
 - Butterfly Valves
 - Globe Valves
 - Balance Valves
 - Drain Valves
- Low Pressure Steam/Condensate (15 psig or less)
 - Gate Valves
 - Butterfly Valves
 - Globe Valves
 - Drain Valves
- Specialty Valves and Valve Accessories
 - Stem Extensions

PART 3 - EXECUTION

- General
- Shut-off Valves
- Balancing Valves
- Calibrated Balancing Valves
- Drain Valves

RELATED WORK

Section 23 05 15 - Piping Specialties
Section 23 09 14 - Pneumatic and Electric Instrumentation and Control Devices for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SUBMITTALS

Refer to division 1, General Conditions, Submittals.

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

OPERATION AND MAINTENANCE DATA

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

1 **DESIGN CRITERIA**

2 Where valves are specified for individual mechanical services (i.e. hot water heating, steam, etc.) all valves
3 shall be of the same manufacturer unless prior written approval is obtained from DFD.
4

5
6 **PART 2 - PRODUCTS**
7

8 **MANUFACTURERS**

9 Anvil, Apollo, Armstrong, Bell & Gossett, Cash-Acme, Dresser Consolidated, Conval, Crane, Anderson
10 Greenwood and Crosby, Danfoss-Flomatic, DeZurik, Durco, Fisher, Grinnell, Griswold, Hammond,
11 Hancock, Hoffman, Jamesbury, Keystone, Kunkle, Leslie, Lunkenheimer/Cincinnati, Metraflex,
12 Milwaukee, Mueller, Newco, Nexus, Nibco, Powell, RP&C, Sarco, Spence, Stockham, Taco, Tasco,
13 Thrush-Amtrol, Vogt, Watts, or approved equal.
14

15 **WATER SYSTEM VALVES**

16 All water system valves to be rated at not less than 125 psig water working pressure at 240°F unless noted
17 otherwise.
18

19 **GATE VALVES:**

20 2" and smaller: Use ball valves; gate valves will not be accepted in sizes 2" and smaller.
21

22 **BALL VALVES:**

23 2" and smaller: Two piece bronze body; threaded or soldered ends, as appropriate to the pipe material;
24 stainless steel or chrome plated brass/bronze ball; conventional port; glass filled teflon seat; threaded
25 packing gland follower; blowout-proof stem; 600 psig WOG.
26

27 Valve stems shall allow operators to clear insulation without interference. Provide stem extensions when
28 valve operators interfere with pipe insulation.
29

30 Apollo 70-100/200 series, Hammond 8301/8311, Milwaukee BA100/150, Nibco T/S 585-70, Stockham
31 S206/216.
32

33 **BUTTERFLY VALVES:**

34 2" and smaller: Use ball valves; butterfly valves will not be accepted in sizes 2 inch and smaller.
35

36 **GLOBE VALVES:**

37 Do not use globe valves for water service, except in temperature control applications.
38

39 **BALANCE VALVES:**

40 2" and smaller: Bronze or copper alloy body with calibrated ball, globe or venturi/valve arrangement,
41 integral pointer and calibrated scale to register degree of valve opening, memory stop, drain tapping,
42 threaded or soldered ends, with or without integral unions, P/T or Shraeder pressure taps with integral
43 check valves and seals, adjustable memory stop, suitable for 200 psig water working pressure at 250°F.
44

45 Armstrong CBV, Bell & Gossett Circuit Setter Plus, Griswold Quickset, Nexus Orturi, Nibco 1710 Series,
46 Taco Accu-Flo, Tour & Anderson STAS/STAD, Victaulic series 786/787.
47

48 Include one bellows type differential pressure meter kit that includes a six inch diameter gauge with 270°
49 arc readout and having an accuracy of ±1% of full scale or better and suitable for the differential pressures
50 of the valves supplied for this project, over-range protection, color coded hoses not less than ten feet in
51 length with brass connectors suitable for connection to the low and high pressure connections on the
52 balance valves, instrument valving so meter can be vented and drained, pressure and temperature rating at
53 least equal to that of the valves. Provide meter and all accessories in a durable case with carrying handle.
54

55 Barton 247A, Midwest 809.
56

57 **DRAIN VALVES:**

58 Use 3/4 inch ball valve with threaded hose adapter except strainer blowdown valves to be the same size as
59 the blowdown connection.
60
61
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64

1 **LOW PRESSURE STEAM/CONDENSATE (15 psig or less)**

2
3 **GATE VALVES:**

4 2" and smaller: Class 150, bronze body, bronze trim, threaded ends, solid wedge, rising stem, non-asbestos
5 packing, union bonnet, malleable iron hand wheel.

6
7 Crane 431UB, Hammond IB629, Milwaukee 1151(M), Nibco T134, Lunkenheimer 3151, Powell 2714,
8 Stockham B120.

9
10 2-1/2" and larger: Class 125, iron body, bronze trim, non-asbestos packing, bolted bonnet, O.S. & Y., solid
11 wedge, flanged.

12
13 Crane 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco F-617-O, Lunkenheimer 4330 IBBM, Powell
14 1793, Stockham G623.

15
16 **BUTTERFLY VALVES:**

17 3" and smaller: Use gate valves, butterfly valves are not acceptable in sizes 3" and smaller.

18
19 **GLOBE VALVES:**

20 2" and smaller: Class 150, bronze body, bronze trim, threaded ends, teflon disc, rising stem, non-asbestos
21 packing, union bonnet, malleable iron hand wheel.

22
23 Crane 7TF, Hammond IB413T, Milwaukee 590T, Nibco T235, Lunkenheimer LQ600-150, Powell 150,
24 Stockham B-22T.

25
26 **DRAIN VALVES:**

27 Use 3/4 inch, class 150 gate valve as specified for steam and condensate systems with threaded hose
28 adapter. Strainer blowdown valves to be the same size at the blowdown connection.

29
30 **SPECIALTY VALVES AND VALVE ACCESSORIES**

31
32 **STEM EXTENSIONS:**

33 Provide stem extensions when valve operators interfere with pipe insulation.

34
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36 **PART 3 - EXECUTION**

37
38 **GENERAL**

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

41
42 Install valves in strict accordance with valve manufacturer's installation recommendations. Do not support
43 weight of piping system on valve ends.

44
45 Install all temperature control valves.

46
47 Install all valves with the stem in the upright position. Valves may be installed with the stem in the
48 horizontal position only where space limitations do not allow installation in an upright position or where
49 large valves are provided with chain wheel operators. Where valves 2-1/2" and larger are located more than
50 12'-0" above mechanical room floors, install valve with stem in the horizontal position and provide a chain
51 wheel operator. Valves installed with the stems down, will not be accepted.

52
53 Install stem extensions when shipped loose from valve.

54
55 Prior to flushing of piping systems, place all valves in the full-open position.

56
57 **SHUT-OFF VALVES**

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

60
61 **WATER SYSTEM:**

62 Butterfly valves installed at the location of a flow sensing device are to have a memory stop.

1 **BALANCING VALVES**
2 Provide balancing valves for all variable air volume terminal units and as indicated on drawings and details.

3
4 **CALIBRATED BALANCE VALVES:**
5 Install where indicated on the drawings and details for balancing of hydronic systems.

6
7 **DRAIN VALVES**
8 Provide drain valves for complete drainage of all systems. Locations of drain valves include low points of
9 piping systems, equipment locations specified or detailed including reheat coils, other locations required for
10 drainage of systems.

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13 **END OF SECTION**

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SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE

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

PART 1 - GENERAL

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

PART 2 - PRODUCTS

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

PART 3 - EXECUTION

- Installation
- Hanger and Support Spacing
- Anchors

RELATED WORK

Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment
Section 23 07 00 - HVAC Insulation

REFERENCE

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

REFERENCE STANDARDS

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

QUALITY ASSURANCE

Refer to Division 1, General Conditions, Equals and Substitutions.

DESCRIPTION

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

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

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

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

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

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

1 **DESIGN CRITERIA**

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

4
5 Piping supported by laying on the bottom chord of joists or trusses will not be accepted.

6
7 Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.

8
9 Allow sufficient space between adjacent pipes and ducts for insulation, valve operation, routine
10 maintenance, etc.

11
12
13 **PART 2 - PRODUCTS**

14
15 **PIPE HANGER AND SUPPORT MANUFACTURERS**

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

18
19 **STRUCTURAL SUPPORTS**

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

23
24 **PIPE HANGERS AND SUPPORTS**

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

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

27
28 **HANGERS FOR STEEL PIPE SIZES 2-1/2" AND OVER:**

29 Carbon steel, adjustable, clevis, black finish. Anvil figure 260.

30
31 Adjustable steel yoke, cast iron roll, double hanger. Anvil figure 181.

32
33 **MULTIPLE OR TRAPEZE HANGERS:**

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

35
36 **WALL SUPPORT:**

37 Welded steel bracket with hanger. B-Line 3068 Series, Anvil 194 Series.

38
39 Perforated epoxy painted finish, 16-12 gauge min., steel channels securely anchored to wall structure with
40 interlocking, split type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000
41 series clamps, Anvil type AS200 H with AS 1200 clamps. When copper piping is being supported,
42 provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and
43 avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers
44 clamp and cushion assemblies, B-Line BVT series, Anvil cushion clamp assembly.

45
46 **COPPER PIPE SUPPORT:**

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

48
49 **INSULATION PROTECTION SHIELDS:**

50 Galvanized carbon steel of not less than 18 gauge for use on insulated pipe 2-1/2 inch and larger.

51 Minimum shield length is 12 inches. Equal to Anvil figure 167.

52
53 **STEEL HANGER RODS:**

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

55
56 Size rods for individual hangers and trapeze support as indicated in the following schedule.

57
58 Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed
59 the limits indicated.

Maximum Load (Lbs.) (650°F Maximum Temp.)	Rod Diameter (inches)
610	3/8
1130	1/2

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1810 5/8
2710 3/4

Provide rods complete with adjusting and lock nuts.

BEAM CLAMPS

MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick for single threaded rods of 3/8, 1/2, and 5/8 inch diameter, for use with pipe sizes 4 inch and less. Furnish with a hardened steel cup point set screw. Anvil figure 86.

MSS SP-58 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 but limited in application to pipe sizes 8 inch and less without prior approval. Anvil figure 228.

CONCRETE INSERTS

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

ANCHORS

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

PART 3 - EXECUTION

INSTALLATION

Install supports to provide for free expansion of the piping and duct system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Piping shall be supported independently from ductwork and all other trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes for the supporting steel.

Perform all welding in accordance with standards of the American Welding Society. Clean surfaces of loose scale, rust, paint or other foreign matter and properly align before welding. Use wire brush on welds after welding. Welds shall show uniform section, smoothness of weld metal and freedom from porosity and clinkers. Where necessary to achieve smooth connections, joints shall be dressed smooth.

HANGER AND SUPPORT SPACING

Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

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

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of this specification. Space hangers for pipe as follows:

<u>Pipe Material</u>	<u>Pipe Size</u>	<u>Max. Spacing</u>
Steel	1/2" through 1-1/4"	6'-6"
Steel	1-1/2" through 6"	10'-0"
Copper	1/2" through 1-1/4"	5'-0"
Copper	1-1/2" and larger	8'-0"

ANCHORS

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

END OF SECTION

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SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC
For Informational Purposes Only

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PART 1 - GENERAL

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SCOPE

Testing, Adjusting and Balancing will be contracted separately by the owner under a separate contract.
Testing, Adjusting and Balancing should not be included in the Scope of Work for the Bidding HVAC Contractor. This specification section is for informational purposes only.

This section includes air and water testing, adjusting and balancing for the entire project. Included are the following topics:

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PART 1 - GENERAL

Scope
Related Work
Reference
Reference Standards
Description
Submittals

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PART 2 - PRODUCTS

Instrumentation

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PART 3 - EXECUTION

Preliminary Procedures
Balancing Scope
Performing Testing, Adjusting and Balancing
Deficiencies

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64
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RELATED WORK

Section 23 05 00 Common Work Results for HVAC
Section 23 07 00 HVAC Insulation
Section 23 09 14 Pneumatic and Electric Instrumentation and Control Devices for HVAC
Section 23 09 23 Direct Digital Control System for HVAC

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REFERENCE

Applicable provisions of the General Conditions, Supplementary General Conditions and General Requirements in Division 1 govern work under this section.

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REFERENCE STANDARDS

AABC National Standards for Total System Balance, Sixth Edition, 2002.
ASHRAE ASHRAE Handbook, 2007 HVAC Applications, Chapter 37, Testing Adjusting and Balancing.
NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, Seventh Edition, 2005.
TABB Tab Procedural Guide, First Edition, 2003.

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DESCRIPTION

The County will separately contract with an independent test and balance agency to perform all testing, adjusting, and balancing of air and hydronic systems required for this project. Work related to the testing, adjusting, and balancing that must be performed by the installing mechanical contractor is specified in other section of these specifications.

Provide total mechanical systems testing, adjusting and balancing. Requirements include the balance of air and water distribution, adjustment of new and existing systems and equipment to provide design requirements indicated on the drawings, electrical measurement and verification of performance of all mechanical equipment, all in accordance with standards published by AABC, NEBB, or TABB.

Test, adjust and balance all air and hydronic systems so that each room, piece of equipment or terminal device meets the design requirements indicated on the drawings and in the specifications.

1 Accomplish testing, adjusting and balancing work in a timely manner that allows partial occupancy of
2 major buildings, occupancy of one building when the project involves many buildings, and completion of
3 the entire project in the time stated in the Instruction to Bidders and in accordance with the completion
4 schedule established for this project.

5
6 Verify that provisions are being made to accomplish the specified testing, adjusting and balancing work. If
7 problems are found, handle as specified in Part 3 under Deficiencies.

8 9 **QUALITY ASSURANCE**

10 11 **Qualifications**

12 An independent Firm specializing in the Testing and Balancing of HVAC systems for a minimum of 3
13 years. A Firm not engaged in the commerce of furnishing or providing equipment or material generally
14 related to HVAC work other than that specifically related to installing Testing and Balancing components
15 necessary for work in this section such as, but not limited to sheaves, pulleys, and balancing dampers.

16
17 A certified member of AABC or certified by NEBB or TABB in the specific area of work performed.
18 Maintain certification for the entire duration of the project. If certification of firm or any staff performing
19 work is terminated or expires during the duration of the project, contact DFD immediately.

20 21 **SUBMITTALS**

22 Submit testing, adjusting and balancing reports bearing the seal and signature of the NEBB, AABC or
23 TABB Certified Test and Balance Supervisor. The reports certify that the systems have been tested,
24 adjusted and balanced in accordance with the referenced standards; are an accurate representation of how
25 the systems have been installed and are operating; and are an accurate record of all final quantities
26 measured to establish normal operating values of the systems.

27
28 Format: Cover page identifying project name, project number and descriptive title of contents. Divide the
29 contents of the report into the below listed divisions:

- 30 • General Information
- 31 • Summary
- 32 • Air Systems
- 33 • Hydronic Systems
- 34 • Special Systems

35
36 Contents: Provide the following minimum information, forms and data:

- 37
38 • General Information: Inside cover sheet identifying Test and Balance Agency, Contractor,
39 Architect, Engineer, Project Name and Project Number. Include addresses, contact names
40 and telephone numbers. Also include a certification sheet containing the seal and signature of
41 the Test and Balance Supervisor.
- 42
43 • Summary: Provide summary sheet describing mechanical system deficiencies. Describe
44 objectionable noise or drafts found during testing, adjusting and balancing. Provide
45 recommendations for correcting unsatisfactory performances and indicate whether
46 modifications required are within the scope of the contract, are design related or installation
47 related. List instrumentation used during testing, adjusting and balancing procedures.
- 48
49 • The remainder of the report to contain the appropriate standard NEBB, AABC, or TABB
50 forms for each respective item and system. Fill out forms completely. Where information
51 cannot be obtained or is not applicable indicate same.

52
53 Distribution: Provide electronic (PDF) copies of test and balance report to A/E for review. Final approved
54 copies of test and balance report shall be inserted into each Operation and Maintenance Manual.

55 56 **PART 2 - PRODUCTS**

57 58 **INSTRUMENTATION**

59 Provide all required instrumentation to obtain proper measurements. Application of instruments and
60 accuracy of instruments and measurements to be in accordance with the requirements of NEBB, AABC, or
61 TABB Standards and instrument manufacturer's specifications.

1 All instruments used for measurements shall be accurate, and calibration histories for each instrument to be
2 available for examination upon request. Calibration and maintenance of all instruments to be in accordance
3 with the requirements of NEBB, AABC, or TABB Standards
4
5
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7

8 **PART 3 - EXECUTION**

9 **PRELIMINARY PROCEDURES**

10 Review preconstruction meeting report, applicable construction bulletins, applicable change orders and
11 approved shop drawings of equipment, outlets/inlets and temperature controls.
12
13

14 Check filters for cleanliness, dampers and valves for correct positioning, equipment for proper rotation and
15 belt tension, temperature controls for completion of installation and hydronic systems for proper charge and
16 purging of air.
17

18 Identify deficiencies preventing completion of testing, adjusting and balancing procedures. Do not proceed
19 until systems are fully operational with all components necessary for complete testing, adjusting and
20 balancing. Installing Contractors are required to provide personnel to check and verify system completion,
21 readiness for balancing and assist Balancing Agency in providing specified system performance.
22

23 **BALANCING SCOPE**

24 The following shall be tested, adjusted and balanced:

- 25 • All new air terminal units (airflow and water flow)
- 26 • All new supply grilles.
- 27 • All new return grilles.

28 **PERFORMING TESTING, ADJUSTING AND BALANCING**

29 Perform testing, adjusting and balancing procedures on each system identified, in accordance with the
30 detailed procedures outlined in the referenced standards except as may be modified below.
31
32

33 Unless specifically instructed in writing, all work in this specification section is to be performed during the
34 normal workday.
35

36 In areas containing ceilings, remove ceiling tile to accomplish balancing work; replace tile when work is
37 complete and provide new tile for any tile that are damaged by this procedure. If the ceiling construction is
38 such that access panels are required for the work of this section and the panels have not been provided,
39 inform the owner's project representative.
40

41 Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary for
42 adequate performance of procedures. Patch using materials identical to those removed, maintaining vapor
43 barrier integrity and pressure rating of systems.
44

45 In air systems employing filters, blank off sufficient filter area to simulate a pressure drop that is midway
46 between that of a clean filter and that of a dirty filter.
47

48 Measure and record system measurements at the fan and/or pump to determine total flow. Adjust
49 equipment as required to yield specified total flow at terminals. Proceed taking measurements in mains and
50 branches as required for final terminal balancing. Perform terminal balancing to specified flows balancing
51 branch dampers, deflectors, extractors and valves prior to adjustment of terminals.
52

53 Adjust register, grille and diffuser vanes and accessories to achieve proper air distribution patterns and
54 uniform space temperatures free from objectionable noise and drafts within the capabilities of the installed
55 system.
56

57 Provide fan and motor drive sheave adjustments necessary to obtain design performance. Provide drive
58 changes specifically noted on drawings, if any. If work of this section indicates that any drive or motor is
59 inadequate for the application, advise the owner's project representative by giving the representative
60 properly sized motor/drive information (in accordance with manufacturers original service factor and
61 installed motor horsepower requirements); Confirm any change will keep the duct/piping system within its
62 design limitations with respect to speed of the device and pressure classification of the distribution system.
63 Required motor/drive changes not specifically noted on drawings or in specifications will be considered an

1 extra cost and will require an itemized cost breakdown submitted to owner's project representative. Prior
2 authorization is needed before this work is started.

3
4 Areas or rooms designed to maintain positive, negative or balanced air pressures with respect to adjacent
5 spaces, as indicated by the design air quantities, require special attention. Adjust fan drives, distribution
6 dampers, terminals and controls to maintain indicated pressure relationship.

7
8 Final air system measurements to be within the following range of specified cfm:

9 Fans	0% to +10%
10 Supply grilles, registers, diffusers	0% to +10%
11 Return grilles, registers	0% to -10%

12
13 Final water system measurements must be within the following range of specified gpm:

14 Heating flow rates	0% to -10%
-----------------------	------------

15
16 Contact the temperature control Contractor for assistance in operation and adjustment of controls during
17 testing, adjusting and balancing procedures. Cycle controls and verify proper operation and setpoints.
18 Include in report description of temperature control operation and any deficiencies found.

19
20 Permanently mark equipment settings, including damper and valve positions, control settings, and similar
21 devices allowing settings to be restored. Set and lock memory stops.

22
23 Leave systems in proper working order, replacing belt guards, closing access doors and electrical boxes,
24 and restoring temperature controls to normal operating settings.

25
26 Verify and record, in the T&B Report, "K" factors for all VAV air terminal devices and air flow stations.

27
28 **DEFICIENCIES**

29 Division 23 00 00 contractor to correct any installation deficiencies found by the test and balance agency
30 that were specified and/or shown on the Contract Documents to be performed as part of that division of
31 work. All corrective work to be done at no cost to the Owner. Retest mechanical systems, equipment, and
32 devices once corrective work is complete as specified.

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END OF SECTION

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**SECTION 23 07 00
HVAC INSULATION**

PART 1 - GENERAL

SCOPE

This section includes insulation specifications for heating, ventilating and air conditioning piping, ductwork and equipment. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference Standards
- Quality Assurance
- Description
- Definitions
- Shop Drawings
- Operation and Maintenance Data
- Environmental Requirements

PART 2 - PRODUCTS

- Materials
- Insulation Types
- Jackets
- Insulation Inserts and Pipe Shields
- Accessories

PART 3 - EXECUTION

- Examination
- Installation
- Protective Jacket Installation
- Piping, Valve and Fitting Insulation
- Piping Protective Jackets
- Pipe Insulation Schedule
- Duct Insulation
- Duct Insulation Schedule
- Equipment Insulation Schedule

RELATED WORK

- Section 23 05 00 - Common Work Results for HVAC
- Section 23 21 13 - Hydronic Piping
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 31 00 - HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ASTM B209 Aluminum and Aluminum Alloy Sheet and Plate
- ASTM C165 Test Method for Compressive Properties of Thermal Insulations
- ASTM C177 Heat Flux and Thermal Transmission Properties
- ASTM C195 Mineral Fiber Thermal Insulation Cement
- ASTM C240 Cellular Glass Insulation Block
- ASTM C302 Density of Preformed Pipe Insulation
- ASTM C303 Density of Preformed Block Insulation
- ASTM C355 Test Methods for Test for Water Vapor Transmission of Thick Materials
- ASTM C449 Mineral Fiber Hydraulic Setting Thermal Insulation Cement
- ASTM C518 Heat Flux and Thermal Transmission Properties
- ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation
- ASTM C534 Preformed Flexible Elastomeric Thermal Insulation
- ASTM C547 Mineral Fiber Preformed Pipe Insulation
- ASTM C552 Cellular Glass Block and Pipe Thermal Insulation
- ASTM C553 Mineral Fiber Blanket and Felt Insulation

1	ASTM C578	Preformed, Block Type Cellular Polystyrene Thermal Insulation
2	ASTM C591	Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
3	ASTM C610	Expanded Perlite Block and Thermal Pipe Insulation
4	ASTM C612	Mineral Fiber Block and Board Thermal Insulation
5	ASTM C921	Properties of Jacketing Materials for Thermal Insulation
6	ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
7	ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
8	ASTM D1000	Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and
9		Electronic Applications
10	ASTM D1621	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
11	ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
12	ASTM D1940	Method of Test for Porosity of Rigid Cellular Plastics
13	ASTM D2126	Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
14	ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
15	ASTM E84	Surface Burning Characteristics of Building Materials
16	ASTM E814	Standard Test Method for Fire Tests of Penetration Firestop Systems
17	ASTM E2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
18	MICA	National Commercial & Industrial Insulation Standards
19	NFPA 225	Surface Burning Characteristics of Building Materials
20	UL 723	Surface Burning Characteristics of Building Materials

21
22 **QUALITY ASSURANCE**

23 Refer to division 1, General Conditions, Equals and Substitutions

24
25 Label all insulating products delivered to the construction site with the manufacturer's name and description
26 of materials.

27
28 Insulation systems shall be applied by experienced contractors. Within the past five (5) years, the contractor
29 shall be able to document the successful completion of a minimum of three (3) projects of at least 50% of
30 the size and similar scope of the work specified in this section.

31
32 **DESCRIPTION**

33 Furnish and install all insulating materials and accessories as specified or as required for a complete
34 installation. The following types of insulation are specified in this section:

- 35 • Pipe Insulation
- 36 • Duct Insulation
- 37 • Equipment Insulation

38
39 Install all insulation in accordance with the latest edition of MICA (Midwest Insulation Contractors
40 Association) Standard and manufacturer's installation instructions. Exceptions to these standards will only
41 be accepted where specifically modified in these specifications, or where prior written approval has been
42 obtained from the DFD Project Representative.

43
44 **DEFINITIONS**

45 Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other
46 areas, including walk-through tunnels, shall be considered as exposed.

47
48 **SHOP DRAWINGS**

49 Refer to division 1, General Conditions, Submittals.

50
51 Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening
52 methods, fitting materials along with material safety data sheets and intended use of each material. Include
53 manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and
54 manufacturer's installation instructions.

55
56 **OPERATION AND MAINTENANCE DATA**

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

59
60 **ENVIRONMENTAL REQUIREMENTS**

61 Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install
62 insulation products that have been exposed to water.

63
64 Protect installed insulation work with plastic sheeting to prevent water damage.

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PART 2 - PRODUCTS

MATERIALS

Manufacturers: Armacell, Certainteed, Manson, Childers, Dow, Extol, Fibrex, Halstead, H.B. Fuller, Imcoa, Johns Manville, Knauf, Owens-Corning, Partek, Pittsburgh Corning, Rubatex, VentureTape or approved equal.

Materials or accessories containing asbestos will not be accepted.

Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

Pipe insulation which is not located in an air plenum may have a flame spread rating not over 25 and a smoke developed rating no higher than 450 when tested in accordance with UL 723 and ASTM E84.

INSULATION TYPES

Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

FLEXIBLE FIBERGLASS INSULATION:

Minimum nominal density of 0.75 lbs. per cu. ft., and thermal conductivity of not more than 0.3 at 75 degrees F, rated for service to 250 degrees F.

RIGID FIBERGLASS INSULATION:

Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75 degrees F, minimum compressive strength of 25 PSF at 10% deformation, rated for service to 450 degrees F.

JACKETS

PVC FITTING COVERS AND JACKETS (PFJ):

White PVC film, gloss finish one side, semi-gloss other side, FS LP-535D, Composition A, Type II, Grade GU. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation, in kitchens or food processing areas or installed outdoors. Jacket thickness to be minimum .02" indoors/.03" outdoors for piping 12" and smaller, .03" indoors/.04" outdoors for piping 15" and larger.

ALL SERVICE JACKETS (ASJ):

Heavy duty, fire retardant material with white kraft reinforced foil vapor barrier, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

FOIL SCRIM ALL SERVICE JACKETS (FSJ):

Glass fiber reinforced foil kraft laminate, factory applied to insulation. Maximum permeance of .02 perms and minimum beach puncture resistance of 25 units.

INSULATION INSERTS AND PIPE SHIELDS

Manufacturers: B-Line, Pipe Shields, Value Engineered Products

Construct inserts with calcium silicate or polyisocyanurate (service temperatures below 300 degrees F only), minimum 140 psi compressive strength. Piping 12" and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be minimum 180 degree coverage on bottom supported piping and full 360 degree coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate.

Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/premanufactured product described above. On low temperature systems, high density rigid polyisocyanurate may be substituted for calcium silicate provided insert and shield length and shield gauge are increased to compensate for lower insulation compressive strength.

Precompressed 20# density molded fiberglass blocks, Hamfab or equal, of the same thickness as adjacent insulation may be substituted for calcium silicate inserts with one 1"x6" block for piping through 2-1/2" and three 1"x6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/premanufactured product described above.

Wood blocks will not be accepted.

1 **ACCESSORIES**

2 All products shall be compatible with surfaces and materials on which they are applied, and be suitable for
3 use at operating temperatures of the systems to which they are applied.

4
5 Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for
6 applications specified.

7
8 Insulation bands to be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness to be
9 .015 inch for aluminum and .010 inch for stainless steel.

10 Tack fasteners to be stainless steel ring grooved shank tacks.

11
12 Staples to be clinch style.

13
14 Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.

15
16 Finishing cement to be ASTM C449.

17
18 Fibrous glass or canvas fabric reinforcing shall have a minimum untreated weight of 6 oz./sq. yd.

19
20 Bedding compounds to be non-shrinking and permanently flexible.

21
22 Vapor barrier coatings to have maximum applied water vapor permeance of .05 perms.

23
24 Fungicidal water base coating (Foster 40-20 or equal) to be compatible with vapor barrier coating.

25
26
27
28 **PART 3 - EXECUTION**

29
30 **EXAMINATION**

31 Verify that all piping, equipment, and ductwork are tested and approved prior to installing insulation. Do
32 not insulate systems until testing and inspection procedures are completed.

33
34 Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

35
36 Fix and repair any existing insulation damaged during demolition and new construction. Provide
37 continuous insulation and locations where existing walls/partitions have be removed and existing insulation
38 was not previously continuous thru removed wall/partition.

39
40 **INSTALLATION**

41 All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be
42 installed in strict accordance with manufacturer's recommendations, building codes, and industry
43 standards. Do not install products when the ambient temperature or conditions are not consistent with the
44 manufacturer's recommendations. Surfaces to be insulated must be clean and dry.

45
46 Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in
47 such a manner as to protect all raw edges, ends and surfaces of insulation.

48
49 Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be
50 accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other
51 locations where insulation terminates.

52
53 Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

54
55 Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or
56 pieces cut undersize and stretched to fit will not be accepted.

57
58 All pipe and duct insulation shall be continuous through walls, ceiling or floor openings and through
59 sleeves except where firestop or firesafing materials are required. Vapor barriers shall be maintained
60 continuous through all penetrations.

61
62 Provide a continuous unbroken moisture vapor barrier on insulation applied to systems noted below.
63 Attachments to cold surfaces shall be insulated and vapor sealed to prevent condensation.

64 Provide a complete vapor barrier for insulation on the following systems:

- Insulated Duct
- Equipment, ductwork or piping with a surface temperature below 65 degrees F

PROTECTIVE JACKET INSTALLATION

SELF-ADHERING JACKETS (SAJ):

Install according to manufacturer's recommendations. Cut allowing minimum 4" overlap on ends and 6" on longitudinal joints. Align parallel to surface. Remove release paper and press flat to surface to avoid wrinkles. Rub entire surface for full adhesion and sealing at joint overlaps. On exterior applications, provide a bead of compatible caulk along exposed edges.

Piping with self-adhering (SAJ) jackets shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the self-adhering (SAJ) jacket may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

VAPOR RETARDING JACKETS (VRJ):

Piping with vapor retarding (VRJ) jackets shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the vapor retarding (VRJ) jackets may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

PVC FITTING COVERS AND JACKETS (PFJ):

Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4" without fasteners where required to absorb expansion and contraction. For sections where vapor barrier is not required and jacket requires routine removal, tack fasteners may be used. Secure PVC fitting covers with tack fasteners. For systems requiring a vapor barrier, apply a 1-1/2" band of mastic over ends, throat, seams and penetrations.

PIPING, VALVE, AND FITTING INSULATION

GENERAL:

Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2" lap on jacket seams and 2" tape on butt joints, firmly cemented with lap adhesive unless otherwise noted. Additionally secure with staples along seams and butt joints. Coat staples, longitudinal and transverse seams with vapor barrier mastic on systems requiring vapor barrier.

Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not required or where roller hangers are not being used, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp.

Where insulated piping is installed on hangers and supports, the insulation shall be installed continuous through the hangers and supports. High density inserts shall be provided as required to prevent the weight of the piping from crushing the insulation. Pipe shields are required at all support locations. The insulation shall not be notched or cut to accommodate the supporting channels.

Fully insulate all reheat coil piping, fittings and valves (with the exception of unions) up to coil connection to prevent condensation when coil is inactive during cooling season. Provide a vapor proof seal between the pipe insulation and the insulated coil casing.

INSULATION INSERTS AND PIPE SHIELDS:

Provide pipe shields at all hanger and support locations. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Quantity and placement of inserts shall be according to the manufacturer's installation instructions, however the inserts shall be no less than 12" in length. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required for system.

Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4" and smaller copper piping provided 12" long 22 gauge pipe shields are used.

FITTINGS AND VALVES:

Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Where the ambient temperature exceeds 150

degrees F, cover insulation with fabric reinforcing and mastic. Where the ambient temperatures do not exceed 150 degrees, furnish and install PVC fitting covers.

ELASTOMERIC AND POLYOLEFIN:

Where practical, slip insulation on piping during pipe installation when pipe ends are open. Miter cut fittings allowing sufficient length to prevent stretching. Completely seal seams and joints for vapor tight installation. For elastomeric insulation, apply full bed of adhesive to both surfaces. For polyolefin, seal factory preglued seams with roller and field seams and joints with full bed of hot melt polyolefin glue to both surfaces. Cover elastomeric insulation on systems operating below 40 degrees F with vapor barrier mastic.

PIPING PROTECTIVE JACKETS

In addition to the jackets specified in the pipe insulation schedule below the following protective jackets are required:

Provide a protective PVC jacket (PFJ) for the following insulated piping:

- Piping exposed in finished locations

PIPE INSULATION SCHEDULE:

Provide insulation on new and existing remodeled piping as indicated in the following schedule:

<u>Service</u>	<u>Insulation</u>	<u>Jacket</u>	<u>Insulation Thickness by Pipe Size</u>			
			<u>≤ 1-1/4"</u>	<u>1-1/2"</u>	<u>2" to 4"</u>	<u>4" to 6"</u>
Heating Hot Water	Rigid Fiberglass	ASJ	1.5"	1.5"	2"	2"
Low Pressure Steam	Rigid Fiberglass	ASJ	2.5"	2.5"	2.5"	2.5"
Steam Condensate	Rigid Fiberglass	ASJ	1.5"	1.5"	2"	2"

The following piping and fittings are not to be insulated:

- Steam/Condensate piping inside radiation, convector, or cabinet heater enclosures (Steam/condensate piping located below enclosures shall be insulated).
- Piping unions for systems not requiring a vapor barrier

For systems with fluid temperatures 65° F or less, furnish and install removable elastomeric insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel. Examples include but are not limited to: flow sensing devices, circuit setters, manual ball valve air vents, drain valves, blowdown valves, pressure/temperature test plugs, grease fittings, pump bearing caps, equipment labels, etc. Covers shall be tight fitting to ensure a complete vapor barrier.

DUCT INSULATION

GENERAL:

Secure flexible duct insulation on sides and bottom of ductwork over 24" wide and all rigid duct insulation with weld pins. Space fasteners 18" on center or less as required to prevent sagging.

Secure rigid board insulation to ductwork with weld pins. Apply insulation with joints firmly butted as close as possible to the equipment surface. Pins shall be located a maximum of 3" from each edge and spaced no greater than 12" on center.

Install weld pins without damage to the interior galvanized surface of the duct. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4" tape of same material as jacket. Seal tape with plastic applicator and secure with staples. All joints, seams, edges and penetrations to be fully vapor sealed.

Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.

External supply duct insulation is not required where ductwork contains continuous 1" acoustical liner. Provide 4" overlap of external insulation over ends of acoustically lined sections.

Where insulated ductwork is supported by trapeze hangers, the insulation shall be installed continuous through the hangers. Drop the supporting channels required to facilitate the installation of the insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent the weight of the ductwork from crushing the insulation.

1 Where insulated low temperature (below 45°F) ductwork is supported by steel metal straps or wire ropes
2 that are secured directly to the duct, the straps or ropes shall be completely covered with insulation and
3 sealed to provide a complete vapor barrier.
4

5 Where insulated duct risers are supported by steel channels secured directly to the duct, extend the
6 insulation and vapor barrier jacketing to encapsulate the support channels.
7

8 **DUCT INSULATION SCHEDULE:**

9 Provide duct insulation on new and existing remodeled ductwork in the following schedule:
10

11 Service	Insulation Type	Jacket	Insulation Thickness
12 Exposed supply ducts*	Rigid Fiberglass	FSJ	2"
13 Concealed supply ducts	Flexible Fiberglass	FSJ	1-1/2"

14
15 * Exposed supply branch ducts located in the space they are serving do not require insulation. Exposed
16 supply main ducts running through spaces they serve shall be insulated as exposed supply ducts
17 scheduled above.
18

19 **EQUIPMENT INSULATION SCHEDULE:**

20 Provide equipment insulation as follows:
21

22 Equipment	Insulation	Jacket	Thickness
23			Type
24 Reheat coil casing in exposed supply ducts	Rigid Fiberglass	FSJ	2"
25 Reheat coil casing in concealed supply ducts	Flexible Fiberglass	FSJ	1-1/2"

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SECTION 23 09 23
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

SCOPE

The existing building utilizes an Alertton direct digital control (DDC) system. This project will add (6) new air terminal units and (5) sections of wall fin radiation with DDC control that will be integrated into the existing building Alertton DDC system. This project shall provide:

- All new controllers required to integrate (6) new VAV air terminals into the existing building automation system.
- (6) new hot water reheat DDC temperature control valves for new VAV air terminals.
- (5) new hot water DDC temperature control valves for existing hot water convectors.
- (6) new space temperature sensors associated with each VAV air terminal.
- All control wiring (low and line voltage) for a complete operating system.
- Update of existing 3rd floor and 5th floor City County Building automation graphics to include new air terminals, convectors, etc. associated with this project.

All new air terminals and air terminal controls shall be integrated into the Alertron DDC system.

All new controllers, control wiring and temperature control valves shall follow current City County Building protocols to provide building continuity in regards to controllers, wiring and equipment.

Work in this section includes Direct Digital Control (DDC) panels, main communication trunk, software programming, and other equipment and accessories necessary to constitute a complete Direct Digital Control (DDC) system.

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Submittals
- Operation and Maintenance Data
- Material Delivery and Storage

PART 2 - PRODUCTS

- General
- Control Valves
- Thermostats

PART 3 - EXECUTION

- General
- Installation
- Sequence of Operation
- Owner Training
- Points List

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

FCC Part 15, Subpart J, Class A - Digital Electronic Equipment to Radio Communication Interference

1 **QUALITY ASSURANCE**

2
3 APPROVED MANUFACTURER:

4 Alerton.

5
6 INSTALLER:

7 The installer shall be specialized and experienced in Alerton DDC control systems and installation for not
8 less than 5 years. All engineering work shall be done by qualified employees of Alerton, or qualified
9 employees of an Alerton Authorized Representative that provides engineering and commissioning of
10 Alerton control equipment. Where installing contractor is an authorized representative of Alerton, submit
11 written confirmation of such authorization. Indicate in letter of authorization that the installing contractor
12 has successfully completed all necessary training required for the engineering, installation, and
13 commissioning of equipment and systems to be provided for the project and that such authorization has
14 been in effect for a period of not less than three years. The letter of authorization should also indicate that
15 the installing contractor is authorized to install Alerton DDC equipment at the project location at the time
16 the project is bid. Installation of the equipment shall be done by qualified mechanics and/or electricians in
17 the direct employ or be directly subcontracted and under the supervision of Alerton or Authorized Alerton
18 Representative. The contractor providing and installing the equipment under this specification section shall
19 be the same contractor providing and installing equipment under the 23 09 14 specification section.

20
21 The owners preferred Alerton temperature control system installer is:

22
23 Environmental Systems Inc.
24 Brookfield, Wisconsin Office
25 3410 Gateway Road
26 Brookfield, WI 53045
27 Office: 262-544-8860
28 Facsimile: 262-544-0783
29 Contact: Jerry Gitlewski

30
31 **RESPONSE TIME:**

32 During warrantee period, three (3) hours or less, 24-hours/day, 7 days/week.

33
34 ELECTRICAL STANDARDS:

35 Provide electrical products, which have been tested, listed and labeled by Underwriters' Laboratories (UL)
36 and comply with NEMA standards.

37
38 DDC Standards: DDC manufacturer shall provide written proof with shop drawings that the equipment
39 being provided is in compliance with F.C.C. rules governing the control of interference caused by Digital
40 Electronic Equipment to Radio Communications (Part 15, Subpart J, Class A).

41
42 **SUBMITTALS**

43 Provide submittals on all DDC control work.

44
45 Details of construction, layout, and location of each temperature control panel within the building,
46 including instruments location in panel and labeling. Indicate which piece of mechanical equipment is
47 associated with each controller and what area within the building is being served by that equipment. For
48 terminal unit control, provide a room schedule that would list mechanical equipment tag, room number of
49 space served, address of DDC controller, and any other pertinent information required for service.

50
51 A complete description of each control sequence for equipment that is not controlled by direct digital
52 controls. Direct digital controlled equipment control sequences will be provided by the DDC control
53 contractor.

54
55 PRODUCT DATA

56 Submit manufacturer's specifications for each control device furnished, including installation instructions
57 and startup instructions. General catalog sheets showing a series of the same device is not acceptable
58 unless the specific model is clearly marked. Annotated software program documentation shall be submitted
59 for system sequences, along with descriptive narratives of the sequence of operation of the entire system
60 involved. Submit wiring diagram for each electrical control device along with other details required to
61 demonstrate that the system has been coordinated and will function as a system.

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MAINTENANCE DATA

Submit maintenance data and spare parts lists for each control device. Include this data in maintenance manual.

RECORD DRAWINGS

Provide as-built record control drawings, including sequences, for the installation of all DDC controls.

OPERATION AND MAINTENANCE DATA

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

MATERIAL DELIVERY AND STORAGE

Provide factory shipping cartons for each piece of equipment and control device. This contractor is responsible for storage of equipment and materials inside and protected from the weather.

PART 2 - PRODUCTS

GENERAL

Provide DDC control and actuation to accomplish Sequence of Operation (indicated below) and DDC Points list. Provide all controllers, temperature control panels, wiring, etc. for a complete installation.

Controls installed as part of this project shall be fully compatible with existing DDC controls located within the facility.

Provide updated DDC/BAS graphics reflecting new work and sequences of control.

Provide all required installation, termination, wiring, power, graphics and programming for a complete operating system.

CONTROL VALVES

Manufacturer: Belimo (Valve and Actuator) only.

Provide all control valves as shown on the plans/details and as required to perform functions specified. Spring ranges must be selected to prevent overlap of operation and simultaneous heating and cooling.

Size operators to allow smooth and positive operation of devices served and to provide sufficient torque capacity for tight shutoff against system temperatures and pressure encountered. Use fully proportional actuators with 0-10VDC inputs and zero and span adjustments unless specified otherwise. If TriState with feedback is specified, valve position shall be fed back to the controller and controller shall position valve based on this feedback. Electric actuators, for applications other than terminal units, shall be provided with a manual override capability. All electric actuators shall be provided with a visible position indicator.

All power required for electric actuation shall be provided by this contractor if it is not able to be directly provided from the DDC controller.

Provide operators that are full proportioning or two-position, as required for specified sequence of operation.

Provide operators with linkages and brackets for mounting on device served.

All valves unless specifically noted on the plans or indicated below shall be ball style valves.

VALVE SERVING	TYPE	SIGNAL	SPRING RETURN	FAIL POSITION
Reheat Coil	Ball	0-10 VDC	No	Last Position
Perimeter Radiation	Valve - Belimo – B215HT186 (1/2”, Cv=1.86) Actuator – Belimo – TR24-SR US			

54
55
56
57
58

Use equal percentage valves for two-way control valves; size for a pressure drop not less than 4 psi or more than 6 psi. Note: For low flows, the required minimum Cv size will result in lower pressure drop than 4 psi.

1
2 Globe valves 2" and smaller: Cast bronze or forged brass body, brass plug and brass or stainless steel seat,
3 stainless steel stem, screwed ends, suitable for use on water systems at 150 psig and 240° F. Seat leakage
4 with actuator supplied will meet ANSI class IV leakage (0.01%). For globe valves that are specified to fail
5 in place, valves shall be open when the stem is up. Only the following globe valve body styles will be
6 acceptable for terminal unit control. Valves and actuators shall be by Belimo.
7

8 **THERMOSTATS**

9 Thermostats shall match existing thermostats (finish and functionality) located in adjacent areas of the City
10 County Building.
11

12 **PART 3 - EXECUTION**

13 **GENERAL**

14 All electronic work required as an integral part of the Direct Digital Control system work is the
15 responsibility of this contractor.
16

17 This contractor shall provide all labor, materials, engineering, software, permits, tools, checkout and
18 certificates required to install a complete Direct Digital Control system as herein specified.
19

20 This Direct Digital Control system as herein specified shall be fully integrated and completely installed by
21 this section. It shall include all required computer CPU software and hardware. Include the engineering,
22 installation, supervision, calibration, software programming, and checkout necessary for a fully operational
23 system.
24

25 **INSTALLATION**

26 All work and materials are to conform in every detail to the rules and requirements of the National
27 Electrical Code and present manufacturing standards. All material shall be UL approved.
28

29 Install system and materials in accordance with manufacturer's instructions, rough-in drawings and details
30 on drawings.
31

32 Any line voltage wiring to be by this contractor.
33

34 Label all control devices with the exception of dampers, valves, and terminal unit devices with permanent
35 printed labels that correspond to control drawings. Temperature control junction and pullboxes shall be
36 identified utilizing spray painted green covers. Other electrical system identification shall follow the 26 05
37 53 specification.
38

39 All control devices and electrical boxes mounted on insulated ductwork shall be mounted over the
40 insulation. Provide mounting stand-offs where necessary for adequate support. Cutting and removal of
41 insulation to mount devices directly on ductwork is not acceptable. This contractor shall coordinate with
42 the insulation contractor to provide for continuous insulation of ductwork.
43

44 Provide all electrical relays and wiring, line and low voltage, for control systems, devices and components.
45 Install all high voltage and low voltage wiring (includes low voltage cable) in rigid metal conduit. All
46 conduit must be installed in accordance with electrical sections (Division 26) of this specification and the
47 National Electrical code.
48

49 Conduit shall be a minimum of 1/2 " for low voltage control provided the pipe fill does not exceed 40%.
50

51 Minimum low voltage wiring gauge to be 18 AWG for outputs and 20 AWG for inputs. All low voltage
52 wiring to be stranded.
53

54 Low voltage wiring can be run without conduit above accessible lay-in tile ceilings. All wiring in
55 mechanical rooms, above inaccessible hard ceilings, exterior locations, and in any exposed areas, and in all
56 other locations should be in conduit. Wire for wall sensors must be run in conduit. Wiring for radiation
57 valves shall be run in conduit where routed through walls.
58

59 Where wiring is installed free-air, installation shall consider the following:
60

- 61 • Wiring shall utilize the cable tray wherever possible.
- 62 • Wiring shall run at right angles and be kept clear of other trades work.
63

- 1 • Wiring shall be supported utilizing "J" or "Bridal-type" steel mounting rings anchored to ceiling
2 concrete, piping supports, walls above ceiling or structural steel beams. Mounting rings shall be of
3 open design (not a closed loop) to allow additional wire to be strung without being threaded through
4 the ring. For mounting rings that do not completely surround the wire, attach the wire to the mounting
5 ring with a strap.
- 6 • Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If
7 wiring "sag" at mid-span exceeds 6-inches; another support shall be used.
- 8 • Wiring shall never be laid directly on the ceiling grid or attached in any manner to the ceiling grid
9 wires.
- 10 • Wall penetrations shall be sleeved.

11
12 Wiring shall not be attached to existing cabling, existing tubing, plumbing or steam piping, ductwork,
13 ceiling supports or electrical or communications conduit.

14
15 Mount control panels adjacent to associated equipment on vibration-free walls or free-standing angle iron
16 supports. One cabinet may accommodate more than one system in same equipment room. Provide
17 engraved plastic nameplates for instruments and controls inside cabinet and on cabinet face.

18
19 Provide as-built control drawings of all systems served by each local panel in a location adjacent to or
20 inside of panel cover. Provide a protective cover or envelope for drawings.

21
22 Provide all necessary routers and or repeaters to accomplish connection to the BAN via the panel-mounted
23 port provided.

24
25 All tubing, cable and individual wiring is to be permanently tagged, with numbers corresponding with
26 "Record Drawings", spares are to be labelled as "Spare".

27
28 Provide technician to work with air balancing contractor and/or provide balancing contractor with
29 necessary hardware to over-ride DDC controllers for air balancing.

30
31 Provide documentation to demonstrate that all points, input and output, have been checked out and verified
32 operational, note any points not operating properly with notation of reason.

33 **SEQUENCE OF OPERATION**

34 VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT

35
36 Systems consist of:

- 37 • Variable air volume terminal
- 38 • Hot water reheat coil with 2-way temperature control valve.
- 39 • DDC space sensor.
- 40 • Lighting Occupancy Sensor (Sensor provided and installed by electrical contractor, Large
41 Conference Room Only).
- 42
- 43

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

45
46 Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for
47 the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the
48 air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal
49 damper is at its minimum flow, the hot water valve shall modulate open to maintain space temperature. If
50 the air terminal has a heating airflow, the hot water control valve and air terminal shall open in parallel.

51
52 The reverse shall occur when space temperature is below setpoint. The heating coil valve shall be
53 commanded closed whenever the associated AHU is off. Provide a discharge air temperature sensor for
54 monitoring purposes.

55
56 Each space temperature sensor shall have a manual override button that shall index the space to the
57 occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the
58 terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).

1 Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes.
2 When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed
3 and the airflow at heating and cooling minimum flow.
4

5 Occupancy sensors will be provided by the Division 26 contractor. Provide wiring from all occupancy
6 sensor contacts to building automation system for space occupied/unoccupied control. When the
7 occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and
8 the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied
9 heating and cooling setpoints as defined by the weekly schedule (grouped or individually). When the
10 occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled
11 and the occupied heating and cooling temperature setpoints shall be maintained regardless of the weekly
12 schedule. All programming for the above sequence shall reside in the terminal unit controller and a
13 supervisory controller shall not be required to reset any flow or temperature setpoints based on the
14 occupancy sensor.
15

16 Where there are multiple occupancy sensors associated with a VAV zone that serves multiple spaces, all
17 occupancy sensors must be “unoccupied” for the air terminal to move to zero airflow setpoint.
18

19 VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT AND PERIMETER
20 RADIATION

21 Systems consist of:

- 22 • Variable air volume terminal
- 23 • Hot water reheat coil with 2-way temperature control valve.
- 24 • Existing hot water convector with new DDC control valve and actuator
- 25 • DDC discharge air sensor.
- 26 • DDC space sensor.
27

28 Provide all line and low voltage wiring for a complete operating system.
29

30 Mount discharge air temperature sensor a minimum of 3 duct diameters downstream of reheat coil
31

32 Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for
33 the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the
34 air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal
35 damper is at its minimum flow, the hot water reheat valve and perimeter radiation valve shall modulate
36 open in parallel to maintain space temperature.
37

38 The reverse shall occur when space temperature is below setpoint.
39

40 The heating coil valves shall be commanded closed whenever the associated AHU is off. Provide a
41 discharge air temperature sensor for monitoring purposes.
42

43 Each space temperature sensor shall have a manual override button that shall index the space to the
44 occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the
45 terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).
46

47 Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes.
48 When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed
49 and the airflow at heating and cooling minimum flow.
50

51 **OWNER TRAINING**

52 Provide factory authorized representative and/or field personnel knowledgeable with the operations,
53 maintenance and troubleshooting of the system and/or components defined within this section for a
54 minimum period of 2 hours.
55

1 Provide two follow-up visits for troubleshooting and instruction, one six months after substantial
2 completion and the other at the end of the warranty period. Length of each visit to be not less than 2 hours
3 or the time necessary to provide required information and complete troubleshooting and inspection activity
4 for all controls.

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END OF SECTION

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**SECTION 23 21 13
HYDRONIC PIPING**

PART 1 - GENERAL

SCOPE

This section contains specifications for all HVAC hydronic pipe and pipe fittings for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria

PART 2 - PRODUCTS

- Heating Hot Water
- Unions and Flanges
- Gaskets
- Unions and Flanges
- Mechanical Grooved Pipe Connections

PART 3 - EXECUTION

- Preparation
- Erection
- Threaded Pipe Joints
- Mechanical Grooved Pipe Connections
- Copper Pipe Joints
- Water Systems
- Unions and Flanges
- Gaskets
- Piping System Leak Tests
- Hydronic Piping System Flushing

RELATED WORK

- Section 23 05 23 - General-Duty Valves for HVAC Piping
- Section 23 05 15 - Piping Specialties
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 07 00 - HVAC Insulation
- Section 23 25 00 - HVAC Water Treatment.

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ANSI B16.3 Malleable Iron Threaded Fittings
- ANSI B16.4 Cast Iron Threaded Fittings
- ANSI B16.5 Pipe Flanges and Flanged Fittings
- ANSI B16.22 Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
- ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- ASTM A105 Forgings, Carbon Steel, for Piping Components
- ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- ASTM A181 Forgings, Carbon Steel for General Purpose Piping
- ASTM A197 Cupola Malleable Iron
- ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- ASTM B75 Seamless Copper Tube
- ASTM B88 Seamless Copper Water Tube

1 **SHOP DRAWINGS**

2 Refer to division 1, General Conditions, Submittals.

3
4 Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed
5 along with its type and grade and sufficient information to indicate the type and rating of fittings for each
6 service.

7
8 **TYPE F STEEL PIPE:**

9 Statement from manufacturer on his letterhead that the pipe furnished meets the ASTM specification
10 contained in this section.

11
12 **TYPE E OR S STEEL PIPE:**

13 Mill certification papers, also known as material test reports, for the pipe furnished for this project, in
14 English. Heat numbers on these papers to match the heat numbers stenciled on the pipe. Chemical
15 analysis indicated on the mill certification papers to meet or exceed the requirements of the referenced
16 ASTM specification.

17
18 **COPPER TUBE:**

19 Statement from manufacturer on his letterhead that the pipe furnished meets the ASTM specification
20 contained in this section.

21
22 **QUALITY ASSURANCE**

23 Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or
24 each bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.

25
26 Any installed material not meeting the specification requirements must be replaced with material that meets
27 these specifications without additional cost to the Owner.

28
29 **DELIVERY, STORAGE, AND HANDLING**

30 Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

31
32 Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do
33 not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where
34 end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges,
35 and unions by storage inside or by durable, waterproof, above ground packaging.

36
37 Offsite storage agreements will not relieve the contractor from using proper storage techniques.

38
39 Storage and protection methods must allow inspection to verify products.

40
41 **DESIGN CRITERIA**

42 Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM
43 specifications as listed in this specification.

44
45 Construct all piping for the highest pressures and temperatures in the respective system in accordance with
46 ANSI B31, but not less than 125 psig unless specifically indicated otherwise.

47
48 Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a
49 centerline radius of 1.5 pipe diameters.

50
51 Where ASTM A53 type F pipe is specified, ASTM A53 grade A type E or S, or ASTM A53 grade B type E
52 or S may be substituted at Contractor's option. Where ASTM A53 grade A pipe is specified, ASTM A53
53 grade B pipe may be substituted at Contractor's option. Where the grade or type is not specified,
54 Contractor may choose from those commercially available.

55
56 Where ASTM B88, type L hard temper copper tubing is specified, ASTM B88, type K hard temper copper
57 tubing may be substituted at Contractor's option.

58
59 **PART 2 - PRODUCTS**

60
61 **HEATING HOT WATER**

62 2" and Smaller: ASTM A53, type F, standard weight (schedule 40) black steel pipe with ASTM
63 A126/ANSI B16.4, class 125, standard weight cast iron threaded fittings.

1 Contractor may use ASTM B88 seamless, type L, hard temper copper tube with ANSI B16.22 wrought
2 copper solder-joint fittings in lieu of steel pipe for all sizes. Mechanically formed tee fittings may be used
3 in lieu of wrought copper solder-joint tee fittings for branch takeoff up to one-half (1/2) the diameter of the
4 main.
5

6 **UNIONS AND FLANGES**

7 2" and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron
8 on black steel piping and galvanized malleable iron on galvanized steel piping. Use ANSI B16.18 cast
9 copper alloy unions on copper piping. Use unions of a pressure class equal to or higher than that specified
10 for the fittings of the respective piping service but not less than 250 psi.
11

12 **GASKETS**

13 Water and Glycol Systems: Branded, compressed, non-asbestos sheet gaskets. Klingsil C4401, Garlock
14 3000, JM Clipper 978 or approved equal.
15

16 **MECHANICAL GROOVED PIPE CONNECTIONS**

17 Will not be allowed on this project.
18
19

20 **PART 3 - EXECUTION**

21 **ERECTION**

22 Carefully inspect all pipe, fittings, valves, equipment and accessories before installation. Any items that
23 are unsuitable, cracked or otherwise defective shall be rejected and removed from the job site immediately.
24 Excluding minor surface rust, piping that exhibits significant oxidation or corrosion will be rejected.
25
26

27 Exercise care at every stage of storage, handling, laying and erecting to prevent entry of foreign matter into
28 piping, fittings, valves, equipment and accessories. Do not erect or install any item that is not clean.
29 Remove all loose dirt, scale, oil, chips, burrs and other foreign material from the internal and external
30 surfaces of all pipe and piping components prior to assembly, including debris associated with cutting,
31 threading and welding.
32

33 During fabrication and assembly, remove slag and weld spatter from internal pipe surfaces at all joints by
34 peening, chipping and wire brushing.
35

36 During construction, until system is fully operational, keep all openings in piping and equipment closed
37 except when actual work is being performed on that item of the system. Use plugs, caps, blind flanges or
38 other items designed for this purpose.
39

40 Furnish and install all flanges, caps, bypasses, drains, valves, etc. required to facilitate flushing and
41 draining all heating and cooling system piping.
42

43 Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a
44 window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute
45 piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe
46 spaces, ceiling heights, door and window openings, or other architectural details before installing piping.
47

48 Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and
49 contract without damage to itself, equipment, or building.
50

51 Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are
52 not acceptable.
53

54 "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the
55 main.
56

57 Install drains throughout the systems to permit complete drainage.
58

59 Do not route piping through transformer vaults or above transformers, panelboards, or switchboards,
60 including the required service space for this equipment, unless the piping is serving this equipment
61

1 Install all valves, control valves, and piping specialties, including items furnished by others, as specified
2 and/or detailed. Make connections to all equipment installed by others where that equipment requires the
3 piping services indicated in this section.
4

5 **THREADED PIPE JOINTS**

6 Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement
7 or caulking will be allowed.
8

9 **MECHANICAL GROOVED PIPE CONNECTIONS**

10 Are not allowed on this project.
11

12 **COPPER PIPE JOINTS**

13 Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces.
14 Clean fitting and tube with emery cloth or sandpaper. Remove residue from the cleaning operation, apply
15 flux, and assemble joint. Use 95-5 solder or brazing to secure joint as specified for the specific piping
16 service.
17

18 Where mechanically formed tee fittings are allowed, form mechanically extracted collars in a continuous
19 operation, consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a
20 height of not less than three times the thickness of the tube wall. Use an adjustable collaring device. Notch
21 and dimple the branch tube. Braze the joint, applying heat properly so that pipe and tee do not distort;
22 remove distorted connections.
23

24 **WATER SYSTEM**

25 Run water mains level or pitch horizontal mains up 1 inch in 40 feet in the direction of flow. Install manual
26 air vents at all high points where air may collect. If vent is not in an accessible location, extend air vent
27 piping to the nearest code acceptable drain location with vent valve located at the drain.
28

29 Main branches and runouts to terminal equipment may be made at the top, top 45 degree, side, and/or
30 bottom 45 degree of the main provided that there are drain valves suitably located for complete system
31 drainage and manual air vents are located at all top and top 45 degree connections. Bottom connections are
32 not acceptable unless approved by the DFD Mechanical Inspector.

33 Use top or top 45 degree connection to main for upfeed risers and bottom 45 degree connection to main for
34 downfeed risers. Bottom connections are not acceptable.
35

36 Use a minimum of two elbows in each pipe line to a piece of terminal equipment to provide flexibility for
37 expansion and contraction of the piping systems. Offset pipe connections at equipment to allow for
38 service, such as removal of the terminal device.
39

40 Use eccentric fittings for changes in horizontal pipe sizes with the fittings installed for proper air venting.
41 Concentric fittings may be used for changes in vertical pipe sizes.
42

43 **UNIONS AND FLANGES**

44 Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece
45 of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located
46 at a piece of equipment, locate the flange or union connection on the equipment side of the valve.
47 Concealed unions or flanges are not acceptable.
48

49 **GASKETS**

50 Store horizontally in cool, dry location and protect from sunlight, water and chemicals. Inspect flange
51 surfaces for warping, radial scoring or heavy tool marks. Inspect fasteners, nuts and washers for burrs or
52 cracks. Replace defective materials.
53

54 Align flanges parallel and perpendicular with bolt holes centered without using excessive force. Center
55 gasket in opening. Lubricate fastener threads, nuts and washers with lubricant formulated for application.
56

57 Draw flanges together evenly to avoid pinching gasket. Tighten fasteners in cross pattern sequence (12 – 6
58 o'clock, 3 – 9 o'clock, etc.), one pass by hand and four passes by torque wrench at 30% full torque, 60%
59 full torque and two passes at full torque per ASME B16.5.
60

61 **PIPING SYSTEM LEAK TESTS**

62 Verify that the piping system being tested is fully connected to all components and that all equipment is
63 properly installed, wired, and ready for operation. If required for the additional pressure load under test,

1 provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can
 2 withstand any additional weight load that may be imposed by the test.
 3
 4 Provide all piping, fittings, blind flanges, and equipment to perform the testing.
 5
 6 Conduct pressure test with test medium of air or water unless specifically indicated. Minimum test time is
 7 indicated in the table below; additional time may be necessary to conduct an examination for leakage.
 8 Each test must be witnessed by the A/E or an approved representative from the County. If leaks are found,
 9 repair the area with new materials and repeat the test; caulking will not be acceptable.

10
 11 Do not insulate pipe until it has been successfully tested.

12
 13 For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents
 14 or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

<u>System</u>	<u>Pressure</u>	<u>Medium</u>	<u>Duration</u>
Heating hot water	100 psig	Water	8 hr

15
 16
 17
 18 All pressure tests are to be documented.

19
 20 On piping that cannot be tested because of connection to an active line, provide temporary blind flanges
 21 and hydrostatically test new section of piping. After completion of test, remove temporary flanges and
 22 make final connections to piping

23
 24 **HYDRONIC PIPING SYSTEM FLUSHING**

25 All new heating hot water system piping shall be flushed thoroughly before the systems are put in to
 26 operation. Subsequent to executing the chemical cleaning processes specified in Section 23 25 00 – HVAC
 27 WATER TREATMENT, and prior to adding scale and corrosion inhibitors, flush all piping and
 28 components with a clean source of water until the discharge from the system is clean. Discharge shall be
 29 from drains provided at all low points in the piping, ends of headers and as otherwise necessary to flush and
 30 drain the entire system.

31
 32
 33

END OF SECTION

PIPING SYSTEM LEAKAGE TEST REPORT

Date Submitted: _____

Project Name: _____

Location: _____

Contractor: _____

- HVAC Refrigeration Controls
 Power Plant Plumbing Sprinkler
Test Medium: Air Water Other _____

Test performed per specification section No. _____

Specified Test Duration _____ **Hours** **Specified Test Pressure** _____ **PSIG**

System Identification: _____

Describe Location: _____

Test Date: _____	
Start Test Time: _____	Initial Pressure: _____ PSIG
Stop Test Time: _____	Final Pressure: _____ PSIG

Tested By: _____

Witnessed By: _____

Title: _____

Title: _____

Signed: _____

Signed: _____

Date: _____

Date: _____

Comments: _____

PIPING SYSTEM FLUSHING REPORT (revised 10/1/2012)

Date Submitted: _____

Project Name: _____

Location: _____

Contractor: _____

System Identification (check one):

- Chilled Water Process Chilled Water Heat Reclaim
 Heating Hot Water Other _____

Describe procedure: _____

Flush Date: _____ **Start Time:** _____ **Stop Time:** _____

Pressure of Water Source: _____ **PSIG** **Describe water source and method of connection to source :**

PIPING SYSTEM FLUSHING REPORT (page 2)

Flushed By: _____

Witnessed By: _____

Title: _____

Title: _____

Company: _____

Signed: _____

Signed: _____

Date: _____

Date: _____

Describe results: _____

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SECTION 23 22 13
STEAM AND CONDENSATE HEATING PIPING

PART 1 - GENERAL

SCOPE

This section contains specifications for steam and condensate heating piping for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria

PART 2 - PRODUCTS

- Low Pressure Steam (15 psig and lower)
- Low Pressure Steam Condensate (Steam pressure 15 psig and lower)
- Unions and Flanges

PART 3 - EXECUTION

- Preparation
- Erection
- Threaded Pipe Joints
- Steam and Steam Condensate
- Unions and Flanges

RELATED WORK

- Section 23 05 23 - General-Duty Valves for HVAC Piping
- Section 23 05 15 - Piping Specialties
- Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
- Section 23 07 00 - HVAC Insulation

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- ANSI B16.4 Cast Iron Threaded Fittings
- ANSI B16.5 Pipe Flanges and Flanged Fittings
- ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- ASTM A105 Forgings, Carbon Steel, for Piping Components
- ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- ASTM A380 Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

QUALITY ASSURANCE

Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

1 **DELIVERY, STORAGE, AND HANDLING**

2 Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

3
4 Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do
5 not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where
6 end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges,
7 and unions by storage inside or by durable, waterproof, above ground packaging.

8
9 Offsite storage agreements will not relieve the contractor from using proper storage techniques.

10 Storage and protection methods must allow inspection to verify products.

11
12
13 **DESIGN CRITERIA**

14 Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM
15 specifications as listed in this specification.

16
17 Construct all piping for the highest pressures and temperatures in the respective system in accordance with
18 ANSI B31, but not less than 125 psig unless specifically indicated otherwise.

19
20 Where weld fittings fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe
21 diameters.

22
23 Where ASTM A53 type F pipe is specified, ASTM A53 grade A type E or S, or ASTM A53 grade B type E
24 or S may be substituted at Contractor's option. Where ASTM A53 grade A pipe is specified, ASTM A53
25 grade B pipe may be substituted at Contractor's option. Where the grade or type is not specified,
26 Contractor may choose from those commercially available.

27
28
29 **PART 2 - PRODUCTS**

30
31 **LOW PRESSURE STEAM (15 psig and lower)**

32 2" and Smaller above grade in buildings: ASTM A53, type F, standard weight (schedule 40) black steel
33 pipe with ASTM A126/ANSI B16.4, Class 125 cast iron threaded fittings.

34
35 **LOW PRESSURE STEAM CONDENSATE (Steam pressure 15 psig and lower)**

36 2" and Smaller above grade in buildings: ASTM A53, type F, extra strong (schedule 80) black steel pipe
37 with ASTM A126/ANSI B16.4, Class 125 cast iron threaded fittings.

38
39 **UNIONS AND FLANGES**

40 2" and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron
41 on black steel piping and galvanized malleable iron on galvanized steel piping. Use ANSI B16.18 cast
42 copper alloy unions on copper piping. Use unions of a pressure class equal to or higher than that specified
43 for the fittings of the respective piping service but not less than 250 psi.

44
45 Provide ASTM A 193 B7 grade bolts and A 194 2H grade nuts & hardened washers for connections (Use
46 star washers when required for grounding.)

47
48
49 **PART 3 - EXECUTION**

50
51 **PREPARATION**

52 Remove all foreign material from interior and exterior of pipe and fittings.

53
54 **ERECTION**

55 Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a
56 window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute
57 piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe
58 spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

59
60 Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and
61 contract without damage to itself, equipment, or building.

62
63 All pipe shall be installed with adequate space to fully insulate the pipe, minor alignment offsets to provide
64 adequate spacing for the pipes shall have no additional cost to the project.

1 Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are
2 not acceptable.

3
4 "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the
5 main.

6
7 Do not route piping through transformer vaults or above transformers, panelboards, or switchboards,
8 including the required service space for this equipment, unless the piping is serving this equipment

9
10 Install all valves, control valves, and piping specialties, including items furnished by others, as specified
11 and/or detailed. Make connections to all equipment installed by others where that equipment requires the
12 piping services indicated in this section.

13
14 **THREADED PIPE JOINTS**

15 Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement
16 or caulking will be allowed.

17
18 **STEAM AND STEAM CONDENSATE**

19 Pitch mains down 1 inch in 40 feet in the direction of flow. Pitch terminal equipment runouts down 1 inch
20 in 2 feet for proper condensate drainage.

21
22 Use eccentric fittings for changes in horizontal pipe sizes with the fittings installed for proper condensate
23 drainage. Concentric fittings may be used for changes in vertical pipe sizes.

24
25 Make branch connections and runouts at the top of the main or 45 degrees from the top. Condensate
26 connections may be made in the horizontal plane in limited space situations.

27
28 Use a minimum of two elbows in each pipe line to a piece of terminal equipment to provide flexibility for
29 expansion and contraction of the piping system. Offset pipe connections at equipment to allow for service,
30 such as removal of the terminal device.

31
32 Install flanges, taps, vents and drains needed to fill, vent and drain the piping for hydrostatic testing.

33
34 **UNIONS AND FLANGES**

35 Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece
36 of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located
37 at a piece of equipment, locate the flange or union connection on the equipment side of the valve.
38 Concealed unions or flanges are not acceptable.

39
40

END OF SECTION

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SECTION 23 25 00
HVAC WATER TREATMENT

PART 1 - GENERAL

SCOPE

This section includes specifications for chemical treatment of all new water piping. All new water piping, (branch and main piping) shall be cleaned. Included are the following topics:

PART 1 - GENERAL

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

PART 2 - PRODUCTS

- Manufacturers
- System Cleaner
- System Inhibitor
- Closed Water System Treatment

PART 3 - EXECUTION

- Preparation
- Cleaning Sequence
- Closed Water Systems

Appendix

- Pipe Cleaning and Treatment Report

REFERENCE

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

RELATED WORK

Section 23 05 15 - Piping Specialties

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Required for all equipment and chemicals specified including data concerning dimensions, capacities, materials of construction, weights, operating sequence, composite wiring diagrams and appropriate identification. Chemical data to include the description of the chemical, its composition, its function, and the associated material safety data sheet.

OPERATION AND MAINTENANCE DATA

Provide for the services of the manufacturer's trained representative to approve the installation and instruct the user agency in the operation of each system.

Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

DESIGN CRITERIA

This project will be responsible for flushing and cleaning of all new hot water piping in the areas of renovation only. The existing hot water heating loop currently has a chemical treatment system installed.

All chemicals used must be compatible with the existing chemical treatment system

1 Provide electrical devices, motors, wiring, pumps, etc. to provide system cleaning and flushout.

2
3 **MAINTENANCE SERVICE**

4 Not required. The County currently contracts for chemical treatment.

5
6
7 **PART 2 - PRODUCTS**

8
9 **MANUFACTURERS**

10 Betz Entac, Dearborn Div. - W. R. Grace & Co., Fremont Industries, IWM, Mitco Water Labs, Mogul
11 Corporation, Nalco Chemical Co., Western Water Management, or approved equal.

12
13 **SYSTEM CLEANER**

14 Blend of organic alkaline penetrants, emulsifiers, surfactants and corrosion inhibitors that remove grease
15 and petroleum products from the interior of piping systems. Cleaners that contain trisodium phosphate are
16 specifically not acceptable.

17
18 All chemicals used must be compatible with the existing chemical treatment system

19
20 **SYSTEM INHIBITOR**

21 Scale and corrosion inhibitor consisting of boron nitrite, benzol thiazol, benzotriazole, mercapto-benzo-
22 thiazole, and tolyltrizole silicates.

23
24 All chemicals used must be compatible with the existing chemical treatment system

25
26 **CLOSED WATER SYSTEM TREATMENT**

27 Sequestering agent to reduce deposits and adjust pH: polyphosphate.

28
29 Corrosion inhibitors: boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight
30 polymers, phosphonates, sodium molybdate, or sulphites.

31
32 Conductivity enhancers: phosphates or phosphonates.

33
34
35 **PART 3 - EXECUTION**

36
37 **PREPARATION**

38 Prior to cleaning, verify that systems are operational, filled, started, and vented. Use water meter to record
39 capacity in each system.

40
41 Place terminal control valves in the full-open position

42
43 **CLEANING SEQUENCE**

44
45 **GENERAL**

46 Clean all new hot water mains and branch piping.

47
48 Systems are to be cleaned before they are used for any purpose except conduct pressure test before
49 cleaning. Add cleaner to closed systems at concentrations as recommended by the manufacturer. Remove
50 water filter elements from the system before starting circulation. For steam systems, fill boilers only, using
51 the water and cleaner solution.

52
53 Use neutralizer agents on recommendation of the system cleaner supplier and approval of the
54 Architect/Engineer.

55
56 Remove, clean, and replace strainer screens.

57
58 Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include
59 disassembly of components as required.

60
61 **HOT WATER HEATING SYSTEMS**

62 Add cleaner to the system water until the M alkalinity value is 250 above that of the initial fill water.
63 Verify the M alkalinity level before and after the addition of the cleaner by means of chemical tests that are
64 observed by the Owner's construction representative; include results of all tests in the Operating and

1 Maintenance manuals. Apply heat while circulating, slowly raising temperature to 160°F and maintain for
2 12 hours minimum; vent all high points to assure 100% system circulation. Remove heat and circulate to
3 100°F or less; drain system as quickly as possible and refill with clean water. Circulate for 6 hours at
4 design temperature, vent air at all high points, then drain. Refill with clean water and repeat until the
5 system cleaner is removed and the M alkalinity level returns to normal. Remove and clean all strainers.
6 Re-vent the system. Treat with scale and corrosion inhibitors before using the system for building heating
7 or cooling.

8
9 **CLOSED WATER CHEMICAL TREATMENT SYSTEM**

10 The existing building chemical treatment system will be used for treating the existing, expanded hot water
11 heating loop.

12
13 Prior to allowing the new hot water piping to be tied into the existing building hot water heating loop, all
14 new piping must be pressure tested and cleaned as indicated above, with documentation (Pipe Cleaning and
15 Treatment Report). Prior to allowing building hot water to circulate thru new piping and return back to the
16 building, notify City County Building Facilities Personnel that the new piping connection is ready for use.

17
18

PIPE CLEANING AND TREATMENT REPORT

Date Submitted: _____

Project Name: _____
Location: _____
Contractor: _____

System Tested: Hot Water ___ Glycol Water ___ Chilled Water ___ Fuel Oil ___

System Volume: _____

Materials Used (Provide MSDS for each)

Cleaner: _____	Quantity Used: _____
Inhibitor: _____	Quantity Used: _____
Sequestering Agent: _____	Quantity Used: _____
Algaecide: _____	Quantity Used: _____
Neutralizer: _____	Quantity Used: _____

M Alkalinity

Prior to Cleaning: _____ During Cleaning: _____ After Flushing: _____

System Temperature

Prior to Cleaning: _____ During Cleaning: _____

Duration

	Date/Time Start	Date/Time Stop
Initial Circulation	_____	_____
Draindown	_____	_____
System Refill	_____	_____
Final Circulation	_____	_____
Heating system Warmup	_____	_____

Component Checklist (Describe procedures performed at each)

Strainers: _____
Filters: _____
Vents: _____
Drains: _____
Traps: _____
Branch Lines: _____
Terminal Units: _____
Additional Comments: _____

END OF SECTION

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SECTION 23 31 00
HVAC DUCTS and CASINGS

PART 1 - GENERAL

SCOPE

This section includes specifications for all duct systems used on this project. Included are the following topics:

PART 1 - GENERAL

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

PART 2 - PRODUCTS

- General
- Ductwork Pressure Class
- Materials
 - High Pressure Ductwork (Pressure class 3 inch and over)
 - Low Pressure Ductwork (Maximum 2 inch pressure class)
- Duct Sealant
- Gaskets

PART 3 - EXECUTION

- Installation
- Ductwork Support
- High Pressure Duct (Pressure class 3 inch and over)
- Low Pressure Duct (Maximum 2 inch pressure class)
- Cleaning
- Leakage Test

APPENDIX

- Duct Leakage Test Report

RELATED WORK

- Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC
- Section 23 33 00 – Air Duct Accessories

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

ASTM A90	Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
ASTM A623	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
ASTM A527	Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
ASTM 924	Standard Specification for General Requirements for Sheet Steel, Metallic-coated by the Hot-dip Method
ASTM C 1071	Specification for Fibrous Glass Duct Lining Insulation
ASTM C 411	Test Method for Hot Surface Performance of High Temperature Thermal Insulation
ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM C 1338	Test Method for Determining Fungal Resistance of Insulation Materials and Facings
ASTM G 21	Standard Practice for Determining Resistance of Synthetic Polymeric Materials

1	ASTM C 916	Standard Specification for Adhesives for Duct Thermal Insulation NFPA 90A
2		Standard for the Installation of Air Conditioning and Ventilating Systems
3	UL 181	Standard for Safety for Factory Made Air Ducts and Air Connectors.
4	NAIMA	Fibrous Glass Duct Liner Standard

5
6 **QUALITY ASSURANCE**

7 Refer to division 1, General Conditions, Equals and Substitutions.

8
9 **SHOP DRAWINGS**

10 Refer to division 1, General Conditions, Submittals.

11
12 Include manufacturer's data and/or Contractor data for the following:

- 13 • Schedule of duct systems including material of construction, gauge, pressure class,
- 14 system class, method of reinforcement, joint construction, fitting construction, and
- 15 support methods, all with details as appropriate.
- 16 • Duct sealant and gasket material.
- 17 • Duct liner including data on thermal conductivity, air friction correction factor, and
- 18 limitation on temperature and velocity.

19
20 **DESIGN CRITERIA**

21 Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under

22 specified operating conditions.

23
24 Use material, weight, thickness, gauge, construction and installation methods as outlined in the following

25 SMACNA publications, unless noted otherwise:

- 26 • HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005
- 27 • HVAC Air Duct Leakage Test Manual, 2nd Edition, 2012
- 28 • HVAC Systems - Duct Design, 4th Edition, 2006
- 29 • Rectangular Industrial Duct Construction Standard, 2nd Edition, 2004
- 30 • Round Industrial Duct Construction Standards, 2nd Edition, 1999

31
32
33 Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke

34 developed rating no higher than 50.

35
36 **DELIVERY, STORAGE AND HANDLING**

37 Promptly inspect shipments to ensure that Ductwork is undamaged and complies with the specification.

38
39 Protect Ductwork against damage.

40
41 Protect Ductwork by storing inside or by durable, waterproof, above ground packaging. Do not store

42 material on grade. Protect Ductwork from dirt, dust, construction debris and foreign material. Where end

43 caps/packaging are provided, take precautions so caps/packaging remain in place and free from damage.

44
45 Offsite storage agreements do not relieve the contractor from using proper storage techniques.

46 Storage and protection methods must allow inspection to verify products.

47
48 **PART 2 - PRODUCTS**

49
50 **GENERAL**

51 All sheet metal used for construction of duct shall be 24 gauge or heavier except for round and spiral

52 ductwork and spiral duct take-offs 12" and below may be 26 gauge where allowed in SMACNA HVAC

53 Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005.

54
55 Duct sizes indicated on plans are net inside dimensions; where duct liner is specified, dimensions are net,

56 inside of liner.

57
58 **DUCTWORK PRESSURE CLASS**

59 Minimum acceptable duct pressure class, for all ductwork except transfer ductwork, is 2 inch W.G. positive

60 or negative, depending on the application. Transfer ductwork minimum acceptable duct pressure class is 1

1 inch W.G. positive or negative, depending on the application. Duct system pressure classes not indicated on
2 the drawings to be as follows:

3		
4	Supply duct upstream of VAV boxes	4 in. pressure class
5	Supply duct downstream of VAV terminals	2 in. pressure class
6	Transfer ducts	2 in. pressure class
7	Return ducts	3 in. pressure class

8 9 **MATERIALS**

10 **GALVANIZED STEEL SHEET:**

11 Use ASTM A 653 galvanized steel sheet of lock forming quality. Galvanized coating to be 1.25 ounces per
12 square foot, both sides of sheet, G90 in accordance with ASTM A90. Provide "Paint Grip" finish or
13 galvaneal sheetmetal for ductwork that will be painted.
14

15 **HIGH PRESSURE DUCTWORK (Pressure class 3 inch and over)**

16 Manufacturers: Ajax, Semco, United Sheet Metal, Sheet Metal Connectors or approved equal.
17

18 Machine formed round and/or flat oval spiral lock seam duct constructed of galvanized steel.
19

20 Rectangular high pressure duct using a transverse joint system as manufactured by Ductmate, Nexus, TDC,
21 TDF, or approved equal, may be used at contractor's option. Duct to be flanged, gasketed and sealed.
22

23 Contractor fabricated ductwork meeting specified construction standards is acceptable with prior approval
24 of Architect/Engineer. Submit construction details, a description of materials to be used, type of service,
25 reinforcing methods, and sealing procedures.
26

27 Use a perforated inner liner on double wall high-pressure duct. Annular space between inner liner and
28 outer duct to be filled with 1 inch glass fiber insulation.
29

30 Use cemented slip joints with 2 inch minimum overlap, flanged connections, or welded/brazed connections,
31 unless noted otherwise for special applications. Prime coat welded joints.
32

33 Provide standard 90 degree conical tee takeoffs except for exhaust at velocities over 2000 feet per minute,
34 use 45° lateral connections; straight taps or bullhead tees are not acceptable.
35

36 Internal bracing will not be accepted on ductwork below 48 inches.
37

38 Use turning vanes as specified in Section 23 33 12.
39

40 Provide bellmouth fittings or expanded fittings at each duct connection to air plenums.
41

42 Provide pressure relief fittings as indicated on the plans and/or details.
43

44 Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.
45

46 **LOW PRESSURE DUCTWORK (Maximum 2 inch pressure class)**

47 Fabricate and install ductwork in sizes indicated on the drawings and in accordance with SMACNA
48 recommendations, except as modified below.
49

50 Construct so that all interior surfaces are smooth. Use slip and drive or flanged and bolted construction
51 when fabricating rectangular ductwork. Use spiral lock seam construction when fabricating round spiral
52 ductwork. Sheet metal screws may be used on duct hangers, transverse joints and other SMACNA
53 approved locations if the screw does not extend more than 1/2 inch into the duct.
54

55 Use elbows and tees with a center line radius to width or diameter ratio of 1.5 wherever space permits.
56 When a shorter radius must be used due to limited space, install single wall sheet metal splitter vanes in
57 accordance with SMACNA publications, Type RE 3. Where space will not allow and the C value of the
58 radius elbow, as given in SMACNA publications, exceeds 0.31, use rectangular elbows with turning vanes
59 as specified in Section 23 33 00. Square throat-radius heel elbows will not be acceptable. Straight taps or
60 bullhead tees are not acceptable.
61

62 Where rectangular elbows are used, provide turning vanes in accordance with Section 23 33 00.
63

1 Provide expanded take-offs or 45 degree entry fittings for branch duct connections with branch ductwork
2 airflow velocities greater than 700 fpm. Square edge 90-degree take-off fittings or straight taps will not be
3 accepted.

4
5 Button punch snaplock construction will not be accepted on aluminum ductwork.

6
7 Round ducts may be substituted for rectangular ducts if sized in accordance with ASHRAE table of
8 equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by
9 written permission of the Architect/Engineer.

10
11 Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence
12 upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

13 14 **DUCT SEALANT**

15 Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal & Seal, Lockformer cold
16 sealant, Mon-Eco Industries, United Sheet Metal, or approved equal. Silicone sealants are not allowed in
17 any type of ductwork installation.

18
19 Install sealants in strict accordance with manufacturer's recommendations, paying special attention to
20 temperature limitations. Allow sealant to fully cure before pressure testing of ductwork, or before startup
21 of air handling systems.

22 23 **GASKETS**

24 **2 INCH PRESSURE CLASS AND LOWER:**

25 Soft neoprene or butyl gaskets in combination with duct sealant for flanged joints.

26
27 **3 INCH PRESSURE CLASS AND HIGHER:**

28 Butyl gaskets.

29 30 **PART 3 - EXECUTION**

31 32 **INSTALLATION**

33 On 5th floor, new ductwork will be tied into existing fiberglass duct board. Contractor to make provisions
34 for connection of new duct to existing duct.

35
36 Verify dimensions at the site, making field measurements and drawings necessary for fabrication and
37 erection. Check plans showing work of other trades and consult with Architect in the event of any
38 interference.

39
40 Make allowances for beams, pipes or other obstructions in building construction and for work of other
41 contractors. Transform, divide or offset ducts as required, in accordance with SMACNA HVAC Duct
42 Construction Standards, Figure 4-7, except do not reduce duct to less than six inches in any dimension and
43 do not exceed an 8:1 aspect ratio. Where it is necessary to take pipes or similar obstructions through ducts,
44 construct easement as indicated in SMACNA HVAC Duct Construction Standards, Figure 4-8, Fig. E. In
45 all cases, seal to prevent air leakage. Pipes or similar obstructions may not pass through high pressure or
46 fume exhaust ductwork.

47
48 Test openings for test and balance work will be provided under Section 23 05 93.

49
50 Provide frames constructed of angles or channels for coils, filters, dampers or other devices installed in
51 duct systems, and make all connections to such equipment including equipment furnished by others.
52 Secure frames with gaskets and screws or nut, bolts and washers.

53
54 Do not install ductwork through dedicated electrical rooms or spaces unless the ductwork is serving this
55 room or space.

56
57 Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

58
59 Provide adequate access to ductwork for cleaning purposes.

60
61 Provide temporary capping of ductwork openings to prevent entry of dirt, dust and foreign material.

1 Protect diffusers, registers and grilles with plastic wrap or some other approved form of protection to
2 maintain dirt and dust free and to prevent entry of dirt, dust and foreign material into the Ductwork.
3
4 During construction provide temporary closures of metal or taped polyethylene on open ductwork to
5 prevent construction dust from entering ductwork system.
6
7 **DUCTWORK SUPPORT**
8 Support ductwork in accordance with SMACNA HVAC Duct Construction Standards, Figure 5-5, except
9 supporting ductwork with secure wire method is not allowed.
10
11 Support with 3/32 inch, 7 x 7, stainless steel air-craft cable, with matching fastener rated for 50% of actual
12 load, will be allowed on round ductwork under 12 inches if installed as detailed, with cable double looped
13 on duct and at point of support.
14
15 **HIGH PRESSURE DUCT (Pressure class 3 inch and over)**
16 Seal all duct in accordance with SMACNA seal class "A"; all seams, joints, and penetrations shall be
17 sealed.
18
19 See plans for locations of single wall and double wall high pressure ductwork.
20
21 **LOW PRESSURE DUCT (Maximum 2 inch pressure class)**
22 Seal all duct, with the exception of transfer ducts, in accordance with SMACNA seal class "A"; all seams,
23 joints, and penetrations shall be sealed.
24 Install a manual balancing damper in each branch duct and for each diffuser or grille. The use of splitter
25 dampers, extractors, or grille face dampers will not be accepted for balancing dampers.
26
27 Hangers must be wrapped around bottom edge of duct and securely fastened to duct with sheetmetal screws
28 or pop rivets. Trapeze hangers may be used at contractor's option.
29
30 **CLEANING**
31 Remove all dirt and foreign matter from the entire duct system and clean diffusers, registers, grilles and the
32 inside of air-handling units before operating fans.
33
34 Clean duct systems with high power vacuum machines where systems have been used for temporary heat,
35 air-conditioning, or ventilation purposes during construction. Protect equipment that may be harmed by
36 excessive dirt with filters, or bypass during cleaning.
37
38 **LEAKAGE TEST**
39 Leakage testing will not be required, unless the owner or A/E observes excessive leakage from ductwork,
40 or test and balancing reports indicate duct leakage.
41
42

END OF SECTION

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SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

SCOPE

This sections includes accessories used in the installation of duct systems. Included are the following topics:

PART 1 - GENERAL

- Related Work
- Reference
- Reference Standards
- Quality Assurance
- Shop Drawings
- Operation and Maintenance Data

PART 2 - PRODUCTS

- Manual Volume Dampers
- Turning Vanes
- Access Doors
- Flexible Duct
- Duct Lining

PART 3 - EXECUTION

- Manual Volume Dampers
- Turning Vanes
- Access Doors
- Flexible Duct
- Duct Lining

RELATED WORK

- Section 23 05 29 – Hanger and Supports for HVAC Piping and Equipment
- Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment
- Section 23 31 00 – HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

- NFPA 90A Standard for Installation of Air Conditioning and Ventilating Systems
- SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition, 1995
- UL 214
- UL 555 (6th edition) Standard for Fire Dampers and Ceiling Dampers

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Submit for all accessories and include dimensions, capacities, ratings, installation instructions, and appropriate identification.

Include certified test data on dynamic insertion loss, self-noise power levels, and aerodynamic performance of sound attenuators.

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

OPERATION AND MAINTENANCE DATA

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

1
2
3
4 **PART 2 - PRODUCTS**

5 **MANUAL VOLUME DAMPERS**

6 Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.

7 Dampers must be constructed in accordance with SMACNA Fig. 2-12, Fig. 2-13, and notes relating to
8 these figures, except as modified below.

9 Reinforce all blades to prevent vibration, flutter, or other noise. Construct dampers in multiple sections
10 with mullions where width is over 48 inches. Use rivets or tack welds to secure individual components;
11 sheet metal screws will not be accepted. Provide operators with locking devices and damper position
12 indicators for each damper; use an elevated platform on insulated ducts. Provide end bearings or bushings
13 for all volume damper rods penetrating ductwork constructed to a 3" w.c. pressure class or above.

14
15 **TURNING VANES**

16 Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

17 Construct turning vanes and runners for square elbows in accordance with SMACNA Fig. 2-3 and Fig. 2-4
18 except use only airfoil type vanes. Construct turning vanes for short radius elbows and elbows where one
19 dimension changes in the turn in accordance with SMACNA Fig. 2-5 and Fig. 2-6.

20
21 **ACCESS DOORS**

22 Access door to be designed and constructed for the pressure class of the duct in which the door is to be
23 installed. Doors in exposed areas shall be hinged type with cam sash lock. Hinges shall be aluminum or
24 steel full length continuous piano type. Doors in concealed spaces may be secured in place with cam sash
25 latches. For both hinged and non-hinged doors provide sufficient number of cam sash latches to provide
26 air tight seal when door is closed. Do not use hinged doors in concealed spaces if this will restrict
27 access. Use minimum 1" deep 24 gauge galvanized steel double wall access doors with minimum 24 gauge
28 galvanized steel frames. For non-galvanized ductwork, use minimum 1" deep double wall access door with
29 frame that shall use materials of construction identical to adjacent ductwork. Provide double neoprene
30 gasket that shall provide seals from the frame to the door and frame to the duct. When access doors are
31 installed in insulated ductwork or equipment provide insulated doors with insulation equivalent to what is
32 provided for adjacent ductwork or equipment. Access doors constructed with sheet metal screw fasteners
33 will not be accepted.

34 Use insulated, 1-1/2 hour UL 1978 listed and labeled access doors in kitchen exhaust ducts.

35
36
37 **FLEXIBLE DUCT**

38 Manufacturers: Anco Products, Clevaflex, Thermaflex, Flexmaster or approved equal.

39 Factory fabricated, UL 181 listed as a class 1 duct, and having a flame spread of 25 or less and a smoke
40 developed rating of 50 or under in accordance with NFPA 90A.

41 Suitable for pressures and temperatures involved but not less than a 180°F service temperature and ±2 inch
42 pressure class, depending on the application.

43 Duct to be composed of polyester film, aluminum laminate or woven and coated fiberglass fabric bonded
44 permanently to corrosion resistant coated steel wire helix. Two-ply, laminated, and corrugated aluminum
45 construction may also be used.

46 Where duct is specified to be insulated, provide a minimum 1 inch fiberglass insulation blanket with
47 maximum thermal conductance of 0.23 K (75 degrees F.) and vapor barrier jacket of polyethylene or
48 metalized reinforced film laminate. Maximum perm rating of vapor barrier jacket to be 0.1 perm.

49
50 **DUCT LINING**

51 Manufacturer: Manville, Owens-Corning, Knauf, or approved equal.

52 1 inch thick, flexible, mat faced insulation made from inorganic glass fibers bonded with a thermosetting
53 resin with thermal conductivity of .25 Btu inch / hour sq.ft. deg F.

54 Meet erosion testing per UL 181 or ASTM C 1071 for 5000 fpm maximum air velocity. ASTM C 411
55 maximum operating temperature rating of 250 deg F. ASTM E84 flame spread less than 25 and smoke
56 developed less than 50.

1 Meet requirements of ASTM C 1338 and ASTM G21 for fungi resistance.

2
3 Install liner using adhesive conforming to ASTM C 916.

4 5 6 **PART 3 - EXECUTION**

7 8 9 **MANUAL VOLUME DAMPERS**

10 Install manual volume dampers in each branch duct and for each grille, register, or diffuser as far away
11 from the outlet as possible while still maintaining accessibility to the damper. Install so there is no flutter
12 or vibration of the damper blade(s).

13 14 **TURNING VANES**

15 Install turning vanes in all rectangular, mitered elbows in accordance with SMACNA standards and/or
16 manufacturer's recommendations.

17
18 Install double wall, airfoil, 2 inch radius vanes in ducts with vane runner length 18" or greater and air
19 velocity less than 2000 fpm. Install double wall, airfoil, 4-1/2 inch radius vanes in ducts with vane runner
20 length 18" or greater and air velocity 2000 fpm or greater.

21
22 If duct size changes in a mitered elbow, use single wall type vanes with a trailing edge extension. If duct
23 size changes in a radius elbow or if short radius elbows must be used, install sheetmetal turning vanes in
24 accordance with SMACNA Figure 2-5 and Figure 2-6.

25 26 **ACCESS DOORS**

27 Install access doors where specified, indicated on the drawings, and in locations where maintenance,
28 service, cleaning or inspection is required. Examples include, but are not limited to motorized dampers,
29 fire and smoke dampers, smoke detectors, fan bearings, heating and cooling coils, filters, valves, and
30 control devices needing periodic maintenance.

31
32 Size and numbers of duct access doors to be sufficient to perform the intended service. Minimum access
33 door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as
34 indicated. Install access doors on both inlet and outlet sides of reheat coils as well as other duct mounted
35 coils.

36
37 Label fire, smoke and combination fire smoke dampers on the exterior surface of ductwork directly
38 adjacent to access doors using a minimum of 0.5 inch height lettering reading, "SMOKE DAMPER" or
39 "FIRE DAMPER". Smoke and combination fire smoke dampers shall also include a second line listing the
40 individual damper tag. The tags must be coordinated with the mechanical schedules. Utilize stencils or
41 manufactured labels. All other forms of identification are unacceptable. All labels shall be clearly visible
42 from the ceiling access point.

43 44 **FLEXIBLE DUCT**

45 Flexible duct may only be used for final connections of air inlets and outlets at diffuser, register, and grille
46 locations. Where flexible duct is used, it shall be the minimum length required to make the final
47 connections, but no greater than 5 feet in length, and have no more than one (1) 90 degree bend.

48
49 Secure inner jacket of flexible duct in place with stainless steel metal band clamp. Secure insulation vapor
50 barrier jacket in place with steel or nylon draw band. Sheetmetal screws and/or duct tape will not be
51 accepted.

52
53 Flexible duct used to compensate for misalignment of main duct or branch duct will not be accepted.

54
55 Individual sections of flexible ductwork shall be of one piece construction. Splicing of short sections will
56 not be accepted.

57
58 Flexible ductwork used as transfer duct shall be sized for a maximum velocity of 300 fpm.

59
60 Penetration of any partition, wall, or floor with flexible duct will not be accepted.

61 62 **DUCT LINING**

63 Only apply lining to the following ductwork:

- 1 • Transfer Air Ducts.
- 2 • Return Air Ducts (as noted on drawings).

3
4 Install liner in compliance with the latest edition of NAIMA's Fibrous Glass Duct Liner Standard. Locate
5 longitudinal joints at the corners of duct only. Cut and fit to assure lapped, compressed joints. Coat all
6 transverse and longitudinal joints and edges with adhesive. Provide metal nosing on leading edge where
7 lined duct is preceded by unlined duct. Adhere liner to duct with full coverage area of adhesive.
8 Additionally, secure liner to duct using mechanical fasteners spaced as recommended by the liner
9 manufacturer without compressing liner more than 1/8" with the fasteners.

10
11
12

END OF SECTION

1 **OPERATION AND MAINTENANCE DATA**

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

4
5 **DESIGN CRITERIA**

6 Select sizes, capacities, configuration, and operating characteristics as shown on the plans and/or as
7 scheduled.

8
9 **PART 2 - PRODUCTS**

10
11 **SUPPLY AIR TERMINAL BOXES**

12 Units shall be single duct and pressure independent.

13
14 **MANUFACTURERS:**

15 Nailer is the only approved manufacturer.

16
17 **CONSTRUCTION:**

18 Unit casing shall be minimum 22 gauge steel and internally insulated with 13/16" rigid fiberglass insulation
19 with a foil scrim face or 3/4" thick polyolefin closed cell insulation. Construction to meet UL 181 and
20 NFPA 90A. Casing shall be sealed to limit leakage to a maximum of 15 cfm at 6.0 inches of static
21 pressure. Casing outlet shall have slip and drive joint for connection to discharge ductwork.

22
23 Metal damper blade shall be mounted to shaft having self-lubricated bearings. Shaft end shall be marked to
24 indicate damper position and shall have a built-in stop to prevent overstroking. Damper blade shall close
25 off against gasket to limit leakage to 10 cfm at 6.0 inches of differential static pressure. Damper linkage
26 shall be sized to accept at least 40 inch-pounds of torque to the damper shaft. Damper shaft shall be
27 provided with a marking indicating damper position.

28
29 Round inlet collar shall be equipped with a multi-point flow sensor that shall amplify the measured velocity
30 pressure. Pneumatic tubing from flow sensor to differential pressure transducer shall be UL listed, fire
31 retardant (FR) type.

32
33 Provide factory access door in bottom on unit.

34
35 **HOT WATER REHEAT COIL:**

36 Construct coils of copper tubes and aluminum fins in a serpentine arrangement with piping connections on
37 the same end. Provide galvanized steel casing, end supports, top and bottom channels to allowance for
38 expansion of finned tube section. Factory test coils at 200 psig.

39
40 Headers may be cast iron with tubes expanded into the header, steel pipe with tubes brazed to the header, or
41 seamless copper with tubes brazed to the header.

42
43 Frames to be flanged for a gasketed connection to adjacent ductwork or constructed for slip and drive
44 connection to the ductwork.

45
46 Minimum reheat coil size is 8 inches x 8 inches.

47
48 **ACCESS DOORS**

49
50 **STANDARD ACCESS DOORS:**

51 Access door to be designed and constructed for the pressure class of the duct in which the door is to be
52 installed. Doors in exposed areas shall be hinged type with cam sash lock. Hinges shall be steel full length
53 continuous piano type. Doors in concealed spaces may be secured in place with cam sash latches. For both
54 hinged and non hinged doors provide sufficient number of camp sash latches to provide air tight seal when
55 door is closed. Do not use hinged doors in concealed spaces if this will restrict access. Use minimum 1"
56 deep 24 gauge galvanized steel double wall access doors with minimum 24 gauge galvanized steel
57 frames. For non-galvanized ductwork, use minimum 1" deep double wall access door with frame that shall
58 use materials of construction identical to adjacent ductwork. Provide double neoprene gasket that shall
59 provide seals from the frame to the door and frame to the duct. When access doors are installed in

1 insulated ductwork or equipment provide insulated doors with insulation equivalent to what is provided for
2 adjacent ductwork or equipment. Access doors constructed with sheet metal screw fasteners will not be
3 accepted.

4 5 **ROUND DUCT ACCESS DOORS:**

6 For duct pressure class positive or negative up to 6 in. wg. Access doors shall be constructed from 16
7 gauge stainless steel for fume exhaust ducts and 16 gauge galvanized steel for general exhaust or return
8 ducts. Hinges shall be continuous piano style constructed from the same material as the access door.
9 Access doors shall be sealed with ¼” closed cell butyl gasketing permanently bonded on all four sides and
10 no fewer than two draw latches with strike plates. The strike plates shall match the duct/access door
11 material.

12
13 For duct pressure class positive or negative up to 10 in. wg. Access doors shall be the sandwich type and
14 constructed from two layers of stamped 22 gauge stainless steel for fume exhaust ducts and 22 gauge
15 galvanized steel for general or return ducts. Access doors shall be sealed with ¼” butyl gasketing
16 permanently bonded to all four sides of the inside door. The bolts and springs shall be constructed from the
17 same material as the access door. The knobs shall be constructed from polypropylene with threaded metal
18 inserts and able to be fastened without the use of wrenches.

19 20 **INSULATION**

21 Materials or accessories containing asbestos will not be accepted.

22 Use composite insulation systems (insulation, jackets, sealants, and adhesives) that have a flame spread
23 rating of 25 or less and smoke developed rating of 50 or less.

24
25 The following two internal insulation options may be utilized.

26 27 **RIGID FIBERGLASS INSULATION:**

28 Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75 degrees
29 F, minimum compressive strength of 25 PSF at 10% deformation, rated for service to 450 degrees F.

30
31 Foil-scrim-kraft vapor barrier jacket, factory applied to insulation, maximum permeance of .02 perms. All
32 exposed insulation edges shall be covered with metal nosing.

33 34 **POLYOLEFIN INSULATION:**

35 Flexible closed cell, minimum nominal density of 1.5 lbs. per cu. ft., thermal conductivity of not more than
36 0.24 at 75 degrees F, minimum compressive strength of 5 psi at 25% deformation, maximum water vapor
37 permeability of 0.0 perm inch, maximum water absorption of 0% by weight and volume, rated for service
38 range of -165 degrees F to 210 degrees F.

39 40 41 **PART 3 - EXECUTION**

42 43 **INSTALLATION**

44 Install air terminal units as indicated on project drawings and in accordance with the manufacturer’s
45 installation instructions.

46
47 Mount air terminal boxes with a minimum 3 feet of straight ductwork upstream of inlet flow sensor for
48 sizes 12” diameter and below. Provide a minimum of 3X the inlet diameter of straight duct upstream of the
49 inlet flow sensor for inlet sizes above 12” diameter.

50
51 Where hot water reheat coils are provided with air terminal boxes the following two options may be used.

52
53 Field mount coil separate from box with a 12-18” section of duct between the air terminal box and reheat
54 coil. The reheat coil and 12-18” section of duct shall be wrapped with external insulation as indicated in
55 specification section 23 07 00 – HVAC Insulation.

56
57 Factory mount coil in extended supply air terminal unit. The supply air terminal unit shall be extended at
58 the factory 12-18” and internally insulated to match the insulation used for the supply air terminal unit
59

1 Provide at least 24" of clearance on controller side of the air terminal unit. The clearance area shall extend
2 the full length of the supply air terminal unit and the full length (including the access door) of the
3 exhaust/return air terminal unit
4

5 Support air terminal units from building structure using sheet metal straps or trapeze hanger with rods. Do
6 not mount air terminal units off of adjacent ductwork or piping.
7

8 **REHEAT COILS**

9 Comb bent or crushed fins and clean dust and debris from each coil before enclosing coils in ductwork.
10 Pitch coil casings in accordance with manufacturer's instructions. Install a drain valve on the coil side of
11 the shutoff valves for each reheat coil.
12

13 Pipe coils with multiple rows for counter flow arrangement.
14

15 **ACCESS DOORS**

16 **DUCT ACCESS DOORS – SQUARE DUCT:**

17 Provide duct access doors in duct or extended supply air terminal unit upstream and downstream of the
18 reheat coil. Duct access doors shall be as large as duct allows with a maximum size of 18"x18". Install
19 heating coils in accordance with Section 23 73 12 - Air Handling Unit Coils.
20
21

22 **DUCT ACCESS DOORS – ROUND DUCT:**

23 Install round duct access doors on the side of the duct upstream of the return/exhaust terminal unit. At no
24 time shall the access door be installed in the bottom of the duct. Piano hinged style access doors shall be
25 installed with the piano hinges located ½ above the bottom of the duct to allow the access door to swing
26 down toward the floor.
27

28 **INSULATION**

29 **RIGID FIBERGLASS INSULATION:**

30 All rigid duct insulation edges shall be covered with metal nosing. Foil scrim face must completely
31 separate the rigid fiberglass duct material from the air stream.
32
33

34 **POLYOLEFIN INSULATION:**

35 Apply full cover coat of adhesive to surface to be insulated, insulation and edge butt joints. Place insulation
36 with edge joints firmly butted pressing to surface for full adhesion. Seal seams and joints vapor tight.
37

38 **ADJUSTING**

39 Coordinate adjustment of air terminal units with section 23 05 93 - Testing, Adjusting and Balancing.
40
41

42
END OF SECTION

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SECTION 23 37 13
DIFFUSERS, REGISTERS & GRILLES

PART 1 - GENERAL

SCOPE

This section includes specifications for air terminal equipment. Included are the following topics:

PART 1 - GENERAL

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

PART 2 - PRODUCTS

- Manufacturers
- Square Ceiling Diffusers - Plaque
- Eggcrate Grille

PART 3 - EXECUTION

- Installation

RELATED WORK

- Section 23 31 00 - HVAC Ducts and Casings
- Section 23 33 00 - Air Duct Accessories
- Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

- NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- UL 181 - Factory-Made Air Ducts and Connectors.
- ARI-ADC Standard 880

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions.

SUBMITTALS

Refer to division 1, General Conditions, Submittals.

Furnish submittal information including, but not limited to, the following:

- Manufacturer's name and model number
- Identification as referenced in the documents
- Capacities/ratings
- Materials of construction
- Sound ratings
- Dimensions
- Finish
- Color selection charts where applicable
- Manufacturer's installation instructions
- All other appropriate data

1 **DESIGN CRITERIA**

2 All performance data shall be based on tests conducted in accordance with Air Diffusion Council (ADC)
3 Test Code 1062 GRD 84.

4
5 **PART 2 - PRODUCTS**

6
7 **MANUFACTURERS**

8 Manufacturers: Carnes, Krueger, Titus, Metal-Aire, and E.H. Price, and United Sheet Metal.

9
10 Acceptable manufacturers for specific products are listed under each item.

11
12 **SQUARE CEILING DIFFUSERS - Plaque**

13 Titus model OMNI, Carnes series SFPA/SHPA, Price model ASPD, Metal Aire series 5750, and Krueger
14 series PLQ/5PLQ.

15
16 Aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type appropriate to
17 installation.

18
19 Directional blow pattern as shown on the drawings and/or as scheduled.

20
21 One-piece removable square face plaque with one-piece backpan.

22
23 White, baked enamel finish or powder coat finish, unless otherwise indicated.

24
25 **PART 3 - EXECUTION**

26
27 **INSTALLATION**

28 Install grilles, registers and diffusers as shown on drawings and according to manufacturer's instructions.

29
30 Furnish diffusers with equalizing grids where it is not possible to maintain minimum 2 duct diameter
31 straight duct into diffuser. Equalizing grids shall consist of individually adjustable vanes designed for
32 equalizing airflow into diffuser neck and providing directional control of airflow.

33
34 Unless otherwise indicated, size ductwork drops to diffusers or grilles to match unit collar size.

35
36 Seal connections between ductwork drops and diffusers/grilles airtight.

37
38 Where diffusers, registers and grilles cannot be installed to avoid seeing inside duct, paint inside of duct
39 with flat black paint to reduce visibility.

40
41
42 **END OF SECTION**

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	General Electrical Requirements
Section 26 09 23	Occupancy Sensor Lighting Control System
Section 26 20 00	Basic Materials and Methods
Section 26 51 13	Lighting
Section 27 10 00	Telecommunications Distribution System
Section 27 11 16	Communication Cabinets
Section 27 11 17	EcoAisle Thermal Containment System
Section 28 13 00	Access Control System
Section 28 31 00	Fire Alarm System

- 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

1 additional labor and materials.

2 1.06 DRAWINGS

3 A. The Electrical drawings do not attempt to show the complete details of building construction which affect
4 the electrical installation. The Contractor shall refer to the architectural, civil, structural and mechanical
5 drawings for additional details which affect the proper installation of this work. The Contractor is
6 cautioned that diagrams showing electrical connections and/or circuiting are diagrammatic only and must
7 not be used for obtaining lineal runs of wire to conduit. Wiring diagrams do not necessarily show the
8 exact physical arrangement of the equipment.

9 1.07 MATERIAL AND EQUIPMENT

10 A. All material and equipment shall be new and of the quality used for the purpose in good commercial
11 practice, and shall be standard product of reputable manufacturers. Each major component of equipment
12 shall have the manufacturer's name, catalog number, and capacity or rating on a nameplate, securely
13 affixed on the equipment in a conspicuous place.

14 1.08 SUBSTITUTION AND APPROVAL OF MATERIAL

15 A. See Instructions to Bidders.

16 B. Such requests shall be accompanied by three copies of all necessary illustrations, cuts, drawings and
17 descriptions of material proposed for substitution and shall fully describe all points in which it differs
18 from the articles specified. Two copies will be retained by the Architect and one copy returned to the
19 Contractor with approval or revisions indicated thereon.

20 1.09 DAMAGE TO OTHER WORK

21 A. The Electrical Contractor will be held rigidly responsible for all damages to the work of his own or any
22 other trade resulting from the execution of his work. It shall be the Contractor's responsibility to
23 adequately protect his work at all times. All damages resulting from his operations shall be repaired or
24 the damaged portions replaced by the party originally performing the work, (to the entire satisfaction of
25 the Architect), and all cost thereof shall be borne by the Contractor responsible for the damage.

26 1.10 COOPERATION WITH OTHER TRADES

27 A. This Contractor shall completely cooperate with all other trades in the matter of planning and executing
28 of the work. Every reasonable effort shall be made to prevent conflict and interferences as to space
29 requirements, dimensions, locations, openings, sleeving or other matters which tend to delay or obstruct
30 the work of any trade.

31 1.11 NEGLIGENCE

32 A. Should the Contractor fail to provide materials, templates, etc., or other necessary information causing
33 delay or expense to another party, he shall pay the actual amount of the damages to the party who
34 sustained the loss.

35 1.12 FIELD CHANGES

36 A. Should any change in drawings or specifications be required to comply with local regulations and/or field
37 conditions, the Contractor shall refer same to Architect for approval before any work which deviates
38 from the original requirements of the drawings and specifications is started. In the event of
39 disagreements as to the necessity of such changes, the decision of the Architect shall be final.

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. Netshelter Racks
- 29 10. Eco Aisle Enclosure
- 30 11. Security System
- 31 12. Water Sensors
- 32 13. Other materials at the request of the Engineer

- 33 B. See Section 01300.

- 34 C. Shop drawings shall bear the Contractor's stamp indicating approval.

- 35 D. Any equipment fabrication prior to shop drawing review shall be at the Contractor's risk.

36 1.19 WORKMANSHIP

- 37 A. The installation of all work shall be made so that its several component parts will function as a workable
- 38 system complete with all accessories necessary for its operation, and shall be left with all equipment
- 39 properly adjusted and in working order. The work shall be executed in conformity with the best accepted
- 40 standard practice of the trade so as to contribute to efficiency and appearance. It shall also be executed
- 41 so that the installation will conform and adjust itself to the building structure, its equipment and its usage.

42

1 1.20 DRAWINGS OF OTHER TRADES

2 A. The Contractor shall consult the drawings of the work for the various other trades; field layouts of the
3 parties performing the work of the other trades; their shop drawings, and he shall be governed
4 accordingly in laying out his work.

5 B. Specifically examine shop drawings to confirm voltage, current characteristics, and other wiring
6 requirements for utilization equipment. Bring any discrepancies to the attention of the A/E.

7 1.21 FIELD MEASUREMENTS

8 A. The Contractor shall take all field measurements necessary for his work and shall assume the full
9 responsibility for their accuracy.

10 1.22 STRUCTURAL INTERFERENCES

11 A. Should any structural interferences prevent the installation of the outlets, running of conduits, etc., at
12 points shown on drawings, the necessary minor deviation therefrom, as determined by the Architect, may
13 be permitted. Minor changes in the position of the outlets or equipment if decided upon before any work
14 has been done by the Contractor shall be made without additional charge.

15 1.23 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

16 A. Before submitting a bid, the Contractor shall visit the site and familiarize himself with all features of the
17 building and site which may affect the execution of his work. No extra payment will be allowed for the
18 failure to obtain this information. If in the opinion of the Contractor there are omissions or errors in the
19 plans or specifications, the Contractor shall clarify these points with the Architect before submitting his
20 bid. In lieu of written clarification by addendum, resolve all conflicts in favor of the greater quantity or
21 better quality.

22 1.24 GUARANTEE

23 A. The Contractor shall unconditionally guarantee his work and all components thereof, excluding lamps,
24 for a period of one year from the date of his final payment. He shall remedy any defects in workmanship
25 and repair or replace any faulty equipment which shall appear within the guarantee period to the entire
26 satisfaction of the Architect at no additional charge.

27 1.25 TEMPORARY WIRING AND SERVICE

28 A. No temporary electrical service is required on this project. The existing electrical distribution system in
29 the Dane County City-County Building shall provide any power required for construction.

30 B. All contractors shall provide and maintain their own extension cords and additional lamps as required to
31 perform his work properly. Contractors requiring temporary connections to 3 phase power service and
32 single phase feeders for other than lighting and small fractional horsepower motorized tools shall make
33 arrangement with the Electrical Contractor. Contractors requiring lighting outside of the building shall
34 make their own arrangements with the Electrical Contractor and pay all costs for installation,
35 maintenance and removal. Contractors requiring electrical equipment over one HP, including welders,
36 hoists, heaters and coolers shall make their own arrangements for such service beyond the main switch
37 and shall pay all costs thereof.

38 C. No permanent electrical equipment or wiring shall be used for temporary connections, unless authorized
39 by this Section, upon signed order and with approval by the Architect in behalf of the Owner. Such
40 approvals shall not shorten guarantee period.

1 D. Electrical energy to be paid for by owner.

2 1.26 ELECTRICAL SERVICE

3 A. The existing electrical service in the Dane County City-County Building shall remain as is.

- 4 1. The building has a 208Y/120-volt, 3-phase, 4-wire service for general lighting and receptacle
- 5 loads.
- 6 2. The building also has a 480-volt electrical service that is used for large HVAC loads.
- 7 3. Refer to the electrical drawings for partial one line riser diagrams and the work involved on the
- 8 project.

9 1.27 BRANCH CIRCUIT WIRING

10 A. See plans for general arrangement of circuits, conduit runs, and ratings of branch circuits and special

11 circuits.

12 B. Provide everything necessary to comply with the general scheme shown, including all types of control.

13 C. Circuit numbers as shown on plans are for contractor to plan his wiring and for estimating purposes.

14 These numbers are not necessarily consecutive numbers of the panelboard breakers. Balanced load on

15 bus is to be the determining factor in arrangement of circuits. Balance loading to within 7 1/2%.

16 D. Minimum size of lighting system branch circuit conductors to be #12 AWG.

17 E. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond outlet box conduit

18 fitting.

19 F. 120 volt circuit home runs greater than 50 feet in length shall have #10 AWG minimum size between

20 panel and first receptacle or fixture outlet.

21 **G. The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All**

22 **branch circuits shall be furnished and installed with an individual accompanying neutral, sized the**

23 **same as the phase conductors.**

24 1.28 MOTOR WIRING

25 A. Unless otherwise indicated on the drawings or elsewhere in these specifications, all motors shall be

26 furnished by others.

27 B. Motors shall be set in place by others and the associated motor starters and controllers shall be turned

28 over to this Contractor for erection and line voltage power wiring.

29 C. Any contractor supplying starters and controllers that are not part of this contract shall index same and

30 provide this Contractor with instructions as to proper location in sufficient time to permit the installation

31 of a concealed raceway system.

32 D. Where this Contractor is required to provide control wiring, the Contractor supplying the controllers shall

33 provide all necessary and required wiring diagrams for proper installation.

34 E. Low voltage (less than 115 volts) control wiring shall be by others, unless noted elsewhere in the

35 specifications except that this Contractor shall extend circuit to associated transformers, wire and connect

36 to same.

37 F. This Contractor shall examine the plans and specifications of other sections and shall include in his bid

38 all control wiring, as referenced to be performed by Section 16001.

1 G. Required disconnect switches furnished by other sections shall be installed by Section 16001.
2 Furthermore, this Contractor shall provide all disconnect switches required by code that are not furnished
3 by other sections.

4 1.29 SPECIAL OUTLETS

5 A. General: Furnish and install outlets, wiring and receptacles accordingly, at locations required by
6 equipment serviced or otherwise as directed. Extend wiring to outlets on equipment and make final
7 connection.

8 1.30 IDENTIFICATION

9 A. General:

- 10 1. Materials and equipment installed under this Section shall be clearly identified as listed below.
- 11 2. Locate identification conspicuously.
- 12 3. Terminology to be approved by Architect.
- 13 4. See plans for any additional items to be identified.
- 14 5. Loads such as motors shall be described by function rather than by the system of arbitrary number
15 as shown on electrical plans.
- 16 6. Use abbreviations sparingly.

17 B. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely screwed or riveted to the
18 following equipment. Size 1" x 4" with 3/8" high letters; unless space available dictates differently.

- 19 1. Each panelboard, contactor, time switch, starter or disconnect switch. Locate on inside cover of
20 panels.
- 21 2. Each feeder at all accessible locations.
- 22 3. Each end of empty conduit runs to indicate the intended use of the conduit and the location of
23 opposite end. Use room numbers that are permanently assigned.

24 C. Typewritten Directory: Each panelboard both new and existing shall be provided with a typewritten
25 directory attached to the inside of panel door and covered with clear plastic indicating load served and
26 rooms served by each protective device in the respective panel. Spares and spaces shall be clearly
27 identified.

28 D. Switch Station:

- 29 1. All key switches shall be engraved indicating controlled item.
- 30 2. All remote switches shall be engraved indicating controlled item.

31 E. Conductor Identification:

- 32 1. Identify each conductor at each wiring device, connector or splice point with permanently attached
33 wrap-around adhesive markers as manufactured by Brady Co. or 3M.
- 34 2. This identification shall include branch circuit number, control circuit, or any other appropriate
35 number or lettering that will expedite future tracing and trouble shooting.
36

1 1.31 LOCATIONS OF OUTLETS AND WIRING DEVICES

2 A. Outlets:

- 3 1. Locations of outlets and electrical equipment on the drawings are approximate only. Unless
4 otherwise indicated on the drawings or established in the specifications, the exact locations of
5 electrical outlets shall be established in the field by directive from the Architect. Generally,
6 outlets shall be located as required for proper installation of equipment served and otherwise
7 locations shall be established by construction or code requirements and such as to be coordinated
8 with equipment of other trades.
- 9 2. This Section shall consult with the Architect and refer to all details, sections, elevations and
10 equipment plans and the plans of other trades for exact location.
- 11 3. The Architect reserves the right to make reasonable changes in the location of outlets, apparatus or
12 equipment up to the time of roughing in. Such changes as directed shall be made by the
13 Contractor without additional compensation.
- 14 4. Dimensions taken by scale shall not be used to establish rough-in locations.

15 B. Wiring Devices:

- 16 1. The approximate location of wiring devices are indicated on the drawings; the specific location
17 shall be determined in accordance with "Location of Outlets" of these specifications and as
18 follows.
- 19 2. This Section is referred to equipment plans, equipment shop drawings, elevation drawings and
20 other detail or dimensional drawings, and he shall consult with the Architect before installation of
21 proceeding with any work dependent upon this information.
- 22 3. Generally, wiring devices shall be located as follows:
- 23 a. Wall receptacles shall generally be centered 15" above the finished floor and 6" above
24 surface of built-in counters and tables where same abuts wall and 4" above
25 backsplashes if counters are so equipped.
- 26 b. Special purpose receptacles shall be located as required by equipment served.
- 27 c. Switches shall be centered 48" above finished floor on latch side of door opening with
28 edge of plate not more than 12" from door frame, except as noted on the drawings.
- 29 d. In hazardous areas, the location of wiring devices shall be established by Code
30 requirements which shall take precedence over conflicting information on the drawings
31 or included herein.

32 1.32 TELEPHONE SYSTEM

33 A. Refer to the electrical specification section 27 10 00 – Telecommunication Distribution System for
34 detailed information on the telephone system.

35 B. Dane County is currently using a VOIP (voice over internet protocol) telephone system so all telephone
36 cabling will be using same cabling used for data.

37 C. Telephone instruments, switching equipment, and other accessories shall be furnished and installed by
38 the Owner (Dane County)

39 D. This Contractor shall supply all required cabling, jacks, conduit, sleeves, and service fittings for the
40 telephone system.

41 E. All conduits shall be complete with fish wire by this Contractor, and all telephone outlets shall be fed by
42 a minimum 1" conduit.

43 F. All telephone boxes shall be two gang boxes with one gang plaster cover.

1 G. Verify all phone locations with the Architect in the field.

2 1.33 DEMOLITION, RENOVATION AND DISPOSITION OF EXISTING EQUIPMENT

3 A. This Contractor shall note that portions of the existing building will remain in service during portions of
4 the construction period. Areas of the building will be vacated as required to facilitate construction. This
5 Contractor shall proceed with the completion of his work in such a manner as to cause the least possible
6 interference with the Owner's operation. All work required in the existing building shall be done in a
7 manner and time acceptable to the Owner.

8 B. Outages and other work rendering existing equipment inoperative shall be held to a minimum - prior
9 arrangements for each shall be made with the Owner and shall be acceptable as to time and duration.

10 C. Electrical equipment in conflict with construction shall be removed and/or relocated as indicated on the
11 drawings, as directed or required. This Contractor shall remove all electrical equipment released from
12 service as a result of construction, and no equipment removed shall be reused, except as specifically
13 directed on the drawings or elsewhere herein. All electrical equipment removed during construction shall
14 be presented to the Owner for his acceptance or rejection. Materials rejected by the Owner become the
15 Contractor's property and shall be removed from the site.

16 D. This Contractor shall be responsible for the work of other trades as may be necessary to facilitate the
17 installation of electrical work in the existing building. Such work necessary that is normally done by
18 other trades and is not covered as a part of other divisions of the work shall be done under the direction
19 and at the expense of the Electrical Contractor. This work shall include but is not limited to cutting,
20 patching, and all work necessary and required to leave existing building in condition acceptable to the
21 Architect.

22 E. Any existing circuits or equipment not shown on the drawings and which are logically expected to be
23 continued in service and which may be interrupted or disturbed during construction shall be reconnected
24 in an approved manner. In addition, any existing circuit or equipment which may require relocations or
25 rerouting, as a result of construction, shall be considered a part of the work of this branch and shall be
26 done by this contractor with no additional compensation.

27 F. All coring that is required for electrical work shall be by this Contractor.

28 G. All new conduit and wiring shall be concealed where possible to do so without extensive cutting and
29 patching. All exposed work shall be run in wiremold and installed only where approved by Architect.
30 Routing shall be subject to Architects approval. Make use of all standard wiremold colors to match
31 surfaces as closely as possible.

32 H. All ballasts and lamps removed during the project, unless part of fixtures claimed by the Owner, become
33 the Contractor's property and he shall dispose of them in accordance with applicable DNR and EPA
34 regulations.

35 1.34 SEALING AND FIREPROOFING

36 A. Sealing and fireproofing of openings between conduit, cable tray, wireway, trough, cablebus, busduct,
37 etc. and fire rated surfaces shall be the responsibility of the contractor whose work penetrates the
38 opening.

39 B. Sealing and fireproofing shall use materials and methods complying with ASTM E814 requirements
40 appropriate to the rating of the material penetrated.

41 C. Materials by Dow-Corning, 3M, Specified Technologies, Inc., and Chase-Foam are acceptable if in
42 accordance with (B) above.

1 D. Submit manufacturer's penetration details to authority having jurisdiction. Details shall confirm
2 method's compliance with ASTM E814.

3 E. Include copies of penetration details in Project Operation and Maintenance Manuals.

4 1.35 ALTERNATE BIDS

5 A. See Section 01030 for descriptions of alternates required.

6 END OF SECTION 26 05 00

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 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 1.04 QUALITY ASSURANCE

2 A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized
3 Testing Laboratory (NRTL).

4 1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.

5 2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

6 B. Regulatory Requirements:

7 1. National Electrical Code: Components and installation shall comply with NFPA 70.

8 2. Local codes and ordinances.

9 PART 2 - PRODUCTS

10 2.01 ELECTRICAL METALLIC TUBING (EMT)
11 INTERMEDIATE METALLIC CONDUIT (IMC)
12 GALVANIZED RIGID STEEL CONDUITS (GRS)

13 A. Manufacturers:

14 1. Allied Steel

15 2. Omega

16 3. Wheatland

17 4. Columbia

18 B. Manufacturer's standard lengths and size.

19 C. Protected inside and out by hot-dipped galvanized or electrogalvanized coating.

20 D. Minimum size: 3/4 inch, except as follows:

21 1. Conduit for lighting switch legs containing switched conductors only may be 1/2 inch.

22 2. As noted on drawings.

23 E. Do not use aluminum conduit.

24 2.02 PLASTIC CONDUIT (PVC)

25 A. Manufacturers:

26 1. Carlon.

27 2. Genova.

28 3. Certainteed.

29 B. Standard lengths and sizes.

30 C. Schedule 40 or 80, heavy wall rigid plastic (PVC) conduit manufactured to NEMA TC2 standards, UL
31 listed, and as required by NEC.

32 D. Rated for 90 degree c. cable.

33 E. Minimum size: 2" inches.

1 2.03 FLEXIBLE CONDUIT

2 A. Manufacturers:

- 3 1. Triangle PWC, Inc.
- 4 2. Anaconda
- 5 3. Flexsteel
- 6 4. American Flexible Conduit

7 B. Galvanized flexible steel.

8 C. Standard conduit sizes.

9 D. Minimum Size: 1/2 inch.

10 2.04 LIQUIDTIGHT FLEXIBLE CONDUIT

11 A. Manufacturers:

- 12 1. O-Z/Gedney Company
- 13 2. American Flexible Conduit
- 14 3. Flex-Guard, Inc.
- 15 4. Liguatite
- 16 5. Anaconda

17 B. Galvanized flexible steel.

18 C. Standard conduit sizes.

19 D. Minimum Size: 1/2 inch.

20 E. Heavy wall PVC jacket.

21 2.05 FITTINGS

22 A. Manufacturers:

- 23 1. Appleton Electric Company.
- 24 2. Steel City, American Electric.
- 25 3. Oz-Gedney Co.

26 B. Steel or malleable iron, zinc galvanized or cadmium plated.

27 C. Do not use set screw or indentor type fittings.

28 D. Do not use aluminum or die cast fitting.

29 E. EMT IMC and GRS Connectors and Couplings:

- 30 1. Threaded.
- 31 2. Gland compression type.
- 32 3. Insulated throat.
- 33 4. Rain and concrete type.

- 1 F. Flexible Conduit Connectors and Couplings:
- 2 1. Threaded.
- 3 2. Insulated throat.
- 4 3. Grounding type.
- 5 4. Gland compression type.
- 6 G. Liquidtight Flexible Conduit Fittings:
- 7 1. Liquidtight.
- 8 2. Insulated throat.
- 9 3. Threaded.
- 10 4. Gland compression type.
- 11 5. Grounding type.
- 12 H. Expansion Joints:
- 13 1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.
- 14 2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.
- 15 I. Seals:
- 16 1. Wall entrance, Appleton Type FSK or FSC.
- 17 J. Drain Fittings:
- 18 1. Automatic Drain Breather:
- 19 a. Explosionproof.
- 20 i. Safe for Class I, Groups C and D.
- 21 b. Capable of passing minimum 25 cc water/minimum and minimum 0.05 cubic foot
- 22 air/minimum at atmospheric pressure.
- 23 2. Condensate Drain:
- 24 a. Conduit outlet body, Type T.
- 25 b. Threaded, galvanized plug with 3/16 inch drilled holed through plug.
- 26 2.06 SURFACE METAL RACEWAY
- 27 A. Manufacturers:
- 28 1. Wiremold Co.
- 29 2. Hubbell Co.
- 30 3. Steel City, American Electric
- 31 B. General:
- 32 1. Wiremold Series 700 series or equal.
- 33 2. Base and cover section to accommodate pulling conductors through raceway.
- 34 3. capable of being over painted.
- 35 4. Full complement of fitting must be available.
- 36 C. The use of surface raceways shall be minimized on the project. Surface raceway shall only be used
- 37 where installing new devices on existing walls that are not being furred out or where conduit cannot be
- 38 installed in an existing wall

1 D. Any use of surface raceway shall be approved by the Architect prior to installation.

2 2.07 WIRES, CABLES, AND CONNECTORS

3 A. Manufacturers:

4 1. Wire and Cable:

- 5 a. Continental
- 6 b. Southwire.
- 7 c. Rome Cable.
- 8 d. Houston Wire and Cable.
- 9 e. Beldon.
- 10 f. Dekoron.
- 11 g. Royal
- 12 h. South
- 13 i. General

14 2. Connectors:

- 15 a. Burndy.
- 16 b. Thomas and Betts.
- 17 c. Blackburn, American Electric.

18 3. Electrical Tape:

- 19 a. 3M Scotch Brand.
- 20 b. Plymouth.
- 21 c. or equal.

22 B. Copper wire only.

23 C. 600 v insulation (ASTM standard compounds) and color code conductors for low voltage (secondary
24 feeders and branch circuits) as required by NEC.

- 25 1. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for branch circuit and feeder
26 conductors size No. 8 AWG and smaller.
- 27 2. Type XHHW-2 Stranded: Single conductor for branch circuits, feeders and service conductors
28 larger than No. 8 AWG.
- 29 3. Provide grounding conductor with same insulation as circuit conductors when run with circuit
30 conductors.
- 31 4. Type THWN-2 Stranded: Single conductor No. 12 AWG minimum for 120 v control wiring and
32 No. 14 AWG minimum for graphic indication, nonshielded instrumentation and other control
33 wiring operating at less than 120 v unless otherwise noted on Drawings.
 - 34 a. Provide high density polyethylene jacketed multi-wire cable assemblies in underground
35 conduit or duct.

36 D. Joints, Taps, and Splices:

- 37 1. Joints, Taps, and Splices in Conductors No. 10 AWG and Smaller: UL listed compression spring-
38 type solderless connectors with plastic cover.
- 39 2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger: Solderless two or four-bolt
40 compression type connectors of type that will not loosen under vibration or normal strains.
- 41 3. Terminations: Compression-type crimp lugs.

1 2.08 BOXES

2 A. Manufacturer:

3 1. Interior Outlet Boxes:

- 4 a. Appleton Electric Company.
- 5 b. Raco.
- 6 c. Steel City, American Electric.

7 2. Weatherproof Outlet Boxes:

- 8 a. Appleton Electric Company.
- 9 b. Crouse-Hinds Company.
- 10 c. O-Z/Gedney company.
- 11 d. Perfect-Line, American Electric.

12 3. Junction and Pull Boxes:

- 13 a. Hoffman Engineering Company.
- 14 b. Keystone Columbia, Inc.
- 15 c. Electromate.

16 B. Outlet Boxes - Flush Mounted:

- 17 1. Wall Outlets: Square corner, galvanized masonry type with internally mounted ears or 4-inches
- 18 square with raised cover having square corners and internally mounted ears.
- 19 2. Ceiling Lighting Fixture Outlet Boxes: 4-inch square galvanized box with raised cover set flush
- 20 with finished surface, complete with 3/8 inch fixture stud.

21 C. Outlet Boxes - Surface Mounted:

- 22 1. General Use: 4-inches square with raised device cover.
- 23 2. Weatherproof: Cast galvanized with threaded hub.
- 24 3. Safety outlet enclosure - Tay Mac Co. - Verify outlet configuration.
- 25 4. Hazardous Locations: Cast galvanized approved for classification of area.

26 D. Junction and Pull Boxes:

- 27 1. Fabricate from code gauge galvanized steel, with covers held in-place by corrosion resistant
- 28 machine screws.
- 29 2. Size as required by code for number of conduits and conductors entering and leaving box.
- 30 3. Provide with welded seams where applicable, and equipment with corrosion resistant nuts, bolts,
- 31 screws, and washers.
- 32 4. Finish with rust inhibiting primer.

33 2.09 FIRE RATED THROUGH FLOOR FITTINGS

34 A. Manufacturers:

- 35 1. Hubbell Electric Co.
- 36 2. Square D.
- 37 3. Steel City, American Electric.

38 B. Rating:

- 39 1. Floor fittings requiring penetration of floor slab listed by UL and have UL fire rating of 2 hours.

- 1 C. Floor Service Pedestal:
- 2 1. Painted textured aluminum surface.
- 3 2. 2 to 8 gangs of service capacity and suitable for:
- 4 a. Duplex receptacles 15 or 20-amp.
- 5 b. Single twist lock receptacle 20-or 30-amp.
- 6 c. Communication/data outlet (2/gang).
- 7 d. 1-inch ID protective bushing for cables.
- 8 e. Furniture feed plate suitable for 3/4-inch flexible metal conduit connection.
- 9 D. Junction Boxes in Ceiling Space Below Floor:
- 10 1. Suitable to accommodate separate services of power and communications.
- 11 2. Code approved for plenum space when applicable.
- 12 E. Raceways through Floor:
- 13 1. Provide separation of power and low voltage.
- 14 2. For 2-inch core holes:
- 15 a. 3/4 inch raceway for communication.
- 16 b. 1/2 inch raceway for power.
- 17 c. Heat Transfer: .11 square inch of copper cross section maximum for both.
- 18 3. For 3-inch core holes:
- 19 a. 1-1/4 inch raceway for communication.
- 20 b. 1/2 inch raceway for power.
- 21 c. Heat Transfer: .16 square inch of copper cross section maximum for both.
- 22 F. Abandonment Plates:
- 23 1. Maintain same UL listed fire rating.
- 24 2. Packaged, identified, and turned over to OWNER.
- 25 2.10 WIRING DEVICES
- 26 A. Manufacturers:
- 27 1. Hubbell Wiring Device Division.
- 28 2. Pass and Seymour, Inc.
- 29 3. Leviton
- 30 4. Cooper Wiring Devices
- 31 B. Fabricated Devices:
- 32 1. Factory-fabricated, specification grade wiring devices in type, color, and electrical rating for
- 33 service indicated. Ivory color or as selected by ENGINEER OR OWNER.
- 34 2. Wiring devices of one manufacturer.
- 35 3. See Drawing symbol schedule for identification of device type.
- 36 C. Switches:
- 37 1. General Use Lighting Switches: 20 amp toggle, equal to Hubbell No. 1221-I series.
- 38

- 1 2. Switches controlling equipment, operation of which is not evident from switch position, shall
2 include flush neon pilot light in conjunction with proper switch. Each switch shall be complete
3 with engraved plate to identify equipment being controlled (white letters on black, 1/8 inch high
4 minimum).
- 5 D. Receptacles:
 - 6 1. General use duplex receptacles: NEMA No. 5-20R, grounding type, 20 amp Hubbell No. 5362
7 Specification Grade.
 - 8 2. Special purpose receptacles as shown on Drawings and schedules.
 - 9 3. Receptacles supplied from standby emergency system to have red face.
 - 10 4. GFI receptacles shall be Hubbell GFR5352IA
- 11 E. Wiring Device Plates and Covers:
 - 12 1. Wall plates for wiring devices with ganging and cut-outs as indicated, provided with metal screws
13 for securing plates to devices, screw heads colored to match finish of plate.
 - 14 2. Plates for Flush Mounted Devices: Equal to Sierra P line specifications grade Type No. 430
15 brushed stainless steel.
 - 16 3. Telephone outlet configuration to match telephone outlet jack or cable.
 - 17 4. Device plates for surface mounted Type FS or FD boxes to be Type FSK galvanized steel.
 - 18 5. Device plates for surface mounted, 4-inch square bossed to be ½ inch raised galvanized steel
19 covers.
 - 20 6. Weatherproof outlet enclosure for exterior devices or devices in damp locations to be marked
21 galvanized gray cast malleable with gasketed lift cover plate as shown on Drawings. Suitable for
22 wet locations while in use. Enclosure must be gasketed. Provide Intermatic WP1010MC,
23 WP1010HMC, or WP1030MC with appropriate mounting base(s) and inserts.

24 2.11 MOTOR AND CIRCUIT DISCONNECTS

- 25 A. Manufacturers:
 - 26 1. Eaton/Cutler-Hammer
 - 27 2. Siemens
 - 28 3. Square D
 - 29 4. Allen Bradley
 - 30 5. General Electric
- 31 B. Enclosed Circuit Breaker Construction:
 - 32 1. Dual cover interlock.
 - 33 2. External trip indication.
 - 34 3. Provisions for control circuit interlock.
 - 35 4. Padlock provisions for padlock in Off position.
 - 36 5. Handle attached to box, not cover.
 - 37 6. Handle position indicates On, Off or Tripped.
 - 38 7. Provisions for insulated or groundable neutral.
- 39 C. Safety Switches:
 - 40 1. NEMA heavy duty Type HD.
 - 41 2. Dual cover interlock.
 - 42 3. Visible blades.

- 1 4. Provisions for control circuit interlock.
- 2 5. Pin type hinges.
- 3 6. Tin plated current carrying parts.
- 4 7. Quick make and break operator mechanism.
- 5 8. Handle attached to box, not cover.
- 6 9. Handle position indication, On in up position and Off in down position.
- 7 10. Padlock provisions for up to 3 padlocks in Off position.
- 8 11. UL listed lugs for type and size of wire specified.
- 9 12. Spring reinforced fuse clips for Class R fuses.
- 10 13. Provisions for insulated or groundable neutral.
- 11 14. UL listed short circuit rating 200,000 RMS amp with Class R fuses.
- 12 D. Enclosures:
 - 13 1. Indoor: NEMA 1 code gauge steel with rust inhibiting primer and baked enamel finish.
 - 14 2. Outdoor: NEMA 3R code gauge zinc coated steel with baked enamel finish.
- 15 2.12 FUSES
 - 16 A. Manufacturers:
 - 17 1. Bussmann
 - 18 2. Gould Shawmut
 - 19 3. Littlefuse
 - 20 4. Brush
 - 21 B. 250 v. Fuses:
 - 22 1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp
 - 23 interrupting rating.
 - 24 a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection
 - 25 for motor, transformer, welder, feeder, and main service protection.
 - 26 C. 600v Fuses:
 - 27 1. Class RK-1, 1-end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000-amp
 - 28 interrupting rating.
 - 29 a. Gould Shawmut Tri-Onic TR-R, dual element, time delay with short circuit protection
 - 30 for motor, transformer, welder, feeder and main service protection.
 - 31 2. Class L, bolt-in 601 to 6,000 amps, 200,000-amp interrupting rating.
 - 32 a. Gould Shawmut A48Y, time delay for overload and short circuit protection for motor,
 - 33 transformer, feeder, and main service protection.
 - 34 3. Class CC, fast acting, single element, 1/10 to 30 amps, 200,000-amp interrupting rating.
 - 35 a. Gould Shawmut ATDR, UL listed for motor control circuits, lighting ballasts, control
 - 36 transformers, and street lighting fixtures.
 - 37 D. Spare Fuses:
 - 38 1. 10%, minimum of 3, of each type and rating of installed fuses.
 - 39

- 1 2.13 PANELBOARDS
- 2 A. Manufacturers:
- 3 1. Square D only to match building standard.
- 4 B. Panelboard Ratings:
- 5 1. UL listed short circuit rating (integral equipment rating):
- 6 a. Up to 240 v: 10,000 RMS symmetrical amp minimum.
- 7 b. Up to 480 v. 14,000 RMS symmetrical amp minimum.
- 8 c. As shown on Drawings.
- 9 C. Panelboard Construction:
- 10 1. Main breaker or main lugs only, per panelboard schedule.
- 11 2. Molded case circuit breakers.
- 12 3. Terminals:
- 13 a. UL listed for type or wire specified.
- 14 b. Anti-turn solderless compression type.
- 15 4. Bussing:
- 16 a. Distributed phase sequence type.
- 17 b. 225 amps, 98% conductivity hard drawn copper or as shown on panelboard schedule or
- 18 Drawings.
- 19 c. Copper.
- 20 d. Mounting hardware behind usable space.
- 21 5. Gutters adequate for wire size used, 4-inch minimum.
- 22 6. Boxes:
- 23 a. Code gauge galvanized steel.
- 24 b. Without knockouts.
- 25 7. Fronts:
- 26 a. Panel front cover shall have piano hinge to allow access to wiring gutters without
- 27 removal of panel trim. Hinged trim held in place with screw fasteners. Door shall be
- 28 built into trim, which allows access to breakers as well as to hinged trim screw
- 29 fasteners. Breaker access door shall have the following features:
- 30 i. Concealed piano hinge.
- 31 ii. Flush stainless steel cylinder tumbler type locks with spring loaded door pulls.
- 32 iii. Locks keyed alike.
- 33 iv. Rust inhibiting primer, baked enamel finish.
- 34 v. Dead front safety type.
- 35 vi. Concealed hinges and trim clamps..
- 36 vii. Circuit Directory:
- 37 viii. Suitable for complete descriptions.
- 38 ix. Clear plastic cover.
- 39 8. Typewritten card inside panel door.
- 40 9. Special features as shown on Drawings.
- 41 10. Code gauge steel.
- 42 11. Engraved laminated nameplate in accordance with Section 26 05 00.

1 2.14 MOLDED CASE CIRCUIT BREAKERS

2 A. Manufacturers:

3 1. Square D

4 B. Permanent Trip Circuit Breakers:

5 1. Lighting Panel Circuit Breakers:

- 6 a. Thermal and magnetic protection.
- 7 b. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
- 8 c. Bolt-on type unless otherwise noted on Drawings.
- 9 d. Quick make and break toggle action.
- 10 e. Handle trip indication.
- 11 f. Handle position indication, On, Off, and Tripped centered.
- 12 g. UL listed for type of wire specified.
- 13 h. UL listed short circuit rating (integrated equipment rating).
 - 14 i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
 - 15 ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.
- 16 i. UL SWDL switching duty on 120 v. circuits for switched circuits.
- 17 j. Switch neutral common trip per NEC 514-5 for fuel pumps.

18 2. Power Panel Circuit Breakers:

- 19 a. Thermal and magnetic protection.
- 20 b. Magnetic protection only in combination with motor starters and motor circuit
- 21 protectors (MCP).
- 22 c. Single magnetic trip adjustment.
- 23 d. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).
- 24 e. Push-to-trip test button.
- 25 f. Bolt-on type.
- 26 g. Quick make and break toggle action.
- 27 h. Handle trip indication.
- 28 i. Handle position indication, On, Off, and Tripped centered.
- 29 j. UL listed for type of wire specified.
- 30 k. UL listed short circuit rating (integrated equipment rating).
 - 31 i. Up to 240 v: 10,000 RMS symmetrical amp minimum.
 - 32 ii. Up to 480 v: 14,000 RMS symmetrical amp minimum.

33 2.15 GROUND-FAULT CIRCUIT INTERRUPTER RECEPTACLES (GFCI)

34 A. Ratings:

- 35 1. 120 vac.
- 36 2. 20 amp.

37 B. Tripping Requirement:

- 38 1. UL Class A.

39

- 1 C. Construction:
- 2 1. Shallow depth.
- 3 2. Line and load terminal screws.
- 4 3. Noise suppression.
- 5 4. Feed through.
- 6 5. Standard duplex wall plates shall fit.
- 7 6. NEMA 5-20R configuration.
- 8 D. Meet requirements of UL 943 ground-fault circuit interrupters.
- 9 2.16 GROUNDING AND BONDING
- 10 A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings,
- 11 and quantities indicated are in excess of NEC requirements, more stringent requirements and greater size,
- 12 rating, and quantity indications govern.
- 13 B. Conductor Materials: Copper.
- 14 C. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- 15 D. Equipment Grounding Conductor: Green insulated.
- 16 E. Grounding Electrode Conductor: Stranded cable.
- 17 F. Bare Copper Conductors:
- 18 1. Solid Conductors: ASTM B3.
- 19 2. Assembly of Stranded Conductors: ASTM B8.
- 20 3. Tinned Conductors: ASTM B33.
- 21 G. Ground Bus: Bar annealed copper bars of rectangular cross section.
- 22 H. Braided Bonding Jumpers: Copper tape, braided No. 30 gage bar copper wire, terminated with copper
- 23 ferules.
- 24 I. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inches thick and 2 inches wide, except as
- 25 indicated.
- 26 J. Connector Products
- 27 1. General: Listed and labeled as grounding connectors for materials used.
- 28 2. Pressure Connectors: High-conductivity-plated units.
- 29 3. Bolted Clamps: Heavy-duty units listed for application.
- 30 4. Exothermic Welded Connections: Provide in kit form and select for specific types, sizes, and
- 31 combinations of conductors and other items to be connected.
- 32

1 PART 3 - EXECUTION

2 3.01 GENERAL

3 A. Install products in accordance with NEC, manufacturer's instructions, applicable standards, and
4 recognized industry practices to ensure products serve intended function.

5 3.02 CONDUITS AND CONDUIT FITTINGS

6 A. Complete conduit installation prior to installing cables.

7 B. Unless specifically indicated otherwise on Drawings, use rigid galvanized steel conduit for general
8 wiring.

9 C. Provide watertight conduit system where installed in wet places, underground or where buried in
10 masonry or concrete.

11 D. EMT conduit may be used for conduit sizes up to 4 inches.

12 E. Conduit shall be run concealed except exposed surface conduit may be installed where noted on
13 Drawings or where concealment found to be impractical or impossible, and only with approval of
14 ENGINEER.

15 F. Continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes.

16 G. Enter and secure to boxes ensuring electrical continuity from point of service to outlets.

17 H. Conduit runs extending through areas of different temperature or atmospheric conditions or partly
18 indoors and partly outdoors shall be sealed, drained, and installed in manner preventing drainage of
19 condensed or entrapped moisture into cabinets, motors or equipment enclosures.

20 I. Run conduits within concrete structures parallel to each other and spaced on center of at least three times
21 conduit trade diameter with minimum 2-inch concrete covering. Conduits over 1 inch may not be
22 installed in slab without approval of ENGINEER.

23 J. Run exposed conduits parallel to or at right angles with lines of building.

24 K. Route conduit runs above suspended acoustical ceilings not interfering with tile panel removals.

25 L. Secure conduit in-place with not less than 1 malleable corrosionproof alloy strap or hanger per 8 feet of
26 conduit.

27 1. Do not use perforated strapping.

28 M. Connections to Motors and Equipment Subject to Vibration:

29 1. Flexible steel conduit not over 3 feet long or where exposed in mechanical and utility areas and
30 not subjected to moisture, dirt, and fumes.

31 2. Liquidtight flexible conduit not over 3 feet long where exposed in finished areas or where subject
32 to moisture, dirt, fumes, oil, corrosive atmosphere, exposed or concealed, with connectors to
33 ensure liquidtight, permanently grounded connection. Locate where least subject to physical
34 abuse.

35 N. Use double lock nuts and insulated bushings with threads fully engaged.

- 1 O. Connectors at fixture bodies and boxes shall be rigidly secured with galvanized lock nut and bushing.
- 2 P. Cap conduits after installation to prevent entry of debris.
- 3 Q. Install conduit expansion fittings complete with bonding jumper in following locations.
- 4 1. Conduit runs crossing structural expansion joint.
- 5 2. Conduit runs attached to two separate structures.
- 6 3. Conduit runs where movement perpendicular to axis of conduit may be encountered.
- 7 R. Install 4 feet-0 inch to 6 feet-0 inch flexible steel conduit drops from independent junction box mounted
- 8 above ceiling and accessible from below ceiling to recessed ceiling mounted equipment. Allow for
- 9 positioning of equipment to tile increments.
- 10 S. Negotiate beams and changes in ceiling heights with LB conduit fittings on outside corners and ells on
- 11 inside corners. Arrange bends and offsets in parallel conduits to present neat symmetrical appearance.
- 12 T. In precast areas, run conduits in insulation space or in floor topping without crossing conduits, using 3/4
- 13 in. maximum conduit size.
- 14 U. Core drill through reinforced concrete with approval of ENGINEER.
- 15 V. Split, crushed or scarred conduit not acceptable.
- 16 W. Do not route over boiler, incinerator or other high temperature equipment.
- 17 X. Flexible metal conduit can only be used for final connections to motors, transformers, or to light fixtures
- 18 above suspended ceilings.
- 19 3.03 SURFACE METAL RACEWAY
- 20 A. Mount to surface with No. 8 flathead fasteners or approved support clips.
- 21 B. Do not pinch wires.
- 22 C. Remove metal burrs and sharp edges.
- 23 D. Provide bushing.
- 24 E. Install in accordance with manufacturer's recommendations.
- 25 F. Provide covers where two lengths come together.
- 26 3.04 WIRE AND CABLE
- 27 A. Run wire and cable in conduit unless otherwise indicated on Drawings.
- 28 B. On branch circuits, use standard colors.
- 29 C. Each tap, joint or splice in conductors No. 8 AWG and larger shall be taped with 2 half-lap layers of
- 30 vinyl plastic electrical tape and finish wrap of color coding tape, where required by code.
- 31 D. Run ground wire with power circuits; conduit shall not be grounding path.

1 E. Color Coding: Conductors for lighting and power wiring as indicated below.

2	<u>Phase</u>	<u>208/120v</u>	<u>480/277v</u>
3	A	Black	Brown
4	B	Red	Orange
5	C	Blue	Yellow
6	Neutral	White	Gray
7	Ground	Green	Green

8 3.05 BOXES

9 A. Install knockout closures to cap unused knockout holes where blanks have been removed.

10 B. Locate boxes to ensure accessibility of electrical wiring.

11 C. Secure boxes rigidly to subsurface upon which being mounted or solidly embed boxes in concrete or
12 masonry. Do not support from conduit.

13 D. Do not burn holes, use knockout punches or saw.

14 E. Provide outlet box accessories as required for each installation such as mounting brackets, fixture study,
15 cable clamps, and metal straps for supporting outlet boxes compatible with outlet boxes being used and
16 meeting requirements of individual wiring situations.

17 F. Location of outlets and equipment shown on Drawings is approximate. Verify exact location.

18 G. Minor modification in location of outlets and equipment is considered incidental up to distance of 10 feet
19 with no additional compensation, provided notification of modification is given prior to roughing in of
20 outlet.

21 H. Flush outlets shall have edges or plaster flush with finished wall or ceiling surfaces so plates can be
22 drawn tightly to wall or ceiling surfaces.

23 I. Mounting heights:

24 1. Shall conform to ADA guidelines.

25 2. In general, unless otherwise shown on Drawings:

26 a. Switches: 48 inches above floor to top of box.

27 b. AC Receptacles and Telephone Outlets: 15 inches above floor to bottom of box or 6
28 inches above counters, counter backsplashes in finished areas; 48 inches to top of box
29 above floor in unfinished areas.

30 c. Wall Bracket Lighting Fixtures: 8 inches above mirrors or 6 feet-6 inches above floor.

31 d. Pushbuttons: 48 inches above floor to top of box.

32 e. Motor Starters and Disconnect Switches: 60 inches above floor.

33 i. Thermostats: 48 inches above floor.

34 f. Bells and Horns: 8 feet-0 inches above floor.

35 g. Clocks: 8 ft.-0 inches above floor.

36 h. Fire Alarm visual signals 80" above floor.

37 i. Emergency Battery Units: 8 ft. - 0 inches above floor or 12" below ceiling.

38 J. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall,
39 minimum 12 inches.

- 1 K. Where emergency switches occur adjacent to normal light switches, install in separate boxes in
2 accordance with NEC and device plate color coding separation.
- 3 L. Light Fixture Outlet Boxes:
- 4 1. Securely mount with approved type bar hangers spanning structural members to support weight of
5 fixture.
- 6 2. Do not support from conduit.
- 7 3. Equip with 3/8-inches fixture stud and tapped fixture ears.
- 8 3.06 FIRE RATED THROUGH FLOOR FITTINGS
- 9 A. Spacing and location as noted on Drawing.
- 10 B. Install in accordance with manufacturer's instructions.
- 11 3.07 WIRING DEVICES
- 12 A. Do not install devices until wiring is complete.
- 13 B. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or
14 otherwise. Make circuit connections by using wire connectors and pigtails.
- 15 C. Install gasket plates for devices or system components having light emitting features such as switch with
16 pilot light and dome lights. Where installed on rough textured surfaces, seal with black self-adhesive
17 polyfoam.
- 18 D. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box
19 connection or as shown on Drawings.
- 20 E. Wrap wiring devices with insulating tape.
- 21 F. Install emergency switches which occur adjacent to normal light switches in separate boxes to maintain
22 systems isolation in accordance with NEC.
- 23 3.08 MOTOR STARTERS
- 24 A. Examine area to receive motor starters to ensure adequate clearance for starter installation.
- 25 B. Anchor firmly to wall or structural surface.
- 26 3.09 MOTOR AND CIRCUIT DISCONNECTS.
- 27 A. Locate disconnect switches as shown on Drawings and required by NEC.
- 28 B. Provide control circuit interlock as required by NEC.
- 29 3.10 OVERCURRENT PROTECTIVE DEVICES.
- 30 A. Install fuses just prior to energizing equipment.
- 31 B. Locate circuit breakers as shown on Drawings.

1 C. Install GFCI receptacles as required by NEC.

2 3.11 PANELBOARDS

3 A. Flush or surface mount as specified on drawings and schedules.

4 B. Support panel cabinets independently to structure with no weight bearing on conduits.

5 C. Install recessed panelboards to allow cover to be drawn tight against wall to provide neat appearance.

6 D. Install panelboards so top breaker is not higher than 6 feet-0 inches above floor.

7 E. Adjacent panel cabinets shall be same size and mounted in horizontal alignment.

8 F. Install typewritten directory in each panelboard, accurately indicating rooms or equipment being served
9 after final circuit changes have been made to balance circuit loads.

10 G. Install four spare 1 inch conduits from top of each flush mounted panelboard to area above ceiling for
11 future use. On flush mounted panelboards located on first and higher level floors, provide two spare 1
12 inch conduits from bottom of panelboard to ceiling area of floor below for future use.

13 3.12 GROUNDING AND BONDING

14 A. Application

15 1. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and
16 quantities of equipment grounding conductors, except where larger sizes or more conductors are
17 indicated.

18 a. Install separate insulated equipment grounding conductors with circuit conductors.
19 Raceway may be used as equipment ground conductor where feasible in non-hazardous
20 areas and permitted by NEC for lighting circuits. Install insulated equipment ground
21 conductor in nonmetallic raceways unless designated for telephone or data cables.

22 2. Underground Conductors: Bare tinned, stranded copper except otherwise indicated.

23 3. Signal and Communications: For telephone, alarm, instrumentation and communication systems,
24 provide #4 AWG minimum green insulated copper conductor in raceway from grounding
25 electrode system to each terminal cabinet or central equipment location.

26 4. Ground separately derived systems required by NEC to be grounded in accordance with NEC
27 paragraph 250-26.

28 5. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to grounding electrode as
29 indicated in addition to separate equipment grounding conductor run with supply branch circuit.

30 6. Connections to Lighting Protection System: Bond grounding conductors or grounding conductor
31 conduits to lighting protection down conductors or grounding conductors in compliance with
32 NFPA 78.

33 B. Installation

34 1. General: Ground electrical systems and equipment in accordance with NEC requirements except
35 where Drawings or Specifications exceed NEC requirements.

36 2. Ground Rods:

37 a. Locate minimum of one-rod length from each other and at least same distance from any
38 other grounding electrode.

39 b. Interconnect ground rods with bare conductors buried at least 24 inches below grade.

- 1 c. Connect bare-cable ground conductors to ground rods by means of exothermic welds
2 except as otherwise indicated.
- 3 d. Make connections without damaging copper coating or exposing steel.
- 4 e. Use 3/4-inch by 10-foot ground rods except as otherwise indicated.
- 5 f. Drive rods until tops are 6 inches below finished floor or final grade except as
6 otherwise indicated.
- 7 3. Metallic Water Service Pipe:
- 8 a. Provide insulated copper ground conductors, sized as indicated, in conduit from
9 building main service equipment, or ground bus, to main metallic water service
10 entrances to building.
- 11 b. Connect ground conductors to street side of main metallic water service pipes by means
12 of ground clamps.
- 13 c. Bond ground conductor conduit to conductor at each end.
- 14 4. Braided-Type Bonding Jumpers:
- 15 a. Use elsewhere for flexible bonding and grounding connections.
- 16 5. Route grounding conductors along shortest and straightest paths possible without obstructing
17 access or placing conductors where they may be subjected to strain, impact, or damage, except as
18 indicated.
- 19 C. Connections
- 20 1. General: Make connections to minimize possibility of galvanic action or electrolysis. Select
21 connectors, connection hardware, conductors, and connection methods so metals in direct contact
22 will be galvanically compatible.
- 23 a. Use electroplated or hot-tin-coated materials to assure high conductivity and make
24 contact points closer in order of galvanic series.
- 25 b. Make connections with clean bare metal at points of contact.
- 26 c. Aluminum to steel connections: stainless steel separators and mechanical clamps.
- 27 d. Aluminum to galvanized steel connections: tin-plated copper jumpers and mechanical
28 clamps.
- 29 e. Coat and seal connections involving dissimilar metals with inert material such as red
30 lead paint to prevent future penetration of moisture to contact surfaces.
- 31 2. Exothermic Welded Connections:
- 32 a. Use for connections to structural steel and for underground connections except those at
33 test wells.
- 34 b. Install at connections to ground rods and plate electrodes.
- 35 c. Comply with manufacturer's written recommendations.
- 36 d. Welds that are puffed up or that show convex surfaces indicating improper cleaning are
37 not acceptable.
- 38 3. Terminations:
- 39 a. Terminate insulated equipment grounding conductors for feeders and branch circuits
40 with pressure-type grounding lugs.
- 41 b. Where metallic raceways terminate at metallic housings without mechanical and
42 electrical connection to housing, terminate each conduit with grounding bushing.
- 43 c. Connect grounding bushings with bare grounding conductor to ground bus in housing.
- 44 d. Bond electrically noncontinuous conduits at both entrances and exist with grounding
45 bushings and bare grounding conductors.
- 46

1 3.13 FIELD QUALITY CONTROL

2 A. Control Circuits, Branch Circuits, Feeders, Motor Circuits, and transformers:

- 3 1. Megger check to phase-to-phase and phase-to-ground insulation levels.
4 a. Do not megger check solid state equipment.
5 2. Continuity.
6 3. Short circuit.
7 4. Operational check.

8 B. Wiring Devices:

- 9 1. Test receptacles with Hubbell 5200, Woodhead 1750 or equal tester for correct polarity, proper
10 ground connection, and wiring faults.

11 3.14 ADJUSTMENT AND CLEANING

12 A. Motor Starters and Disconnects:

- 13 1. Adjust covers and operating mechanisms for free mechanical movement.
14 2. Tighten wire and cable connections.
15 3. Verify overcurrent protection thermal unit size with motor nameplate to provide proper operation
16 and compliance with NEC.
17 4. Clean interior of enclosures.
18 5. Touch up scratched or marred surfaces to match original finish.

19 B. Circuit Breakers:

- 20 1. Adjustable settings shall be set to provide selective coordination, proper operation, and
21 compliance with NEC.

22 C. Restore damaged areas on PVC jacketed rigid conduit with spray type touch-up coating compound or as
23 directed by manufacturer.

24 D. Pull cleaning plug through conduits to clear of dirt, oil, and moisture.

25 END OF SECTION 26 20 00

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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 LED FIXTURES

- 8 A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification
9 Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified
10 Products List, but they must meet the Product Qualification Criteria. The technical requirements that the
11 luminaire shall meet for each Application Category are:
- 12 1. Minimum Light Output.
 - 13 2. Zonal Lumen Requirements.
 - 14 3. Minimum Luminaire Efficacy.
 - 15 4. Minimum CRI.
 - 16 5. L70 Lumen Maintenance.
 - 17 6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED
18 components.

19 **Additional requirements:**

- 20 B. Color Temperature of 3000K-5000K for interior fixtures as listed in the Light Fixture Schedule on the
21 plans. The color temperature of exterior LED fixtures should not exceed 4100K (nominal).
22
- 23 C. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to
24 achieve consistent fixture-to-fixture color for interior fixtures. Exterior fixtures shall use a maximum 5-
25 step MacAdam Ellipse binning process.
26
- 27 D. Glare Control: Exterior fixtures shall meet DesignLights Consortium's® criteria for Zonal Lumen
28 Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior fixtures.
29
- 30 E. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
31
- 32 F. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
33
- 34 G. Light output of the LED system shall be measured using the absolute photometry method following IES
35 LM-79 and IES LM-80 requirements and guidelines.
36
- 37 H. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
38
- 39 I. Driver shall have a rated life of 50,000 hours, minimum.
40
- 41 J. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
42
- 43 K. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
44
- 45 L. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior fixtures, and a minimum
46 of 70 for exterior fixtures.
47
- 48 M. LED fixture shall be thermally designed as to not exceed the maximum junction temperature of the LED
49 for the ambient temperature of the location the fixture is to be installed. Rated case temperature shall be
50 suitable for operation in the ambient temperatures typically found for the intended installation. Exterior
51 luminaires to operate in ambient temperatures of -20°F to 122°F (-29°C to 50°C).
52

- 1 N. LED driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full
2 input power and across specified voltage range.
3
- 4 O. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.
5
- 6 P. Luminaire shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and
7 across specified voltage range.
8
- 9 Q. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
10
- 11 R. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in
12 the event connections are reversed or shorted during the installation process.
13
- 14 S. Fuse Protections: All luminaires shall have built-in fuse protection. All power supply outputs shall be
15 either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected as per Class 2
16 UL listing.
17
- 18 T. All luminaires shall be provided with knockouts for conduit connections.
19
- 20 U. The LED lighting fixture shall carry a limited 5-year warranty minimum for LED light engine(s)/board
21 array, and driver(s).
22
- 23 V. Provide all of the following data on submittals:
24 1. Delivered lumens
25 2. Input watts
26 3. Efficacy
27 4. Color rendering index.
28

29 **Emergency LED Fixture Compatibility with Inverters:**

- 30 W. Emergency Inverters shall be sine-wave type, or have written confirmation from the luminaire
31 manufacturer that the fixture will function with a square-wave inverter.
32

33 **Dimming:**

- 34 X. LED driver shall be compatible with dimming controls where dimming is indicated on the plans.
35 Dimmable drivers shall use Dimming Constant Current (DCC) or Pulse Width Modulation (PWM)
36 operation.
37
- 38 Y. LED fixtures shall dim to (20%, 15%, 10%, 5%, or 0.1%) as specified in the Light Fixture Schedule on
39 the plans without visible flicker or "popcorn effect". "Popcorn effect" is defined as the fixture being on a
40 pre-set dimmed level (less than 100%), and going to 100% prior to returning to the pre-set level when
41 power is returned to the fixture.

42 2.05 FIXTURES FOR HAZARDOUS LOCATIONS

- 43 A. Conform to UL 844 or provide units that have Factory Mutual Engineering and Research Corporation
44 (FM) certification for indicated class and division of hazard.

45 2.06 TRACK LIGHTING SYSTEMS

- 46 A. Conform to UL 1574. Provide components, including track, fittings, and fixtures from same
47 manufacturer, and as recommended by manufacturer for intended purpose.
- 48 B. Stage and Studio Lighting Equipment: Conform to UL 1573.

49 2.07 EXIT SIGNS

- 50 A. Conform to UL 924.

- 1 1. Sign Colors: Conform to local code.
- 2 B. Self-Powered Exit Signs (Battery Type): Integral automatic high/low trickle charger in self-contained
3 power pack.
- 4 1. Battery: Sealed, maintenance-free, nickel cadmium type with special project warranty.
- 5 2.08 LAMPS
- 6 A. Conform to ANSI C78 series applicable to each type of lamp.
- 7 2.09 FINISH
- 8 A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs,
9 holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project
10 warranty period and replace with new fixtures.
- 11 B. Other Parts: Manufacturer's standard finish.
- 12 C. Verify and provide light fixture finishes as selected by ARCHITECT for all light fixture types. Include
13 colored finish selection tables with product submittals. Upon request submit actual material finish
14 swatches for A/E review.
- 15 PART 3 - EXECUTION
- 16 3.01 INSTALLATION
- 17 A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to
18 manufacturer's printed instructions and approved submittals.
- 19 B. Support For Recessed and Semirecessed Fixtures: Units may be supported from suspended ceiling
20 support system. Install ceiling system support rods or wires at minimum of four rods or wires per fixture
21 located not more than 6 inches from fixture corners.
- 22 1. Fixtures Smaller Than Ceiling Grid: Install minimum of four rods or wires for each fixture and
23 locate at corner of ceiling grid where fixture is located. Do not support fixtures by ceiling
24 acoustical panels.
- 25 2. Fixtures of Sizes Less Than Ceiling Grid: Center in acoustical panel. Support fixtures
26 independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- 27 3. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near
28 each fixture corners.
- 29 C. Support for Suspended Fixtures: Brace pendants and rods that are 4 feet long or longer to limit swinging.
30 Support stem mounted single-unit suspended fluorescent fixtures with twin-stem hangers. For
31 continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit
32 length of chassis, including one at each end.
- 33 D. Lamping: Lamp units according to manufacturer's instructions.
- 34 3.02 GROUNDING
- 35 A. Ground fixtures and metal poles according to Section 26 20 00.
- 36 3.03 FIELD QUALITY CONTROL
- 37 A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

- 1 B. Give 7-day notice of dates and times for field tests.
- 2 C. Verify normal operation of each fixture after fixtures have been installed and circuits have been
3 energized with normal power source.
- 4 D. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation.
 - 5 1. Duration of supply.
 - 6 2. Low battery voltage shut-down.
 - 7 3. Normal transfer to battery source and retransfer to normal.
 - 8 4. Low supply voltage transfer.
- 9 E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until units
10 operate properly.
- 11 3.04 ADJUSTING AND CLEANING
- 12 A. Clean fixtures upon completion of installation. Use methods and materials recommended by
13 manufacturer.
- 14 B. Adjust aimable fixtures to provide required light intensities.

15 END OF SECTION 26 51 13

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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. (third floor only)
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.
 - c. Removal of copper data cabling on the fifth floor.
 - d. Relocation of fiber optic cabling on the fifth floor.

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

- 1 Infrastructure of Commercial Buildings
- 2 f. ANSI/TIA/EIA-607(A) -- Commercial Building Grounding and Bonding Requirements
- 3 for Telecommunications
- 4 g. ANSI/TIA/EIA-526-7 -- Measurement of Optical Power Loss of Installed Single-Mode
- 5 Fiber Cable Plant
- 6 h. ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed
- 7 Multimode Fiber Cable Plant
- 8 i. ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications
- 9 Cabling Standard
- 10 B. Install cabling in accordance with the most recent edition of BICSI® publications:
- 11 1. BICSI -- Telecommunications Distribution Methods Manual
- 12 2. BICSI -- Cabling Installation Manual
- 13 3. BICSI -- LAN Design Manual
- 14 4. BICSI -- Customer-Owned Outside Plant Design Manual
- 15 C. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of
- 16 the specifications as if herein repeated or hereto attached. If the contractor should note items in the
- 17 drawings or the specifications, construction of which would be code violations, promptly call them to the
- 18 attention of the owner's representative in writing. Where the requirements of other sections of the
- 19 specifications are more stringent than applicable codes, rules, regulations, and ordinances, the
- 20 specifications shall apply.
- 21 1.03 PERMITS, FEES, AND CERTIFICATES OF APPROVAL
- 22 A. As prerequisite to final acceptance, supply to the owner certificates of inspection from an inspection
- 23 agency acceptable to the owner and approved by local municipality and utility company serving the
- 24 project.
- 25 1.04 SYSTEM DESCRIPTION
- 26 A. Telecommunications cabling system generally consists of one telecommunications outlet in each
- 27 workstation, wall telephones in common and mechanical areas and telecommunications rooms (TRs)
- 28 located on each floor.
- 29 1. For this project, the telecommunications rooms are existing.
- 30 2. The equipment room (ER) is currently existing and is located on the 5th Floor of the City-County
- 31 Building.
- 32 B. The typical work area consists of a single-gang plate with up to six standards compliant work area
- 33 outlets.
- 34 1. Each work area outlet consists of one (1) four-pair data Category 6 cable or above, installed from
- 35 work area outlet to the TR. Terminate data cables on rack mounted modular patch panels located
- 36 in the appropriate TR.
- 37

1 1.05 SUBMITTALS

2 A. Submit to the engineer/designer shop drawings, product data (including cut sheets and catalog
3 information), and samples required by the contract documents. Submit shop drawings, product data, and
4 samples with such promptness and in such sequence as to cause no delay in the work or in the activities
5 of separate contractors. The engineer/designer will indicate approval of shop drawings, product data, and
6 samples submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted
7 shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's
8 legitimate firm name.

9 1. By submitting shop drawings, product data, and samples, the contractor represents that he or she
10 has carefully reviewed and verified materials, quantities, field measurements, and field
11 construction criteria related thereto. It also represents that the contractor has checked,
12 coordinated, and verified that information contained within shop drawings, product data, and
13 samples conform to the requirements of the work and of the contract documents. The
14 engineer/designer remains responsible for the design concept expressed in the contract documents
15 as defined herein.

16 2. The engineer's/designer's approval of shop drawings, product data, and samples submitted by the
17 contractor shall not relieve the contractor of responsibility for deviations from requirements of the
18 contract documents, unless the contractor has specifically informed the engineer/designer in
19 writing of such deviation at time of submittal, and the engineer/designer has given written
20 approval of the specific deviation. The contractor shall continue to be responsible for deviations
21 from requirements of the contract documents not specifically noted by the contractor in writing,
22 and specifically approved by the engineer in writing.

23 3. The engineer's/designer's approval of shop drawings, product data, and samples shall not relieve
24 the contractor of responsibility for errors or omissions in such shop drawings, product data, and
25 samples.

26 4. The engineer's/designer's review and approval, or other appropriate action upon shop drawings,
27 product data, and samples, is for the limited purpose of checking for conformance with
28 information given and design concept expressed in the contract documents. The
29 engineer's/designer's review of such submittals is not conducted for the purpose of determining
30 accuracy and completeness of other details such as dimensions and quantities, or for substantiating
31 instructions for installation or performance of equipment or systems, all of which remain the
32 responsibility of the contractor as required by the contract documents. The review shall not
33 constitute approval of safety precautions or of construction means, methods, techniques,
34 sequences, or procedures. The engineer's/designer's approval of a specific item shall not indicate
35 approval of an assembly of which the item is a component.

36 B. Perform no portion of the work requiring submittal and review of shop drawings, product data, or
37 samples, until the engineer/designer has approved the respective submittal. Such work shall be in
38 accordance with approved submittals.

39 C. Submit shop drawings, product data, and samples as a complete set within thirty (30) days of award of
40 contract.

41 1. For initial submission and for resubmission required for approval, submit four (4) copies of each
42 item. The engineer/designer will only return two copies. Make reproductions as required for your
43 use and distribution to subcontractors.

44 2. Illegible submittals will not be checked by the engineer.

45 D. General: Submit the following:

46 1. Bill of materials, noting long lead time items

47 2. Optical loss budget calculations for each optical fiber run

48 3. Project schedule including all major work components that materially affect any other work on the

- 1 project
- 2 E. Shop drawings: Submit the following:
- 3 1. Backbone (riser) diagrams.
- 4 2. System block diagram, indicating interconnection between system components and subsystems.
- 5 3. Interface requirements, including connector types and pin-outs, to external systems and systems or
- 6 components not supplied by the contractor.
- 7 4. Fabrication drawings for custom-built equipment.
- 8 F. Product Data -- Provide catalog cut sheets and information for the following:
- 9 1. Wire and cable
- 10 2. Outlets, jacks, faceplates, and connectors
- 11 3. All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings
- 12 4. Terminal blocks and patch panels
- 13 G. Project record drawings:
- 14 1. Submit project record drawings at conclusion of the project and include:
- 15 a. Approved shop drawings
- 16 b. Plan drawings indicating locations and identification of work area outlets, nodes,
- 17 telecommunications rooms (TRs), and backbone (riser) cable runs
- 18 c. Telecommunications rooms (TRs) and equipment room (ER and/or MC) termination
- 19 detail sheets.
- 20 d. Cross-connect schedules including entrance point, main cross-connects, intermediate
- 21 cross-connects, and horizontal cross-connects.
- 22 e. Labeling and administration documentation.
- 23 f. Warranty documents for equipment.
- 24 g. Copper certification test result printouts and diskettes.
- 25 (a.) Optical fiber power meter/light source test results.

26 1.06 QUALITY ASSURANCE

- 27 A. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type
- 28 and size.
- 29 B. Upon request by the engineer/designer, furnish a list of references with specific information regarding
- 30 type of project and involvement in providing of equipment and systems.
- 31 C. Equipment and materials of the type for which there are independent standard testing requirements,
- 32 listings, and labels, shall be listed and labeled by the independent testing laboratory.
- 33 D. Where equipment and materials have industry certification, labels, or standards (i.e., NEMA - National
- 34 Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with
- 35 standards.
- 36 E. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment
- 37 and materials of the same type shall be a product of the same manufacturer throughout.
- 38 F. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes
- 39 toward the owner and engineer/designer.

40 1.07 WARRANTY

1 A. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and
2 workmanship for a period of not less than fifteen (15) years from date of acceptance by the owner. The
3 owner shall deem acceptance as beneficial use.

4 B. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit
5 these warranties on each item in list form with shop drawings. Detail specific parts within equipment
6 that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved
7 in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

8 1.08 DELIVERY, STORAGE, AND HANDLING

9 A. Protect equipment during transit, storage, and handling to prevent damage, theft, soiling, and
10 misalignment. Coordinate with the owner for secure storage of equipment and materials. Do not store
11 equipment where conditions fall outside manufacturer's recommendations for environmental conditions.
12 Do not install damaged equipment; remove from site and replace damaged equipment with new
13 equipment.

14 1.09 SEQUENCE AND SCHEDULING

15 A. Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for
16 conformance to specific job completion dates. As a minimum, dates are to be provided for bid award,
17 installation start date, completion of station cabling, completion of riser cabling, completion of testing
18 and labeling, cutover, completion of the final punch list, start of demolition, owner acceptance, and
19 demolition completion.

20 1.10 USE OF THE SITE

21 A. Use of the site shall be at the owner's direction in matters in which the owner deems it necessary to place
22 restriction.

23 B. Access to building wherein the work is performed shall be as directed by the owner.

24 C. The owner will occupy the premises during the entire period of construction for conducting his or her
25 normal business operations. Cooperate with the owner to minimize conflict and to facilitate the owner's
26 operations.

27 D. Schedule necessary shutdowns of plant services with the owner, and obtain written permission from the
28 owner. Refer to article - CONTINUITY OF SERVICES herein.

29 E. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and
30 operations of the owner.

31 1.11 CONTINUITY OF SERVICES

32 A. Take no action that will interfere with, or interrupt, existing building services unless previous
33 arrangements have been made with the owner's representative. Arrange the work to minimize shutdown
34 time.

35 B. Owner's personnel will perform shutdown of operating systems. The contractor shall give three (3) days'
36 advance notice for systems shutdown.

37

38 C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material,
39 and equipment necessary for prompt restoration of interrupted service.

1 PART 2 - PRODUCTS

2 2.01 MANUFACTURERS

3 A. Hubbell, Ortronics, Panduit

4 1. Or any other approved equivalent manufacturer that meets the performance requirements of this
5 specification. Category 6 performance is standard.

6 2. Contractor shall be a certified installer.

7 B. Berk-Tek

8 C. Belden

9 D. Mohawk

10 E. Commscope

11 F. Superior Essex

12 G. Optical Cable Corporation

13 2.02 FABRICATION

14 A. Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional
15 aspects of equipment and its installation.

16 2.03 SUITABILITY

17 A. Provide products that are suitable for intended use, including, but not limited to environmental,
18 regulatory, and electrical.

19 2.04 STATION CABLE

20 A. VOICE TELECOMMUNICATIONS STATION CABLE

21 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four
22 individually twisted-pairs, which meet or exceed the mechanical and transmission performance
23 specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.

24 a. Listed Type CMP (as required in the NEC 2011).

25 B. DATA STATION CABLE (Copper)

26 1. Solid copper, 24 AWG, 100 W balanced twisted-pair (UTP) Category 6 cables with four
27 individually twisted-pairs, which meet or exceed the mechanical and transmission performance
28 specifications in ANSI/TIA/EIA-568-B.2 up to 250 MHz.

29 a. Listed Type CMP (as required in the NEC 2011).

30

- 1 2.05 WORK AREA OUTLETS
- 2 A. VOICE/DATA WORK AREA OUTLETS (Copper only)
- 3 1. Single-gang mounting plate with six (6) openings containing the following devices (see drawings
4 for quantity):
- 5 a. Voice Outlet - 8-pin modular, Category 6, unkeyed, white, pinned to T568A standards.
- 6 b. Data Outlet - 8-pin modular, Category 6, unkeyed, blue, pinned to T568A standards.
- 7 2. The device color of outlets and jacket color for cabling that will be used on the project shall be
8 coordinated with the Dane County Information Technology (IT) Department prior to the
9 beginning of any work. It is intended that the Dane County standard being maintained.
- 10 B. WALL VOICE OUTLETS
- 11 1. Single-gang stainless steel faceplate with six-conductor jack and wall telephone mounting lugs
- 12 C. DATA ONLY WORK AREA OUTLET
- 13 1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, blue data jack, pinned to T568A
14 standards
- 15 D. VOICE ONLY WORK AREA OUTLET
- 16 1. Single-gang faceplate with 8-pin modular, category 6, unkeyed, white telephone jack, pinned to
17 T568A standards
- 18 2.06 PATCH PANELS
- 19 A. 19 in. rack mountable, 24-port 8-pin modular to insulation displacement connector (IDC) meeting
20 Category 6 performance standards, and pinned to either T568 (A or B) standards. Typical examples of
21 IDC connections are the 110, BIX, and Krone.
- 22 2.07 EQUIPMENT RACKS
- 23 A. Frames, Open, Four Post (provide three in Open Office 528)
- 24 Frames shall be manufactured from aluminum and/or steel extrusion and sheet.
- 25 Each frame will have two L-shaped top angles, two L-shaped base angles, a top and bottom pan, and
26 four C-shaped equipment-mounting channels (a front and rear pair). The rack will assemble
27 with nut and bolt hardware. The base angles and bottom pan will be pre-punched for
28 attachment to the floor. The top pan will be pre-punched for attaching ladder rack with J-bolts.
- 29 Equipment mounting channels will be 3" deep and punched on the front and rear flange with the EIA-
30 310-D Universal hole pattern to provide 45 rack-mount spaces for equipment. Each mounting
31 space will be marked and numbered on the mounting channel.
- 32 When assembled with top and bottom pans and angles, equipment-mounting channels will be spaced
33 to allow attachment of 19" EIA rack-mount equipment. Attachment points will be threaded
34 with 12-24 roll-formed threads. The frame will include assembly and equipment-mounting
35 hardware. Frames will include 100 each combination pan head, pilot point, mounting screws.
- 36 The assembled frame will measure 7' (84") high, 20.3" wide and 41" deep. There will be 29" between
37 the front and rear mounting surfaces of the two pairs of mounting channels. The sides (webs)
38 of the equipment-mounting channels will be punched to allow attachment of vertical cable
39 managers along the sides of the frame or for frame-to-frame or frame-to-rack baying (frames
40 must be able to bay with a 2-post relay rack).
- 41 The frame will be rated for 2,000 lb. of equipment.
- 42 Finish shall be either clear grained aluminum or epoxy-polyester hybrid powder coat in the color as
43 specified below.

- 1 Design Make:
2 Chatsworth Products, Inc. (CPI),
3 QuadraRack™ 4-Post Frame
- 4 B. Enclosed Racks in Computer Room 530 - see Section 27 11 16.
- 5 2.08 RACK MOUNTED OPTICAL FIBER TERMINATION PANEL
- 6 A. 19 in. rack mounted 72-port rack-mounted optical fiber termination panel with cable strain relief,
7 grounding lugs, slack storage and three 12-port duplex LC or approved alternative connector panels
8 with adapters and provisions for six (6) splice trays.
- 9 2.09 SPLICE TRAYS
- 10 A. Sized for singlemode and multimode fibers, nonmetallic with clear plastic cover, 12-fiber splice
11 capacity, compatible with splice enclosure and splicing method.
- 12 2.10 OPTICAL FIBER CONNECTORS
- 13 A. Ceramic tipped field installed 568SC connectors, which meet or exceed the performance
14 specifications in ANSI/TIA/EIA-568-B.3.
- 15 PART 3 - EXECUTION
- 16 3.01 PRE-INSTALLATION SITE SURVEY
- 17 A. Prior to start of systems installation, meet at the project site with the owner's representative and
18 representatives of trades performing related work to coordinate efforts. Review areas of potential
19 interference and resolve conflicts before proceeding with the work. Facilitation with the General
20 Contractor will be necessary to plan the crucial scheduled completions of the equipment room and
21 telecommunications closets.
- 22 B. Examine areas and conditions under which the system is to be installed. Do not proceed with the work
23 until satisfactory conditions have been achieved.
- 24 C. The contractor shall be responsible for meeting with the Owner's (Dane County) Information
25 Technology staff prior to the start of any installation to coordinate the work to be installed as part of this
26 project. It is the design intent to maintain any cabling or installation standards that are currently in use
27 by Dane County.
- 28 1. Failure to perform this meeting may cause work to be removed and reinstalled if not deemed
29 acceptable by Dane County.
- 30 3.02 HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS
- 31 A. Be responsible for safekeeping of your own and your subcontractors' property, such as equipment and
32 materials, on the job site. The owner assumes no responsibility for protection of above named property
33 against fire, theft, and environmental conditions.
- 34 3.03 PROTECTION OF OWNER'S FACILITIES
- 35 A. Effectively protect the owner's facilities, equipment, and materials from dust, dirt, and damage during
36 construction.
- 37 B. Remove protection at completion of the work.
- 38 3.04 INSTALLATION

- 1 A. Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as
2 part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading,
3 setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting
4 wiring of system components, equipment alignment and adjustment, and other related work whether or
5 not expressly defined herein.
- 6 B. Install materials and equipment in accordance with applicable standards, codes, requirements, and
7 recommendations of national, state, and local authorities having jurisdiction, and National Electrical
8 Code® (NEC) and with manufacturer's printed instructions.
- 9 C. Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall
10 pressure when installing cables.
- 11 1. Where manufacturer does not provide bending radii information, minimum-bending radius shall
12 be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable
13 to the engineer and the owner.
- 14 D. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or
15 galvanized rigid conduit (GRC) sleeves and shall be firestopped after installation and testing, utilizing a
16 firestopping assembly approved for that application.
- 17 E. Install station cabling to the nearest telecommunications room (TR), unless otherwise noted.
- 18 F. Installation shall conform to the following basic guidelines:
- 19 1. Use of approved wire, cable, and wiring devices
20 2. Neat and uncluttered wire termination
- 21 G. Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support
22 cables installed above removable ceilings.
- 23 H. Install adequate support structures for 10 foot of service slack at each TR.
- 24 I. Support riser cables every three (3) floors and at top of run with cable grips.
- 25 1. Limit number of four-pair data riser cables per grip to fifty (50)
- 26 J. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings
27 or noted below:
- 28 K. Provide overvoltage protection on both ends of cabling exposed to lightning or accidental contact with
29 power conductors.
- 30 3.05 GROUNDING
- 31 A. Grounding shall conform to ANSI/TIA/EIA 607(A) - Commercial Building Grounding and Bonding
32 Requirements for Telecommunications, National Electrical Code®, ANSI/NECA/BICSI-568 and
33 manufacturer's grounding requirements as minimum.
- 34 B. Bond and ground equipment racks, housings, messenger cables, and raceways.
- 35 C. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system
36 via #6 AWG green insulated copper grounding conductor.
- 37 3.06 LABELING
- 38 A. Labeling shall conform to ANSI/TIA/EIA-606(A) standards. In addition, provide the following:

1. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.
2. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:
 - a. Inside receptacle box at the work area.
 - b. Behind the communication closet patch panel or punch block.
 - c. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein.
 - d. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-606(A) standard color codes for termination blocks.
 - e. Mount termination blocks on color-coded backboards.
 - f. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
 - g. Label cables, outlets, patch panels, and punch blocks with room number in which outlet is located, followed by a single letter suffix to indicate particular outlet within room, i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number.
 - h. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner two (2) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.
 - i. Three (3) sets of as-built drawing shall be delivered to the owner within four (4) weeks of acceptance of project by the owner. A set of as-built drawings shall be provided to the owner in magnetic media form (3.5" floppy disks) and utilizing CAD software that is acceptable to the owner. The magnetic media shall be delivered to the owner within six (6) weeks of acceptance of project by owner.

3.07 TESTING

- A. Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level IIe or higher field testers.
- B. Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded, and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.
 1. Perform testing of copper cables with tester meeting ANSI/TIA/EIA-568-B.1 requirements.

Category 6 Test Parameters:

Frequency Mhz	Category 6 Cable Permanent Link Test					
	TIA/EIA 568B.2-1 Insertion Loss	TIA/EIA 568B.2-1 NEXT	TIA/EIA 568B.2-1 PSNEXT	TIA/EIA 568B.2-1 ELFEXT	TIA/EIA 568B.2-1 PSELFEXT	TIA/EIA 568B.2-1 Return Loss
	Attenuation Max. dB	Worst Pair to Pair dB	Worst Case Loss dB	Worst Pair to Pair Loss DB	Loss 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

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C. Propagation Delay

1. The maximum propagation delay determined in accordance with the ANSI/TIA/EIA –568B.2 for a Permanent Link configuration shall be less than 498-ns measured at 10MHz. (Note: In determining the permanent link propagation delay, the propagation delay contribution of connecting hardware is assumed to not exceed 2.5 ns from 1 MHz to 250MHz).

D. Delay Skew

1. For all frequencies from 1 MHz to 250 MHz, Category 6 cable propagation delay skew shall not exceed 44ns/100m at 20 degrees C, 40 degrees C, and 60 degrees C. In addition, the propagation delay skew between all pairs shall not vary more than +/- 10ns from the measured value at 20 degrees C when measured at 40 degrees C and 60 degrees C. Compliance shall be determined using a minimum 100m of cable.

E. In order to establish testing baselines, cable samples of known length and of the cable type and lot installed shall be tested. The cable may be terminated with an 8-position Category 6 Modular plug (8-pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be calculated based on this test and be utilized during the testing of the installed cable plant. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.

F. In the event results of the tests are not satisfactory, the Contractor shall make adjustments, replacement and changes as are necessary, and shall then repeat the test or tests which disclosed faulty or defective material, equipment or installation method, and shall make additional tests as the Engineer deems necessary at no additional expense to the project or user agency.

G. Where any portion of system does not meet the specifications, correct deviation and repeat applicable testing at no additional cost to the owner.

3.08 FIELD QUALITY CONTROL

A. Employ job superintendent or project manager during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. This person shall maintain current RCDD® (Registered Communications Distribution Designer) registration and shall be responsible for quality control during installation, equipment set-up, and testing.

B. At least 30 percent of installation personnel shall be BICSI Registered Telecommunications Installers. Of that number, at least 15 percent shall be registered at the Technician Level, at least 40 percent shall be registered at the Installer Level 2, and the balance shall be registered at the Installer Level 1.

C. Installation personnel shall meet manufacturer’s training and education requirements for implementation of extended warranty program.

END OF SECTION 27 10 00

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SECTION 27 11 16

COMMUNICATIONS CABINETS

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. Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation as required for the complete performance of the work, and as herein specified.
- B. The work specified includes, but shall not be limited to, requirements for cabinets, in data centers, computer rooms, and communications equipment rooms.
- C. Included in this section are the minimum composition requirements and installation methods for NetShelter SX Cabinets.
- D. These cabinets shall be installed as part of an "Ecoaisle" Cold Aisle containment system.

1.03 RELATED WORK

- A. Section 27 11 17 – EcoAisle thermal containment system

1.04 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
- B. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
- C. Material and work specified herein shall comply with the applicable requirements of the following standards and regulations:
 - 1. TIA – 569-B Commercial Building Standard for Telecommunications Pathways and Spaces, 2004
 - 2. ANSI/ TIA – 568-C Commercial Building Telecommunications Cabling Standard, 2009
 - 3. ANSI/ NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 - 4. TIA – 606-A Administration Standard for Commercial Telecommunications Infrastructure, 2007
 - 5. ANSI-J-STD – 607-A Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, 2002
 - 6. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers, 2005
 - 7. NFPA 70 – National Electric Code, 2011

1 1.05 SUBMITTALS

- 2 A. Provide product data for the following:
3 1. Manufacturer's data sheets/cut sheets, specifications and installation instructions for all
4 products (submit with bid).

5 1.06 DELIVERY, STORAGE, AND HANDLING

- 6 A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers,
7 labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if
8 any.
9 1. The unit shall be shipped fully assembled as one orderable SKU.
10 2. The unit shall ship on a wooden pallet. Optional packaging shall be available for shipping
11 cabinets with 1250 lbs to 2000 lbs of installed equipment.
12 3. The unit shall be bolted to the wooden pallet for stability during shipment.
13 4. The unit shall be protected by corrugated corners, which are stretch-wrapped to limit damage
14 during handling.
15 5. The unit shall have unpacking instructions including manufacturer's contact information for
16 customer support.
17
18 B. The customer shall store materials in their original, undamaged packages and containers, inside a
19 well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and
20 humidity.
21 1. The manufacturer shall offer an inside-delivery shipping option which includes reasonable
22 delivery to the inside of a customer's building and removal and disposal of shipping material
23 and packaging

24 1.07 PROJECT CONDITIONS

- 25 A. Environmental Requirements: Do not install equipment until space is enclosed and weatherproof,
26 wet work in space is completed and nominally dry, work above ceilings is complete, and ambient
27 temperature and humidity conditions are and will be continuously maintained at values near those
28 indicated for final occupancy.

29 1.08 WARRANTY

- 30 A. The manufacturer shall warrant the unit to be free from defects in materials and workmanship for a
31 minimum period of five years from the date of purchase. The manufacturer's obligation under this
32 warranty shall be to repair or replace the unit, at its own sole option. This warranty shall not apply
33 to equipment that has been damaged by accident, negligence, or misapplication or has been altered
34 or modified in any way.
35
36 B. The manufacturer shall warrant all accessories and options to be free from defects in materials and
37 workmanship for a minimum period of two years from the date of purchase. The manufacturer's
38 obligation under this warranty shall be to repair or replace the equipment, at its own sole option.
39 This warranty shall not apply to equipment that has been damaged by accident, negligence, or
40 misapplication or has been altered or modified in any way.
41

1 PART 2 - PRODUCT

2 2.01 MANUFACTURER

3 A. Product specified is "NetShelter SX" Cabinet as manufactured by Schneider Electric. Items specified are
4 to establish a standard of quality for design, function, materials, and appearance.

5 2.02 DESIGN REQUIREMENTS

6 A. Equipment cabinets to store computer, data storage and networking equipment in the data centers,
7 computer rooms and equipment rooms. Each cabinet shall be designed to provide a secure, managed
8 environment for server and networking equipment. Cabinets shall be designed to accommodate power
9 and cable management accessories that keep network and power cables separate and organized.

10 B. Physical Specifications:

11 1. Cabinet dimensions, equipment mounting compatibility and weight load ratings:

12 a. Racks 1-9 and 11-19 shall be as follows:

45U	19"	2124mm (83.62")	600mm (23.62")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
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13 b. Racks 10 and 20 shall be as follows:

45U	19"	2124mm (83.62")	750mm (29.53")	1070mm (42.13")	1363 kg (3000lbs)	1022 kg (2250lbs)
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- 14
- 15 2. The 45U unit shall support a static load (weight supported by the casters and leveling feet) of at
16 least 1,364 kg. (3,000 lb) total installed equipment weight.
- 17 3. The 45U unit shall support a rolling load (rolling on the casters) of at least 1,023 kg. (2,250 lb)
18 total installed equipment weight.
- 19 4. The units (45U) shall ship with a perforated front door, perforated split rear doors, four (4) half-
20 height side panels, toolless roof, two (2) vertical frame posts, four (4) adjustable vertical
21 mounting rails, minimum of two (2) and maximum of four (4) vertical PDU mount cable
22 organizers, four (4) leveling feet and four (4) casters, baying and grounding hardware pre-
23 installed by the manufacturer.

24 C. Material Requirements

- 25 1. All weight bearing components shall be constructed from steel with a thickness no less than
26 0.9mm (20 gauge).
- 27 2. All sheet metal parts shall be painted using a powder coat paint process.
- 28 3. Plastic materials shall comply with Underwriters Laboratory Specification 94 with HB rating
29 (UL94 V-1) or better.
- 30 4. All interior components of the cabinets shall not have electroplated zinc coating to minimize
31 zinc whiskers near active equipment.
- 32

33 D. Access and Installation:

- 34 1. The unit shall provide 45U of equipment vertical mounting space.
- 35 2. The vertical mounting rails shall be easily adjustable to allow different mounting depths.
- 36 a. Each vertical mounting rail shall be marked on both sides with lines showing the top and
37 bottom of each U and the number U space next to the middle hole. Each U consists of
38 three square holes and is 1.75 inches (44.45 mm) high.
- 39 3. The unit shall include M6 caged nuts, bolts and cup washers, and caged nut tool for the
40 mounting of equipment inside the unit.
- 41 4. Both the front and rear doors shall be designed with lift-off hinges allowing for quick and easy
42 detachment without the use of tools.
- 43 a. The front and rear doors shall open a minimum of 120 degrees to allow easy access to the
44 interior.
- 45 b. The front door of the unit shall be reversible so that it can be mounted on either side.

- c. Split rear doors are provided for increased service clearance.
 - d. The front door of the unit shall be capable of being installed on the rear of the unit and the rear doors shall be capable of being installed on the front of the unit.
5. The unit shall include half-height side panels that are removed without tools using easy finger latches for fast access to cabling and equipment.
- a. The side panels on the unit shall double as privacy panels when the units are bayed together.
 - b. Side panels shall be flush with the frame so the overall width of the unit does not change with the side panels installed.
 - c. Baying brackets must provide two sets of mounting holes for standard cabinet spacing of 24" or 600mm.
6. Grounding:
- a. All cabinet components such as doors, side panels, roofs, etc. shall be bonded directly to the frame.
 - b. Grounding points shall be provided on the cabinet's frame to externally bond each unit to the building ground.

2.03 VENTILATION

- A. The unit shall have ventilated front and rear doors to provide adequate airflow required by the major server manufacturers.
- B. The unit shall have a minimum total ventilation area for the front door, split rear doors, and roof as specified in the table below:

1. Racks 1-9 and 11-19 shall be as follows:

45U	600mm (23.62")	6348 cm ² (984 in ²)	7154 cm ² (1109 in ²)
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2. Racks 10 and 20 shall be as follows:

45U	750mm (29.53")	8470 cm ² (1313 in ²)	9290 cm ² (1440 in ²)
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- C. The unit shall provide the means to mount optional cooling accessories for high-density applications.
- D. The manufacturer shall offer an optional toolless blanking panel kit to prevent the recirculation of hot exhaust air.

2.04 CABLE ACCESS

- A. Top cable management openings provided in the cabinet roof.

1. Racks 1-9 and 11-19 shall be as follows:

42U/ 45U/ 48U	600mm (23.62")	1200mm (47.24")	Two 66mm (2.60") x 252mm (9.93") and nine 171mm (6.75") x 54mm (2.14") Rectangular Openings	567mm (22.32") x 1023mm (40.28")
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2. Racks 10 and 20 shall be as follows:

42U/ 45U/ 48U	750mm (29.53")	1200mm (47.24")	Two 66mm (2.60") x 252mm (9.93") and nine 171mm (6.75") x 54mm (2.14") Rectangular Openings	716mm (28.20") x 1023mm (40.28")
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- B. Cable opening edges shall be protected with plastic grommets or radiused edges.

1 C. Bottom cable management opening provided in the cabinet base:

2 1. Racks 1-9 and 11-19 shall be as follows:

42U/45U/48U	600mm (23.62")	1200mm (47.24")	567mm (22.32") x 962mm (37.87")
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3 2. Racks 10 and 20 shall be as follows:

42U/45U/48U	750mm (29.53")	1200mm (47.24")	717mm (28.23") x 962mm (37.87")
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4

5 D. Side cable management opening shall be provided in the cabinet base. A minimum of two and
6 maximum of four vertical PDU mount cable organizers shall be offered.

7 2.05 ENVIRONMENTAL

8 A. The unit shall have a minimum of IP 20 rating for protection against touch, ingress of foreign bodies,
9 and ingress of water.

10 B. Manufacturer must certify products are RoHS and China RoHS compliant.

11 C. The cabinet shall both protect the user from mechanical hazards and generally meet the requirements
12 (stability, mechanical strength, aperture sizes, etc.) as defined in IEC 60950 Third Edition.

13 2.06 SECURITY

14 A. The unit shall include a front door lock, rear door lock and four (4) side panel locks. All six (6) locks
15 shall be configured to use the same key. Two copies of the key shall be included.

16 1. Replacement key lock cylinders from the handle manufacturer shall be available to provide a
17 minimum of 220 unique key combinations on the front and rear doors.

18 B. The manufacturer shall provide optional products and accessories to allow the cabinet environment to
19 be monitored for temperature, humidity, and electronic pass key door access.

20 C. The unit shall have mounting provisions for optional door alarm switches to monitor access to the
21 cabinet doors.

22 2.07 STABILIZATION

23 A. The unit shall ship with provisions for stabilization in the field using the pallet mounting brackets.

24 B. The manufacturer shall offer an optional stabilizer kit that can be attached to the cabinet frame. The
25 frame can then be bolted to the floor.

26 C. The manufacturer shall offer an optional bolt down kits, consisting of brackets and mounting hardware
27 that attach to the cabinet frame and which must be anchored to the sub-floor for compliance with the
28 local Uniform Building Code (UBC).

29 D. The manufacturer shall supply structural calculations by a professionally registered engineer showing
30 compliance with the local UBC for floor anchoring.

31 E. The unit shall have four (4) adjustable leveling feet to help provide a stable base in the event of an
32 uneven floor surface and to prevent rolling.
33

1 2.08 ACCESSORIES

2 A. The manufacturer shall provide these accessories as required to accommodate customer requirements.

3 1. For each rack, provide:

4 a. Supply spare 12-24 screws (minimum of 24).

5 b. Ground Bar and #6 AWG Ground lug.

6 2. Jumper Management

7 a. Rack shall be equipped with Vertical Jumper Management Hardware as to allow an
8 orderly routing of twisted pair, optical fiber and coaxial jumpers from the patch panels to
9 the customer provided network equipment.

10 b. Hardware shall provide for cable routing on front and rear of each rack.

11 c. Channel dimensions: Minimum width: 4” or as shown on project drawings.

12 d. Hardware shall be designed to mount on spacers attached to the rack uprights and not on
13 the upright itself.

14 i. Where multiple racks are to be installed, mount hardware between the uprights
15 of adjacent racks.

16 ii. Secure rack uprights and spacers together per manufacturer recommendations.

17 PART 3 - EXECUTION

18 3.01 EXAMINATION

19 A. Verification of Conditions: Examine areas and conditions under which the work is to be installed,
20 and notify the Contractor in writing, with a copy to the Owner and the Architect/Engineer, of any
21 conditions detrimental to the proper and timely completion of the work. Do not proceed with the
22 work until unsatisfactory conditions have been corrected. Beginning the work shall indicate
23 acceptance of the areas and conditions as satisfactory by the Installer.

24 3.02 INSTALLATION

25 A. NetShelter SX Equipment Cabinets

26 1. Provide all components of the cabinet system including accessories.

27 2. Install and adjust to position all cabinet components including accessories. Install vertical
28 cable managers, power distribution and equipment-mounting rails, using the manufacturer’s
29 installation instructions prior to buying and/or placing the cabinet for attachment to the
30 building and before installing any rack-mount equipment into the cabinet. Shelves, horizontal
31 cable managers and filler panels, if used, may be installed after the cabinet is placed.

32 3. When attached to the structural floor, the installer shall provide installation hardware.

33 4. When used in a multi-cabinet bay, cabinets shall be attached side-by-side using included
34 buying kits according to the manufacturer’s instructions.

35 5. Attach overhead ladder rack or cable tray to the ceiling or the top of the cabinet. The ladder
36 rack/cable tray shall be positioned so that it does not interfere with the hot air exhaust through
37 the cabinet’s top panel.

38 6. Cabinets shall be securely bonded to a common ground. Attach a bonding conductor sized as
39 defined in J-STD-607-A and as defined by local code or the authority having jurisdiction
40 (AHJ) between the common ground and the cabinet. Attach the bonding conductor to the
41 cabinet using a ground terminal block according to the manufacturer’s installation
42 instructions. The installer shall provide the bonding conductor and other necessary hardware
43 required to make the connections between the cabinet and the common ground.

44 3.03 FIELD QUALITY CONTROL

1
2
3
4

A. MANUFACTURER FIELD SERVICE

1. Replacement parts: Parts shall be available through the worldwide service organization 24 hours a day, 7 days a week, and 365 days a year.

END OF SECTION 27 11 16

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SECTION 27 11 17

ECOAISLE THERMAL CONTAINMENT 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 SUMMARY

- A. The EcoAisle uses a series of panels, door frames and doors, and air blocks to enclose a cold aisle zone which contains cooling unit supply air (CACS).

Cold Aisle Containment (CACS) - The cold aisle zone is the space between two rows of IT equipment racks with cold air being supplied between the two rows of racks (or one row of racks and an architectural wall) and the IT equipment exhausts hot air away from the aisle. In this enclosed space cooling unit supply air is collected inside of the EcoAisle. The cool air is supplied to the IT equipment while the IT equipment exhaust air is pushed outside the EcoAisle and returned to the cooling unit.

By preventing mixing of cool supply air and hot exhaust air, this self-contained configuration is capable of supporting a complete range of low, medium and high power/heat density loads, and can be deployed in multiple environments without affecting the surrounding area.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements: The EcoAisle shall be sized for two equal length rows of IT enclosures with supporting infrastructure. Aisle width is 5'-0". Ceiling and duct panels must be constructed in a rectangular fashion and extend horizontally and vertically (angled panels or tapers are not supported). Refer to proper documentation for clearance requirements for various components. Data center floor must be level. The EcoAisle shall be installed in conjunction with Netshester SX communications cabinets.

- B. System Characteristics:

- 1. Physical:

- a. External width dimensions shall be the aisle width plus two rows of enclosures.
- b. External depth dimensions shall be the length of the row of enclosures and any clearances for end-of-aisle doors.

1.04 SUBMITTALS FOR REVIEW

- A. Product Data: Provide for manufactured products and assemblies. Indicate dimensions, System layout, description and location of components, rough-in connections, and materials characteristics and connection requirements.
- B. Installation, Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.
- C. Submit installation - startup report provided by manufacturer's factory trained technician.

1 1.05 QUALITY ASSURANCE

2 A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this
3 section with minimum 5 years documented experience with service facilities within 8 hours reaction
4 time of Project site.

5 1.06 DELIVERY, STORAGE, AND HANDLING

6 A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers,
7 labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if
8 any.

9 B. The customer shall store materials in their original, undamaged packages and containers, inside a well
10 ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

11 1.07 WARRANTY

12 A. The manufacturer shall provide a one-year warranty against defects in material and workmanship for
13 12 months after initial start-up.

14 B. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may
15 have under other provisions of the Contract Documents and shall be in addition to and run concurrent
16 with other warranties made by the Contractor under requirements of the Contract Documents.

17 1.08 MAINTENANCE

18 A. The equipment supplier shall be capable to maintain, service, and repair the equipment for a period of
19 two (2) years. The supplier is responsible to include all parts & labor and maintain the equipment in
20 accordance to the equipment manufacturer's recommended guidelines as set forth in the equipment's
21 user/operations manual.
22

23 PART 2 - PRODUCTS

24 2.01 MANUFACTURERS

25 A. Basis of Design: Product specified is EcoAisle Thermal Containment System as manufactured by
26 Schneider Electric. Items specified are to establish a standard of quality for design, function,
27 materials, and appearance.

28 B. Subject to compliance with these and related specification sections, the following Manufacturers may
29 propose on the project: Schneider Electric

30 C. Substitutions: Proposed substitutions must be approved prior to bidding. Alternate
31 manufacturers/suppliers will be responsible for any required changes and associated costs if alternate
32 is accepted.

33 D. UL Listing: All system components shall be certified as suitable for this data center environment by
34 documentation supporting UL Listings: UL484, CSA C22.2 No.236 and UL723S.

35 2.02 CEILING PANELS

36 A. Ceiling panels shall be 6.0 mm thick Lexan clear-ribbed panels or 2.36 mm thick V0 clear panels with
37 aluminum framing.

38 B. Flame spread rates: Smoke development index "0-65" and flame spread index "0" in accordance with
39 UL723 or ASTM84. Nominal thickness: 2.36 mm (V0 clear) –or– Smoke development index "20"
40 and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 6.0 mm
41 (Lexan)

42 C. Minimum Light Transmission per ASTM D1003 equal to 82% or greater.
43

1 D. Ceiling panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling
2 Panel frames sizes shall be suitable to match up with various rack widths, row width, and hot aisle
3 widths.

4 E. The ceiling system shall be designed to permit removal of the ceiling panel from within the contained
5 zone without the use of tools for service access to the space above the EcoAisle.

6 2.03 AIR RETURN SYSTEM

7 A. Shall be 6.0 mm thick Lexan clear-ribbed panels or 2.36 mm thick V0 clear panels with aluminum
8 framing.

9 B. Flame spread rates: Smoke development index "0-65" and flame spread index "0" in accordance with
10 UL723 or ASTM84. Nominal thickness: 2.36 mm (V0 clear) –or– Smoke development index "20"
11 and flame spread index "0" in accordance with UL723 or ASTM84. Nominal thickness: 6.0 mm
12 (Lexan)

13 C. Minimum Light Transmission per ASTM D1003 equal to 82% or greater.

14 D. Duct panels shall be designed to be supported by the frames of the IT Equipment racks. Ceiling Panel
15 frames sizes shall be suitable to match up with various rack widths, row width, and hot aisle widths.

16 E. The air return system shall be designed to permit removal of the airblocks from within the contained
17 zone without the use of tools for service access to the space above the EcoAisle.

18 2.04 RACK EQUIPMENT BAYING KITS

19 A. Metal and plastic components shall be supplied to establish consistent spacing between the racks or
20 rack based equipment, and to fill the space to provide an air containment seal at the juncture between
21 two adjacent racks or rack based equipment.

22 2.05 DOOR FRAMES AND DOORS

23 A. Metal door frames and doors shall be provided to establish air containment at the end of two rows of
24 racks. The door frame system shall match the height of the rack based equipment, and match the
25 design width of the contained aisle.

26 B. Doors shall be hinged or sliding, to permit access into the contained aisle for maintenance or
27 servicing. Standard door operation shall not interfere with access or service on any rack or rack based
28 equipment.

29 C. Doors shall be provided with a window, handles and latches. The following options are available and
30 should be provided if specified:

- 31 1. Door locks and three matching keys per door
- 32 2. Two proximity switches provided per door for open/closed status
- 33 3. Automatic door closure system for sliding door
- 34 4. Sliding Doors shall be provided with swing-open functionality in case of emergency inside the
35 aisle.
- 36 5. Door frame includes mounting for differential pressure sensor (Active Flow Controller)

37 2.06 FRAMES AND COMPONENTS SEALS

38 A. Foam Rubber gaskets or metal/composite, brush, or plastic air blocks shall be installed at EcoAisle
39 joints to minimize open gaps between containment system components, such as door frames, ceiling
40 and duct panels, and IT Equipment racks and rack based equipment. Gasketing and/or air blocks may
41 include, but not be limited to, the following.

- 42 1. Joints between adjacent ceiling/duct panels
 - 43 2. Joints between ceiling/duct panels and top of racks, if not metal to metal.
- 44

- 1 3. Joints between door frames and ceiling/duct panels, if not metal to metal.
- 2 4. Joints between door frames and racks at the end of the row(s).
- 3 5. Joints between rack bottom rear frame and floor.
- 4 6. Joints between duct panel and ceiling/roof of room.

5 2.07 SYSTEM AIR LEAKAGE

6 A. The EcoAisle is not designed or intended to be air tight. The balance between exhaust air and supply
7 air must be maintained by the match up of server airflow with airflow of the cooling equipment. The
8 recommended minimum total per zone airflow for the cooling equipment is 5% more than the design
9 IT Server airflow. This allows the cooling equipment airflow system to closely match the server
10 airflow system, and avoids excessive cooling airflow system power consumption when variable
11 speed/capacity cooling system fans/blowers are used.

12 2.08 SPECIAL FEATURES TO BE PROVIDED

13 A. Lighting

- 14 1. UL Listing: Lighting system complies to UL484, CSA C22.2 No.236, EN 55022:2006, EN
15 55024:1998, EN 61000-3-2:2006, EN 61000-3-3:1995, EN 60950-1:2006, CFR 47 FCC Part
16 15:2011, ANSI C63.4-2003, ICES-003:2004, AS/NZS CISPR 22:2009.
- 17 2. Available for both ducted and ceiling panel, single or dual rack row installations.
 - 18 a. Shall provide additional duct mounting rail for duct configurations:
 - 19 i. Lights shall fasten to rail
 - 20 ii. Wire covers used for spaces between lights
 - 21 iii. The bulk of the wiring shall be hidden inside the rail behind each light and cover
 - 22 b. Lights shall be mounted to upper corners inside contained aisle along aisle length
 - 23 c. Lighting density TO PROVIDE 300 mm, spacing between each light
 - 24 d. Lights are to be installed on the equipment side of aisle.
 - 25 e. Shall include all necessary cabling, connectors, and fasteners (no tools provided)
 - 26 f. Across aisle cable shall be provided to minimize number of control units per contained
27 pod
- 28 3. Control Unit
 - 29 a. Shall be mounted in rack
 - 30 b. Voltage options are 100-240VAC single phase 50/60 Hz
 - 31 c. Shall power up to 12 lights per control unit
 - 32 d. Shall be provided with 2 power cords: (1) C13/C14, (1) C13/NEMA 5-15P
 - 33 e. Group control capability for use of more than one control unit per contained pod. Up to
34 five total control units can be grouped together
 - 35 f. Control unit comes with integrated rotary switch for adjusting light ON interval. Time
36 settings shall consist of various presets from 1 to 75 minutes of light ON operation
 - 37 g. Two group LED outputs on control unit (lights wired in series)
 - 38 h. Integrated LED indicates power status of control unit
 - 39 i. Controller is to be installed to mounting rails in lowest position of rack (preferably the
40 0U position) (hardware provided)
- 41 4. Motion Sensor
 - 42 a. Shall provide two motion sensors per control unit
 - 43 b. Capable up to four motion sensors per control unit
 - 44 c. Motion sensors shall mount to door or curtain header (mounting brackets provided)

- 1 d. If any of the four motion sensors (per control unit) detect movement, LED bank will
- 2 illuminate.
- 3 e. Utilizes a single RJ45 connection per motion sensor (shall be routed out of visibility)
- 4 5. Manual Light Switch
- 5 a. Shall provide two manual light switches
- 6 b. Shall mount inside or outside of aisle
- 7 c. Shall mount via three methods (hardware provided): 1) Fastener 2) Magnet, or 3) hook
- 8 and loop
- 9 d. Manual switch turns OFF the light bank
- 10 e. Motion sensors become inactive when a manual switch is pushed. After 10 seconds,
- 11 motion sensors are automatically restored
- 12 B. Blanking Panels, Height Adapters, and Depth Extenders
- 13 1. Blanking Panels shall be placed where gaps between racks exist to seal contained aisle. The
- 14 panel shall match the height of the enclosures and match the width of the gap. It shall not be
- 15 mounted to any adjacent blanking panels nor shall it support any adjustable height supports.
- 16 2. Depth Extenders shall mount to front or back of APC by Schneider Electric enclosures to align
- 17 aisle. The extender shall match the depth of the adjacent racks and match the width and height
- 18 of the enclosure (including any height adapters) of which it is being mounted
- 19 3. Height Adapters shall mount to the top of APC by Schneider Electric enclosures to align the
- 20 enclosure height. The height adapter match the height of the adjacent racks and shall match the
- 21 width and depth of the rack (including any depth adapters) of which it is being mounted.

22 PART 3 - EXECUTION

23 3.01 MANUFACTURER FIELD SERVICE:

- 24 A. Prepare, receive, inventory and install containment system components.
- 25 B. Prepare and submit report of system installation indicating all system parameters.
- 26 C. Provide the services of the manufacturer's technical representative to attend and participate in the on-
- 27 site integration and to commission equipment. All vendors and contractors affecting the equipment
- 28 specified herein shall be present at the same time.
- 29

30 END OF SECTION 27 11 17

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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 Tyco Integrated Security.
- B. Contact Richard Gerou at 608-838-5824.
- 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 ≤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.

- 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 original fire alarm system within the City/County building was a Simplex 2120 fire alarm control panel that was installed in the early 1980's.
- C. Under a 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 2016 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 1. Provides four, power-limited NACs with general alarm operation, available as Class B or Class A,
2 each rated 2 A (expandable to eight NACs)
- 3 a. Includes 8 A power supply/charger
- 4 b. Follows coded or non-coded alarm input

5 2.11 MAGNETIC DOOR HOLDERS

- 6 A. Door holder shall be LCN 404SE (Furnished and installed by General Contractor):

- 7 1. Closer holder combination
- 8 2. 24V DC solenoid

9 2.12 FLOW, PRESSURE AND TAMPER SWITCHES

- 10 A. Wire and install in accordance with requirements of other specification sections and wire as specified in
11 this section. Provide necessary monitor modules and circuits. Wire and install outdoor sprinkler alarm
12 bell. Flow, pressure, tamper switches and sprinkler alarm bell furnished by others.

13 2.13 SLAVE FAN RELAY

- 14 A. Slave fan relay shall be SimplexGrinnell model 4090-9002 Relay IAM

15 PART 3 - EXECUTION

16 3.01 INSPECTION

- 17 A. Examine areas and conditions under which fire alarm system to be installed and notify ENGINEER in
18 writing of conditions detrimental to proper and timely completion of Work.

19 3.02 INSTALLATION

- 20 A. Installation of the Fire Alarm/Life Safety System shall be in strict compliance with manufacturer's
21 recommendations. Consult the manufacturer's Control Panel and Peripheral Equipment installation
22 manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system
23 installation.

- 24 B. Power Requirements:

- 25 1. The Fire Alarm Control Panel (FACP) and/or Notification Appliance Circuit (NAC) panels shall
26 be connected to a separate 20 ampere, 120 volt dedicated branch circuit labeled as FIRE ALARM.
- 27 2. The Control Panel Cabinet shall be grounded securely using a copper grounding conductor.
- 28 3. Conduit shall enter into the Fire Alarm Control panel backbox only at those areas of the back box
29 which have factory conduit knockouts.
- 30 4. All field wiring shall be completely supervised. In the event of a primary power failure,
31 disconnected standby battery, removal of any internal modules, or any open circuits in the field
32 wiring; an audible and visual trouble signal will be activated until system and its associated field
33 wiring are restored to normal condition.

- 34 C. Cables must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed
35 in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.

- 36 D. SLC loops shall be loaded to no more than 75% of their capacity.

37

- 1 E. Install wiring in accordance with Section 16001 and shall be in accordance with the NEC, NFPA 72
2 1999, local and state codes, as shown on the drawings, and as recommended by the major equipment
3 manufacturer. See Article 3.06 FREE AIR CABLING for further requirements.
- 4 1. SLC loop shall be 2 #16 shielded FPLR or FPLP cable as required.
5 2. Signal circuit wiring shall be 2 conductor #14 or 2 conductor #12 FPLR or FPLP cable as
6 required. 2#14 or 2#12 THHN is acceptable if signal circuits are enclosed in listed raceway.
7 Synchronization modules shall be utilized to provide audio and visual synchronization over 2
8 conductors. Consult loading chart for proper wire gauge and wire length to insure against
9 excessive DC voltage drop. A minimum of 20.5V DC must be available at the last signal of a
10 NAC under full alarm condition.
11 3. Provide 2 #14 from control panel or door holder power supply to door holders.
- 12 F. Provide all fire alarm system wiring drops to devices within raceways and junction boxes. Where
13 existing conditions prohibit fishing existing walls, so as to avoid excessive cutting and restoration
14 metallic wiremold finished to match existing wall surface shall be permitted where allowed by
15 OWNER/ENGINEER, routing subject to OWNER/ENGINEER approval. Install conduit in accordance
16 with Section 16001 and as shown on Drawings.
- 17 G. All fire detection and alarm system devices, control panels and remote annunciators shall be flush
18 mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- 19 H. Smoke detectors shall not be installed prior to the system programming and test period. If construction is
20 ongoing during this period, measures shall be taken to protect smoke detectors from contamination and
21 physical damage. Ref: NFPA 72, 1999 2-3.6.1.3.
- 22 I. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may
23 be exposed in unfinished areas if approved by Owner/Engineer before installation. All system junction
24 boxes shall be as manufactured by system supplier or painted red and stenciled with fire alarm system
25 designation.
- 26 J. All fire detection and alarm system devices shall be flush mounted when located in finished areas and
27 may be surface mounted when located in unfinished areas if approved by Owner/Engineer before
28 installation.
- 29 K. All conductor identification shall be labeled in accordance with 16001 at all accessible locations
30 including at control panel, junction boxes and at devices for future tracing and maintenance.
- 31 L. Provide concealed 3/4" conduit and wire to telephone terminal board from main fire alarm control panel.
- 32 M. Coordinate connections with supplier of central station network system.
- 33 N. Provide concealed 3/4" conduit and wire to security panel for monitoring of trouble, supervisory and
34 system alarm.
- 35 O. Provide elevator recall and elevator shunt trip using addressable control modules. Utilizing detector
36 auxiliary contacts is not acceptable and violates NFPA 72, 1999 3-9.2.1. Provide Elevator shunt trip
37 power supervision for integrity per NFPA 72, 1999 3-9.4.4.
- 38 3.03 ADJUSTMENT AND CLEANING
- 39 A. Clean system equipment and enclosure of dirt and debris.
40

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 $\leq 480V$ 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 Kellem 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 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

INFORMATION MANAGEMENT OFFICE REMODEL CITY-COUNTY BUILDING THIRD AND FIFTH FLOORS 210 MARTIN LUTHER KING, JR. BLVD. MADISON, WISCONSIN

ABBREVIATIONS

ADA	AMERICANS WITH DISABILITIES ACT
A.F.F.	ABOVE FINISHED FLOOR
AL	ALUMINUM
AP	ACCESS PANEL
CG	CORNER GUARD
CJ	CONTROL JOINT
CMU	CONCRETE MASONRY UNIT
CONC	CONCRETE
CPT	CARPET
CT	CERAMIC TILE
CUH	CABINET UNIT HEATER
EJ	EXPANSION JOINT
EWC	ELECTRIC WATER COOLER
FD	FLOOR DRAIN
FO	FOUNDATION DRAIN SYSTEM FLUSHOUT
FRT	FIRE TREATED
FX-#	FIRE EXTINGUISHER AND TYPE
GWB	GYPSON WALL BOARD
HM	HOLLOW METAL
MB	MARKER BOARD
TB	TACK BOARD
BB	BULLETIN BOARD
M.O.	MASONRY OPENING
N.I.C.	NOT IN CONTRACT
O.F.C.I.	OWNER FURNISHED CONTRACTOR INSTALLED
O.F.O.I.	OWNER FURNISHED OWNER INSTALLED
OPP	OPPOSITE
P.LAM.	PLASTIC LAMINATE
REV	REVERSE
R.O.	ROUGH OPENING
S.S.	STAINLESS STEEL
TZO	TERRAZZO
U.N.O.	UNLESS NOTED OTHERWISE
VCT	VINYL COMPOSITION TILE
WD	WOOD
WP	WATER PROOFING
WPT	WORK POINT

MAJOR USE & OCCUPANCY CLASSIFICATION: B
CONSTRUCTION CLASSIFICATION: IB
GROSS FLOOR AREA OF RENOVATION: 5,000 GSF
SPRINKLERED
MAXIMUM EXIT ACCESS TRAVEL DISTANCE: 300'
OFFICE RENOVATION OCCUPANCY < 49
SINGLE MEETING ROOM OCCUPANCY < 100

INDEX OF DRAWINGS

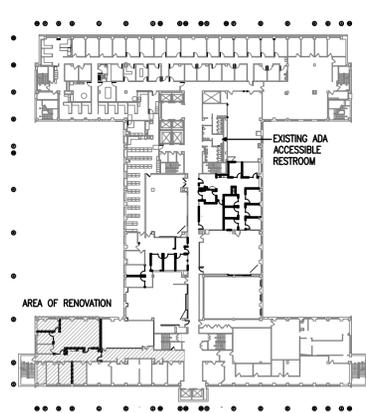
GENERAL	
G100	COVER SHEET AND INDEX OF DRAWINGS
ARCHITECTURAL	
A203	PARTIAL THIRD FLOOR PLAN AND DEMOLITION PLAN
A205	PARTIAL FIFTH FLOOR PLAN AND DEMOLITION PLAN
A303	PARTIAL THIRD FLOOR REFLECTED CEILING PLANS
A305	PARTIAL FIFTH FLOOR REFLECTED CEILING PLANS
A700	DOOR SCHEDULE, INTERIOR ELEVATIONS AND DETAILS
A903	PARTIAL THIRD FLOOR FINISH PLAN
A905	PARTIAL FIFTH FLOOR FINISH PLAN
FIRE PROTECTION	
F000	SYMBOLS, ABBREVIATIONS, NOTES AND DETAILS - FIRE PROTECTION
F103	PARTIAL THIRD FLOOR PLANS - FIRE PROTECTION
F105	PARTIAL FIFTH FLOOR PLANS - FIRE PROTECTION
PLUMBING	
P000	ABBREVIATIONS, SYMBOLS AND SCHEDULES - PLUMBING
P103	PARTIAL THIRD FLOOR PLANS - PLUMBING
HVAC	
M000	SYMBOLS AND ABBREVIATIONS - HVAC
M103	PARTIAL THIRD FLOOR DEMOLITION PLAN - HVAC
M105	PARTIAL FIFTH FLOOR DEMOLITION PLANS - HVAC
M108	PARTIAL ROOF/PENTHOUSE - HVAC
M203	PARTIAL THIRD FLOOR NEW WORK PLANS - HVAC
M205	PARTIAL FIFTH FLOOR NEW WORK PLANS - HVAC
M800	SCHEDULES - HVAC
M900	SCHEDULES - HVAC
ELECTRICAL	
E000	SYMBOLS, ABBREVIATIONS AND SHEET INDEX
E203	PARTIAL THIRD FLOOR PLANS - POWER & SYSTEMS
E205	PARTIAL FIFTH FLOOR PLANS - POWER & SYSTEMS
E206	PARTIAL ROOF/PENTHOUSE - ELECTRICAL
E303	PARTIAL THIRD FLOOR PLANS - LIGHTING
E305	PARTIAL FIFTH FLOOR PLANS - LIGHTING
E400	DETAILS
E401	ELECTRICAL SCHEDULES

ARCHITECTURAL SYMBOLS AND LEGEND

X/XXX	DETAIL REFERENCE
X/XXX	SHEET REFERENCE
X/XXX	DETAIL NUMBER
X/XXX	WALL SECTION REFERENCE
X/XXX	SHEET REFERENCE
X/XXX	DETAIL NUMBER
X	WALL SECTION REFERENCE
X	SHEET REFERENCE
X	DETAIL NUMBER
X	ELEVATION REFERENCE
X	PARTITION TYPE REF. SEE SHEET A700
X	NEW WALLS
X	WINDOW TYPES SEE A700
X	1 HOUR FIRE RATED WALL
X	2 HOUR FIRE RATED WALL
X	DOOR SWING w/NUMBER. SEE A700
X	EXISTING DOOR SWING w/NUMBER. SEE A700
X	REVISIONS
FX-1	RECESSED FIRE EXTINGUISHER
FX-2	SURFACE MOUNT FIRE EXTINGUISHER
x70-1	SPOT ELEVATION (FEET-INCHES)
x70.83	SPOT ELEVATION (FEET.DECIMAL)
OFFICE	ROOM NAME & NUMBER
012	SEE FINISH PLAN SHEET A900s



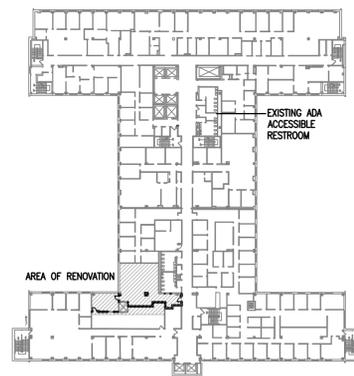
MADISON, WISCONSIN



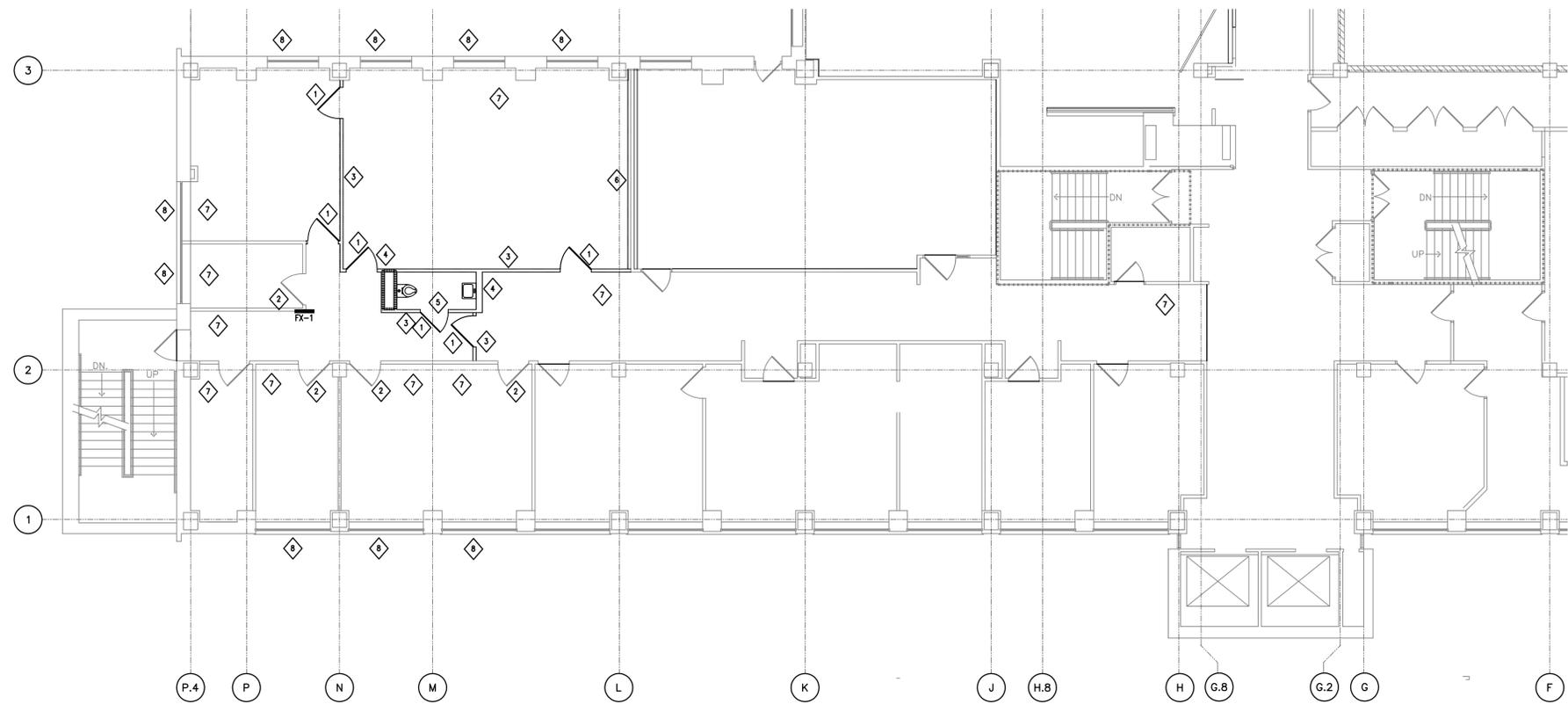
THIRD FLOOR PLAN

ADA ACCESSIBLE ROUTE EXTENDS FROM BUILDING, DOWN ADA ACCESSIBLE RAMP TO ADA ACCESSIBLE PARKING STALL ON MARTIN LUTHER KING JR. BOULEVARD.

SEE A203 GENERAL NOTES, PROVIDE VERTICAL GRAB BAR.



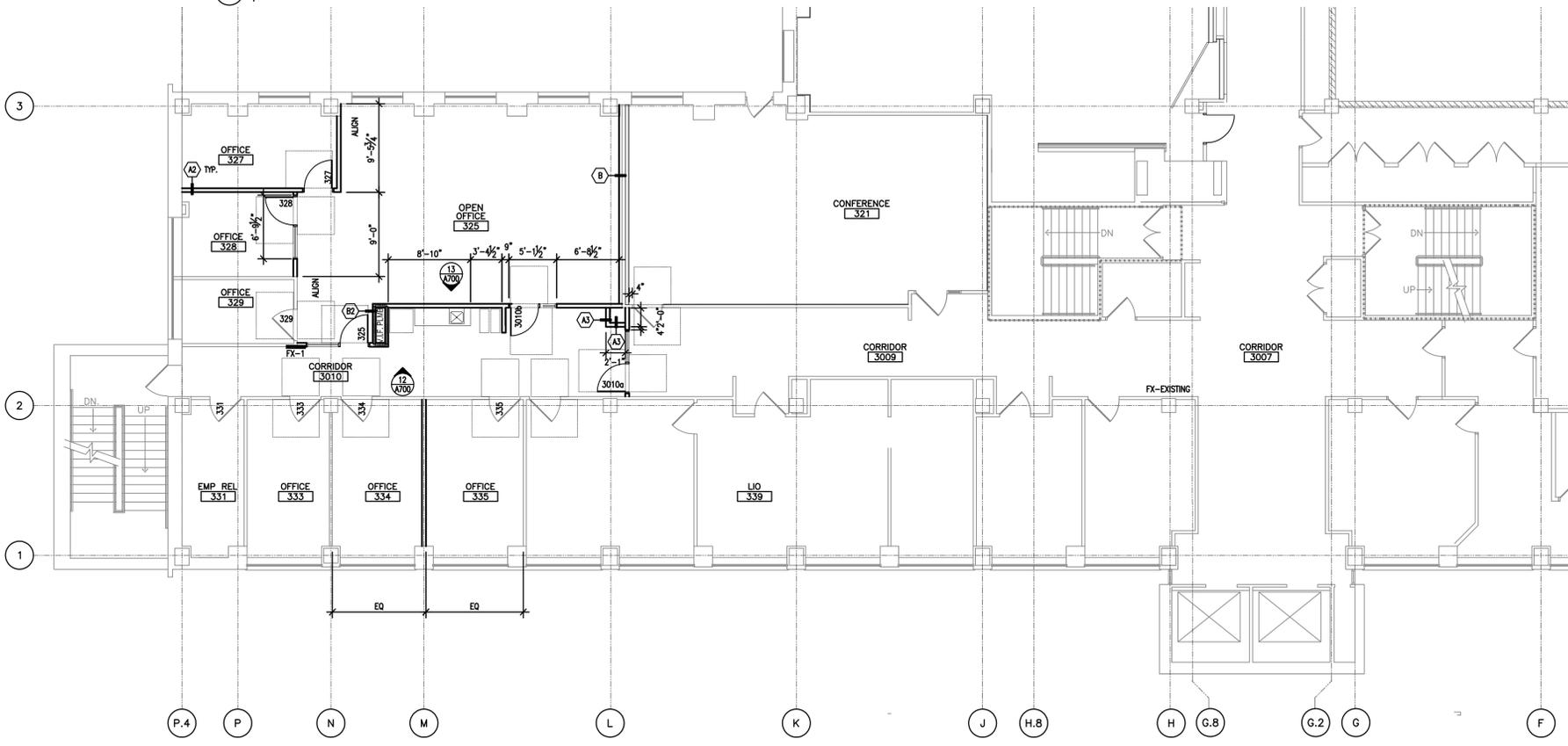
FIFTH FLOOR PLAN



DEMOLITION NOTES	
EXISTING WHITE BOARD AND CONFERENCE ROOM EQUIPMENT TO BE REMOVED AND SALVAGED FOR REINSTALLATION BY OWNER.	
CONTRACTOR TO COMPLETE INVESTIGATIVE DEMOLITION OF WALLS AT SCHEDULED RATED/SEALED CONDITIONS PRIOR TO DEMO FOR ARCHITECT REVIEW OF EXISTING SYSTEM.	
1 DEMO DOOR AND HM FRAME. SALVAGE HARDWARE AND TURN OVER TO OWNER.	
2 DEMO HARDWARE FOR INSTALLATION OF HARDWARE. SALVAGE HARDWARE NOTED FOR REINSTALLATION. SEE HARDWARE SCHEDULE. REMOVE DECALS FROM WOOD DOOR.	
3 DEMO EXISTING WALL IN ITS ENTIRETY.	
4 DEMO PLUMBING WALL IN ITS ENTIRETY. MAINTAIN FIRE RATINGS. FIELD VERIFY ANY PLUMBING CHASES PRIOR TO DEMO.	
5 DEMO CERAMIC FLOOR TILE AND BASE.	
6 REMOVE FINISH FACE OF WALL ONLY TO RECEIVE NEW FINISH.	
7 DEMO FINISH FLOORING AND RUBBER BASE. COORDINATE ABATEMENT BY OWNER WITH OWNER.	
8 DEMO WINDOW COVERINGS.	
9 DEMO ACCESS FLOOR SYSTEM IN ITS ENTIRETY, INCLUDING STAR. SEE PHASING NOTES.	
10 DEMO ACOUSTICAL WALL PANELS, SALVAGE FOR REINSTALLATION.	

GENERAL NOTES:	
1. FIELD VERIFY ALL EXISTING CONDITIONS, NOTIFY ARCHITECT OF ANY DISCREPANCIES.	
2. EXISTING FLOOR TO FLOOR CONCRETE STRUCTURE HEIGHT IS 11'-8".	
3. REPAIR ALL EXISTING GWB OR PLASTER WALLS WHERE DAMAGED BY DEMOLITION. ALL WALLS TO RECEIVE TEXTURE.	
4. CONTRACTOR RESPONSIBLE FOR ALL WORK REQUIRED TO MODIFY AND REINSTALL THE EXISTING RAISED ACCESS FLOOR WHERE SCHEDULED TO REMAIN AND EXISTING ACT CEILING WHERE SCHEDULED TO REMAIN. SEE A205 AND A305.	
5. IN EACH OF THE THIRD FLOOR AND FIFTH FLOOR ACCESSIBLE RESTROOMS NOTED ON G100, ONE PER FLOOR, ADD AN 18" VERTICAL GRAB BAR, BRADLEY 812 OR APPROVED EQUAL. LOCATION PER ANSI 117.1.	
WORK BY OWNER:	
1. TESTING AND BALANCING	
2. SEALANT AT EXISTING WINDOWS.	

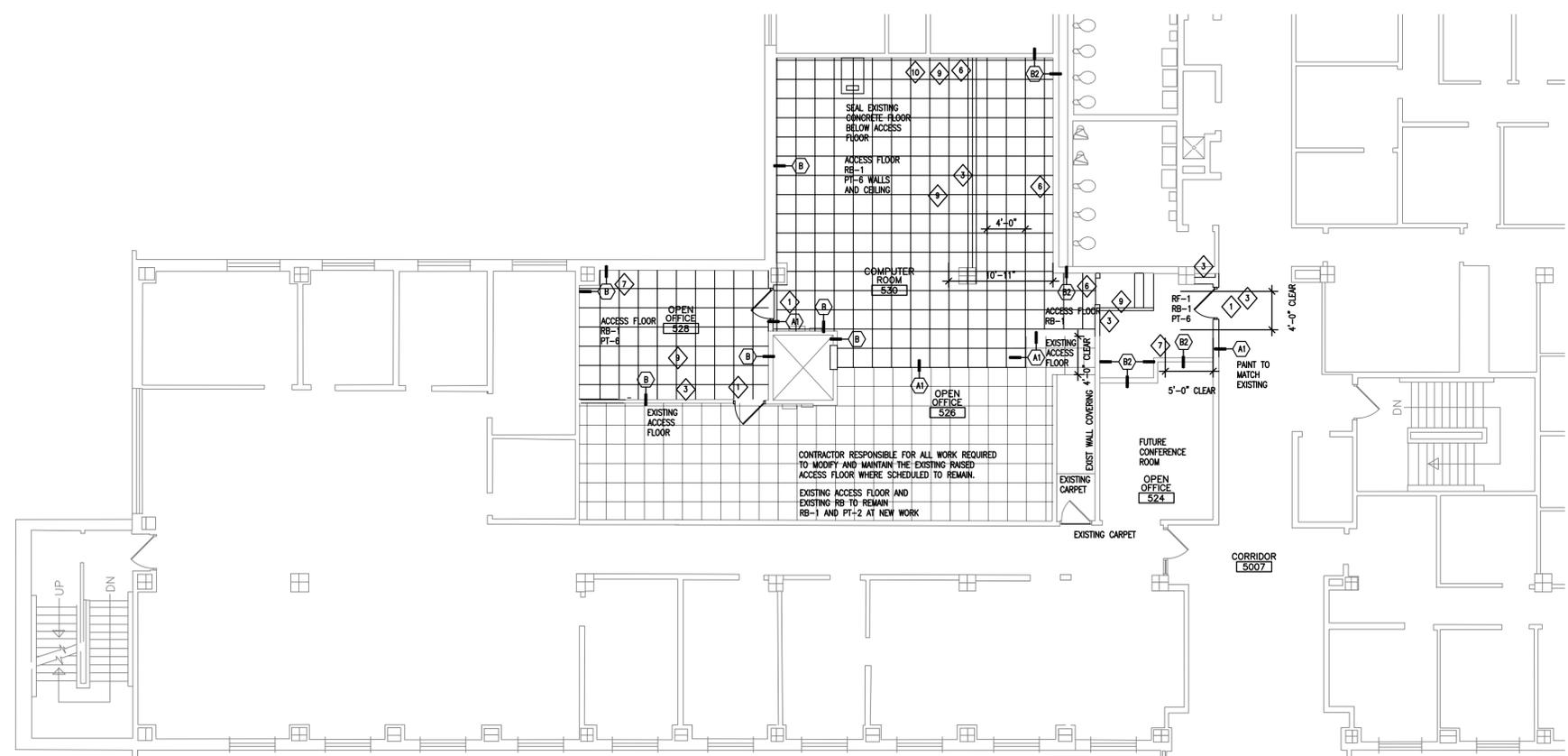
1 PARTIAL THIRD FLOOR PLAN - DEMOLITION
1/8"=1'-0"



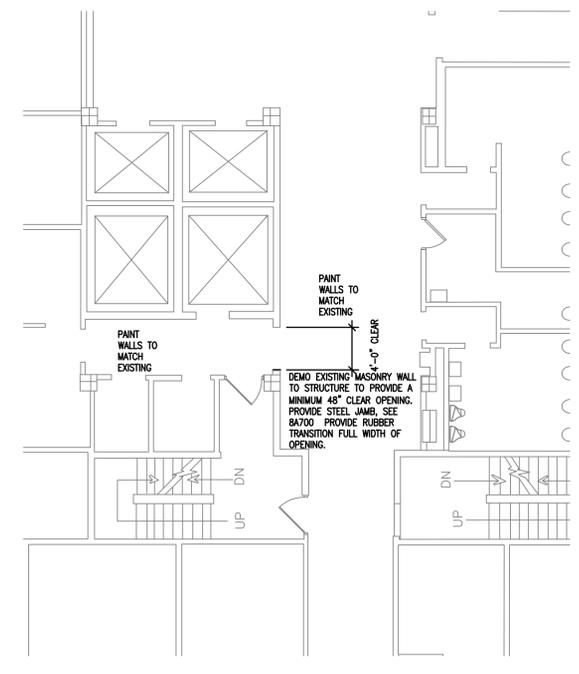
2 PARTIAL THIRD FLOOR PLAN
1/8"=1'-0"



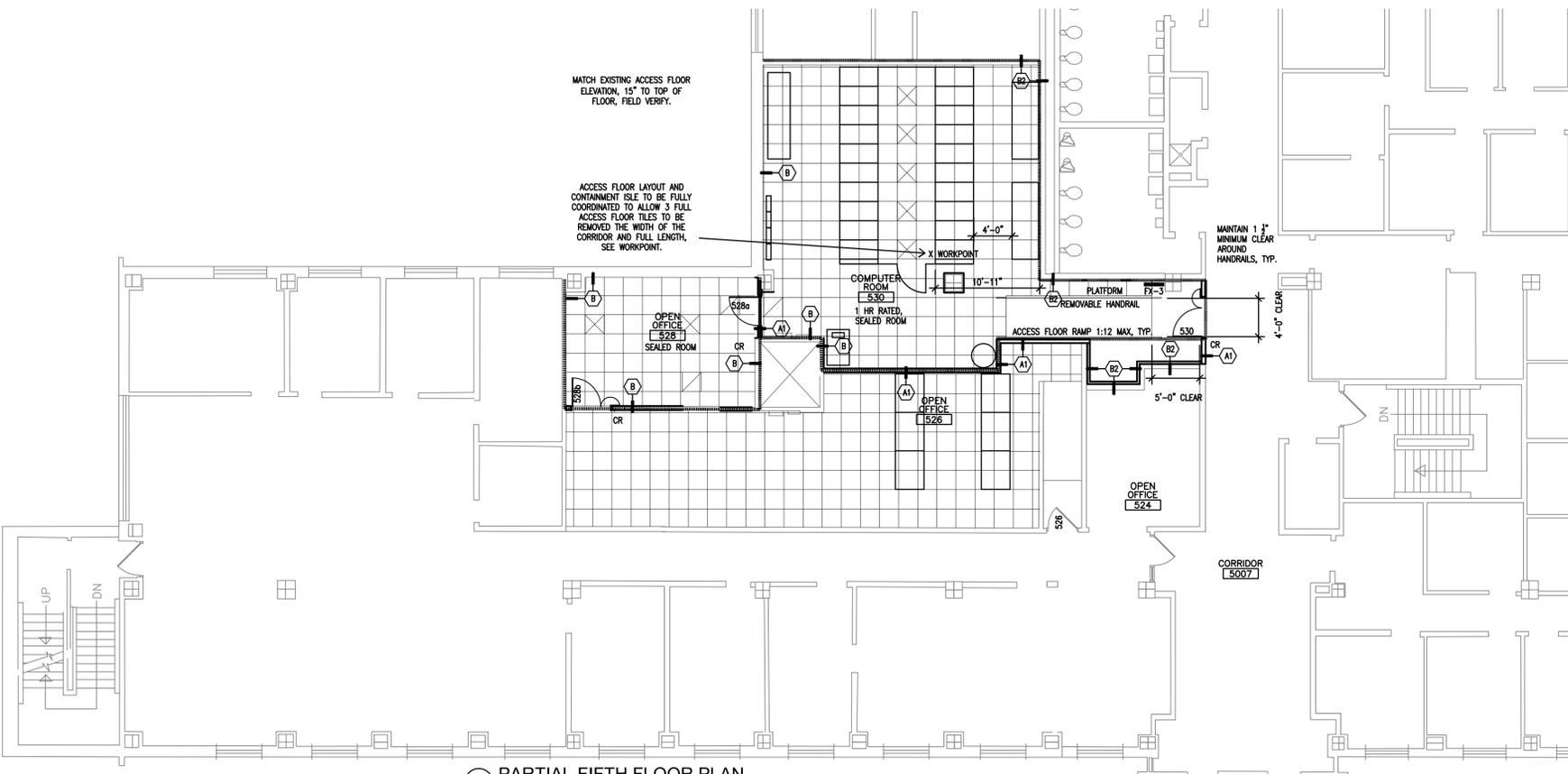
COMPUTER ROOM PHASING REQUIREMENTS:	
CONTRACTOR TO SUBMIT A COORDINATED PHASING PLAN FOR COUNTY APPROVAL PRIOR TO COMMENCEMENT.	
COUNTY WILL REMOVE ALL RACKS FROM EAST SIDE OF ROOM AND ALL STORAGE AND FURNITURE FROM THE SET-UP ROOM.	
CONTRACTOR TO INSTALL DUST PROTECTION AND ENCLOSED AIR SUPPLY TO THE WEST SIDE OF THE ROOM. WEST SIDE OF COMPUTER ROOM TO REMAIN ACTIVE AND FREE OF DUST. CONTRACTOR ACCESS TO WORK AREA ONLY FROM MAIN CORRIDOR. DURING CONSTRUCTION COUNTY ACCESS TO COMPUTER ROOM ONLY FROM EXISTING RAMP. ALL ELECTRICAL, FA, MECHANICAL, FIRE SUPPRESSION TO REMAIN ACTIVE.	
EAST SIDE OF ROOM: COMPLETE ALL WORK.	
REFEED LIEBERT UNITS FROM 480 VOLT EMERGENCY PANEL DP1 IN CORRIDOR. RELOCATE TRANSFORMER AND ENCLOSED CIRCUIT BREAKER. REMOVE ELECTRICAL PANELS AT SHAFT.	
INSTALL RAMP TO MAIN CORRIDOR. PROVIDE DUST PROTECTION. INSTALL DOOR TO CORRIDOR. COMPLETE ELEVATOR LOBBY WORK. PROVIDE TEMPORARY ENCLOSURE/HARDWARE TO ALWAYS SECURE THE ACTIVE COMPUTER ROOM.	
SET-UP ROOM: INSTALL ANY RAISED FLOOR ACCESS REQUIRED TO COLD ISLE. INSTALL INSULATED Baffle.	
CLEAN EAST SIDE OF COMPUTER ROOM.	
CONTRACTOR TO PROVIDE AN ACCESS ROUTE CONTINUOUS FROM EXISTING RAISED FLOOR TO RAISED FLOOR INSTALLED ON EAST SIDE OF ROOM THROUGH SET-UP ROOM. PROVIDE ALL MODIFICATIONS TO EXISTING RAISED FLOOR SYSTEM AND EXISTING ACT SYSTEM TO REMAIN IN PLACE AND GROUNDED.	
MIGRATION BY COUNTY.	



1 PARTIAL FIFTH FLOOR DEMOLITION PLAN
1/8"=1'-0"



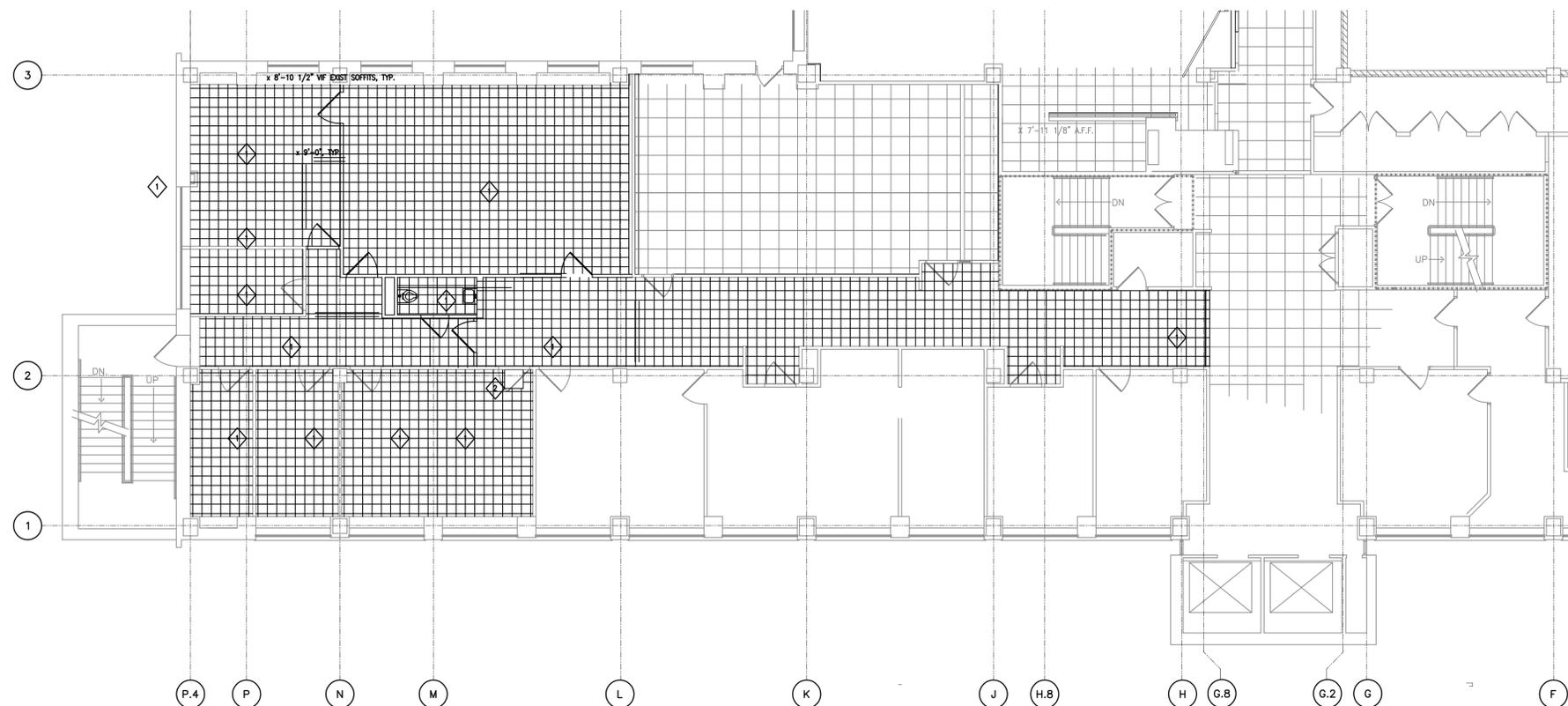
3 PARTIAL FIFTH FLOOR PLAN FREIGHT ELEVATOR LOBBY
1/8"=1'-0"



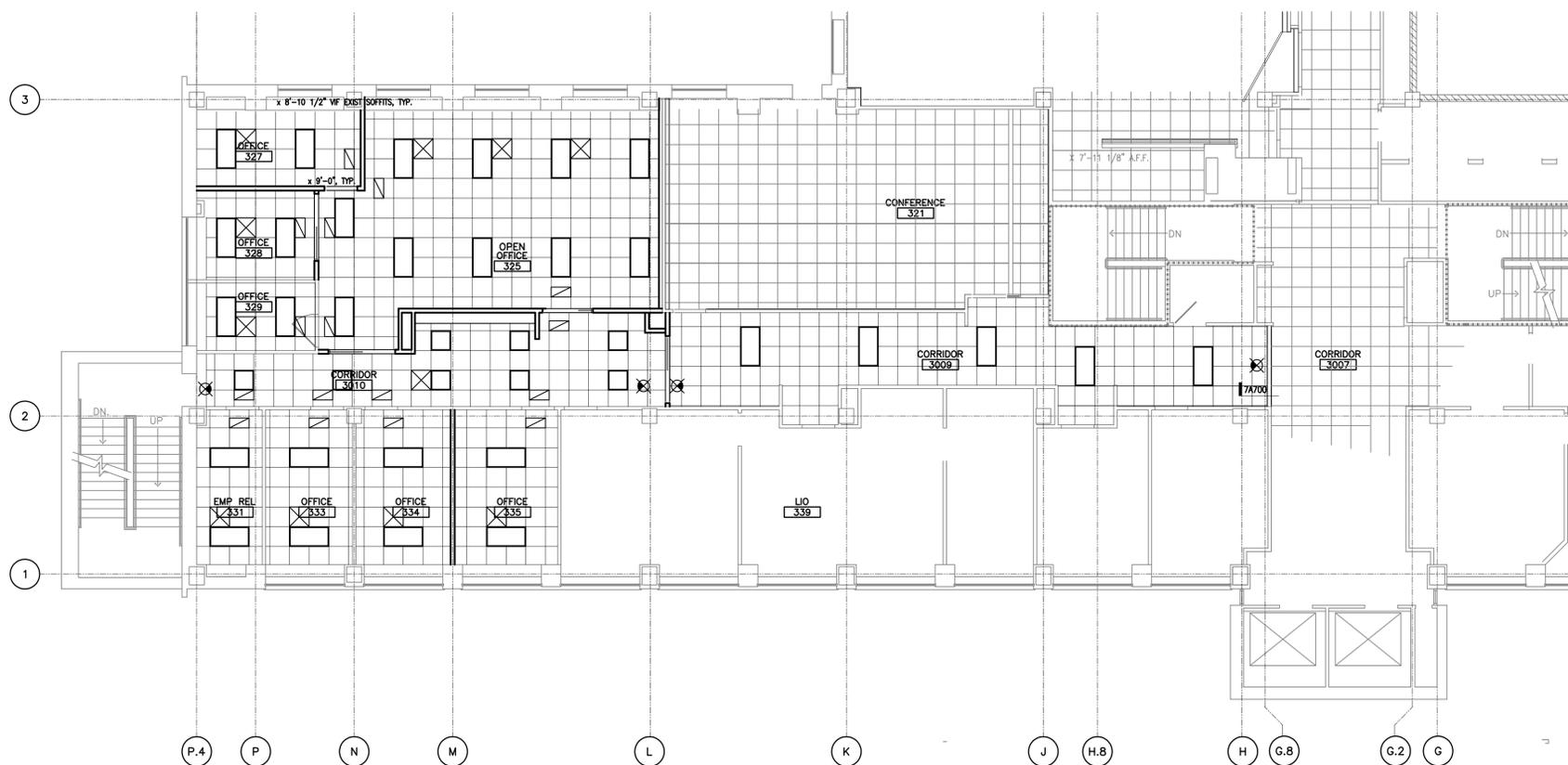
2 PARTIAL FIFTH FLOOR PLAN
1/8"=1'-0"



- REFLECTED CEILING PLAN GENERAL NOTES**
1. FIELD VERIFY ALL CONDITIONS, NOTIFY ARCHITECT OF ANY DISCREPANCY.
 2. SEE MEP FOR ADDITIONAL INFORMATION.
 3. CENTER FIXTURES, FP HEADS IN TILE.
 4. PAINT ALL GWB SOFFITS, INCLUDING EXISTING IN AREA OF WORK.
 5. REMOVE AND REINSTALL EXISTING CEILING HUNG SIGNAGE TO REMAIN.
 6. WHERE EXISTING WALLS DO NOT EXTEND TO STRUCTURE, PROVIDE ACOUSTIC BATT INSULATION OVER ACOUSTIC CEILING TILE 24" IN EITHER DIRECTION.
- REFLECTED CEILING PLAN DEMOLITION NOTES**
- ◆ DEMO METAL PAN OR ACT CEILING AND FIXTURES/DIFFUSERS IN ITS ENTIRETY. SEE MEP FOR ADDITIONAL INFORMATION
 - ◇ DEMO GWB/PLASTER CEILING. SEE MEP FOR ADDITIONAL INFORMATION



1 PARTIAL THIRD FLOOR PLAN - DEMOLITION
1/8"=1'-0"



2 PARTIAL THIRD FLOOR REFLECTED CEILING PLAN
1/8"=1'-0"

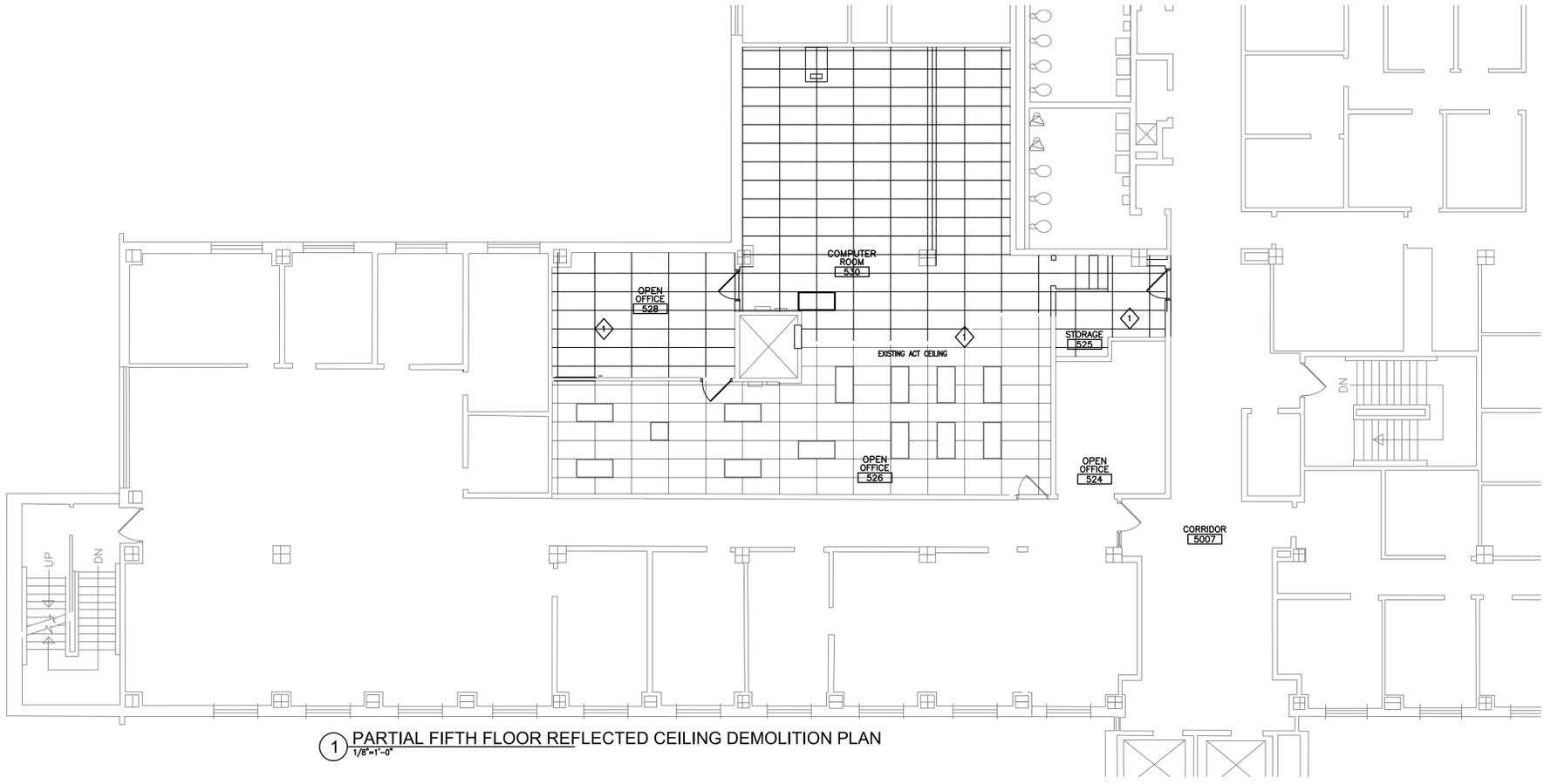


PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
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210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

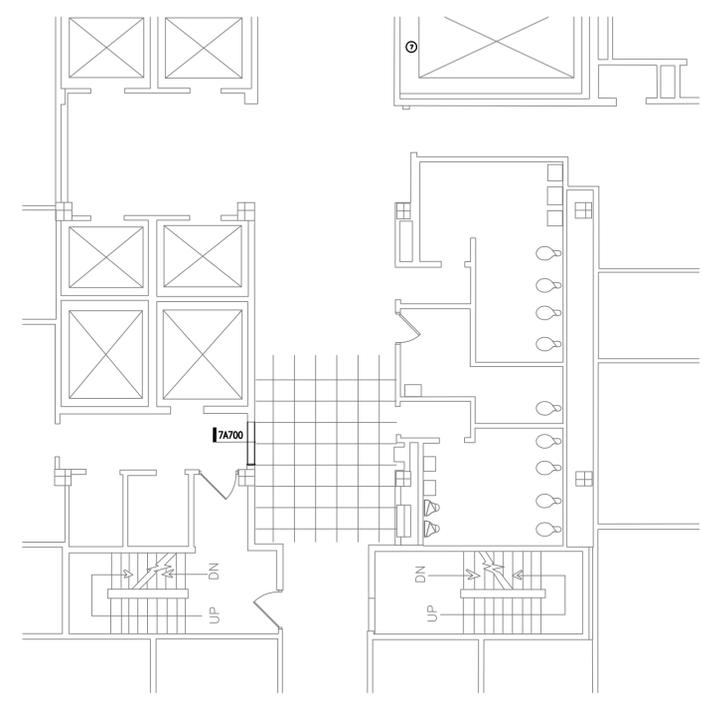
DRAWING
PARTIAL THIRD FLOOR
REFLECTED CEILING PLANS

DATE
11.10.17

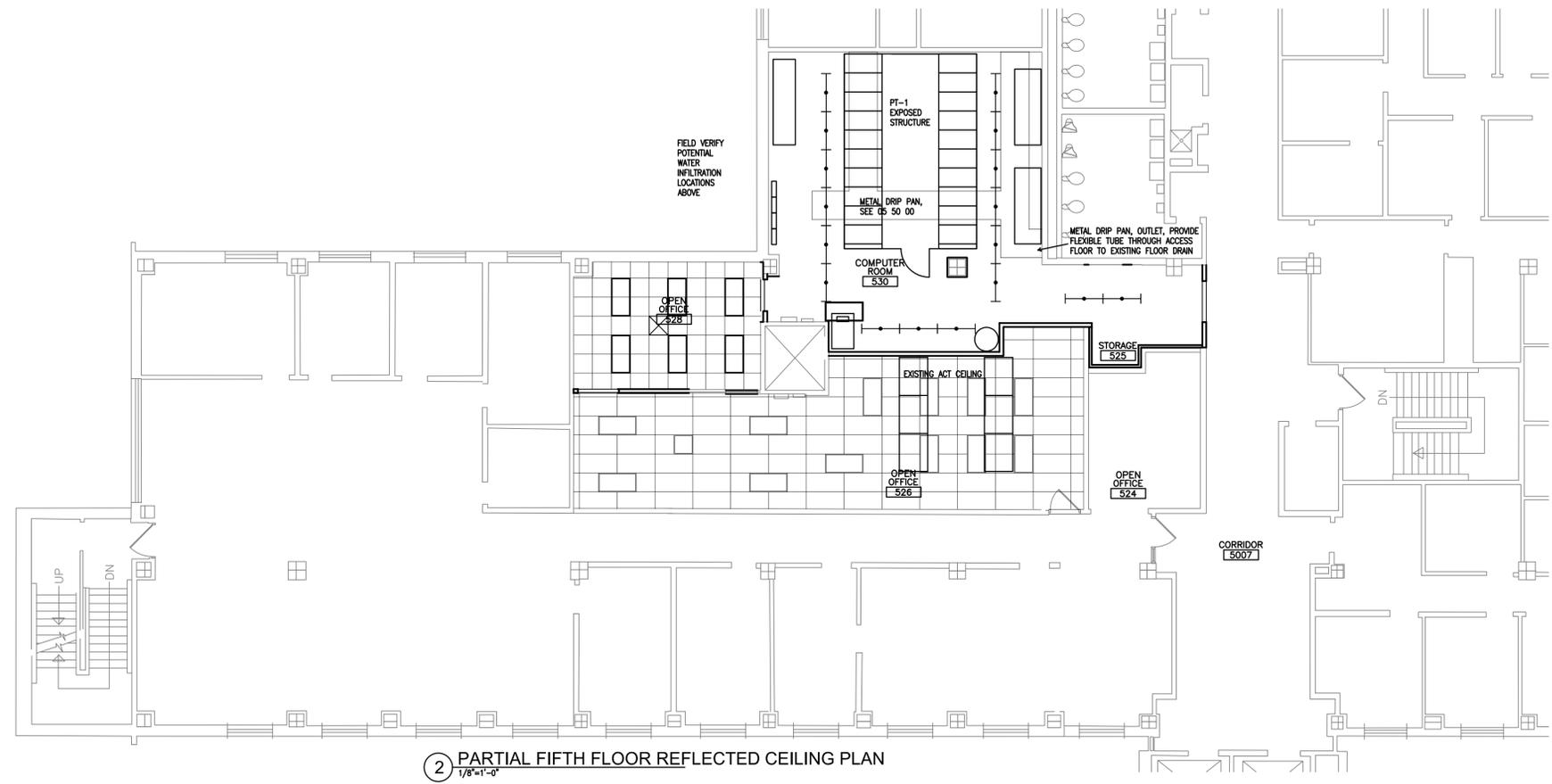
ISSUED



1 PARTIAL FIFTH FLOOR REFLECTED CEILING DEMOLITION PLAN
1/8"=1'-0"



3 PARTIAL FIFTH FLOOR RCP FREIGHT ELEVATOR LOBBY
1/8"=1'-0"



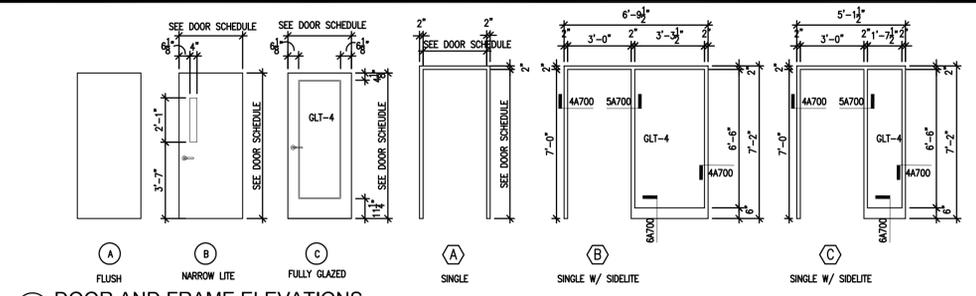
2 PARTIAL FIFTH FLOOR REFLECTED CEILING PLAN
1/8"=1'-0"

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210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

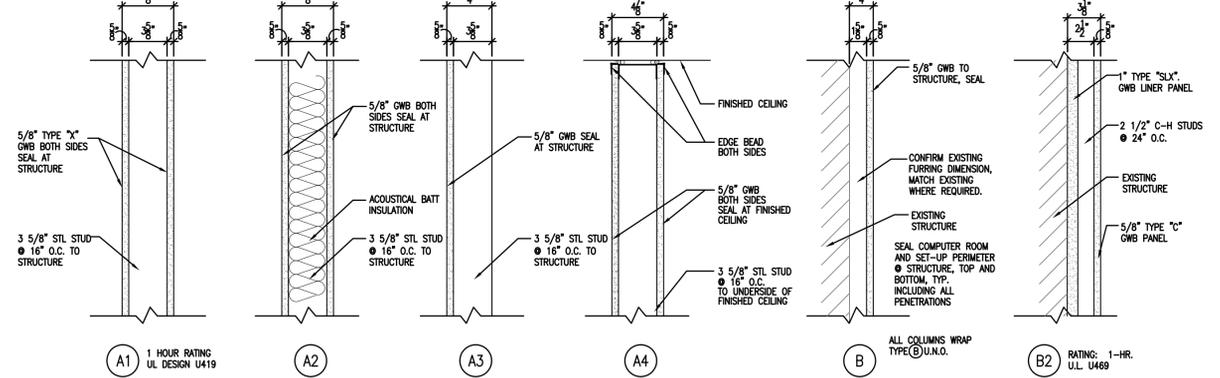
DRAWING
PARTIAL FIFTH FLOOR
REFLECTED CEILING PLANS

DATE
11.10.17

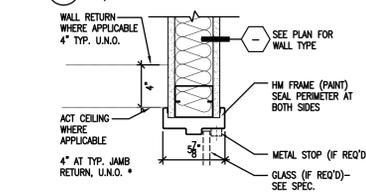




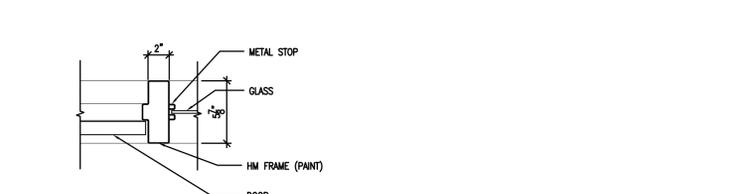
1 DOOR AND FRAME ELEVATIONS
1/4"=1'-0"



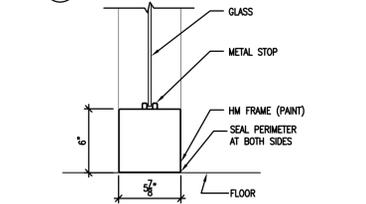
2 PARTITION TYPES
1/2"=1'-0"



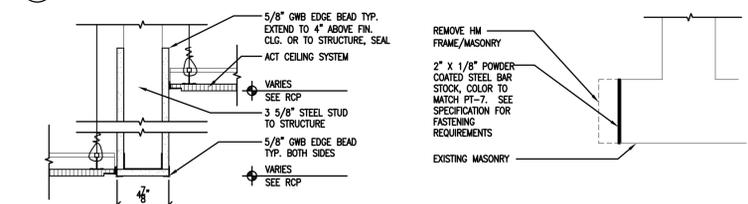
4 HM DOOR JAMB/HEAD DETAIL
1/2"=1'-0"



5 HM JAMB DETAIL
1/2"=1'-0"



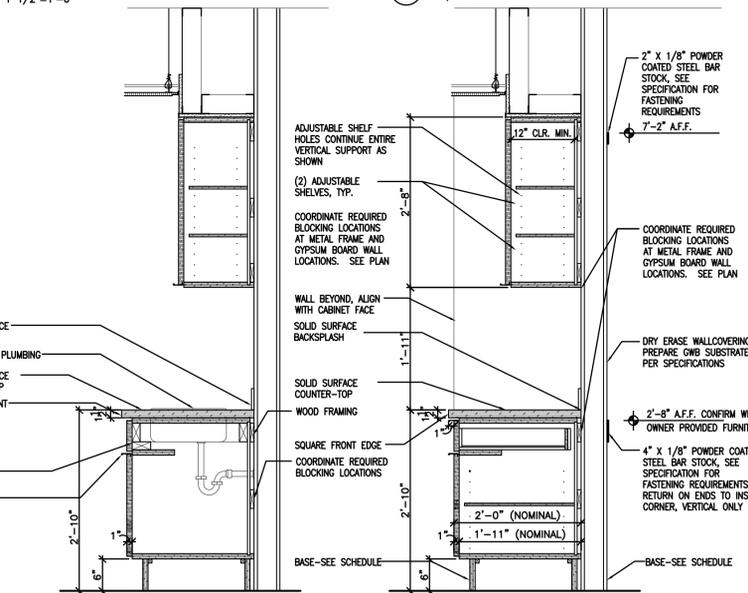
6 HM SILL DETAIL
1/2"=1'-0"



7 BULKHEAD DETAIL
1/2"=1'-0"



9 NOT USED
3/4"=1'-0"

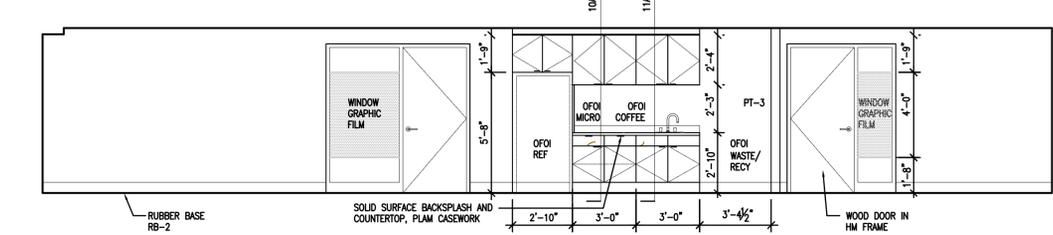


10 SECTION
3/4"=1'-0"

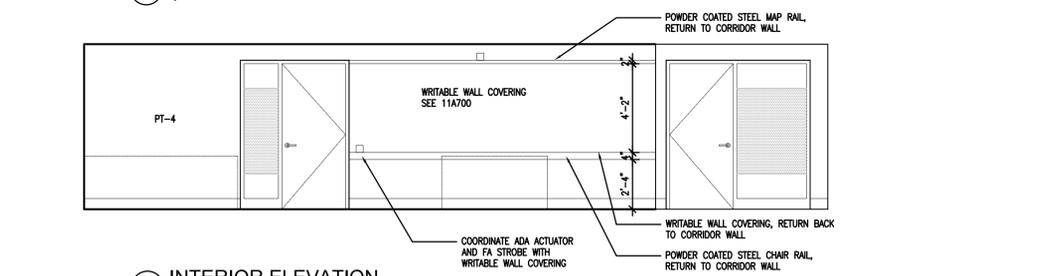


11 SECTION
3/4"=1'-0"

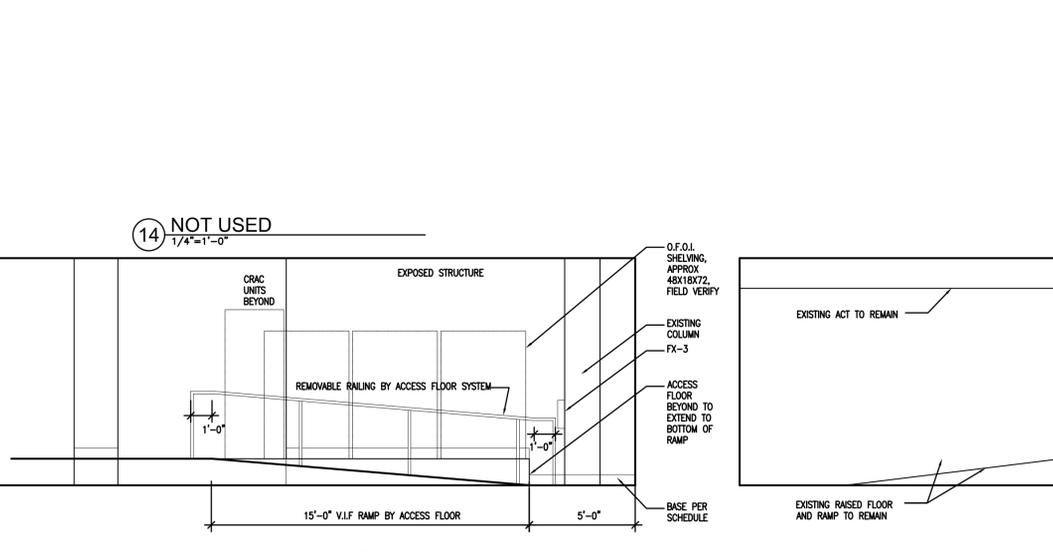
3 NOT USED
1/4"=1'-0"



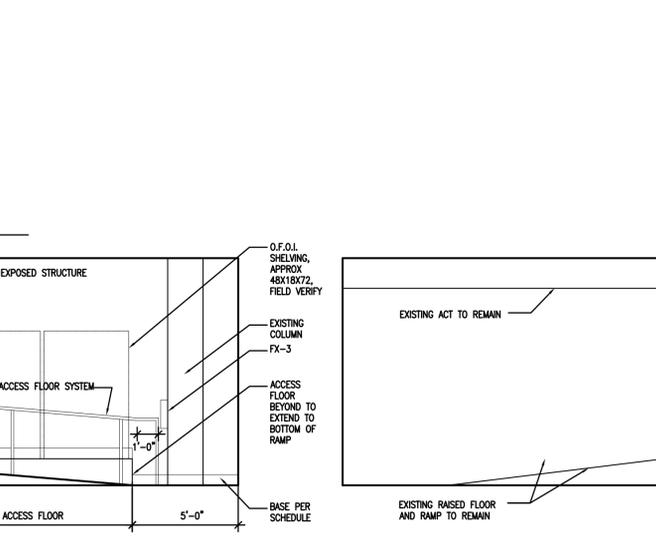
12 INTERIOR ELEVATION
1/4"=1'-0"



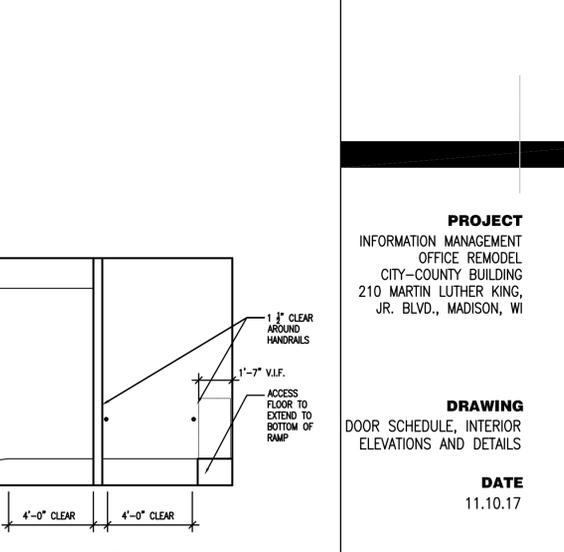
13 INTERIOR ELEVATION
1/4"=1'-0"



14 NOT USED
1/4"=1'-0"



15 INTERIOR ELEVATION
1/4"=1'-0"



16 INTERIOR ELEVATION
1/4"=1'-0"

DOOR NO.	QNTY	DOOR							FRAME				FIRE LABEL	HDWR GROUP	REMARKS	
		W	H	T	MATERIAL	ELEV	GLASS	LOUVER OR UNDERCUT	MATL	ELEV	HEAD	JAMB				SILL
325	1	3'-0"	7'-0"	-	WD	A	-	-	HM	B1A700	4A700	4/5A700	6A700	-	10	CR
327	1	3'-0"	7'-0"	-	WD	A	-	-	HM	A1A700	4A700	4A700	-	-	1	
328	1	3'-0"	7'-0"	-	WD	A	-	-	HM	B1A700	4A700	4/5A700	6A700	-	1	
329	1	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	1A	
331	-	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	1A	existing hardware to remain
333	1	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	1A	
334	1	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	1A	
335	1	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	1A	salvage auto operator for reinstall
3010a	1	3'-0"	7'-0"	-	WD	A	-	-	HM	B1A700	4A700	4/5A700	6A700	-	2	passage set, reinstall salvaged auto operator
3010b	1	3'-0"	7'-0"	-	WD	A	-	-	HM	C1A700	4A700	4/5A700	6A700	-	9	CR, auto operator
526	-	3'-0"	7'-0"	-	exist WD	-	-	-	exist HM	-	-	-	-	-	-	existing hardware to remain, exist CR
528a	1	3'-0"	7'-0"	-	WD	A	-	-	HM	A1A700	4A700	4A700	-	45 MIN	10	CR, seals
528b	1	3'-0"	7'-0"	-	WD	A	-	-	HM	A1A700	4A700	4A700	-	45 MIN	4E	CR, seals
530	1	3'-0"	7'-0"	-	WD	A	-	-	HM	A1A700	4A700	4A700	-	45 MIN	4E	CR, seals

GENERAL NOTES:

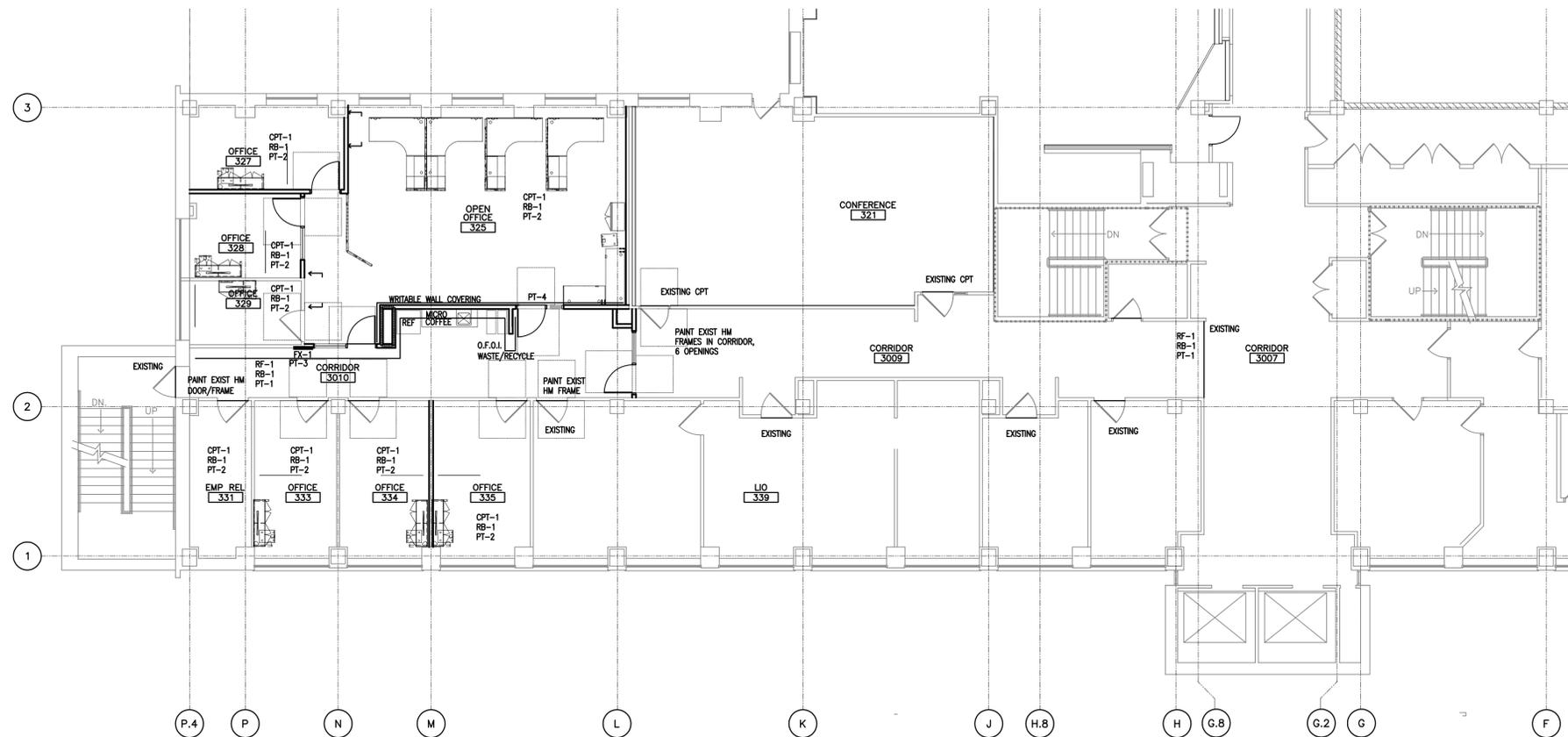
- PAINT HM FRAMES, EXISTING HM DOORS AND FRAMES SCHEDULED AND EXISTING NOTED ON PLAN TO MATCH OWNER'S SAMPLE.
- STAIN WOOD DOORS TO MATCH OWNER'S SAMPLE.
- FIELD VERIFY ALL DIMENSIONS.
- REFER TO SHEET A700 FOR HOLLOW METAL FRAME ELEVATIONS.

REMARKS:

- CLOTHES/ROBE HOOK ON BACK OF OFFICE DOORS.

LEGEND

AL ALUMINUM
HM HOLLOW METAL
WD WOOD
UC UNDERCUT



FINISH SCHEDULE:	
PT-1	ALL SOFFITS: DOVER WHITE
PT-2	FIELD WALL PAINT
PT-3	ACCENT COLOR CORRIDOR
PT-4	ACCENT COLOR OFFICE
PT-5	ACCENT COLOR
PT-6	FIELD PAINT, WALLS AND CEILING COMPUTER ROOM
PT-7	HOLLOW METAL DOORS AND FRAMES
PAINT EXISTING CONNECTION UNIT COVERS IN THE AREA OF WORK.	
SEE HARDWARE SCHEDULE FOR PAINTING HM FRAMES.	

1 ILLUSTRATIVE FURNITURE PLAN AND FINISH PLAN
1/8"=1'-0"



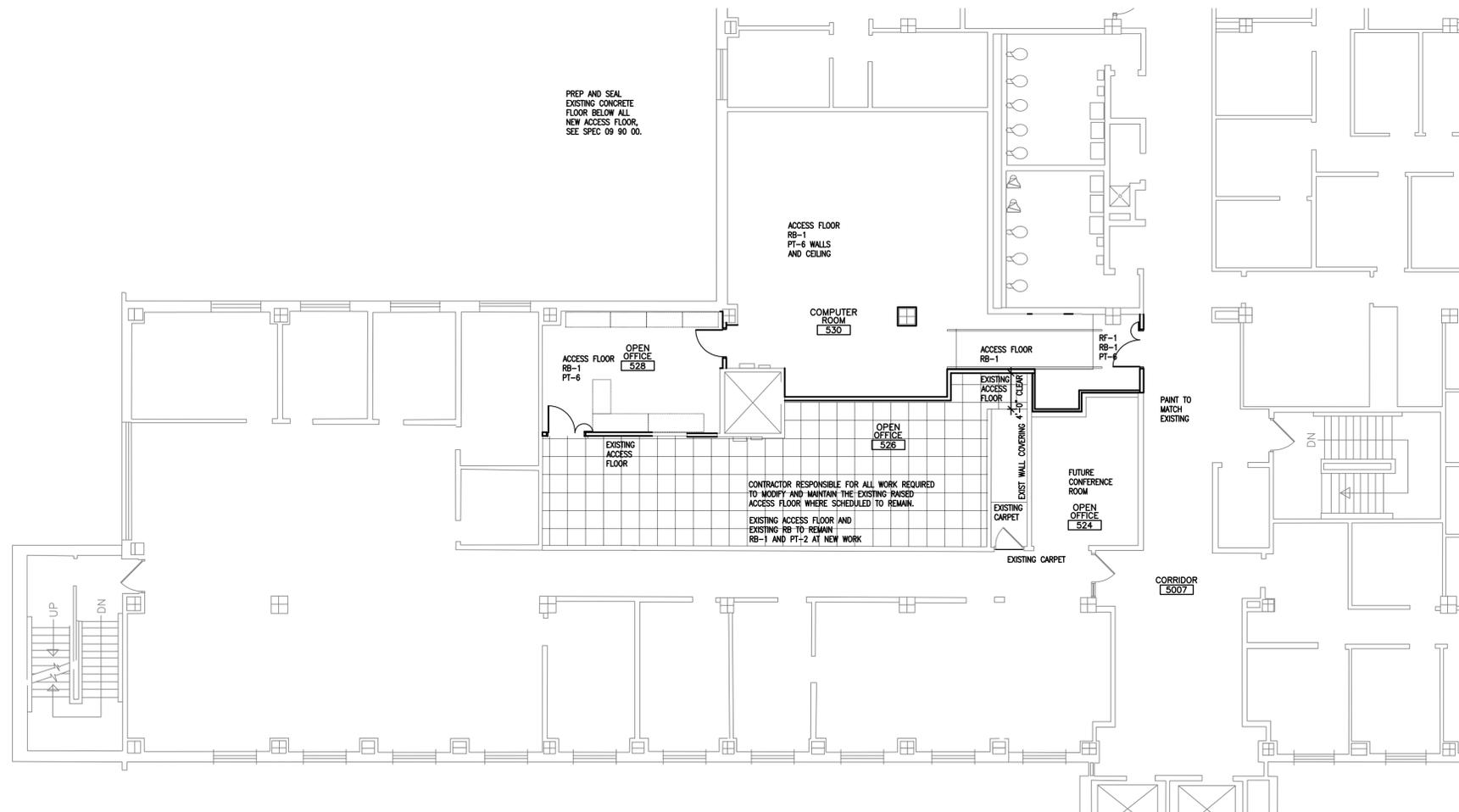
PROJECT
INFORMATION MANAGEMENT
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CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL THIRD FLOOR
FINISH PLAN

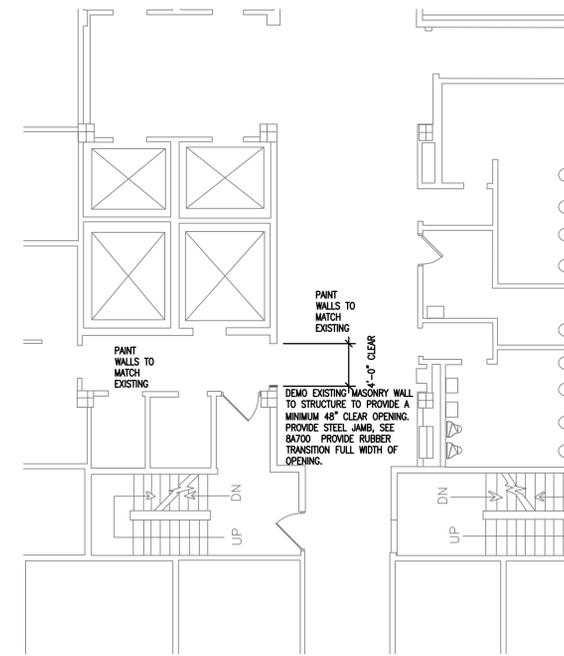
DATE
11.10.17

A903

ISSUED



1 FINISH PLAN AND ILLUSTRATIVE FURNITURE PLAN
1/8"=1'-0"



2 PARTIAL FIFTH FLOOR PLAN FREIGHT ELEVATOR LOBBY
1/8"=1'-0"



PROJECT
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CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
FIFTH FLOOR FINISH PLAN

DATE
11.10.17

A905

Architecture
Planning

DorschnerAssociates, Inc.
849 E. Washington Ave., Ste 112
Madison, Wisconsin 53703

ISSUED

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728 FAX: 608.271.7046
JDR PROJECT NO. 16.0180

PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
SYMBOLS, ABBREVIATIONS,
NOTES AND DETAILS -
FIRE PROTECTION
DATE
11.10.17

F000

FIRE PROTECTION LEGEND

	EXISTING PIPING TO BE REMOVED/DEMOLISHED
	EXISTING PIPING (SERVICE DESIGNATED)
	FIRE PROTECTION WATER SERVICE
	SPRINKLER PIPING
	TEE (BRANCH TO SIDE)
	TEE (BRANCH DOWN)
	RISER UP
	RISER DOWN
	FLANGE
	FLOW
	CHECK VALVE
	POINT OF CONNECTION (POC)
	CAP
	SHUT-OFF VALVE
	PIPE STRAINER
	FLOW SWITCH
	TAMPER SWITCH
	OS&Y GATE VALVE
	FIRE DEPARTMENT CONNECTION (FDC)
	VALVE IN RISER
	PRESSURE GAUGE
	ANGLE VALVE - FIRE HOSE CONNECTION
	DEMOLITION KEYED NOTE
	NEW WORK KEYED NOTE
	REVISION KEYED NOTE
	TAG FOR CONTINUATION MATCH POINTS

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BFF	BELOW FINISHED FLOOR
BFG	BELOW FINISHED GRADE
DCV	DOUBLE DETECTOR CHECK VALVE
E	EXISTING
EC	ELECTRICAL CONTRACTOR
F	FIRE PROTECTION WATER SERVICE
FPC	FIRE PROTECTION CONTRACTOR
FPTC	FIRE PUMP TEST CONNECTION
GC	GENERAL CONTRACTOR
HC	HVAC CONTRACTOR
PC	PLUMBING CONTRACTOR
SPR	SPRINKLER PIPING

FIRE PROTECTION GENERAL NOTES:

1. VERIFY UTILITY INFORMATION WITH LOCAL UTILITY COMPANIES. VISIT THE BUILDING SITE AND BECOME THOROUGHLY FAMILIAR WITH ALL EXISTING CONDITIONS AFFECTING THE WORK.
2. VERIFY ALL MEASUREMENTS, PIPE SIZES, PIPE LOCATIONS, ELEVATIONS, ETC. AT SITE.
3. DRAWINGS OF ALL OTHER TRADES SHALL BE REVIEWED. COORDINATE THE INSTALLATION AND SCHEDULING OF THE WORK WITH OTHER TRADES TO PREVENT INTERFERENCE WITH THEIR RESPECTIVE INSTALLATION.
4. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATION OF ALL STRUCTURAL DIMENSIONS AND LAYOUT.
5. IT IS THE INTENT OF THESE DRAWINGS THAT A COMPLETE WORKING SYSTEM, PROPERLY TESTED, WILL BE OPERATIONAL UPON COMPLETION OF INSTALLATION.
6. CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO BID OPENING. THE ENGINEER RESERVES THE RIGHT TO FINAL INTERPRETATION.
7. ALL SPRINKLER PIPING SHALL BE LOCATED WITHIN THE JOIST SPACE UNLESS INDICATED OTHERWISE.
8. SPRINKLER/FIRE SUPPRESSION SYSTEM(S) SHALL BE DEFINED FOR INDIVIDUAL AREAS. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING TYPES, EXPOSED STRUCTURE AND CEILING DEVICES. IN EXPOSED AREAS, COORDINATE PIPE ROUTING AND HEAD LAYOUT TO PROVIDE A CLEAN SYMMETRICAL INSTALLATION WITH DUCTWORK, LIGHTING, ETC.
9. INSTALL SPRINKLERS IN CENTER OF CEILING TILES WHERE APPLICABLE.

FIRE PROTECTION NARRATIVE

1. THE FIRE PROTECTION SYSTEM IS TO BE DESIGNED TO THE CONTRACT SCOPE DOCUMENTS, NFPA 13 LATEST EDITION, AND THE LOCAL AUTHORITY HAVING JURISDICTION REQUIREMENTS.
2. CONTRACTOR TO NOTE SPECIAL AESTHETIC CONDITION OF SPRINKLER INSTALLATION IN AREAS WITH NO CEILINGS.
3. SPRINKLER COVERAGE AND PIPING SHALL BE WET PIPE HYDRAULICALLY DESIGNED BY THE FIRE PROTECTION CONTRACTOR BASED ON NFPA 13 & 231.

FIRE PROTECTION SYSTEM CLASSIFICATION

LIGHT HAZARD OCCUPANCY:

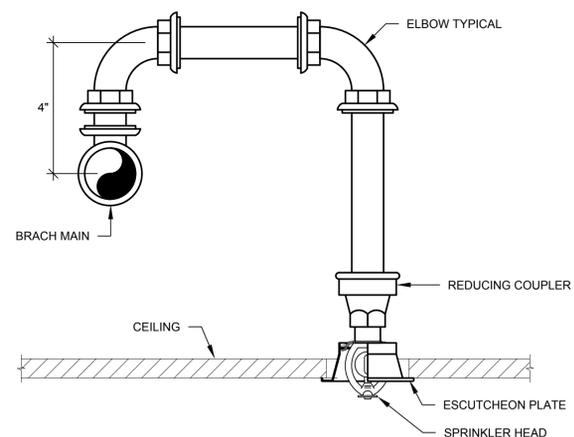
THE PROTECTION AREA ALLOTTED PER SPRINKLER SHOULD NOT EXCEED 200 SQUARE FEET WITH THE MAXIMUM DISTANCE BETWEEN LINES AND SPRINKLERS ON LINES BEING 15 FEET. THE SPRINKLERS DO NOT NEED TO BE STAGGERED.

AREAS OF LIGHT HAZARD SHALL INCLUDE: ALL GENERAL OFFICE SPACE, TOILET ROOMS, AND CORRIDORS.

ORDINARY HAZARD OCCUPANCY:

THE PROTECTION AREA ALLOTTED PER SPRINKLER SHOULD NOT EXCEED 130 SQUARE FEET WITH THE MAXIMUM DISTANCE BETWEEN LINES AND SPRINKLERS ON LINES BEING 15 FEET. SPRINKLERS SHALL BE STAGGERED IF THE DISTANCE BETWEEN HEADS EXCEEDS 12 FEET.

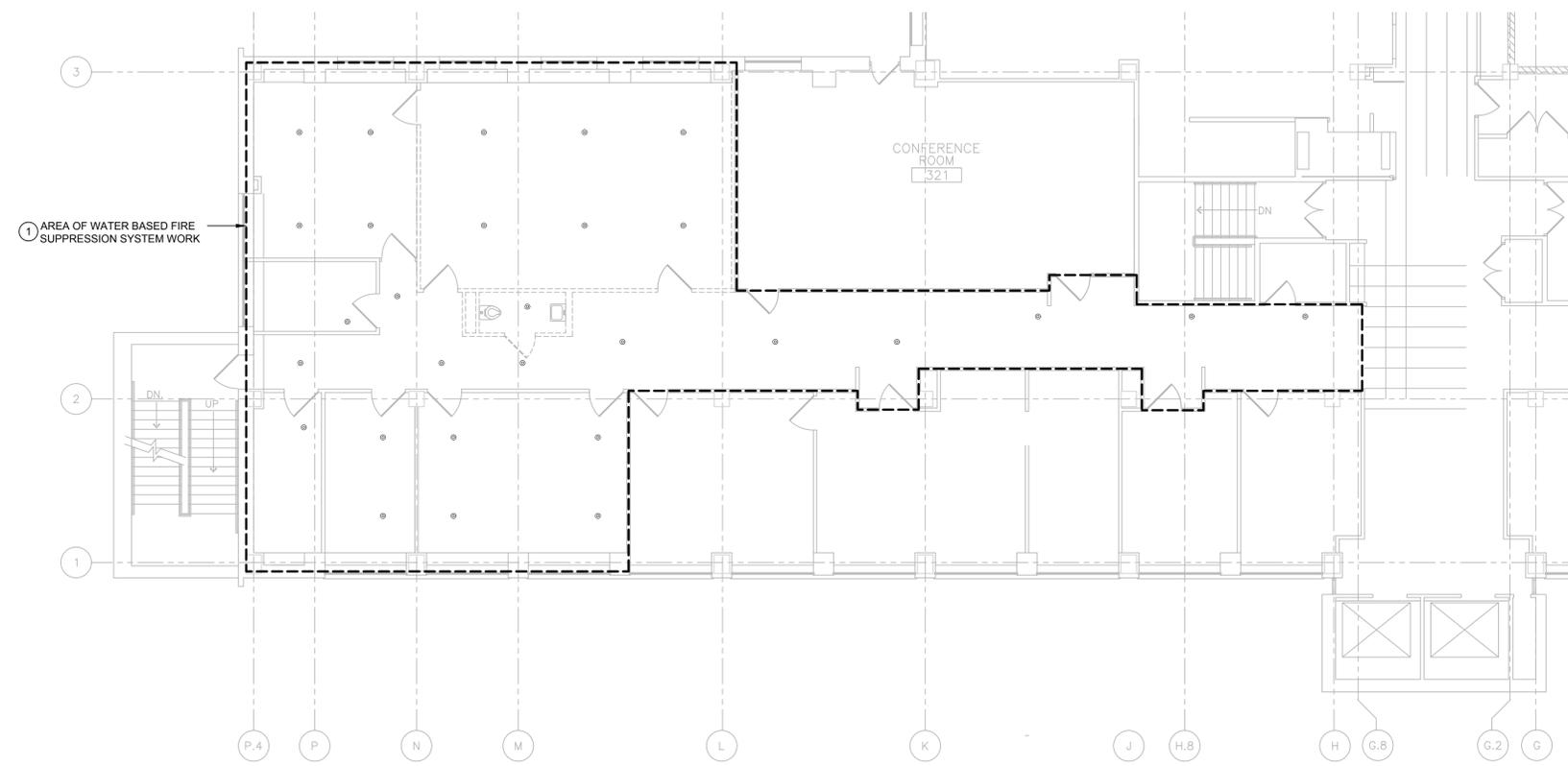
AREAS OF ORDINARY HAZARD SHALL INCLUDE: MECHANICAL ROOMS, JANITOR CLOSETS, AND STORAGE ROOMS.



1 TYPICAL SPRINKLER HEAD INSTALLATION
F000 SCALE: NONE

FIRE PROTECTION SHEET INDEX

F000	SYMBOLS, ABBREVIATIONS, NOTES AND DETAILS - FIRE PROTECTION
F103	PARTIAL THIRD FLOOR PLANS - FIRE PROTECTION
F105	PARTIAL FIFTH FLOOR PLANS - FIRE PROTECTION



1 PARTIAL THIRD FLOOR DEMOLITION PLAN - FIRE PROTECTION
F103 SCALE: 1/8"=1'-0"

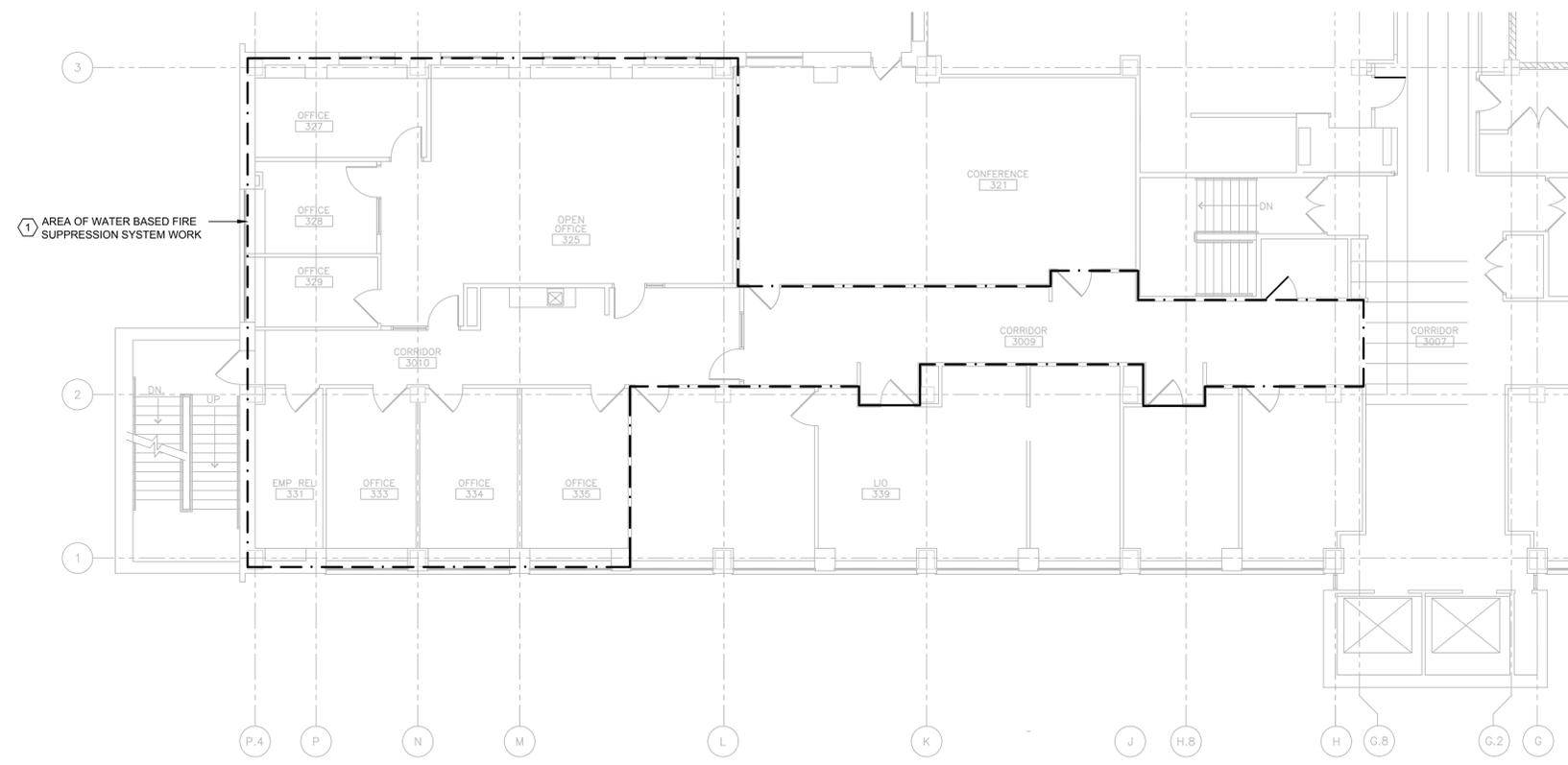


GENERAL NOTES:

1. FPC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT AND DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.

KEYED NOTES:

① AREA OF EXISTING SPRINKLER SYSTEM (WATER BASED) REWORK. EXISTING SPRINKLER HEADS SHOWN FOR REFERENCE ONLY. DEMOLISH ALL EXISTING SPRINKLER HEADS AND BRANCH PIPING (BACK TO MAINS 4" AND LARGER) WHERE NEW CEILINGS ARE BEING INSTALLED. DEMOLISHED SPRINKLER HEADS SHALL NOT BE REUSED.



2 PARTIAL THIRD FLOOR NEW WORK PLAN - FIRE PROTECTION
F103 SCALE: 1/8"=1'-0"



GENERAL NOTES:

1. FPC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.

KEYED NOTES:

① AREA OF EXISTING SPRINKLER SYSTEM (WATER BASED) REWORK. PROVIDE NEW BRANCH PIPING. COORDINATE WITH ELECTRICAL AND HVAC CONTRACTORS. DEMOLISH ALL EXISTING SPRINKLER HEADS WHERE NEW CEILINGS ARE INSTALLED. DEMOLISHED SPRINKLER HEADS SHALL NOT BE REUSED.

HAZARD CLASSIFICATIONS:

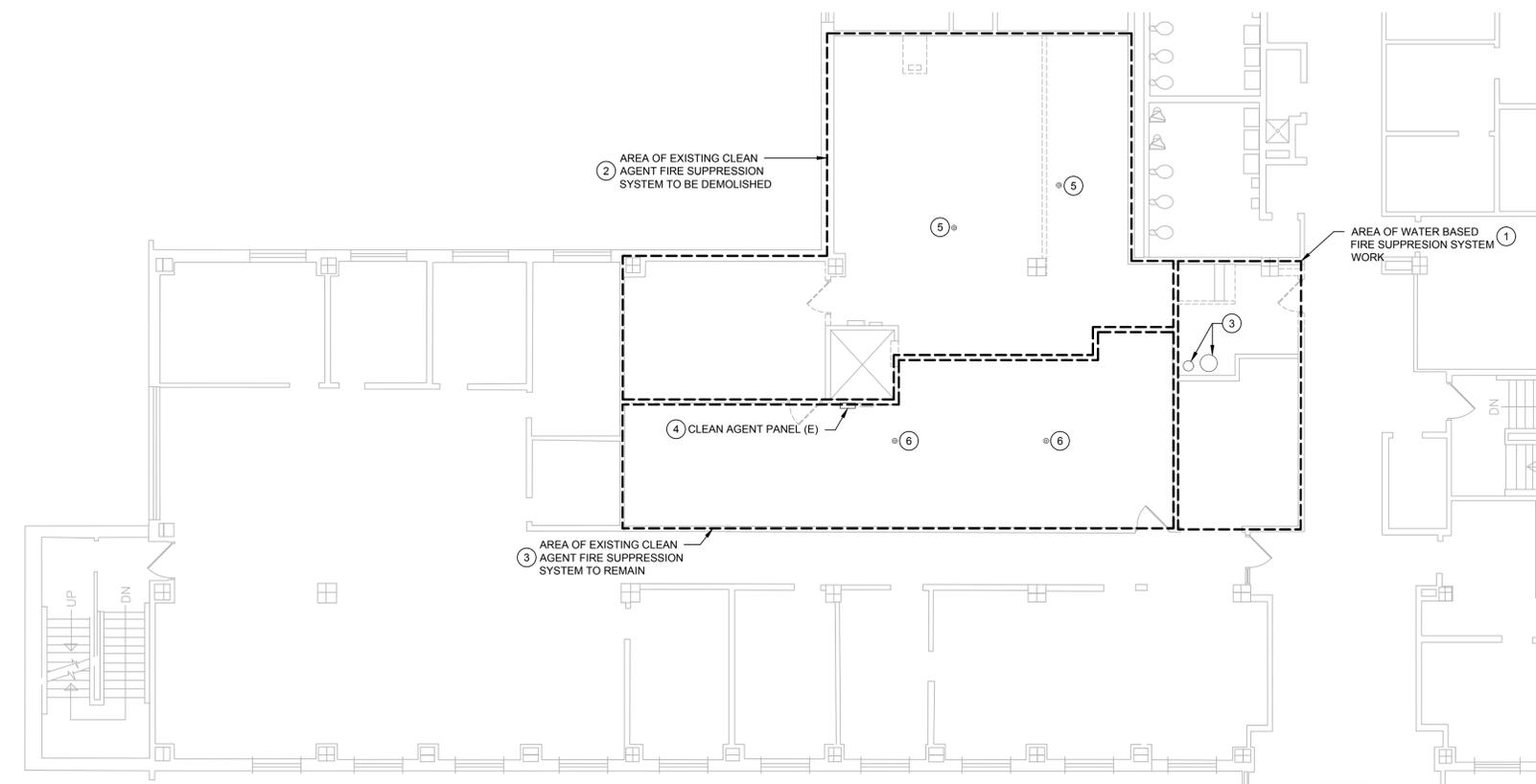
LIGHT HAZARD (NFPA 13) - MAXIMUM AREA PER ZONE = 52,000 SF (SPRINKLER HEADS: CHROME SEMI-RECESSED IN LAY-IN ACT CEILINGS, AND WHITE CONCEALED IN GYP CEILINGS)

ORDINARY HAZARD GROUP I (NFPA 13) - MAXIMUM AREA PER ZONE = 52,000 SF (SPRINKLER HEADS: UPRIGHTS IN EXPOSED STRUCTURE, CHROME SEMI-RECESSED IN CEILINGS)

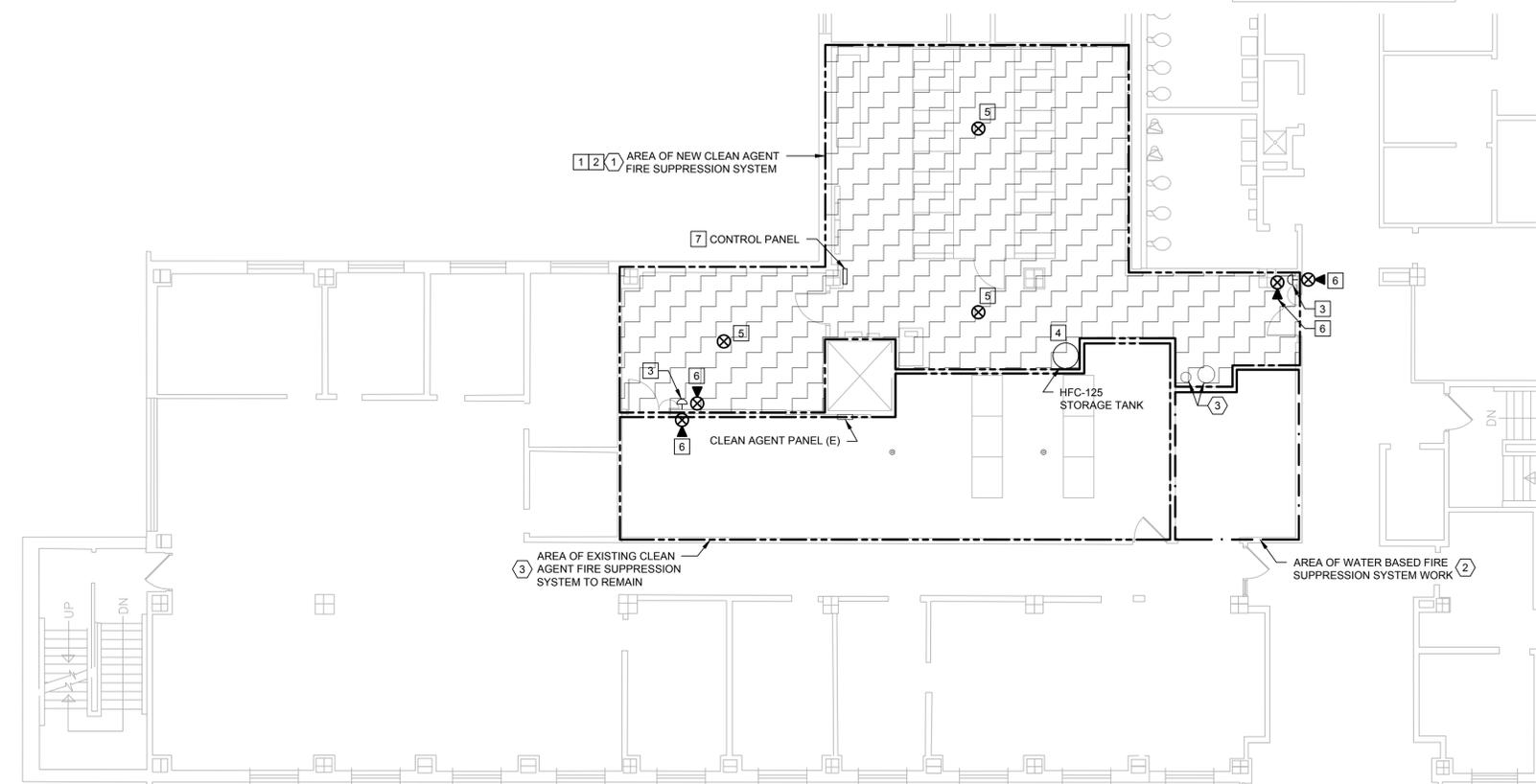
JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728 FAX: 608.271.7046
JDR PROJECT NO. 16.0180

PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL THIRD FLOOR
PLANS
- FIRE PROTECTION
DATE
11.10.17



1 PARTIAL FIFTH FLOOR DEMOLITION PLAN - FIRE PROTECTION
SCALE: 1/8"=1'-0"



2 PARTIAL FIFTH FLOOR NEW WORK PLAN - FIRE PROTECTION
SCALE: 1/8"=1'-0"



GENERAL NOTES:

1. FPC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.

KEYED NOTES:

- ① AREA OF EXISTING SPRINKLER SYSTEM (WET) REWORK. EXISTING SPRINKLER HEADS SHOWN FOR REFERENCE ONLY. DEMOLISH ALL EXISTING SPRINKLER HEADS AND BRANCH PIPING (BACK TO MAINS).
- ② AREA OF EXISTING CLEAN AGENT FIRE SUPPRESSION SYSTEMS TO BE REMOVED. DEMOLISH SYSTEMS BACK TO TANK. EXISTING EQUIPMENT SHALL REMAIN.
- ③ EXISTING CLEAN AGENT FIRE SUPPRESSION TANKS, CONTROLS, AND PIPING SHALL REMAIN FOR IT ROOM AND RAISED FLOOR TO SOUTH. EXISTING CLEAN AGENT PIPING AND HEADS IN CEILING AND RAISED FLOOR SHALL BE DEMOLISHED IN AREA TO NORTH AS SHOWN.
- ④ EXISTING FENWAL CLEAN AGENT FIRE SUPPRESSION CONTROL PANEL SHALL REMAIN FOR AREA TO SOUTH. REPROGRAM PANEL AS REQUIRED FOR DEMOLITION AND NEW WORK.
- ⑤ DEMOLISH EXISTING CLEAN AGENT FIRE SUPPRESSION HEAD IN CEILING AND PIPING BACK TO EXISTING TANK.
- ⑥ EXISTING CLEAN AGENT FIRE SUPPRESSION HEAD IN CEILING. HEADS AND PIPING IN CEILING AND RAISED FLOOR SHALL REMAIN FOR SYSTEM IN THIS AREA.

GENERAL NOTES:

1. FPC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.

KEYED NOTES:

- ① AREA OF NEW CLEAN AGENT FIRE SUPPRESSION SYSTEM. AREA INCLUDES 15" RAISED FLOOR SUPPLY AIR PLENUM AND HOT ISLE CONTAINMENT SYSTEM.
- ② AREA OF EXISTING SPRINKLER SYSTEM (WATER BASED) REWORK. PROVIDE NEW BRANCH PIPING. COORDINATE WITH ELECTRICAL AND HVAC CONTRACTORS. DEMOLISH ALL EXISTING SPRINKLER HEADS WHERE NEW CEILINGS ARE INSTALLED. DEMOLISHED SPRINKLER HEADS SHALL NOT BE REUSED.
- ③ EXISTING CLEAN AGENT FIRE SUPPRESSION TANKS, CONTROLS, AND PIPING SHALL REMAIN FOR IT ROOM AND RAISED FLOOR TO SOUTH. EXISTING CLEAN AGENT PIPING AND HEADS IN CEILING AND RAISED FLOOR SHALL BE DEMOLISHED IN AREA TO NORTH AS SHOWN.

HAZARD CLASSIFICATIONS:

- LIGHT HAZARD (NFPA 13) - MAXIMUM AREA PER ZONE = 52,000 SF (SPRINKLER HEADS: CHROME SEMI-RECESSED IN LAY-IN ACT CEILINGS, AND WHITE CONCEALED IN GYP CEILINGS)
- ORDINARY HAZARD GROUP I (NFPA 13) - MAXIMUM AREA PER ZONE = 52,000 SF (SPRINKLER HEADS: UPRIGHTS IN EXPOSED STRUCTURE, CHROME SEMI-RECESSED IN CEILINGS)
- CLEAN AGENT FIRE SUPPRESSION SYSTEM (HFC-125); REFER TO KEYED NOTES AND SPECIFICATIONS

CLEAN AGENT GENERAL NOTES:

- 1. CLEAN AGENT FIRE SUPPRESSION SYSTEM (HFC-125) TO BE DESIGNED AND INSTALLED IN ACCORDANCE WITH NFPA.
- 2. FIRE PROTECTION CONTRACTOR IS RESPONSIBLE FOR FINAL DESIGN, SYSTEM SIZING, PIPE LAYOUT, AND NOZZLE LAYOUT. SUBMIT SHOP DRAWINGS FOR A/E REVIEW.
- 3. ALL DEVICES AND EQUIPMENT SHALL BE LOCATED IN THE CENTER OF CEILING TILES AND SYMMETRICAL WITHIN ROOMS (WHENEVER POSSIBLE).
- 4. SEAL ALL PIPE PENETRATIONS THROUGH PERIMETER WALLS OF ROOMS TO BE SERVED BY CLEAN AGENT SYSTEM AND ALL FIRE-RATED ASSEMBLIES.
- 5. FIRE PROTECTION CONTRACTOR SHALL COORDINATE LOCATION OF ALL NEW PIPING, SPRINKLER HEADS, DISCHARGE NOZZLE, INDICATING DEVICES, ETC WITH OTHER TRADES PRIOR TO INSTALLATION. OFFSET PIPING AS REQUIRED TO ACCOMMODATE DUCTWORK, LIGHTING, CONDUIT, AND PLUMBING PIPING.
- 6. ALL DEVICES INCLUDING STROBES, HORN/STROBE, MANUAL DISCHARGE CONTROL, ABORT CONTROL, ETC ASSOCIATED WITH THE CLEAN AGENT FIRE SUPPRESSION SYSTEM SHALL BE FURNISHED AND INSTALLED BY CASC. ALL LINE AND LOW VOLTAGE POWER/CONTROL WIRING IS THE RESPONSIBILITY OF THE CASC.

CLEAN AGENT KEYED NOTES:

- ① THE AREA WITHIN THE DEFINED LIMITS SHALL BE PROTECTED BY A CLEAN AGENT FIRE SUPPRESSION SYSTEM (HFC-125). COORDINATE INTERLOCKS FOR HVAC SYSTEM SHUTDOWN WITH HC. COORDINATE INTERFACE OF CONTROL SYSTEM ALARMS WITH FIRE ALARM CONTRACTOR (EC). ELECTRICAL/FIRE ALARM CONTRACTOR SHALL (AT MINIMUM) INTERFACE THE ALARM POINT, SUPERVISORY (TANK MONITOR), TROUBLE, AND DISCHARGE NOTIFICATION THROUGH THE CLEAN AGENT SYSTEM CONTROL PANEL.
- ② SEAL ALL NEW AND EXISTING PIPE, DUCT, CONDUIT AND CONSTRUCTION JOINTS IN ALL PERIMETER WALLS ENCLOSED AREAS TO BE SERVED BY HFC-125 CLEAN AGENT FIRE EXTINGUISHING SYSTEM. ALL DOORS BETWEEN/LEAVING INDIVIDUAL ZONES SHALL BE EQUIPPED WITH SWEEPS AND SELF-CLOSING DEVICES.
- ③ MANUAL DISCHARGE DEVICE INTERLOCKED WITH CLEAN AGENT SYSTEM CONTROLS. EACH STATION SHALL CONSIST OF A DOUBLE GANG BOX WITH COMBINATION "MANUAL DISCHARGE" SWITCH AND SEPARATE "ABORT" SWITCH.
- ④ LOCATION OF CLEAN AGENT SYSTEM TANK, AND ASSOCIATED PIPING.
- ⑤ INDICATOR STROBE FURNISHED AND INSTALLED BY CASC. PROVIDE A STROBE AND INTERLOCK WITH ASSOCIATED CONTROL PANEL. COORDINATE LOCATION WITH LIGHTS AND DIFFUSER LOCATIONS. CASC IS RESPONSIBLE FOR FINAL QUANTITIES AND LOCATION.
- ⑥ COMBINATION HORN/STROBE INDICATOR INTERLOCKED WITH ZONE CONTROL PANEL. HORN/STROBE SHALL ANNUNCIATE A DISCHARGE CONDITION IS PRESENT. PROVIDE SIGNAGE ADJACENT TO DOOR DEFINING THE INDICATION. HORN/STROBE STATION TO BE FURNISHED AND INSTALLED BY CASC.
- ⑦ CLEAN-AGENT SYSTEM CONTROL PANEL SHALL HAVE INTERLOCKS DEFINED WITHIN SPECIFICATIONS TO FIRE ALARM SYSTEM. PROVIDE CONTRACTOR FOR BUILDING AUTOMATION SYSTEM TO SHUT DOWN HVAC EQUIPMENT ON ALARM CONDITION.

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CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL FIFTH FLOOR
PLANS
- FIRE PROTECTION
DATE
11.10.17

PLUMBING FIXTURE SCHEDULE

REFER TO SPECIFICATION SECTION 22 40 00 FOR ACCEPTABLE EQUAL MANUFACTURERS

ID	FIXTURE	WASTE			WATER				DESCRIPTION/REMARKS
		DFU	TRAP	VENT (MIN)	COLD		HOT		
					CWFU	SIZE	HWFU	SIZE	
S-1	SINK (ADA COMPLIANT)	2	1-1/2"	1-1/2"	1.5	1/2"	1.5	1/2"	FIXTURE: ELKAY LRAD 2219-6.5, 18 GAUGE TYPE 304 STAINLESS STEEL SINK, SELF-RIMMING, 22"x19"x6.5" DEEP, FOUR (4) FAUCET HOLES ON 4" CENTERS, ADA COMPLIANT. SINK FAUCET: KOHLER SIMPLICE K-597, MANUAL FAUCET WITH PULL-DOWN SPRAY, METAL CONSTRUCTION, 1.8 GPM AERATOR, POLISHED CHROME FINISH, SINGLE HOLE MOUNTING, INCLUDE 8" ESCUCHEON FOR THREE HOLE INSTALLATION, SINGLE CONTROL LEVER, ADA COMPLIANT. DRINKING WATER FILTER AND FAUCET: AQUA-PURE CS-S FILTER AND SPOUT PACKAGE, MOUNT FILTER UNDER COUNTER WITH MANUFACTURER'S MOUNTING HARDWARE, PIPE TO DRINKING WATER SPOUT. MOUNT DRINKING WATER SPOUT IN SINK SPOUT HOLE TO THE RIGHT OF SINK FAUCET. PROVIDE BALL VALVE UNDER COUNTER ON COLD WATER SUPPLY TO DRINKING WATER FILTER. TRAP & DRAIN: CHROME PLATED CAST BRASS P-TRAP, WITH GRID STRAINER DRAIN. SINK FAUCET STOPS & SUPPLIES: McGUIRE H2167LK, LOOSE KEY QUARTER TURN ANGLE STOPS WITH CHROME PLATED ESCUTCHEONS & CHROME PLATED COPPER RISER SUPPLIES.

PLUMBING LEGEND

	EXISTING PIPING TO BE REMOVED/DEMOLISHED
	EXISTING PIPING (SERVICE DESIGNATED)
	SANITARY DRAIN, WASTE OR SEWER (SAN)
	STORM DRAIN CONDUCTOR OR SEWER
	VENT (V)
	COLD WATER
	HOT WATER
	HOT WATER RECIRCULATION
	TEE (BRANCH TO SIDE)
	TEE (BRANCH DOWN)
	RISER UP
	RISER DOWN
	CLEANOUT (CO)
	WALL CLEANOUT (WCO)
	FLOOR CLEANOUT (FCO)
	FLOW
	HOSE BIBB (HB) OR WALL HYDRANT (WH)
	POINT OF CONNECTION (POC)
	CAP
	BALANCING VALVE
	SHUT-OFF VALVE
	PIPE STRAINER
	FIXTURE STOP
	VALVE IN RISER
	WATER HAMMER ARRESTOR
	FLOOR DRAIN (FD)
	HUB DRAIN (HD)
	DEMOLITION KEYED NOTE
	NEW WORK KEYED NOTE
	REVISION KEYED NOTE
	TAG FOR CONTINUATION MATCH POINTS

ABBREVIATIONS

AAV	AIR ADMITTANCE VALVE
CO	CLEANOUT
CS	COLD SOFT WATER/CUP SINK
CW	COLD WATER
DW	DISHWASHER
E	EXISTING
EC	ELECTRICAL CONTRACTOR
ESEW	EMERGENCY SHOWER/EYEWASH
F	FIRE PROTECTION WATER SERVICE
FCO	FLOOR CLEANOUT
FPC	FIRE PROTECTION CONTRACTOR
G	NATURAL GAS
GC	GENERAL CONTRACTOR
HB	HOSE BIBB
HC	HVAC CONTRACTOR
HW	HOT WATER
HWR	HOT WATER RECIRCULATION
IE	INVERT ELEVATION
L	LAVATORY
MB	MOP BASIN
OD	OVERFLOW DRAIN
ORD	OVERFLOW ROOF DRAIN
PC	PLUMBING CONTRACTOR
PRV	PRESSURE REGULATING VALVE
RPBP	REDUCED PRESSURE ZONE BACKFLOW PREVENTER
S	SINK
SAN	SANITARY
SH	SHOWER
ST	STORM
UR	URINAL
V	VENT
VTR	VENT THRU ROOF
W	DOMESTIC WATER SERVICE
WC	WATER CLOSET
WCO	WALL CLEANOUT
WM	WASHING MACHINE WALL BOX
WHA	WATER HAMMER ARRESTOR
WHR	WATER HEATER

PLUMBING SHEET INDEX

P000	SYMBOLS, ABBREVIATIONS, AND SCHEDULES - PLUMBING
P103	PARTIAL THIRD FLOOR PLANS - PLUMBING

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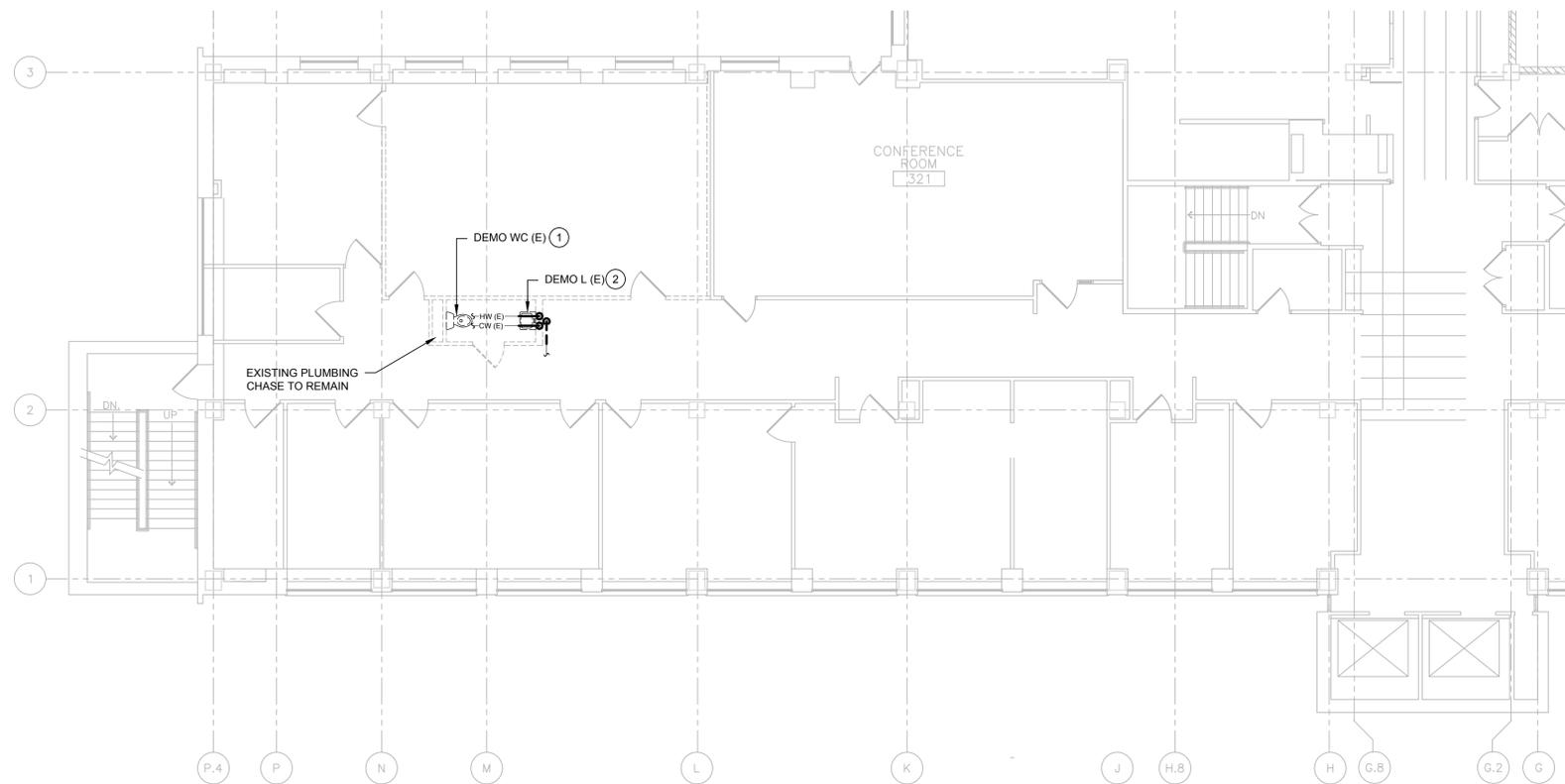
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AND SCHEDULES -
PLUMBING
DATE
11.10.17

P000



1 PARTIAL THIRD FLOOR DEMOLITION PLAN - PLUMBING
P103 SCALE: 1/8"=1'-0"

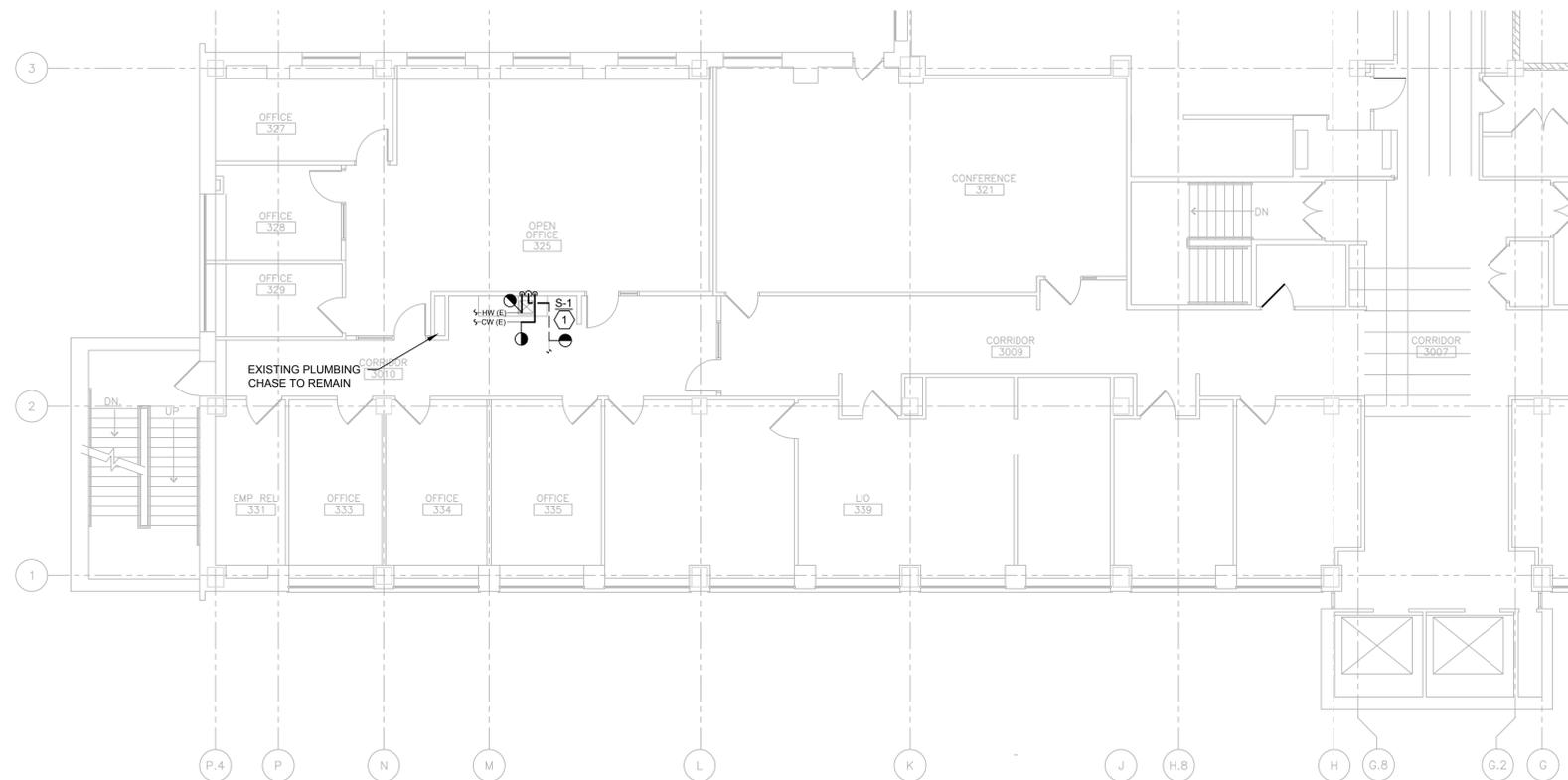


GENERAL NOTES:

1. PC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT AND DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.
2. PC SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF FLOORS, WALLS AND CEILINGS AS REQUIRED FOR DEMOLITION AND NEW PLUMBING WORK.

KEYED NOTES:

- 1 DEMOLISH EXISTING WATER CLOSET COMPLETE. DEMOLISH EXISTING WASTE BELOW FLOOR AND CAP AT NEAREST ACTIVE MAIN. REMOVE WATER BACK TO NEAREST ACTIVE MAIN AND CAP. PATCH ALL HOLES THROUGH FLOOR TO MATCH EXISTING.
- 2 DEMOLISH EXISTING LAVATORY COMPLETE. DEMOLISH EXISTING WASTE BELOW FLOOR. SEE NEW PLAN FOR EXTENSION OF WASTE TO NEW SINK. PATCH ALL HOLES THROUGH FLOOR TO MATCH EXISTING. REMOVE WATER AND VENT AND PREPARE FOR EXTENSION TO NEW SINK. SEE NEW PLAN.



2 PARTIAL THIRD FLOOR NEW WORK PLAN - PLUMBING
P103 SCALE: 1/8"=1'-0"



GENERAL NOTES:

1. PC SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT AND DISCREPANCIES TO THE A/E PRIOR TO COMMENCING WORK AND ORDERING MATERIALS.
2. PC SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF FLOORS, WALLS AND CEILINGS AS REQUIRED FOR DEMOLITION AND NEW PLUMBING WORK.

KEYED NOTES:

- 1 EXTEND EXISTING WATER, VENT, AND WASTE TO NEW SINK. INSTALL 1-1/2" SAN THROUGH FLOOR AND CONNECT TO EXISTING SANITARY WASTE IN CEILING BELOW. CONNECT NEW 1/2" HW/CW AND 1-1/2" VENT TO EXISTING SERVICES IN CEILING. PROVIDE VALVE AND ASSE 1022 BACKFLOW DEVICE FOR COFFEE MAKER.

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ABBREVIATIONS

A	COMPRESSED AIR	EJ	EXPANSION JOINT	LAT	LEAVING AIR TEMPERATURE	T	THERMOSTAT/TEMPERATURE SENSOR
ACC	AIR COOLED CONDENSER	EL	ELEVATION	LBS	POUNDS	TA	THROWAWAY
ACCU	AIR COOLED CONDENSING UNIT	ELEC	ELECTRICAL	LD	LINEAR DIFFUSER	TCAC	TEMPERATURE CONTROL AIR COMPRESSOR
ACU	AIR CONDITIONING UNIT	EQUIP	EQUIPMENT	LPC	LOW PRESSURE CONDENSATE	TC	TEMPERATURE CONTROL CONTRACTOR
AD	ACCESS DOOR	ER	EXHAUST REGISTER	LPS	LOW PRESSURE STEAM	TCV	TEMPERATURE CONTROL VALVE
ADJ	ADJUSTABLE	ERU	ENERGY RECOVERY UNIT	LR	LINEAR RETURN	TEMP	TEMPORARY
AE	ARCHITECT/ENGINEER	ERV	ENERGY RECOVERY VENTILATOR	LT	LIGHT TROFFER	TF	TRANSFER FAN
AF	AIR FOIL	ET	EXPANSION TANK	LW	LEAVING WATER TEMPERATURE	TFA	TO FLOOR ABOVE
AFF	ABOVE FINISHED FLOOR	ETR	EXISTING TO REMAIN	M	MOTOR OPERATED DAMPER	TFB	TO FLOOR BELOW
AFMS	AIR FLOW MEASURING STATION	EWH	ELECTRIC WALL HEATER	MAT	MIXED AIR	TG	TRANSFER GRILLE
AHU	AIR HANDLING UNIT	EWT	ENTERING WATER TEMPERATURE	MA	MAKE-UP AIR UNIT	TO	TEST OPENINGS
AL	ALUMINUM	EXH	EXHAUST	MAX	MAXIMUM	TS	TIP SPEED
AMP	AMPERE	EXT	EXTERIOR OR EXTERNAL	MBH	1000 BRITISH THERMAL UNITS/HOUR	TYP	TYPICAL
AP	ACCESS PANEL	F	FURNACE	MCA	MINIMUM CIRCUIT AMPS	UH	UNIT HEATER
APD	AIR PRESSURE DROP	F°	DEGREES FAHRENHEIT	MCC	MOTOR CONTROL CENTER	UST	UNDERGROUND STORAGE TANK
ASC	ABOVE SUSPENDED CEILING	F&B	FACE & BYPASS	MECH	MECHANICAL	UV	UNIT VENTILATOR
ATR	AIR TROFFER - RETURN	F&T	FLOAT & THERMOSTAT TRAP	MEZZ	MEZZANINE	UNEX	UNEXCAVATED
ATS	AIR TROFFER - SUPPLY	FA	FREE AREA	MFS	MAXIMUM FUSE SIZE	V	VENT
AUTO	AUTOMATIC	FC	FORWARD CURVED	MIN	MINIMUM	VAC	VACUUM
B	BOILER	FCU	FAN COIL UNIT	MOC	MAXIMUM OVERCURRENT PROTECTION	VAV	VARIABLE AIR VOLUME
BB	BASEBOARD	FD	FLOOR DRAIN OR FIRE DAMPER	MTD	MOUNTED	VB	VOLUME DAMPER
BC	BOOSTER COIL	FFA	FROM FLOOR ABOVE	MUA	MAKE-UP AIR UNIT	VDT	VERTICAL DRAW THRU
BCU	BLOWER COIL UNIT	FFB	FROM FLOOR BELOW	NC	NOISE CRITERIA	VEL	VELOCITY
BDD	BACK DRAFT DAMPER	FILL	FILL LINE	NO	NORMALLY OPEN	VERT	VERTICAL
BFP	BACKFLOW PREVENTER	FLA	FULL LOAD AMPS	NPLV	NOMINAL PART LOAD VALUE	VFD	VARIABLE FREQUENCY DRIVE
BHP	BRAKE HORSEPOWER	FLEX	FLEXIBLE	NTS	NOT TO SCALE	VSC	VARIABLE SPEED CONTROL
BI	BACKWARD INCLINED	FM	FLOW METER	O	OXYGEN	W TO W	WALL TO WALL
BLDG	BUILDING	FOO	FUEL OIL OVERFLOW	OA	OUTDOOR AIR	WC	WATER COLUMN
BOD	BOTTOM OF DUCT	FOR	FUEL OIL RETURN	OAT	OUTDOOR AIR TEMPERATURE	WF	WALL FIN
BOP	BOTTOM OF PIPE	FOS	FUEL OIL SUPPLY	OC	ON CENTER	WP	WEATHER PROOF
BOS	BOTTOM OF STRUCTURE	FOV	FUEL OIL VENT	OPD	OPPOSED BLADE DAMPER	WPD	WATER PRESSURE DROP
BR	BRINE RETURN	FPC	FIRE PROTECTION CONTRACTOR	P	PUMP	YH	YARD HYDRANT
BRG	BEARING	FTM	FEET PER MINUTE	PC	PLUMBING CONTRACTOR		
BS	BRINE SUPPLY	FS	FLOW SWITCH	PD	PUMP DISCHARGE		
BMT	BASEMENT	FT	FOOT OR FEET	PLBG	PLUMBING		
BTU	BRITISH THERMAL UNIT	G	GAS	POC	POINT OF CONNECTION		
C	CONVECTOR	GA	GAUGE	PRE	POWER ROOF EXHAUST FAN		
CA	COMBUSTION AIR	GAL	GALLON	PRELIM	PRELIMINARY		
CAB	CABINET	GALV	GALVANIZED	PRESS	PRESSURE		
CCC	COOLING COIL CONDENSATE	GC	GENERAL CONTRACTOR	PRV	PRESSURE REDUCING VALVE		
CCD	CEILING DIFFUSER	GLYR	GLYCOL RETURN	PS	PRESSURE SWITCH		
CF	CEILING (DESTRATIFICATION) FAN	GLYS	GLYCOL SUPPLY	PSD	PUMP SUCTION DIFFUSER		
CFM	CUBIC FEET PER MINUTE	GRH	GAS FIRED RADIANT HEAT	PSI	POUNDS PER SQUARE INCH		
CH	CHILLER	GPM	GALLONS PER MINUTE	PTAC	PACKAGED TERMINAL AIR CONDITIONER		
CWR	CHILLED WATER RETURN	CUH	CUBIC FEET UNIT HEATER	PVC	POLYVINYL CHLORIDE		
CWS	CHILLED WATER SUPPLY	CV	GAS VENT	R	REFRIGERANT		
CI	CAST IRON OR CUBIC INCH	H	HUMIDIFIER	RA	RETURN AIR		
CL	CENTERLINE	HB	HEATING CONTRACTOR	RCP	RADIANT CEILING PANEL		
CLG	CEILING	HCR	HOT/CHILLED WATER RETURN	RD	ROOF DRAIN		
CMU	CONCRETE MASONRY UNIT	HCS	HOT/CHILLED WATER SUPPLY	REQD	REQUIRED		
COMB	COMBINATION OR COMBUSTION	HD	HORIZONTAL DRAW THRU	RF	RETURN FAN		
CONC	CONCRETE	HGT	HEIGHT	RG	RETURN GRILLE		
COND	CONDENSATE	HHP	HORSEPOWER	RH	RELIEF HOOD		
CONTR	CONTRACTOR	HPC	HIGH PRESSURE CONDENSATE	RHG	REFRIGERANT HOT GAS		
COP	COEFFICIENT OF PERFORMANCE	HPS	HIGH PRESSURE STEAM	RL	REFRIGERANT LIQUID		
CP	CONDENSATE PUMP	HPU	HEAT PUMP UNIT	RPM	REVOLUTIONS PER MINUTE		
CR	COMPUTER ROOM UNIT	HPWR	HEAT PUMP WATER RETURN	RS	REFRIGERANT SUCTION		
CR	CONDENSER WATER RETURN	HPWS	HEAT PUMP WATER SUPPLY	RR	RETURN REGISTER		
CS	CONDENSER WATER SUPPLY	HR	HOUR	RTU	ROOF TOP UNIT		
CT	COOLING TOWER	HRU	HEAT RECOVERY UNIT	S	SUPPLY		
CJ	COPPER	HSR	HEAT SINK RETURN	SA	SUPPLY AIR		
CUH	CABINET UNIT HEATER	HSS	HEAT SINK SUPPLY	SCR	SILICONE CONTROLLED RECTIFIERS		
CW	COLD WATER	HTWR	HIGH TEMPERATURE HOT WATER RETURN	SD	SLOT DIFFUSER		
D	DRAIN	HVAC	HEATING VENTILATING AND AIR CONDITIONING	SEER	SEASONAL ENERGY EFFICIENCY RATIO		
DB	DRY BULB	HW	HOT WATER	SEG	SECURITY EXHAUST GRILLE		
DC	DRY COOLER	HWR	HOT WATER RETURN	SF	SUPPLY FAN		
DCO	DOOR CUTOFF BY GC	HWS	HOT WATER SUPPLY	SG	SUPPLY GRILLE		
DDC	DIRECT DIGITAL CONTROL	HWY	HIGHWAY	SM	SHEET METAL		
DEPT	DEPARTMENT	HX	HEAT EXCHANGER	SQ FT	SQUARE FEET		
DG	DOOR GRILLE BY GC	HYD	HYDRANT	SR	SUPPLY REGISTER		
DIA	DIAMETER	HZ	HERTZ	SRG	SECURITY RETURN GRILLE		
DN	DOWN	IH	INTAKE HOOD	SRV	SAFETY RELIEF VALVE		
DSA	DUCT SOUND ATTENUATOR	IFBP	INTERNAL FACE & BYPASS	SS	STAINLESS STEEL		
DSF	DESTRATIFICATION FAN	IN	INCH	SSG	SECURITY SUPPLY GRILLE		
DWD	DUAL WALL DUCTWORK	INV	INVERT	STG	SECURITY TRANSFER GRILLE		
DWD	DOUBLE WIDTH DOUBLE INLET	IPLV	INTEGRATED PART LOAD VALUE	SWD	SINGLE WALL DUCTWORK		
DWG	DRAWING	JWR	JACKET WATER RETURN	SWI	SINGLE WIDTH SINGLE INLET		
E	EXISTING	JWS	JACKET WATER SUPPLY				
EAT	ENTERING AIR TEMPERATURE	KW	KILOWATT				
EC	ELECTRICAL CONTRACTOR						
EF	EXHAUST FAN						
EER	ENERGY EFFICIENCY RATIO						
EFBP	EXTERNAL FACE & BYPASS						
EG	EXHAUST GRILLE						

GENERAL SYMBOLS

	THERMOSTAT OR TEMPERATURE SENSOR
	THERMOSTAT OR TEMPERATURE SENSOR WITH SECURITY COVER
	HUMIDISTAT OR HUMIDITY SENSOR
	HUMIDISTAT OR HUMIDITY SENSOR WITH SECURITY COVER
	MOTOR STARTER
	SPEED CONTROLLER
	START/STOP SWITCH
	CARBON DIOXIDE SENSOR
	EXISTING TO REMAIN (DUCTWORK, PIPING, & EQUIPMENT)
	EXISTING TO BE REMOVED (DUCTWORK, PIPING, & EQUIPMENT)
	NEW DUCTWORK/PIPING
	NEW EQUIPMENT

DOUBLE LINE PIPING SYMBOLS

	BUTTERFLY VALVE		GATE ANGLE VALVE
	CHECK VALVE		GLOBE ANGLE VALVE
	FLOW METER		PIPE SECTION
	VENTURI FLOW METER		PIPE (DOWN OR AWAY)
	OS&Y VALVE		LOCK SHIELD HANDLE
	PRESSURE REDUCING VALVE		SOLENOID
	RELIEF/SAFETY VALVE		FLEXIBLE CONNECTION
	3-WAY VALVE		BASKET STRAINER
	2-WAY VALVE		AIR SEPARATOR
	GATE VALVE		PUMP
	GLOBE VALVE		

PIPING SYSTEMS

	GENERAL SHUTOFF VALVE SEE SPECIFICATIONS FOR TYPE		AIR VENT		HIGH-PRESSURE STEAM
	BALL VALVE		VACUUM BREAKER		LOW-PRESSURE STEAM
	GAUGE VALVE		AIR SEPARATOR		HIGH-PRESSURE CONDENSATE
	BUTTERFLY VALVE		PIPE ALIGNMENT GUIDE		LOW-PRESSURE CONDENSATE
	GATE VALVE		PIPE ANCHOR		BOILER BLOWDOWN
	GATE, ANGLE VALVE		BALL JOINT		PUMP DISCHARGE CONDENSATE
	GLOBE VALVE		EXPANSION JOINT		CONDENSATE
	GLOBE, ANGLE VALVE		EXPANSION LOOP		VACUUM
	PLUG VALVE (GAS)		FLEXIBLE CONNECTOR		COLD WATER (DOMESTIC)
	CALIBRATED BALANCE/SHUTOFF VALVE (FLOW MEASURING)		STEAM TRAP		MAKEUP WATER
	OS & Y GATE VALVE		FLOW METER		ATMOSPHERIC VENT
	OS & Y GLOBE VALVE		FLOW SWITCH		FUEL OIL OVERFLOW
	2-WAY TEMPERATURE CONTROL VALVE (PNEUMATIC OR ELECTRIC)		TEMPERATURE SENSOR		FUEL OIL SUPPLY
	3-WAY TEMPERATURE CONTROL VALVE (PNEUMATIC OR ELECTRIC)		PITCH OF PIPE		FUEL OIL RETURN
	CHECK VALVE		PRESSURE GAUGE AND COCK		FUEL OIL TANK VENT
	DRAIN VALVE (W/ HOSE CONNECTION & BRASS CAP)		PRESSURE SWITCH		FUEL OIL FILL
	LOCK SHIELD VALVE		PUMP		GAS
	NEEDLE VALVE		PUMP IN VERTICAL		LIQUID PROPANE
	PRESSURE REDUCING VALVE		HOT WATER SUPPLY		HOT WATER RETURN
	RELIEF (R) OR SAFETY (S) VALVE		STRAINER		COMPRESSED AIR
	SOLENOID VALVE		STRAINER, W/ BLOW DOWN VALVE		VACUUM (AIR)
	TRIPLE DUTY VALVE		THERMOMETER		REFRIGERANT HOT GAS
	BLIND FLANGE		THERMOMETER WELL, ONLY		REFRIGERANT SUCTION
	CAP		REFRIGERANT LIQUID		BRINE SUPPLY
	CONNECTION, BOTTOM		BRINE RETURN		CONDENSER WATER SUPPLY
	CONNECTION, TOP		CONDENSER WATER RETURN		CHILLED WATER SUPPLY
	ELBOW, TURNED UP		CHILLED WATER RETURN		HUMIDIFICATION LINE
	ELBOW, TURNED DOWN		DRAIN		
	REDUCER, CONCENTRIC				
	REDUCER, ECCENTRIC - STRAIGHT INVERT				
	REDUCER, ECCENTRIC - STRAIGHT CROWN				

DUCTWORK SYSTEMS

	DUCT SIZE, (FIRST FIGURE IS SIDE SHOWN)		SMOKE DAMPER		LOUVER AND BIRD SCREEN
	ROUND DUCT		FIRE DAMPER		DOOR GRILLE
	OVAL DUCT		COMBINATION FIRE/SMOKE DAMPER		3/4" DOOR CUTOFF (UNDERCUT) BY GC
	AXIAL FLOW FAN		STANDARD BRANCH, SUPPLY, RETURN, OR EXHAUST, NO SPLITTER		ELBOW WITH TURNING VANES
	CHANGE OF ELEVATION IN DIRECTION OF AIR FLOW		ROOF VENTILATOR OR HOOD ON ROOF ABOVE		TERMINAL UNIT, MIXING
	ACCESS DOOR, VERTICAL OR HORIZONTAL		ROOF VENTILATOR OR HOOD ON ROOF		TERMINAL UNIT, VARIABLE VOLUME WITH REHEAT
	ACOUSTICAL DUCT LINER		DUCT CAP		TERMINAL UNIT, VARIABLE VOLUME WITH REHEAT
	DUCT LAGGING		END OF DUCT		TERMINAL UNIT, VARIABLE VOLUME
	FLEXIBLE CONNECTION		POSITIVE PRESSURE DUCT SECTION		BOOSTER COIL
	DUCT SOUND ATTENUATOR		POSITIVE PRESSURE DUCT (DOWN OR AWAY)		UNIT HEATER
	DUCT TRANSITION (DOUBLE LINE)		NEGATIVE PRESSURE DUCT SECTION		CENTRIFUGAL FAN
	DUCT TRANSITION (RECT. TO ROUND)		NEGATIVE PRESSURE DUCT (DOWN OR AWAY)		PROPELLER FAN
	DUCT TRANSITION (SINGLE LINE)		FLEXIBLE DUCT DIFFUSER CONNECTION		AIR FLOW
	HIDDEN DUCTWORK		SIDEWALL AIR DEVICE		POINT OF NEW CONNECTION (PIPE OR DUCT)
	BACK DRAFT DAMPER		EXHAUST, RETURN, OR TRANSFER AIR DEVICE		SQUARE FEET
	DUCT HEATER, ELECTRIC		SUPPLY AIR DEVICE		ELEVATION SYMBOL
	MOTOR OPERATED DAMPER		LINEAR OR SLOT AIR DEVICE		MAXIMUM SECURITY BARS
	MANUAL VOLUME DAMPER		TRANSFER GRILLE ASSEMBLY		MEDIUM SECURITY BARS
	SMOKE DETECTOR				

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Madison, Wisconsin 53703

ISSUED

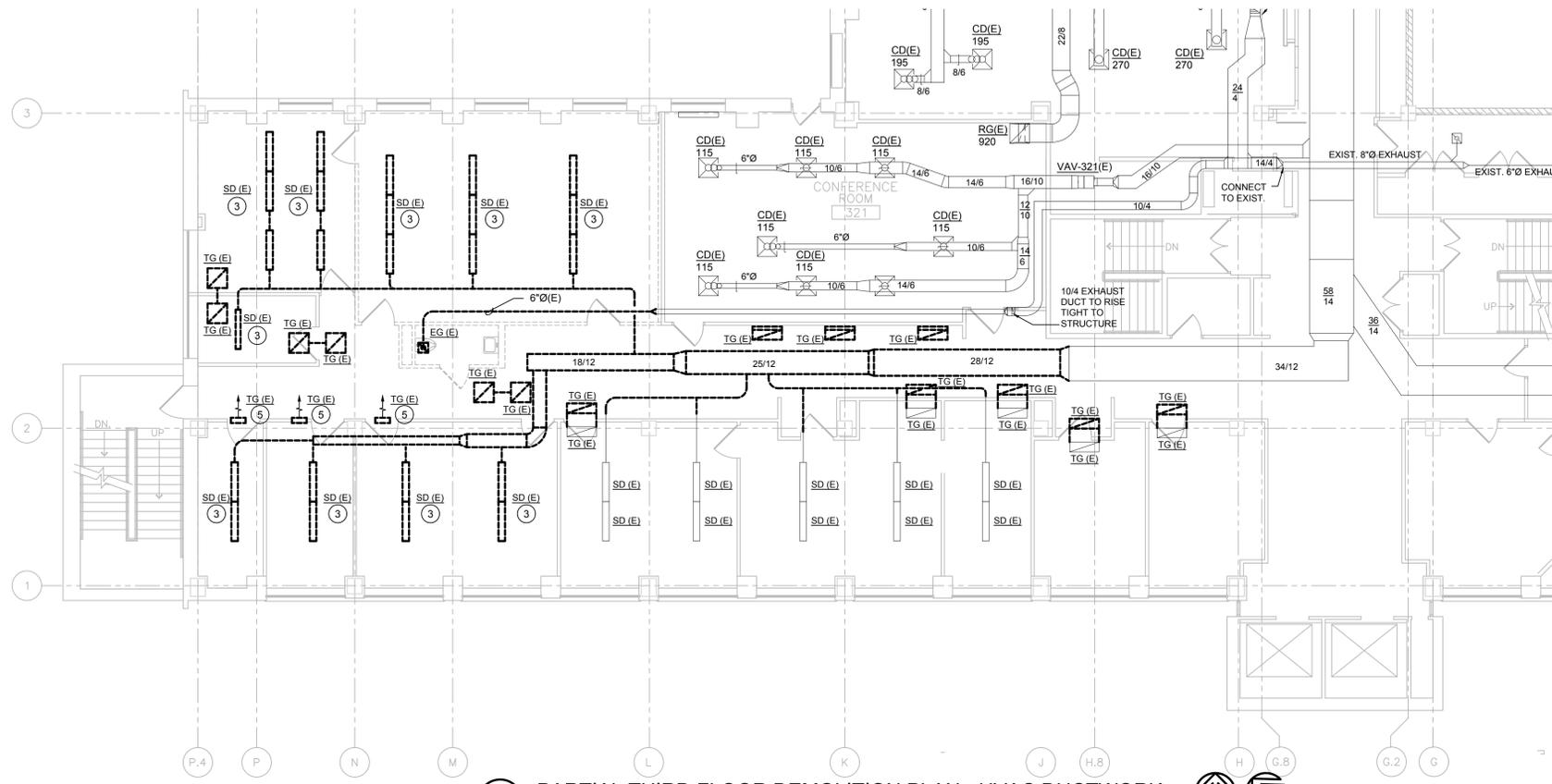
JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728 FAX: 608.271.7046
JDR PROJECT NO. 16.0180

PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
SYMBOLS AND
ABBREVIATIONS - HVAC

DATE
11.10.17

M000



1 PARTIAL THIRD FLOOR DEMOLITION PLAN - HVAC DUCTWORK
M103 SCALE: 1/8"=1'-0"

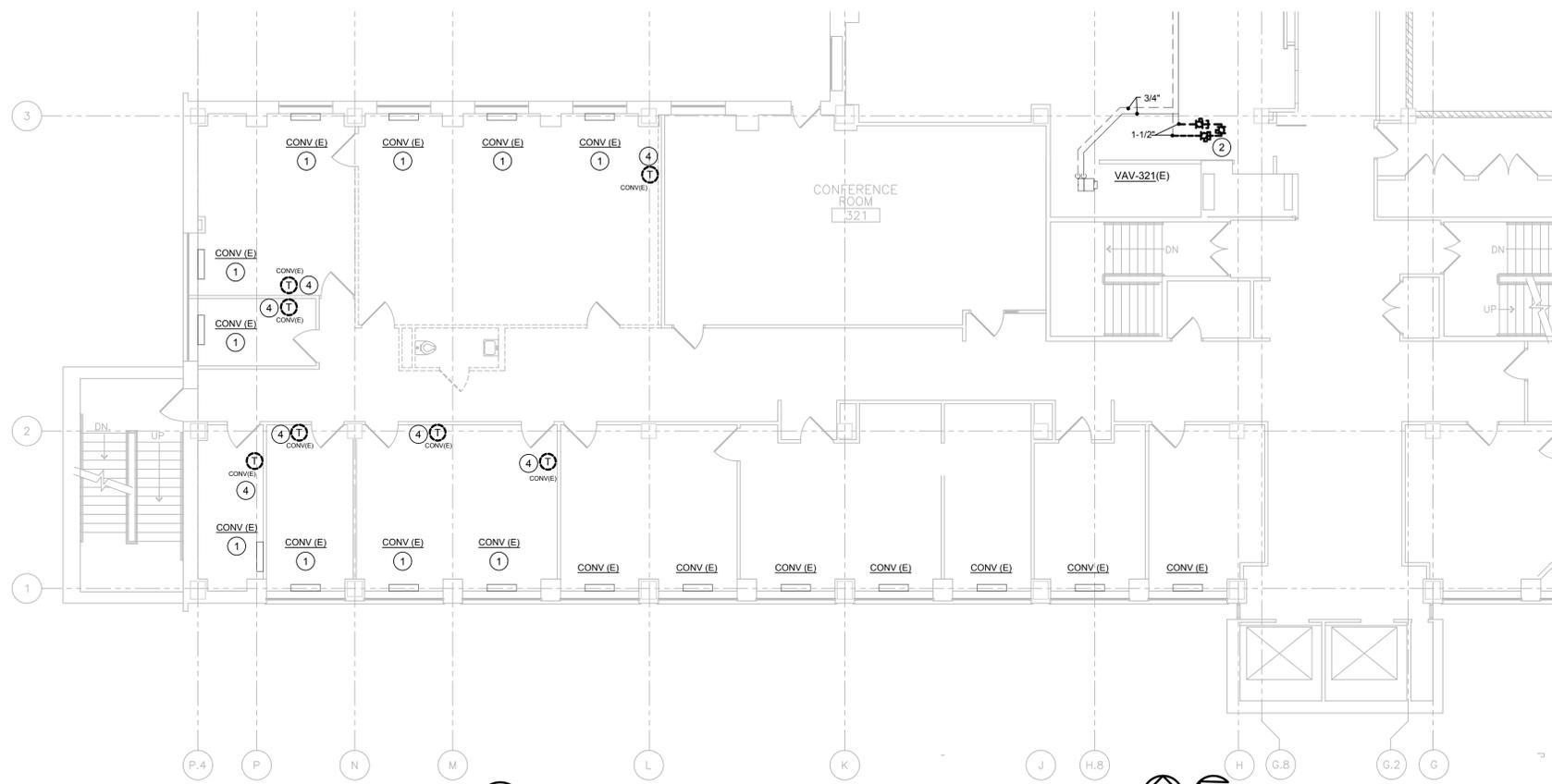


GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS BEFORE COMMENCING WORK. REPORT ANY DISCREPANCIES TO THE A/E IMMEDIATELY.
2. THE BUILDING IS TO REMAIN OCCUPIED DURING CONSTRUCTION AND THE AIR HANDLER SERVING THIS AREA WILL CONTINUE TO OPERATE. SUPPLY AND RETURN AIR DUCTWORK SHALL BE PROTECTED FROM THE ENTRANCE OF CONSTRUCTION DUST, DIRT AND DEBRIS. INSTALL TEMPORARY MERV 7 FILTERS ON RETURN AIR OPENINGS DURING CONSTRUCTION. CHANGE FILTER FREQUENTLY. SEE ARCHITECTURAL PLANS FOR ANY PHASING SCHEDULES AND/OR AREAS.
3. WHEN PNEUMATIC CONTROLS ARE INDICATED TO BE REMOVED, REMOVE ALL PNEUMATIC CONTROL TUBING BACK TO THE POINT REQUIRED TO BE ACTIVE AND CAP.
4. PNEUMATIC TUBING LOCATED DIRECTLY IN CONCRETE FLOORS CAN BE ABANDONED IN PLACE, PROVIDED THAT THE TUBING IS REMOVED TO BELOW FLOOR LEVEL (SO THAT NEW FLOORING IS NOT AFFECTED) AND SEALED OR FILLED AIR TIGHT.
5. COORDINATE ALL INTERRUPTIONS WITH OWNERS REPRESENTATIVE PRIOR TO STARTING WORK.
6. ALL DUCTWORK, PIPING, EQUIPMENT, ETC. NOTED FOR DEMOLITION SHALL BE REMOVED COMPLETE.
7. ALL EXISTING ABANDONED DUCTWORK, PIPING, EQUIPMENT, ETC IN THE CEILING SHALL BE REMOVED COMPLETE.
8. PIPING NOTED FOR DEMOLITION SHALL BE REMOVED BACK TO THE POINT REQUIRED TO REMAIN ACTIVE AND CAPPED.
9. ANY DUCTWORK CONNECTIONS NOT TO BE REUSED SHALL BE SHEETMETAL PATCHED, SEALED AND INSULATED WITH COMPLETE VAPOR BARRIER.
10. ALL EXISTING TO REMAIN GRILLES, REGISTERS, DIFFUSERS, CONVECTORS, ETC. SHALL BE PROTECTED DURING CONSTRUCTION.
11. SEE REFLECTED CEILING PLANS FOR AREAS WHERE EXISTING CEILINGS WILL BE REMOVED BY THE GC AND NEW CEILING WILL BE INSTALLED (BY GC). THE GC IS RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ALL OTHER CEILING REQUIRED TO PERFORM HVAC WORK.

KEYED NOTES:

- 1 EXISTING STEAM RADIATION. REMOVE CABINET. REMOVE EXISTING LPS ISOLATION VALVES AND PNEUMATIC CONTROL VALVE. REMOVE ALL EXISTING PNEUMATIC CONTROL TUBING NOT REQUIRED TO STAY ACTIVE. CAP AIR TIGHT AT MAINS. EXISTING 3/4" STERLING OR TRANE BL STEAM TRAP TO BE REBUILT. SEE DETAIL FOR ADDITIONAL WORK.
- 2 REMOVE EXISTING ISOLATION VALVES AND BALANCE VALVE. SEE NEW WORK PLAN FOR NEW CONNECTION.
- 3 REMOVE EXISTING MODULINE VAV SUPPLY AIR DIFFUSERS COMPLETE.
- 4 REMOVE EXISTING PNEUMATIC THERMOSTAT COMPLETE. REMOVE ALL EXISTING PNEUMATIC CONTROL TUBING NOT REQUIRED TO STAY ACTIVE. CAP AIR TIGHT AT MAINS.
- 5 REMOVE EXISTING WALL MOUNTED TRANSFER GRILLES.

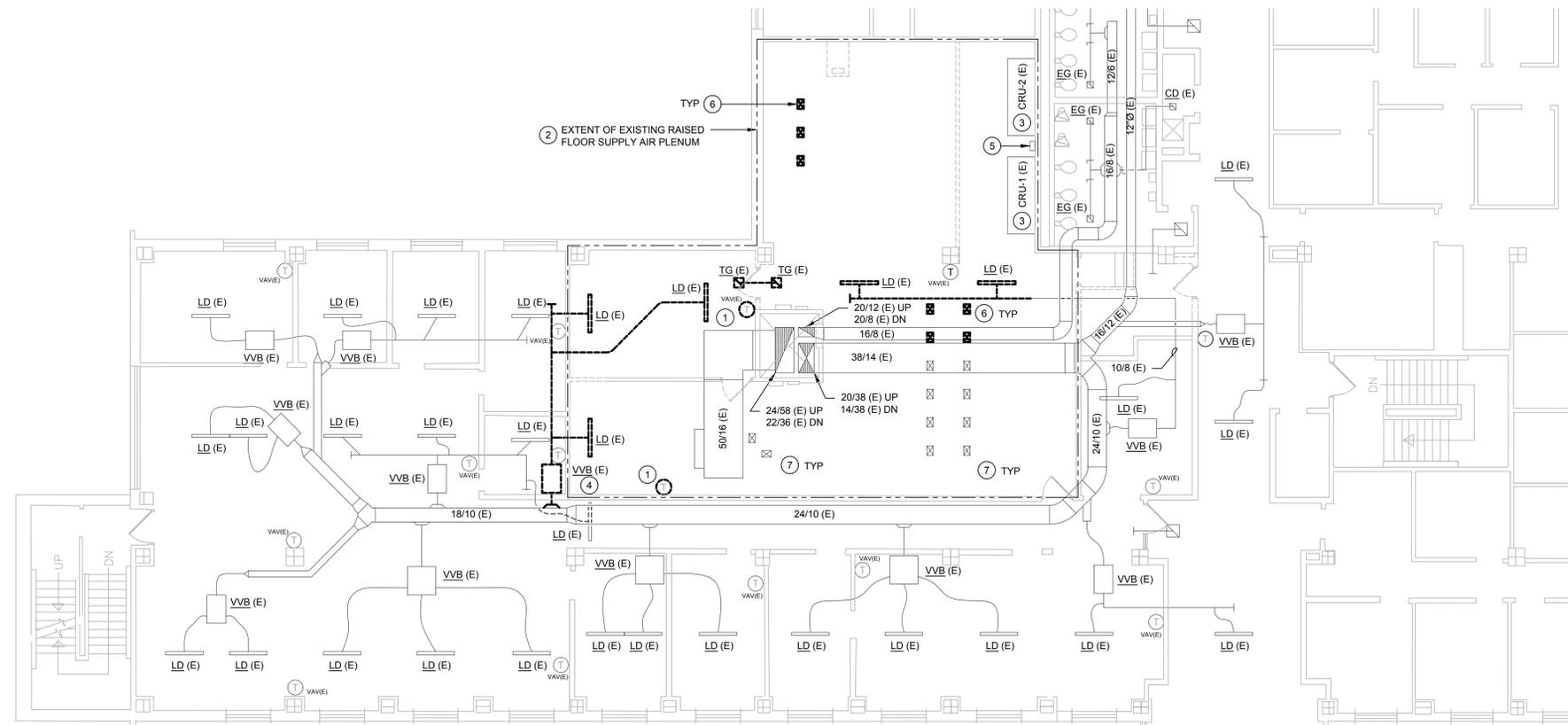


2 PARTIAL THIRD FLOOR DEMOLITION PLAN - HVAC PIPING
M103 SCALE: 1/8"=1'-0"



PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL THIRD FLOOR
DEMOLITION PLANS
- HVAC
DATE
11.10.17



1 PARTIAL FIFTH FLOOR DEMOLITION PLAN - HVAC DUCTWORK
M105 SCALE: 1/8"=1'-0"

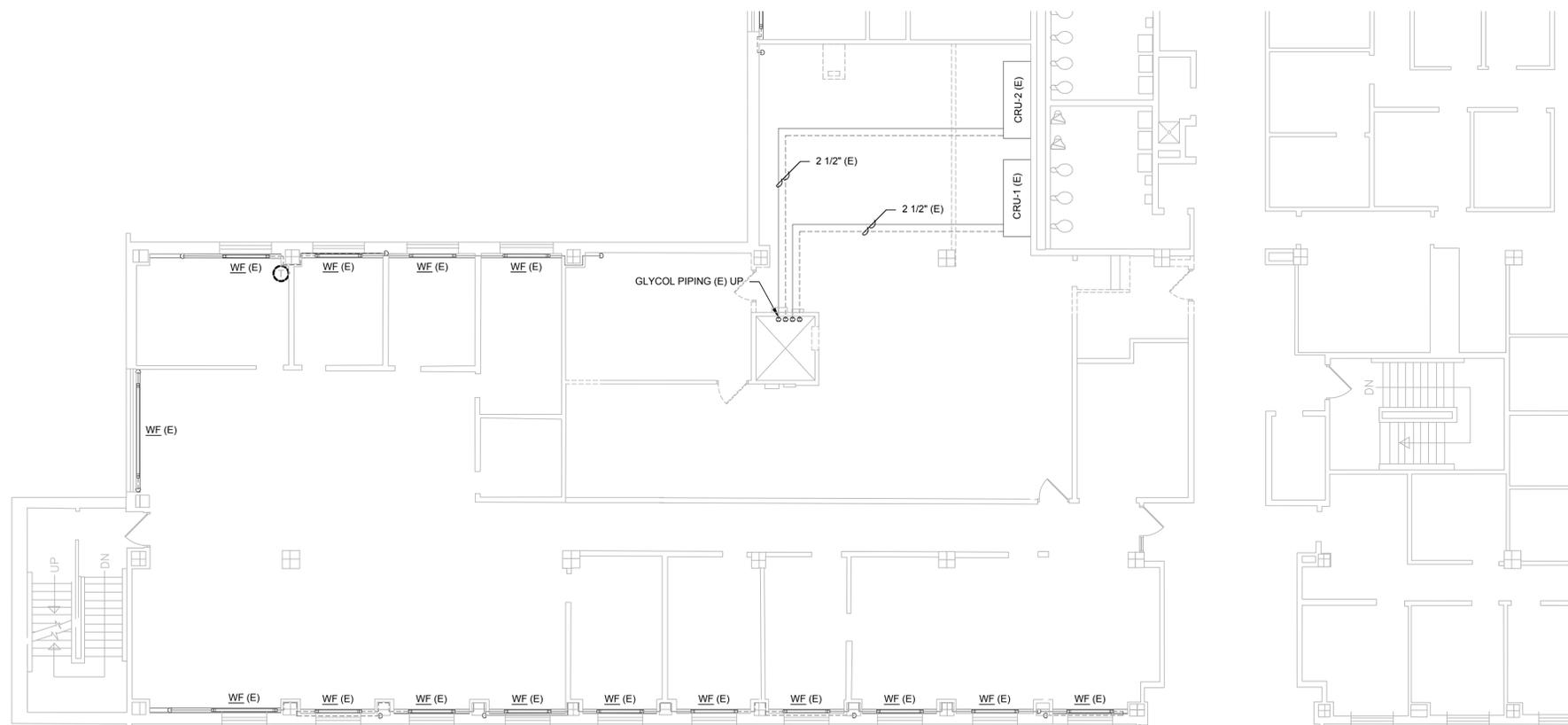


GENERAL NOTES:

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2. THE BUILDING IS TO REMAIN OCCUPIED DURING CONSTRUCTION AND THE AIR HANDLER SERVING THIS AREA WILL CONTINUE TO OPERATE. SUPPLY AND RETURN AIR DUCTWORK SHALL BE PROTECTED FROM THE ENTRANCE OF CONSTRUCTION DUST, DIRT AND DEBRIS. INSTALL TEMPORARY MERV 7 FILTERS ON RETURN AIR OPENINGS DURING CONSTRUCTION. CHANGE FILTER FREQUENTLY. SEE ARCHITECTURAL PLANS FOR ANY PHASING SCHEDULES AND/OR AREAS.
3. WHEN PNEUMATIC CONTROLS ARE INDICATED TO BE REMOVED, REMOVE ALL PNEUMATIC CONTROL TUBING BACK TO THE POINT REQUIRED TO BE ACTIVE AND CAP.
4. PNEUMATIC TUBING LOCATED DIRECTLY IN CONCRETE FLOORS CAN BE ABANDONED IN PLACE, PROVIDED THAT THE TUBING IS REMOVED TO BELOW FLOOR LEVEL (SO THAT NEW FLOORING IS NOT AFFECTED) AND SEALED OR FILLED AIR TIGHT.
5. COORDINATE ALL INTERRUPTIONS WITH OWNERS REPRESENTATIVE PRIOR TO STARTING WORK.
6. ALL DUCTWORK, PIPING, EQUIPMENT, ETC. NOTED FOR DEMOLITION SHALL BE REMOVED COMPLETE.
7. ALL EXISTING ABANDONED DUCTWORK, PIPING, EQUIPMENT, ETC. IN THE CEILING SHALL BE REMOVED COMPLETE.
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9. ANY DUCTWORK CONNECTIONS NOT TO BE REUSED SHALL BE SHEETMETAL PATCHED, SEALED AND INSULATED WITH COMPLETE VAPOR BARRIER.
10. ALL EXISTING TO REMAIN GRILLES, REGISTERS, DIFFUSERS, CONVECTORS, ETC. SHALL BE PROTECTED DURING CONSTRUCTION.
11. SEE REFLECTED CEILING PLANS FOR AREAS WHERE EXISTING CEILINGS WILL BE REMOVED BY THE GC AND NEW CEILING WILL BE INSTALLED (BY GC). THE GC IS RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ALL OTHER CEILING REQUIRED TO PERFORM HVAC WORK.
12. ALL WORKING PNEUMATICALLY CONTROLLED VARIABLE AIR VOLUME TERMINALS SHALL BE TURNED OVER TO THE OWNER IN WORKING CONDITION.

KEYED NOTES:

- 1 REMOVE EXISTING THERMOSTAT. RETAIN FOR REINSTALLATION.
- 2 EXISTING RAISED FLOOR (SUPPLY AIR PLENUM) TO BE REMOVED AND REPLACED. GC TO REMOVE ALL FLOOR TILE AND GRID SYSTEM.
- 3 EXISTING DOWNFLOW WATER COOLED COMPUTER ROOM COOLING UNITS TO REMAIN. UNITS WILL REMAIN OPERATING DURING CONSTRUCTION. PROVIDE ADDITIONAL TEMPORARY FILTRATION FOR EACH UNIT DURING CONSTRUCTION.
- 4 REMOVE EXISTING VAV TERMINAL AND ALL ASSOCIATED DUCT. PATCH OPENING IN MAIN AND INSULATE WITH VAPOR BARRIER.
- 5 EXISTING COMPUTER ROOM COOLING UNIT CONTROL PANEL (LIEBERT / VERTIV SITE LINK).
- 6 EXISTING FLOOR MOUNTED DIFFUSER TO BE REMOVED (TYPICAL).
- 7 EXISTING FLOOR MOUNTED DIFFUSER TO REMAIN (TYPICAL).

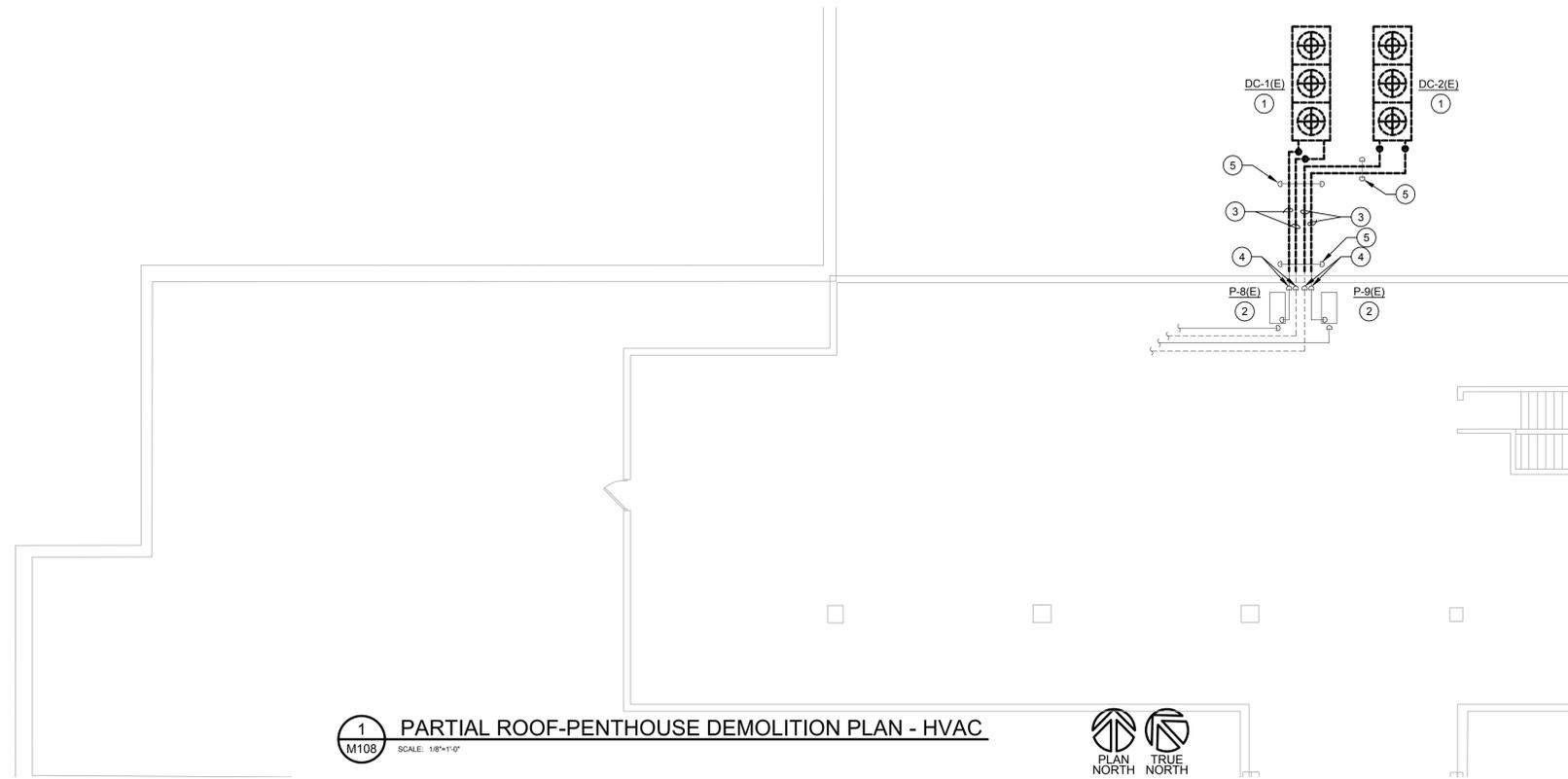


2 PARTIAL FIFTH FLOOR DEMOLITION PLAN - HVAC PIPING
M105 SCALE: 1/8"=1'-0"



PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL FIFTH FLOOR
DEMOLITION PLANS
- HVAC
DATE
11.10.17

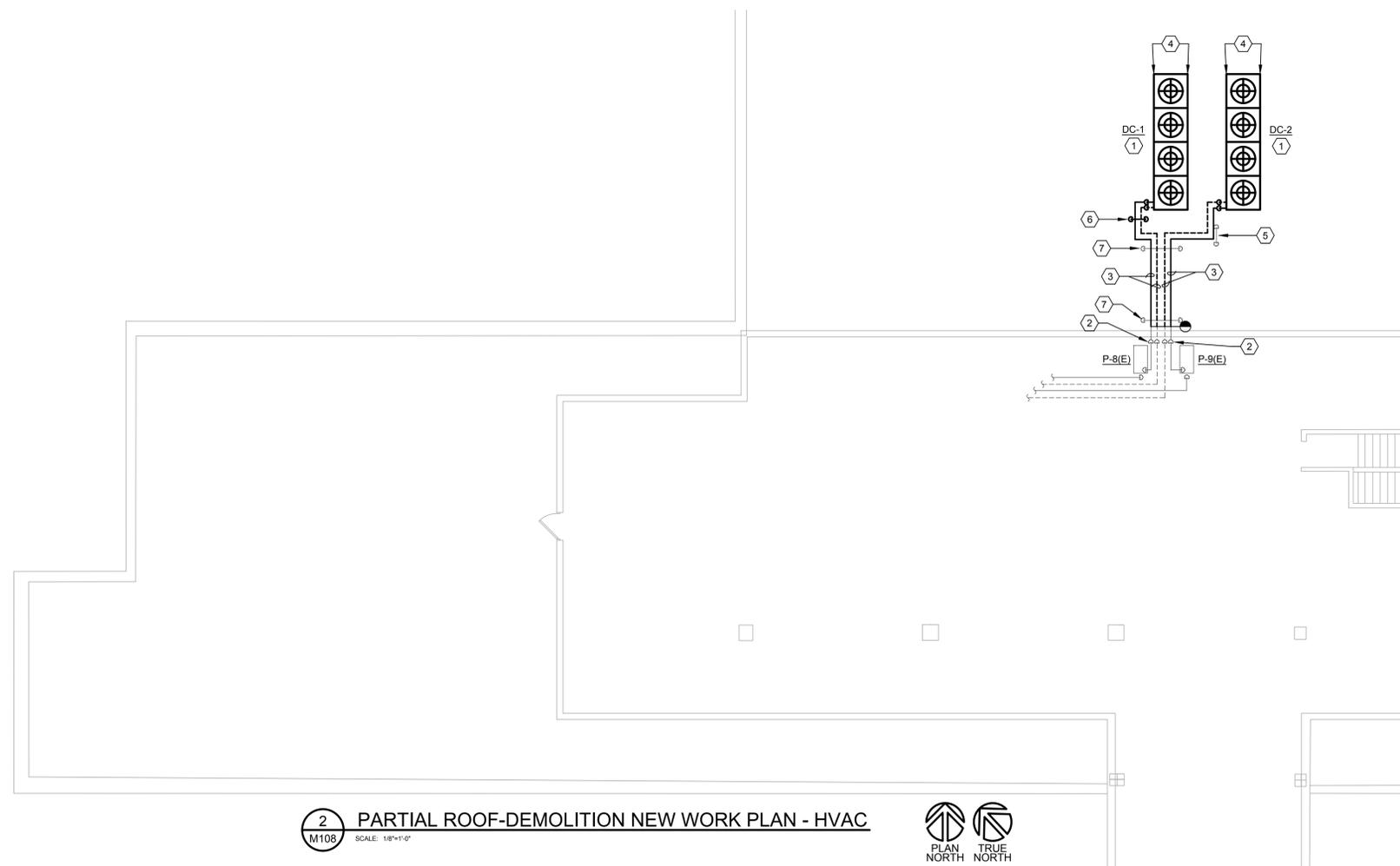


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- WHEN PNEUMATIC CONTROLS ARE INDICATED TO BE REMOVED, REMOVE ALL PNEUMATIC CONTROL TUBING BACK TO THE POINT REQUIRED TO BE ACTIVE AND CAP.
- PNEUMATIC TUBING LOCATED DIRECTLY IN CONCRETE FLOORS CAN BE ABANDONED IN PLACE, PROVIDED THAT THE TUBING IS REMOVED TO BELOW FLOOR LEVEL (SO THAT NEW FLOORING IS NOT AFFECTED) AND SEALED OR FILLED AIR TIGHT.
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- PIPING NOTED FOR DEMOLITION SHALL BE REMOVED BACK TO THE POINT REQUIRED TO REMAIN ACTIVE AND CAPPED.
- ANY DUCTWORK CONNECTIONS NOT TO BE REUSED SHALL BE SHEETMETAL PATCHED, SEALED AND INSULATED WITH COMPLETE VAPOR BARRIER.
- COORDINATE COMPUTER ROOM COOLING UNIT OUTAGES WITH OWNER. (1) UNIT SHALL REMAIN ACTIVE AND COOLING AT ALL TIMES. AT NO TIME SHALL BOTH UNITS BE SHUT-OFF FOR ANY REASON.

KEYED NOTES:

- REMOVE EXISTING DRY COOLER. ROOF SUPPORTS/RAILS TO REMAIN. EC TO DISCONNECT POWER.
- EXISTING IN-LINE-PUMPS TO REMAIN.
- REMOVE EXISTING 2-1/2" GLYCOL PIPING AND SUPPORTS ON ROOF.
- REMOVE EXISTING 2-1/2" VALVES IN SUPPLY AND RETURN PIPING. REPLACE WITH NEW.
- EXISTING PIPE SUPPORT. CONTRACTOR TO STRIP AND PREP EXISTING SUPPORTS FOR NEW PAINT.



GENERAL NOTES:

- CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS BEFORE COMMENCING WORK. REPORT ANY DISCREPANCIES TO THE A/E IMMEDIATELY.
- THE BUILDING IS TO REMAIN OCCUPIED DURING CONSTRUCTION AND THE AIR HANDLER SERVING THIS AREA WILL CONTINUE TO OPERATE. SUPPLY AND RETURN AIR DUCTWORK SHALL BE PROTECTED FROM THE ENTRANCE OF CONSTRUCTION DUST, DIRT AND DEBRIS. INSTALL TEMPORARY MERV 7 FILTERS ON RETURN AIR OPENINGS DURING CONSTRUCTION. CHANGE FILTER FREQUENTLY. SEE ARCHITECTURAL PLANS FOR PHASING SCHEDULES AND AREAS.
- COORDINATE ALL INTERRUPTIONS WITH OWNERS REPRESENTATIVE PRIOR TO STARTING WORK.
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- SEE REFLECTED CEILING PLANS FOR AREAS WHERE EXISTING CEILINGS WILL BE REMOVED BY THE GC AND NEW CEILING WILL BE INSTALLED (BY GC). THE GC IS RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ALL OTHER CEILING REQUIRED TO PERFORM HVAC WORK.
- COORDINATE COMPUTER ROOM COOLING UNIT OUTAGES WITH OWNER. (1) UNIT SHALL REMAIN ACTIVE AND COOLING AT ALL TIMES. AT NO TIME SHALL BOTH UNITS BE SHUT-OFF FOR ANY REASON.

KEYED NOTES:

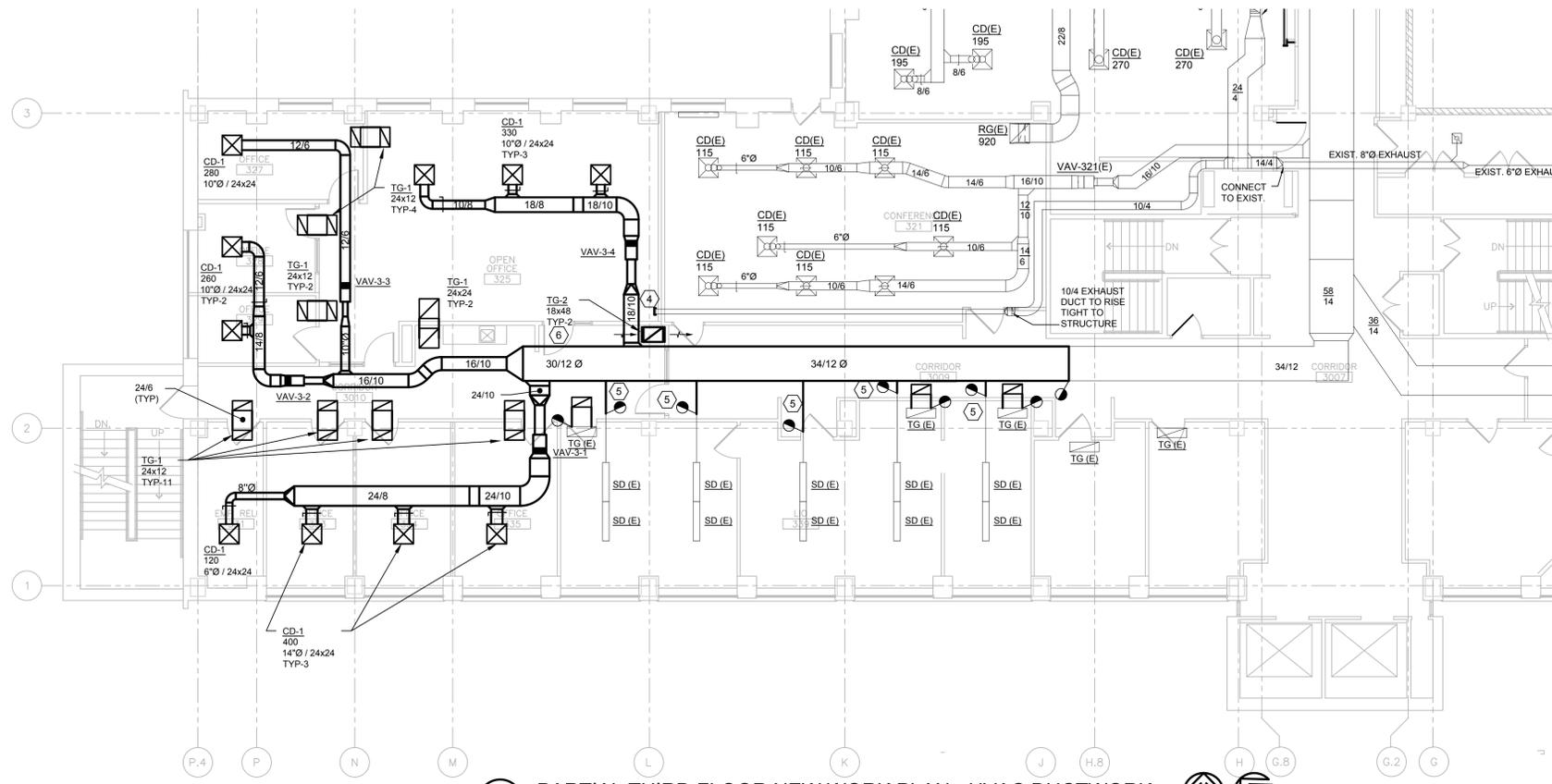
- NEW DRYCOOLER. MOUNT TO EXISTING ROOF RAILS. SEE DETAIL.
- NEW 2-1/2" ISOLATION VALVE IN SUPPLY AND RETURN PIPING.
- NEW 2-1/2" GLYCOL SUPPLY AND RETURN PIPING ON ROOF WITH NEW ROOF SUPPORTS.
- EXISTING ROOF RAILS TO BE EXTENDED APPROXIMATELY 4'-0" FOR NEW DRY COOLER INSTALLATION. CONTRACTOR SHALL BE RESPONSIBLE FOR ROOF RAIL EXTENSION USING THE OWNERS PREFERRED ROOFING CONTRACTOR AS TO NOT VOID ANY EXISTING ROOF WARRANTIES.
- MODIFY AND PAINT EXISTING PIPING SUPPORT STAND FOR NEW DRY COOLER CONFIGURATION.
- NEW PIPE SUPPORT STAND FOR FOR NEW DRY COOLER PIPING. CONTRACTOR SHALL BE RESPONSIBLE FOR ROOF RAIL EXTENSION USING THE OWNERS PREFERRED ROOFING CONTRACTOR AS TO NOT VOID ANY EXISTING ROOF WARRANTIES.
- PAINT EXISTING PIPE SUPPORT STAND.

1 PARTIAL ROOF-PENTHOUSE DEMOLITION PLAN - HVAC
M108 SCALE: 1/8"=1'-0"

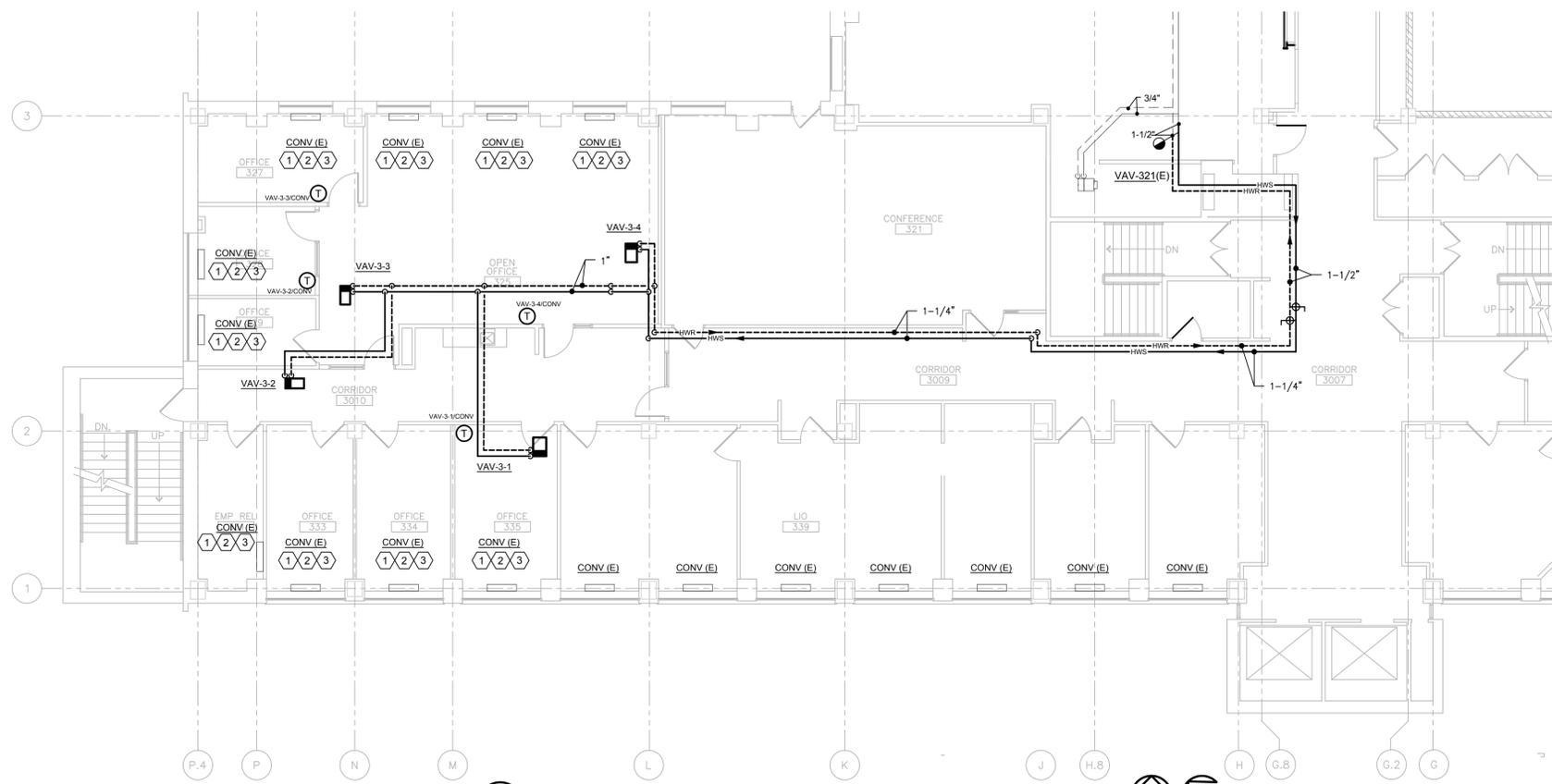


2 PARTIAL ROOF-DEMOLITION NEW WORK PLAN - HVAC
M108 SCALE: 1/8"=1'-0"





1 PARTIAL THIRD FLOOR NEW WORK PLAN - HVAC DUCTWORK
SCALE: 1/8"=1'-0"



2 PARTIAL THIRD FLOOR NEW WORK PLAN - HVAC PIPING
SCALE: 1/8"=1'-0"

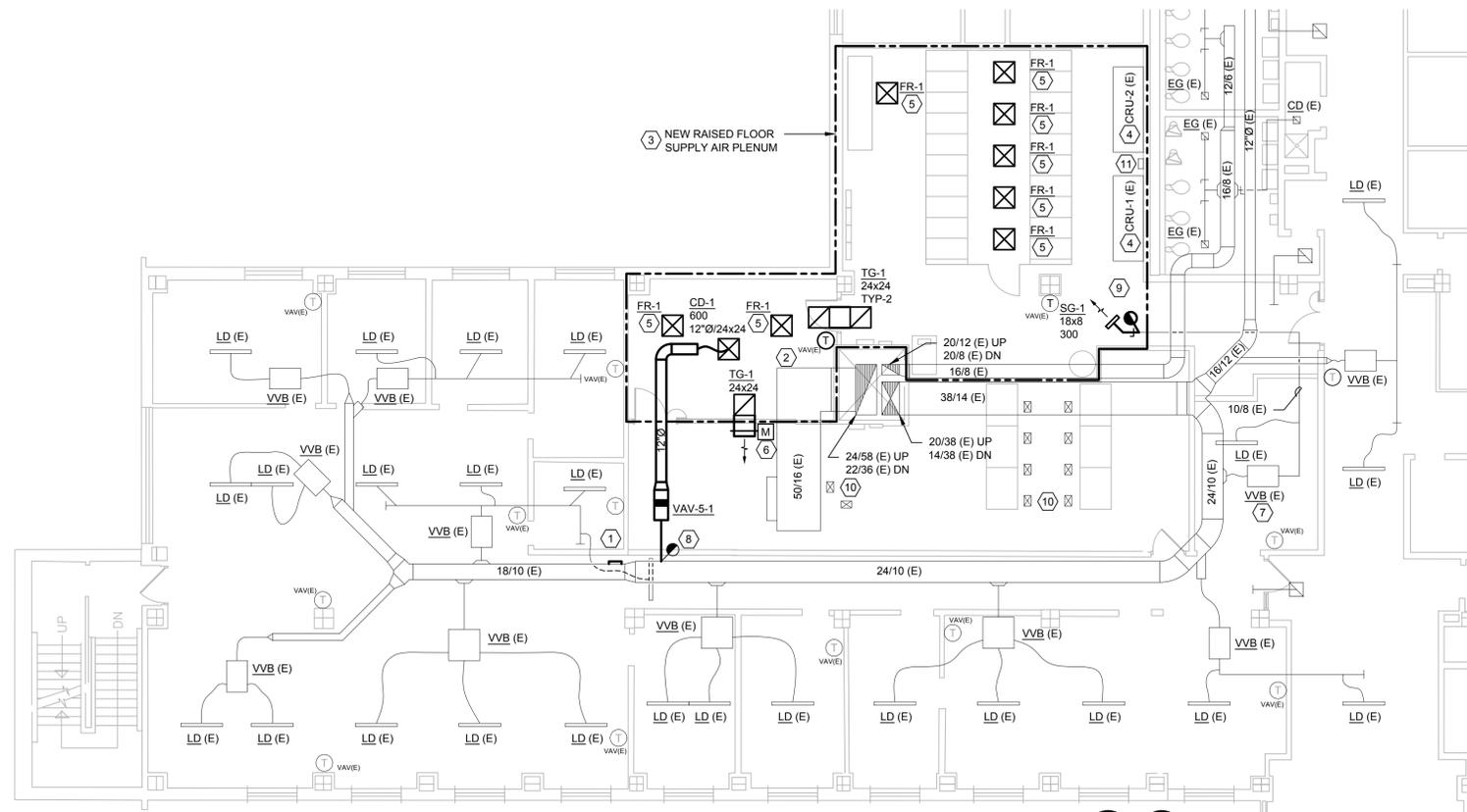


GENERAL NOTES:

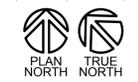
1. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS BEFORE COMMENCING WORK. DUCT FABRICATION OR EQUIPMENT RELEASE. REPORT ANY DISCREPANCIES TO THE A/E IMMEDIATELY.
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7. ALL HOT WATER SUPPLY AND RETURN BRANCH PIPING TO VAV TERMINALS SHALL BE 3/4" UNLESS NOTED OTHERWISE.
8. CONTROL WIRING FOR NEW CONVECTOR CONTROL VALVES MAY BE ROUTED IN SURFACE MOUNTED WIREMOLD ON EXTERIOR WALL ONLY IF EXTERIOR WALL IS NOT BEING REPLACED. IF EXTERIOR WALL IS BEING REPLACED, CONTROL WIRING MUST BE CONCEALED.

KEYED NOTES:

- 1 PROVIDE NEW LPS ISOLATION VALVES ON RADIATION. TCC TO PROVIDE 1/2" ELECTRONIC STEAM TCV (BELIMO B215HT186, 1/2", CV=1.86 WITH TR24-SRUS ACTUATOR). HC TO INSTALL VALVE IN VERTICAL POSITION. SEE DETAIL FOR ADDITIONAL NOTES.
- 2 REINSTALL CONVECTOR COVER.
- 3 THERMOSTAT SHALL CONTROL AIR TERMINAL AND ALL CONVECTORS IN SAME ZONE SERVED BY AIR TERMINAL.
- 4 CAP EXISTING EXHAUST AIR DUCT.
- 5 RECONNECT EXISTING BRANCH DUCT TO NEW BRANCH DUCT.
- 6 26/18 LINED TRANSFER DUCT. MOUNT BOTTOM OF WEST TG 8" AFF. MOUNT TOP OF EAST TG 6" BELOW CEILING.



1 PARTIAL FIFTH FLOOR NEW WORK PLAN - HVAC DUCTWORK
M205 SCALE: 1/8"=1'-0"

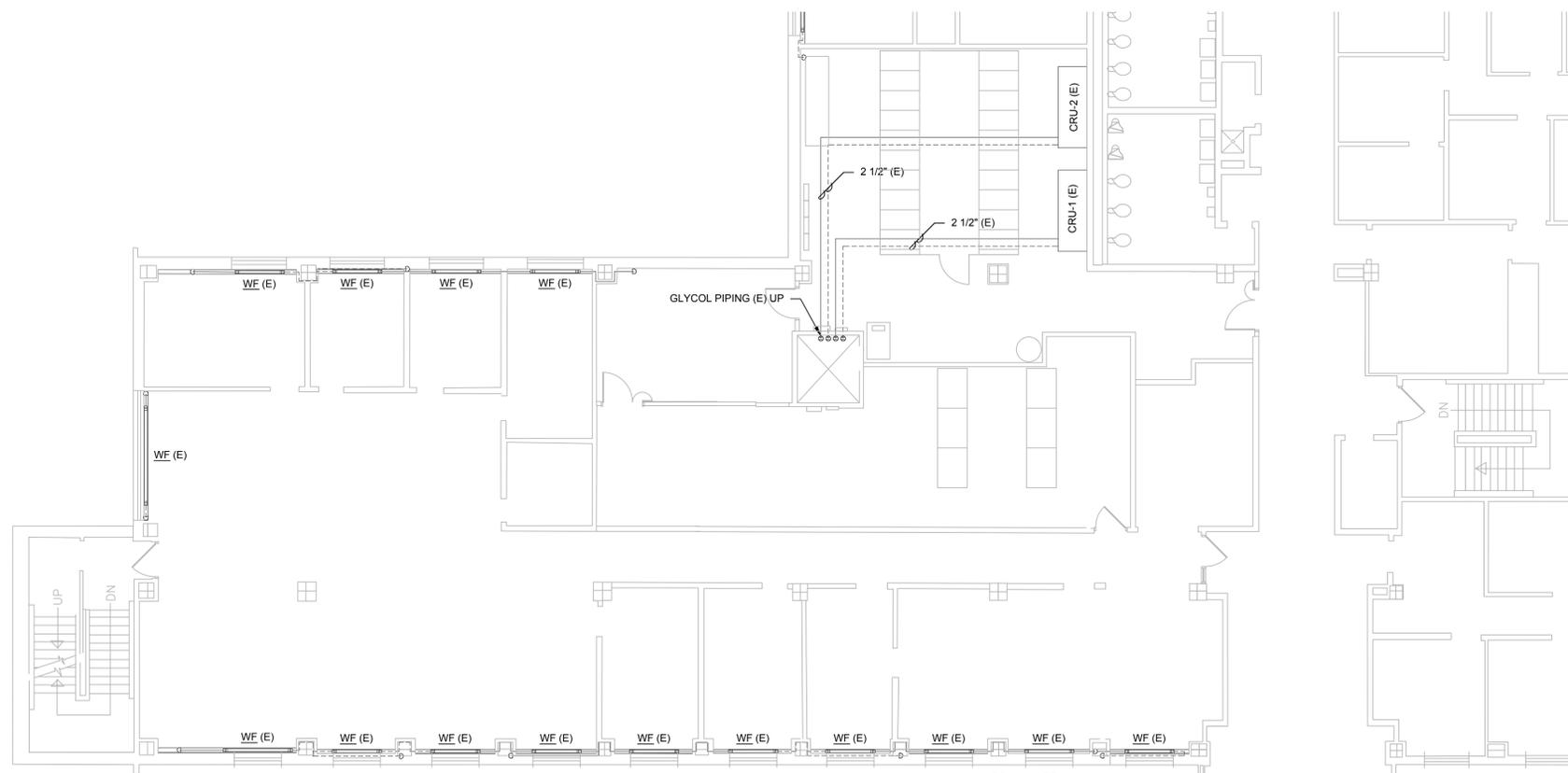


GENERAL NOTES:

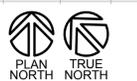
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7. ALL HOT WATER SUPPLY AND RETURN BRANCH PIPING TO VAV TERMINALS SHALL BE 3/4" UNLESS NOTED OTHERWISE.
8. CONTROL WIRING FOR NEW CONVECTOR CONTROL VALVES MAY BE ROUTED IN SURFACE MOUNTED WIREMOLD ON EXTERIOR WALL ONLY IF EXTERIOR WALL IS NOT BEING REPLACED. IF EXTERIOR WALL IS BEING REPLACED, CONTROL WIRING MUST BE CONCEALED.

KEYED NOTES:

- 1 PROVIDE AIR TIGHT AND INSULATED (WITH VAPOR BARRIER) CAP ON UNUSED DUCT.
- 2 RELOCATE PNEUMATIC THERMOSTAT TO CONTROL NEW VAV-5-1.
- 3 NEW RAISED FLOOR GRID AND TILE SYSTEM BY GC. HC TO PROVIDE ALL SUPPLY AIR FLOOR DIFFUSERS.
- 4 EXISTING DOWNFLOW CRAC UNITS TO REMAIN.
- 5 FLOOR REGISTER IN RAISED SUPPLY FLOOR PLENUM. VERIFY LOCATION WITH FINAL LAYOUT.
- 6 QUICK ACTING NORMALLY CLOSED MOTORIZED ISOLATION DAMPER. DAMPER SHALL BE INTERLOCKED WITH EACH CLEAN AGENT FIRE SUPPRESSION SYSTEM AND CLOSE UPON ACTIVATION OF ANY CLEAN AGENT FIRE SUPPRESSION SYSTEM.
- 7 REBALANCE EXISTING AIR TERMINAL TO 600 CFM MAX / 200 CFM MIN.
- 8 NEW SHEETMETAL DUCT TO BE TIED INTO EXISTING FIBERGLASS DUCT BOARD MAIN DUCT.
- 9 CONNECT NEW 10/8 TO EXISTING 10/8. EXPAND TO 18x8 FOR SUPPLY GRILLE.
- 10 EXISTING FLOOR DIFFUSER (TYPICAL).
- 11 EXISTING COMPUTER ROOM COOLING UNIT CONTROL PANEL. SEE UNIT SCHEDULE FOR CONTROL UPGRADES.



2 PARTIAL FIFTH FLOOR NEW WORK PLAN - HVAC PIPING
M105 SCALE: 1/8"=1'-0"



Architecture
Planning

Dorschner Associates, Inc.
849 E. Washington Ave., Ste 112
Madison, Wisconsin 53703

ISSUED

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728 FAX: 608.271.7046
JDR PROJECT NO. 16.0180

PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
SCHEDULES - HVAC

DATE
11.10.17

M800

AIR DEVICE SCHEDULE					
EG - 1.(3)	THROW (IF OTHER THAN				
22x22 / 24x24	NECK / FACE SIZE				
300	UNIT NUMBER				
	CFM				
UNIT NO.	CD-1	FR-1	SG-1	TG-1	TG-2
SERVICE	SUPPLY	SUPPLY	SUPPLY	TRANSFER	TRANSFER
MANUFACTURER	TITUS	TATE	TITUS	TITUS	TITUS
MODEL NO.	OMNI	GRATEAIRE	300FS	350FL	350FL
FACE STYLE	PLAQUE	-	LOUVERED	LOUVERED	LOUVERED
PATTERN	4-WAY	-	DBL DEFL	45 DEG	45 DEG
FINISH	WHITE	WHITE	WHITE	WHITE	WHITE
MATERIAL	ALUM	ALUM	ALUM	ALUM	ALUM
SIZE (FACE/NECK)	SEE PLANS	22x22 / 24x24	SEE PLANS	SEE PLANS	SEE PLANS
CFM RANGE	SEE PLANS	0 - 810	SEE PLANS	SEE PLANS	SEE PLANS
MOUNTING	LAY-IN	FLOOR	DUCT	LAY-IN	SURFACE
DAMPER	NO	YES	NO	NO	NO
REMARKS		1			

SPECIFIC NOTES
1. PROVIDE WITH OPPOSED BLADE DAMPER.

AIR TERMINAL UNIT SCHEDULE WITH REHEAT						
UNIT NO.	VAV-3-1	VAV-3-2	VAV-3-3	VAV-3-4	VAV-5-1	
INLET SIZE	14"	10"	8"	10"	8"	
MAX. CFM	1320	520	280	990	600	
MIN. CFM	400	160	85	297	180	
MAX. AIR PRESS DROP (WC)	0.5	0.5	0.5	0.5	0.5	
HOT WATER REHEAT COIL DATA	EWRT (F)	180	180	180	180	
	LWT (F)	150	150	150	150	
	EAT (F)	54.0	54.0	54.0	54.0	54.0
	LAT (F)	100.0	100.0	100.0	100.0	85.0
	CAPACITY (MBH)	20.0	8.0	4.2	14.8	6.1
	GPM	1.3	0.5	0.3	1.0	0.4
	MAX. WPD (FT WC)	2.5	2.5	2.5	2.5	2.5
TCV TYPE	2-WAY	3-WAY	2-WAY	2-WAY		
REMARKS					1, 2	

KEYED NOTES:
1. REHEAT COIL TO BE INSTALLED BUT NOT PIPED. UNIT TO BE PIPED IN FUTURE.
2. UNIT TO HAVE PNEUMATIC ACTUATION AND CONTROL. PNEUMATIC ACTUATION AND CONTROL TO BE REMOVED AND REPLACED WITH DDC CONTROL IN FUTURE PROJECT.

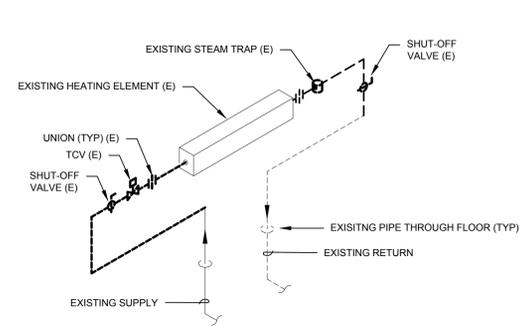
COMPUTER ROOM UNIT SCHEDULE		
UNIT NO.	CRAC-1 (EXIST)	CRAC-2 (EXIST)
SERVICE	DATA ROOM	DATA ROOM
SYSTEM DATA		
SYSTEM TYPE	WATER COOLED	WATER COOLED
CONFIGURATION	DOWNFLOW	DOWNFLOW
MANUFACTURER	LIEBERT	LIEBERT
MODEL NO.	DS053KUAOEI320A	DS053KUAOEI320A
NOMINAL COOLING CAPACITY (TONS)	15	15
REMARKS	1, 3	1, 3
DRY COOLER SCHEDULE		
UNIT NO.	DC-1	DC-2
SERVICE	CRAC-1 (EXIST)	CRAC-2 (EXIST)
SYSTEM TYPE	DRY COOLER	DRY COOLER
MANUFACTURER	LIEBERT	LIEBERT
MODEL NO.	DSO352	DSO352
SYSTEM DATA		
GLYCOL TYPE:	EG - 50%	EG - 50%
NUMBER OF CIRCUITS		
DESIGN AMBIENT AIR TEMP. (°F)	100	100
MIN. OPERATING TEMP (°F)	-15	-15
CAPACITY TOTAL (MBH)	-	-
ELECTRICAL DATA		
NUMBER OF FANS	3	3
FAN MOTOR TYPE (EACH)	ECM	ECM
FAN MOTOR HP (EACH)		
VOLTS / PHASE	208 / 3	208 / 3
UNIT FULL LOAD AMPS	11.4	11.4
UNIT MOCP	15	15
PHYSICAL DATA		
VIBRATION ISOLATOR TYPE	-	-
VIB. ISOLATOR DEFLECTION	-	-
MOUNTING LEG HEIGHT (IN)	48	48
WIDTH (IN)	-	-
LENGTH (IN)	-	-
OVERALL HEIGHT (WITH LEGS) (IN)	-	-
UNIT WEIGHT (LBS)	-	-
REMARKS	2	2

REMARKS
1. EXISTING GLYCOL COOLED INDOOR UNIT TO REMAIN. REPLACE OUTDOOR DRY COOLER ONLY. LIEBERT/VERTIV FACTORY TECHNICIAN TO PROVIDE SERVICE UPDATE TO EXISTING LIEBERT/VERTIV SITE LINK CONTROL PACKAGE TO ALLOW FOR INTEGRATION INTO THE EXISTING BUILDING AUTOMATION SYSTEM FOR MONITORING PURPOSES.
2. REPLACEMENT DRY COOLER. ONLY LIEBERT / VERTIV DRY COOLERS WILL BE ALLOWED. SPECIFICALLY SELECTED TO MATCH THE EXISTING INDOOR UNITS FOR THIS SPECIFIC APPLICATION AND CONDITIONS.
3. PROVIDE NEW FILTERS IN EACH UNIT AT COMPLETION OF PROJECT.

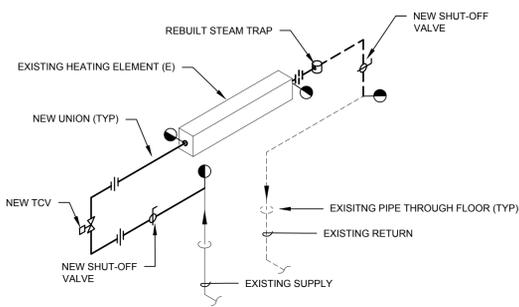
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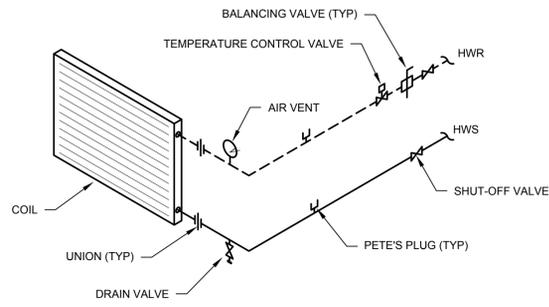
9 EXISTING RADIATION PIPING DETAIL
SCALE: NONE DEMOLITION



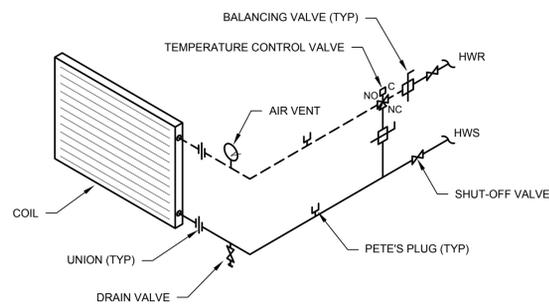
10 EXISTING RADIATION PIPING DETAIL
SCALE: NONE NEW WORK

GENERAL NOTES
1. CLEAN STEAM HEATING ELEMENT.
2. REBUILD EXISTING 3/4" STERLING STEAM TRAP.

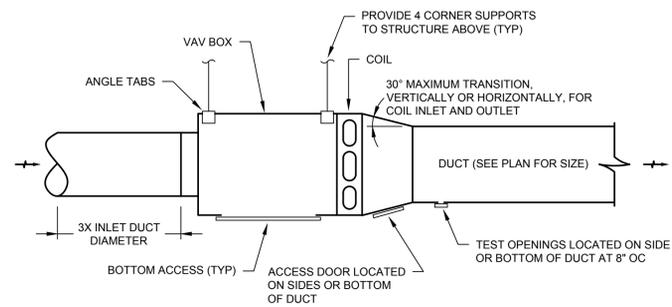
GENERAL NOTES
1. NEW DDC CONTROL VALVE TO BE MOUNTED IN VERTICAL POSITION BY HC (VALVE PROVIDED BY HC).
2. CONTROL VALVE SHALL BE BELIMO B215HT186, 1/2", 1.86 CV WITH TR24-SRUS ACTUATOR (PROVIDED BY TCC).
3. ALL CONTROL WIRING BY TEMPERATURE CONTROL CONTRACTOR.



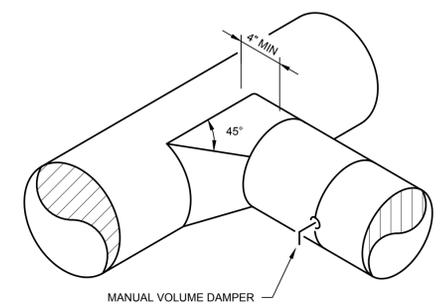
7 BOOSTER COIL HOT WATER COIL PIPING DETAIL
SCALE: NONE (WITH 2-WAY TCV)



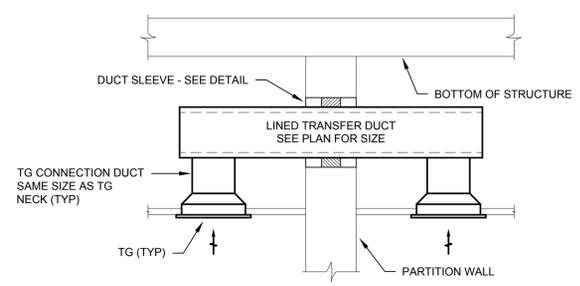
8 BOOSTER COIL HOT WATER COIL PIPING DETAIL
SCALE: NONE (WITH 3-WAY TCV)



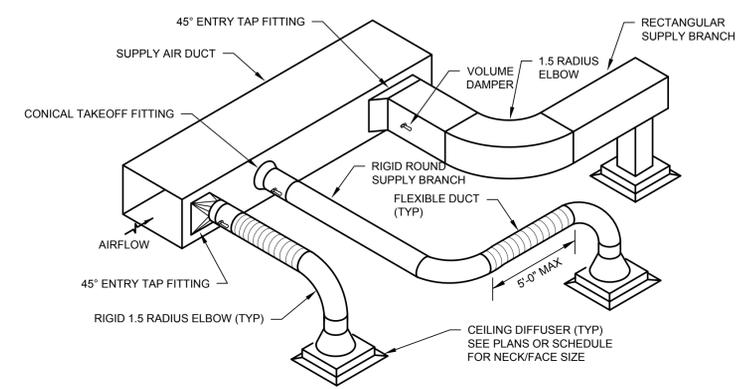
4 VAV BOOSTER COIL DETAIL
SCALE: NONE



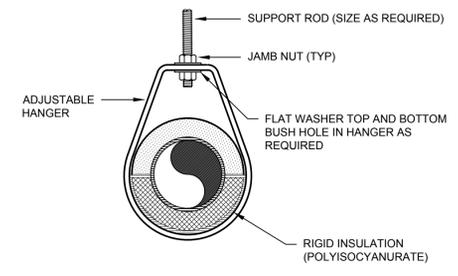
1 BRANCH DUCT TAKEOFF DETAIL
SCALE: NONE



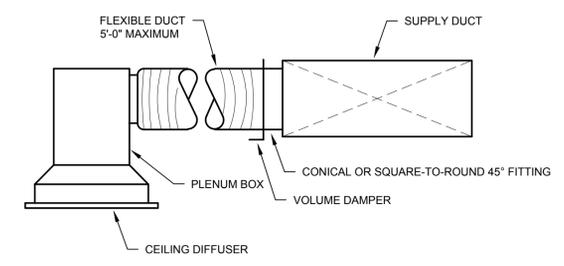
5 TRANSFER DUCT DETAIL
SCALE: NONE



2 BRANCH DUCT & DIFFUSER CONNECTION
SCALE: NONE



6 TYPICAL PIPE SUPPORT DETAIL
SCALE: NONE



3 CEILING DIFFUSER CONNECTION DETAIL
SCALE: NONE

PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
DETAILS - HVAC

DATE
11.10.17

M900

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PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
FIFTH FLOOR
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
SYMBOLS,
ABBREVIATIONS
AND SHEET INDEX
DATE
09.29.17

E000

ELECTRICAL SYMBOLS

-  RECESSED LED FIXTURE
-  LED STRIP FIXTURE
-  SINGLE POLE TOGGLE SWITCH (3) THREE WAY (4) FOUR WAY (K) KEY (P) PILOT LIGHT (OS) OCCUPANCY SENSOR MOUNT 48" ABOVE FLOOR TO TOP OF BOX.
-  WALL BOX DIMMER - MOUNT 48" ABOVE FLOOR TO TOP OF BOX. PROVIDE LUTRON MAESTRO MS-2101-WH 0-10V WITH INTEGRAL VACANCY SENSOR. FOR 3-WAY WIRING, SEE LUTRON INSTALLATION INSTRUCTIONS.
-  SWITCH AND DUPLEX RECEPTACLE IN SAME BOX - MOUNT 48" ABOVE FLOOR TO TOP OF BOX.
-  DUPLEX RECEPTACLE 15" ABOVE FLOOR TO BOTTOM OF BOX OR HEIGHT AS INDICATED
-  TWO-POLE DUPLEX RECEPTACLE 15" ABOVE FLOOR TO BOTTOM OF BOX OR HEIGHT AS INDICATED
-  DOUBLE DUPLEX RECEPTACLE 15" ABOVE FLOOR TO BOTTOM OF BOX OR HEIGHT AS INDICATED
-  DUPLEX RECEPTACLE HORIZONTAL ABOVE COUNTER
-  VOICE/DATA OUTLET
-  PUSHBUTTON - 5/2" MAX. IF SIDE ACCESSIBLE OR 48" MAX. IF FORWARD ACCESSIBLE ONLY. HEIGHT MEASURED FROM FLOOR TO TOP OF BOX.
-  MUSHROOM PUSHBUTTON ABOVE SWITCH
-  ELECTRIC STRIKE - SEE HARDWARE SECTION
-  CARD READER - SEE SECTION 28 13 00
-  OCCUPANCY SENSOR
-  INTRUSION DETECTOR
-  WIRELESS ACCESS POINT - PROVIDE (1) CAT6 CABLE TERMINATED ON RJ45 JACK. COIL UP 20 FEET OF SURPLUS CABLE AT ACCESS POINT. PLACE 3 FEET OF BLACK ELECTRICAL TAPE ON TEE-BAR JUST BELOW CABLE.
-  WIRE PASS THROUGH - SEE HARDWARE SECTION
-  DOOR POSITION SWITCH - SEE HARDWARE SECTION
-  CLEAN AGENT CONTROL PANEL - WIRE TO CIRCUIT 600-10. RELEASING WIRING BY MECHANICAL CONTRACTOR.
-  SECURITY PANEL TO BE INSTALLED UNDER SEPARATE CONTRACT.
-  WATER SENSOR
-  VOICE EVACUATION SPEAKERS
-  CEILING MOUNTED EXIT SIGN
-  WALL MOUNTED EXIT SIGN
-  ELECTRICAL PANEL
-  DETAIL NUMBER
-  NOTE OR DETAIL SYMBOL
-  SHEET LOCATION
-  SPEAKER/STROBE 80" AFF TO BOTTOM OF BOX OR 6' DOWN FROM CEILING TO TOP OF BOX WHICHEVER IS LOWER
-  DETAIL NUMBER
-  NOTE OR DETAIL SYMBOL
-  SHEET LOCATION
-  SPEAKER/STROBE 80" AFF TO BOTTOM OF BOX OR 6' DOWN FROM CEILING TO TOP OF BOX WHICHEVER IS LOWER
-  FIRE ALARM STROBE - ADA RATED 80" TO BOTTOM OF BOX OR 6' DOWN FROM CEILING TO TOP OF BOX WHICHEVER IS LOWER
-  CEILING MOUNTED FIRE ALARM STROBE - ADA RATED 80" TO BOTTOM OF BOX OR 6' DOWN FROM CEILING TO TOP OF BOX WHICHEVER IS LOWER
-  SMOKE DETECTOR

ABBREVIATIONS

- AFF ABOVE FINISHED FLOOR
- AFG ABOVE FINISHED GRADE
- BFG BELOW FINAL GRADE
- BOL BUILT-IN OVERLOAD
- C CONDUIT
- CKT CIRCUIT
- CS COMBINATION STARTER
- D DEDICATED
- DD DOUBLE DUPLEX
- EC ELECTRICAL CONTRACTOR
- EUC ELECTRIC WATER COOLER
- ER EXISTING TO BE REMOVED
- ERL EXISTING RELOCATED (NEW LOCATION)
- ETL EXISTING TO BE RELOCATED (OLD LOCATION)
- EX EXISTING TO REMAIN
- FACP FIRE ALARM CONTROL PANEL
- GC GENERAL CONTRACTOR
- GFI GROUND FAULT INTERRUPTER
- HV HEATING AND VENTILATION CONTRACTOR
- IG ISOLATED GROUND
- IR IN ROOM
- IU IN UNIT
- MAN MANUAL STARTER
- MAG MAGNETIC STARTER
- MCA MINIMUM CIRCUIT AMPACITY
- NIC NOT IN CONTRACT
- NL NIGHT LIGHT
- NJ NEAR UNIT
- OFCI OWNER FURNISHED CONTRACTOR INSTALLED
- PB PUSHBUTTON
- PC PLUMBING CONTRACTOR
- PW PRE-WIRED
- RV REDUCED VOLTAGE STARTER
- RAI REMAIN AS IS
- SC SEPARATE CIRCUIT
- SS SPEED SWITCH
- SW SWITCH
- TC TIMECLOCK
- TS THERMOSTAT
- UM UNIT MANUFACTURER
- WP WEATHERPROOF

ELECTRICAL SHEET INDEX

SHEET NUMBER	SHEET NAME
E000	SYMBOLS, ABBREVIATIONS AND SHEET INDEX
E203	PARTIAL THIRD FLOOR PLANS - POWER & SYSTEMS
E205	PARTIAL FIFTH FLOOR PLANS - POWER & SYSTEMS
E206	PARTIAL ROOF-PENTHOUSE ELECTRICAL PLANS
E303	PARTIAL THIRD FLOOR PLANS - LIGHTING
E305	PARTIAL FIFTH FLOOR PLANS - LIGHTING
E400	DETAILS
E401	SCHEDULES AND DETAILS

C16078

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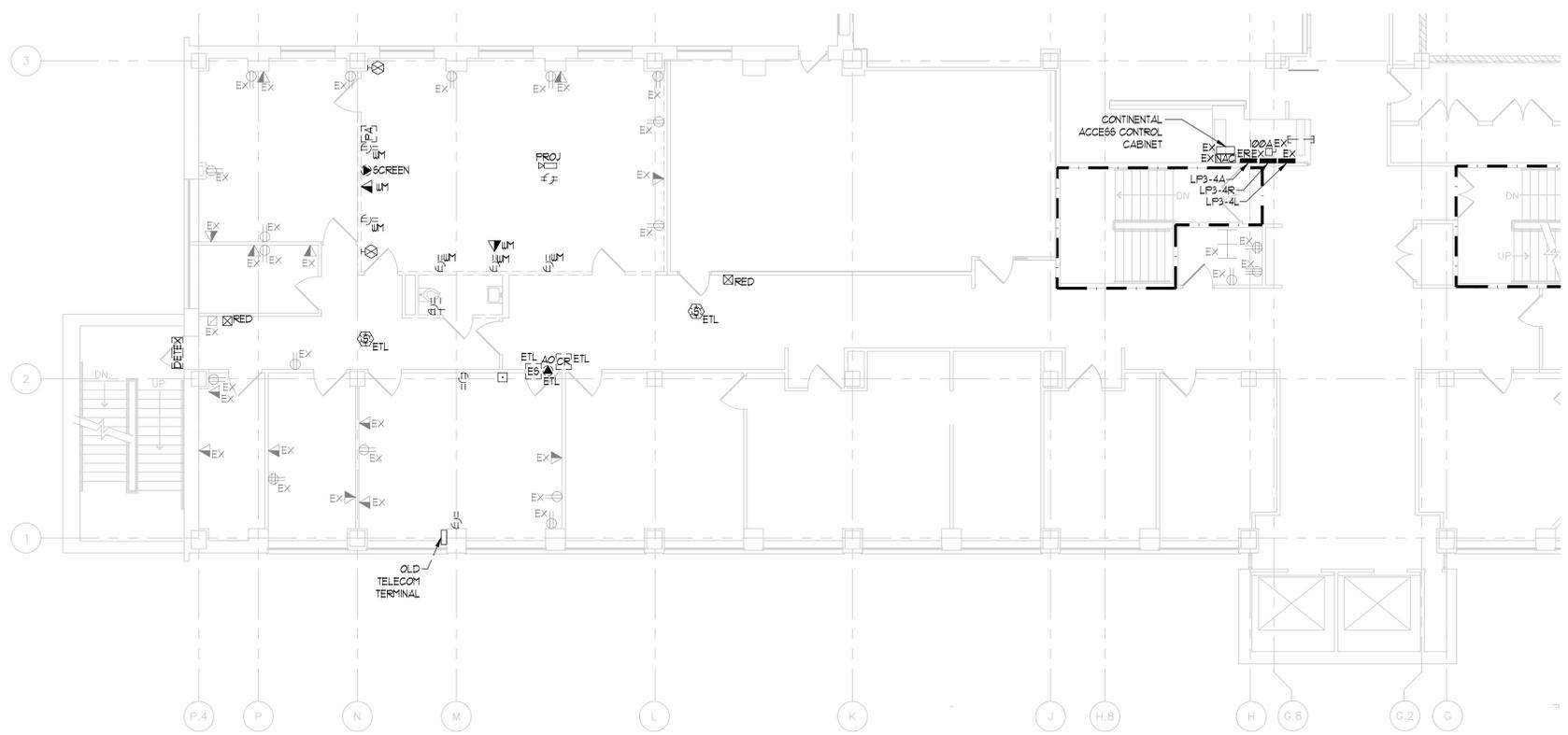
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GENERAL NOTES:

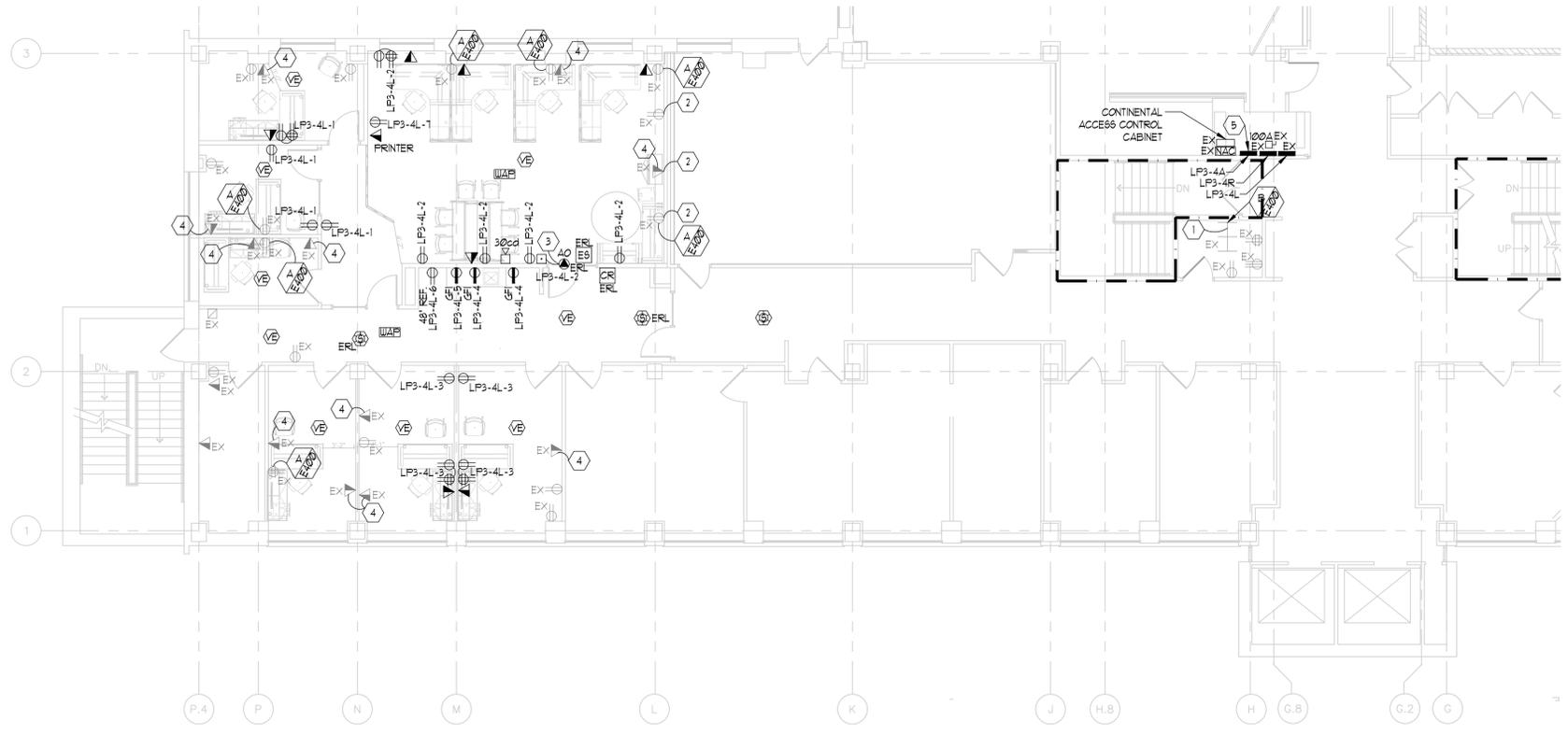
1. REMOVE ALL ITEMS SHOWN ON DEMOLITION PLAN UNLESS NOTED "EX".

KEYED NOTES:

1. EXISTING RACKS - TERMINATE NEW CABLING AT THIS LOCATION. PROVIDE NEW PATCH PANEL.
2. REMOVE AND REINSTALL AFTER NEW WALL SURFACE IS INSTALLED.
3. WIRE TO OPEN ON SUCCESSFUL CARD READ.
4. REPLACE TELECOM OUTLET. PROVIDE (4X)CAT6 CABLES AND JACKS.
5. REPLACE SURFACE MOUNTED LOAD CENTER WITH SQUARE D "NQ" PANEL WITH (42) IP CIRCUITS. PROVIDE 15A AND 20A BREAKERS TO MATCH EXISTING BREAKER COMPLEMENT. RECONNECT EXISTING FEEDER AND BRANCH CIRCUITS.



1 PARTIAL THIRD FLOOR PLAN - POWER & SYSTEMS DEMOLITION
1/8"=1'-0"



2 PARTIAL THIRD FLOOR PLAN - NEW POWER & SYSTEMS
1/8"=1'-0"

ISSUED

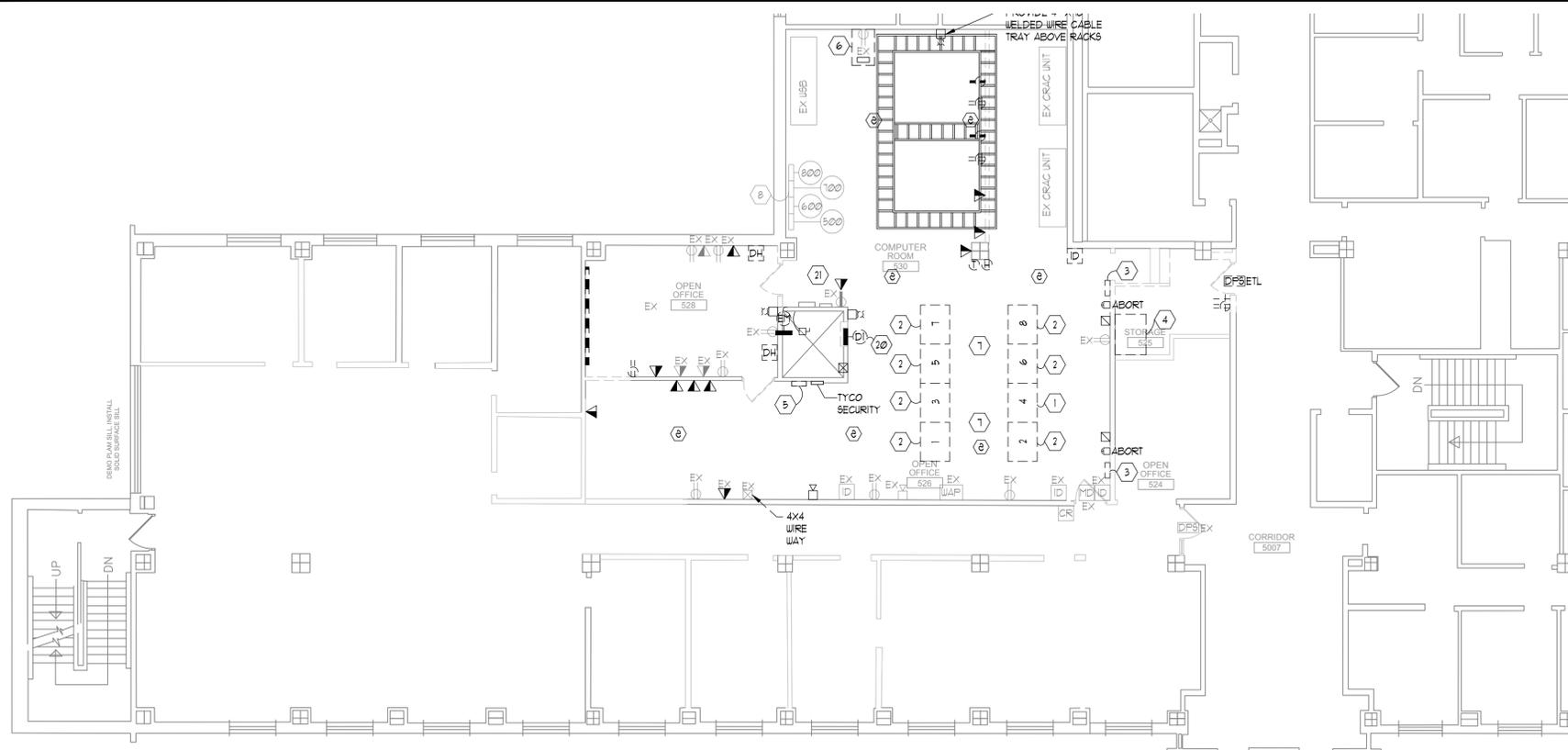
PROJECT
INFORMATION MANAGEMENT
OFFICE REMODEL
FIFTH FLOOR
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL THIRD
FLOOR PLANS -
POWER & SYSTEMS
DATE
09.29.17

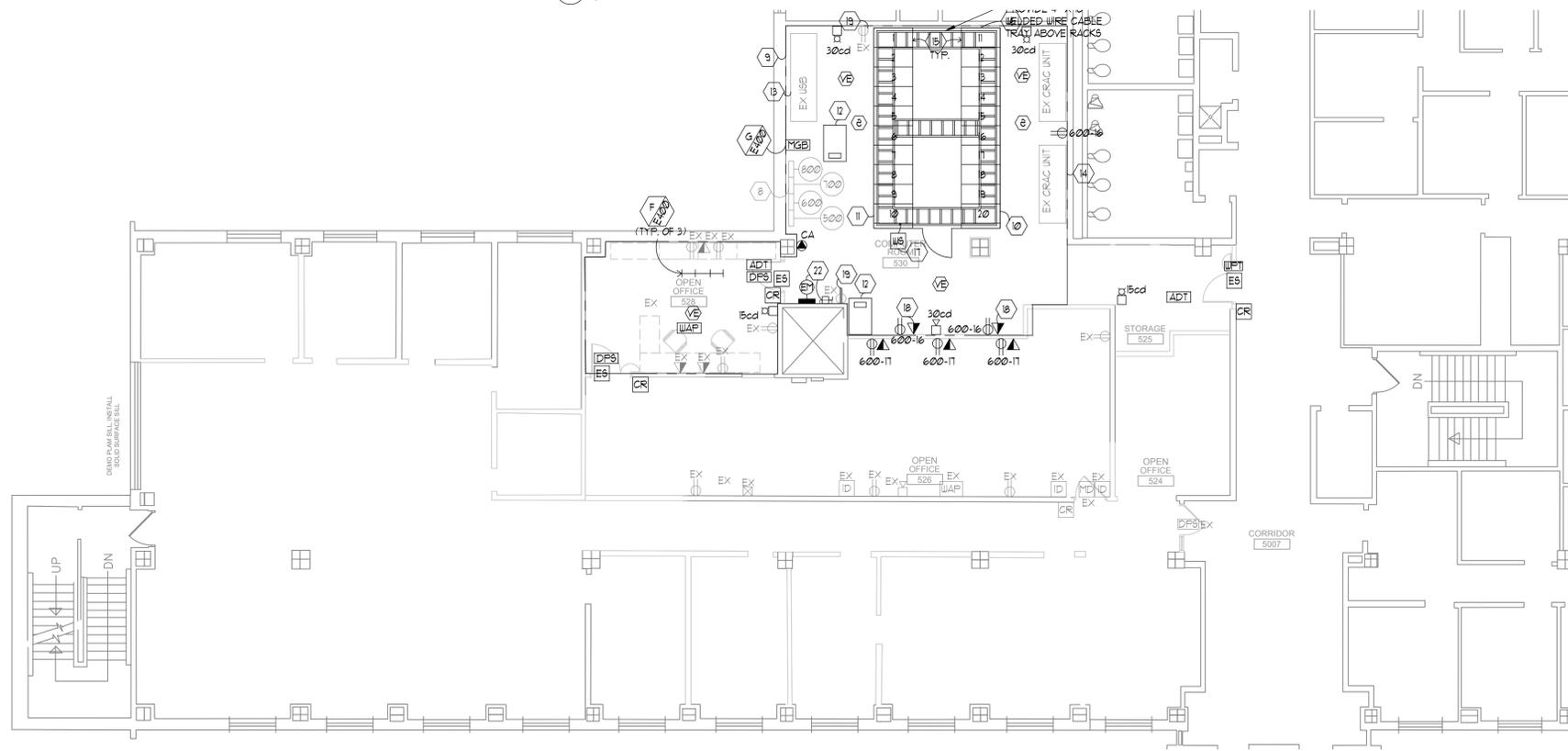


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E203



1 PARTIAL FIFTH FLOOR PLAN - POWER & SYSTEMS DEMOLITION
1/8"=1'-0"



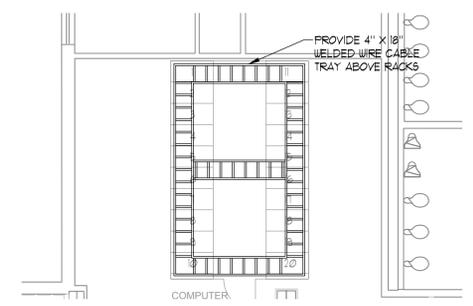
2 PARTIAL FIFTH FLOOR PLAN - NEW POWER & SYSTEMS
1/8"=1'-0"



PHOTO "A"



PHOTO "B"



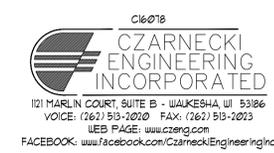
3 CABLE TRAY PLAN
1/8"=1'-0"

GENERAL NOTES:

1. REMOVE ALL ITEMS SHOWN ON DEMOLITION PLAN UNLESS NOTED "EX".
2. TERMINATE NEW TELECOM CABLING ON RACKS IN 528
3. ALL RECEPTACLES ON UPS POWER TO BE RED.

KEYED NOTES:

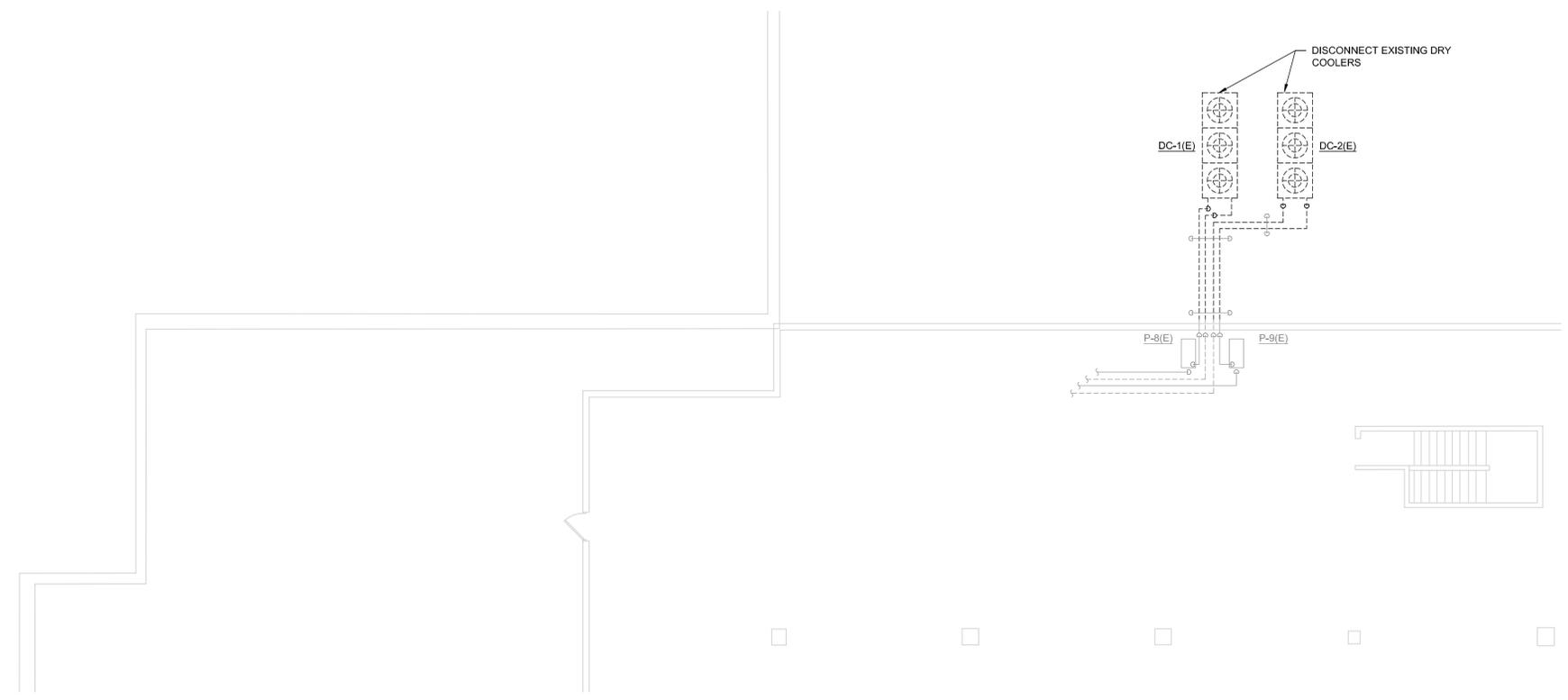
1. EXISTING FIBER CABINET, DANE COUNTY WILL MIGRATE FIBER TO NEW CABINET 20 AND REMOVE WHEN MIGRATION IS COMPLETE.
2. EXISTING ENCLOSED ELECTRONICS RACKS, DANE COUNTY WILL MIGRATE CONTENTS TO NEW RACKS AND REMOVE WHEN MIGRATION IS COMPLETE.
3. REMOVE ADT FOCUS SECURITY PANEL.
4. EXISTING CLEAN AGENT EQUIPMENT.
5. EXISTING FENVAL CLEAN AGENT RELEASING PANEL.
6. EXISTING 150KVA TRANSFORMER AND 400A ENCLOSED CIRCUIT BREAKER TO BE RELOCATED. SEE PHOTO "B".
7. SEE PHOTO "A" BELOW FOR TYPICAL UNDER FLOOR POWER CLUSTER. CIRCUITS ORIGINATE IN PANELS 500, 600, 100, 800. DANE COUNTY WILL REMOVE OUTLETS AND CABLES, AS ELECTRONICS RACKS ARE EMPTIED.
8. EXISTING UPS OUTPUT PANELS, REDO CIRCUIT DIRECTORIES TO DOCUMENT ALLOCATION OF EXISTING CIRCUITS TO NEW RACKS.
9. EXTENT OF NEW RAISED FLOOR. GROUND FLOOR PER H/E400 AND I/E400.
10. FIBER TERMINATION CABINET - MAIN (30" WIDTH).
11. FIBER TERMINATION CABINET - SECONDARY (30" WIDTH). PROVIDE A 24 PORT CAT6 PATCH PANEL IN RACK.
12. RELOCATED TRANSFORMER AND ENCLOSED CIRCUIT BREAKER TIME IS OF THE ESSENCE IN RELOCATING THESE ITEMS. COORDINATE WITH IT DEPARTMENT.
13. EXISTING UPS SUPPORT WHILE RAISED FLOOR IS REPLACED.
14. REWIRE PER POWER RISER.
15. EXTEND CIRCUITS TO RACKS PER SCHEDULE - SEE SHEET 401.
16. TWENTY RACK ECO AISLE ENCLOSURE - SEE SECTION 21 II IT.
17. LOCATE NEAR FLOOR DRAIN. SEE DETAIL D/E400 AND E/400.
18. PROVIDE (6) CAT6 CABLES AND JACKS AT THIS OUTLET.
19. EXTEND OUTLET TO FACE OF NEW FURRING. REPLACE DEVICE AND COVERPLATE.
20. REMOVE PANEL. SEE RISER ON SHEET E401 FOR NEW WORK.
21. REMOVE MANUAL TRANSFER SWITCH AND PANEL. REINSTALL AFTER WALL IS FURRED.
22. REINSTALL PANEL AND MANUAL TRANSFER SWITCH. CONCEAL CONDUITS IN NEW FURRED WALL. SEE PHOTOS ON E401.



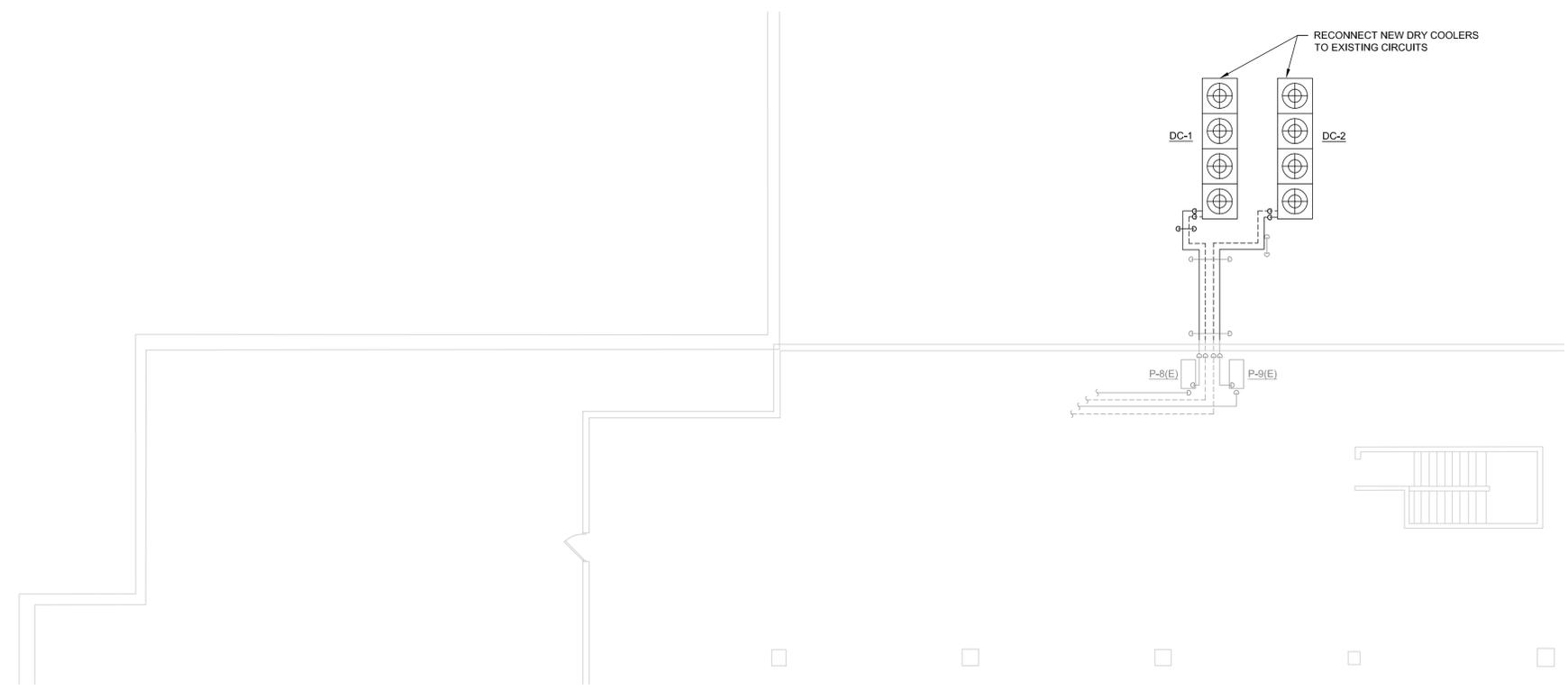
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1 PARTIAL ROOF-PENTHOUSE ELECTRICAL DEMOLITION PLAN
1/8"=1'-0"



2 PARTIAL ROOF-PENTHOUSE ELECTRICAL PLAN
1/8"=1'-0"



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PROJECT
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 OFFICE REMODEL
 FIFTH FLOOR
 CITY-COUNTY BUILDING
 210 MARTIN LUTHER KING,
 JR. BLVD., MADISON, WI

DRAWING
 PARTIAL ROOF/PENTHOUSE
 - ELECTRICAL

DATE

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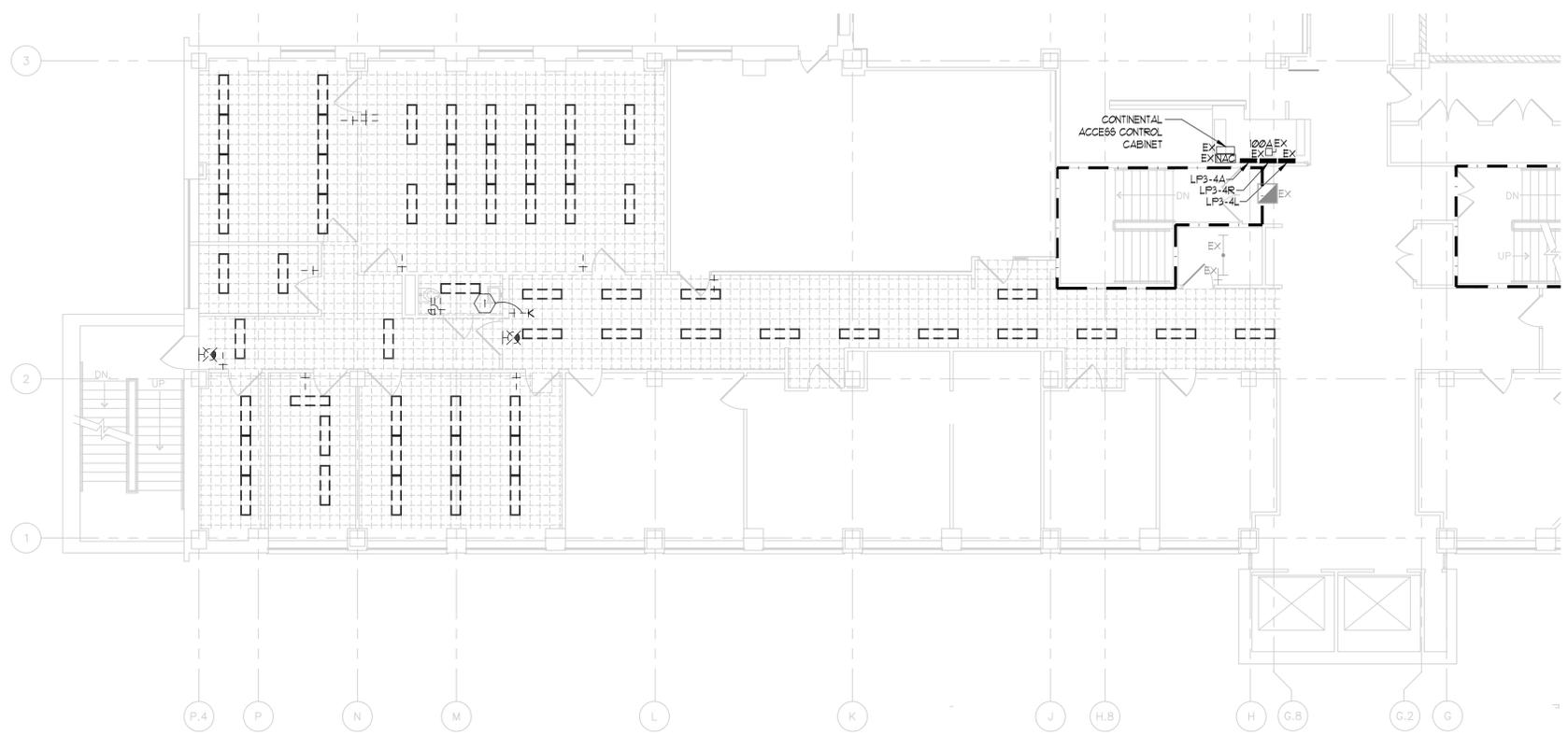
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GENERAL NOTES:

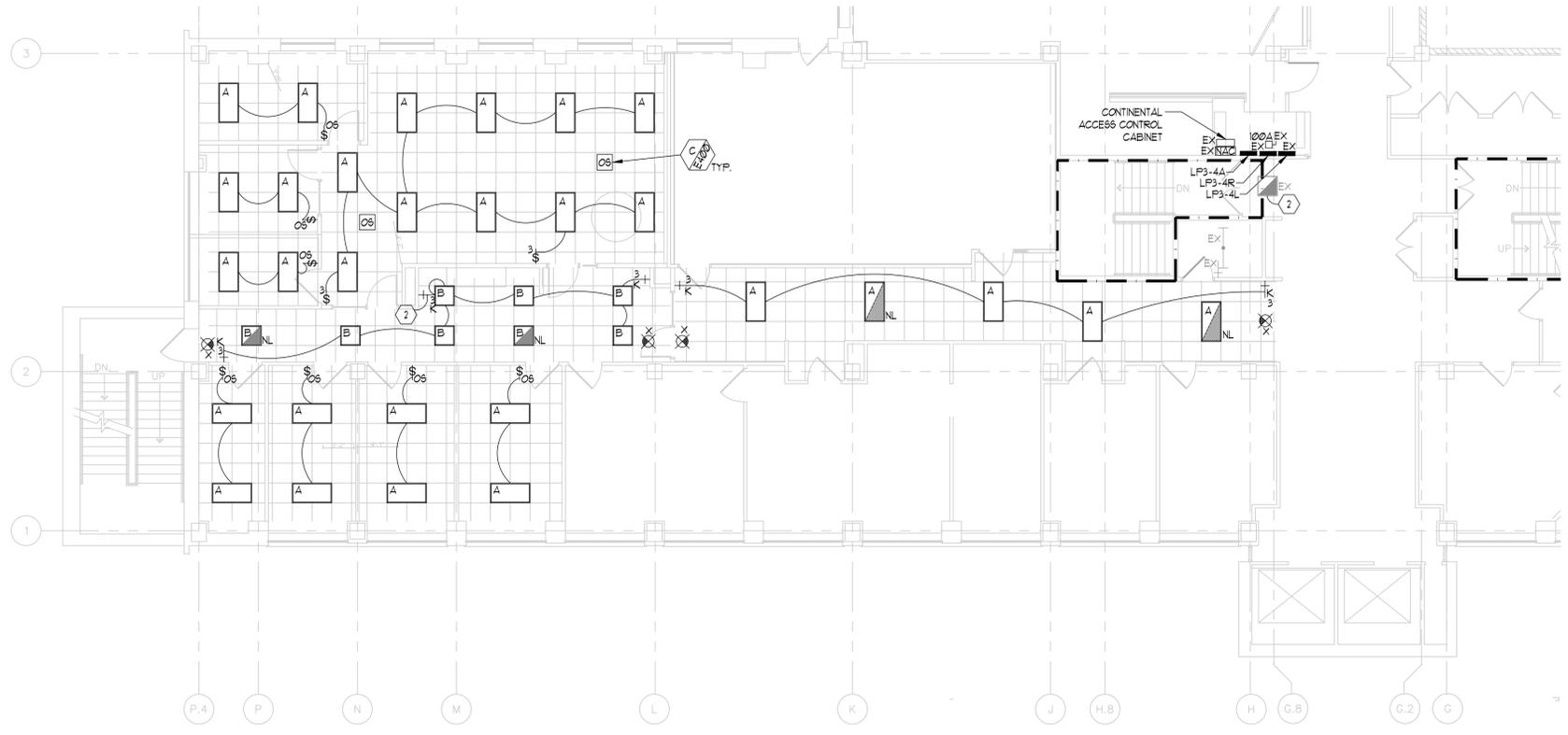
1. REMOVE ALL ITEMS SHOWN ON DEMOLITION PLAN UNLESS NOTED "EX".
2. WIRE NEW LIGHTING TO EXISTING LIGHTING CIRCUITS SERVING AREA.
3. WIRE ALL EXIT LIGHTS AND NIGHT LIGHTS TO EXIT LIGHTS AND EMERGENCY LIGHTING CIRCUITS SERVING 3RD FLOOR.

KEYED NOTES:

- ① REMOVE KEYED SWITCH DURING DEMOLITION. JUNCTION BOX TO REMAIN AS IS.
- ② INSTALL NEW 3-WAY KEYED SWITCH IN EXISTING JUNCTION BOX.
- ③ EXISTING EMERGENCY FIXTURE



1 PARTIAL THIRD FLOOR PLAN - LIGHTING DEMOLITION
1/8"=1'-0"



2 PARTIAL THIRD FLOOR PLAN - NEW LIGHTING
1/8"=1'-0"

PROJECT
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OFFICE REMODEL
FIFTH FLOOR
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL THIRD
FLOOR PLANS -
LIGHTING
DATE
09.29.17



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OFFICE REMODEL
FIFTH FLOOR
CITY-COUNTY BUILDING
210 MARTIN LUTHER KING,
JR. BLVD., MADISON, WI

DRAWING
PARTIAL FIFTH
FLOOR PLANS -
LIGHTING
DATE
09.29.17

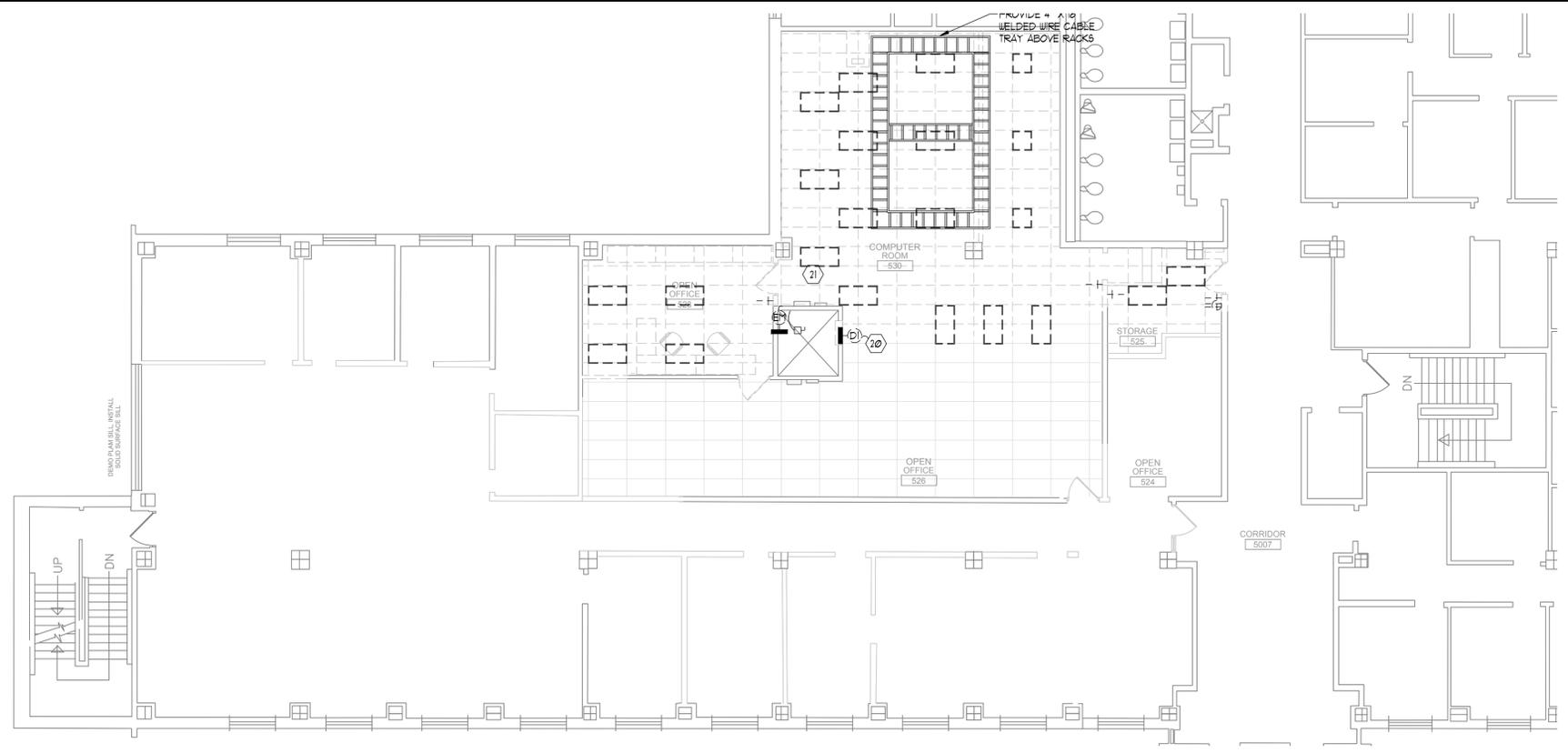
E305

GENERAL NOTES:

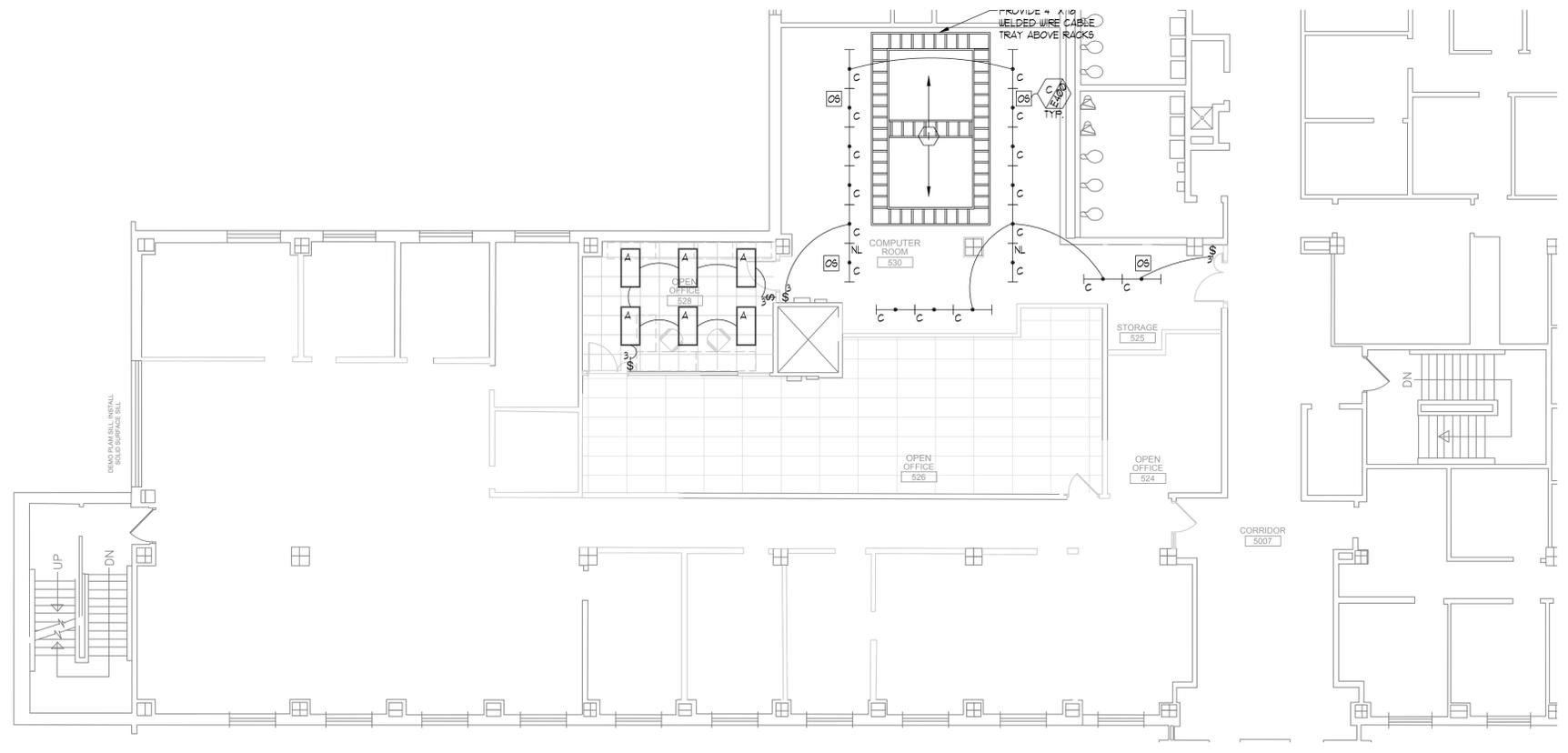
1. REMOVE ALL ITEMS SHOWN ON DEMOLITION PLAN UNLESS NOTED "EX".
2. WIRE LIGHTING TO EXISTING LIGHTING CIRCUITS SERVING AREA.

KEYED NOTES:

- ① LIGHTING PROVIDED WITH ELECTRONICS RACK SYSTEM.



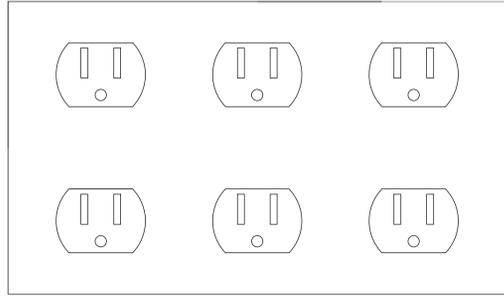
① PARTIAL FIFTH FLOOR PLAN - LIGHTING DEMOLITION
1/8"=1'-0"



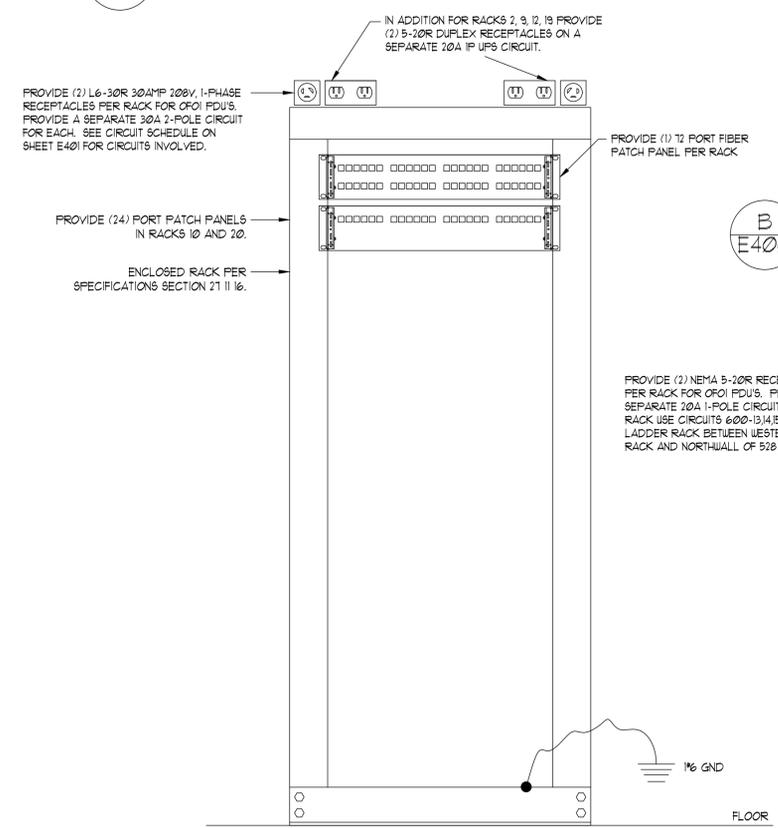
② PARTIAL FIFTH FLOOR PLAN - NEW LIGHTING
1/8"=1'-0"



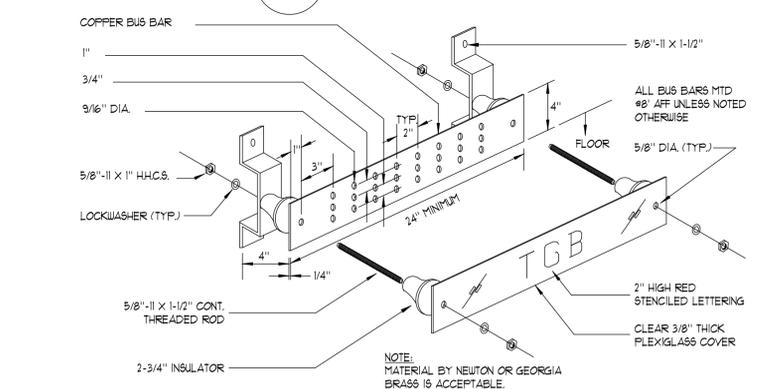
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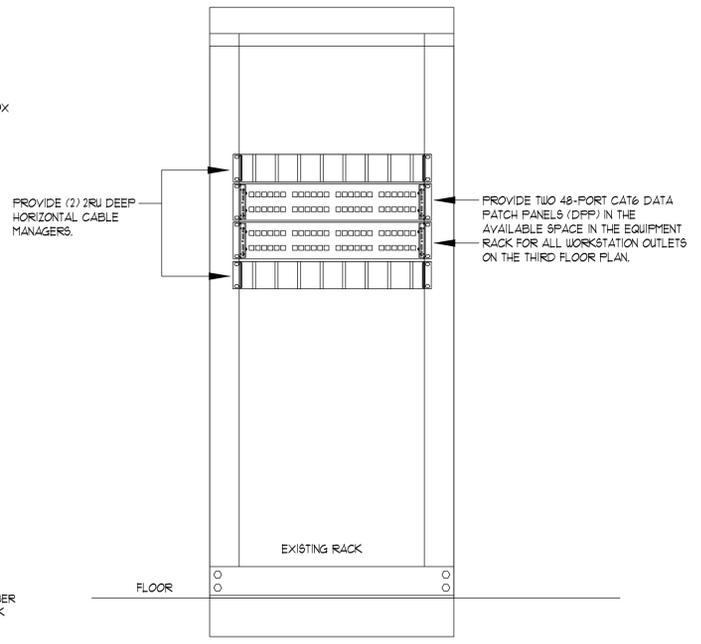
A
E400 RECEPTACLE DETAIL
NOT TO SCALE



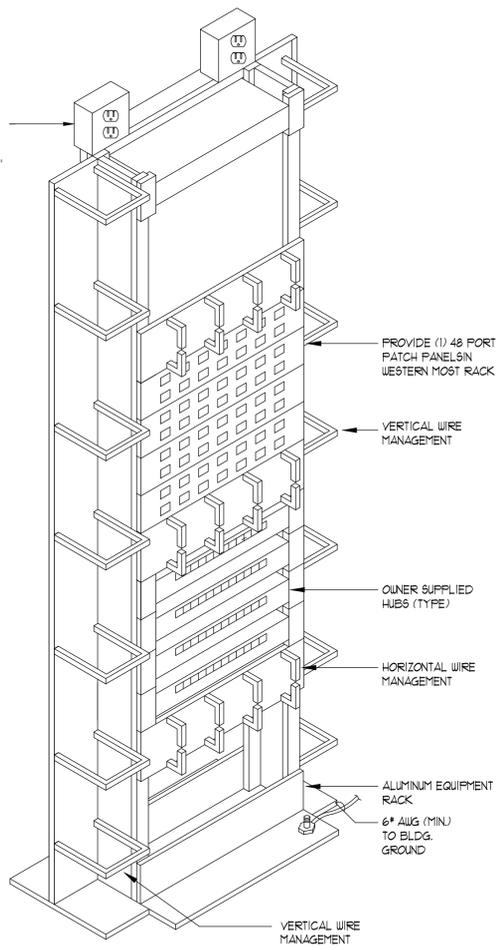
E
E400 TYPICAL RACK - COLD AISLE SIDE
NOT TO SCALE



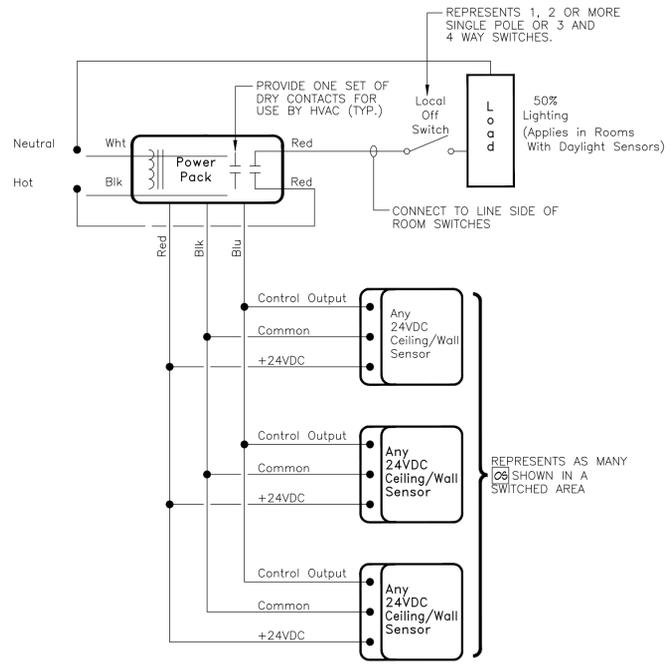
G
E400 GROUND BUS DETAIL
NOT TO SCALE



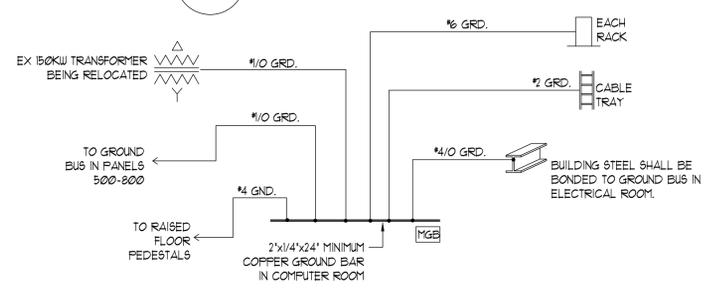
B
E400 RACK ELEVATION - EXISTING TELECOM CLOSET
NOT TO SCALE



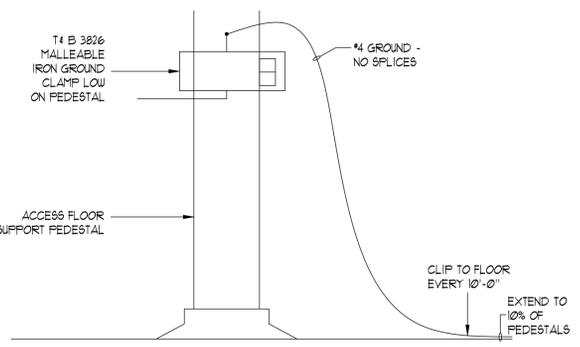
F
E400 OPEN DATA COMMUNICATION WIRING RACKS
NOT TO SCALE



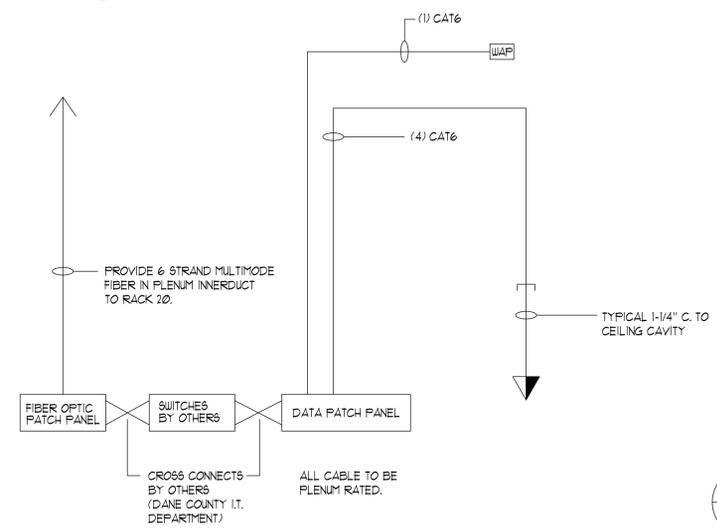
C
E400 WIRING DIAGRAM - OCCUPANCY SENSORS
NOT TO SCALE



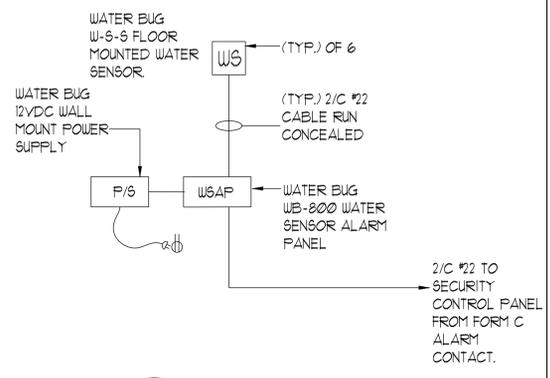
H
E400 GROUNDING SYSTEM DETAIL
NOT TO SCALE



I
E400 GROUNDING DETAIL - ACCESS FLOOR
NOT TO SCALE

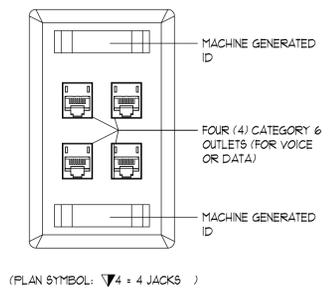


J
E400 DATA RISER DIAGRAM - CATEGORY 6 PERFORMANCE
NOT TO SCALE



D
E400 WATER SENSOR RISER
NOT TO SCALE

NOTE:
ALL WORK BY E.C.
MATERIALS ARE AVAILABLE
FROM WINLAND
ENVIRONMENTAL SECURITY
800-635-4269
(www.winlandsecurity.com)



K
E400 TYPICAL WORKSTATION DATA OUTLET DETAIL
NOT TO SCALE

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DRAWING
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E400

