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

February 25, 2015

ATTENTION ALL REQUEST FOR BID RFB HOLDERS

RFB NO. 313083 - ADDENDUM NO. 3

CONSTRUCTION OF EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A) AND MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

DEPARTMENT OF PUBLIC WORKS, HIGHWAY & TRANSPORTATION 3562 COUNTY HIGHWAY AB MCFARLAND, WISCONSIN

BIDS DUE MARCH 3, 2015, 2:00 PM. DUE DATE AND TIME ARE CHANGED BY THIS ADDENDUM.

This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. Please attach this Addendum to the RFB. Acknowledge this addendum on the Bid Form.

PLEASE MAKE THE FOLLOWING CHANGES:

1. **All Cover Pages – Bid Due Date Change**
   CONSTRUCTION OF EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A) AND MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B) The bid due date has changed. On all cover pages for both projects,
   Replace: "Due Date / Time: **MONDAY, MARCH 2, 2015, 2:00 P.M."**
   With: "Due Date / Time: **TUESDAY MARCH 3, 2015, 2:00 P.M."**

2. **Cover Letter**
   Change on both projects the two references to due date from
   "**2:00 p.m., MONDAY, MARCH 2, 2015."** to read
   "**2:00 p.m., TUESDAY, MARCH 3, 2015."**

3. **IINSTRUCTIONS TO BIDDERS (ITB)**
   - Clarification: Bidders should follow the instructions within pages ITB -1 through ITB -14 and Bid Form page 12 (BF12), on how to provide the bid information for the Sealed Bid.
   - 15. **ALTERNATE BIDS**
     Change: To allow Numeric Price **only on Alternate Bid items**, issued with this Addendum.
   - 16. **INFORMATIONAL BIDS**
     Change: To allow **only Informational Bid items** to be submitted on **March 4, 2015 at 1pm**. Which is after the bid opening of **March 3, 2015,** issued with this Addendum.
   - 19. **WORK BY OWNER**
     Add: 4. Payment for permanent electrical and gas fees will be by Owner, issued with this Addendum.
     Clarification: Permanent electric and gas connection fees should be paid by the owner. Temporary electric and gas service cost for construction utilities should be paid by the contractor. Well installation costs should be paid as part of the construction contract. Temporary water for construction should be paid by the contractor.

4. **Bid Form**
   Delete: Current pages BF-1-12;
   Replace: With new pages BF-1-12, issued with this Addendum.

5. **Project Labor Agreement: Bid Package A and Bid Package B.**
   - Add: Appendix B to both
     - **East Highway Garage – Salt Storage Facility (Bid Package A).**
     - **Medical Examiner Office Building (Bid Package B).**

   - Clarification: Section 3 (a) – Issues in finding qualified sub-bidders.
     It is the responsibility of the Bidder to find qualified sub-bidders. In the event that none are found it is the responsibility of the Bidder to notify the South Central Building and Construction Trades Council.

6. **Bid Package A**
   This Addendum is issued to modify, explain or correct the original Drawings and Specifications as noted in Addendum #A3 – Bid Package A attached, and is hereby made a part of the Contract documents. Please attach this Addendum to the Specifications in your possession. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

This Addendum consists of 10written pages, (1) 8 page added specification section, and 18 revised sheets.

7. Bid Package B

This Addendum is issued to modify, explain or correct the original Drawings and Specifications as noted in Addendum B3 – Bid Package B attached, and is hereby made a part of the Contract documents. Please attach this Addendum to the Specifications in your possession. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

This Addendum consists of 56 written pages, 16 revised sheets and 3 Addendum B3 Bid Questions and Answers written pages.

If any additional information about this Addendum is needed, please call Rob Nebel at 608/267-0119 or 608/575-0890 nebel@countyofdane.com or neitzel-knox@countyofdane.com

Sincerely,
Rob Nebel
Assistant Public Works Director

Enclosures:
Addendum 3 Bid Form
Addendum 3 Appendix B
Addendum A3 – East Highway Garage – Salt Storage Facility (Bid Package A)
Drawings
A-101 Master Coordination Site Plan
A-213 Fuel Island Plan
A-402 Wall Sections
M-001 Mechanical Site Plan Base
M-002 Mechanical Site Plan Alt#10
M-003 Site Piping Details
M-202 Mechanical Mezzanine Floor Plan
M-300 Mechanical Schedules
M-301 Mechanical Details
M-301a Alt pumping Pipe Schematic
E-101 Electrical Site Plan
E101a Informational Bid "F" and Alternate Bid #10 Waste Heat Loop Electrical Site Plan
E-205 Office and Small Vehicle Storage Power and Systems Plan
E-210 Fire Pump Building Plan, Emergency Generator
E-212 Alternate Bid #10 Waste Heat Loop Pump Enclosures
E-213 Informational Bid "F" Waste Heat Loop Pump Enclosure
E-503 Schedules, Details
E-504 Schedules, Details
Addendum B3- Medical Examiner Office Building (Bid Package B)
Drawings
A200 First Floor Plan
A210 Enlarged Floor Plans
A501 Exterior Wall Sections
A605 Exterior Details
A609 Exterior Details
A801 Interior Elevations
S200 Roof Framing Plan
S201 Misc Framing Plans
S403 Framing Details
M200 HVAC First Floor Plan
M800 HVAC Hot Water Schematics
M900 HVAC Schedules
M901 HVAC Schedules
M902 HVAC Schedules
Addendum B3 Bid Questions and Answers

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Name of Bidding Firm: _____

BID FORM

BID NO. 313083
PROJECT: CONSTRUCTION OF EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A) AND MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

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

BASE BID - LUMP SUM:
Construction of a new East Highway Garage/Salt Storage Facility, exhibit and Medical Examiner Office Building site cover approximately 20 acres.
Bid Package A Description: The Project consists of construction of an 84,038 sq. ft. one (1) story building. The building framing system will be steel columns, truss girders and truss joists or steel beams; insulated precast concrete panel exterior and interior walls. Load bearing and non-load bearing walls will support the precast concrete mezzanine deck. Uniquely, building systems will utilize waste heat from the landfill and the project includes the installation of photovoltaics.
Bid Package B Description: Perform the Work as specified and detailed in the Construction Documents package. Contractor is to provide construction services for a new facility of approximately 28,500 square feet in McFarland Wisconsin. Generally, the scope includes a one story, masonry and metal clad steel framed office/laboratory with a pre-engineered metal garage component. Uniquely, building systems will utilize waste heat from the landfill and the project includes the installation of photovoltaics.

Construction is to begin by March 26, 2015 and be completed by
Bid Package A:
Salt Storage Facility by April 25, 2015
East Highway Garage by December 1, 2015
Bid Package B:
Medical Examiner Office Building by June 24, 2016.

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 both Bid Package A - East Highway/Salt Storage Facility and Bid Package B - Medical Examiner Office Building, as specified in the Construction Documents, for the Base Bid stipulated sum of:

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

The undersigned agrees to add the alternate(s) portion of the Work as described, for the following addition(s) to or subtraction(s) from the Base Bid, as stipulated below.

ALTERNATE BID 1 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Satellite Facility

State addition to Base Bid to provide the complete Satellite Facility as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 2 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Water Reuse System

State addition to Base Bid to provide the Water Reuse System as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 3 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Rainwater Reclaim System

State addition to Base Bid to provide the Rainwater Reclaim System as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 4 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Radiant Flooring - Below Slab

State addition to Base Bid to provide the Radiant Flooring – Below Slab as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 5 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Radiant Flooring - Above Slab

State addition to Base Bid to provide the Radiant Flooring – Above Slab as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 6 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Evaporating Equipment

State addition to Base Bid to provide the Evaporating Equipment as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 7 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Bridge Crane – Large Vehicle Storage #138

State addition to Base Bid to provide the Bridge Crane – Large Vehicle Storage #138 as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 8 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

Photovoltaic Panels and Distribution System

State addition to Base Bid to provide the Photovoltaic Panels and Distribution System as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

ALTERNATE BID 9 – BID PACKAGE A - EAST HIGHWAY GARAGE/SALT STORAGE FACILITY - LUMP SUM: ADDITIONAL

LED Interior Lighting

State addition or deduction from to Base Bid to provide the LED Interior Lighting as described in the Plans and Specifications.

_____ and _____ /100 Dollars

Written Price

$_____

Numeric Price

ALTERNATE BID 10 -- BID PACKAGE A -- EAST HIGHWAY GARAGE/SALT STORAGE FACILITY -- LUMP SUM: DEDUCTION

Hot Water Pipe from Landfill and Heat Exchangers - Alternate Piping

State deduction from Base Bid to provide the hot water pipe from landfill and heat exchangers shown for the alternate method in lieu of the base bid method as described in the Plans and Specifications.

_____ and _____ /100 Dollars

Written Price

$_____

Numeric Price

ALTERNATE BID B1 – BID PACKAGE B – MEDICAL EXAMINER OFFICE BUILDING FACILITY - LUMP SUM:

LED Fixtures:

State addition or deduction from Base Bid to provide LED fixtures as scheduled in the Alternate Bid LED Light Fixture Schedule as shown on the Electrical Drawings.

STATE ADDITION OR DEDUCTION

_____ and _____ /100 Dollars

Written Price

$_____

Numeric Price

ALTERNATE BID B2 – BID PACKAGE B – MEDICAL EXAMINER OFFICE BUILDING FACILITY - LUMP SUM: DEDUCTION

MEP Room 145 Modifications:

State deduction from Base Bid to provide MEP Room 145 layout per drawings M200, M300, M800, M900, M901, M902 and specifications..

STATE DEDUCTION

_____ and _____ /100 Dollars

Written Price

$_____

Numeric Price

DIRECT PURCHASE OF MATERIALS & EQUIPMENT BY COUNTY BID PACKAGE A – EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:
The amount of materials and equipment that individually exceeds Five Thousand Dollars ($5,000), to be purchased by the County that is included in the above base price (including tax).

Direct Owner Purchase Value:

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

DIRECT PURCHASE OF MATERIALS & EQUIPMENT BY COUNTY BID PACKAGE B – MEDICAL EXAMINER OFFICE BUILDING:
The amount of materials and equipment that individually exceeds Five Thousand Dollars ($5,000), to be purchased by the County that is included in the above base price (including tax).

Direct Owner Purchase Value:

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:
1. For book keeping purposes the Owner needs to identify the cost of the East Highway Garage/Salt Storage Facility and proportional associated site work and utilities; all of which is included in the base bid. State amount of all work included within the East Highway Garage/Salt Storage Facility (Bid Package A)

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:
A. Well State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Well as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

B. Septic System State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Septic System as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

C. Fire Pump, Underground Water Tank & Vertical Pump Vault - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Fire Pump, Underground Water Tank & Vertical Pump Unit as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

D. 6" D.I Fire Protection Piping to Medical Examiner - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the 6" D.I. Fire Protection Piping to Medical Examiner as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

E. Generator Layout Detail - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Generator Layout Detail as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

F. Hot Water Pipe from Landfill and Heat Exchangers - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Hot Water Pipe from Landfill and Heat Exchangers as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

G. 4" D.I. Water Main for the Medical Examiner Building - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the 4" D.I. Water Main for the Medical Examiner Building as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

H. Sanitary Holding Tank for ME Building Process Waste - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Sanitary Holding Tank for ME Building Process Waste as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

I. Sanitary Holding Tank for ME Building Interior Waste - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Sanitary Holding Tank for ME Building Interior Waste as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE A: EAST HIGHWAY GARAGE/SALT STORAGE FACILITY:

J. Square D - State amount included within the East Highway Garage/Salt Storage Facility (Bid Package A) for the Square D equipment as described in the Plans and Specifications.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE B: MEDICAL EXAMINER OFFICE BUILDING:

B1 - For book keeping purposes the Owner needs to identify the cost of the Medical Examiner Office Building. State amount of all work included within the Medical Examiner Office Building (Bid Package B)

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE B: MEDICAL EXAMINER OFFICE BUILDING:

B2 – Controls State amount included within the Medical Examiner Office Building (Bid Package B) for Section 23 09 23 – Direct digital Control System for HVAC.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

INFORMATIONAL BID PACKAGE B: MEDICAL EXAMINER OFFICE BUILDING:

B3 – Square D State amount included within the Medical Examiner Office Building (Bid Package B) for Square D equipment as specified in section 26 05 11, including motor starters, disconnect switches, panel boards, circuit breakers and transformers.

_____ and _____ /100 Dollars
Written Price

$_____
Numeric Price

UNIT PRICES – BID PACKAGE A

Should more or less work of the following categories be required, adjustment will be made to the contract sum at the following unit prices, which shall include all expenses, transportation, trucking, restocking charges and overhead profit.

UNIT PRICE A: REMOVAL OF SOIL: (EAST HIGHWAY GARAGE/SALT STORAGE FACILITY BID PACKAGE A)

A1: Cut and Haul Additional Unsuitable Soils from Site

Add price for the removal of unsuitable soil where soil testing agency has determined existing conditions are insufficient for the purposes of the project (refer to Section 31 20 00 Earthwork).

- 500 cu. Yds or less: @ $_____/cu.yd.
- 500 cu.yds or greater: @ $_____/cu.yd.

A2: Compacted Backfill

Price per cubic yard of compacted backfill, in place (refer to Section 31 20 00 Earthwork).

- 500 cu. Yds or less: @ $_____/cu.yd.
- 500 cu.yds or greater: @ $_____/cu.yd.

A3: Additional Concrete

Price per cubic yard of additional concrete, formwork and reinforcement (in place) required for additional depth of foundation walls or omitting same (refer to Section 03 30 00 Concrete).

- 500 cu. Yds or less: @ $_____/cu.yd.
- 500 cu.yds or greater: @ $_____/cu.yd.

A4: Well Drilling Depth

Price per foot of additional drilling to achieve suitable well depth or omitting same (refer to Section 33 21 00). @ $_____/ft.

A5: Well Casing Depth

Price per foot of additional 8” grouted well casing required or omitting same (refer to Section 33 21 00). @ $_____/ft.

ADDENDA – BID PACKAGE A

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

Addendum No(s). _____ through _____

Dated _____

Dane County, Department of Public Work, Highway & Transportation must have this project completed by schedule below:

UNIT PRICE B: REMOVAL OF SOIL: (MEDICAL EXAMINER OFFICE BUILDING BID PACKAGE B)

B1: Cut and Haul Additional Unsuitable Soils from Site

Provide price per cubic yard for cutting, loading, hauling and properly disposing off-site additional unsuitable soil encountered beyond the limits shown on the project drawings, as determined by the Engineer or Owner. Cut and Haul Additional Unsuitable Soils from Site volume will be measured jointly in the field by Engineer or Owner and Contractor. Refer to section 31 20 00 Excavation, Backfilling and Compaction.

- 500 cu. Yds or less: @ $_____/cu.yd
- 500 cu.yds or greater: @ $_____/cu.yd.

B2: Furnish and Install Granular Backfill Material

Provide price per cubic yard for providing, placing and compacting granular backfill material to stabilize a soft subgrade in accordance with the project specifications. Granular Backfill Material will be measured based on weight determined by quarry scale or other scale. Refer to section 31 20 00 Excavation, Backfilling and Compaction.

- 500 cu. Yds or less: @ $_____/cu.yd.
- 500 cu.yds or greater: @ $_____/cu.yd.

B3: Furnish and Install 3" Dense Graded Base Material

Indicate cost for providing, placing and compacting 3" dense graded base material to stabilize a soft subgrade in accordance with the project specifications. 3" Dense Graded Base Material will be measured based on weight determined by quarry scale or other scale. Refer to section 31 20 00 Excavation, Backfilling and Compaction.

- 500 cu. Yds or less: @ $_____/cu.yd.
- 500 cu.yds or greater: @ $_____/cu.yd.

ADDENDA – BID PACKAGE B

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

Addendum No(s). _____ through _____

Dated _____

Dane County, Department of Public Work, Highway & Transportation must have this project completed by schedule below:

COMMENCEMENT AND COMPLETION DATES

Bid Package A:
Salt Storage Facility by April 25, 2015
East Highway Garage by December 1, 2015
Bid Package B:
Medical Examiner Office Building by June 24, 2016.
Assuming this Work can be started by March 26, 2015, what dates can you commence and complete this job?

Bid Package A:
Commencement Date: _____ Completion Date: _____
(final, not substantial)

Bid Package B:
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 60 days from date of Award of Contract.

SIGNATURE: _____
(Bid is invalid without signature)

Print Name: _____ Date: _____

Title: _____

Address: _____

Telephone No.: _____ Fax No.: _____

Email Address: _____

Contact Person: _____

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

BID CHECK LIST:
These items **must** be included with Bid:
☐ Bid Form ☐ Bid Bond ☐ Fair Labor Practices Certification

BIDDERS SHOULD BE AWARE OF THE FOLLOWING:

DANE COUNTY VENDOR REGISTRATION PROGRAM

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

DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION

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

EQUAL BENEFITS REQUIREMENT

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

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ADDENDUM 3

EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A) AND MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

BID NO. 313083

ADDENDUM A3 (Bid Package A) and ADDENDUM B3 (Bid Package B):

The following pages are Appendix B for both **East Highway Garage – Salt Storage Facility (Bid Package A)** and **Medical Examiner Office Building (Bid Package B)**

Medical Examiner Facility

CONTRACTOR

By:

Name: _____

Title: _____

COUNCIL:

Dane County Building and Construction Trades Council:

By: Name Dave Branson

Title: Executive Director

Medical Examiner Facility
Signature Page For

Union Name Bricklayers and Allied Crafts Local 13

By: [signature] **Name:** James A Vick **Title:** Field Rep.

Union Name Electricians Local 159

By: [signature] **Name:** Robert P. Doyle **Title:** Business Manager

Union Name Elevator Constructors Local132

By: [signature] **Name:** Steven Ketelboeter **Title:** Business Manager

Union Name Heat & Frost Insulators Local19

By: [signature] **Name:** Gregory Hunt **Title:** Business Agent

Union Name Iron Workers Local 383

By: [signature] **Name:** Tim DeMatt **Title:** BM/FST

Union Name Laborers Local 464

By: [signature] **Name:** Corey McGann **Title:** Business Manager

Union Name Operating Engineers Local 139

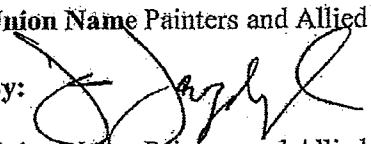
By: **Name:** **Title:**

Union Name Operative Plasterers & Cement Masons Local 599

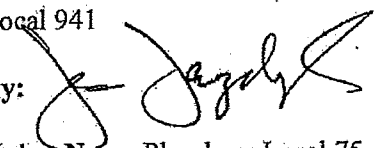
By: [signature] **Name:** Jim Miller **Title:** Business Agent

Medical Examiner Facility
Signature Page For

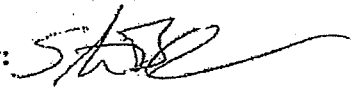
Union Name Painters and Allied Trades District Council No. 7 Painters Local 802

By:  **Name:** Joe Jazdzewski **Title:** Manager

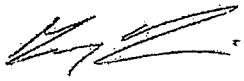
Union Name Painters and Allied Trades District Council No. 7 Glazers & Glassworkers Local 941

By:  **Name:** Joe Jazdzewski **Title:** Manager

Union Name Plumbers Local 75

By:  **Name:** Steve Bratlow **Title:** Manager

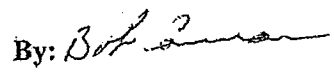
Union Name Roofers Local 65

By:  **Name:** Gerry Ferreira **Title:** Manager

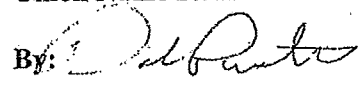
Union Name Sheet Metal Workers Local 18

By:  **Name:** Scott Bartz **Title:** Bus. Rep.

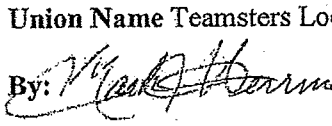
Union Name Fire Sprinkler Fitters Local 669

By:  **Name:** Shawn Broadrick **Title:** BA/Bus

Union Name Steamfitters Local 601

By:  **Name:** Dale Powell **Title:** President

Union Name Teamsters Local 695

By:  **Name:** Mark Herrmann **Title:** Bus. Rep

Medical Examiner Facility
Signature Page For

Union Name Painters and Allied Trades District Council No. 7 Painters Local 802

By: **Name:** **Title:**

Union Name Painters and Allied Trades District Council No. 7 Glazers & Glassworkers Local 941

By: **Name:** **Title:**

Union Name Plumbers Local 75

By: **Name:** **Title:**

Union Name Roofers Local 65

By: **Name:** **Title:**

Union Name Sheet Metal Workers Local 18

By: **Name:** **Title:**

Union Name Fire Sprinkler Fitters Local 669

By: **Name:** **Title:**

Union Name Steamfitters Local 601

By: [signature] **Name:** Kevin Lamere **Title:** Business Manager

Union Name Teamsters Local 695

By: **Name:** **Title:**

Medical Examiner Facility
Signature Page For

Union Name Bricklayers and Allied Crafts Local 13

By: **Name:** **Title:**

Union Name Boilermakers Local 107

By: **Name:** BLAKE TOM **Title:** Business Manager

Union Name Electricians Local 159

By: **Name:** **Title:**

Union Name Elevator Constructors Local132

By: **Name:** **Title:**

Union Name Heat & Frost Insulators Local19

By: **Name:** **Title:**

Union Name Iron Workers Local 383

By: **Name:** **Title:**

Union Name Laborers Local 464

By: **Name:** **Title:**

Union Name Operating Engineers Local 139

By: **Name:** **Title:**

Union Name Operative Plasterers & Cement Masons Local 599

By: **Name:** **Title:**

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ADDENDUM 3

EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A)

BID NO. 313083

ADDENDUM A3 (Bid Package A): The following pages are addendum3 for East Highway Garage – Salt Storage Facility (Bid Package A)

February 25, 2015

ADDENDUM #A3 – BID PACKAGE A

Dane County Bid No. 313083
Madison, Wisconsin

BIDS DUE: TUESDAY, MARCH 3, 2015 AT 2:00 (REVISED) at the Dane County Public Works, Highway & Transportation Dept., 1919 Alliant Energy Center Way, Madison, WI 53713 At that time Bids will be opened publicly for consideration by the Owner.

To all Contract Bidders of record.

This Addendum is issued to modify, explain or correct the original Drawings and Specifications as noted below, and is hereby made a part of the Contract documents. Please attach this Addendum to the Specifications in your possession. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

This Addendum consists of ten (10) written pages, one (1) 8 page updated specification section, and eighteen (18) revised sheets.

GENERAL COMMENTS

1. BIDDERS NOTE: This addendum contains changes with regards to the Hot Water Pipe from Landfill and Heat Exchangers. Please review how this change will affect the base bid, alternate bid, and informational bid.

QUESTIONS & ANSWERS

1. **Q:** I have a question on the tanks that are being called out in Section 11 11 28 Vehicle Fuel Equipment and Canopy. How many fittings do you want in each manway and how many shell fittings do you want? I was looking at the only drawing that I can find that references the tank (A-213) and it doesn't show much detail for the tank. **A:** The fittings will vary depending on the tank manufacturer. Follow the tank manufacturer requirements.

2. **Q:** As I mentioned in the pre-bid meeting, the proposed well for this project classifies as a high capacity well which requires a DNR approval which is a 6 month minimum turnaround. How do you want the well contractor to bid this well without an approved design? Are there any other details for the well other than it is to be 1000' deep and produce 150 gpm, i.e. amount and diameter of casing, pump and motor design, drop pipe, pitless unit design etc.? We can design a well and what we think the well would need for casing but the DNR needs to approve the design submitted in the permit prior to installation. **A**: See information provided in this and previous addenda.

3. **Q:** There are also a number of setback requirements related to a well location required in the approval process. Two major setback requirements that would be related to this project would be a landfill (1200') and a salt storage building (250'). One final thing to look into would be if this facility would require an OTM (Other Than Municipal) Permit . If the well serves more than 25 people more than 6 months out of the year, this permit needs to be applied for and approved prior to installation. From previous projects, we have seen take over 6 months for approval as well. **A**: See information provided in this and previous addenda.

4. **Q:** Section 11 11 28 2.1 S states to "provide concrete island, drive area, and concrete area over tanks as shown on plans." But, the plans do not show a concrete area over the tanks. We agree there should be a concrete tank pad, but would like to see an addendum showing this. **A:** See information provided in this addendum.

5. **Q:** A-213 shows two CNG dispensers (one on each island). The specs call for “diesel / gasoline dispensers" in 11 11 28 2.1 D, but it states "six total dispensers required at the fuel island" and there are only 4 gas/diesel dispensers on the plans. Are the CNG dispensers existing at the landfill and to be moved along with the rest of the CNG system? Or are the specs saying we need new Wayne CNG dispensers? **A:** See information provided in this addendum.

6. **Q:** Section 11 11 28 2.1 K states "fill assemblies shall be 4" galvanized riser" while 11 11 28 3.1 D states to "coat and cathodically protect pipe and fittings, such as fill pipe...". We have not installed galvanized riser pipe for fills. Coat and wrapping carbon pipe is sufficient. **A:** See information provided in this addendum.

7. **Q:** The CNG relocation is in the fuel systems specifications when it is actually a mechanical system most generally installed by a mechanical contractor. **A:** The relocation of the CNG fuel system is correctly stated as work by the Fueling Contractor. There are specialty contractors that will move the system.

8. **Q:** Lastly, who do we bid to for the "Vehicle Fuel Equipment and Canopy" section of the specs. And does it matter in what form we bid to them? We are interested in submitting an "or equal bid" as described in 11 11 28 1.1 B, but would not be as interested in bidding the project with the specified equipment. **A:** The canopy is part of the Fuel System package as specified in 11 11 28.

9. **Q:** At the 60'x10' pad for CNG compressor/storage tanks, will need (12) 6" pipe bollards to protect from traffic. Is that to be part of each fueling contractors design build scope of work? **A:** See information provided in this addendum.

10. **Q:** CNG system will require a seperate 8'x8' concrete pad for the CNG control panel and must be 15' away from compressor. Will need (2) additional 6" pipe bollards to protect it from traffic? **A:** See information provided in this addendum.

11. **Q:** Existing CNG at landfill only has 1 dispenser. Also system not in use. Are there repairs necessary? **A:** See information provided in this addendum.

12. **Q:** Will there be a separate natural gas line brought to the CNG pad from the Garage building in addition to the methane line from landfill provided by the HVAC contractor? **A:** See information provided in this addendum.

13. **Q:** Can we turn underground tanks 90 degrees to make it easier for transport to make deliveries? **A:** See information provided in this addendum.

14. **Q:** Canopy drawing fascia show an extruded bar in middle of fascia. Is this necessary or will 36" flat white fascia be OK? **A:** See information provided in this addendum.

15. **Q:** The Oil or Lube room has no specs or layout for lube equipment. Is there any lube equipment? **A:** Lubrication distribution equipment is part of a future phase. There is no lubrication equipment in this project.

16. **Q:** Primed and painted metal island forms will be rusted out in 5 to 6 years (salt). Can we install hand formed concrete islands instead? **A:** See information provided in this addendum.

17. **Q:** Is there a scope or specification on the type of rack system? There is nothing in the scope of work narrative. **A:** See information provided in this addendum.

18. **Q:** The racking system, can it be a self-ballasting system? If not what method do you require for the installation on the roof? **A:** See information provided in this addendum.

19. **Q:** Have there been any load calculations on the roof to take the weight of the solar system? **A:** Roof structure is designed for a maximum load from the PV System of 5 psf.

20. **Q:** I made a phone call over to the Village of McFarland and was told that the ME & Hwy Garage site is not within their Village. They suggested calling the Town of Cottage Grove, who confirmed the site is within their jurisdiction. Can you please clarify which municipality the site is considered within and what permit/inspection fees bidders should include? **A:** See information provided in this addendum.

21. **Q:** If the Cottage Grove erosion permit has been pulled or if you want the bidders to carry it. At $0.02/sf, I figure it to be $18,720 for the 936,000 SF site. There appears to be some BMPs already installed at the site, so I am wondering if the permit has been pulled. **A:** See information provided in this addendum.

22. **Q:** The Oil or Lube room has no specs or layout for lube equipment. Is there any lube equipment? **A:** Lubrication distribution equipment is part of a future phase. There is no lubrication equipment in this project.

23. **Q:** Is there a qty and spec for the fuel canopy lights? **A:** See Section 11 11 28, Paragraph 2.1 N for canopy lights.

24. **Q:** Please consider the following acceptable manufacturers, requests, and/or comments: Hinges: Ives, an Allegion/Ingersol Rand Company. Locks: Schlage ND series, less core, with Best Access System cylinders. Push/Pull: Ives, an Allegion/Ingersol Rand Company. Kickplates: Ives, an Allegion/Ingersol Rand Company. Weatherstripping, thresholds, door sweeps, gasketing(sound stops): National Guard. Closers: (See attached) The 4040 XP series is the most commonly used closer in the commercial industry. It also allows for multiple options as far as what type of function it can have i.e. EDA, PA, HEDA, CUSH, SCUSH, etc. **A:** See information provided in this addendum.

25. **Q:** On the door schedule it has a column for notes that has specific number values, but does not give further elaboration as to what the note is for. Some of the lockset types that are given as descriptors are not used in the hardware groups, i.e. privacy function for the bathrooms, or storeroom function for storage/equipment. **A:** Under the “Notes” column of the Hardware Schedule, the keynote number appears the first time a note is made. After that, the keynote only appears referencing that note applies. The Lockset Types are typical details. Not all lockset types are necessarily used.

26. **Q:** Jeff McCarthy at Alliant Energy is stating that Alliant Energy estimates the natural gas service installation fee to be +/-$100,000 due to the distance from the point of connection. Should this cost be included in bids? Will it be made known to all bidders? Spec Section 22 05 00 includes a requirement for local utility charges for water, sewer, and gas to be paid by the contractor. However, this is ambiguous as the Plumbing subcontractor will not be installing any gas piping as it is shown on the “M” drawings for installation by the mechanical subcontractor. Please clarify in addendum. **A:** See information provided in this addendum.

27. **Q:** One of our dealers was putting together a bid for the project below, and noticed that Clopay was not listed on the spec. He then got in touch with me, and I wanted to drop you a quick note to let you know a little bit about Clopay and request that we be added as an alternate. **A:** Clopay is an acceptable manufacturer provided the product meets or exceeds the specification.

28. **Q:** You mentioned today that the power for the new pump & heat exchanger enclosure was shown on the prints. I cannot find the connection to the MG&E service that was mentioned. Can you please clarify where that is shown in the documents? **A:** See information provided in this addendum.

29. **Q:** It is not overly clear on the documents who is to provide the new skid-mounted enclosure for the pumps and heat exchanger. The outline is grayed out on the drawing but there is a note that says "new ". Is that something the bidders should be including? Is it provided by the county? **A:** See information provided in this addendum.

30. **Q:** Sheets C-104 & M-001: Assuming the division 23 contractor is to provide the gas line shown on M-001 that appears to end at the HHWS&R expansion loop west of CTH AB please provide a specification. **A:** See information provided in this addendum.

31. **Q:** Please confirm that the crushed limestone interior fill applies to the slab base course and not the fill between existing grade and base course. **A:** That is correct. You must meet all compaction requirements for engineered fill.

32. **Q**: Is it acceptable to borrow fill material from on site? **A:** Review Sheet C-108 for all future work. Any borrow pits shall not interfere with future buildings or paving.

SPECIFICATIONS

Table of Contents

1. ADD 'Section 26 90 00 – Solar PV System' to the Table of Contents.

Section 01 10 00 – Summary of Work

1. Paragraph 1.1 D.3 – Please note the following:
    a. The address for the project is McFarland. The Authority Having Jurisdiction for the project is the Town of Cottage Grove. All necessary Building Permits and Fees are to be obtained and paid for by the Contractor unless noted otherwise.
    b. The Contractor is NOT required to acquire and pay for the Town of Cottage Grove Erosion Control Permit. Erosion control is covered by Dane County Permit listed below.
    c. The following permits have been obtained for the project.
        i. Dane County – Shore land Erosion Control Permit
        ii. Dane County - Storm water Permit
        iii. DNR – Notice of Intent

Section 01 23 00 – Alternates and Informational Bids

1. Paragraph 2.1 A – Alternate Bids
    a. ADD Item 10 – Alternate Bid #10 – Alternate Piping for Hot Water Pipe from Landfill and Heat Exchangers.

2. Paragraph 2.2 B – Alternate Bids
    a. ADD Item 10 – Alternate Bid #10 – Alternate Piping for Hot Water Pipe from Landfill and Heat Exchangers.
        i. Description: Alternate system layout for the installation and control of underground piping and pumps on the waste heat system. Work as shown on Sheets M-002, M-202, M-300, M-301a, E101A, and E-212 included in this addendum. Alternate design is the former base bid design.

3. Paragraph 2.2 C.6 – Informational Bid F: This informational bid is to include the cost for the base bid system as revised in this addendum.

Section 03 30 00 – Cast in Place Concrete

1. Paragraph 5.3.6 – Aquapel by L&M Construction Chemicals will be an acceptable substitute for Ashford Formula.

2. Paragraph 5.3.6 – Seal Hard by L&M Construction Chemicals will be an acceptable substitute for Lapidolith.

Section 08 11 00 – Hollow Metal Doors and Frames

1. Paragraph 2.3 B.2.c – Fill spaces between stiffeners with polyurethane for exterior metal doors.

Section 08 71 00 – Hardware

1. Paragraph 2.1 C: Closures shall be LCN 4040 XP Series or equal from Norton. Provide Special Rust Inhibitor to door closure at the Salt Shed service door.

2. Paragraph 2.2: The following manufacturers are acceptable:
    a. Push Pull: Ives
    b. Thresholds: National Guard Products
    c. Hinges: Ives
    d. Weatherstripping: National Guard Products
    e. Kickplates: Ives
    f. Locksets: A Schlage ND series, less core, with Best Access System cylinder will be acceptable.

Section 11 11 28 – Vehicle Fuel Equipment and Canopy

1. Paragraph 1.1 D – Note the following clarifications regarding the relocation of the existing CNG station:
    a. All equipment to be relocated is currently on the west side of the landfill.
    b. The existing BIOCNG cleanup equipment is being relocated to the east side of the landfill near the gen sets shown on Sheet M-001. This work will be done by the Owner.
    c. The existing BIOCNG storage tanks, BIOCNG compressor skid, control panel, and CNG fueling dispenser is being relocated to the Highway Garage site as shown on Sheet A-213. This work is to be done by the Fuel Contractor.

d. The CNG piping shown on Sheet M-001 will be run with the other lines by the Site Utility Contractor and stubbed to the fuel dispensing site. Final connections on both ends are by the Fuel Contractor. See notes on Sheet A-213.
e. New CNG dispenser is to be a dual hose type, Angi Series II or equal with fueling nozzle Type TK17 CNG. Include Part Numbers: 700-08210, 700-08211, 303-07361, and 303-07362.
f. Existing CNG storage tanks on the west side of the landfill are currently full of CNG. These tanks must be drained by the Fuel Contractor prior to moving.

2. Paragraph 2.1 C – Specification states "Six (6) total dispensers required at the Fuel Island." To clarify, two dispensers are for unleaded, two dispensers are for diesel, one dispenser is an existing CNG dispenser, and one dispenser is a new CNG dispenser. See Sheet A-213, revised as part of the addendum.

3. Paragraph 2.1 K – Coated and wrapped carbon pipe is acceptable.

4. Paragraph 2.1 Q – Island forms shall be stainless steel in lieu of primed and painted steel.

5. Paragraph 2.1 R – Bumper guard sets shall be stainless steel in lieu of primed and painted steel.

Section 21 05 00 – Common Work Results for Fire Suppression

1. On Page 3, add the following under System Description:
   a. Contractor shall include the filling of underground Fire Protection System water supply tank with clean fresh chlorinated water from a municipal water system.
   b. Contractor shall supply clean fresh chlorinated water from a municipal water system for testing of pump and FP system in Public Works Building.
   c. Contractor shall supply clean fresh chlorinated water from a municipal water system to keep buried water tank full as soon as tank is installed and thru-out construction, buried tank shall be full when Owner takes occupancy of Building.

Section 23 09 93 – Sequence of Operations for HVAC Controls

1. Updated sequence of operation for waste heat loop system. See specification section attached to the addendum.

Section 23 11 00 – Facility Fuel Piping

1. Add the following section:
   a. **NATURAL GAS SERVICE –** Owner to pay and provide natural gas service to the building. Contractor shall provide gas load and exact meter location requirements to the owner for gas service installation. Temporary gas service remains the responsibility of the Contractor.

Section 26 90 00 – Solar PV System

1. Paragraph 3.3 Modules: Note the following regarding mounting:
   a. Modules shall be mounted on a self-ballasting rack system. Roof structure is designed for a maximum load from the PV System of 5 psf.
   b. Rack system shall be installed to allow for free flow of water below mounting pads for roof drainage.

Section 28 31 00 – Fire Detection and Alarm

1. Paragraph 2.1 – Manufacturers: Add the following:
    a. Gamewell-FCI as an approved fire alarm system manufacturer. Submitted fire alarm equipment must be equal or exceed specified system on drawings and specifications.

Section 33 21 00 – Well System

1. At SCOPE, Change the Well requirements to:
    a. Drop will be SCH 40 galvanized steel pipe.
    b. Well will have Commercial Pitless adapter with pipe support bracket

2. At REFERENCE STANDARDS, Note the following:
    a. Well shall be designed Per NR 809 & NR812.
    b. The well will be more than 1200 ft from the Landfill.
    c. The well will be more than 250 ft from the salt storage building.
    d. DNR Well permit will be obtained by Owner, not the Well Contractor.

DRAWINGS

Sheet 1.0 – Title Page

1. The address for the project is McFarland. The Authority Having Jurisdiction is the Town of Cottage Grove.

Sheet A-101 – Master Site Plan

1. Revised sheet showing revised details for CNG and Waste Loop Piping.

Sheet A-213 – Fuel Island Plans

1. See revised sheet included in this addendum for revisions and clarifications to the fuel island area.

2. Elevations: Additional extruded canopy band shown is not necessary. A 36” flat fascia panel is acceptable. Panel color to be from manufacturer’s standard range, tan or beige.

3. Underground fuel tanks have been rotated 90 degrees.

4. Install concrete pavement in the fuel island area in lieu of asphalt paving shown. See revised Sheet A-213.

5. Concrete pad under relocated CNG equipment shall be as detailed on revised Sheet A-213. The same pad detail shall apply to the backup generator pad and control panel pad.

6. Provide twelve (12) 6” pipe bollards per Detail 14/A-502 spaced equally along the edge of the CNG equipment pad to protect from traffic. Provide two (2) 6” pipe bollards at CNG Control Panel Pad. This work is to be done by the Fuel Contractor.

7. Of the two CNG dispensers shown, one shall be a new dispenser; one shall be an existing dispenser. Existing dispenser shall be relocated from the adjacent landfill.

8. Complete startup of the existing CNG system will be the responsibility of the Fuel Contractor. Any damage or disrepair as a result of the system being unused for the past twelve months will not be the responsibility of the Fuel Contractor.

9. Natural Gas service with a separate meter will be provided to the fuel island area as shown on Sheet A-213.

Sheet A-402 – Wall Sections

1. Detail 3 – Wall Section. See added detail to this sheet for steel support of sectional door track. See revised sheet included in this addendum.

2. Detail 6 – Added detail for steel support of sectional door track. This detail occurs wherever sectional door track passes in front of a window. See revised sheet included in this addendum.

Sheet P-202 – Plumbing Office Plan

1. Drawing 1, DWH 5 is supplied by HVAC Contractor; Plumber to pipe.

Sheet M-001 – Mechanical Site Plan - Base

1. New base bid primary secondary pumping arrangement for waste heat piping. Former arrangement is now Alternate #10.

2. Plan showing natural gas piping to be installed by mechanical site contractor from landfill to CNG fill station.

3. Plan has been updated to reflect current grades. Previous plan reflected future grades.

Sheet M-002 – Mechanical Site Plan – Alternate #10

1. Former base bid underground piping arrangement is shown as Alternate #10.

2. Plan showing natural gas piping to be installed by mechanical site contractor from landfill to CNG fill station.

3. Plan has been updated to reflect current grades. Previous plan reflected future grades.

Sheet M-003 – Site Piping Details

1. Site piping details relocated to Sheet M-003.

Sheet M-202 – Mechanical Mezzanine Floor Plan

1. New pump P-13a shown on HX1 enlarged plan.

2. Waste Loop Bypass valve shown on building heating secondary loop.

Sheet M-300 – Mechanical Schedules

1. Pump schedule has been updated.

2. Heat exchanger schedule has been updated for outside installation of HX2 and HX3.

Sheet M-301 – Mechanical Details

1. Primary secondary pumping arrangement schematic.

2. Revised sequence of operations for base bid primary secondary pumping.

Sheet M-301a – Alternate Pumping Pipe Schematic

1. Alternate #10 system schematic.

2. Sequence of operations revised to add waste loop bypass and remove Pump P-9.

Sheet E-101 – Electrical Site Plan

1. Moved north parking lot pole at west parking lot south. Center of parking lot pole shall be 4' from parking lot.

Sheet E-101A – Waste Heat Loop Electrical Site Plan

1. NEW SHEET showing the following:
    a. Revised pump enclosure locations and fiber optic control conduit and in-ground box locations. Base bid work to be included in Informational Bid F.
    b. Alternate pump enclosure locations and fiber optic control conduit and in-ground box locations. Alternate work to be included in Alternate Bid 10.

Sheet E-205 – Office and Small Vehicle Storage Power and Systems Plan

1. Base Bid and Alternate Bid #10: Pump P-9 to be removed. Pump P-13A to be added.

Sheet E-210 – Fire Pump Building Plan, Emergency Generator

1. Revised Detail 2 shows revised metering for the highway facility building. The Highway Facility metering was changed to a termination compartment with metering. See revised sheet included in this addendum.

2. Revised Detail 3 shows revised metering for the fire pump building. The 400 Amp fused disconnect was removed and a 200 Amp meter was added. See revised sheet included in this addendum.

Sheet E-212 – Waste Heat Loop Pump Enclosure

1. Revised Sheet showing the following:
    a. Revised Informational Bid "F" pump enclosure electrical. Pump enclosure will have a new 480V service from MG&E. Distribution equipment changed for a lower Amps interrupting rating.

Sheet E-213 – Waste Heat Loop Pump Enclosure

1. New Sheet showing Alternate Bid #10 pump enclosure electrical.

Sheet E-503 – Schedules, Details

1. Revised one-line for revised Highway Facility and Fire Pump Building metering. See revised sheet included in this addendum.

2. Pump P-9 to be removed. Pump P-13A to be added.

Sheet E-504 – Schedules, Details

1. Pump P-9 to be removed. Pump P-13A to be added.

* * * * * * * *

SECTION 23 09 93
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

P A R T 1 - G E N E R A L

SCOPE
This section includes control sequences for HVAC equipment as well as equipment furnished by others that may need monitoring or control. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Description of Work
- Submittals
- Design Criteria

PART 2 - PRODUCTS
- Not Applicable

PART 3 – EXECUTION
- Central VAV Air handler with DX Coil
- Exhaust Fans
- CO/NO2/Methane Detection System
- Energy Recovery Unit
- Direct Fired Make up air units
- Louvers
- Hot Water Boilers
- Heating Water Pumps
- Radiant Floor
- Hydronic Cabinet and Suspended Unit Heaters
- Generator Indirect Fired Water Heater
- Indirect Water Heater
- IT Room Cooling Unit

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.
Section 23 0593 - Testing, Adjusting, and Balancing for HVAC - Coordination
Division 23 - HVAC - Equipment provided to be controlled or monitored
Division 26 - Electrical - Equipment provided to be controlled or monitored
Division 28 - Electronic Safety and Security

REFERENCE
Section 23 09 14 work includes furnishing and installing all field devices, equipment, and all related field wiring, interlocking control wiring between equipment, pneumatic tubing, sensor mounting, etc., that is covered in that section.

Motorized control dampers and actuators, thermowells (temperature sensing wells), automatic control valves and their actuators are also covered in Section 23 09 14.

DESCRIPTION OF WORK
Control sequences are hereby defined as the manner and method by which automatic controls function. Requirements for each type of operation are specified in this section.

Operation equipment, devices and system components required for automatic control systems are specified in other Division 23 control sections of these specifications.

All temperature, humidity, and pressure sensing, and all other control signal transportation for the control sequences shall be furnished under Section 23 09 14. All pneumatic, electronic, and

electric input/output signals shall be extended under Section 23 09 14, with adequate lead length for termination within the appropriate control panel being provided under Section 23 09 23.

Sequences for equipment controlled by pneumatic or electric self-contained controls are accomplished by hardware provided under Section 23 09 14.

SUBMITTALS
Refer to Division 1, General Conditions, Submittals, Section 23 05 00 and Sections, and 23 09 14 for descriptions of what should be included in the submittals.

Shop drawings shall be provided by contractor(s) providing equipment under 23 09 14. The contractor providing the 23 09 14 equipment shall provide a complete narrative of the sequence of operation for equipment that is controlled directly from that equipment (without control logic through the DDC system). The narrative of the sequence of operation shall not be a verbatim copy of the sequences contained herein, but shall reflect the actual operation as applied by the contractor.

DESIGN CRITERIA
Reference Section 23 09 14.

P A R T 2 - P R O D U C T S

Not applicable to this Section – reference Sections 23 09 14 for product descriptions.

P A R T 3 - E X E C U T I O N

CONTROL SEQUENCES
CENTRAL VARIABLE VOLUME AIR HANDLER WITH DX COIL
The control system shall be able to limit adjustability from 0F to +/-5F. The contractor shall provide a minimum of 4hours of training to maintenance staff on use and maintenance of the VVT system. After system has been in operation for a least 3months, but not longer than 6months this contractor shall schedule 4hrs of controls system training and troubleshooting.

The VAV system shall integrate completely with the DDC system, all points of the operation sequence shall be visible in the DDC system. Provide a VAV zoning system to accomplish the following sequences of operation:

The air handling unit shall be controlled to provide 57F(Adjustable) leaving air temperature. The control system shall have the ability to "poll" the VAV zones for damper position and discharge air temperature. The system shall reset the static pressure setting to the minimum pressure required so at least one VAV damper has a position of greater than 75%open. The discharge air temperature shall adjust between 55°F minimum and 65°Fmaximum to satisfy at least 1 zone from using reheat. The discharge air temperature shall be limited to 60°F max when the OA temp is above 60°F.

VFD Pressure Control:
The pressure controller shall be capable of reading supply static pressure and controlling the supply fan speed to maintain the supply static set point (1.0”SP 2/3 down duct stream). The static pressure sensor shall be located approximately 2/3 down the supply duct system. The BAS shall have the capability of displaying system static pressure, duct temperature, pressure set point and VFD speed.

Dry bulb economizer logic shall be enabled to monitor RA, OA and SA temperatures and open/close outside air damper to provide space cooling with a percentage of OA higher than the minimum. The AHU shall modulate return and outside dampers along with DX cooling coil stage to maintain discharge air temperature. The economizer control shall be integrated with the

cooling coil to energize the cooling and open the outside air damper when the OA temp is less than the return air temp.

Occupied mode: the fan shall run continuously and the outside air damper shall be open to the minimum position. DX cooling shall be energized and staged to maintain discharge air setpoint. Economizer sequence shall be enabled.

Unoccupied mode: The fan shall operate intermittently to satisfy unoccupied temperature settings and OA damper shall be closed. Dry bulb economizer shall be available. Include morning warm up/cool down cycle to change unoccupied temperature settings to occupied temperature settings 1hr(adjustable) prior to start of occupied time. During morning warm up/cool down the OA damper shall remain closed. If radiant heating alternate is accepted the unoccupied heating setpoint shall be maintained by the infloor radiant system.

Include an unoccupied mode override button on the sensor that can switch system into occupied mode for 2hrs(adjustable) during unoccupied mode.

A freezestat shall be positioned in the mixed air portion of the air handler. If the mixed air temperature is below 32°F the unit shall go into unoccupied mode and an alarm shall be sent through the BAS.

ENERGY RECOVERY VENTILATOR

ERV-1 supply and exhaust fans shall be interlocked with fan occupied mode of the AHU-1. Additionally the supply and exhaust fans shall be interlocked with the lighting occupancy sensors in Women's 130-A and Men's 135-A, 135-B. When the locker room spaces are occupied the supply and exhaust fans shall be energized. When the locker room spaces are not occupied the ERV shall be off independent of the occupied mode of the AHU. When the AHU is in economizer mode the ERV supply fan shall be indexed off and the exhaust fan shall remain on to relieve economizer air. If the air handler is in unoccupied mode and the ERV goes into occupied mode the air handler shall be indexed into occupied mode for the same time period as the ERV.

VAV BOXES WITH HOT WATER REHEAT

Provide a DDC temperature sensor in location shown on plans to control, in sequence, a modulating electronic control valve for the hot water reheat coil, and an actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum airflow position. After the air terminal damper is at its minimum airflow, the hot water valve shall modulate open to maintain space temperature. When the hot water valve is fully open, the terminal unit damper shall modulate open to the maximum heating air flow setpoint. The reverse shall occur when space temperature is above setpoint.

Provide separate adjustable minimum and maximum airflow setpoints for both heating and cooling modes in the occupied mode and a separate set of setpoints for the unoccupied mode. Airflow setpoints shall be set as scheduled on the plans and specifications.

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

Provide a programmed closing of each air terminal and auto-zero of the differential pressure sensor used for measuring air flow. For air handling units that run continuously, the scheduled time of day for accomplishing this shall be staggered to allow the air handling unit to continue to run normally.

The VAV terminals serving Women's 130-A and Men's 135-A, 135-B shall be interlocked with the lighting occupancy sensors for the spaces. The airflow shall close to no airflow when the spaces are unoccupied. When the spaces are occupied the airflow damper shall be at the minimum positions or modulated to maintain the heating or cooling setpoint.

EXHAUST FANS

All interlocking, operation, and/or monitoring of exhaust fans shall be performed by DDC system.

Exhaust Fan (PRV-1,2) Small Vehicle garage emergency exhaust fans shall be interlocked with alarm mode of vehicle storage garage CO/NO2/NG gas detection system. Upon detection of toxic or flammable gases beyond setpoint the fans shall energize.

Exhaust Fan (PRV-3) Small Vehicle exhaust shall operate 24/7

Exhaust Fans (PRV-4,5) Large Vehicle garage emergency exhaust fans shall be interlocked with the CO, NO2, and natural gas detection system. Upon detection of toxic or flammable gases beyond setpoint the fans shall energize.

Exhaust Fan (PRV-6) Large Vehicle exhaust shall operate 24/7

Exhaust Fans (PRV-7,8) Large Vehicle garage emergency exhaust fans shall be interlocked with the CO, NO2, and natural gas detection system. Upon detection of toxic or flammable gases beyond setpoint the fans shall energize.

Exhaust Fan (PRV-9) Large Vehicle exhaust shall operate 24/7

Exhaust fan (PRV-10) serving the weld repair bay shall be energized by the methane detection system with methane is sensed more than 1% natural gas in the space.

Exhaust fan (PRV-11) serving the oil distribution room shall operate 24/7

Exhaust fan (PRV-12) serving the weld bay exhaust shall be operated during occupied hours of the weld bay 1245. PRV-12 shall be shut off when PRV-10 is energized.

Exhaust fan (EF-1) serving the source capture vehicle exhaust shall be provided with a wall mounted manual push button switch.

Exhaust fan (EF-2) serving the elevator equipment room shall be interlocked a reverse acting thermostat set to 80F.

Sidewall Exhaust fan (SEF-1,2,3,4) shall be controlled by a wall switch located at the entrance door of the salt shed.

CO/NO2/Methane DETECTION SYSTEMS

CO/NO2/Methane detection system shall have 3 detections levels

1. Normal operating condition
2. Alarm condition 1 shall energize garage exhaust fans interlocked with the system
3. Alarm condition 2 shall continue exhausting the garage and an audible alarm.

Any sensor located in a garage shall be interlock with all exhaust fans in that garage.

Interlock gas detection system in the welding bay with the receptacles for welding equipment, coordinate with the electrical contractor for interlock.

DIRECT FIRED MAKE UP AIR UNITS

Make up air unit MUA-1 shall be interlocked with CO/NO2/NG detection system in large vehicle storage garage. The burner shall be controlled by a discharge air sensor mounted in the discharge air plenum. The discharge air shall be held at 70°F(adjustable). The Make up air unit shall be equipped with a VFD for building pressurization and soft start operation. Building pressure shall be adjusted by increasing the VFD speed upon operation of exhaust fans in the Small Vehicle and Large vehicle storage garages. The VFD speed shall be adjusted during final balancing to maintain a slightly negative pressure (-0.02--0.05"wc) during alarm mode and slightly positive pressure during normal operation (+0.02-+0.05"wc). For softsart operation the VFD shall be programmable to slowly ramp up to full speed within 30seconds of control signal to start.

Make up air unit MUA-2 shall be interlocked with CO/NO2/NG detection system in large vehicle storage garage. The burner shall be controlled by a discharge air sensor mounted in the discharge air plenum. The discharge air shall be held at 50°F(adjustable). Make up air unit shall be equipped with a VFD for soft start operation. The VFD shall be programmable to slowly ramp up to full speed within 30seconds of control signal to start.

Make up air unit MUA-3 shall be interlocked with operation of exhaust fans PRV-12 to operate when the weld bay is occupied. The hot water coil shall be controlled by a discharge air sensor mounted in the supply duct downstream of the coil. The discharge air shall be held at 70°F(adjustable). The hot water coil shall be the first stage of heat. The control system shall energize the gas heating in the make up air unit when the discharge air temperature is below 40°F and operate until the discharge air reaches setpoint. The gas heat shall modulate the make up air unit leaving air temperature to a setpoint of 35°F when the OA temperature is below 40°F. Include an extended purge cycle time of 1 minute below burner can engage. Provide low leakage discharge damper with end switch to operate fan. If the coil discharge air temperature is below 30°F then the MUA shall turn off, the discharge damper shall close and an alarm shall sound. MUA-3 high fan speed shall be interlocked with the operation of PRV-10. When the welding bay is unoccupied MUA-3 shall be off unless PRV-10 is operating. Then the outside air temp is below 35°F and the make up air unit is off the coil valve shall remain open for freeze protection.

Make up air unit MUA-4 shall run 24/7 to maintain building pressure. The MUA shall also be interlocked with CO/NO2/NG detection system in small vehicle storage area to increase fan speed during alarm. The burner shall be controlled by a discharge air sensor mounted in the discharge air plenum. The discharge air shall be held at 70°F(adjustable). The Make up air unit shall be equipped with a VFD for building pressurization and soft start operation. Building pressure shall be adjusted by increasing the VFD speed upon operation of exhaust fans in the Small Vehicle storage garage. The VFD speed shall be adjusted during final balancing to maintain a slightly negative pressure (-0.02--0.05"wc) during alarm mode and slightly positive pressure during normal operation (+0.02-+0.05"wc). For softsart operation the VFD shall be programmable to slowly ramp up to full speed within 30seconds of control signal to start.

Interlock operation of make up air units with fire alarm. When building is in fire alarm, shut down all make up air units.

LOUVERS

Salt shed louvers shall have motorized dampers that interlock with the operation of the exhaust fans. The louvers shall open when the exhaust fans are energized and close when the fans are off.

HOT WATER BOILER

The hot water boiler shall be the backup source of heat in the event when the heat recovery system cannot maintain the secondary loop temperature. The Boiler shall be engaged to maintain Secondary loop temperature at 180F.

HEATING WATER PUMPS

Pump P-1 and P-2 shall be interlocked with boiler operation. 1 pump for each boiler and shall be interlocked the boiler the pump serves.

Pump P-3, P-4(Secondary Loop Pump) shall run in a lead lag sequence. The lead pump sequencing shall be variable based on the runtime of the pump. The lead pump shall be switched when the operating hours have reached 80hours(adjustable). The lead pump shall be energized when a call for heat comes from the Hydronic terminal units, VAV Boxes, or radiant zone sensor. The speed control on the pump shall modulate the pump speed to maintain a control pressure at the remote pressure sensor of 10psi(adjustable).

Pump (P-5) and (P-6) see radiant floor sequence of operation
Alt#10 Pump P-7,8(Buried piping side Waste Heat Exchanger) pumps shall run in a lead lag sequence. When either the highway building or future medical examiner building is calling for heat the lead pump shall be energized. The lead pump sequencing shall be variable based on the runtime of the pump. The lead pump shall be switched when the operating hours have reached 80hours(adjustable). The lead pump shall run and vary the VFD to maintain a differential pressure at the highway building heat exchanger of 10psi

Pump P-10 (Indirect water heater) shall energize when the domestic water tank falls below setpoint of 115°F. The pump shall shut off when the tank has reaches a setpoint of 120°F.

Pump P-7a (Secondary underground loop pump) When either the highway building or future medical examiner building is calling for heat the pump shall be energized. The pump shall be provided with a VFD. The pump shall operate at half flow when only 1 building is calling for heat.

Pump P-13a(Hwy Building Side Waste Heat exchanger pump) shall energize on a call for heating or domestic hot water from the building. The pump shall energize and increase the VFD to high speed for 5minutes or until the supply water temperature sensor is above 180°F. If the hwy building heating loop return water temperature is higher than the waste heat loop supply water temperature the pump shall shut down(see HX1 sequence). If the hwy building heating loop return water temperature is lower than the waste heat loop supply water temperature the pump shall modulate to its minimum speed, the 2-way bypass valve shall close to send the highway building secondary loop water through the heat exchanger then the VFD shall modulate to maintain the highway building secondary loop at 180°F.

Pump P-11a (HX2 generator HX waste heat loop primary pump) shall energize to maintain the waste heat loop temperature setpoint of 207°F. The pump shall not energize unless pump P-7a is energized.

Pump P-12a (HX2 generator HX waste heat loop primary pump) shall energize to maintain the waste heat loop temperature setpoint of 207°F. The pump shall not energize unless pump P-7a is energized.

RADIANT FLOOR

Vehicle storage and parts areas: The radiant floor zone shall be controlled with a room temperature sensor and a slab temperature sensor. There shall be 1 slab temperature sensor for and air temperature sensor for each manifold. The room thermostat shall be set to 65°F (adjustable). The slab sensor shall shut off the zone valve if the slab temperature is above 80F.

Office areas: The radiant floor shall serve a floor warming for the areas served by air system heating and cooling. The slab sensor shall maintain 70°F slab temperature when the outside air temperature is below 35°F. There shall be 1 slab temperature sensor and air temperature sensor for each manifold. On a call for heating from the air sensor the slab temperature shall increase until air temperature sensor is satisfied or the slab temperature reaches 80°F. When the slab temperature has reached 80°F the manifold valve shall close and the hot water reheat valve on the VAV zone shall open to meet zone heating setpoint.

Circulation Pump: When a radiant zone calls for heating pump (P-4) shall energize. . The speed control on the pump shall modulate the pump speed to maintain a control pressure at the remote pressure sensor of 10psi.

Injection Pump: Pump P-5 shall be energized to maintain the radiant heating loop temperature at 120°F. Pump P-5 shall operate when flow has been proven on the radiant floor circulation loop.

HYDRONIC CABINET AND SUSPENDED UNIT HEATERS

Provide DDC sensor as shown on the plans. When temperature is below setpoint the 2-way or 3-way control shall open to let hot water into the coil. An Aquastat on the return piping downstream of the coil and control valve shall energize the fan when temperature is above 120^0F.

HEAT EXCHANGERS

BUILDING WASTE HEAT EXCHANGER (HX1) - Pump P-13a shall be provided with a VFD. On a call for heat in the hwy building heating loop pump P-13a shall energize. See pump P-13a sequence for specific operation the pump shall modulate to maintain the heating loop at 180°F.

GENERATOR HEAT EXCHANGERS (HX2,3) - The generator side 3-way control valve shall modulate open to maintain a maximum of 207°F, water temperature returning to the generator water jacket. When the leaving water temperature rises above 200°F the 3-way valve shall open to the the fluid cooler. When the jacket return water temperature drops below 200°F the valve shall open to the heat exhanger. The generator side 3-way valve shall fail open to the fluid cooler.

FLUID COOLER STAGING – Each fluid cooler shall be provided with staging controls to sequence fan speed operation on the fluid cooler. When the water temperature returning to the generator from the 3-way valve is above 190°F the low speed shall be energized. When the water temperature leaving the fluid cooler is above 150°F the high speed shall be energized.

Alt #10HEAT EXCHANGERS

Alt #10 - BUILDING WASTE HEAT EXCHANGER (HX1) - waste heat loop side temp control Waste heat loop temp control - The 2-way control valve on HX1 waste heat side shall be controlled by the main building heating loop temp sensor downstream of the HX1 connection to the main building heating loop. When the main heating loop is below setpoint the valve shall open when the main heating loop is above setpoint the valve shall close. The valve shall be interlocked with the bypass control valve. When the bypass control valve is open(diverting the main building heating loop water from the HX1 loop) the control valve shall close.

Alt #10 - Waste heat loop bypass control - When the return water temp sensor on the building heating loopthe HX1 building loop is below the supply water temp from the underground loop of HX1. The control valve shall close and allow the main building heating loop water to circulate through HX1. When the return water temp sensor on the building heating loop is above the supply water temp on the underground loop of HX1. The control valve shall open and bypass the heat exchanger.

Alt #10 GENERATOR HEAT EXCHANGERS (HX2,3) - The generator side 3-way control valve shall modulate open to maintain 207°F leaving water temperature on the generator side of the heat exchanger. When the leaving water temperature rises above 207°F the 3-way valve shall divert water to the fluid cooler to maintain 207°F leaving water temp on the heat exchanger. When the leaving water temperature falls below 207°F the valve shall divert all of the water through the heat exchanger. The generator side 3-way valve shall fail open to the heat exchanger. See the sequence of operation for pumps P-7,8 for the underground piping side of the heat exchanger control sequence. The underground piping side of the heat exchanger shall be balanced to 200GPM/heat exchanger at full flow.

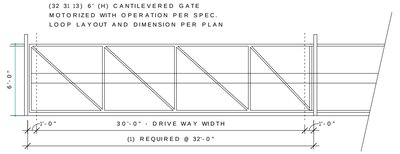
INDIRECT WATER HEATER

Indirect water heater pump shall energize when the domestic water tank falls below setpoint of 120°F. The pump shall shut off when the tank has reached setpoint.

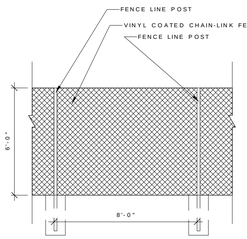
IT ROOM COOLING UNIT

Provide integral thermostat with remote control setpoint adjustment. Install temp sensor from BAS in IT room to monitor space temp. Provide BAS alarm when space is above 80°F.

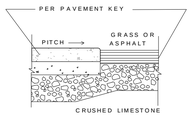
END OF SECTION 15940



2 Cantilever Gate Detail
1/8" = 1'-0"

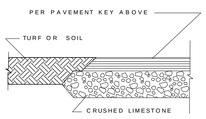


3 Typ. Fence Section - Elevation
1/4" = 1'-0"



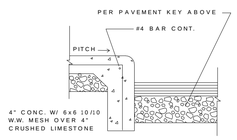
Asphalt @ Concrete

4 Typical Site Edges - Asphalt @ Concrete
3/4" = 1'-0"



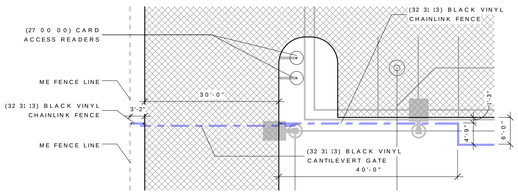
Asphalt @ Topsoil

5 Typical Site Edges - Asphalt @ Topsoil
3/4" = 1'-0"

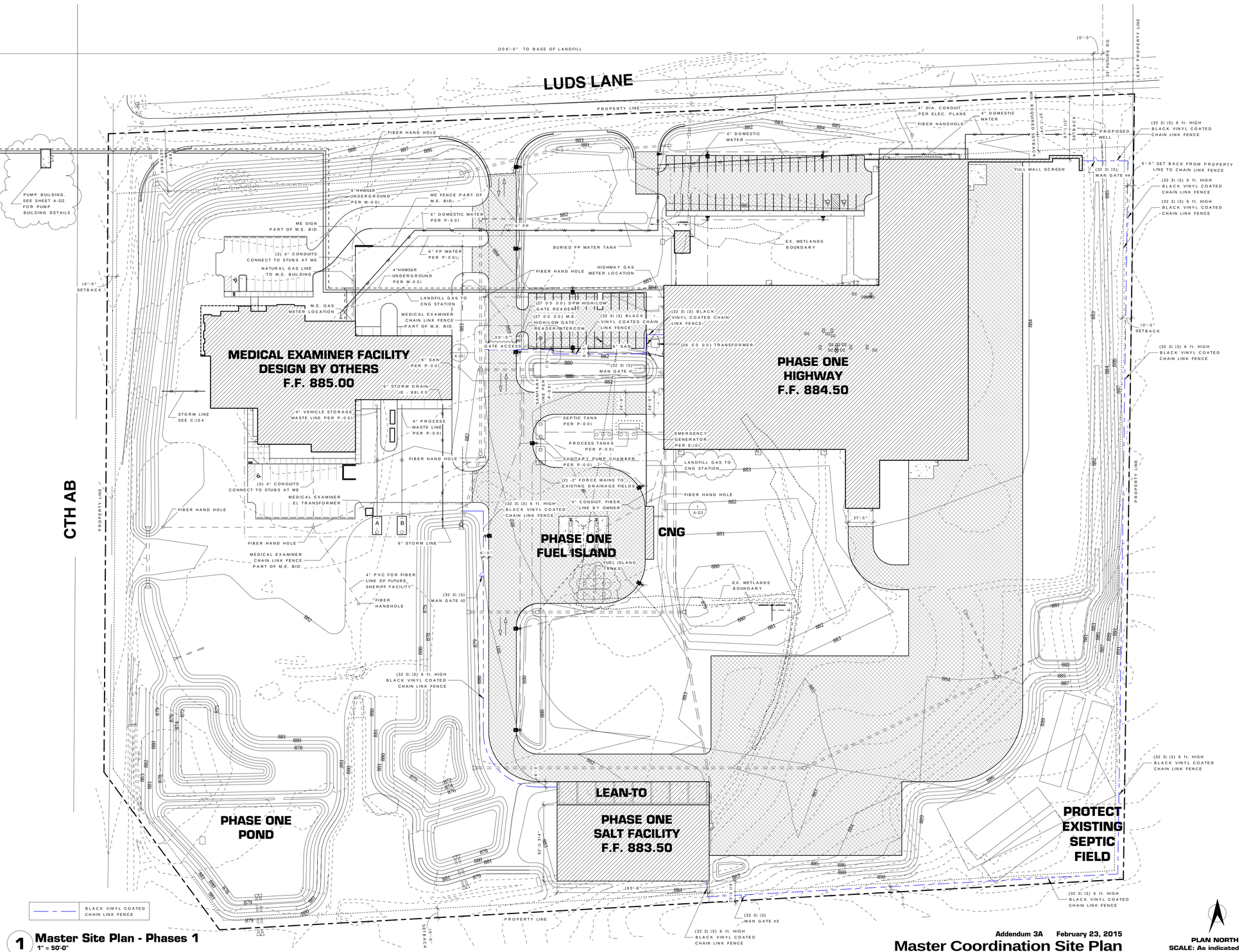


Walk @ Asphalt

6 Typical Site Edges - Walk @ Asphalt
3/4" = 1'-0"



7 Gate Enlarged Plan
1/16" = 1'-0"



1 Master Site Plan - Phases 1
1" = 50'-0"

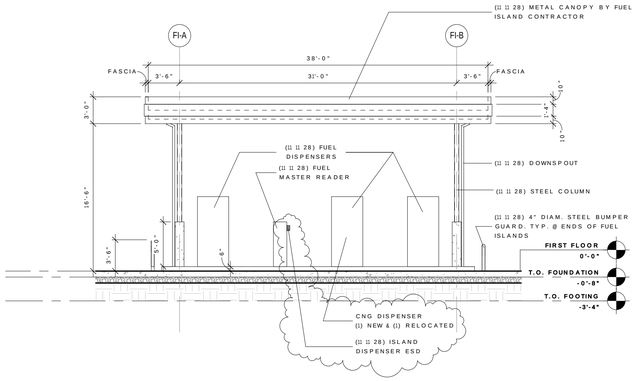
Addendum 3A February 23, 2015

Master Coordination Site Plan

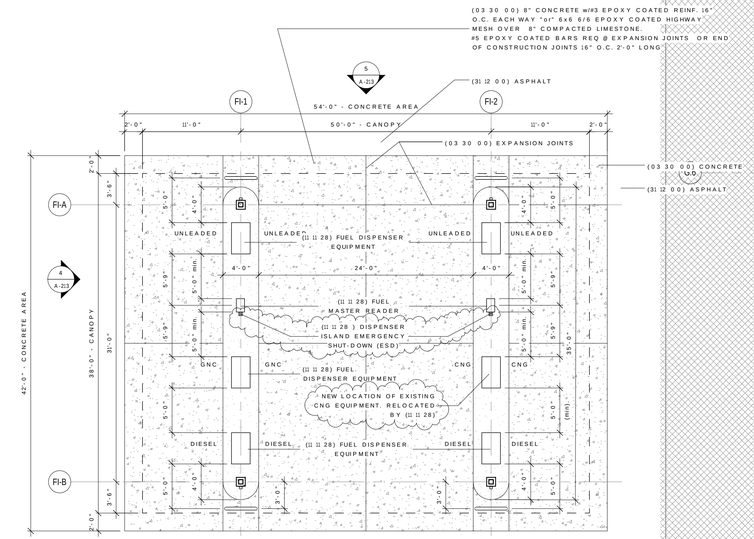
Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

PLAN NORTH
SCALE: As indicated

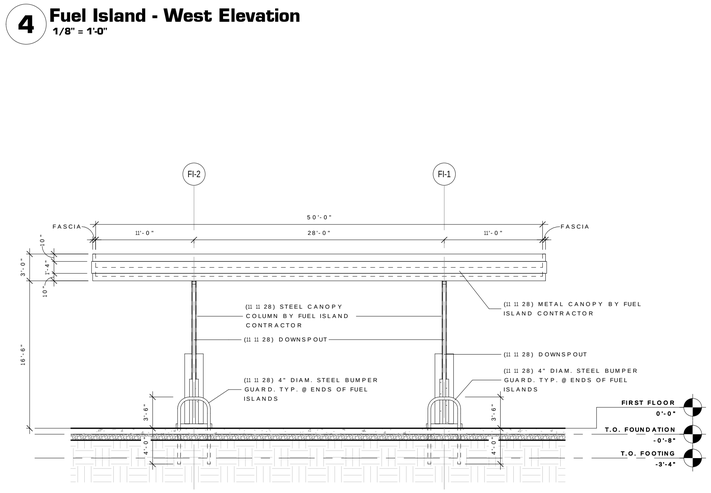
A-101



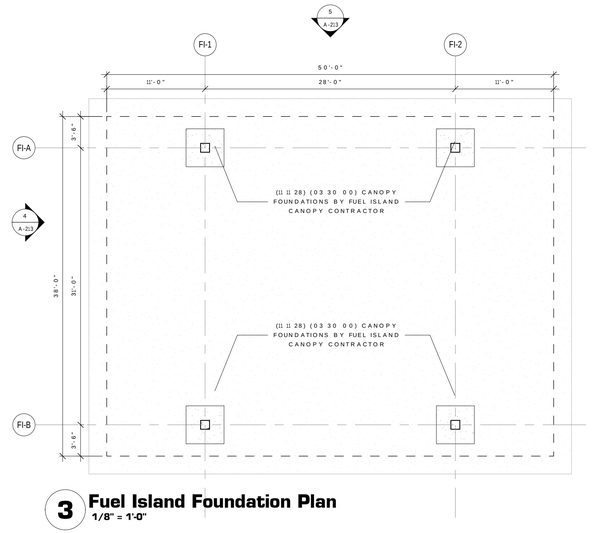
4 Fuel Island - West Elevation
1/8" = 1'-0"



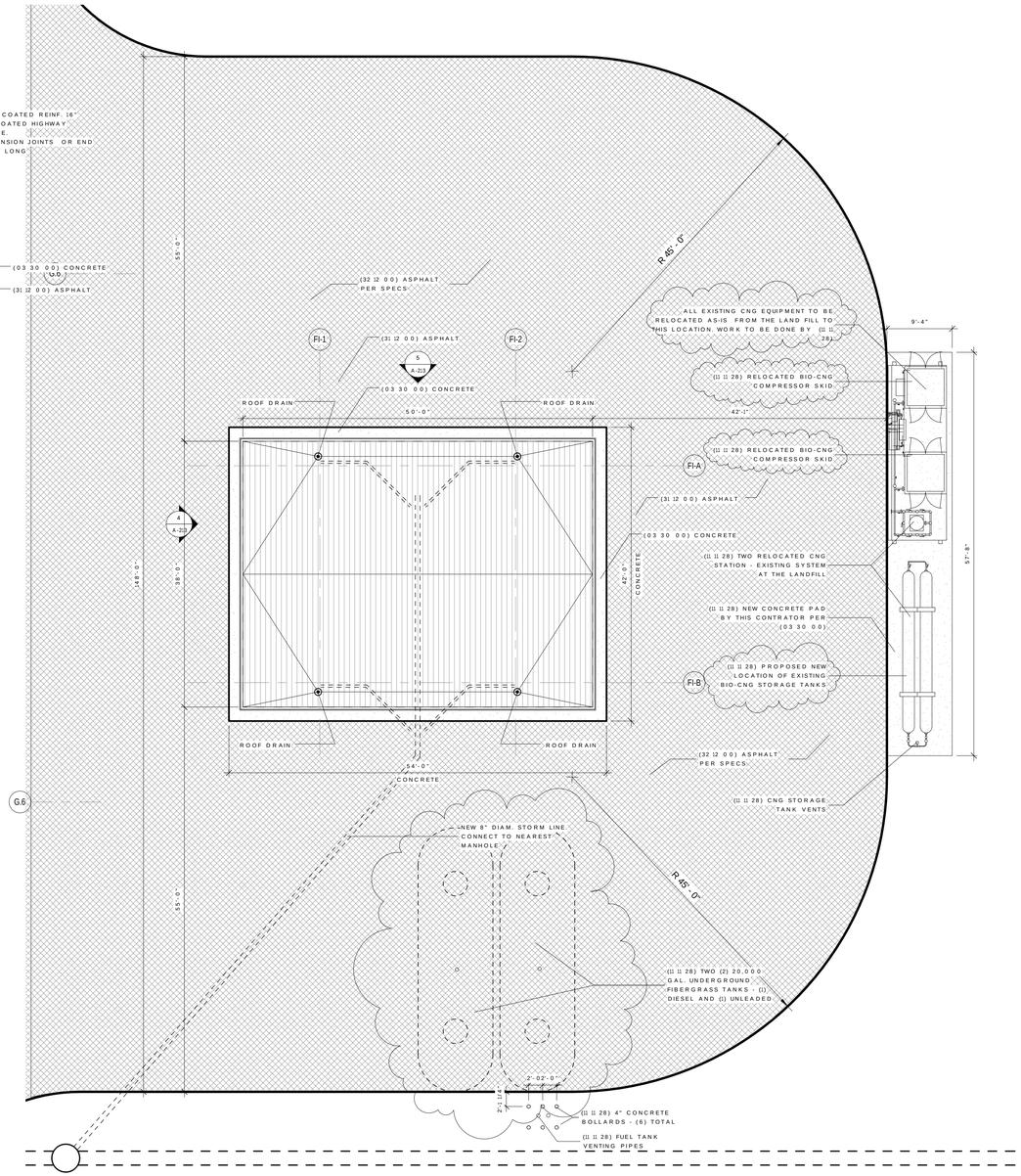
2 Fuel Island Floor Plan
1/8" = 1'-0"



5 Fuel Island - North Elevation
1/8" = 1'-0"



3 Fuel Island Foundation Plan
1/8" = 1'-0"



1 Fuel Island Site Plan
1" = 10'-0"

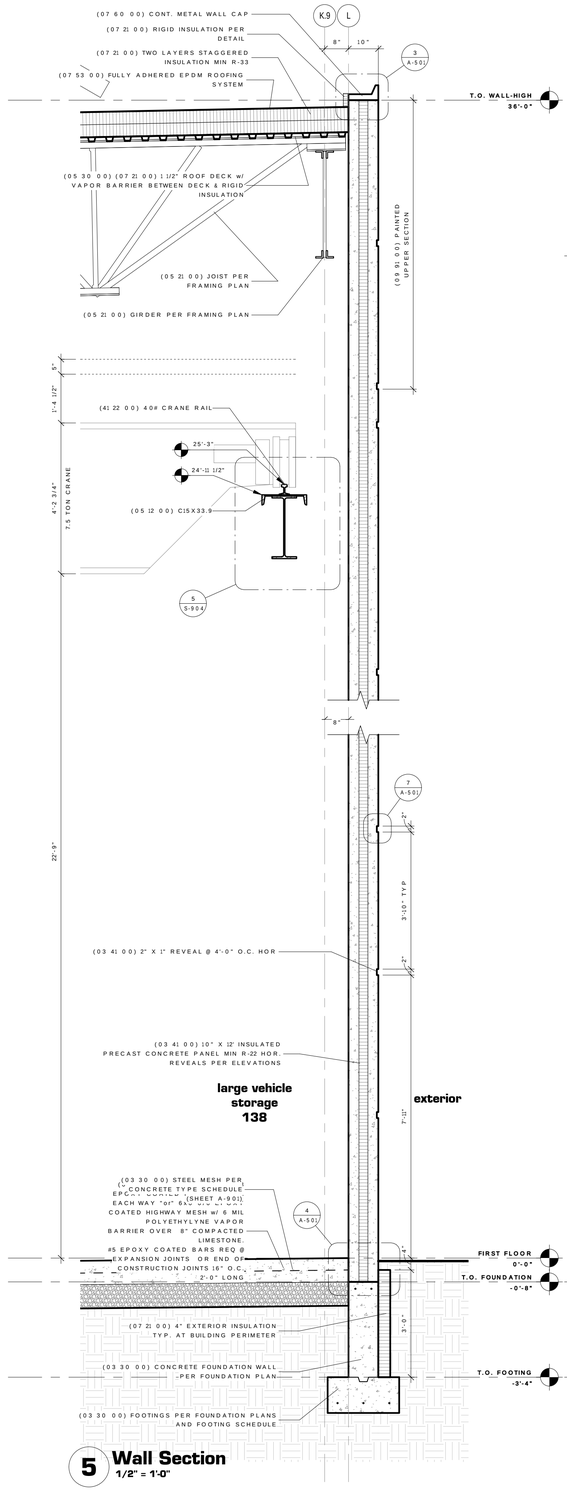
Addendum 3A February 23, 2015

Fuel Island Plans

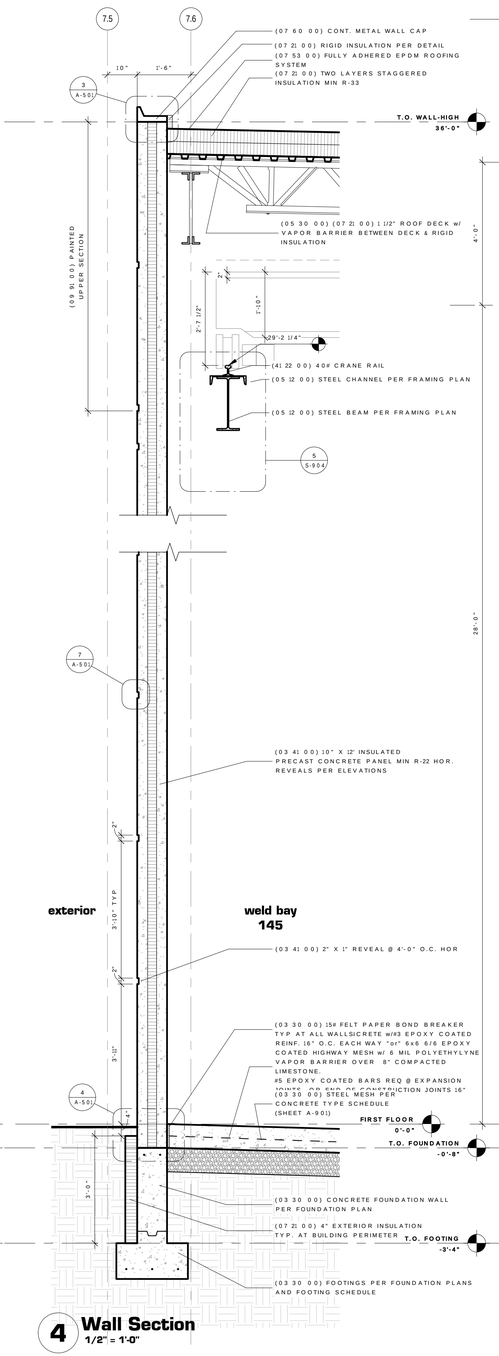
Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

PLAN NORTH
SCALE: As indicated

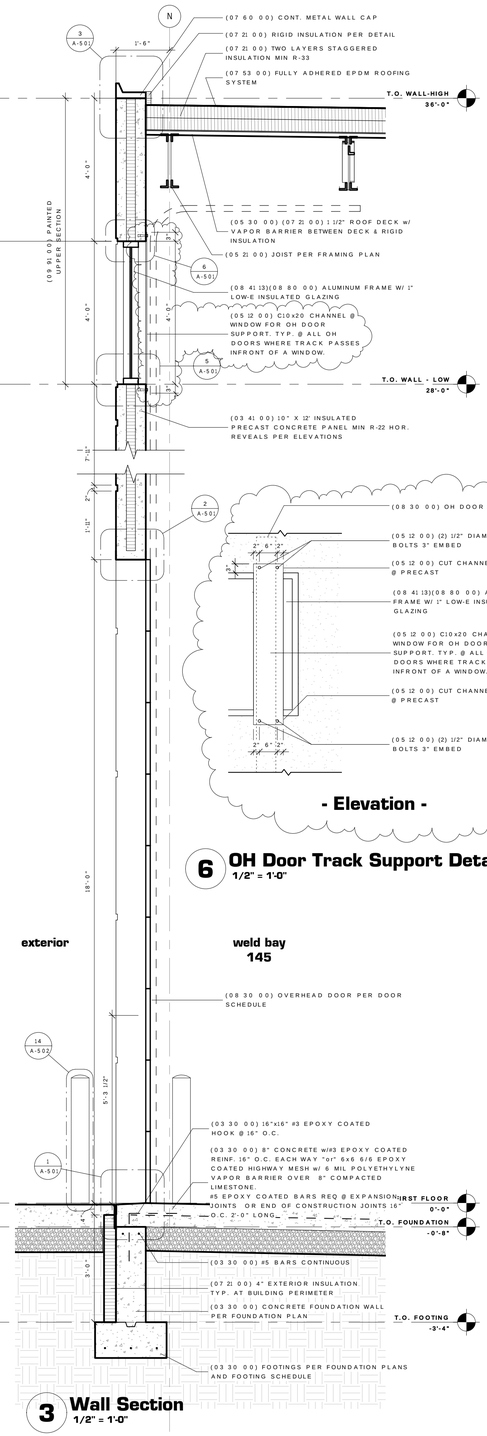
A-213



5 Wall Section
1/2" = 1'-0"

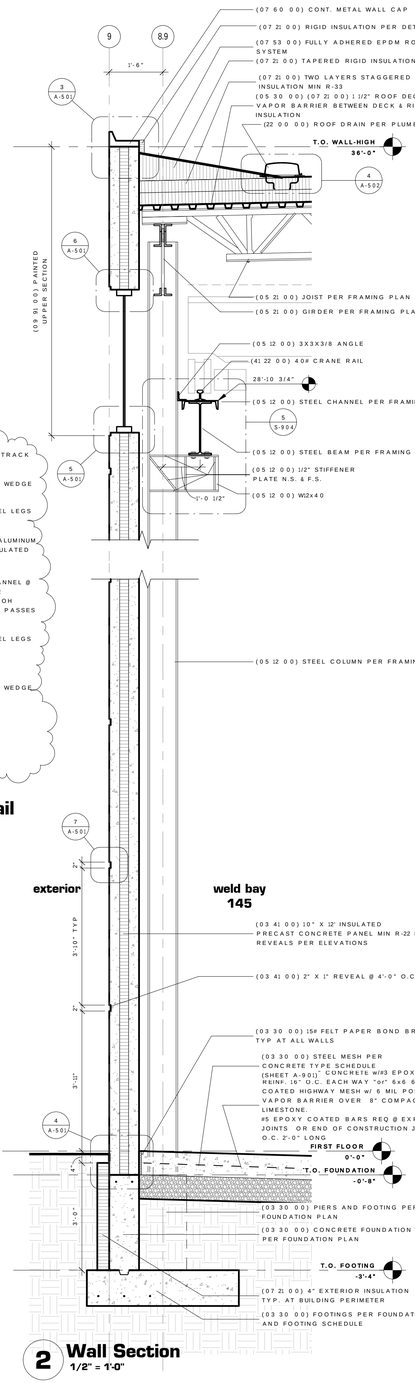


4 Wall Section
1/2" = 1'-0"

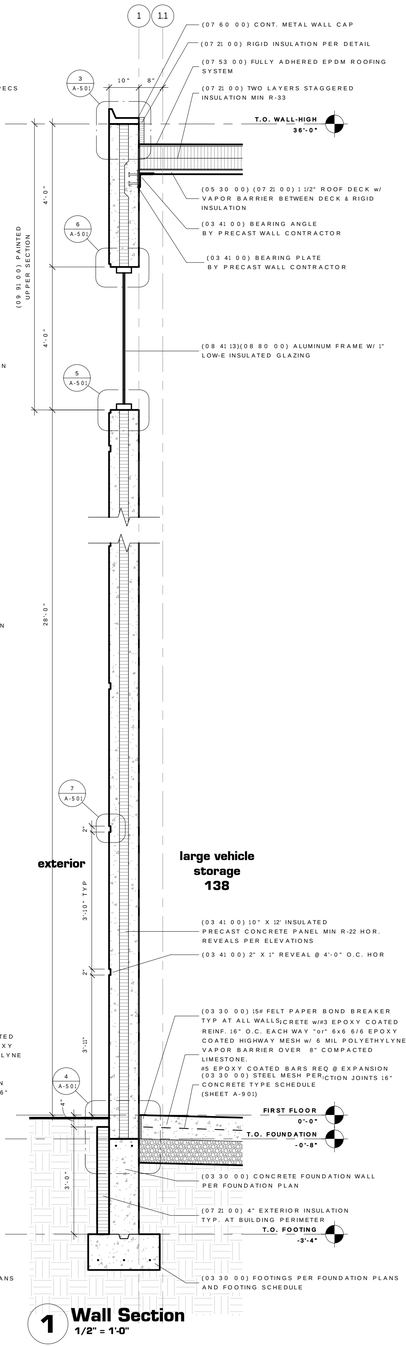


6 OH Door Track Support Detail
1/2" = 1'-0"

3 Wall Section
1/2" = 1'-0"



2 Wall Section
1/2" = 1'-0"



1 Wall Section
1/2" = 1'-0"

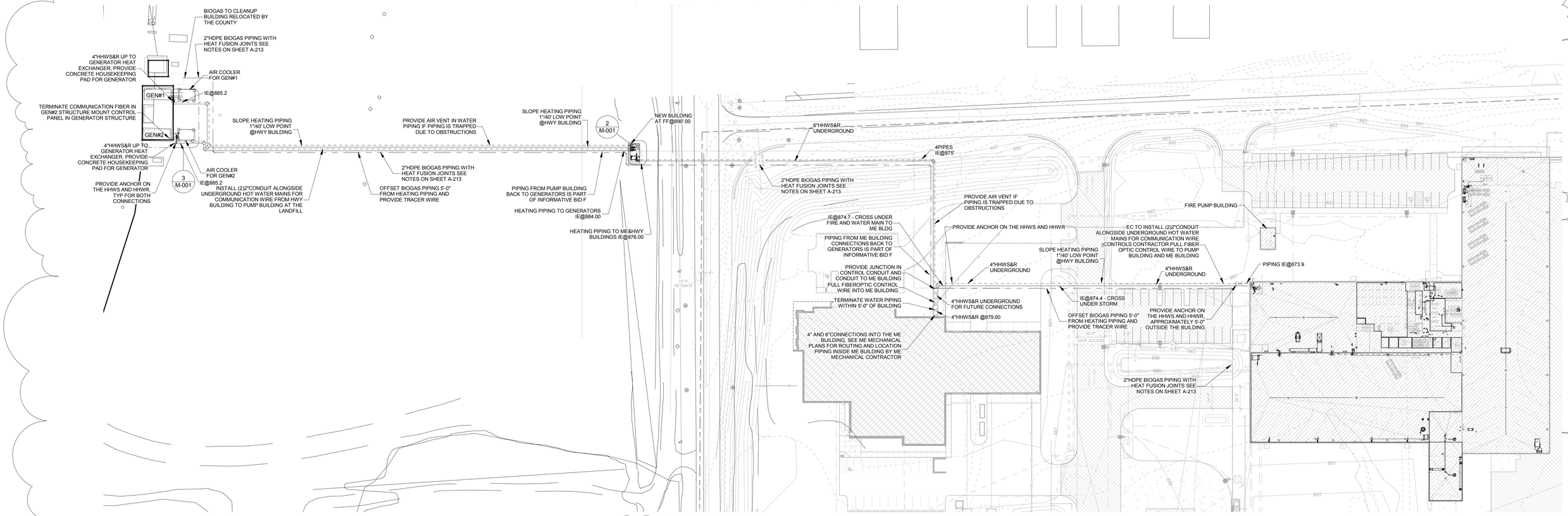
Addendum 3A February 23, 2015

Wall Sections

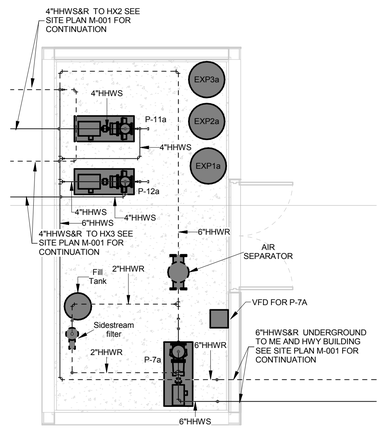
Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

SCALE: 1/2" = 1'-0"

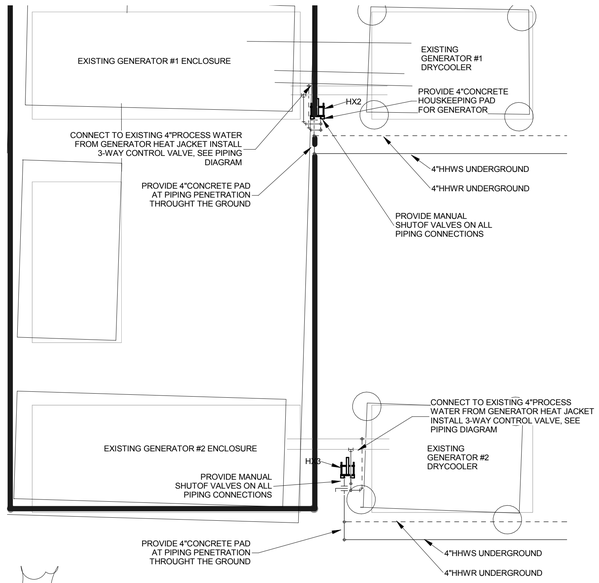
A-402



N 1 M-001 Mechanical Site Plan - Base Bid
SCALE: 1" = 50'-0"



N 2 M-001 Landfill Site Pump Building - Base Bid
SCALE: 1/4" = 1'-0"



N 3 M-001 Generator Heat Exchangers Base Bid
SCALE: 1/8" = 1'-0"

DESCRIPTIONS OF ALTERNATES/INFORMATIVE BIDS AFFECTING MECHANICAL - SEE GENERAL SPECIFICAITONS FOR FURTHER DESCRIPTION

ALT#4 - BID TO INSTALL THE RADIANT TUBING AND INSULATION FOR THE INFLOOR HEATING SYSTEM. THE TUBING WILL BE TERMINATED ABOVE THE SLAB FOR CONNECTION TO MANIFOLDS IN ALT#5

ALT#5 - BID TO PROVIDE INJECTION PUMP, CIRCULATION PUMP, DISTRIBUTION PIPING, AND MANIFOLDS FOR INFLOOR RADIANT HEATING SYSTEM. UNIT HEATERS SERVING VEHICLE BAYS WITH INFLOOR RADIANT HEAT ARE ELIMINATED IF INFLOOR RADIANT HEATING IS INSTALLED.

ALT#10 - BID TO PROVIDE ALTERNATE PUMPING BUILDING AT NEW THE GENERATOR BUILDING. THE WASTE HEAT LOOP SHALL BE PUMPED WITH A MAIN PUMP WITH SPEED CONTROLLED BY THE SYSTEM PRESSURE. SEE SHEETS M-002 AND M-301a FOR SCHEMATICS AND PIPE ROUTING.

INFORMATIVE BID F - INFORMATIONAL BID FOR THE UNDERGROUND PIPING AND PUMPS ON THE WASTE HEAT SYSTEM THAT IS SHARED BY THE MEDICAL EXAMINER BUILDING AND THE HIGHWAY BUILDING.

Sheet List-Mechanical

Sheet Number	Sheet Name
M-001	Mechanical Site Plan Base
M-002	Mechanical Site Plan Alt#10
M-003	Site Piping Details
M-200	Mechanical Office Plan
M-201	Mechanical First Floor Plan
M-202	Mechanical Mezzanine Floor Plan
M-203	Mechanical Roof Plan
M-204	Alt Radiant Floor Plan - Storage
M-205	Alt Radiant Floor Plan - Office
M-206	Mech Detail Plans and Sections
M-207	Salt Shed Mech Plan
M-208	Mechanical Plan and Schedules
M-300	Mechanical Schedules
M-301	Mechanical Details
M-301a	Alt pumping Pipe Schematic
M-302	Mechanical Details

3a

3a

Addendum 3a 02-24-2015

Mechanical Site Plan Base

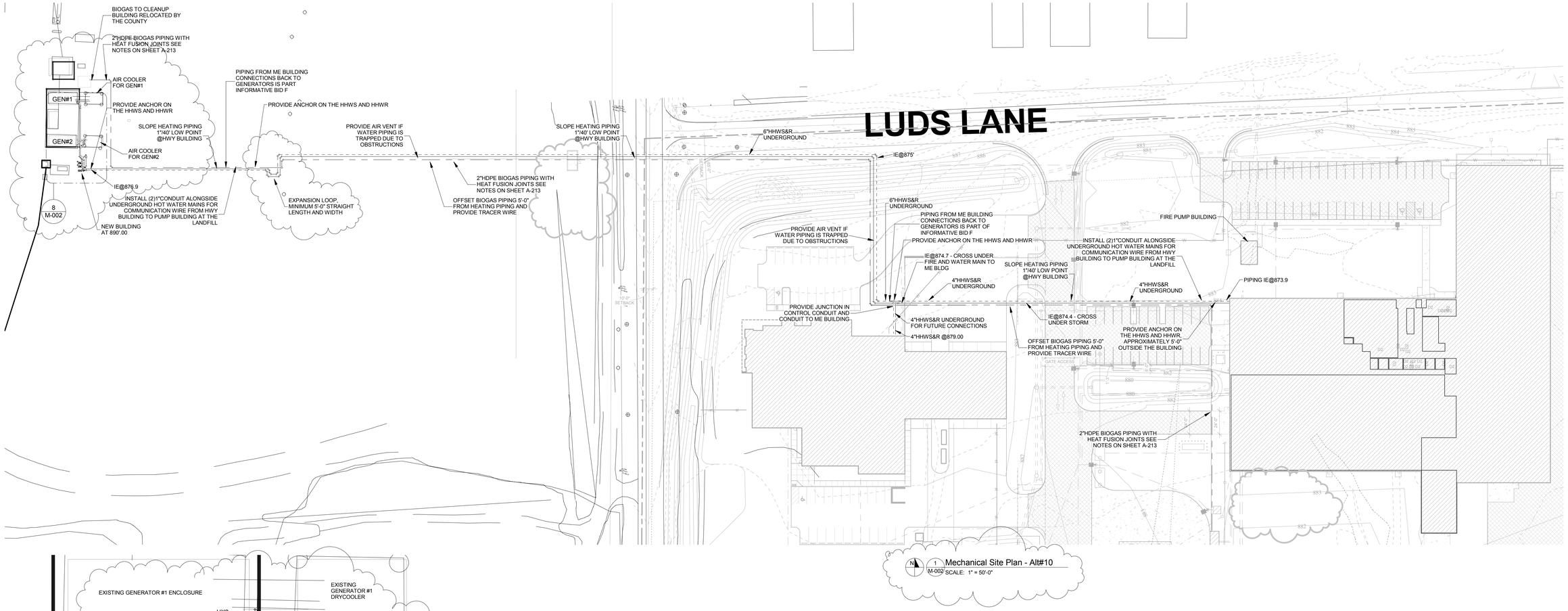
Kueny Archtects - Dane County Highway

02/18/15

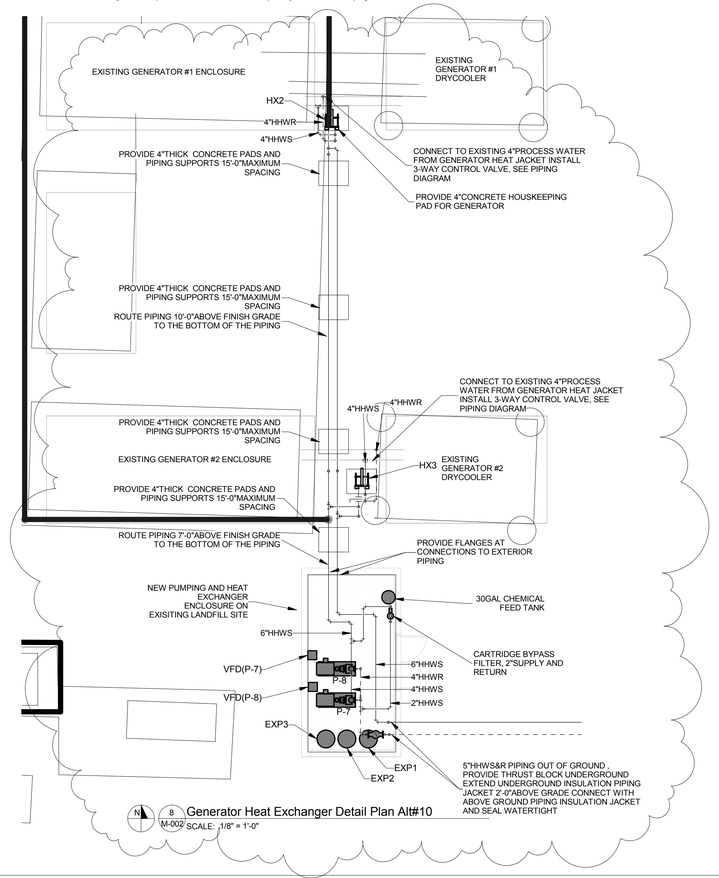
PLAN NORTH

SCALE: As indicated

M-001



N 1 M-002 Mechanical Site Plan - Alt#10
SCALE: 1" = 50'-0"



N 8 M-002 Generator Heat Exchanger Detail Plan Alt#10
SCALE: 1/8" = 1'-0"

Sheet List-Mechanical

Sheet Number	Sheet Name
M-001	Mechanical Site Plan Base
M-002	Mechanical Site Plan Alt#10
M-003	Site Piping Details
M-200	Mechanical Office Plan
M-201	Mechanical First Floor Plan
M-202	Mechanical Mezzanine Floor Plan
M-203	Mechanical Roof Plan
M-204	Alt Radiant Floor Plan - Storage
M-205	Alt Radiant Floor Plan - Office
M-206	Mech Detail Plans and Sections
M-207	Salt Shed Mech Plan
M-208	Mechanical Plan and Schedules
M-300	Mechanical Schedules
M-301	Mechanical Details
M-301a	Alt pumping Pipe Schematic
M-302	Mechanical Details

Addendum 3a 02-24-2015

Mechanical Site Plan Alt#10

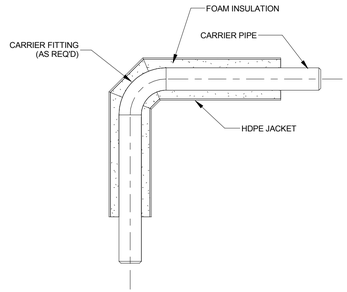
Kueny Archtects - Dane County Highway

01/12/15

PLAN NORTH

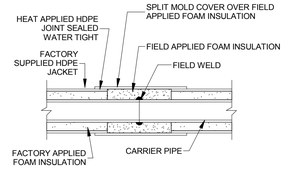
SCALE: As indicated

M-002

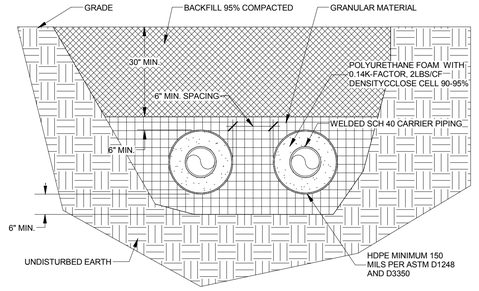


PRE-FAB CORED ELBOW DETAIL
N.T.S.

N 4 M-003 UNDERGROUND PIPING ELBOW
SCALE: 12" = 1'-0"



N 3 M-003 UNDERGROUND PIPING JOINT DETAIL
SCALE: 12" = 1'-0"



N 5 M-003 UNDERGROUND PIPING AND TRENCH SECTION
SCALE: 12" = 1'-0"

N 1 M-003 UNDERGROUND PIPING VAULT ENTRANCE
SCALE: 12" = 1'-0"

N 2 M-003 UNDERGROUND PIPING SLAB ON GRADE ENTRANCE
SCALE: 12" = 1'-0"

FIELD APPLIED STEEL ANCHOR DETAIL
N.T.S.

N 6 M-003 UNDERGROUND PIPING ANCHOR FLANGE
SCALE: 12" = 1'-0"

N 7 M-003 UNDERGROUND AIR VENT DETAIL
SCALE: 3/16" = 1'-0"

3a

Addendum 3a **02-24-2015**

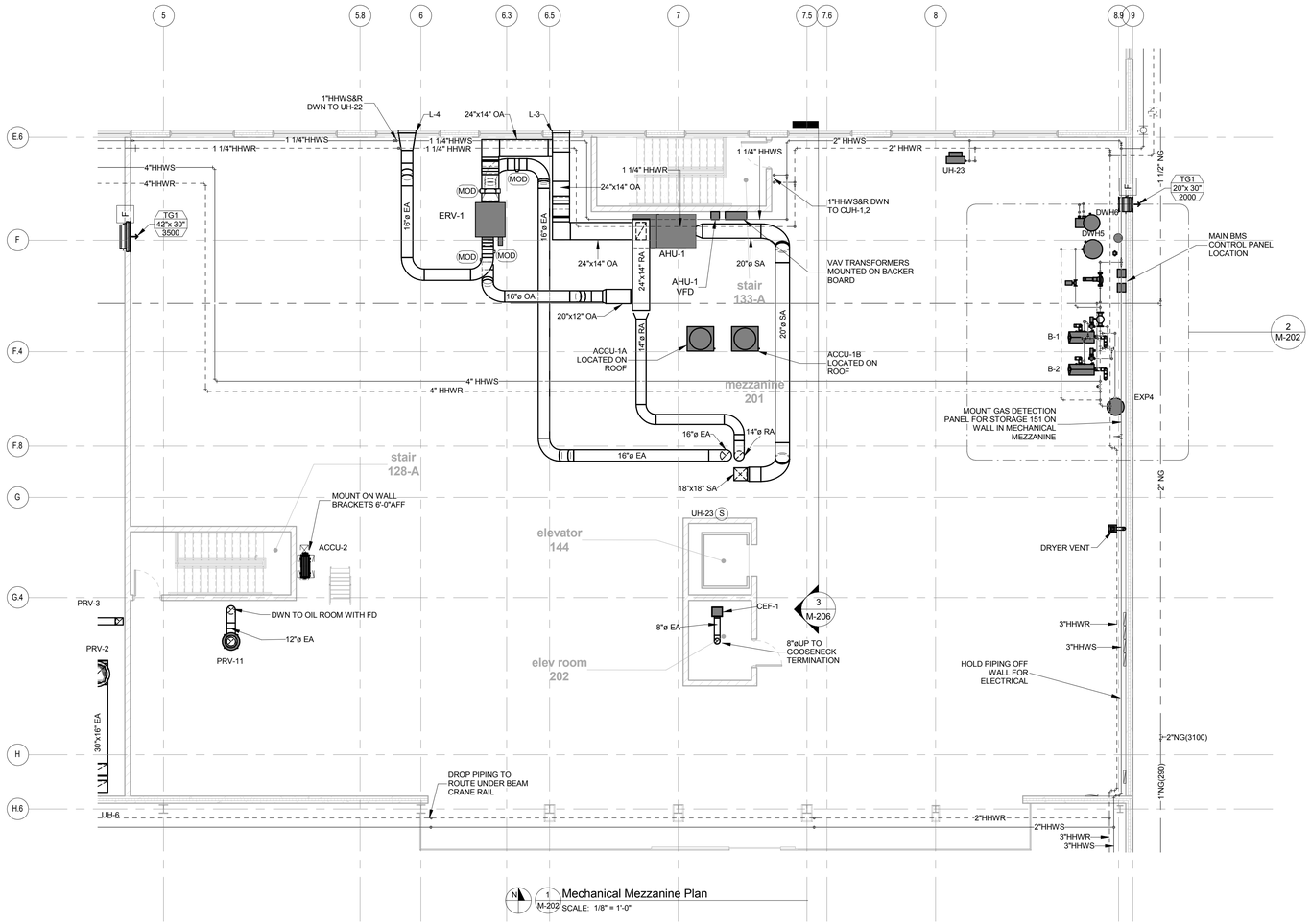
Site Piping Details

Kueny Archtects - Dane County Highway

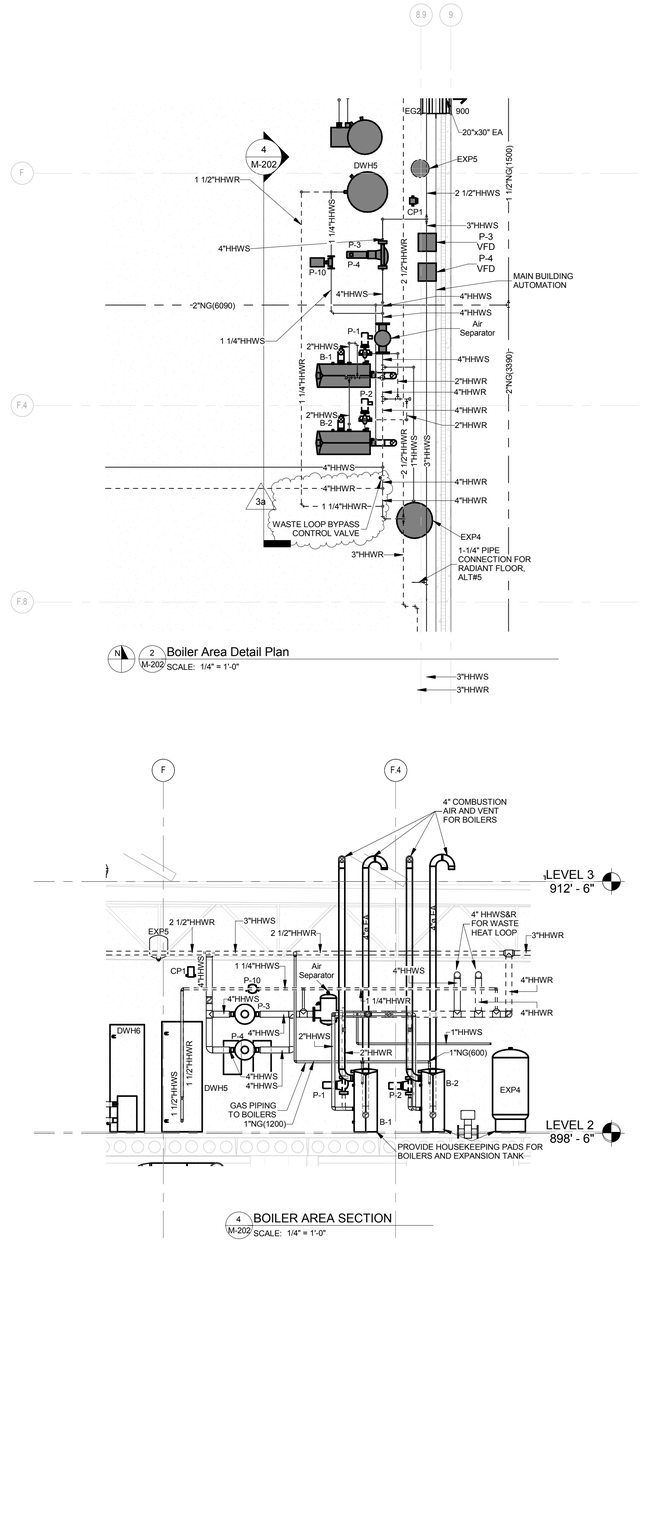
02/23/15

PLAN NORTH
SCALE: As indicated

M-003

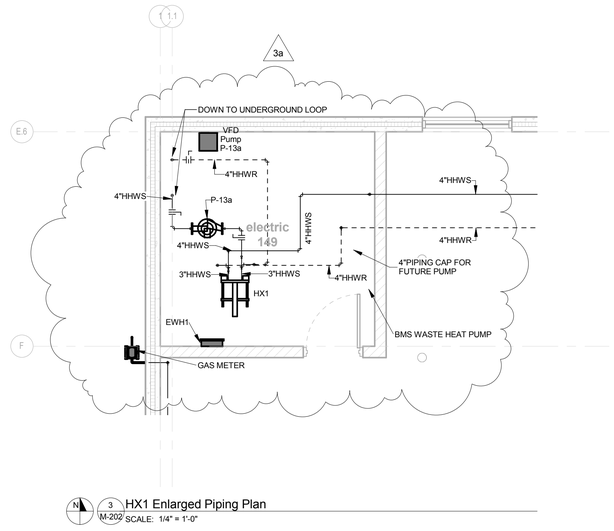


N 1 M-202 Mechanical Mezzanine Plan
SCALE: 1/8" = 1'-0"



N 2 M-202 Boiler Area Detail Plan
SCALE: 1/4" = 1'-0"

4 M-202 BOILER AREA SECTION
SCALE: 1/4" = 1'-0"



N 3 M-202 HX1 Enlarged Piping Plan
SCALE: 1/4" = 1'-0"

Addendum 3a **02-24-2015**

Mechanical Mezzanine Floor Plan

Kueny Archtects - Dane County Highway

01/12/15

PLAN NORTH

SCALE: As indicated

M-202

ROOF EXHAUST FAN SCHEDULE

TAG	SERVES	AIRFLOW	ESP	MOTOR HP	MOTOR BHP	MOTOR RPM	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	MOUNTING LOCATION	ROOF OPENING WIDTH	ROOF OPENING HEIGHT	MODEL	MFG	WEIGHT	NOTES
PRV-1	SMALL VEHICLE 140	4500 CFM	0.50 in-wg	1.50 hp	1.12 hp	1725	460 V	3	60 Hz	Roof Mounted	20 1/2"	20 1/2"	GB-200-15	GREENHECK	160.00 lb	1,2
PRV-2	SMALL VEHICLE 140	4500 CFM	0.50 in-wg	1.50 hp	1.12 hp	1725	460 V	3	60 Hz	Roof Mounted	20 1/2"	20 1/2"	GB-200-15	GREENHECK	160.00 lb	1,2
PRV-3	SMALL VEHICLE 140	450 CFM	0.50 in-wg	0.17 hp	0.09 hp	1725	115 V	1	60 Hz	Roof Mounted	12 1/2"	12 1/2"	G-095-VG	GREENHECK	66.10 lb	1,2
PRV-4	LARGE VEHICLE 138	11500 CFM	0.50 in-wg	3.00 hp	2.66 hp	1725	460 V	3	60 Hz	Roof Mounted	38 1/2"	38 1/2"	GB-330-30	GREENHECK	298.30 lb	1,2
PRV-5	LARGE VEHICLE 138	11500 CFM	0.50 in-wg	3.00 hp	2.66 hp	1725	460 V	3	60 Hz	Roof Mounted	38 1/2"	38 1/2"	GB-330-30	GREENHECK	298.30 lb	1,2
PRV-6	LARGE VEHICLE 138	1150 CFM	0.50 in-wg	0.25 hp	0.21 hp	1725	115 V	1	60 Hz	Roof Mounted	14 1/2"	14 1/2"	GB-121-4	GREENHECK	88.90 lb	1,2
PRV-7	LARGE VEHICLE 122A	16250 CFM	0.50 in-wg	5.00 hp	3.70 hp	1725	460 V	3	60 Hz	Roof Mounted	44 1/2"	44 1/2"	GB-420-50	GREENHECK	423.90 lb	1,2
PRV-8	LARGE VEHICLE 122A	16250 CFM	0.50 in-wg	5.00 hp	3.70 hp	1725	460 V	3	60 Hz	Roof Mounted	44 1/2"	44 1/2"	GB-420-50	GREENHECK	423.90 lb	1,2
PRV-9	LARGE VEHICLE 122A	1625 CFM	0.50 in-wg	0.33 hp	0.32 hp	1725	115 V	1	60 Hz	Roof Mounted	14 1/2"	14 1/2"	GB-131-3	GREENHECK	92.50 lb	1,2
PRV-10	WELD BAY 145	3500 CFM	0.25 in-wg	0.75 hp	0.51 hp	1725	460 V	3	60 Hz	Roof Mounted	20 1/2"	20 1/2"	CUBE-200-7	GREENHECK	171.00 lb	1,2
PRV-11	OIL	500 CFM	0.50 in-wg	0.25 hp	0.08 hp	1725	115 V	1	60 Hz	Roof Mounted	14 1/2"	14 1/2"	G-099-VG	GREENHECK	78.50 lb	1,2,3
PRV-12	WELD BAY 145	1750 CFM	0.50 in-wg	0.50 hp	0.38 hp	1725	115 V	1	60 Hz	Roof Mounted	18 1/2"	18 1/2"	CUBE-141-5	GREENHECK	126.10 lb	1,2

NOTES:
1. PROVIDE 18" INSULATED ROOFCURB ON FANS
2. PROVIDE DISCONNECT AND GRAVITY BACKDRAFT DAMPERS
3. PROVIDE EXPLOSION PROOF CONSTRUCTION WITH ALUMINUM RUB RING

UTILITY EXHAUST FAN SCHEDULE

TAG	SERVES	AIRFLOW	ESP	FAN RPM	MOTOR HP	MOTOR BHP	MOTOR RPM	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	MOUNTING LOCATION	MODEL	MFG	WEIGHT	NOTES
EF-1	VEHICLE SOURCE	1200 CFM	3.25 in-wg	2433.2	1.50 hp	1.05 hp	1725	460 V	3	60 Hz	ROOF	12-BISW-21-10-I-15	GREENHECK	244.00 lb	1,2,3

NOTES:
1. PROVIDE DISCONNECT
2. PROVIDE BACKDRAFT DAMPER
3. PROVIDE BASE ROOF RAILS, SPRING ISOLATORS, FLEXIBLE CANVAS CONNNECTIONS, NO LOSS STACK DISCHARGE, AND ROOFCURB FOR DUCT PENETRATION

SIDEWALL CENTRIFUGAL EXHAUST FAN SCHEDULE

TAG	SERVES	AIRLFOW	TSP	MOTOR HP	MOTOR BHP	MOTOR RPM	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	WALL OPENING HEIGHT	WALL OPENING WIDTH	MODEL	MFG	WEIGHT	NOTES
SEF-1	SALT SHED	4000 CFM	0.25 in-wg	0.50 hp	0.45 hp	1725	115 V	1	60 Hz	1' - 6"	1' - 6"	CWB-240-5	GREENHECK	137.20 lb	1,2,3
SEF-2	SALT SHED	4000 CFM	0.25 in-wg	0.50 hp	0.45 hp	1725	115 V	1	60 Hz	1' - 6"	1' - 6"	CWB-240-5	GREENHECK	137.20 lb	1,2,3
SEF-3	SALT SHED	4000 CFM	0.25 in-wg	0.50 hp	0.45 hp	1725	115 V	1	60 Hz	1' - 6"	1' - 6"	CWB-240-5	GREENHECK	137.20 lb	1,2,3
SEF-4	SALT SHED	4000 CFM	0.25 in-wg	0.50 hp	0.45 hp	1725	115 V	1	60 Hz	1' - 6"	1' - 6"	CWB-240-5	GREENHECK	137.20 lb	1,2,3

NOTES:
1. PROVIDE SIDEWALL MOUNTING PLATE
2. PROVIDE DISCONNECT
3. PROVIDE BACKDRAFT DAMPER

CEILING EXHAUST FAN SCHEDULE

TAG	SERVES	AIR FLOW	ESP	RPM	SONES	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	ELECTRICAL MOTOR HP	MODEL	MFG	WEIGHT	NOTES
CEF-1	ELEVATOR EQUIPMENT	200 CFM	0.38 in-wg	971	3.2	115 V	1	60 Hz	0.111 hp	SP-A250	GREENHECK	25.00 lb	1,2

NOTES:
1. PROVIDE GOOSENECK TERMINATION ON ROOF
2. PROVIDE BACKDRAFT DAMPER AND SPEED CONTROLLER

MAKE UP AIR UNIT SCHEDULE

MARK	SERVES	UNIT AIRFLOW	ESP	TSP	FAN RPM	BTU/Hr IN	BTU/Hr OUT	LAT@ -10°F EAT	ELECTRICAL V	ELECTRICAL PH	ELECTRICAL HZ	ELECTRICAL MOTOR HP	ELECTRICAL BRAKE HP	MODEL	MFG	WEIGHT	NOTES
MUA-1	LARGE VEHICLE 140	22000 CFM	0.50 in-wg	1.83 in-wg	761	2,335,500	2,148,300	90 °F	480	3	60	15 hp	9.37 hp	R340	ABSOLUTEAIRE	5100 lb	1,2,3,5
MUA-2	LARGE VEHICLE 151	32500 CFM	0.25 in-wg	1.43 in-wg	740	3,100,000	2,821,000	70 °F	480	3	60	15 hp	12.70 hp	R344	ABSOLUTEAIRE	5600 lb	1,2,3,5
MUA-3	WELDING 145	3500 CFM	0.50 in-wg	1.70 in-wg	1112	290,000	266,800	60 °F	480	3	60	3 hp	1.80 hp	V212	ABSOLUTEAIRE	775 lb	1,2,3,5
MUA-4	SMALL VEHICLE 138	10000 CFM	0.25 in-wg	1.43 in-wg	1132	1,180,000	1,085,000	90 °F	480	3	60	5 hp	3.90 hp	R327	ABSOLUTEAIRE	3300 lb	1,2,3,4,5,6

NOTES:
1 PROVIDE 20" INSULATED ROOFCURB
2. PROVIDE 2"ALUMINUM V-BANK FILTER SECTION, FILTERED INTAKE HOOD
3. PROVIDE LOW LEAKAGE INLET DAMPER
4. PROVIDE VFD IN LOCATION SHOWN ON THE PLANS WITH BUILDING PRESSURE CONTROL
6. MINIMUM AIRFLOW TO BE 5000CFM

HYDRONIC HEATING COILS

TAG	SERVES	AIRFLOW	apd	GPM	Water Pressure Drop	COIL ROWS	DUCT HEIGHT	DUCT WIDTH	BTUH Out	EAT °F	LAT °F	EWT °F	LWT °F	MFG	Model	NOTES
HC-1	MUA-3	3500 CFM	0.14 in-wg	19 GPM	0.81 ftH2O	2	27"	36"	285530.0 Btu/h	35 °F	113 °F	180 °F	150 °F	TRANE	D5WB27	

AIR HANDLING UNIT SCHEDULE

TAG	Design Supply Air Flow	OUTSIDE AIR	ESP	TSP	DX COOLING COIL EAT DB	EAT WB	LAT DB	LAT WB	TOTAL	SENS	TYPE	ROWS	ELECTRICAL V	PH	FREQ	FLA	MOCP	MCA	HP	OPERATING WEIGHT	MODEL	MFG	NOTES
AHU-1	2400 CFM	150 CFM	1.50 in-wg	2.75 in-wg	79 °F	67 °F	57 °F	57 °F	92320.0 Btu/h	64080.0 Btu/h	DX coil - 14 FPI	6	460 V	3	60 Hz	3 A	15 A	4 A	2.0	708.72 lb	UCCAA06C	TRANE	1,2,3,4,5

NOTES:
1 PROVIDE VFD ON SUPPLY FAN
2. PROVIDE MIXING BOX WITH ECONOMIZER DAMPERS AND MERV 8 FILTERS
3. PROVIDE RETURN AIR DUCT SMOKE DETECTOR
4. PROVIDE INTERTWINED DUAL CIRCUIT COOLING COIL
5. PROVIDE CANVAS DUCT CONNECTIONS ON SUPPLY, RETURN AND OUTSIDE AIR

VAV BOX WITH HOT WATER REHEAT SCHEDULE

TAG	SERVES	INLET SIZE	VEL	APD	AIRFLOW MAX	AIRFLOW MIN	AIRFLOW HEATING	REHEAT COIL DELTA T	CAPACITY	EWT	EAT	LAT	FLOW	WPD	MODEL	MFG	NOTES
V-1	BREAKROOM 132	8" (203mm)	1580 FPM	0.29 in-wg	550 CFM	180 CFM	250 CFM	31 °F	15360 Btu/h	180 °F	55 °F	112 °F	1.0 GPM	0.04 psi	DESV	TITUS	1,2,3
V-2	WOMENS LOCKER ROOM	8" (203mm)	860 FPM	0.10 in-wg	300 CFM	0 CFM	250 CFM	31 °F	15360 Btu/h	180 °F	55 °F	112 °F	1.0 GPM	0.04 psi	DESV	TITUS	1,2,3
V-3	MENS LOCKER ROOM	14" (356mm)	890 FPM	0.11 in-wg	950 CFM	0 CFM	750 CFM	50 °F	40670 Btu/h	180 °F	55 °F	105 °F	2.0 GPM	0.06 psi	DESV	TITUS	1,2,3
V-5	OFFICE 123	6" (154mm)	1270 FPM	0.17 in-wg	250 CFM	75 CFM	100 CFM	33 °F	8250 Btu/h	180 °F	55 °F	131 °F	0.5 GPM	0.07 psi	DESV	TITUS	1,2,3
V-6	OFFICE 120,121, 122	8" (203mm)	1000 FPM	0.13 in-wg	350 CFM	125 CFM	200 CFM	28 °F	13890 Btu/h	180 °F	55 °F	119 °F	1.0 GPM	0.04 psi	DESV	TITUS	1,2,3
V-7	OFFICE 124	4" (102mm)	1720 FPM	0.03 in-wg	150 CFM	50 CFM	100 CFM	33 °F	8250 Btu/h	180 °F	55 °F	131 °F	0.5 GPM	0.07 psi	DESV	TITUS	1,2,3

NOTES:
1 PROVIDE LOW VOLTAGE TRANSFORMER FOR EACH ZONE DAMPER
2. PROVIDE DUCT TRANSITIONS TO ZONE DAMPERS AS REQUIRED
3. MINIMUM 2 ROW HEATING COIL

ENERGY RECOVERY VENTILATOR SCHEDULE

TAG	SERVES	SA FLOW	SA ESP	SA SUMMER DB	SA SUMMER WB	SA WINTER DB	SA WINTER WB	OA SUMMER DB	OA SUMMER WB	OA WINTER DB	OA WINTER WB	EA FLOW	EA DB	EA ESP	ENTHALPY EFFECT TOTAL% SUMMER	ENTHALPY EFFECT TOTAL% WINTER	ELECTRICAL SA HP	EA HP	V	PH	MCA	MOCP	WEIGHT LBS	MFG	MODEL	NOTES
ERV-1	AHU-1/EXHAUST	1350 CFM	0.5	79.2	71	47.2	38.4	90	77	-11	-13	0 CFM	70	0.5	54	68	1.5	1.5	208 V	3	11.9	15	414	RENEWAIRE	HE2XINH	1,2,3

NOTES:
1 PROVIDE DISCONNECT
2. PROVIDE SEPARATE STARTERS FOR SUPPLY AND EXHAUST FANS
3. PROVIDE CONTROL DAMPERS ON DUCT CONNECTIONS AS SHOWN ON PLANS

AIR COOLED CONDENSING UNIT SCHEDULE

TAG	SERVES	NOMINAL TONS	ELECTRICAL INFORMATION V	PH	HZ	MCA	MOCP	MODEL	MFG	WEIGHT	NOTES
ACCU-1A	AHU-1	4	460 V	3	60 Hz	8 A	15 A	4TTA3048D4	TRANE	225.00 lb	3
ACCU-1B	AHU-1	4	460 V	3	60 Hz	8 A	15 A	4TTA3048D4	TRANE	225.00 lb	3
ACCU-2	CRU1	1	208 V	1	60 Hz	12 A	15 A	GE12NA	Mitsubishi Electric	77.00 lb	1,2

NOTES:
1. MOUNT ON ANGLE BRACKETS MOUNTED ON THE WALL
2. CORRDINATE WITH E.C FOR POWER WIRING FROM ACCU-2 TO CRU-1
3. PROVIDE LIGHT WEIGHT CONCRETE PAD, 4"TREATED 4X4'S, AND NEOPRENE ISOLATION PADS FOR MOUNTING ON THE ROOF

SPLIT SYSTEM COOLING UNIT SCHEDULE

TAG	SERVES	Unit Airflow	ELECTRICAL V	PH	HZ	WATTS	MCA	COOLING CAPACITY(BTU/Hr)	MFG	Model	Weight	NOTES
CRU1	DATA ROOM	364 CFM	208 V	1	60 Hz	8 W	Power From Outdoor	12000	Mitsubishi Electric	GE12NA	20.00 lb	1,2,3

NOTES:
1. PROVIDE WALL BRACKET FOR REMOTE CONTROL
2. PIPE CONDENSATE TO NEAREST DRAIN WITH 3/4"PVC DRAIN PIPING
3. MOUNT HIGH ON WALL COORDINATE FINAL LOCATION WITH OWNER'S IT REPRESENTATIVE

LOUVERS

TAG	SERVES	FPM	PD "WG	CFM	HEIGHT	WIDTH	MODEL	MFG	NOTES
L-1	SALT BLDG	740 FPM	0.09 in-wg	8000 CFM	60"	48"	ESD-603	GREENHECK	1,2,3,4
L-2	SALT BLDG	740 FPM	0.09 in-wg	8000 CFM	60"	48"	ESD-603	GREENHECK	1,2,3,5
L-3	OFFICE OA	610 FPM	0.06 in-wg	2400 CFM	48"	24"	ESD-603	GREENHECK	1
L-4	ERV EXHAUST	510 FPM	0.04 in-wg	1400 CFM	36"	24"	ESD-603	GREENHECK	1

NOTES:
1. PROVIDE STANDARD COLOR POWDER COAT FINISH SELECTED BY ARCHITECT
2. PROVIDE DAMPER AND ACTUATOR FOR INTERLOCK WITH EXHAUST FAN
3. INCLUDED IN ALTERNATE #5
4. PROVIDE 24V ACTUATOR AND INTERLOCK WITH OPERATION OF SEF-1&2
5. PROVIDE 24V ACTUATOR AND INTERLOCK WITH OPERATION OF SEF-3&4

EXHAUST HOSE REEL SCHEDULE

MARK	FLOW	AIR PRESSURE	Manufacturer	Model	NOTES
HR1	600 CFM	2.10 in-wg	DSP MONOXIVENT	9000	1-5
HR2	600 CFM	2.10 in-wg	DSP MONOXIVENT	9000	1-5

NOTES:
1. PROVIDE ROCKER SWITCH FOR LOWERING HOSE FROM DRUM
2. 32"DRUM WIDTH
3. PROVIDE 36'-0" OF 4000 SERIES HOSE FOR EACH REEL
4. PROVIDE 6" 8000-VG TAILPIPE CLAMP FOR EACH REEL
5. PROVIDE 1 STACK CRANE 41000 AND LIFTING POLE

ELECTRIC HEATER SCHEDULE

TAG	SERVES	BTU/Hr OUTPUT	ELECTRICAL V	PH	HZ	A	WATTS	MODEL	MFG	NOTES
EUH1	FIRE PUMP 156	17060	480 V	3	60 Hz	6.0 A	5000 W	MUH	QMARK	3,4,5
EWH1	EQUIPMENT 149	16380	277 V	1	60 Hz	17.3 A	4800 W	AWH	QMARK	1,2

NOTES:
1. PROVIDE SURFACE MOUNT KIT
2. PROVIDE DISCONNECT AND INTEGRAL THERMOSTAT
3. PROVIDE IN ALT #15
4. PROVIDE WALL MOUNT BRACKETS, MOUNT HEATER 10'-0"AFF
5. PROVIDE 5-2 PROGRAMMABLE THERMOSTAT

DUCT CONSTRUCTION SCHEDULE

TYPE	SYSTEM LOCATION	SMACNA PRESSURE CLASS	SMACNA SEAL CLASS	INSULATION THICKNESS	INSULATION TYPE	MATERIAL	NOTES
Exhaust Air	SHOP GENERAL EXHAUST	2"	C	None	NONE	GALVANIZED	
Exhaust Air	TOILET EXAUST - ERV	2"	C	2" R 5.6	FLEXIBLE FIBERGLASS	GALVANIZED	1,3
Exhaust Air	SOURCE CAPTURE EXHAUST	10"	B	NONE	NONE	GALVANIZED	2
Exhaust Air	CLOTHES DRYER	2"	C	NONE	NONE	GALVANIZED	
Outside Air	ALL	2"	A	2" R 5.6	FLEXIBLE FIBERGLASS	GALVANIZED	
Return Air	ALL	2"	B	2" R 5.6	FLEXIBLE FIBERGLASS	GALVANIZED	1,3
Supply Air	MAKE UP AIR UNITS	2"	A	NONE	NONE	GALVANIZED	
Supply Air	OFFICE	2"	A	2" R 5.6	FLEXIBLE FIBERGLASS	GALVANIZED	1,3

NOTES:
1. OWENS CORNING, KNAUF, JOHNS MANVILLE, OR 3M INSULATION
2. PROVIDE 24GAUGE FITTINGS ON SOURCE CAPTURE DUCT
3. INSULATE ALL EXPOSED DUCT ROUTED IN MEZZANINE

GRILLES, REGISTERS, AND DIFFUSERS SCHEDULE

TAG	TYPE	MODEL	MOUNT	MFG	DESCRIPTION	NOTES
EG1	Exhaust Air	530	LAYIN	PRICE	3/4" LOUVERED FACE SPACING	1,2
EG2	Exhaust Air	EXPANDED WIRE MESH	DUCT	NA	CONTRACTOR PROVIDED WIRE MESH OVER OPENING	
EG3	Exhaust Air	530	SURFACE	PRICE	3/4" LOUVERED FACE SPACING	1
RG1	Return Air	530	LAYIN	PRICE	3/4" LOUVERED FACE SPACING	1
RG2	Return Air	530-STEEL	LAYIN	PRICE	3/4" LOUVERED FACE SPACING	1,2
SD1	Supply Air	SPD	LAYIN	PRICE	6" NECK PLAQUE LAYIN DIFFUSER, 24X24 FACE	1
SD2	Supply Air	SPD	LAYIN	PRICE	8" NECK PLAQUE LAYIN DIFFUSER, 24X24 FACE	1
SD3	Supply Air	SPD	LAYIN	PRICE	10"NECK PLAQUE LAYIN DIFFUSER, 24X24 FACE	1
SD4	Supply Air	520 DOUBLE DEFLECTION	DUCT	PRICE	STEEL 3/4" BLADE SPACING	1
SD5	Supply Air	SPD	SURFACE	PRICE	6" NECK PLAQUE LAYIN DIFFUSER	1,3
TG1		EXPANDED WIRE MESH	WALL	NA	CONTRACTOR PROVIDED WIRE MESH OVER OPENING	

NOTES:
1. PROVIDE WHITE BAKED ENAMEL FINISH
2. NO SCREW HOLES IN LAYIN FRAME
3. PROVIDE PLASTER FRAME

HYDRONIC UNIT HEATERS

TAG	SERVES	AIRFLOW	BTU/hr OUT	Air Delta T	WATER FLOW	WATER PD	WATER EWT	WATER LWT	ELECTRICAL V	PH	HTZ	A	HP	MFG	MODEL	WEIGHT	NOTES
CUH1	VESTIBULE	275 CFM	0	-460 °F	1.0 GPM	0.00 ftH2O	180 °F	160 °F	120 V	1	60 Hz	1 A	0.010 hp	RITTLING	RS-02	85.00 lb	1,3
CUH2	STAIR	275 CFM	0	-460 °F	1.0 GPM	0.00 ftH2O	180 °F	160 °F	120 V	1	60 Hz	1 A	0.010 hp	RITTLING	RS-02	85.00 lb	1,3
UH-1	SMALL VEHICLE 140	1775 CFM	69400	36 °F	6.0 GPM	0.43 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.125 hp	RITTLING	RH-121	90.00 lb	1
UH-2	SMALL VEHICLE 140	1775 CFM	69400	36 °F	6.0 GPM	0.43 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.125 hp	RITTLING	RH-121	90.00 lb	1
UH-3	SMALL VEHICLE 140	1775 CFM	69400	36 °F	6.0 GPM	0.43 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.125 hp	RITTLING	RH-121	90.00 lb	1
UH-4	SMALL VEHICLE 140	1775 CFM	69400	36 °F	6.0 GPM	0.43 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.125 hp	RITTLING	RH-121	90.00 lb	1
UH-5	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-6	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-7	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-8	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-9	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-10	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-11	LARGE VEHICLE 138	2500 CFM	102600	38 °F	9.0 GPM	1.02 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-165	110.00 lb	1,2
UH-12	WELDING 145	1550 CFM	62500	37 °F	5.0 GPM	0.35 ftH2O	180 °F	150 °F	120 V	1	60 Hz	1 A	0.100 hp	RITTLING	RH-108	90.00 lb	1,2
UH-13	WELDING 145	1550 CFM	62500	37 °F	5.0 GPM	0.35 ftH2O	180 °F	150 °F	120 V	1	60 Hz	1 A	0.100 hp	RITTLING	RH-108	90.00 lb	1,2
UH-15	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-16	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-17	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-18	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-19	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-20	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-21	LARGE VEHICLE 151	2900 CFM	120300	38 °F	10.0 GPM	1.37 ftH2O	180 °F	150 °F	115 V	1	60 Hz	2 A	0.250 hp	RITTLING	RH-193	115.00 lb	1
UH-22	PARTS 137	730 CFM	26000	33 °F	3.0 GPM	0.09 ftH2O	180 °F	150 °F	120 V	1	60 Hz	1 A	0.067 hp	RITTLING	RH-47	50.00 lb	1,2
UH-23	MEZZANINE 202	1550 CFM	62500	37 °F	5.0 GPM	0.35 ftH2O	180 °F	150 °F	120 V	1	60 Hz	1 A	0.100 hp	RITTLING	RH-108	90.00 lb	1

NOTES:
1 SEE DETAIL FOR AQUASTAT AND CONTROL
2. REMOVED IN ALTERNATE #18
3. FLOOR MOUNTED SLOPED TOP CABINET UNIT HEATER

NATURAL GAS BOILER SCHEDULE

TAG	SERVES	FLOW GPM	P.D. FT. HEAD	HEATING BTU/Hr INPUT	HEATING BTU/Hr OUTPUT	ELECTRICAL V	PH	HZ	EWT	LWT	PRESS. RELIEF	MODEL	MFG	WEIGHT	NOTES
B-1	BUILDING	32 GPM	23 FT	500,000	470,000	120 V	1	60 Hz	150 °F	180 °F	50PSI	TRINITY LX	NTI	320	1,2,3
B-2	BUILDING	32 GPM	23 FT	500,000	470,000	120 V	1	60 Hz	150 °F	180 °F	50PSI	TRINITY LX	NTI	320	1,2,3

NOTES:
1 MOUNT ON HOUSEKEEPING PAD WITH MFG'S FLOOR RACK
2. PROVIDE SOLID WALL PVC OR CPVC VENTING AND COMBUSTION AIR
3. PROVIDE BACNet INTERFACE CARD TO INTERFACE WITH BAS

3a

EXPANSION TANK SCHEDULE

TAG	SERVES	PRESSURE PSIG OPERATING	PRESSURE PSIG MAXIMUM	CONNECT. DIA.	VOLUME	MODEL	MFG	WEIGHT	NOTES
EXP1	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,3,5
EXP1a	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,3,4
EXP2	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,5
EXP2a	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,4
EXP3	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,5
EXP3a	WASTE HEAT LOOP	20	100	3/4"	112.0 gal	CBX425-125	Taco	380.00 lb	1,4
EXP4	BLDG HEATING LOOP	15	50	3/4"	79.0 gal	CBX300-125	Taco	300.00 lb	1,2,4

NOTES:
1. PROVIDE 4" CONCRETE HOUSEKEEPING PAD
2. PROVIDE 4904-AD AIR AND DIRT SEPARATOR
3. PROVIDE 4906-AD AIR AND DIRT SEPARATOR
4. PROVIDED ON BASE BID
5. PROVIDED IN ALTERNATE #10

INDIRECT WATER HEATER SCHEDULE

TAG	VOLUME	HEATING SOURCE WATER FLOW	PD	LWT	EWT	CONNECTIONS	DOMESTIC WATER EWT	LWT	GPH	CONNECTIONS	MFG	MODEL	WEIGHT	NOTES
DWH5	119.0 gal	12 GPM	15.9 ftH2O	145 °F	180 °F	0' - 1 1/2"	50 °F	140 °F	210	0' - 1 1/2"	HTP	SSU-119DW	210.00 lb	1,2,3,4,5

NOTES:
1. HVAC CONTRACTOR TO INSTALL HEATER & PIPE SOURCE SIDE
2. PLUMB CONTRACTOR TO PIPE DOMESTIC
3. PROVIDE HOUSEKEEPING PAD
4. PROVIDE P&T VALVE PIPED TO FLOOR DRAIN
5. PROVIDE TANK MOUNTED AQUASTAT FOR PUMP CONTROL

3a

HEAT EXCHANGER SCHEDULE

TAG	SERVES	TYPE	MATERIAL	SOURCE GPM	PD	EWT	LWT	FLUID	TRANSFER GPM	PD	EWT	LWT	FLUID	MODEL	MFG	NOTES
HX1	WASTE HEAT LOOP	Plate and Frame	AISI 304	175 GPM	3.79 psi	200 °F	180 °F	30%PROPYLENE GLYCOL	175 GPM	3.79 psi	160 °F	180 °F	WATER	PF205-31-4-NH	Taco	1
HX2	GENERATOR #1	Plate and Frame	AISI 304	210 GPM	4.31 psi	230 °F	200 °F	50%PROPYLENE GLYCOL	215 GPM	4.65 psi	178 °F	207 °F	40%PROPYLENE GYLCOL	PF205-61-4-NH	Taco	1,2
HX3	GENERATOR #2	Plate and Frame	AISI 304	210 GPM	4.31 psi	230 °F	200 °F	50%PROPYLENE GLYCOL	215 GPM	4.65 psi	178 °F	207 °F	40%PROPYLENE GYLCOL	PF205-61-4-NH	Taco	1,2

NOTES:
1. PROVIDE HOUSEKEEPING PAD
2. ALL SURFACES TO BE EITHER STAINLESS STEEL, ZINC PLATED OR PAINTED, PROVIDE HEAVY COAT OF GREASE ON TIGHTNING RODS

3a

PUMP SCHEDULE

TAG	SERVES	FLOW	PUMP HEAD (FT)	RPM	ELECTRICAL MOTOR HP	V	PH	HZ	MODEL	MFG	NOTES
P-1	B-1	32 GPM	18	1760	0.5 hp	120 V	1	60 Hz	1911 - 1.5x1.5	Taco	
P-2	B-2	32 GPM	18	1760	0.5 hp	120 V	1	60 Hz	1911 - 1.5x1.5	Taco	
P-3	MAIN LOOP	175 GPM	60	3500	5 hp	460 V	3	60 Hz	1935 - 2x2	Taco	4
P-4	MAIN LOOP	175 GPM	60	3500	5 hp	460 V	3	60 Hz	1935 - 2x2	Taco	4
P-5	RADIANT FLOOR	60 GPM	40	1750	2.2 hp	230 V	1	60 Hz	VR30	Taco	5,6
P-6	INJECTION PUMP	33 GPM	10	3450	0.17 hp	120 V	1	60 Hz	2460	Taco	5
P-7	WASTE HEAT LOOP	175 GPM	220	3500	50 hp	480 V	3	60 Hz	2509C - 3x2.5	Taco	1,2,4,7
P-7a	WASTE HEAT LOOP	430 GPM	30	1760	5 hp	480 V	3	60 Hz	4007 - 5x4	Taco	1,2,3
P-8	WASTE HEAT LOOP	175 GPM	220	3500	50 hp	480 V	3	60 Hz	2509C - 3x2.5	Taco	1,2,4,7
P-10	INDIRECT WATER HEATER	12 GPM	20	3250	0.17 hp	120 V	1	60 Hz	0013	Taco	1,2
P-11a	HX2	215 GPM	65	1760	7.5 hp	480 V	3	60 Hz	2510C - 3x2.5	Taco	1,2,3
P-12a	HX3	215 GPM	65	1760	7.5 hp	480 V	3	60 Hz	2510C - 3x2.5	Taco	1,2,3
P-13a	HX1	175 GPM	40	1760	5 hp	480 V	3	60 Hz	3009 - 3x3	Taco	

NOTES:
1 PROVIDE INERTIA BASE
2. PROVIDE HOUSEKEEPING PAD
3. PROVIDED IN INFORMATION BID F
4. VFD RATED PUMP WITH SHAFT GROUNDING RING
5. PROVIDED IN ALT#5
6. ECM MOTOR PUMP WITH FLOW SENSING, INCLUDE BAS INPUTS FOR PUMP
7. PROVIDED IN ALT#10

HYDRONIC RADIANT MANIFOLDS

TAG	SERVES	MANIFOLD FLOW	INDIVIDUAL LOOP FLOW	NO OF LOOPS	MFG	NOTES
MAN1	LARGE VEHICLE 138	8 GPM	0.95 GPM	8Loop	Uponor, Inc.	1,2,4,5,6
MAN2	LARGE VEHICLE 138	8 GPM	0.95 GPM	8Loop	Uponor, Inc.	1,2,4,5,6
MAN3	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN4	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN5	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN6	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN7	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN8	LARGE VEHICLE 138	6 GPM	0.95 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN9	WELDING 145	7 GPM	1.10 GPM	6Loop	Uponor, Inc.	1,2,4,5,6
MAN10	WELDING 145	4 GPM	1.00 GPM	4Loop	Uponor, Inc.	1,2,4,5,6
MAN11	OFFICE124, OFFICE 123	2 GPM	0.75 GPM	2Loop	Uponor, Inc.	1,2,3,5,6
MAN12	MENS LOCKER ROOM	5 GPM	2.25 GPM	2Loop	Uponor, Inc.	1,2,3,5,6
MAN13	WOMENS LOCKER ROOMS	2 GPM	0.75 GPM	2Loop	Uponor, Inc.	1,2,3,5,6
MAN14	KIT134, PARTS	10 GPM	1.25 GPM	8Loop	Uponor, Inc.	1,2,4,5,6
MAN15	OFFICE 120,121, 122	2 GPM	0.75 GPM	2Loop	Uponor, Inc.	1,2,3,5,6
MAN16	BREAK ROOM	3 GPM	1.25 GPM	2Loop	Uponor, Inc.	1,2,3,5,6

NOTES:
1. 3/4"PEX TUBING CONNECTIONS
2. LIMIT CIRCUITS TO 450' MAXIMUM FOR 3/4"PEX
3. 2 CIRCUIT MANIFOLD WITH CONTROL VALVE ON EACH CIRCUIT LINKED TO SPACE SENSORS
4. 1 CONTROL VALVE ON MANIFOLD LINKED TO SPACE SENSOR
5. PROVIDE SLAB STAT TO SHUT OFF CONTROL VAVLE IF SLAB TEMP IS ABOVE 80°F
6. INCLUDED IN ALTERNATE #18

PLAN NORTH
SCALE: 12" = 1'-0"

Addendum 3a **02-24-2015**

Mechanical Schedules

Kueny Archtects - Dane County Highway

01/12/15

M-300

SEQUENCE OF OPERATIONS FOR GENERATOR JACKET(WASTE) HEAT RECOVERY - Copied from spec section 23 09 93
Pump P-7a (Secondary underground loop pump) When either the highway building or future medical examiner building is calling for heat the pump shall be energized. The pump shall be provided with a VFD. The pump shall operate at half flow when only 1 building is calling for heat.

Pump P-13a(Hwy Building Side Waste Heat exchanger pump) shall energize on a call for heating or domestic hot water from the building. The pump shall energize and increase the VFD to high speed for 5minutes or until the supply water temperature sensor is above 180°F. If the hwy building heating loop return water temperature is higher than the waste heat loop supply water temperature the pump shall shut downsee HX1 sequence). If the hwy building heating loop return water temperature is lower than the waste heat loop supply water temperature the pump shall modulate to its minimum speed, the 2-way bypass valve shall close to send the highway building secondary loop water through the heat exchanger then the VFD shall modulate to maintain the highway building secondary loop at 180°F.

Pump P-11a (HX2 generator HX waste heat loop primary pump) shall energize to maintain the waste heat loop temperature setpoint of 207°F. The pump shall not energize unless pump P-7a is energized.

Pump P-12a (HX2 generator HX waste heat loop primary pump) shall energize to maintain the waste heat loop temperature setpoint of 207°F. The pump shall not energize unless pump P-7a is energized.

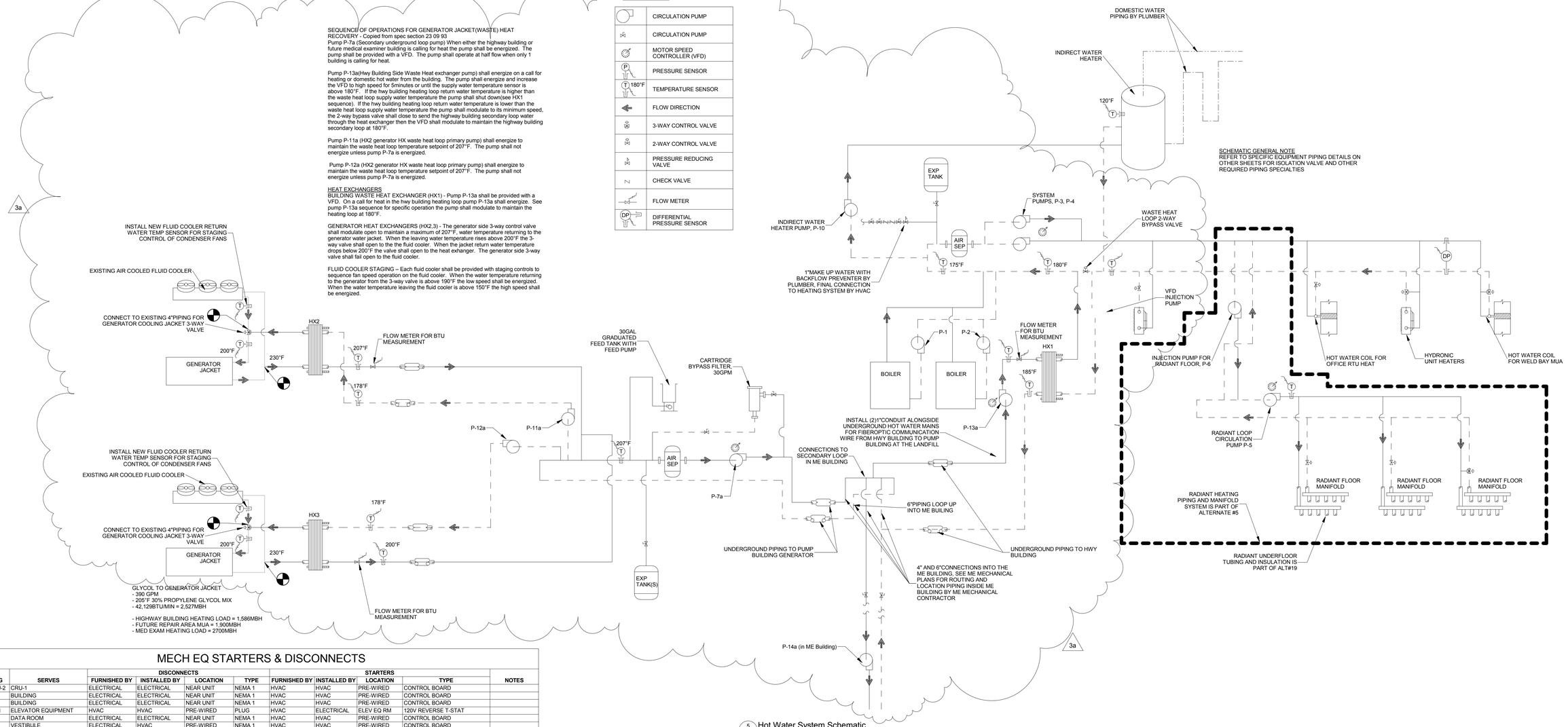
HEAT EXCHANGERS
BUILDING WASTE HEAT EXCHANGER (HX1) - Pump P-13a shall be provided with a VFD. On a call for heat in the hwy building heating loop pump P-13a shall energize. See pump P-13a sequence for specific operation the pump shall modulate to maintain the heating loop at 180°F.

GENERATOR HEAT EXCHANGERS (HX2,3) - The generator side 3-way control valve shall modulate open to maintain a maximum of 207°F, water temperature returning to the generator water jacket. When the leaving water temperature rises above 200°F the 3-way valve shall open to the the fluid cooler. When the jacket return water temperature drops below 200°F the valve shall open to the heat exhanger. The generator side 3-way valve shall fail open to the fluid cooler.

FLUID COOLER STAGING – Each fluid cooler shall be provided with staging controls to sequence fan speed operation on the fluid cooler. When the water temperature returning to the generator from the 3-way valve is above 190°F the low speed shall be energized. When the water temperature leaving the fluid cooler is above 150°F the high speed shall be energized.

SYMBOL LEGEND

	CIRCULATION PUMP
	CIRCULATION PUMP
	MOTOR SPEED CONTROLLER (VFD)
P	PRESSURE SENSOR
T 180°F	TEMPERATURE SENSOR
	FLOW DIRECTION
	3-WAY CONTROL VALVE
	2-WAY CONTROL VALVE
	PRESSURE REDUCING VALVE
	CHECK VALVE
	FLOW METER
DP	DIFFERENTIAL PRESSURE SENSOR



5 M-301 Hot Water System Schematic
SCALE: NO SCALE

MECH EQ STARTERS & DISCONNECTS

		DISCONNECTS				STARTERS				
TAG	SERVES	FURNISHED BY	INSTALLED BY	LOCATION	TYPE	FURNISHED BY	INSTALLED BY	LOCATION	TYPE	NOTES
ACCU-2	CRU-1	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
B-1	BUILDING	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
B-2	BUILDING	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
CEF-1	ELEVATOR EQUIPMENT	HVAC	HVAC	PRE-WIRED	PLUG	HVAC	ELECTRICAL	ELEV EQ RM	120V REVERSE T-STAT	
CRU1	DATA ROOM	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
CUH1	VESTIBULE	ELECTRICAL	HVAC	PRE-WIRED	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
CUH2	STAIR	ELECTRICAL	HVAC	PRE-WIRED	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
EF-1	VEHICLE SOURCE	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	WELDING	WALL SWITCH	
MUA-1	LARGE VEHICLE 140	HVAC	HVAC	PRE-WIRED	NEMA 3R	HVAC	HVAC	STORAGE 138	VFD W/REMOTE PANEL	1
MUA-2	LARGE VEHICLE 151	HVAC	HVAC	PRE-WIRED	NEMA 3R	HVAC	HVAC	PRE-WIRED	STARTER W/REMOTE PANEL	
MUA-3	WELDING 145	HVAC	HVAC	PRE-WIRED	NEMA 3R	HVAC	HVAC	PRE-WIRED	STARTER W/REMOTE PANEL	
MUA-4	SMALL VEHICLE 138	HVAC	HVAC	PRE-WIRED	NEMA 3R	HVAC	HVAC	PRE-WIRED	STARTER W/REMOTE PANEL	
P-1	B-1	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR BOILERS	STARTER W/ 24VRELAY	
P-2	B-2	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR BOILERS	STARTER W/ 24VRELAY	
P-3	MAIN LOOP	HVAC	ELECTRICAL	NEAR UNIT	FUSED	HVAC	ELECTRICAL	NEAR BOILERS	VFD	1
P-4	MAIN LOOP	HVAC	ELECTRICAL	NEAR UNIT	FUSED	HVAC	ELECTRICAL	NEAR BOILERS	VFD	1
P-7	WASTE HEAT LOOP	HVAC	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR UNIT	VFD	1
P-7a	WASTE HEAT LOOP	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	NEAR UNIT	VFD	1
P-8	WASTE HEAT LOOP	HVAC	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR UNIT	VFD	1
P-10	INDIRECT WATER HEATER	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	ELECTRICAL	ELECTRICAL	NEAR UNIT	CONTACTOR W/24V RELAY	
P-11a	HX2	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	ELECTRICAL	ELECTRICAL	NEAR UNIT	STARTER W/ 24VRELAY	
P-12a	HX3	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	ELECTRICAL	ELECTRICAL	NEAR UNIT	STARTER W/ 24VRELAY	
P-13a	HX1	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	NEAR UNIT	VFD	1
PRV-1	SMALL VEHICLE 140	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-2	SMALL VEHICLE 140	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-4	LARGE VEHICLE 138	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-5	LARGE VEHICLE 138	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-7	LARGE VEHICLE 122A	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-8	LARGE VEHICLE 122A	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-9	LARGE VEHICLE 122A	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-10	WELD BAY 145	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	WELD BAY 145	STARTER W/ 24VRELAY	
PRV-11	OIL	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	SEE E-PLANS	STARTER W/ 24VRELAY	
PRV-12	WELD BAY 145	HVAC	HVAC	PRE-WIRED	NEMA 1	ELECTRICAL	ELECTRICAL	WELD BAY 145	INTERLOCK WITH LIGHTS	
UH-1	SMALL VEHICLE 140	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-2	SMALL VEHICLE 140	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-3	SMALL VEHICLE 140	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-4	SMALL VEHICLE 140	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-5	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-6	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-7	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-8	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-9	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-10	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-11	LARGE VEHICLE 138	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-12	WELDING 145	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-13	WELDING 145	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-15	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-16	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-17	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-18	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-19	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-20	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-21	LARGE VEHICLE 151	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-22	PARTS 137	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	
UH-23	MEZZANINE 202	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	HVAC	PRE-WIRED	CONTROL BOARD	

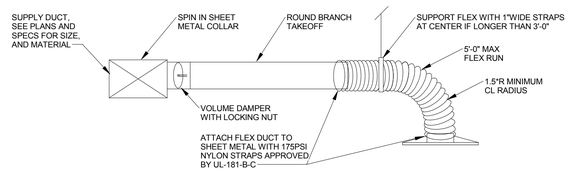
3a

ADDITIONAL MECH EQ STARTERS & DISCONNECTS FOR ALT #5

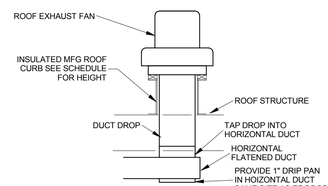
		DISCONNECTS				STARTERS				
TAG	SERVES	FURNISHED BY	INSTALLED BY	LOCATION	TYPE	FURNISHED BY	INSTALLED BY	LOCATION	TYPE	NOTES
P-5	RADIANT FLOOR	HVAC	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR BOILERS	CONTACTOR W/24V RELAY	1
P-6	INJECTION PUMP	ELECTRICAL	ELECTRICAL	NEAR UNIT	NEMA 1	HVAC	ELECTRICAL	NEAR BOILERS	CONTACTOR W/24V RELAY	1

NOTES:
1. INCLUDED IN ALTERNATE #5

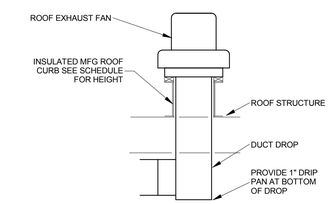
3a



1 M-301 BRANCH DUCT TAP
SCALE: NO SCALE



4 M-301 EXHAUST FAN DROP DETAIL(BULL NOSE)
SCALE: NO SCALE



2 M-301 EXHAUST FAN DROP DETAIL
SCALE: NO SCALE

Addendum 3a 02-24-2015

Mechanical Details

Kueny Archtects - Dane County Highway

01/12/15

PLAN NORTH
SCALE: 12" = 1'-0"

M-301

SEQUENCE OF OPERATIONS FOR GENERATOR JACKET(WASTE) HEAT RECOVERY - Copied from spec section 23 09 93
Pump P-7,8(Buried piping side Waste Heat Exchanger) pumps shall run in a lead lag sequence. When either the highway building or future medical examiner building is calling for heat the lead pump shall be energized. The lead pump sequencing shall be variable based on the runtime of the pump. The lead pump shall be switched when the operating hours have reached 80hours(adjustable). The lead pump shall run and vary the VFDto maintain a differential pressure at the highway building heat exchanger of 10psi

HEAT EXCHANGERS
BUILDING WASTE HEAT EXCHANGER (HX1) - waste heat loop side temp control
Waste heat loop temp control - The 2-way control valve on HX1 waste heat side shall be controlled by the main building heating loop temp sensor downstream of the HX1 connection to the main building heating loop. When the main heating loop is below setpoint the valve shall open when the main heating loop is above setpoint the valve shall close. The valve shall be interlocked with the bypass control valve. When the bypass control valve is open(diverting the main building heating loop water from the HX1 loop) the control valve shall close.

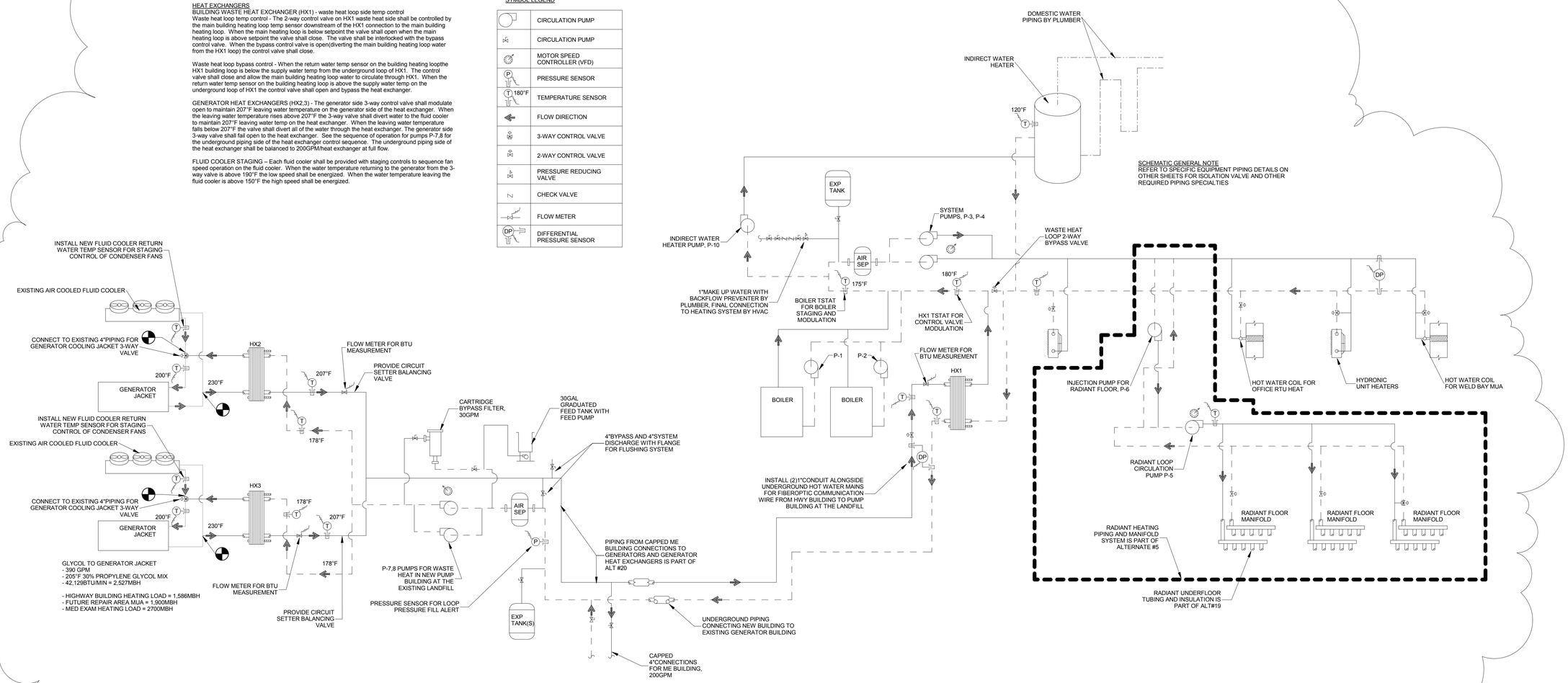
Waste heat loop bypass control - When the return water temp sensor on the building heating loopthe HX1 building loop is below the supply water temp from the underground loop of HX1. The control valve shall close and allow the main building heating loop water to circulate through HX1. When the return water temp sensor on the building heating loop is above the supply water temp on the underground loop of HX1 the control valve shall open and bypass the heat exchanger.

GENERATOR HEAT EXCHANGERS (HX2,3) - The generator side 3-way control valve shall modulate open to maintain 207°F leaving water temperature on the generator side of the heat exchanger. When the leaving water temperature rises above 207°F the 3-way valve shall divert water to the fluid cooler to maintain 207°F leaving water temp on the heat exchanger. When the leaving water temperature falls below 207°F the valve shall divert all of the water through the heat exchanger. The generator side 3-way valve shall fail open to the heat exchanger. See the sequence of operation for pumps P-7,8 for the underground piping side of the heat exchanger control sequence. The underground piping side of the heat exchanger shall be balanced to 200GPM/heat exchanger at full flow.

FLUID COOLER STAGING – Each fluid cooler shall be provided with staging controls to sequence fan speed operation on the fluid cooler. When the water temperature returning to the generator from the 3-way valve is above 190°F the low speed shall be energized. When the water temperature leaving the fluid cooler is above 150°F the high speed shall be energized.

SYMBOL LEGEND

	CIRCULATION PUMP
	CIRCULATION PUMP
	MOTOR SPEED CONTROLLER (VFD)
P	PRESSURE SENSOR
T 180°F	TEMPERATURE SENSOR
	FLOW DIRECTION
	3-WAY CONTROL VALVE
	2-WAY CONTROL VALVE
	PRESSURE REDUCING VALVE
	CHECK VALVE
	FLOW METER
DP	DIFFERENTIAL PRESSURE SENSOR



1 M-301a Hot Water System Schematic - ALT 10
SCALE: NO SCALE

3a

3a

Addendum 3a 02-24-2015

Alt pumping Pipe Schematic

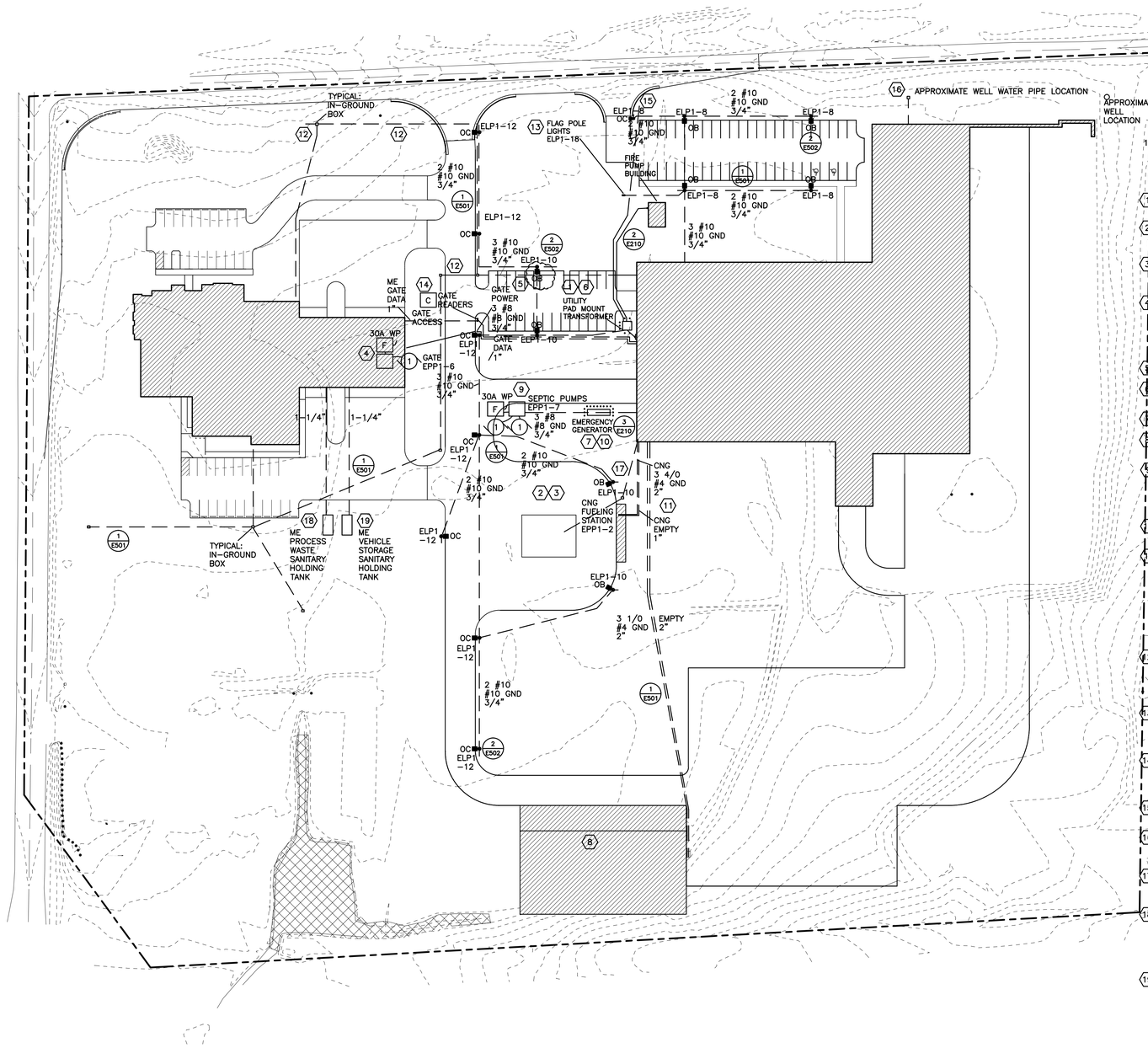
Kueny Archtects - Dane County Highway

02/19/2015

PLAN NORTH

SCALE: 12" = 1'-0"

M-301a



GENERAL SHEET NOTES

SEE DRAWING NOTES AND BIDDING NOTES ON SHEET E-506 FOR BASE BID AND ALTERNATE BIDS.

SHEET NOTES

1. APPROXIMATE UTILITY PAD MOUNT TRANSFORMER LOCATION SHOWN. VERIFY LOCATION. COORDINATE ALL SERVICE WORK WITH UTILITY.
2. FUEL ISLAND AREA: 20' AREA AROUND GAS PUMPS AND 5' AREA AROUND UNDERGROUND TANK FILL OPENING OR VENT ARE CLASS 1, DIVISION 1 OR DIVISION 2 LOCATIONS. ELECTRICAL CONTRACTOR TO VERIFY CLASSIFIED LOCATIONS AND KEEP CONDUITS AND EQUIPMENT AWAY FROM THESE AREAS.
3. ALL FUEL ISLAND EQUIPMENT (PUMPS, CANOPY LIGHTS, CARD READERS, SYSTEMS AND/OR ANY OTHER ASSOCIATED DEVICES) WIRING AND CONDUIT BY FUEL SYSTEMS CONTRACTOR UNDER ALTERNATE BID #2. ELECTRICAL CONTRACTOR TO PROVIDE FUEL ISLAND PANEL FI, TRANSFORMER AND FEEDER UNDER BASE BID.
4. PROVIDE DISCONNECT AND POWER CONNECTION TO GATE. PROVIDE POWER CONDUIT FROM BUILDING TO GATE CONTROL BOX. PROVIDE EMPTY 1" CONTROL CONDUIT FROM JOIST AREA IN BUILDING TO GATE CONTROL BOX. PROVIDE 3/4" CONTROL CONDUIT FROM GATE CONTROL BOX TO EACH CARD READER (ONE FOR HIGHWAY BUILDINGS, ONE FOR THE BUILDING). PROVIDE 1" CONTROL CIRCUIT FROM GATE CONTROL BOX TO ME BUILDING. KEEP CONTROL CONDUITS AT LEAST 2' FROM ANY POWER CONDUITS. OUTDOOR CARD READER STANDS BY GENERAL CONTRACTOR.
5. PROVIDE 3 4" PVC CONDUITS WITH PULL STRING FROM DATA 142 TO IN-GROUND BOX.
6. GENERAL CONTRACTOR TO PROVIDE CONCRETE PAD AND BOLLARDS FOR ALLIANT ENERGY PAD MOUNT TRANSFORMER AS REQUIRED.
7. GENERAL CONTRACTOR TO PROVIDE CONCRETE PAD AND BOLLARDS FOR GENERATOR AS REQUIRED.
8. SALT STRUCTURE: PROVIDE POWER CONDUCTORS AND ALL SALT STRUCTURE ELECTRICAL AS SHOWN ON SHEET E-209. STUB EMPTY 2" CONDUIT UP TO 4' AFG APPROXIMATELY 3' NORTH OF PANEL SS ON SALT SHED AND CAP.
9. SEPTIC SYSTEM – INFORMATIONAL BID B: PROVIDE CIRCUIT BREAKER IN PANEL EPP1, FEEDER AND WP FUSED DISCONNECT AT SEPTIC SYSTEM CONTROL PANEL. PROVIDE CONDUIT AND CIRCUITS TO TWO 1 HP SEPTIC PUMPS. SEPTIC SYSTEM CONTROL PANEL AND PUMPS PROVIDED AND MOUNTED BY PLUMBING CONTRACTOR. VERIFY LOCATIONS. PROVIDE 1" EMPTY CONDUIT FROM SEPTIC PANEL TO UNDERGROUND TANK FOR FLOAT CONTROL WIRING BY PLUMBING CONTRACTOR.
10. PROVIDE CONDUITS, CIRCUITS AND CONTROL WIRING AS REQUIRED BY GENERATOR MANUFACTURER. SEE SHEET E-210, DETAIL 3 FOR AN EXPLODED VIEW OF THE GENERATOR AREA.
11. CNG AREA: AREA INSIDE DISPENSER ENCLOSURE IS A CLASS 1 DIVISION 1 LOCATION. 5' AREA AROUND DISPENSER IS A CLASS 1, DIVISION 2 LOCATION. KEEP 20' AWAY FROM TANKS. ELECTRICAL CONTRACTOR TO VERIFY CLASSIFIED LOCATIONS AND KEEP OTHER CONDUITS AND EQUIPMENT AWAY FROM THESE AREAS.
PROVIDE CIRCUIT BREAKER IN PANEL EPP1 AND FEEDER TO CNG PANEL. PROVIDE TERMINATION IN CNG ELECTRICAL PANEL.
ALSO PROVIDE EMPTY 1" TO CNG PANEL FROM BOTTOM OF JOIST AREA INSIDE BUILDING. PROVIDE PULL STRING IN EMPTY CONDUIT. VERIFY LOCATION WITH CNG CONTRACTOR. CNG ELECTRICAL PANEL PROVIDED WITH CNG EQUIPMENT BY CNG CONTRACTOR.
ELECTRICAL SHALL BE CLASS 1 DIVISION 1 (GALVANIZED RIGID STEEL CONDUIT, CLASS 1 DIV. 1 FITTINGS AND SEAL OFFS AS REQUIRED).
12. PROVIDE 3 4" PVC CONDUITS WITH PULL STRING AND IN-GROUND BOXES FOR SYSTEMS USE AS SHOWN. PROVIDE STUBS FROM IN-GROUND BOXES AS SHOWN. PROVIDE 12" WIDE, 12" DEEP CONCRETE PAD AROUND ALL IN-GROUND BOXES. IN-GROUND BOXES SUPPLIED BY SYSTEMS CONTRACTOR AND INSTALLED BY ELECTRICAL CONTRACTOR. MEDICAL EXAMINER CONTRACTOR TO STUB 4" CONDUITS 5' OUT FROM BUILDING. HIGHWAY FACILITY ELECTRICAL CONTRACTOR TO CONNECT TO STUBBED OUT 4" CONDUITS.
13. FLAG POLE PROVIDED WITH TWO UP LIGHTS MOUNTED TO POLE AND PREWIRED TO HAND HOLE BY FLAG POLE MANUFACTURER. ELECTRICAL CONTRACTOR TO PROVIDE CIRCUIT AND CONNECT TO PREWIRED LIGHTS. ELECTRICAL CONTRACTOR TO ALSO PROVIDE A GROUND ROD AND CONDUCTOR TO GROUND FLAG POLE. PROVIDE PVC CONDUIT IN FLAG POLE BASE FOR GROUND CONDUCTOR. VERIFY LOCATION.
14. PROVIDE 1" CONDUIT FROM GATE CONTROL BOX TO JOIST AREA IN MAIN BUILDING. PROVIDE 3/4" CONDUIT FROM GATE CONTROL BOX TO EACH CARD READER (DUAL HEIGHT CARD READERS). VERIFY LOCATION OF CARD READERS WITH SYSTEMS CONTRACTOR. CARD READER STAND BY SYSTEMS CONTRACTOR. CARD READER CONCRETE BASE BY GENERAL CONTRACTOR.
15. PRIMARY UNDERGROUND ELECTRICAL LINE BY ALLIANT ENERGY. ELECTRICAL CONTRACTOR TO STUB 4" PRIMARY CONDUITS OUT FROM UTILITY TRANSFORMER PAD. ALL OTHER PRIMARY WORK BY ALLIANT ENERGY.
16. PROVIDE 1 4" PVC CONDUIT WITH PULL STRING AND IN-GROUND BOX FOR SYSTEMS USE AS SHOWN. STUB 4" UP TO JOIST AREA IN VEHICLE AREA 151. PROVIDE 12" WIDE, 12" DEEP CONCRETE PAD AROUND ALL IN-GROUND BOXES.
17. PROVIDE 1 4" PVC CONDUIT WITH PULL STRING AND IN-GROUND BOX FOR SYSTEMS USE AS SHOWN. STUB 4" UP TO JOIST AREA IN VEHICLE STORAGE 138. PROVIDE 12" WIDE, 12" DEEP CONCRETE PAD AROUND ALL IN-GROUND BOXES.
18. MEDICAL EXAMINER PROCESS WASTE SANITARY HOLDING TANK – INFORMATIONAL BID H: PROVIDE UP TO 1-1/4" CONDUIT FROM LEVEL CONTROLS INSIDE MEDICAL EXAMINER BUILDING TO SANITARY HOLDING TANK LEVEL SENSOR. PROVIDE PVC BOX IN TANK MANHOLE ACCESS PIT AND CONNECTION TO LEVEL CONTROL SENSOR AS REQUIRED. PULL LOW VOLTAGE CABLE AND TERMINATE AS REQUIRED. LOW VOLTAGE CABLE PROVIDED BY PLUMBING CONTRACTOR. RUN CONDUIT TO ONE SIDE OF SEWER LINE. VERIFY CONDUIT SIZE AND LOCATIONS WITH PLUMBING CONTRACTOR.
19. MEDICAL EXAMINER VEHICLE STORAGE SANITARY HOLDING TANK – INFORMATIONAL BID I: PROVIDE UP TO 1-1/4" CONDUIT FROM LEVEL CONTROLS INSIDE MEDICAL EXAMINER BUILDING TO SANITARY HOLDING TANK LEVEL SENSOR. PROVIDE PVC BOX IN TANK MANHOLE ACCESS PIT AND CONNECTION TO LEVEL CONTROL SENSOR AS REQUIRED. PULL LOW VOLTAGE CABLE AND TERMINATE AS REQUIRED. LOW VOLTAGE CABLE PROVIDED BY PLUMBING CONTRACTOR. RUN CONDUIT TO ONE SIDE OF SEWER LINE. VERIFY CONDUIT SIZE AND LOCATIONS WITH PLUMBING CONTRACTOR.

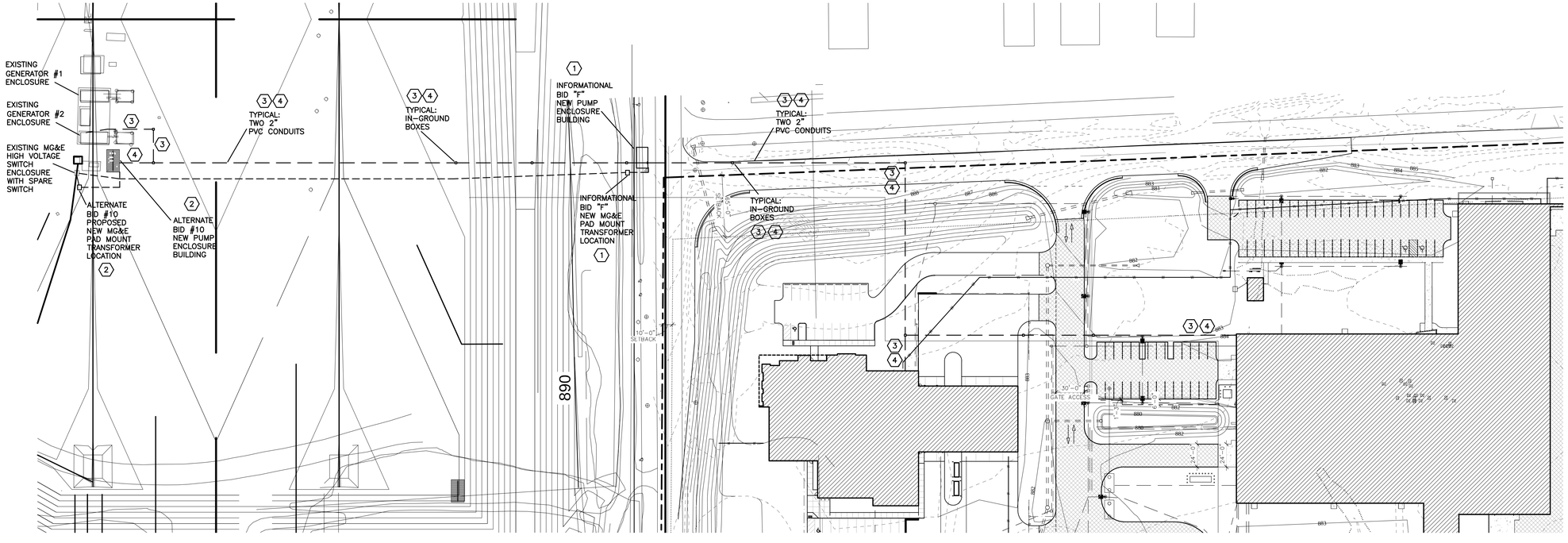
Revised West Parking Pole Location - February 23, 2015

Electrical Site Plan

Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

PLAN NORTH
SCALE: 1"=60'

E-101



SHEET NOTES

1. INFORMATIONAL BID "F": PROVIDE ELECTRICAL SERVICE AND ALL ELECTRICAL FOR WASTE HEAT LOOP PUMP ENCLOSURE PER SHEET E-213.

2. ALTERNATE BID #10: PROVIDE ELECTRICAL SERVICE AND ALL ELECTRICAL FOR WASTE HEAT LOOP PUMP ENCLOSURE PER SHEET E-212.

3. INFORMATIONAL BID "F": PROVIDE TWO 2" PVC CONDUITS WITH PULL STRINGS FOR FIBER CABLE FROM A LARGE JUNCTION BOX INSIDE INFORMATIONAL BID "F" WASTE HEAT LOOP PUMP ENCLOSURE TO GENERATOR #2 ENCLOSURE. PROVIDE A LARGE JUNCTION BOX INSIDE OR OUTSIDE OF GENERATOR #2 ENCLOSURE AS DIRECTED BY CONTROLS CONTRACTOR. PROVIDE TWO 2" PVC CONDUITS WITH PULL STRINGS FOR FIBER CABLE FROM A LARGE JUNCTION BOX INSIDE INFORMATIONAL BID "F" WASTE HEAT LOOP PUMP ENCLOSURE TO A LARGE JUNCTION BOX IN EQUIPMENT ROOM 149 IN THE HIGHWAY FACILITY BUILDING. ALSO PROVIDE TWO 2" CONDUITS TO A LARGE JUNCTION BOX INSIDE THE MECHANICAL ROOM OF THE MEDICAL EXAMINER BUILDING. VERIFY ALL JUNCTION BOX SIZE AND LOCATIONS WITH CONTROLS CONTRACTOR. USE LONG SWEEPING ELBOWS. PROVIDE 30"x30"x24" IN-GROUND QUAZITE BOXES OR EQUAL. PROVIDE GRAVEL BASE AND 12" WIDE, 24" DEEP CONCRETE PAD AROUND ALL IN-GROUND BOXES. VERIFY IN-GROUND BOX SIZE WITH CONTROLS CONTRACTOR. IF LARGER IN-GROUND BOXES ARE REQUIRED NOTIFY THE ENGINEER BEFORE BOXES ARE PURCHASED AND INSTALLED. INSTALL CONDUIT IN SAME TRENCH AS WASTE HEAT PIPING. SEE MECHANICAL PLANS.

4. ALTERNATE BID #10: PROVIDE TWO 2" PVC CONDUITS WITH PULL STRINGS FOR FIBER CABLE FROM A LARGE JUNCTION BOX INSIDE ALTERNATE BID #10 WASTE HEAT LOOP PUMP ENCLOSURE TO A LARGE JUNCTION BOX INSIDE EQUIPMENT ROOM 149 IN THE HIGHWAY FACILITY BUILDING. ALSO PROVIDE TWO 2" CONDUITS TO A LARGE JUNCTION BOX INSIDE THE MECHANICAL ROOM OF THE MEDICAL EXAMINER BUILDING. VERIFY ALL JUNCTION BOX SIZE AND LOCATIONS WITH CONTROLS CONTRACTOR. USE LONG SWEEPING ELBOWS. PROVIDE 30"x30"x24" IN-GROUND QUAZITE BOXES OR EQUAL. PROVIDE GRAVEL BASE AND 12" WIDE, 24" DEEP CONCRETE PAD AROUND ALL IN-GROUND BOXES AS SHOWN. VERIFY IN-GROUND BOX SIZE WITH CONTROLS CONTRACTOR. IF LARGER IN-GROUND BOXES ARE REQUIRED NOTIFY THE ENGINEER BEFORE INSTALLATION. INSTALL CONDUIT IN SAME TRENCH AS WASTE HEAT PIPING. SEE MECHANICAL PLANS.

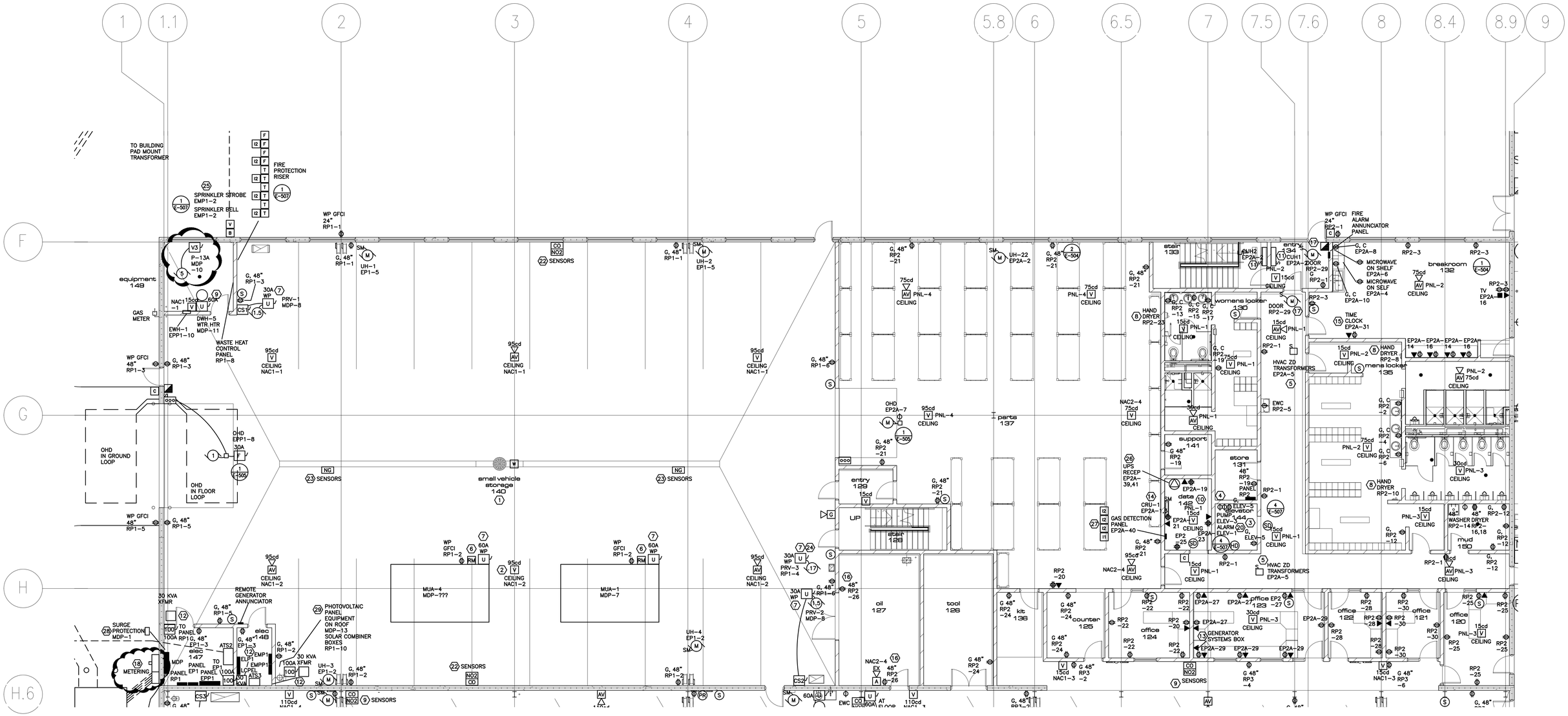
5. GENERAL NOTE: MG&E TO PROVIDE UNDERGROUND CONDUIT, PRIMARY CONDUCTORS, PRECAST CONCRETE TRANSFORMER PAD, UNDERGROUND SECONDARY CONDUITS AND SECONDARY CONDUCTORS FOR ELECTRICAL SERVICES ON INFORMATIONAL BID "F" AND ALTERNATE BID #10. ELECTRICAL CONTRACTOR TO PROVIDE A 2" CONDUIT STUBBED AWAY FROM THE PUMP ENCLOSURE MAIN DISCONNECT. COORDINATE WITH MG&E AS REQUIRED.

Informational Bid "F" and Alternate Bid #10 Waste Heat Loop Electrical Site Plan

PLAN NORTH
SCALE: 1"=60'

Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
February 24, 2015

E-101A



SHEET NOTES

1. CNG VEHICLES WILL BE STORED IN THE SMALL VEHICLE STORAGE 140. KEEP ALL WIRING BELOW THE TOP 18" OF CEILING SPACE WHERE POSSIBLE. ANY ELECTRICAL WORK WITHIN 18" OF THE CEILING SHALL BE CLASS 1, DIVISION 2.
2. TYPICAL: CEILING MOUNT STROBE AND HORN/STROBES SHALL BE MOUNTED LOWER THAN LIGHTS OR OTHER OBSTRUCTIONS (MAINTAIN LINE OF SIGHT).
3. VERIFY ALL ELECTRICAL EQUIPMENT AND DEVICE LOCATIONS IN ELEVATOR SHAFT AND MACHINE ROOM WITH ELEVATOR CONTRACTOR.
4. PROVIDE ONE DUPLEX CIRCUIT WITH TWO CIRCUITS FOR SUMP AND ALARM. GENERAL GFCI RECEPTACLE MUST BE WITHIN 3' OF NON-GCFI RECEPTACLES.
5. PROVIDE 120V POWER TO VAV BOX TRANSFORMERS AT LOCATIONS SHOWN. EACH VAV BOX REQUIRES A TRANSFORMER. EACH LOCATION HAS UP TO FOUR VAV BOXES. TRANSFORMERS PROVIDED BY HVAC CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR. LOW VOLTAGE SECONDARY WIRING BY HVAC CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE PRIMARY AND SECONDARY FUSING AS REQUIRED.
6. INTERLOCK MUA UNIT WITH FIRE ALARM. MUA UNIT TO SHUTDOWN IF FIRE ALARM SYSTEM IS IN ALARM.
7. DISCONNECT PROVIDED ON HVAC EQUIPMENT BY HVAC CONTRACTOR.
8. PROVIDE EXCEL DRYER, INC. ENERGY EFFICIENT "XLERATOR" MODEL XL-W HAND DRYER WITH OPTIONAL RECESS KIT TO MEET ADA PROTRUSION REQUIREMENT OR EQUAL. FINISH SHALL BE WHITE. "XLERATOR" HAND DRYER HAS AN AUTOMATIC (SENSOR), PRODUCES 14,000 LFM OF AIR FLOW AT HANDS 4" BELOW AIR OUTLET, REQUIRES 1500 WATTS (12.5 AMPS, 120V), HAS A FIVE YEAR WARRANTY AND IS "GREENSPEC" LISTED. ANY "EQUAL" HANDRYER SHALL MEET OR EXCEED THE SPECIFIED UNIT. MOUNT HAND DRYER 37" AFF (BOTTOM OF RECESSED BOX 26-1/2" AFF).
9. PUMP P-9 MOTOR STARTER PROVIDED BY HVAC CONTRACTOR. ELECTRICAL CONTRACTOR TO INSTALL. ELECTRICAL CONTRACTOR TO PROVIDE DISCONNECT AND POWER WIRING. VERIFY BEST LOCATION. LOW VOLTAGE WIRING BY HVAC CONTRACTOR.
10. PROVIDE 3 4" PVC CONDUIT WITH PULL STRING FROM DATA 142 TO OUTDOOR IN-GROUND BOX PROVIDED BY OTHERS WEST OF BUILDING. SEE SHEET E-101 FOR IN-GROUND BOX LOCATION. VERIFY CONDUIT LOCATION IN DATA 142 WITH SYSTEMS CONTRACTOR.
11. PROVIDE A LIGHT SWITCH AS A DISCONNECT FOR CUH-1 AND CUH-2.
12. WALL MOUNT DISCONNECTS ABOVE ELECTRICAL ROOMS. MOUNT TRANSFORMERS NEAR BOTTOM OF JOISTS.
13. PROVIDE SYSTEMS BOX WITH 1" CONDUIT TO GENERATOR MONITORING CONNECTION.
14. CRU-1 RECEIVES POWER THRU ACCU-1 ON ROOF.
15. VERIFY TIME CLOCK SYSTEMS BOX AND RECEPTACLE MOUNTING HEIGHT AND LOCATION WITH SYSTEMS CONTRACTOR.
16. PROVIDE CLASS 1, DIV 1 RECEPTACLES IN OIL ROOM. VERIFY LOCATION WITH FLUID SYSTEMS CONTRACTOR.
17. PROVIDE 120V POWER TO ADA DOOR OPERATORS. BATTERY OPERATED, WIRELESS DOOR PUSH BUTTONS INSTALLED BY DOOR CONTRACTOR.
18. PROVIDE TERMINATION COMPARTMENT WITH METERING PER ALLIANT ENERGY REQUIREMENTS.
19. NO NOTE.
20. ELEVATOR: NO ELECTRICAL CONTRACTOR ALTERNATE BID. ELECTRICAL CONTRACTOR TO PROVIDE ALL ELECTRICAL AND FIRE ALARM FOR ELEVATOR PER DRAWINGS UNDER BASE BID.
21. NO NOTE.
22. TYPICAL: CO NO2 SENSORS ARE LOW VOLTAGE THRU GAS DETECTION PANEL. LOW VOLTAGE WIRING BY GAS DETECTION CONTRACTOR. PROVIDE BOXES AND 1/2" EMT CONDUIT UP TO BOTTOM OF JOISTS. CO SENSOR LOCATED APPROXIMATELY 5' AFF. NO2 SENSOR LOCATED APPROXIMATELY 18" BELOW CEILING. VERIFY LOCATIONS.
23. NG SENSORS ARE LOW VOLTAGE THRU GAS DETECTION PANEL. LOW VOLTAGE WIRING BY GAS DETECTION CONTRACTOR. PROVIDE BOX WITH 1/2" BUSHING FOR NG SENSOR.
24. PRV-3 RUNS CONTINUOUSLY.
25. PROVIDE 120V WEATHERPROOF STROBE (AMSECO SLB120-75C) AND BACK BOX (AMSECO SBX-1). VERIFY LOCATION WITH FIRE DEPARTMENT.
26. PROVIDE A 30 AMP, L6-30R RECEPTACLE FOR UPS. VERIFY MOUNTING HEIGHT AND LOCATION WITH SYSTEMS CONTRACTOR.
27. FIRE ALARM SYSTEM TO MONITOR HIGH LEVEL CO, NO2, AND NG GAS DETECTION RELAY CONTACTS IN ROOMS 138, 140, AND 145 (SEVEN RELAY CONTACTS TOTAL). FIRE ALARM PANEL AND ANNUNCIATOR PANEL TO DISPLAY SMALL VEHICLE 140 HIGH CO LEVEL, SMALL VEHICLE 140 HIGH NO2 LEVEL, SMALL VEHICLE 140 HIGH NG LEVEL, LARGE VEHICLE 138 HIGH CO LEVEL, LARGE VEHICLE 138 HIGH NO2 LEVEL, LARGE VEHICLE 138 HIGH NG LEVEL, AND/OR WELD BAY 145 HIGH NG LEVEL.
28. PROVIDE EMERSON 570YC12ARCG1S SURGE PROTECTION DEVICE (125KA MODE/250KA PHASE, DISCONNECT SWITCH) OR EQUAL.
29. PHOTOVOLTAIC PANELS AND DISTRIBUTION SYSTEM – ALTERNATE BID #8: PROVIDE 225 AMP CIRCUIT BREAKER (MUST BE LISTED AS A BACK FED DEVICE) IN PANEL MDP. PROVIDE 225A FEEDER TO SOLAR ELECTRICAL PANEL ON ROOF NEAR COLUMN LINE H.6-2. FROM SOLAR ELECTRICAL PANEL, PROVIDE 90A FEEDER TO WEST INVERTER (NEAR COLUMN G-2) AND 125A FEEDER TO EAST INVERTER (NEAR COLUMN G-4). PROVIDE THREE 4" CONDUIT SLEEVES THRU ROOF FOR SOLAR PANEL CONTROLS. VERIFY LOCATION WITH SOLAR CONTRACTOR. PROVIDE 15/1 CIRCUIT (RP1-10) TO THREE SOLAR COMBINER BOXES. SOLAR COMBINER BOXES LOCATED NEAR COLUMNS G-2 AND G-4 (TWO COMBINER BOXES NEAR G-4).

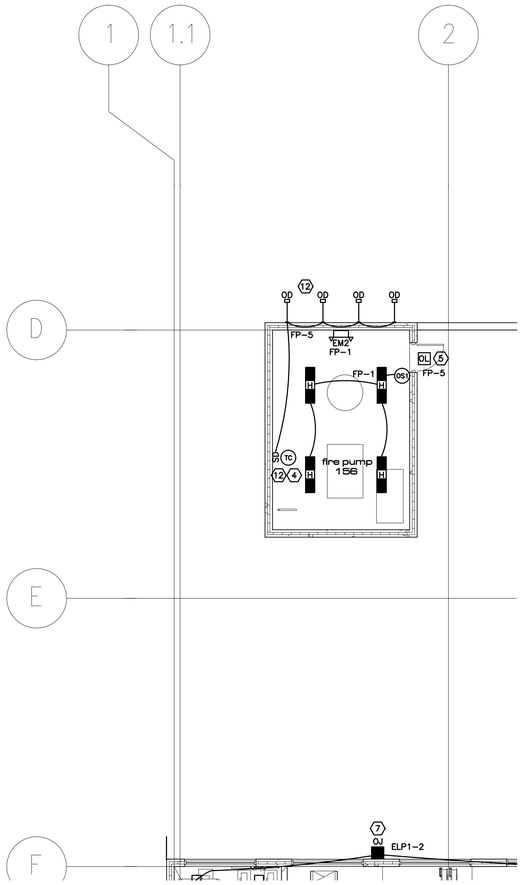
Remove Pump P-9, Add Pump P-13A - February 24, 2015
Revised Metering - February 23, 2015

Office and Small Vehicle Storage Power and Systems Plan

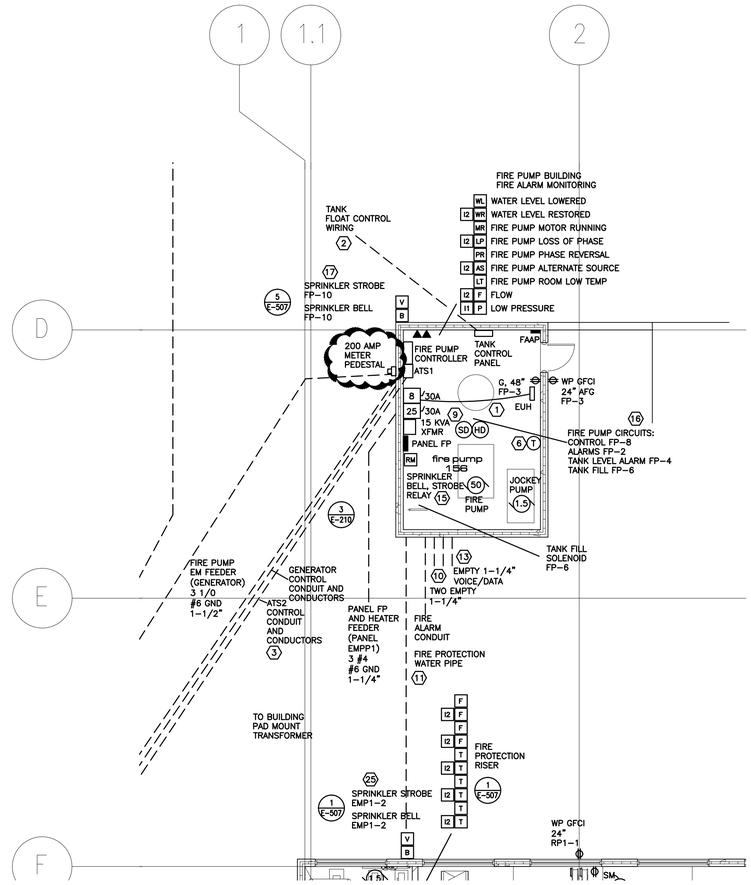
Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53559
January 12, 2015

PLAN NORTH
SCALE: 1/8" = 1'0"

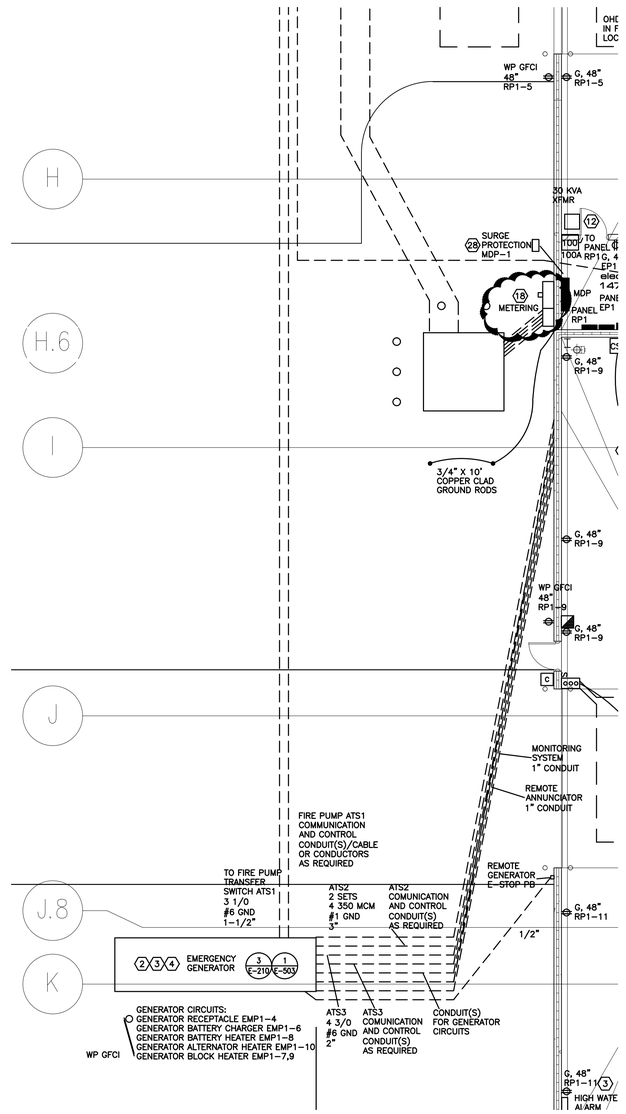
E-205



1 Fire Pump Building Lighting Plan
1/8" = 1'-0"



2 Fire Pump Building Power and Systems Plan
1/8" = 1'-0"



3 Generator Layout
1/8" = 1'-0"

NORTH

FIRE PUMP BUILDING SHEET NOTES

1. FIRE PUMP ROOM AND BUILDING SHALL BE WIRED TO ALL APPLICABLE CODES INCLUDING THE NATIONAL ELECTRICAL CODE ARTICLE 695 (FIRE PUMPS) AND NFPA 20 AND 110.
2. PROVIDE CONDUIT AND WIRING FROM TANK CONTROL PANEL TO FLOATS IN TANK. VERIFY TANK LOCATION ON PLUMBING PLANS. CONNECT WIRING TO TANK CONTROL PANEL PER TANK CONTROL DRAWING.
3. 800 AMP OPTIONAL EMERGENCY POWER AUTOMATIC TRANSFER SWITCH ATS2 SHALL BE INTERLOCKED WITH FIRE PUMP AUTOMATIC TRANSFER SWITCH ATS1. AS FIRE PUMP ATS1 IS MOVING FROM NORMAL POWER TO ALTERNATE EMERGENCY POWER, ATS2 WILL MOVE TO A NEUTRAL POSITION TO REMOVE OPTIONAL EMERGENCY LOADS FROM THE EMERGENCY GENERATOR.
4. ASTRONOMICAL TIME CLOCK FOR EXTERIOR LIGHTING SHALL BE AN INTERMATIC ET8215C WITH TWO INDEPENDANT CONTACTS AND BATTERY BACK UP OR EQUAL. WIRE SIGN FLOOD LIGHTS THRU ONE CONTACT AND ENTRANCE LIGHT OVER DOOR ON ANOTHER CONTACT. PROGRAM SIGN FLOOD CONTACT FOR DUSK TO DAWN OR DUSK TO TIME OPERATION PER OWNER. PROGRAM ENTRANCE LIGHT FOR DUSK TO DAWN OPERATION.
5. CENTER TYPE OL LIGHT APPROXIMATELY 12' AFG.
6. PROVIDE A THERMOSTAT FOR FIRE ALARM LOW ROOM TEMPERATURE (TEMP ALERT MODEL TA-2HL OR EQUAL MOUNTED IN A HINGED COVER ENCLOSURE).
7. GENERAL NOTE: ALL FIRE ALARM AND CONTROL WIRING SHALL BE IN GALVANIZED RIGID CONDUIT.
8. GENERAL NOTE: GENERATOR POWER AND CONTROL WIRING SHALL BE INDEPENDENT OF ALL OTHER WIRING AND SHALL BE ENCASED IN 2" OF CONCRETE, BE PROTECTED BY A MINIMUM 2 HOUR RATED ASSEMBLY OR BE A LISTED ELECTRICAL CIRCUIT PROTECTIVE SYSTEM WITH A MINIMUM 2 HOUR RATING PER NEC.
9. PROVIDE A SEALED, WALL MOUNT 15 KVA TRANSFORMER WITH 2 5% FULL CAPACITY TAPS.
10. PROVIDE TWO EMPTY 1-1/4" CONDUITS FROM BOTTOM OF JOIST IN FIRE PUMP BUILDING TO BOTTOM OF JOISTS INSIDE MAIN BUILDING AND CAP. PROVIDE PULL STRINGS.
11. GROUND WATER PIPE AT ENTRY TO BUILDING. JUMP GROUND AROUND ANY METER OR VALVE AT ENTRY TO BUILDING.
12. MOUNT TYPE OD SIGN FLOOD LIGHTS APPROXIMATELY 2' ABOVE TOP OF SIGN LETTERS. ADJUST ANGLE OF LIGHTS TO SIGN LETTERS FOR BEST COVERAGE. PROVIDE 0-10VDC LED DRIVER DIMMER CONTROL FOR SIGN FLOODS (LEVITON ILLUMATECH SERIES OR EQUAL).
13. PROVIDE AN EMPTY 1-1/4" CONDUIT FROM BOTTOM OF JOISTS IN FIRE PUMP BUILDING TO BOTTOM OF JOISTS INSIDE MAIN BUILDING FOR VOICE/DATA. PROVIDE PULL STRINGS.
14. PROVIDE 3/4" CONDUIT TO BOTTOM OF JOISTS FROM FIRE PUMP CONTROL EQUIPMENT OR SYSTEMS BOXES AS REQUIRED . VERIFY SYSTEMS BOX LOCATIONS WITH FIRE PUMP CONTRACTOR.
15. PROVIDE 120V CIRCUIT TO FIRE PUMP BUILDING SPRINKLER BELL AND STROBE THRU SUPERVISED CONTROL RELAY. PROVIDE INTERFACE RELAY IF NEEDED.
16. PROVIDE CONTROL CIRCUITS AS REQUIRED. VERIFY LOCATIONS WITH FIRE PROTECTION CONTRACTOR.
17. PROVIDE 120V WEATHERPROOF STROBE (AMSECO SLB120-75C) AND BACK BOX (AMSECO SBX-1). VERIFY LOCATION WITH FIRE DEPARTMENT.
18. PROVIDE TERMINATION COMPARTMENT WITH METERING PER ALLIANT ENERGY REQUIREMENTS.

GENERATOR SHEET NOTES

1. GENERATOR CONDUIT SIZE AND LAYOUT FOR ATS CONTROL AND COMMUNICATION WILL VARY WITH MANUFACTURERS. VERIFY CONDUIT SIZES AND LAYOUT.
2. GENERATOR ENCLOSURE MUST BE 20' FROM UTILITY PAD MOUNT TRANSFORMER OR METERING.
3. INFORMATIONAL BID E – GENERATOR PRICE: PROVIDE A PRICE FOR THE GENERATOR ONLY. PRICE DOES NOT INCLUDE LABOR OR OTHER GENERATOR EQUIPMENT (TRANSFER SWITCHES, ETC...).
4. GENERAL CONTRACTOR TO PROVIDE BOLLARDS AROUND GENERATOR PER SHEET E-101.

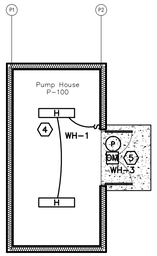
Revised Fire Pump Building Electrical Metering - February 23, 2015
Revised Highway Building Electrical Metering - February 23, 2015

Fire Pump Building Plan, Emergency Generator

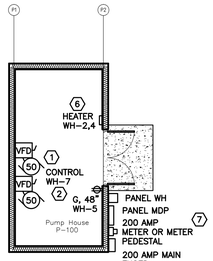
Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

PLAN NORTH
SCALE: 1/8" = 1'-0"

E-210



LIGHTING PLAN



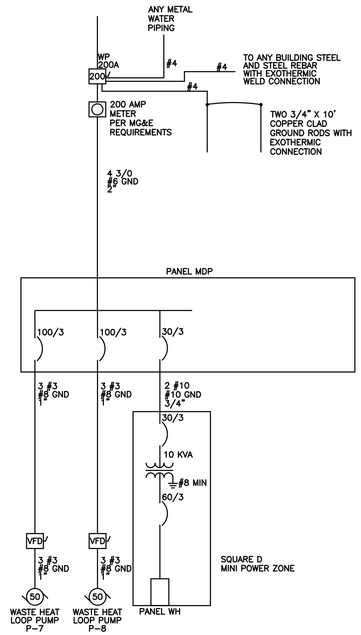
POWER PLAN

PUMP HOUSE NOTES

1. PUMP P-7 AND PUMP P-8 VARIABLE FREQUENCY DRIVES AND DISCONNECTS PROVIDED BY HVAC CONTRACTOR AND MOUNTED AND WIRED BY THE ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE POWER WIRING ONLY. LOW VOLTAGE CONTROL WIRING BY HVAC CONTRACTOR.
2. PROVIDE CIRCUIT TO HVAC CONTROL MODULE TO BE MOUNTED NEAR THE VARIABLE FREQUENCY DRIVES. PROVIDE RECEPTACLE OR LIGHT SWITCH AS A DISCONNECT AS REQUIRED.
3. GENERAL NOTE: VERIFY ALL ELECTRICAL EQUIPMENT AND DEVICE LOCATIONS WITH MECHANICAL CONTRACTORS.
4. CHAIN MOUNT TYPE H LIGHTS AROUND PIPING. VERIFY BEST LOCATION.
5. CENTER TYPE OM OUTDOOR LIGHT BETWEEN TOP OF DOOR AND SOFFIT. TYPE OM LIGHT IS A DARK BRONZE LED CUT OFF SECURITY LIGHT WITH PHOTOCELL (RAB SLIM12N/PC, 1372 LUMEN, 4000K, 120 VOLT, 14 WATT OR EQUAL).
6. VERIFY HEATER LOCATION WITH HVAC CONTRACTOR.
7. USE GALVANIZED STRUT TO MOUNT PANELS TO BUILDING.

1 ALT BID #10 PUMP ENCLOSURE ELECTRICAL PLANS

SCALE: 1/8" = 1'



2 ALT BID #10 PUMP ENCLOSURE ONE-LINE

NO SCALE

PANEL MDP – PUMP ENCLOSURE

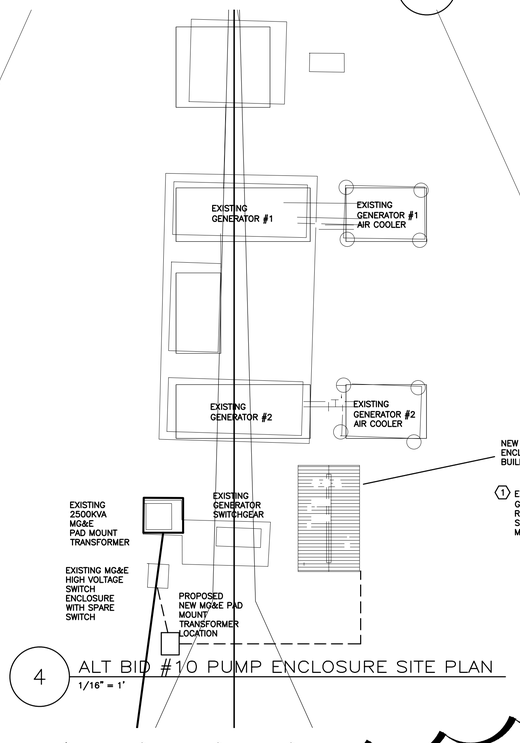
225A MLO 27" SPACE 480V 3 PHASE 4 WIRE COPPER BUS W/GRD BUS SQUARE D HCN I-LINE NEMA 3R				
CIRCUIT BREAKERS: 18 KAIC MINIMUM				
NO.	DESCRIPTION	BKR	KW	SPACE
1	WASTE HEAT LOOP PUMP P-7	100/3	54.04	4.5"
2	WASTE HEAT LOOP PUMP P-8	100/3	54.04	4.5"
3	PANEL A TRANSFORMER	30/2	2.47	3.0"
4	SPACE FOR 225 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
5	SPACE FOR 225 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
6	SPACE FOR 225 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
	TOTAL SPACE AVAILABLE	–	–	27"
	TOTAL SPACE USED	–	–	12.0"
	TOTAL SPACE REMAINING	–	–	15.0"

PANEL WH – WASTE HEAT PUMP ENCLOSURE

SQUARE D MINI POWER-ZONE MPZ10S40F NEMA 3R 480V – 120/240V 1 PH, 3 W 10 KVA SINGLE PHASE TRANSFORMER								
30 AMP PRIMARY CIRCUIT BREAKER 60 AMP SECONDARY CIRCUIT BREAKER 10 POLE PANEL								
MAIN CIRCUIT BREAKER: 18 KAIC MINIMUM					BRANCH CIRCUIT BREAKERS: 10 KAIC MINIMUM			
NO.	DESCRIPTION	BKR	KW	PHASE	KW	BKR	DESCRIPTION	NO.
1	INTERIOR LIGHTS	15/1	.10	A	2.00	15/2	HEATER	2
3	EXTERIOR LIGHT	15/1	.01	B				4
5	RECEPTACLE	20/1	.18	A	–	20/1	SPARE	6
7	PUMP CONTROL MODULE	15/1	.18	B	–	20/1	SPARE	8
9	SPARE	20/1	–	A	–	20/1	SPARE	10

3 ALT BID #10 PUMP ENCLOSURE PANEL SCHEDULES

NO SCALE



PUMP HOUSE SITE NOTES

1. ELECTRICAL CONTRACTOR TO STUB 2" RIGID CONDUIT FROM FUSED DISCONNECT INTO GROUND AND STUB AWAY FROM BUILDING FOR MADISON GAS AND ELECTRIC (MG&E) TO RUN SERVICE LATERAL CONDUCTORS THRU. REMAINING SECONDARY CONDUIT, SECONDARY CONDUCTORS, PRIMARY CONDUITS, PRIMARY CONDUCTORS AND PAD MOUNT TRANSFORMER PRECAST PAD BY MG&E.

4 ALT BID #10 PUMP ENCLOSURE SITE PLAN

1/16" = 1'

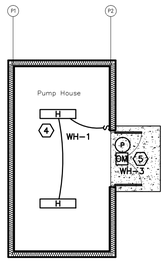
Revised Pump House Electrical - February 24, 2015

Alternate Bid #10 Waste Heat Loop Pump Enclosure

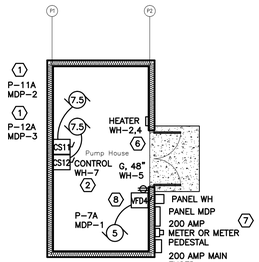
Dane County - Dane County Highway Facility
3582 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

PLAN NORTH
SCALE: 1/8" = 1'0"

E-212



LIGHTING PLAN



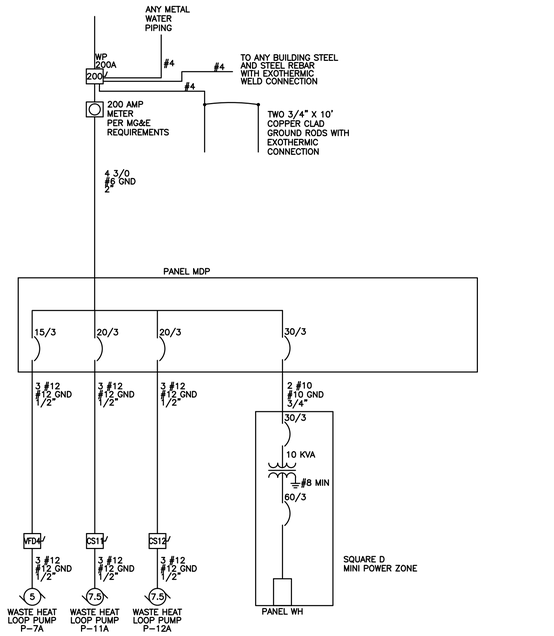
POWER PLAN

PUMP HOUSE NOTES

1. PUMP P-11A AND 12A COMBINATION STARTERS PROVIDED BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE POWER WIRING ONLY. LOW VOLTAGE CONTROL WIRING BY HVAC CONTRACTOR.
2. PROVIDE CIRCUIT TO HVAC CONTROL MODULE. PROVIDE RECEPTACLE OR LIGHT SWITCH AS A DISCONNECT AS REQUIRED. VERIFY LOCATION.
3. GENERAL NOTE: GENERAL LAYOUT SHOWN. VERIFY ALL ELECTRICAL EQUIPMENT AND DEVICE LOCATIONS WITH MECHANICAL CONTRACTOR. VERIFY ALL WORKING CLEARANCES.
4. CHAIN MOUNT TYPE H LIGHTS AROUND PIPING. VERIFY BEST LOCATION.
5. CENTER TYPE OM OUTDOOR LIGHT BETWEEN TOP OF DOOR AND SOFFIT. TYPE OM LIGHT IS A DARK BRONZE LED CUT OFF SECURITY LIGHT WITH PHOTOCELL (RAB SLIM12N/PC, 1372 LUMEN, 4000K, 120 VOLT, 14 WATT OR EQUAL).
6. VERIFY HEATER LOCATION WITH HVAC CONTRACTOR.
7. USE GALVANIZED STRUT TO MOUNT PANELS TO BUILDING.
8. VFD PROVIDED BY HVAC CONTRACTOR AND MOUNTED AND WIRED BY ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE POWER WIRING. LOW VOLTAGE CONTROL WIRING BY HVAC CONTRACTOR.

1 INFORMATIONAL BID "F" PUMP ENCLOSURE ELECTRICAL PLANS

SCALE: 1/8" = 1'



2 INFORMATIONAL BID "F" PUMP ENCLOSURE ONE-LINE

NO SCALE

PANEL MDP – PUMP ENCLOSURE

225A MLO 27" SPACE 480V 3 PHASE 4 WIRE COPPER BUS W/GRD BUS SQUARE D HCN I-LINE NEMA 3R				
CIRCUIT BREAKERS: 18 KAIC MINIMUM				
NO.	DESCRIPTION	BKR	KW	SPACE
1	WASTE HEAT LOOP PUMP P-7A	15/3	6.32	4.5"
2	WASTE HEAT LOOP PUMP P-11A	20/3	9.15	4.5"
3	WASTE HEAT LOOP PUMP P-12A	20/3	9.15	4.5"
4	PANEL A TRANSFORMER	30/2	2.47	3.0"
5	SPACE FOR 225 AMP FRAME CIRCUIT BREAKER	–	–	–
6	SPACE FOR 225 AMP FRAME CIRCUIT BREAKER	–	–	–
	TOTAL SPACE AVAILABLE	–	–	27"
	TOTAL SPACE USED	–	–	16.5"
	TOTAL SPACE REMAINING	–	–	10.5"

PANEL WH – WASTE HEAT PUMP ENCLOSURE

SQUARE D MINI POWER-ZONE MPZ10S40F NEMA 3R 480V – 120/240V 1 PH, 3 W 10 KVA SINGLE PHASE TRANSFORMER								
30 AMP PRIMARY CIRCUIT BREAKER 60 AMP SECONDARY CIRCUIT BREAKER 10 POLE PANEL								
MAIN CIRCUIT BREAKER: 18 KAIC MINIMUM BRANCH CIRCUIT BREAKERS: 10 KAIC MINIMUM								
NO.	DESCRIPTION	BKR	KW	PHASE	KW	BKR	DESCRIPTION	NO.
1	INTERIOR LIGHTS	15/1	.10	A	2.00	15/2	HEATER	2
3	EXTERIOR LIGHT	15/1	.01	B				4
5	RECEPTACLE	20/1	.18	A	–	20/1	SPARE	6
7	PUMP CONTROL MODULE	15/1	.18	B	–	20/1	SPARE	8
9	SPARE	20/1	–	A	–	20/1	SPARE	10

3 INFORMATIONAL BID "F" PUMP ENCLOSURE PANEL SCHEDULES

NO SCALE

INFORMATIONAL BID "F" PUMPING STARTER SCHEDULE

DEVICE	LOCATION	LOAD	TYPE	FUSE	CONTROL TRANSFORMER	CONTROL COIL	LOAD HP/KW	LOAD VOLTAGE	LOAD PHASE	POLES	LOW VOLTAGE CONTROL RELAY	NOTES (SEE BELOW)
VFD4	PUMPING ENCLOSURE	P-7A	VARIABLE FREQUENCY DRIVE WITH DISCONNECT PROVIDED BY HVAC CONTRACTOR.				5.0 HP	480	3	3		12
CS11	PUMPING ENCLOSURE	P-11A	COMBINATION STARTER, FUSED DISCONNECT SWITCH TYPE, NEMA SIZE 1, FULL VOLTAGE, NON-REVERSING, NEMA 1 ENCLOSURE SQUARE D 8538 SERIES OR EQUAL.	BUSSMANN LPS-RK-15SP OR EQUAL	480/120	120	7.5 HP	480	3	3	SQUARE D KP12 DPDT RELAY AND SOCKET OR EQUAL	1,2,3,4,5,7,9
CS12	PUMPING ENCLOSURE	P-12A	COMBINATION STARTER, FUSED DISCONNECT SWITCH TYPE, NEMA SIZE 1, FULL VOLTAGE, NON-REVERSING, NEMA 1 ENCLOSURE SQUARE D 8538 SERIES OR EQUAL.	BUSSMANN LPS-RK-15SP SP OR EQUAL	480/120	120	7.5 HP	480	3	3	SQUARE D KP12 DPDT RELAY AND SOCKET OR EQUAL	1,2,3,4,5,7,9

OPTIONS AND NOTES:

1. PRESS-TO-TEST PILOT LIGHT.
2. MAN/OFF/AUTO SELECTOR SWITCH.
3. LOW VOLTAGE RELAY COIL. VERIFY COIL VOLTAGE.
4. STARTERS TO HAVE ELECTRONIC OVERLOAD PROTECTION.
5. SEE SHEET E506, DETAIL 1.
6. COMBINATION STARTER WIRED THE SAME AS SHEET E506, DETAIL 1 EXCEPT THE MOTOR IS SINGLE PHASE.
7. VERIFY FUSE SIZE (125% OF FLA) WITH MOTOR NAMEPLATE DATA.
8. STAINLESS STEEL ENCLOSURE.
9. IEC STYLE STARTERS WILL NOT BE ACCEPTED.
10. SEE SHEET E506, DETAIL 2.
11. ON AND OFF PUSHBUTTONS.
12. VFD WITH DISCONNECT PROVIDED AND PROGRAMMED BY HVAC CONTRACTOR. INSTALLED BY ELECTRICAL CONTRACTOR.

GENERAL NOTES:

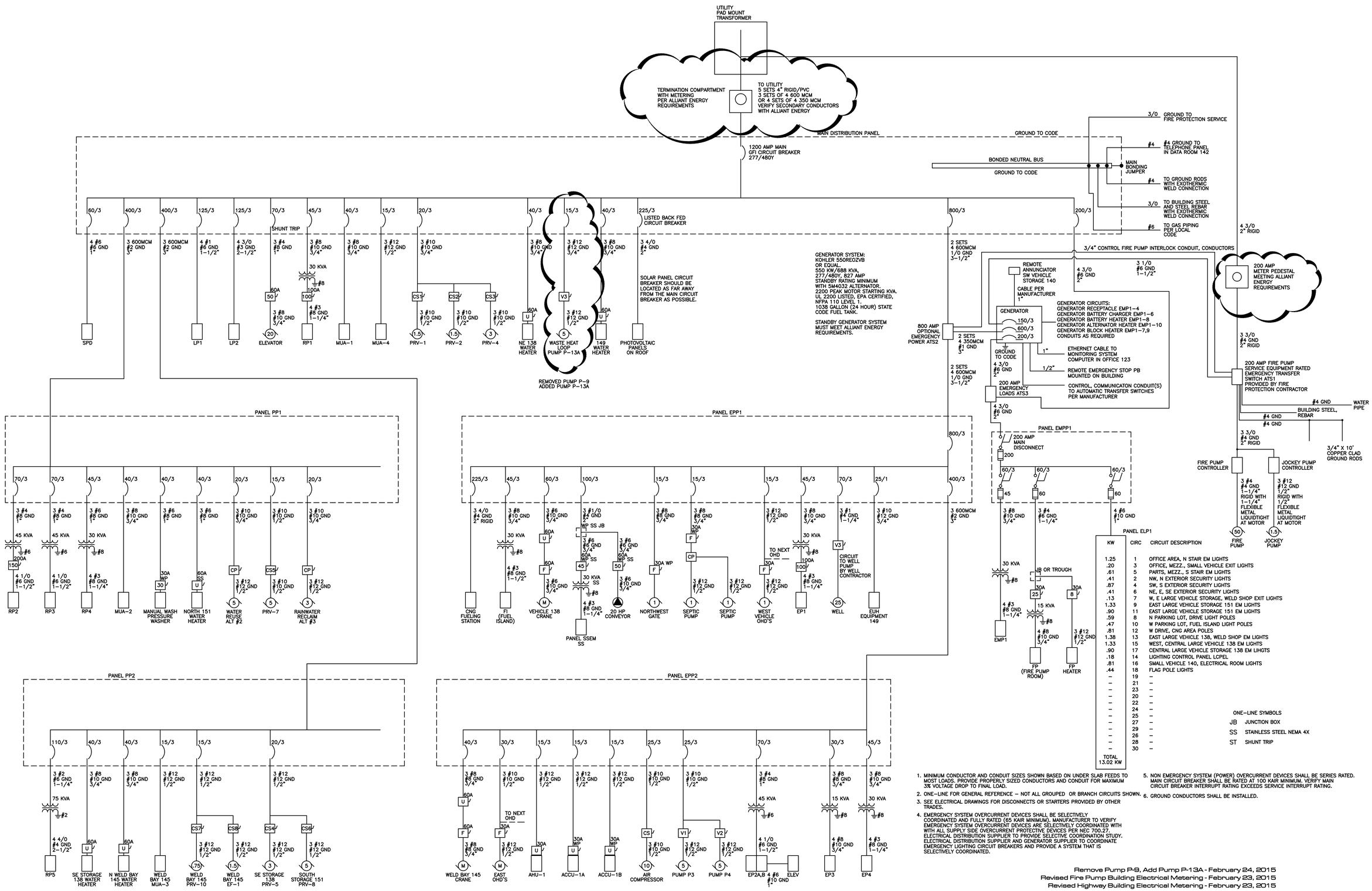
1. "OR EQUAL" MEANS EQUAL EQUIPMENT PROVIDED BY APPROVED MANUFACTURERS LISTED IN SPECIFICATIONS.

Informational Bid "F" Waste Heat Loop Pump Enclosure

Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
February 24, 2015

PLAN NORTH
SCALE: 1/8" = 1'-0"

E-213



1. MINIMUM CONDUCTOR AND CONDUIT SIZES SHOWN BASED ON UNDER SLAB FEEDS TO MOST LOADS. PROVIDE PROPERLY SIZED CONDUCTORS AND CONDUIT FOR MAXIMUM 3% VOLTAGE DROP TO FINAL LOAD.
2. ONE-LINE FOR GENERAL REFERENCE – NOT ALL GROUPED OR BRANCH CIRCUITS SHOWN.
3. SEE ELECTRICAL DRAWINGS FOR DISCONNECTS OR STARTERS PROVIDED BY OTHER TRADES.
4. EMERGENCY SYSTEM OVERCURRENT DEVICES SHALL BE SELECTIVELY COORDINATED AND FULLY RATED (65 KAIR MINIMUM). MANUFACTURER TO VERIFY EMERGENCY SYSTEM OVERCURRENT DEVICES ARE SELECTIVELY COORDINATED WITH WITH ALL SUPPLY SIDE OVERCURRENT PROTECTIVE DEVICES PER NEC 700.27. ELECTRICAL DISTRIBUTION SUPPLIER TO PROVIDE SELECTIVE COORDINATION STUDY. ELECTRICAL DISTRIBUTION SUPPLIER AND GENERATOR SUPPLIER TO COORDINATE EMERGENCY LIGHTING CIRCUIT BREAKERS AND PROVIDE A SYSTEM THAT IS SELECTIVELY COORDINATED.
5. NON EMERGENCY SYSTEM (POWER) OVERCURRENT DEVICES SHALL BE SERIES RATED. MAIN CIRCUIT BREAKER SHALL BE RATED AT 100 KAIR MINIMUM. VERIFY MAIN CIRCUIT BREAKER INTERRUPT RATING EXCEEDS SERVICE INTERRUPT RATING.
6. GROUND CONDUCTORS SHALL BE INSTALLED.

1 ONE-LINE

Remove Pump P-9, Add Pump P-13A - February 24, 2015
Revised Fire Pump Building Electrical Metering - February 23, 2015
Revised Highway Building Electrical Metering - February 23, 2015

Schedules, Details

Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

E-503

PANEL MDP

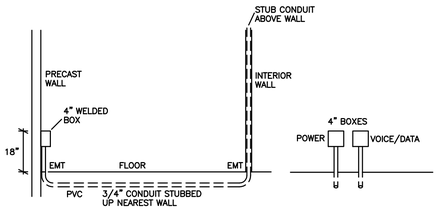
1200A MLO 108" SPACE 480V 3 PHASE 4 WIRE COPPER BUS W/GRD BUS SQUARE D HCR–U I–LINE

MAIN CIRCUIT BREAKER: 65 KAIC MINIMUM — FEEDER CIRCUIT BREAKERS: 65 KAIC MINIMUM

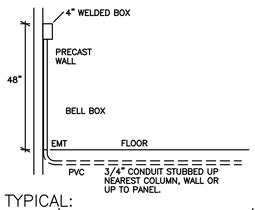
NO.	DESCRIPTION	BKR	KW	SPACE
1	SURGE PROTECTION DEVICE (SPD)	60/3	–	4.5"
2	PANEL PP1	400/3	116.79	6.0"
3	PANEL PP2	400/3	74.40	6.0"
4	PANEL LP1	125/3	22.27	4.5"
5	PANEL LP2	125/3	17.75	4.5"
6	PANEL RP1 TRANSFORMER	45/3	6.89	4.5"
7	LARGE VEHICLE STORAGE 138 MUA–1	40/3	17.46	4.5"
8	SMALL VEHICLE STORAGE 140 PRV–1, 2, LARGE VEHICLE STORAGE 138 PRV–4	20/3	8.98	4.5"
9	NORTH LARGE VEHICLE STORAGE 138 INSTANT WATER HEATER	40/3	24.00	4.5"
10	WASTE HEAT EXCHANGER PUMP P–13A	15/3	6.32	4.5"
11	PUMP ROOM 149 INSTANT WATER HEATER	40/3	24.00	4.5"
12	ELEVATOR	70/3	33.26	4.5"
13	SOLAR PANELS (CIRCUIT BREAKER MUST BE LISTED AS BACK FEED DEVICE) – ALTERNATE BID #8 ***	225/3	–	4.5"
14	EMERGENCY LOADS ATS3 – PANEL EMPP1	200/3	23.72	4.5"
15	OPTIONAL POWER ATS2 – PANEL EPP1	800/3	343.79	9.0"
16	SMALL VEHICLE STORAGE 140 MUA–4	15/3	6.32	4.5"
17	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
18	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
19	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
20	MAIN CIRCUIT BREAKER	1200/3	725.95	15.0"
	TOTAL CIRCUIT BREAKER MOUNTING SPACE AVAILABLE			108"
	TOTAL CIRCUIT BREAKER MOUNTING SPACE USED			94.5"
	TOTAL CIRCUIT BREAKER SPACE REMAINING			13.5"
	TOTAL CONNECTED KW		725.95	

PROVIDE LABEL ON PANEL: "EMERGENCY POWER 550KW, 480V, 3 PHASE, 4 WIRE DIESEL FUELED EMERGENCY GENERATOR LOCATED OUTSIDE ON SOUTHEAST SIDE OF BUILDING"

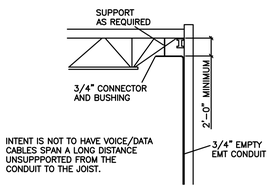
*** SOLAR PANEL CIRCUIT BREAKER SHOULD BE LOCATED AS FAR AWAY FROM THE MAIN CIRCUIT BREAKER AS POSSIBLE.



1 TYPICAL: OFFICE RECEPTACLE/SYSTEMS AT PRECAST WALL



2 TYPICAL: SHOP/STORAGE RECEPTACLE/SYSTEMS AT PRECAST WALL



3 TYPICAL: HIGH BAY LOW VOLTAGE CONDUIT DETAIL

PANEL PP1 – OFFICE, EAST BUILDING AREAS

400A MLO 63" SPACE 480V 3 PHASE 3 WIRE COPPER BUS W/GRD BUS SQUARE D HCM I–LINE

CIRCUIT BREAKERS: 35 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	SPACE
1	PANEL RP2 TRANSFORMER	70/3	27.06	4.5"
2	PANEL RP3 TRANSFORMER	70/3	5.02	4.5"
3	PANEL RP4 TRANSFORMER	45/3	9.16	4.5"
4	LARGE VEHICLE STORAGE 151 MUA–2	40/3	17.46	4.5"
5	NORTH LARGE VEHICLE STORAGE 151 PRESSURE WASHER	40/3	17.46	4.5"
6	NORTH LARGE VEHICLE STORAGE 151 INSTANT WATER HEATER	40/3	24.00	4.5"
7	NORTH LARGE VEHICLE STORAGE 151 WATER REUSE – ALTERNATE BID #2	20/3	6.32	4.5"
8	NORTH LARGE VEHICLE STORAGE 151 PRV–7	15/3	6.32	4.5"
9	NORTH LARGE VEHICLE STORAGE 151 RAINWATER RECLAIM – ALTERNATE BID #3	20/3	3.99	4.5"
10	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
11	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
12	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
13	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
14	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
	TOTAL SPACE AVAILABLE	–	–	63"
	TOTAL SPACE USED	–	–	40.5"
	TOTAL SPACE REMAINING	–	–	22.5"

PANEL PP2 – WELD SHOP

400A MLO 63" SPACE 480V 3 PHASE 3 WIRE COPPER BUS W/GRD BUS SQUARE D HCM I–LINE

CIRCUIT BREAKERS: 35 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	SPACE
1	PANEL RP5 TRANSFORMER	110/3	8.28	4.5"
2	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
3	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
4	SE LARGE VEHICLE STORAGE 138 INSTANT WATER HEATER	40/3	24.00	4.5"
5	N WELD BAY 145 INSTANT WATER HEATER	40/3	24.00	4.5"
6	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
7	WELD BAY 145 MAU–3	15/3	3.99	4.5"
8	WELD BAY 145 PRV–10, SOURCE CAPTURE EF–1	15/3	3.82	4.5"
9	SOUTHEAST LARGE VEHICLE STORAGE 138 PRV–5, SOUTH LARGE VEHICLE STORAGE 151 PRV–8	20/3	10.31	4.5"
10	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
11	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
12	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
13	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
14	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
	TOTAL SPACE AVAILABLE	–	–	63"
	TOTAL SPACE USED	–	–	27"
	TOTAL SPACE REMAINING	–	–	36"

PANEL EPP1 – OPTIONAL EMERGENCY POWER PANEL

800A MCB 72" SPACE 277/480Y 3 PHASE 4 WIRE COPPER BUS W/GRD BUS SQUARE D HCP I–LINE

MAIN CIRCUIT BREAKER: 65 KAIC MINIMUM — FEEDER CIRCUIT BREAKERS: 65 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	SPACE
1	PANEL EPP2	400/3	109.24	6.0"
2	CNG FUELING STATION	225/3	116.73	4.5"
3	FUEL ISLAND PANEL FI TRANSFORMER	45/3	15.00	4.5"
4	LARGE VEHICLE 138 CRANE	60/3	18.79	4.5"
5	SALT SHED	100/3	37.35	4.5"
6	NW GATE	15/3	1.75	4.5"
7	SEPTIC PUMPS	15/3	6.09	4.5"
8	WEST BUILDING OVERHEAD DOORS	15/3	3.49	4.5"
9	PANEL EP1 TRANSFORMER	45/3	2.28	4.5"
10	EQUIPMENT 149 EWH–1	25/1	4.80	1.5"
11	WELL	70/3	28.27	4.5"
12	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
13	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
14	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
15	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
16	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	4.5"
17	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	3.0"
	TOTAL SPACE AVAILABLE	–	–	72.0"
	TOTAL SPACE USED	–	–	48.0"
	TOTAL SPACE REMAINING	–	–	24.0"

PROVIDE LABEL ON PANEL: "OPTIONAL STANDBY PANEL EPP1 FED BY PANEL MDP AND EMERGENCY STANDBY GENERATOR THRU OPTIONAL EMERGENCY AUTOMATIC TRANSFER SWITCH ATS2. EMERGENCY POWER 550KW, 480V, 3 PHASE, 4 WIRE DIESEL FUELED EMERGENCY GENERATOR LOCATED OUTSIDE ON SOUTHEAST SIDE OF BUILDING".

PANEL EPP2 – OPTIONAL EMERGENCY POWER PANEL

400A MLO 63" SPACE 277/480Y 3 PHASE 4 WIRE COPPER BUS W/GRD BUS SQUARE D HCM I–LINE

FEEDER CIRCUIT BREAKERS: 35 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	SPACE
1	WELD BAY 145 CRANE	40/3	11.72	4.5"
2	OFFICE ACCU–1A	15/3	6.65	4.5"
3	WELD BAY, EAST BUILDING OVERHEAD DOORS	30/3	8.73	4.5"
4	OFFICE AHU–1	15/3	2.83	4.5"
5	OFFICE ACCU–1B	15/3	6.65	4.5"
6	AIR COMPRESSOR	25/3	11.64	4.5"
7	BOILER PUMPS P–3, P–4	25/3	12.64	4.5"
8	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
9	PANEL EP2A,B TRANSFORMER	70/3	37.82	4.5"
10	PANEL EP3 TRANSFORMER	30/3	4.44	4.5"
11	PANEL EP4 TRANSFORMER	45/3	6.12	4.5"
12	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
13	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
14	SPACE FOR 250 AMP FRAME CIRCUIT BREAKER	–	–	–
	TOTAL SPACE AVAILABLE	–	–	63"
	TOTAL SPACE USED	–	–	45"
	TOTAL SPACE REMAINING	–	–	18"

GENERAL PANEL NOTES

1. PROVIDE HANDLE CLAMP ON CIRCUIT BREAKERS FOR ALL FIRE ALARM, EMERGENCY LIGHTING, SECURITY, PHONE AND CO/NO2 CIRCUITS.
2. ALL PANELS SHALL HAVE COPPER NEUTRAL AND GROUND BAR UNLESS NOTED OTHERWISE.

PANEL LP1 – OFFICE, SMALL VEHICLE, LARGE VEHICLE, MEZZANINE AREA

125 MLO 30 POLE 277/480Y 3 PH 4 W 125 AMP COPPER BUSS W/GRD BAR SQUARE D NF SURFACE

BRANCH CIRCUIT BREAKERS: 35 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	PHASE	KW	BKR	DESCRIPTION	NO.
1	OFFICE 120–122,MENS LOCKER,BREAKLTS	20/1	1.61	A	2.21	20/1	MEZZANINE, W STAIR LIGHTS	2
3	INSTAIR,WESTOFFICE AREA,HALL,TOOL,OIL,PUMP LTS	20/1	2.15	B	1.11	20/1	W LARGE VEHICLE STORAGE 138 LIGHTS	4
5	PARTS 137 LIGHTS	20/1	1.60	C	1.80	20/1	W LARGE VEHICLE STORAGE 138 LIGHTS	6
7	E SMALL VEHICLE STORAGE 140 LIGHTS	20/1	2.22	A	1.55	20/1	W LARGE VEHICLE STORAGE 138 LIGHTS	8
9	W SMALL VEHICLE STORAGE 140 LIGHTS	20/1	1.55	B	1.80	20/1	CENTER LARGE VEHICLE STORAGE 138 LTS	10
11	SPARE	20/1	–	C	1.80	20/1	CENTER LARGE VEHICLE STORAGE 138 LTS	12
13	SPARE	20/1	–	A	.89	20/1	E LARGE VEHICLE STORAGE 138 LIGHTS	14
15	SPARE	20/1	–	B	1.80	20/1	E LARGE VEHICLE STORAGE 138 LIGHTS	16
17	SPARE	20/1	–	C	.18	15/1	LIGHTING CONTROL PANEL LCP1	18
19	SPARE	20/1	–	A	–	20/1	SPARE	20
21	SPARE	20/1	–	B	–	20/1	SPARE	22
23	SPARE	20/1	–	C	–	20/1	SPARE	24
25	SPARE	20/1	–	A	–	20/1	SPARE	26
27	SPARE	20/1	–	B	–	20/1	SPARE	28
29	SPARE	20/1	–	C	–	20/1	SPARE	30

PANEL LP2 – LARGE VEHICLE STORAGE, WELD BAY

125 MLO 30 POLE 277/480Y 3 PH 4 W 125 AMP COPPER BUSS W/GRD BAR SQUARE D NF SURFACE

BRANCH CIRCUIT BREAKERS: 35 KAIC MINIMUM

NO.	DESCRIPTION	BKR	KW	PHASE	KW	BKR	DESCRIPTION	NO.
1	N LARGE VEHICLE STORAGE 151 LIGHTS	20/1	1.77	A	1.99	20/1	C LARGE VEHICLE STORAGE 151 LIGHTS	2
3	N LARGE VEHICLE STORAGE 151 LIGHTS	20/1	2.22	B	1.99	20/1	S LARGE VEHICLE STORAGE 151 LIGHTS	4
5	N LARGE VEHICLE STORAGE 151 LIGHTS	20/1	1.77	C	1.55	20/1	S LARGE VEHICLE STORAGE 151 LIGHTS	6
7	C LARGE VEHICLE STORAGE 151 LIGHTS	20/1	1.99	A	1.79	20/1	N WELD BAY 145 LIGHTS	8
9	LIGHTING CONTROL PANEL 2	15/1	.18	B	1.07	20/1	SE WELD BAY 145 LIGHTS	10
11	SPARE	20/1	–	C	1.43	20/1	SW WELD BAY 145 LIGHTS	12
13	SPARE	20/1	–	A	–	20/1	SPARE	14
15	SPARE	20/1	–	B	–	20/1	SPARE	16
17	SPARE	20/1	–	C	–	20/1	SPARE	18
19	SPARE	20/1	–	A	–	20/1	SPARE	20
21	SPARE	20/1	–	B	–	20/1	SPARE	22
23	SPARE	20/1	–	C	–	20/1	SPARE	24
25	SPARE	20/1	–	A	–	20/1	SPARE	26
27	SPARE	20/1	–	B	–	20/1	SPARE	28
29	SPARE	20/1	–	C	–	20/1	SPARE	30

Remove Pump P-9, Add Pump P-13A - February 24, 2015

Schedules, Details

Dane County - Dane County Highway Facility
3562 County Highway AB, Cottage Grove, WI 53558
January 12, 2015

E-504

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ADDENDUM 3

MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

BID NO. 313083

ADDENDUM B3 (Bid Package B): The following pages are addendum 3 for Medical Examiner Office Building (Bid Package B)

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

February 23, 2015

CONSTRUCTION OF EAST HIGHWAY GARAGE – SALT STORAGE FACILITY (BID PACKAGE A) AND MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

DEPARTMENT OF PUBLIC WORKS, HIGHWAY & TRANSPORTATION 3562 COUNTY HIGHWAY AB MCFARLAND, WISCONSIN

MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. Acknowledge this addendum on the Bid Form. The portion of this Addendum relating to Bid Package B is referenced as Addendum B3 for clarity.

CHANGES TO SPECIFICATIONS

1. 01 00 00 Basic Requirements
    a. Add 1.06 C. 2. Alternate Bid B2 – Bid Package B – Medical Examiner Office Building: MEP Room 145 Modifications. State deduction from Base Bid to provide MEP Room 145 layout per drawings M200, M300, M800, M900, M901, M902 and specifications.

2. 03 30 00 Cast-in_Place concrete
    a. Modify 3.03.A.1 to; " Lap joints 6 inches and seal with manufacturer's recommended tape".

3. 05 12 00 Structural Steel Framing
    a. Replace in its entirety. Information on Architecturally Exposed Structural Steel was added to the specification.

4. 09 77 30 High-Build Chemical Resistant Epoxy/Urethane Wall Finish System
    a. Revise 3.04.A items 1-16 to the following: "
        1. 130, Autopsy
        2. 130A, Dictation
        3. 130B, Body Viewing
        4. 130C, Cart Storage
        5. 130D, Janitor
        6. 132, Decomp Autopsy
        7. 133, General Lab
        8. 134, Tissue Storage
        9. 136, Vestibule
        10. 141, X-Ray
        11. 144, Body/Receiving Process

12. 144A, Cart Clean
13. 144B, Laundry
14. 144C, Morgue Tech
15. 144D, Tissue Recovery
16. 1007, Corridor"

5. 10 51 13 Lockers
    a. Modify 2.01.A.1.a.1) to the following: "Penco Patriot Gear Locker, model 6KGDA22"
    b. Modify 2.02.A.1.: "
        1. Material
            a. Steel: KD, Knock Down Construction
            b. Shell and body: 16 gauge (18ga. back). Flat top.
            c. Drawer: One (1) 16 gauge with ball bearing glides: 18 inch wide 24-inch deep (balance of space left open).
            d. Doors: Double, 14 gauge, Standard Louvered
            e. Center partition and 21-inch deep shelf: 16 gauge
            f. End and Filler Panels: Finished matching locker color and material.

        2. Dimensions: See Above.
        3. Handle/Latching: Cremone handle
        4. Hinge: 16 gauge piano hinge.
        5. Lock: built-in, combination.
        6. Center partition: 16 gauge (21-inch deep).
        7. Full width hat shelf
        8. Interior drawer 18" wide 24" d and 12" high with drawer dividers/file supports (and bottom horizontal shelf above). Drawer is keyed. Balance of space is left open.
        9. Security box: 12 x 21 x 12" Model: 6ACXHM53H (balance of area left open)
        10. Lockable Compartments: Main doors, drawer and security box.
        11. Heavy duty coat hooks: two (2)
        12. One-inch diameter coat rod and rod bracket.
        13. Filler panels as required to accommodate space as indicated on drawings.
        14. Quantity: as indicated on drawings.
        15. Finish: Manufacturer's standard painted finish, color as selected by Architect from Manufacturer's full range.
        16. Warranty: 2 year."

6. 23 09 14 - Pneumatic and Electric Instruamentation and Control Devices for HVAC
    a. Page 8 Line 1 Insert the following:

AIR FLOW STATIONS
Fan inlet probe air flow stations:
For fan inlet probes provide two probes for each fan inlet (for DWDI fans provide four probes). Pressure drop caused by the airflow elements shall not exceed 0.03" w.c. at 2000 FPM. Airflow elements shall be provided with all necessary pivot mounting hardware and signal connection fittings for connection to tubing provided by the installing contractor. For pitot type air flow stations, the static and total pressure manifold piping by the installing contractor shall be piped symmetrically so take-off will be located where line lengths between all probes are equal in length.

Fan inlet piezometers:
Where fan inlet piezometers are provided, these shall be used by the control contractor for air flow measurement. The air velocity transducers shall be provided under this Section and sized as described below.

For duct mounted and fan inlet pitot flow stations or factory mounted piezometers, air velocity transducers range shall be sized less than two times the design velocity pressure at maximum flow and will meet the requirements under the PRESSURE TRANSDUCERS (AIR) specification later in this specification section unless noted below.

Thermal dispersion air flow stations:
Manufacturers: Ebtron, Air Monitor, Kurz Instruments, or equal.

Probe Sensor Density:

Area (sq. ft.)	Sensors
<= 1.5	2
>1.5 to <4	4
4 to <8	6
8 to <12	8
12 to <16	12
>=16	15

Airflow Sensor Accuracy: ±2% of reading
Calibrated Range: 0-2500 FPM for duct applications and 5000 FPM for fan inlet applications
Temperature Sensor Accuracy: ±0.15°F
Temperature: -20°F to +140°F
Relative Humidity: 0 to 95% (non-condensing)

Provide transmitter that will average up to sixteen sensors and provide two field selectable linear analog output signals (4-20mA and 0-10 VDC) proportional to airflow and temperature. Sensor electronic circuitry other than the temperature sensors shall not be exposed to the air stream and shall be protected from moisture to prevent failure.

7. 23 09 93 – Sequence of Operation for HVAC Controls
    a. Remove existing Section (pages 1 thru 42) and replace with revised section attached (pages 1 thru 42).

8. 23 09 15 DDC Input / Output Summary Table
    a. Remove existing page 1 and replace with the attached 23 09 15-1 to add points for Pump P-14.
    b. Remove existing page 5 and replace with the attached 23 09 15-5 to add points for "Return Air Flow".
    c. Remove existing Page 7 and replace with the attached 23 09 15-7 to add points for "Return Air Flow".

9. 23 21 13 – Hydronic Piping
    a. Page 5 Line 10 Replace "The use of mechanical grooved pipe connections is not allowed to be used on this project." With the following:

        MECHANICAL GROOVED PIPE CONNECTIONS
        Manufacturers:
        Victaulic, Anvil Corp., or Star Pipe Products, Inc.

        Mechanical grooved pipe couplings and fittings may be used with steel pipe on the systems indicated below. Either cut-groove or equivalent roll-groove products are acceptable providing the system temperature and pressure requirements are met. Where malleable iron fittings are indicated, they shall conform to ASTM A47. Where ductile iron fittings are indicated, they shall conform to ASTM A 536. Where forged steel fittings are indicated, they shall conform to ASTM A106, Grade B. Where fabricated steel fittings are indicated, they shall conform to ASTM A53, type F in sizes 3/4" through 1-1/2" and type E or S, grade B in sizes 2" through 20". Do not use fabricated fittings where malleable or ductile iron or forged steel fittings are available. Gaskets in all cases shall be EPDM suitable for temperatures to 230 degrees F.

        The following services may use mechanical grooved pipe connections within the building in mechanical spaces. (Grooved piping is not allowed above accessible ceilings or in chases).

        - Heating Hot Water
        - Chilled Water

        Mechanical grooved pipe connections shall not be used in heating plants or below grade utility distribution systems.

        Mechanical grooved pipe connections shall not be used in chilled water piping between the cooling coil and the isolation valve for that cooling coil.

Fittings and couplings must be suitable for the temperature and pressure involved. In no case is the final system to have a pressure rating of less than 125 psig at the design temperature of the fluid.

Acceptable fittings and couplings are listed below, based on Victaulic. When used on galvanized piping, fittings and couplings shall be galvanized. When used on black steel piping, fittings and couplings shall have an enamel coating.

Couplings: Ductile iron standard couplings, Style 77; lightweight couplings, Style 75; and rigid couplings. Reducing couplings are not acceptable.

Flanges: Ductile iron Style 741 or 742 except at lug type butterfly valves where standard welding flanges shall be used.

Standard flanges are necessary so that the butterfly valve can be properly bolted to the flange and retain its place in the pipe when piping on one side is removed.

Fittings: Ductile iron elbows and tees of the manufacturer's standard line may be used in all sizes except bullhead tees will not be accepted. Fabricated steel fittings may be used in all sizes where fitting wall thickness conforms to standard weight pipe. Mechanical-T Style 920 fittings with malleable iron housings may be used for up to 2" outlet size.

Mechanical grooved pipe couplings are not allowed as a substitute for expansion compensation specified in section 23 05 48.

Mechanical grooved flexible couplings are not allowed as a substitute for the flexible connectors specified in 23 05 48 at pump connections.

b. Page 6 Line 20: Insert the following:
MECHANICAL GROOVED PIPE CONNECTIONS
Use pipe factory grooved in accordance with the coupling manufacturer's specifications or field grooved pipe in accordance with the same specifications using specially designed tools available for the application.

Lubricate pipe and coupling gasket, align pipe, and secure joint in accordance with the coupling manufacturer's specifications.

Support pipe as indicated in Section 23 05 29 of these specifications except as modified below. Support each horizontal pipe section at least once between couplings and whenever a change in direction of line flow takes place. Support vertical pipe at every other floor or every other pipe length, whichever is most frequent. Set the base of the riser or the base fitting on a pedestal or foundation.

Follow coupling manufacturer's installation recommendations if they are more stringent that the above requirements.

10. 23 83 23 – Computer Room Air Conditioning Unit
    a. Page 4 Line 2 Revise from “Air cooled remote condenser…” to “Air cooled remote micro channel condenser…”

11. Section 27 10 00
    a. Add in 2.01A “4. Belden”.

12. 32 92 00 Turf and Grasses
    a. Omit 1.02.B, Item 2.
    b. Omit 2.05.

CHANGES TO DRAWINGS

13. SHEET A200
    a. Replace in its entirety.
    b. 1/A200 First Floor Plan: Revise walls at “Vestibule 1000” to adjust for addition of steel tube storefront support.

14. SHEET A210:
    a. Replace in its entirety.
    b. 1/A210 Unisex Toilet: Revise walls to adjust for addition of steel tube storefront support.

15. SHEET A300
    a. 1 and 2/A300 First Floor Reflected Ceiling Plan: Adjust interior walls of Vestibule 1000 per the attached A200.

16. SHEET A501
    a. Replace in its entirety.
    b. 2/A501 Exterior Wall Sections: Revise section to include new steel tube support for storefront.

17. SHEET A604
    a. Replace in its entirety.
    b. 6 & 7/A604 Exterior Details: Revise details to include new steel support for storefront.

18. SHEET A605
    a. Replace in its entirety.
    b. 5/A605 Exterior Details: Revise detail to include wall adjustments for new steel support for storefront.
    c. Add note to attached detail 2/A605: “Provide mesh, grout top course solid.”

19. SHEET A609
    a. Replace in its entirety.
    b. 5/A609 Exterior Details: Revise detail to include wall adjustments for new steel support for storefront.

20. SHEET A801
    a. Replace in its entirety.
    a. 4/A801 Interior Elevations: Revise interior storefront to accommodate new vestibule wall locations per new steel support for storefront.
    b. 8/A801, MLI: Revised title to read “MLI 124”.

21. SHEET A900
    a. 1/A900, First Floor Finish Plan: Revise room tag at “Autopsy 130” to reflect finishes: Walls: EU, Base: Integral, Flooring: Ter-1.

22. SHEET S200:
    a. Replace in its entirety.
    b. Detail 1/S200.
        i. Revised joist size in the area of grids D.1/E and 5.6/6 to eliminate the “special” joists.
        ii. Added a note for the weight of EF-3 in the garage area.
        iii. Added general note 4 relative to the use of AESS.
    c. Detail 2/S200.
        i. Eliminated the detail.

23. SHEET S201:
    a. Replace in its entirety.
    b. Detail 6/S200. Added wall bracing tubes to the detail.

24. SHEET S403:
    a. Replace in its entirety.
    b. Added detail 16/S403.

25. P000
    a. Add garbage disposal (GD-1) in PLUMBING FIXTURE SCHEDULE under sink (S-1) description. "PROVIDE IN-SINK-ERATOR EVOLUTION ESSENTIAL, 3/4 HP, 8.1 AMPS, 120V, 1 PH, 1725 RPM."

26. P200
    a. Add garbage disposal (GD-1) at sink (S-1) in Break Room 109 and sink (S-1) in Break Out 156.

27. M200
    a. Replace in it entirety.
    b. Detail 1/M200 modified.
    c. Detail 2/M200 modified.
    d. Detail 3/M200 added.

28. M300
    a. Replace in it entirety.
    b. Detail 1/M300 modified.
    c. Detail 3/M300 added.

29. M800
    a. Replace in it entirety.
    b. Detail 1/M800 modified.
    c. Detail 2/M800 added.

30. M900
    a. Replace in it entirety.
    b. Air Device schedule modified.
    c. Pemp Schedule modified.

31. M901
    a. Replace in it entirety.
    a. Water to Water Heat Exchanger Schedule modified.

32. M902
    a. Replace in it entirety.
    b. Variable Frequency Drive Schedule modified.

33. SHEET E001:
    a. Indicate temporary electrical service immediately west of building centerline. Coordinate location with Alliant Energy – their charge for temporary service is based on this location.

34. SHEET E101:
    a. In Garage 150, add note "Ground metal building framework per NEC 250.104C."

END OF ADDENDUM B3

Enclosures:

Section 05 12 00, Structural Framing

Page 23 09 15-1, Page 23 09 15-5 and Page 23 09 15-7

Section 23 09 93 – Sequence of Operation for HVAC Controls

A200, A210, A501, A604, A605, A609, A801, S200, S201, S403, M200, M300, M800, M900, M901, M902.

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes structural steel and grout.

1.02 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using details indicated and AISC's "Specification for Structural Steel Buildings (AISC 360-05)"

1.03 SUBMITTALS

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

B. Shop Drawings: Show fabrication of structural-steel components.

C. Welding certificates.

D. Mill test reports.

E. Source quality-control test reports.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel.

C. Comply with applicable provisions of AISC's "Code of Standard Practice for Steel Buildings and Bridges.

D. Preinstallation Conference: Conduct conference at Project site.

1.05 DEFINITIONS. Architecturally Exposed Structural Steel: Steel designated as AESS in the contract documents.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M Grade 50.

B. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers. Plain finish unless noted otherwise.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers. Plain finish unless noted otherwise.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
1. Configuration: As detailed .
2. Finish: Plain unless noted otherwise.

E. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
1. Finish: Plain unless noted otherwise.

F. Threaded Rods: ASTM A 36/A 36M.
1. Finish: Plain unless noted otherwise.

2.03 PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

C. Galvanizing Repair Paint: ASTM A 780.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's AISC's “Specification for Structural Steel Buildings (AISC 360-05)

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

C. Architecturally exposed Structural Steel (AESS):
1. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

2. Fabricate and erect all structural steel items identified on the drawings as AESS Category 2 in accordance with the AISC Code of Standard Practice for Buildings and Bridges. Fabricate with exposed surfaces smooth, square and free of surface blemishes including pitting, rust, scale, seam marks , roller marks, rolled trade names and roughness. Remove blemishes by filling and grinding or by welding and grinding before cleaning, treating and shop priming. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
3. Prepare AESS surfaces according to the following specifications and standards: SSPC-SP-6 “Commercial Blast Cleaning”.

2.06 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless otherwise indicated.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.07 SHOP PRIMING

A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

D. Finished Paint System for Exposed Structural Steel: Structural steel shall be painted as follows: Apply on coat of steel primer in shop as specified above. Apply two coats of alkyd enamel paint to minimum dry film thickness of 1.5 mils foe each coat. Paint shall be applied according to the manufacturer’s recommendations. Paint shall be free of sags, runs, drips or other defects. Allow ample drying time before handling to prevent damage to coatings.

E.

2.08 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
1. Fill vent holes and grind smooth after galvanizing.
2. Galvanize pieces and assemblies indicated in drawings.

2.09 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Comply with testing and inspection requirements of Part 3, Article "Field Quality Control.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding.

PART 3 - EXECUTION

3.01 ERECTION

A. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings (AISC 360-05)"

C. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
   1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of base plate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.02 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened unless otherwise indicated.
   2. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
   3. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings (AISC 360-05)" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
   1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop and field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051200

SECTION 23 09 93

SEQUENCE OF OPERATION FOR HVAC CONTROLS

P A R T 1 - G E N E R A L

SCOPE

This section includes control sequences for HVAC equipment as well as equipment furnished by others that may need monitoring or control. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Description of Work
- Submittals
- Operation and Maintenance Data
- Design Criteria

PART 2 - PRODUCTS
- Not Applicable

PART 3 - EXECUTION
- General Control
- Heat Exchanger (HX-1)
- Boiler Plant
- Pumps P-3 and P-4
- Heat Exchanger (HX-2)
- Pumps P-5 and P-6
- Snowmelt System
- Chilled Water Plant
- Pumps P-12 and P-13
- In-Floor Radiant Pump System (P-8)
- In-Floor Radiant Pump System (P-9)
- Rooftop Air Handling Unit (AHU-1)
- Rooftop Air Handling Unit (AHU-2)
- Rooftop Air Handling Unit (AHU-3)
- Air Handling Unit and Exhaust F and (AHU-4 and EF-4)
- Office Area – VAV Terminal Unit with Reheat and In-Floor Radiation
- Lab/Autopsy Area – VAV Terminal Unit with Reheat and In-Floor Radiation and Exhaust Valve
- Chiller Room Ventilation (EF-5 and UH-9)
- Exhaust Fan (EF-1)
- Exhaust Fan (EF-2)
- Exhaust Fan (EF-3)
- Exhaust Fan (EF-6)
- Exhaust Fan (EF-7)
- Cabinet Unit Heaters (CUH-1 and CUH-2)
- Unit Heaters (UH-1 thru 8, UH-10)
- Convectors (C-1 and C-2)
- Emergency Generator Operation / Staging

RELATED WORK

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

Applicable provisions of Division 1 govern work under this Section.

Section 01 91 01 – Commissioning Process
Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC – Coordination
Section 23 09 23 - Direct Digital Controls (DDC)
Division 23 - HVAC - Equipment provided to be controlled or monitored

Division 26 - Electrical - Equipment provided to be controlled or monitored

REFERENCE
Section 23 09 23 work includes furnishing and installing all field devices, including electronic sensors for the DDC of this section, equipment, and all related field wiring, interlocking control wiring between equipment, pneumatic tubing, sensor mounting, etc., that is covered in that section.
Motorized control dampers and actuators, thermowells (temperature sensing wells), automatic control valves and their actuators are also covered in Section 23 09 23.

DESCRIPTION OF WORK
Control sequences are hereby defined as the manner and method by which automatic controls function. Requirements for each type of operation are specified in this section.

Operation equipment, devices and system components required for automatic control systems are specified in other Division 23 control sections of these specifications.

Sequences for equipment controlled by Direct Digital Controls (DDC) as specified are accomplished by hardware and software provided under Section 23 09 23.

SUBMITTALS
Refer to Division 1, General Conditions, Submittals, Section 23 05 00 and Sections 23 09 23 for descriptions of what should be included in the submittals.

Shop drawings shall be provided by contractor(s) providing equipment under Sections 23 09 23. The contractor providing the DDC equipment shall provide a complete narrative of the sequence of operations for equipment that is controlled through the DDC system. The narrative of the sequence of operation shall not be a verbatim copy of the sequences contained herein, but shall reflect the actual operation as applied by the contractor.

DESIGN CRITERIA
Reference Section 23 09 23.

P A R T 2 - P R O D U C T S

Not applicable to this Section – reference Sections 23 09 23 for product descriptions.

P A R T 3 - E X E C U T I O N

CONTROL SEQUENCES

GENERAL:

SETPOINTS:
All setpoints indicated in the control specification are to be adjustable. The setpoints shall be readily available to be modified in the mechanical system software system summary (either textual or graphic based) and under the same software level as hardware points. The setpoints indicated herein are only specified as a calculated starting point (or initial system operation). It is expected that setpoint adjustments and control loop tuning shall be required to provide optimum system operation based on requirements of the building. The control contractor shall work with the balancing contractor and the Owner to provide the final system setpoint adjustments and control loop tuning after the system is in operation and building is in

use. Document all final setpoints on the as-built control drawings. Any questions regarding the intended operation of the HVAC equipment and control systems shall be referred to the HVAC design engineer through the appropriate construction communication process. The following setpoints should be used as initial setpoints unless otherwise specified in the individual control sequences or instructed by the Owner. If the contractor fails to check with the user Owner for final setpoints, they shall adjust setpoints at no additional cost.

- Occupied Space Terminal Unit Heating: 68º F
- Occupied Space Terminal Unit Cooling: 72º F
- Unoccupied Space Terminal Unit Heating: 62º F
- Unoccupied Space Terminal Unit Cooling: 82º F
- Entry Way Heating: 60° F
- Mechanical or Unoccupied Space Ventilation: 82º F
- Mechanical or Unoccupied Space Heating: 60º F

ANTI-CYCLING:

When HVAC equipment or a sequence is specified to be started and stopped by a temperature, humidity, pressure setpoint or any other controlled variable, there shall be an adjustable differential setpoint that shall be set to prevent short cycling of the systems and equipment due to minor changes in the controlled variable. Temperature differential setpoints shall be set at 2º F and non-temperature setpoints shall be set at 10% of the controlled range unless otherwise specified. Setpoints shall indicate at when the process should be turned on. Heating and cooling differentials shall be set for above setpoint and will be used to turn the process off. For example, an economizer sequence called to switch at 68º F, would turn on at 68º F and off at 70º F since it is a cooling function. A heating lockout setpoint of 50º F would turn on heating control at 50º F and off at 52º F Non-temperature differentials shall be set above setpoint if the setpoint is indicating a minimum value or below setpoint if the setpoint is indicating a maximum value. Provide minimum runtime timers for loads that are cycled to prevent over-cycling. Timers shall be set as specified or as needed to prevent damage or excessive wear to the equipment. Unless otherwise specified in the individual control sequences, fans and pumps shall have a minimum runtime on timers of 15 minutes (adj.) and off timers of 5 minutes (adj.). Safeties shall override runtime timers.

DEADBANDS:

Provide deadbands for all DDC control loops to prevent constant hunting of output signals to controlled devices. Deadbands shall be set to provide adequate control around setpoint as follows unless otherwise specified in the individual control sequences:

- Temperature Control: ±0.5º F
- Humidity Control: ±1% RH
- Airflow Control: ±2% of total flow
- AHU Static Pressure Control: ±0.01 in. w.c.

ALARMS:

Provide all alarmed points with adjustable time delays to prevent nuisance tripping under normal operation and on equipment start-up. For all commanded outputs that have status feedback, provide an alarm that will indicate the commanded output is not in its commanded state. Provide alarms on all points as indicated on point charts. For existing campus automations systems, add/delete what is called on the point charts for after consultation with user Agency to provide consistent alarming throughout the automation system.

For devices that have form “C” contacts available for alarm monitoring, use closed contacts for the Normal condition and open contacts on Alarm condition. This will provide a level of supervision by detecting a break in the wiring.

EQUIPMENT START/STOP FAILURE STATES:

All start/stop points for equipment shall utilize normally open contacts unless called out specifically in the individual control sequences.

LEAD/LAG SEQUENCING:
For sequences that call for lead/lag of equipment connected to building automation systems, the lead device shall be able to be chosen through a selectable day of the week and time of day through the building automation system. Coordinate with the user Agency for scheduling switchover and frequency. Unless otherwise directed, switchover shall occur at 10AM Tuesday and shall rotate the lead device on a weekly cycle rotating through all devices sequentially. For standalone lead/lag sequence controllers (non-DDC), the lead device shall be selected by a switch on the panel face.

VARIABLE FREQUENCY DRIVE (VFD) MOTOR RUN STATUS:
Use the VFD programmable relay dry contact output specified to be provided with the VFD under Section 23 05 20 to prove motor run status and detect belt loss or coupling break. If a bypass contactor is provided with the VFD, provide an adjustable current switch and wire it in parallel with the VFD output for proving motor status.

VFD BYPASS & SAFETY INTERLOCKS:
VFD's equipped with bypass starters shall be interlocked so that the start/stop and safety circuits that are called out for VFD operation shall be functional when the VFD is indexed to the bypass starter mode. Unless otherwise specified in the sequence below, the switch from inverter to bypass starter modes shall be through a manual switch provided on the VFD/bypass starter package.

VFD MINIMUM SPEED & RAMP TIMERS:
The VFD start-up technician shall work with the DDC Temperature Control Contractor determine the minimum speed required for the motor controlled by the VFD to provide cooling of the motor as installed to prevent heat related problems. This minimum speed shall be set in the VFD controller. The VFD start-up technician shall work with the DDC Temperature Control Contractor to set the acceleration and deceleration timers in the VFD controller at 30 seconds for motors less than 40 HP and 60 seconds for motors 40 HP and greater.

CURRENT SWITCH SETUP:
When current switches are used for proving fan or pump status, they shall be set up so that they will detect belt or coupling loss by the reduction in current draw on loss of coupled load. The current switch set up shall be redone by the 23 09 23 contractor after the balancer is complete.

DAMPER INTERLOCKS FOR FANS WITH VFD'S:
For fan systems with VFD's and shutoff dampers specified with end switches, hardwire interlock the shutoff damper with the fan VFD. When the fan is remotely or locally commanded to start, VFD contacts shall energize damper actuator to open damper. The damper position end switch shall be wired to run permissive input on the VFD and enable the VFD to start when the damper position end switch provides the damper is open. This operation shall be provided for VFD and bypass operation if the VFD is provided with a bypass. The damper end switch shall also be monitored by the DDC system. For fan systems that are ducted in parallel, see specific sequence for fan system on additional interlock requirements.

FAN INTERLOCKING:
Provide interlocks between supply and return or exhaust fan systems as scheduled on the plans or called out in individual control sequences. If DDC controlled, interlocks shall be done through DDC start/stop points unless otherwise specified in individual control sequences. If not DDC controlled, interlocks shall be accomplished via hardwire interlocks between fan starters or VFD's.

THERMOSTATS AND SENSORS:
All devices and equipment including terminal units, specified to be controlled in a control sequence by a thermostat or sensor, shall be provided with a thermostat or sensor, whether or not the device is indicated on the plans. Consult the HVAC design engineer for the thermostat or sensor location.

ORIGINAL EQUIPMENT MANUFACTURER (OEM) CONTROLLER DDC INTEGRATION:

Provide DDC programming to define all equipment integral input/output points, setpoints, data points, calculations, etc. that are available through the manufacturers communication interface. Consult with the Agency DDC operations personnel to determine if some of the points should be omitted (for clarity or lack of value). The following equipment shall be integrated into the DDC system:

- Boilers
- Chillers
- Pumps with Integral Variable Frequency Drives.
- Variable Frequency Drives
- Laboratory Fume Hood Control
- Computer Room Air Conditioners
- BTU / Energy Meters

WATCH DOG TIMER

Where the integrated system consists of programmable DDC controllers with BACnet objects mapped to an enterprise level Building Automation System (BAS) and it is shown that the BACnet objects do not indicate when they are offline on the enterprise level BAS when communication is lost between the two systems, software algorithms shall be provided to alarm when communication is lost. The integrated system shall program a binary data object that is toggled on and off at an adjustable rate (initially one minute) that shall be monitored by the enterprise level BAS which shall alarm if the toggling ceases.

WEEKLY SCHEDULING

Provide scheduling of DDC terminal units in groups based on occupancy. Work with the user Agency to determine how many groups are required and which zones should be included. Individual terminal units shall be able to receive temporary schedules that will override the group schedules. Temporary override buttons at the zone sensor (where specified on point charts) shall override the scheduling to occupied. When groups that consist of more than 20% of terminal units are indexed to occupied, the associated air handling unit shall start if not already running.

DDC CONTROLLER COMMUNICATION BUS CONFIGURATION

The actively controlled primary mechanical equipment (AHU's, hot water, chilled water, boilers, etc.) DDC controllers shall be configured to be located on the same supervisory controller BACnet MSTP communication trunk unless the supervisory controller capacity prevents it. If this is the case, the primary mechanical equipment DDC controllers shall be separated onto supervisory controllers in such a way that the systems that need to share information for operation and interlocking shall reside on the same supervisory controllers. When AHU systems have associated exhaust fan systems that are interlocked and designed to operate together as a combined air system within a building, these must be on the same BACnet MSTP trunk. Peer to peer communication shall be used for interlocks and data sharing between the AHU and exhaust fans systems when possible to limit air system disruptions in the event of a supervisory controller failure. Other critical building systems that require communication between DDC controllers to operate shall be on the same BACnet MSTP communication trunk. Terminal unit controllers shall be located on a separate BACnet MSTP trunks if necessary to allow for primary equipment to reside on the same BACnet MSTP trunk. If the DDC controllers used for control of primary mechanical equipment and interlocks or point information is required for proper operation as described above do not use BACnet MSTP communication but use Ethernet communication, the DDC controllers shall be connected to the same Ethernet switch. If the controllers cannot be connected to the same switch, hardwired points between controllers shall be used to share information.

CONTROLLED VARIABLE REQUIREMENTS

All controlled variables, i.e. static pressure, differential pressure, temperature, humidity, etc., shall be wired directly to the DDC controller in which the software PID loop or other similar software loop resides unless the control sequence specifically allows the controlled variable to be routed over the network. Where a controlled variable is used for reset of a PID loop, the controlled variable shall be allowed to be shared over the network unless specified to be directly wired to the DDC controller.

CALCULATED DATA POINTS

Provide a calculated data point for outside airflow for all fans that have return and outside air mixing dampers and the points required to allow for the following equation:

- Outside Airflow = Supply CFM x (MAT-RAT)/(OAT-RAT)

Where Supply CFM is measured either on variable volume fans or as balanced on constant volume units, MAT is Mixed Air Temperature, RAT is Return Air Temperature, and OAT is Outside Air Temperature. This point is designed as a check for outside air flow stations accuracy and outside air ventilation minimum damper positions. It should be noted that the accuracy of the calculated outside airflow will diminish as outside air temperature approaches return air temperature. It should be used as a check only when the RAT and OAT are greater than 20 DegF and the accuracy of the RAT and OAT temperature sensors are assured.

HEAT EXCHANGER (HX-1):

This is a "site" hot water to "building" hot water heat exchanger.

This water to water heat exchanger system consists of:

- Plate and frame heat exchanger.
- Temperature sensors:
  - Site HWS (inlet of HX).
  - Site HWR (outlet of HX).
  - Building HWS (outlet of HX).
  - Building HWR (in main loop piping).
- Inline pump P-14 with associated variable frequency drive VFD-13. (BASE BID)
- Modulating 2-way temperature control valve (fail to heat exchanger) for "site" hot water (waste heat from site generator reclaim system). (ALTERNATE BID B2).
- Two position 2-way temperature control valve (fail closed) for building hot water.
- Water flow and BTU management station on "site" side of heat exchanger.

Base Bid

On a call for building or domestic hot water heat, the BAS shall send a signal to the generator/waste heat control system to energize waste heat pumps associated with the Highway Building project.

Pump P-14 shall energize on a call for heating or domestic hot water from the building. The pump shall energize and increase the VFD to high speed for 5minutes or until the supply water temperature sensor is above 180°F. If the building heating loop return water temperature is higher than the waste heat loop supply water temperature the pump shall shut down. If the building heating loop return water temperature is lower than the waste heat loop supply water temperature the pump shall modulate to its minimum speed, the 2-way bypass valve shall close to send the building secondary loop water through the heat exchanger then the VFD shall modulate to maintain the building secondary loop at 180°F.

Alternate Bid B2

The 2-way control valve on the "site" side of the heat exchanger shall modulate to maintain a minimum 180°F (Adj.) leaving (building) water temperature from the heat exchanger. The 2-way valve (site) shall have a minimum position of 10%open to maintain flow from the waste heat loop.

On a rise in "building" return water temperature the control valve (site) shall modulate closed. When the building return water temperature drops below setpoint the valve shall modulate open.

The control valve (site) shall fail to full flow through the heat exchanger.

Base and Alternate Bid B2

The "building" hot water supply setpoint shall be 180°F (adj.) at an outside air dry bulb reference temperature of 10° F (adj.) and shall be reset to 140°F (adj.) at an outside air dry bulb reference temperature of 60° F (adj.).

The 2-way, 2-position control valve on the "building" hot water shall be closed whenever "Site" hot water is available (flow and temperature) and the "site" hot water is at least 5°F (adj.) above the "Building" return hot water temperature.

If "site" hot water is not available, or if the "site" hot water temperature is less than 5°F (adj.) above the "building" return hot water temperature, the building valve shall be open to bypass HX-1.

If the "building" hot water supply temperature exceeds 210º F (adj.) the building automation system shall send an alarm and the "site" 2-way control valve shall modulate closed.

The building automation system shall trend site hot water usage thru the BTU management system.

BOILER PLANT

The boiler plant consists of:

- (2) Modular high efficiency modulating boilers (B-1 and B-2)
- (2) constant volume in-line primary boiler pumps (P-1 and P-2)
- 2-way, 2 position natural gas emergency shutdown valve (normally open).
- Natural gas emergency shutdown switch with pilot light.

The hot water boiler plant is a back-up heating system to heat exchanger (HX-1). When HX-1 cannot maintain system setpoint temperature for any 15 minute period (adj.), or when the 2-way valve bypasses water thru HX-1 is open, the boiler plant shall be enabled.

If the 2-way valve forcing water thru HX-1 closes, the boiler plant shall be disabled.

Boiler (B-1 & B-2) shall be indexed and sequenced by the building automation system. The building automation system shall:

- Energize and stage the boiler plant operation.
    - On a call for boiler plant operation with HWS temperature below setpoint, the lead boiler shall energize and fire up to 80% capacity. Upon exceeding 80% capacity, the lag boiler shall also energize, the lead boiler shall reduce capacity and both boilers shall modulate in parallel. The opposite shall occur when the HWS temperature is above setpoint.
- Rotate boiler operation for maintenance and to equalize operating hours.
- Provide alarm signals through BAS on any boiler fault.

The BAS shall provide the boiler plant, when enabled, with the desired hot water supply temperature as described under the control sequence for HX-1.

The primary inline pump for each boiler shall be interlocked and controlled by the building automation system. When water flow is proved in the boiler, the boiler burner shall be enabled and shall fire as required. Provide a current sensor for each pump to provide pump operation.

Upon a manual initiation of the emergency natural gas shutdown switch, the emergency natural gas shutdown valve shall close.

This Contractor shall be responsible for installing and providing complete control wiring for the installation.

PUMPS P-3 AND P-4

These pumps serve the building hot water heating loop.

This system consists of:

- Base mounted variable volume pump P-3 with associated variable frequency drive (VFD-1).
- Base mounted variable volume Pump P-4 with associated variable frequency drive (VFD-2).

- System differential pressure sensor.
- Modulating 2-way by-pass valve.
- Temperature sensor
    - HWS to building (downstream of boiler plant).

These pumps operate in a 100% standby (lead/lag) arrangement and shall be controlled by the DDC system.

Start/Stop: The DDC system shall start the lead pump whenever the outside air temperature is below 60º F (adj) or on a call for system VAV reheat or infloor heating. The lag pump shall normally remain off. The hot water pump start/stop relays shall utilize normally closed contacts so upon failure of the relay or DDC controller the pump will fail on.

Lead / Lag Control: Current status switches, either integral to the VFD and/or discreet devices, shall prove lead and lag pump operation. If the lead pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.), an alarm shall be sent to the operator interface and the BAS shall start the lag pump. Upon sensing the lead pump is operating, the lag pump shall be stopped. The DDC system shall index the lag pump to become the lead pump through weekly scheduling feature of the building automation system. The BAS shall also allow for manual lead/lag selection between the two pumps.

Speed Control: Install a differential pressure sensor across the supply and return piping at the point in the system with the highest pressure drop as indicated on plans. The DDC system shall control the operating pump VFD to maintain a setpoint as described below.

Constant Differential Pressure Setpoint Control: The operating pump VFD shall be modulated to maintain a constant setpoint of 10 psig (adj.) at the differential pressure sensor. Final setpoint shall be optimized by the Balancing Contractor.

By-Pass Valve Control:
Provide modulating, 2-way bypass control valve at remote location in system for minimum pump flow maintenance. Control valve shall be set to maintain pressure at 5 ft (adj) above differential pressure setpoint. As pressure increases to 5 ft above differential pressure setpoint, valve shall modulate open. On a decrease in pressure, valve shall modulate closed.

HEAT EXCHANGER (HX-2):
This is a “building hot water” to “building glycol water” heat exchanger.

This water to water heat exchanger system consists of:
- Plate and frame heat exchanger.
- Temperature sensors:
    - Glycol HWS (outlet of HX).
    - Glycol HWR (inlet of HX).
    - Building HWR (outlet of HX).
- Modulating 2-way temperature control valve (fail to heat exchanger) for building hot water.

The 2-way control valve on the “building hot water” side of the heat exchanger shall modulate to maintain a minimum 175°F (Adj.) leaving (building glycol) water temperature from the heat exchanger.

On a rise in “building glycol) return water temperature the control valve (site) shall modulate closed. When the building return water temperature drops below setpoint the valve shall modulate open.

The control valve (site) shall fail to full flow through the heat exchanger.

The building glycol water supply setpoint shall be 175° F (adj.) at an outside air dry bulb reference temperature of 10° F (adj.) and shall be reset to 140° F (adj.) at an outside air dry bulb reference temperature of 60° F (adj.).

If the "building glycol" water supply temperature exceeds 210º F (adj.) the building automation system shall send an alarm and the "building hot water" 2-way control valve shall modulate closed.

PUMPS P-5 AND P-6

These pumps serve the building chilled water loop.

This system consists of:

- Inline variable volume pump P-5 with associated variable frequency drive (VFD-3).
- Inline variable volume Pump P-6 with associated variable frequency drive (VFD-4).
- System differential pressure sensor.

These pumps operate in a 100% standby (lead/lag) arrangement.

Start/Stop: The DDC system shall start the lead pump whenever the outside air temperature is below 60º F (adj). The lag pump shall normally remain off. The glycol water pump start/stop relays shall utilize normally closed contacts so upon failure of the relay or DDC controller the pump will fail on. Glycol water pumps shall be commanded off if all associated AHU's and unit heaters are off and the outside air temperature is above 60º F.

Lead / Lag Control: Current status switches, either integral to the VFD and/or discreet devices, shall prove lead and lag pump operation. If the lead pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.), an alarm shall be sent to the operator interface and the DDC system shall start the lag pump. Upon sensing the lead pump is operating, the lag pump shall be stopped. The DDC system shall index the lag pump to become the lead pump through weekly scheduling feature of the building automation system.

Speed Control: Install a differential pressure sensor across the supply and return piping at the point in the system with the highest pressure drop as indicated on plans. The DDC system shall control the operating pump VFD to maintain a setpoint as described below.

Constant Differential Pressure Setpoint Control: The operating pump VFD shall be modulated to maintain a constant setpoint of 10 psig (adj.) at the differential pressure sensor. Final setpoint shall be optimized by the Balancing Contractor.

SNOWMELT SYSTEM

This system provides snowmelt to areas of exterior pavement.

This system consists of:

- Inline constant volume pump P-7.
- 3-way modulating mixing valve
- (4) exterior slab mounted temperature/moisture sensors.
- Temperature Sensors:
    - Glycol HWS (to exterior slab)
    - Glycol HWR (from exterior slab)
- Pump pressure switch.

On a call for slab heating from any of the (4) moisture sensors, the building automation system shall start associated pump P-7. The 3-way modulating temperature control valve shall modulate to maintain a constant snowmelt glycol water supply temperature of 130°F (adj.).

During snowmelt operation, the system shall operate to maintain a slab temperature of 36°F (adj.), as averaged by the (4) sensors.

The setpoint shall be 130° F (adj.) at an outside air dry bulb reference temperature of 0° F (adj.) and shall be reset to 105° F (adj.) at an outside air dry bulb reference temperature of 25° F (adj.).

Provide a pressure differential switch to prove pump operation. Should the pump fail to start within 60 seconds of being enabled by the building automation system, send an alarm.

If the outside air temperature is -5°F (adj.) or below, the system shall not be permitted to operate.

If the outside air temperature is above 40 deg F, the snowmelt system shall not be allowed to operate. If the slab temperature is above 50 deg F, and no precipitation is falling, the snowmelt system shall not be allowed to operate.

CHILLED WATER PLANT

This system provides cooling to the building and data room.

The central chiller plant consists of:

- One indoor mounted air cooled screw chiller.
- One outdoor mounted refrigerant condensing unit.
- Two primary constant volume inline chilled water pumps (P-10 and P-11)
- Temperature sensors:
    - CWS (to building).
    - CWR (from building).

The primary pumps operate in a 100% standby (lead/lag) arrangement.

Chiller Point Integration: The chiller will be integrated into the DDC system through the communication method specified in the chiller specification. Provide DDC programming to define all chiller input and output information available through the chiller manufacturer's integration data port.

Primary pump system lead/lag selections: One primary pump and one secondary chilled water pumps will be designated as lead and standby by the chiller unit mounted controls.

Chiller Enable: When outside air temperature is greater than 50 ºF (adj.), or on a call for cooling by AHU-1, AHU-2 or AHU-3, the chiller shall be enabled. The chiller unit mounted controls shall start the lead primary chilled water pump. The chiller unit mounted controls shall monitor its evaporator flow and safety statuses and shall provide a chiller failure alarm in the event of a flow or safety failure.

The chiller unit mounted controls shall modulate chiller capacity to maintain chilled water supply setpoint temperature 42 ºF (adj.)

Condensing Unit Control: The chiller unit mounted controls shall control the associated refrigerant condensing unit.

If the lead primary pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.), an alarm shall be sent from the chiller unit mounted controls to the building automation system and the chiller unit mounted controls shall start the lag pump. Upon sensing the lead pump is operating, the lag pump shall be stopped.

The chiller mounted controller shall index the lag pump to become the lead pump through weekly scheduling.

PUMPS P-12 AND P-13

These are secondary chilled water pumps for building and data room cooling.

The secondary pumps consist of:

- Base mounted pump P-12 with associated variable frequency drive (VFD-5).
- Base mounted Pump P-13 with associated variable frequency drive (VFD-6).
- System differential pressure sensor.

These pumps operate in a 100% standby (lead/lag) arrangement.

Secondary Chilled Water Pump Control: Start/Stop: The DDC system shall enable the secondary chilled water pump when a chiller status is on. The chilled water pump start/stop relays shall utilize normally open contacts so upon failure of the relay or DDC controller the pump will fail off.

Lead / Standby Control: Current status switches, either integral to the VFD and/or discreet devices, shall prove lead and standby pump operation. If the lead pump is called to run and the current status switch indicates that the lead pump is not operating for 30 seconds (adj.), an alarm shall be sent to the operator interface and the DDC system shall start the standby pump. The DDC system shall index the lead pump through weekly scheduling feature of the building automation system or manually as determined by the chiller plant operator.

System Differential Pressure Control: The secondary chilled water pump shall be started first and shall be modulated to maintain a differential pressure setpoint at the lowest reading differential pressure sensor. Final setpoint shall be optimized by the Balancing Contractor. The DDC system shall maintain a differential pressure setpoint as described below.

Constant Differential Pressure Setpoint Control: The operating pump VFD shall be modulated to maintain a constant setpoint of 10 psig (adj.) at the differential pressure sensor. Final setpoint shall be optimized by the Balancing Contractor.

IN-FLOOR RADIANT PUMP SYSTEM (P-8)

This system provides radiant floor heating to areas served by AHU-2.

This system consists of:

- Inline variable volume pump P-8 with integral speed control.
- 3-way modulating mixing valve
- Temperature Sensors:
    - HWS (to floor slab)
    - HWR (from floor slab)
- Pump pressure switch.

The radiant pump shall be controlled by the BAS and shall operate on a call for heat by any radiant floor zone. The pump internal variable frequency drive shall modulate pump speed to maintain the system pressure required to satisfy system flow.

The modulating 3-way mixing valve shall maintain 105°F (adjustable) supply water temperature setpoint to the radiant floor.

IN-FLOOR RADIANT PUMP SYSTEM (P-9)

This system provides radiant floor heating to areas served by AHU-1.

This system consists of:

- Inline variable volume pump P-8 with integral speed control.
- 3-way modulating mixing valve

- Temperature Sensors:
  - HWS (to floor slab)
  - HWR (from floor slab)
- Pump pressure switch.

The radiant pump shall be controlled by the BAS and shall operate on a call for heat by any radiant floor zone. The pump internal variable frequency drive shall modulate pump speed to maintain the system pressure required to satisfy system flow.

The modulating 3-way mixing valve shall maintain 105°F (adjustable) supply water temperature setpoint to the radiant floor.

ROOFTOP AIR HANDLING UNIT (AHU-1):

This is a rooftop mounted variable air volume air handling system controlled by the BAS.

The system consists of:

- Supply fan with variable frequency drive (VFD-7).
- Return Fan with variable frequency drive (VFD-8).
- Motorized modulating outside air damper (fail closed) (damper furnished by 23 73 13, actuator by 23 09 14).
- Motorized modulating return air damper (fail open) (damper furnished by 23 73 13, actuator by 23 09 14).
- Motorized modulating relief air damper (fail closed) (damper furnished by 23 73 13, actuator by 23 09 14).
- Supply Fan Inlet Air Flow Measuring Station.
- Return Fan Inlet Air Flow Measuring Station.
- Chilled water cooling coil with modulating 2-way temperature control valve (fail closed).
- Hot water heating coil with modulating 2-way temperature control valve (fail open).
- Heating coil freezestat.
- Return air duct smoke detector.
- Sensors:
  - Supply duct discharge air temperature sensor.
  - Preheat coil discharge air temperature sensor.
  - Mixed air temperature sensor.
  - Return air temperature sensor.
  - Return air humidity sensor.
  - Supply duct static pressure sensor.
  - Supply duct high static limit sensor.
  - Supply duct low static limit sensor.
  - Return duct static pressure sensor.
  - Return duct high static limit sensor.

FAN CONTROL:

Start/Stop: The DDC system shall start the supply and return fan via the VFD.

Current Status Switch: Provide as described under GENERAL, VFD Motor Run Status, in this Section for both the supply and return fans.

Supply Fan Speed Control: The purpose of the supply fan control is to maintain a minimum static pressure in the supply ductwork to insure proper terminal air box operation. Install a static pressure sensing probe in the main supply duct located at approximately 3/4" of the way down the main supply duct as shown on the plans and pipe to the differential pressure transmitter that shall be located in the unit temperature control panel. The inputs to the differential pressure transmitter shall be the static pressure inside of the duct and the reference input shall sense the actual space served by the air system located in the ceiling below the duct probe. The DDC system shall modulate the supply fan VFD to maintain the static pressure setpoint as sensed by the static pressure sensor. If multiple supply fans are used, the same speed signal will be sent to all operating fans unless the fan is in start or stop mode as described above. If multiple sensing locations are shown, the DDC system shall maintain the static pressure setpoint at the lowest reading sensor. If the static sensors deviate by more than 0.5 in. w.c. (adj.), an alarm shall be sent through the DDC system. Static pressure setpoint shall be as described in the Static Pressure Reset Control below.

Static Pressure Reset Control: Static pressure setpoint shall be reset using Trim & Respond logic within the range 0.15 in. w.c. to 1.3 in. w.c. When the fan is off, the setpoint shall be reset to 0.8 in. w.c. (adj.) and this setpoint shall be used on system start up While the fan is proven on, every two minutes, trim the setpoint by 0.04 in. w.c. if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by increasing the setpoint by 0.06 in. w.c.
A zone pressure request is generated when a VAV damper is greater than 95% open until it drops to 80% open. Provide a binary data enable point for each zone to enable/disable the zone damper in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the static pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the static pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

When more than 10% of the air terminals are indexed to occupied and the static pressure setpoint is below the fan start static setpoint, reset the static pressure to the fan start setpoint and release to trim and respond control. This is to prevent slow system recovery on scheduled start-up.

Return Fan Speed Control: The purpose of the return fan control is to maintain a slightly positive building pressure. The return fan VFD shall modulate to maintain a constant CFM offset 960 CFM (adj.) from the supply fan to account for total exhaust from the area in which it serves while maintaining a positive pressure in relation to AHU-2. The sum of all the air terminal VAV boxes shall be used as the supply CFM total.

Minimum Ventilation Air Flow Control:
Fixed Ventilation Air Flow Setpoint: The AHU outside air ventilation rate shall be maintained at 960 CFM. (The Office Area is to be positive to the Lab Area by 400 CFM)

Minimum Ventilation Air Flow Control Using Volume Matching: The minimum outside air damper position will be reset between a high minimum position and a low minimum position reset from the full design turndown fan speed and maximum fan speed. The Temperature Control Contractor shall work with the Balancing Contractor to determine these damper position setpoints to provide an even mixed air static pressure over the full range of fan turndown.

Install a temperature sensor in the supply duct downstream of the supply fan, all water coils and humidifiers.

Discharge Air Temperature Setpoint: Discharge air temperature setpoint shall be 55º F (adj.).

Discharge Air Temperature Control: The heating coil and cooling coil shall be controlled to maintain the discharge air setpoint temperature. At no time shall the heating coil be operating when the chilled water coil valve is open.

Preheat Coil Discharge Air Temperature Control – Normal Operation: The heating control valve (FO) shall modulate to maintain 55°F (adj.) at probe type sensor located in the supply duct downstream of the AHU. The preheat coil control valve shall be locked in the closed position whenever outside air temperature is above 55°F (adj.) for 10 consecutive minutes (adj.)

Preheat Coil Discharge Air Temperature Control – AHU- Not Running Operation: The Preheat coil discharge air temperature control sensor located immediately downstream of preheat coil shall modulate preheat coil control valve to maintain 52°F (adj.) preheat coil discharge air temperature anytime AHU is not running and safety low temperature limit control (freezestat) is not in alarm.

Cooling Coil Discharge Air Temperature Control: Cooling coil control valve (FC) shall modulate to maintain unit discharge air temperature of 55°F (adj.) via probe type sensor located in the supply duct downstream of the unit discharge. In the cooling mode when the outside air temperature is above 50°F (adj.) as unit discharge air temperature increases, cooling coil control valve shall modulate open to maintain unit discharge air temperature setpoint. The reverse shall occur as unit discharge air temperature decreases. Cooling coil control valve shall be locked in the closed position whenever outside air temperature is below 50°F (adj.) for 10 consecutive minutes (adj.) or whenever associated supply fan is not operating.

Dehumidification Control: Override the cooling coil valve position open to maintain a return air humidity of 60% RH (adj.). Lockout this control when outside air is below 55° F.

Economizer Control: Provide dry bulb economizer control. Whenever outside air dry bulb temperature exceeds the return air temperature plus 4°F (adj.), economizer control shall override mixed air control and modulate AHU-1 outside economizer damper closed.

Economizer control shall be released to mixed air control when outside air dry bulb temperature is less than return air temperature minus 5°F (adj.) for 10 consecutive minutes (adj.)

Mixed Air Temperature Control: The unit includes a single modulating outside air damper, modulating return air damper, and modulating outside air damper. The modulating outside economizer air damper shall be enabled as determined by the economizer mode sequence stated above. The economizer outside air damper and the return air damper shall be controlled by the mixed air temperature controller with averaging type sensor located at the upstream side of the pre-filter to maintain mixed air temperature of 52°F (adj.). As the mixed air temperature decreases, the outside air damper shall close and the return air damper shall open to maintain the mixed temperature setpoint. The reverse shall occur as mixed air temperature increases. The return air damper position may not be proportionally opposite of the outside air damper. Final test and balancing will need to determine the position of the return air damper in order to keep the relief air static pressure positive in all scenarios (min/max CFM).

Relief Air Damper Control: A static pressure control with its pressure transmitter located in the return duct at least three feet from the fan discharge and upstream of the control damper, shall modulate the relief air damper (FC) to maintain initial relief static pressure setpoint of 0.6” WC (adj.). On a drop in return static pressure below setpoint, as measured by the return system static pressure transmitter, relief damper shall modulate closed until return static pressure setpoint has been satisfied. On rise in return static pressure above return system static pressure setpoint, relief damper shall modulate open until return static pressure setpoint is satisfied. Control contractor shall work in association with test and balance contractor to determine actual required static pressure setpoint. Setpoint indicated is to be used for initial system startup. Actual static pressure shall be minimum static pressure required to achieve system design flow.

General Safeties Note: All safeties shall be hard wired to the supply and return fan starters or VFD safety circuits. Starters shall not function in the “Hand” or “Auto” and VFD’s shall be disabled if they are indexed to the “Auto” or “Hand” position in either the VFD or bypass modes.

Freezestat: Install an electric freezestat to shut down the unit (see Unit Shutdown for additional information) if the temperature downstream of the heating coil drops below 35º F (adj.). The electric freezestat shall act independently of the DDC system via hardwire interlock and shall override the DDC system control signal to open the heating coil control valve(s) to maintain an 80°F (adj.) preheat coil discharge air temperature setpoint. The cooling coil control valve shall fully open upon a trip of the freezestat. A freezestat trip shall notify the DDC system that shall send an alarm to the operator interface.

Supply Fan High Pressure Limit: Install a static pressure probe located in the air handling unit main discharge duct at least six feet or as far as physically possible downstream of the fan and upstream of any dampers and pipe to a differential pressure switch located in the temperature control panel. Wire in series with the safety circuit of the supply and return fan. Differential pressure switch shall be a manual reset type and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be +4.0" w.c. (adj.)

Return Fan High Pressure Limit: Install a static pressure probe located in the discharge duct at least six feet or as far as physically possible downstream of the fan and upstream of any dampers and pipe to a differential pressure switch located in the temperature control panel. Wire in series with the safety circuit of the supply and return fan. Differential pressure switch shall be a manual reset type and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be +2.0" w.c.

Supply Fan Low Pressure Limit: Install a low static suction pressure safety switch between the inlet of the supply fan and the cooling coil and wire in series with VFD safety circuit to stop the supply fan. The pressure switch shall be adjusted to -2.0” WC (adj.). The status of the pressure switch shall be wired to the BAS system for alarming. The pressure switch must be manually reset locally before the air handling unit can be restarted. Low static pressure safety switch shall be functional in VFD mode of operation.

Return Fire Alarm Shutdown: Upon a Fire Alarm System alarm, the fire alarm control module provided by the electrical contractor at the temperature control panel shall change state of its contacts. This shall cause the unit to be shut down (see Unit Shutdown for additional information). An auxiliary contact shall be provided to notify the DDC system of a fire alarm shutdown.

Unit Shutdown: Whenever the air handling unit is indexed off, the supply and return fans shall stop, outside air damper shall close, return damper shall fully open, relief damper shall close, chilled water valve shall close, heating coil valve shall remain under control to maintain a 52ºF (adj.) temperature at the preheat discharge air sensor.

If an AHU supply fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the fan shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air dampers and relief air dampers shall fully close.
- The return air damper shall fully open.
- The return fan shall be commanded to stop.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

If return fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the AHU shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air dampers and relief air dampers shall fully close.
- The return air damper shall fully open.

- The supply fan shall be commanded to stop.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

Unoccupied Control General Note: Occupied/unoccupied schedule shall be set at the DDC operator interface. When indexed to unoccupied the unit shall shutdown. Where provided, index DDC controlled heating and cooling terminal units associated with this air handling unit to maintain setback and setup temperature setpoints unless overridden by occupancy sensor or manual pushbutton.

Unoccupied Control - Unit Cycling to Maintain Setback/Setup Temperatures: Cycle the air handling unit on to maintain the setback and setup temperature zone setpoints to maintain 58 ºF (adj.) and 86 ºF (adj.) respectively.

Reset supply return fan volume offset for return air fan control to zero. Supply fan shall be limited to the maximum return fan airflow. In the heating mode, the outside air and relief air dampers shall fully close and the return air damper shall fully open and heating discharge temperature control shall function as specified. In the cooling mode, the economizer and chilled water discharge temperature control shall be allowed to function as specified. Minimum on runtime timer shall be set for 15 minutes (adj.) and the off timer for 30 minutes (adj.).

Monitor and Alarm: Monitor, through BAS, the following points associated with the air handling system and generate the alarms indicated:

- Unit discharge air temperature: Generate alarm if temperature exceeds setpoint by +/- 3°F (adj.) for 10 consecutive minutes (adj.)
- Preheat coil discharge air temperature: Generate alarm if temperature deviates from setpoint by -3.0°F (adj.) for 10 consecutive mintues (adj.)
- Mixed air temperature: Generate alarm if temperature goes below setpoint by 5°F (adj.) for 10 consecutive minutes (adj.)
- High Return airflow: Generate alarm is airflow exceeds setpoint by +/- 500 CFM (adj.) for 10 consecutive minues (adj.)
- Low Limit thermostat (freezestat): Generate alarm and stop AHU
- Supply fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Return fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Supply duct static pressure: Generate alarm if pressure exceeds setpoint by +/- 0.5” WC (adj.) for 5 consecutive minutes (adj.)
- Relief duct static pressure: Generate alarm if pressure goes below 0.0” WC (adj.) for 5 consecutive minutes (adj.)
- Supply discharge static pressure safety switch: Generate alarm and stop AHU if pressure exceeds 4.0” WC (adj.)
- Return discharge static pressure safety switch: Generate alarm and stop AHU if pressure exceeds 2.0” WC (adj.)
- Return suction static pressure safety switch: Generate alarm and stop AHU if pressure exceeds -2.0” WC (adj.)
- Return air smoke detector: Generate alarm and stop AHU.

ROOFTOP AIR HANDLING UNIT (AHU-2)

This is a 100% outside air variable air volume air handling system controlled by the BAS.

The system consists of:

- Supply fan with variable frequency drive (VFD-9)
  - Motorized outside air damper (fail closed) (damper by 23 73 13, actuator by 23 09 14).
  - Chilled water cooling coil with modulating 2-way temperature control valve (fail closed).
  - Hot water heating coil with modulating 2-way temperature control valve (fail open).
  - Heating coil freezestat.
  - Supply air smoke detector.
  - Sensors:
    - Supply duct discharge air temperature sensor.
    - Preheat coil discharge air temperature sensor.
    - Supply duct static pressure sensor.
    - Supply duct high static limit sensor.
    - Supply duct low static limit sensor.

FAN CONTROL:

Start/Stop: The DDC system shall start the supply and return fan via the VFD.

Current Status Switch: Provide as described under GENERAL, VFD Motor Run Status, in this Section for both the supply and return fans.

Supply Fan Speed Control: The purpose of the supply fan control is to maintain a minimum static pressure in the supply ductwork to insure proper terminal air box operation. Install a static pressure sensing probe in the main supply duct located at approximately 3/4" of the way down the main supply duct as shown on the plans and pipe to the differential pressure transmitter that shall be located in the unit temperature control panel. The inputs to the differential pressure transmitter shall be the static pressure inside of the duct and the reference input shall sense the actual space served by the air system located in the ceiling below the duct probe. The DDC system shall modulate the supply fan VFD to maintain the static pressure setpoint as sensed by the static pressure sensor. If multiple supply fans are used, the same speed signal will be sent to all operating fans unless the fan is in start or stop mode as described above. If multiple sensing locations are shown, the DDC system shall maintain the static pressure setpoint at the lowest reading sensor. If the static sensors deviate by more than 0.5 in. w.c. (adj.), an alarm shall be sent through the DDC system. Static pressure setpoint shall be as described in the Static Pressure Reset Control below.

Static Pressure Reset Control: Static pressure setpoint shall be reset using Trim & Respond logic within the range 0.15 in. w.c. to 1.3 in. w.c. When the fan is off, the setpoint shall be reset to 0.8 in. w.c. (adj.) and this setpoint shall be used on system start up While the fan is proven on, every two minutes, trim the setpoint by 0.04 in. w.c. if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by increasing the setpoint by 0.06 in. w.c.

A zone pressure request is generated when a VAV damper is greater than 95% open until it drops to 80% open. Provide a binary data enable point for each zone to enable/disable the zone damper in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the static pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the static pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

When more than 10% of the air terminals are indexed to occupied and the static pressure setpoint is below the fan start static setpoint, reset the static pressure to the fan start setpoint and release to trim and respond control. This is to prevent slow system recovery on scheduled start-up.

Ventilation Air Control: The unit is 100% outside air. Outside air damper to open prior to fan starting.

Install a temperature sensor in the supply duct downstream of the supply fan and all water coils.

Discharge Air Temperature Setpoint: Discharge air temperature setpoint shall be 48º F (adj.).

Discharge Air Temperature Control: The heating coil and cooling coil shall be controlled to maintain the discharge air setpoint temperature. At no time shall the heating coil be operating when the chilled water coil valve is open.

Preheat Coil Discharge Air Temperature Control – Normal Operation: The heating control valve (FO) shall modulate to maintain 55°F (adj.) at probe type sensor located in the supply duct downstream of the AHU. The preheat coil control valve shall be locked in the closed position whenever outside air temperature is above 55°F (adj.) for 10 consecutive minutes (adj.)

Preheat Coil Discharge Air Temperature Control – AHU- Not Running Operation: The Preheat coil discharge air temperature control sensor located immediately downstream of preheat coil shall modulate preheat coil control valve to maintain 52°F (adj.) preheat coil discharge air temperature anytime AHU is not running and safety low temperature limit control (freezestat) is not in alarm.

Cooling Coil Discharge Air Temperature Control: Cooling coil control valve (FC) shall modulate to maintain unit discharge air temperature of 48°F (adj.) via probe type sensor located in the supply duct downstream of the unit discharge. In the cooling mode when the outside air temperature is above 50°F (adj.) as unit discharge air temperature increases, cooling coil control valve shall modulate open to maintain unit discharge air temperature setpoint. The reverse shall occur as unit discharge air temperature decreases. Cooling coil control valve shall be locked in the closed position whenever outside air temperature is below 50°F (adj.) for 10 consecutive minutes (adj.) or whenever associated supply fan is not operating.

Dehumidification Control: Override the cooling coil valve position open to maintain a return air humidity of 50% RH (adj.). Lockout this control when outside air is below 40º F (adj.).

General Safeties Note: All safeties shall be hard wired to the supply VFD safety circuit. Starters shall not function in the “Hand” or “Auto” and VFD’s shall be disabled if they are indexed to the “Auto” or “Hand” position in either the VFD or bypass modes.

Freezestat: Install an electric freezestat to shut down the unit (see Unit Shutdown for additional information) if the temperature downstream of the heating coil drops below 35º F (adj.). The electric freezestat shall act independently of the DDC system via hardwire interlock and shall override the DDC system control signal to open the heating coil control valve(s) to maintain an 80°F (adj.) preheat coil discharge air temperature setpoint. The cooling coil control valve shall fully open upon a trip of the freezestat. A freezestat trip shall notify the DDC system that shall send an alarm to the operator interface.

Supply Fan High Pressure Limit: Install a static pressure probe located in the air handling unit main discharge duct at least six feet or as far as physically possible downstream of the fan and upstream of any dampers and pipe to a differential pressure switch located in the temperature control panel. Wire in series with the safety circuit of the supply and return fan. Differential pressure switch shall be a manual reset type and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be +4.0" w.c. (adj.)

Supply Fan Low Pressure Limit: Install a low static suction pressure safety switch between the inlet of the supply fan and the cooling coil and wire in series with VFD safety circuit to stop the supply fan. The pressure switch shall be adjusted to -2.0” WC (adj.). The status of the pressure switch shall be wired to the BAS system for alarming. The pressure switch must be manually reset locally before the air handling unit can be restarted. Low static pressure safety switch shall be functional in VFD mode of operation.

Supply Fire Alarm Shutdown: Upon a Fire Alarm System alarm, the fire alarm control module provided by the electrical contractor at the temperature control panel shall change state of its contacts. This shall cause

the unit to be shut down (see Unit Shutdown for additional information). An auxiliary contact shall be provided to notify the DDC system of a fire alarm shutdown.

Unit Shutdown: Whenever the air handling unit is indexed off, the supply fan shall stop, outside air damper shall close, chilled water valve shall close, heating coil valve shall remain under control to maintain a 52ºF (adj.) temperature at the preheat discharge air sensor.

If an AHU supply fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the fan shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air damper shall fully close.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

Unoccupied Control General Note: Occupied/unoccupied schedule shall be set at the DDC operator interface. When indexed to unoccupied the unit shall shutdown. Where provided, index DDC controlled heating and cooling terminal units associated with this air handling unit to maintain setback and setup temperature setpoints unless overridden by occupancy sensor or manual pushbutton.

Unoccupied Control - Unit Cycling to Maintain Setback/Setup Temperatures: Cycle the air handling unit on to maintain the setback and setup temperature zone setpoints to maintain 58 ºF (adj.) and 86 ºF (adj.) respectively. Reset supply fan volume to 2770 CFM. In the heating mode, the outside air damper shall open and heating discharge temperature control shall function as specified. In the cooling mode, the outside air damper shall open and chilled water discharge temperature control shall be allowed to function as specified. Minimum on runtime timer shall be set for 15 minutes (adj.) and the off timer for 30 minutes (adj.).

Monitor and Alarm: Monitor, through BAS, the following points associated with the air handling system and generate the alarms indicated:

- Unit discharge air temperature: Generate alarm if temperature exceeds setpoint by +/- 3°F (adj.) for 10 consecutive minutes (adj.)
- Preheat coil discharge air temperature: Generate alarm if temperature deviates from setpoint by -3.0°F (adj.) for 10 consecutive mintues (adj.)
- Low Limit thermostat (freezestat): Generate alarm and stop AHU
- Supply fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Supply duct static pressure: Generate alarm if pressure exceeds setpoint by +/- 0.5” WC (adj.) for 5 consecutive minutes (adj.)
- Supply discharge static pressure safety switch: Generate alarm and stop AHU if pressure exceeds 4.0” WC (adj.)
- Supply air smoke detector: Generate alarm and stop AHU.

ROOFTOP AIR HANDLING UNIT (AHU-3)

This is a rooftop mounted mixed air variable air volume air handling system controlled by the BAS.

The system consists of:

- Supply fan with variable frequency drive (VFD-10).
- Return Fan with variable frequency drive (VFD-11).

- Motorized modulating outside air damper (fail closed) (damper furnished by 23 73 13, actuator by 23 09 14).
- Motorized modulating return air damper (fail open) (damper furnished by 23 73 13, actuator by 23 09 14).
- Motorized modulating relief air damper (fail closed) (damper furnished by 23 73 13, actuator by 23 09 14).
- Supply Fan Inlet Air Flow Measuring Station.
- Return Fan Inlet Air Flow Measuring Station.
- Chilled water cooling coil with modulating 3-way temperature control valve (fail to bypass coil).
- Hot water heating coil with modulating 3-way temperature control valve (fail to coil).
- Heating coil freezestat.
- Return air duct smoke detector.
- Sensors:
    - Supply duct discharge air temperature sensor.
    - Preheat coil discharge air temperature sensor.
    - Mixed air temperature sensor.
    - Return air temperature sensor.
    - Return air humidity sensor.
    - Space mounted humiditat.
    - High limit humidistat (downstream of distribution tube).

FAN CONTROL:
Start/Stop: The DDC system shall start the supply and return fan via the VFD.
Current Status Switch: Provide as described under GENERAL, VFD Motor Run Status, in this Section for both the supply and return fans.

Supply Fan Speed Control: The purpose of the supply fan control is to maintain temperature within the space. See discharge air temperature control sequence below.

Return Fan Speed Control: The purpose of the return fan control is to maintain a slightly positive building pressure. The return fan VFD shall modulate to maintain a constant CFM offset of 300(adj.) from the supply fan to account for total exhaust from the area in which it serves while maintaining a slightly positive pressure. Control contractor shall coordinate with the balancing contractor to optimize this setting.

Minimum Ventilation Air Flow Control:
Fixed Ventilation Air Flow Setpoint: The AHU outside air ventilation rate shall be maintained at 300 CFM. (The Office Area is to be positive to the Lab Area by 400 CFM)

Minimum Ventilation Air Flow Control Using Volume Matching: The minimum outside air damper position will be reset between a high minimum position and a low minimum position reset from the full design turndown fan speed and maximum fan speed. The Temperature Control Contractor shall work with the Balancing Contractor to determine these damper position setpoints to provide an even mixed air static pressure over the full range of fan turndown.

Install a temperature sensor in the supply duct downstream of the supply fan, all water coils and humidifiers.

DISCHARGE AIR TEMPERATURE CONTROL
Discharge Air Temperature Setpoint Reset from Zone Temperature (Heating and Cooling Unit): Reset the discharge air temperature setpoint based on the zone temperature between 55º F (adj.) and 90º F (adj.) to maintain a zone heating and economizer setpoint of 72º F (adj.). Mechanical cooling shall maintain a zone mechanical cooling setpoint of 72º F (adj.). Mechanical cooling shall be locked out below the mechanical cooling setpoint unless dehumidification control is required.

Discharge Air Temperature Control: The heating coil and mixed air dampers shall be controlled in sequence to maintain the discharge air setpoint temperature. At no time shall the heating coil be operating when the mixed air dampers are economizing or the chilled water coil valve is open. Whenever the discharge air temperature is above the setpoint, the following shall occur in sequence: The heating coil control shall modulate closed as sequenced below. When heating is completely off and the economizer sequence is enabled, the economizer outside air damper, return air damper, and relief damper will be modulated together in sequence to maintain discharge air temperature setpoint. When the outside air economizer damper is completely open, or the economizer sequence is not enabled, the chilled water valve will modulate open to maintain the zone mechanical cooling temperature setpoint as described above. The cooling control will be limited to the low discharge temperature reset setpoint. When the discharge air setpoint is below setpoint the reverse shall occur. Cooling coil control shall be locked out below 50º F (adj.) outside air temperature.

Preheat Coil Discharge Air Temperature Control – AHU- Not Running Operation: The Preheat coil discharge air temperature control sensor located immediately downstream of preheat coil shall modulate preheat coil control valve to maintain 52°F (adj.) preheat coil discharge air temperature anytime AHU is not running and safety low temperature limit control (freezestat) is not in alarm.

Humidification Control: Control return air humidity sensor to maintain a reset humidity setpoint. The setpoint shall be 35% RH (adj.) at an outside air dry bulb temperature of 50° F (adj.) and shall be reset to 20% RH (adj.) at an outside air dry bulb temperature of 0° F (adj.). Provide an electronic discharge air humidity sensor that shall limit the discharge humidity to 90% RH (adj.) by overriding the signal to the humidifier. Mount the humidity high limit device a minimum of 6 feet or greater if required by manufacturer.

Dehumidification Control: Override the cooling coil valve position open to maintain a return air humidity of 60% RH (adj.). Lockout this control when outside air is below 55º F.

Economizer Control: Provide dry bulb economizer control. Whenever outside air dry bulb temperature exceeds the return air temperature plus 4°F (adj.), economizer control shall override mixed air control and modulate AHU-1 outside economizer damper closed.
Economizer control shall be released to mixed air control when outside air dry bulb temperature is less than return air temperature minus 5°F (adj.) for 10 consecutive minutes (adj.)

Mixed Air Temperature Control: The unit includes a single modulating outside air damper, modulating return air damper, and modulating outside air damper. The modulating outside economizer air damper shall be enabled as determined by the economizer mode sequence stated above. The economizer outside air damper and the return air damper shall be controlled by the mixed air temperature controller with averaging type sensor located at the upstream side of the pre-filter to maintain mixed air temperature of 52°F (adj.). As the mixed air temperature decreases, the outside air damper shall close and the return air damper shall open to maintain the mixed temperature setpoint. The reverse shall occur as mixed air temperature increases. The return air damper position may not be proportionally opposite of the outside air damper. Final test and balancing will need to determine the position of the return air damper in order to keep the relief air static pressure positive in all scenarios (min/max CFM).

Relief Air Damper Control: A static pressure control with its pressure transmitter located in the return duct at least three feet from the fan discharge and upstream of the control damper, shall modulate the relief air damper (FC) to maintain initial relief static pressure setpoint of 0.6” WC (adj.). On a drop in return static pressure below setpoint, as measured by the return system static pressure transmitter, relief damper shall modulate closed until return static pressure setpoint has been satisfied. On rise in return static pressure above return system static pressure setpoint, relief damper shall modulate open until return static pressure setpoint is satisfied. Control contractor shall work in association with test and balance contractor to determine actual required static pressure setpoint. Setpoint indicated is to be used for initial system startup. Actual static pressure shall be minimum static pressure required to achieve system design flow.

General Safeties Note: All safeties shall be hard wired to the supply and return fan starters or VFD safety circuits. Starters shall not function in the "Hand" or "Auto" and VFD's shall be disabled if they are indexed to the "Auto" or "Hand" position in either the VFD or bypass modes.

Freezestat: Install an electric freezestat to shut down the unit (see Unit Shutdown for additional information) if the temperature downstream of the heating coil drops below 35º F (adj.). The electric freezestat shall act independently of the DDC system via hardwire interlock and shall override the DDC system control signal to open the heating coil control valve(s) to maintain an 80°F (adj.) preheat coil discharge air temperature setpoint. The cooling coil control valve shall fully open upon a trip of the freezestat. A freezestat trip shall notify the DDC system that shall send an alarm to the operator interface.

Return Fire Alarm Shutdown: Upon a Fire Alarm System alarm, the fire alarm control module provided by the electrical contractor at the temperature control panel shall change state of its contacts. This shall cause the unit to be shut down (see Unit Shutdown for additional information). An auxiliary contact shall be provided to notify the DDC system of a fire alarm shutdown.

Unit Shutdown: Whenever the air handling unit is indexed off, the supply and return fans shall stop, outside air damper shall close, return damper shall fully open, relief damper shall close, chilled water valve shall close, heating coil valve shall remain under control to maintain a 52ºF (adj.) temperature at the preheat discharge air sensor.

If an AHU supply fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the fan shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air dampers and relief air dampers shall fully close.
- The return air damper shall fully open.
- The return fan shall be commanded to stop.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

If return fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the AHU shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air dampers and relief air dampers shall fully close.
- The return air damper shall fully open.
- The supply fan shall be commanded to stop.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

Unoccupied Control General Note: Occupied/unoccupied schedule shall be set at the DDC operator interface. When indexed to unoccupied the unit shall shutdown. Where provided, index DDC controlled heating and cooling terminal units associated with this air handling unit to maintain setback and setup temperature setpoints unless overridden by occupancy sensor or manual pushbutton.

Unoccupied Control - Unit Cycling to Maintain Setback/Setup Temperatures: Cycle the air handling unit on to maintain the setback and setup temperature zone setpoints to maintain 58 ºF (adj.) and 86 ºF (adj.) respectively.

Reset supply return fan volume offset for return air fan control to zero. Supply fan shall be limited to the maximum return fan airflow. In the heating mode, the outside air and relief air dampers shall fully close and the return air damper shall fully open and heating discharge temperature control shall function as specified. In the cooling mode, the economizer and chilled water discharge temperature control shall be allowed to function as specified. Minimum on runtime timer shall be set for 15 minutes (adj.) and the off timer for 30 minutes (adj.).

Monitor and Alarm: Monitor, through BAS, the following points associated with the air handling system and generate the alarms indicated:

- Unit discharge air temperature: Generate alarm if temperature exceeds setpoint by +/- 3°F (adj.) for 10 consecutive minutes (adj.)
- Preheat coil discharge air temperature: Generate alarm if temperature deviates from setpoint by -3.0°F (adj.) for 10 consecutive mintues (adj.)
- Mixed air temperature: Generate alarm if temperature goes below setpoint by 5°F (adj.) for 10 consecutive minutes (adj.)
- High Return airflow: Generate alarm is airflow exceeds setpoint by +/- 500 CFM (adj.) for 10 consecutive minues (adj.)
- Low Limit thermostat (freezestat): Generate alarm and stop AHU
- Supply fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Return fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Return air smoke detector: Generate alarm and stop AHU.

AIR HANDLING UNIT AND EXHAUST FAN (AHU-4 AND EF-4)

This is an indoor mounted 100% outside air constant volume air handling system controlled by the BAS

This system consists of:

- AHU-4 supply fan with starter.
- AHU-4 motorized modulating outside air damper (fail closed) (damper furnished by 23 73 13, actuator by 23 09 14).
- AHU-4 hot water heating coil with modulating 3-way temperature control valve (fail to coil).
- AHU-4 heating coil freezestat.
- Supply air duct smoke detector.
- AHU-4 sensors:
  - Supply duct discharge air temperature sensor.
  - Preheat coil discharge air temperature sensor.
- Exhaust fan EF-4 with starter.
- Exhaust air damper and motorized actuator (damper furnished by 23 73 13, actuator by 23 09 14).

FAN CONTROL:
Start/Stop: The DDC system shall start and stop AHU-4 and EF-4.

Current Status Switch: Provide as described under GENERAL for the supply fan and exhaust fan.

The BAS shall operate AHU-4 and EF-4 as follows:

- For a minimum of 5 hours each day, 7 days per week, 365 days per year.
- Upon a “low level” (first alarm) alarm signal from the space mounted gas detection system when the system detects CO, CO2 or Methane (natural gas) levels above the set minimum of the gas detection system.

On a call for AHU-4 and EF-4 to operate, the outside air damper will open 100% and exhaust air damper will open 100%. Upon proving that both dampers are open, AHU-4 and EF-4 shall start Upon an

expiration of the minimum 5 hour run-time, or an all clear signal from the gas detection and monitoring system the reverse shall occur.

Preheat Coil Discharge Air Temperature Control – Normal Operation: The heating control valve (FO) shall modulate to maintain 55°F (adj.) at probe type sensor located in the supply duct downstream of the AHU. The preheat coil control valve shall be locked in the closed position whenever outside air temperature is above 60°F (adj.) for 10 consecutive minutes (adj.)

Preheat Coil Discharge Air Temperature Control – AHU- Not Running Operation: The Preheat coil discharge air temperature control sensor located immediately downstream of preheat coil shall modulate preheat coil control valve to maintain 52°F (adj.) preheat coil discharge air temperature anytime AHU is not running and safety low temperature limit control (freezestat) is not in alarm.

General Safeties Note: All safeties shall be hard wired to the supply VFD safety circuit. Starters shall not function in the "Hand" or "Auto" and VFD's shall be disabled if they are indexed to the "Auto" or "Hand" position in either the VFD or bypass modes.

Freezestat: Install an electric freezestat to shut down the unit (see Unit Shutdown for additional information) if the temperature downstream of the heating coil drops below 35º F (adj.). The electric freezestat shall act independently of the DDC system via hardwire interlock and shall override the DDC system control signal to open the heating coil control valve(s) to maintain an 80°F (adj.) preheat coil discharge air temperature setpoint. The cooling coil control valve shall fully open upon a trip of the freezestat. A freezestat trip shall notify the DDC system that shall send an alarm to the operator interface.

Supply Fire Alarm Shutdown: Upon a Fire Alarm System alarm, the fire alarm control module provided by the electrical contractor at the temperature control panel shall change state of its contacts. This shall cause the unit to be shut down (see Unit Shutdown for additional information). An auxiliary contact shall be provided to notify the DDC system of a fire alarm shutdown.

Unit Shutdown: Whenever the air handling unit is indexed off, the supply fan shall stop, outside air damper shall close, chilled water valve shall close, heating coil valve shall remain under control to maintain a 52ºF (adj.) temperature at the preheat discharge air sensor.

If an AHU supply fan failure occurs, as detected by a current switch, or VFD fault indication from VFD output, the fan shall be stopped and an alarm shall be annunciated at the BAS. This alarm interlock shall be disabled for 60 seconds (adj.) after the fan is initially commanded to start. Upon failure the following shall occur:

- The outside air damper shall fully close.
- The chilled water control valve shall close
- The heating coil control valve shall remain under control from the preheat discharge air temperature sensor to maintain 52°F (adj.)

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

When failed AHU fan is reset through BAS, AHU shall restart as indicated above.

Unoccupied Control General Note: Occupied/unoccupied schedule shall be set at the DDC operator interface. When indexed to unoccupied the unit shall shutdown. Where provided, index DDC controlled heating and cooling terminal units associated with this air handling unit to maintain setback and setup temperature setpoints unless overridden by occupancy sensor or manual pushbutton.

Unoccupied Control - Unit Cycling to Maintain Setback/Setup Temperatures: Cycle the air handling unit on to maintain the setback and setup temperature zone setpoints to maintain 58 ºF (adj.) and 86 ºF (adj.) respectively. Reset supply fan volume to 2770 CFM. In the heating mode, the outside air damper shall open and heating discharge temperature control shall function as specified. In the cooling mode, the outside air damper shall open and chilled water discharge temperature control shall be allowed to function

as specified. Minimum on runtime timer shall be set for 15 minutes (adj.) and the off timer for 30 minutes (adj.).

Monitor and Alarm: Monitor, through BAS, the following points associated with the air handling system and generate the alarms indicated:

- Unit discharge air temperature: Generate alarm if temperature exceeds setpoint by +/- 3°F (adj.) for 10 consecutive minutes (adj.)
- Preheat coil discharge air temperature: Generate alarm if temperature deviates from setpoint by -3.0°F (adj.) for 10 consecutive mintues (adj.)
- Low Limit thermostat (freezestat): Generate alarm and stop AHU
- Supply fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Exhaust fan current switch: Generate alarm if fan status proven by current switch does not match commanded state.
- Supply air smoke detector: Generate alarm and stop AHU.
- Gas detection alarm
    - Level “one” alarm.
    - Level “two” alarm.

OFFICE AREA - VAV TERMINAL UNITS WITH REHEAT AND INFLOOR RADIATION

Systems consist of:

- Variable air volume terminal
- Hot water reheat coil with 2-way or 3-way temperature control valve (see plans).
- DDC space sensor.
- Discharge air temperature sensor.
- Occupancy sensor (lighting occupancy sensor – provided by EC, wiring from sensor to BAS by 23 09 14) (where indicated).

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the radiant floor valve shall open to maintain setpoint. If setpoint cannot be maintained, the reheat coil valve shall modulate open. If the air terminal has a heating airflow, the hot water reheat control valve and air terminal shall open in parallel to the heating airflow.

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

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

Lighting occupancy sensors are to be interlocked to the terminal unit for signalling occupancy to the terminal unit zone: When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints (as determined by the owner). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

This contractor shall provide all control wiring, including control wiring from occupancy sensor to controller.

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

When the space is "unoccupied", the infloor radiation shall be the source of "unoccupied" heating.

The radiant floor hot water valve shall be locked out whenever outside air is above 50º F (adj.).

LAB/AUTOPSY AREA – VAV TERMINAL UNIT WITH REHEAT AND IN-FLOOR RADIATION AND EXHAUST VALVE

130 - AUTOPSY

System consists of:

- Supply air variable air volume terminals (VAV-2-1, VAV-2-2 and VAV-2-4) with:
  - Hot water reheat coils and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-1 – General Autopsy Exhaust
  - EV-2 - General Autopsy Exhaust
  - EV-10 – Janitor / Cart Storage Exhaust
- DDC Space Thermostat with temperature override button.
- DDC Space Humidistat
- Wall Mounted High/Low Ventilation Air Switch
  - Low Ventilation Switch with Amber Pilot Light
  - High Ventilation Switch with Green Pilot Light
  - Red Pilot Light - Alarm

This space shall always be at a negative pressure in relation to the adjacent Corridor (1007).

The space shall have 4 airflow modes of operation:

- A1 – Day / Occupied Building – "Inactive" – Low Ventilation.
- A2 – Day / Occupied Building - "Active" – High Ventilation.
- B1 – Night / Unoccupied Building – "Inactive" – Low Ventilation.
- B2 – Night / Unoccupied Building – "Active" – High Ventilation.

Wall mounted high/low ventilation switch shall be labelled as follows:

- High Airflow – Green Pilot Light
- Low Airflow – Amber Pilot Light
- Alarm – Red Pilot Light

At all times, the pilot lights shall reflect current space airflow ("low" or "high").

Design Intent: During periods where procedures and autopsies are being performed in the space, the airflow shall be "high". During periods when the space is inactive, the airflow shall be "low".

Airflow Schedule (Adj.): The schedule shall default to "low" airflow at all times.

- VAV-2-1, VAV-2-2 and VAV-2-4 shall be at minimum airflow.
- EV-1, EV-2 and EV-10 shall be at minimum airflow.

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building "Occupied": 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building "Unoccupied": 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in "high" airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 68º

"High" Airflow Activation: The system shall be manually indexed to "high" airflow via the wall mounted ventilation air switch. Once manually activated to "high" airflow, the system shall be timed to operate at high airflow for 4 hours (adj) before automatically being indexed back to "low" airflow by the building automation system.

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at "low" airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their "offset" to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

<u>131 – AUTOPSY VIEWING</u>

System consists of:

- Supply air variable air volume terminals (VAV-2-6) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Exhaust air valves
  - EV-4 – General Exhaust
- DDC Space Thermostat with temperature override button.
- Occupancy sensor (lighting occupancy sensor – provided by EC, wiring from sensor to BAS by 23 09 14) (where indicated).

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the radiant floor valve shall open to maintain setpoint. If setpoint cannot be maintained, the reheat coil valve shall modulate open. If the air terminal has a heating airflow, the hot water reheat control valve and air terminal shall open in parallel to the heating airflow.

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

Exhaust valve EV-4 shall track VAV-2-6 and maintain offset.

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

Lighting occupancy sensors are to be interlocked to the terminal unit for signalling occupancy to the terminal unit zone: When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints (as determined by the owner). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

This contractor shall provide all control wiring, including control wiring from occupancy sensor to controller.

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

When the space is “unoccupied”, the infloor radiation shall be the source of “unoccupied” heating.

The radiant floor hot water valve shall be locked out whenever outside air is above 50º F (adj.).

<u>132 – DECOMPOSITION AUTOPSY</u>

System consists of:

- Supply air variable air volume terminal (VAV-2-3) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating temperature control valve.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-3 – General Autopsy Exhaust
  - EV-12 - Fume Hood
- Fume Hood with Occupancy Presence Sensor
- DDC Space Thermostat with override button
- Wall Mounted High/Low Ventilation Air Switch
  - Low Ventilation Switch with Amber Pilot Light
  - High Ventilation Switch with Green Pilot Light
  - Red Pilot Light - Alarm

This space shall always be at a negative pressure in relation to the adjacent Autopsy Suite.

The space shall have 8 airflow modes of operation:

- A1 – Day / Occupied Building – “Inactive” – Low Ventilation and No Fume Hood Use
- A2 – Day / Occupied Building – “Inactive” – Low Ventilation with Fume Hood Use
- A3 – Day / Occupied Building - “Active” – High Ventilation and No Fume Hood Use.
- A4 – Day / Occupied Building - “Active” – High Ventilation with Fume Hood Use.
- B1 – Night / Unoccupied Building – “Inactive” – Low Ventilation and No Fume Hood Use
- B2 – Night / Unoccupied Building – “Inactive” – Low Ventilation with Fume Hood Use

- B3 – Day / Occupied Building - “Active” – High Ventilation and No Fume Hood Use.
- B4 – Day / Occupied Building - “Active” – High Ventilation with Fume Hood Use.

Wall mounted high/low ventilation switch shall be labelled as follows:

- High Airflow – Green Pilot Light
- Low Airflow – Amber Pilot Light
- Alarm – Red Pilot Light

At all times, the pilot lights shall reflect current space airflow (“low” or “high”).

Design Intent: During periods where procedures and autopsies are being performed in the space, the airflow shall be “high”. During periods when the space is inactive, the airflow shall be “low”. The fume hood airflow shall be controlled via the occupancy presence sensor.

Airflow Schedule (Adj.): The schedule shall default to “low” airflow at all times.

- VAV-2-3 shall be at minimum airflow.
- EV-3 shall be at minimum airflow.
- EV-12 shall be at minimum airflow (unless activated by the zone presence sensor).

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building “Occupied”: 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building “Unoccupied”: 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in “high” airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 68º

Fume Hood: When the fume hood is not in use, as sensed by the fume hood presence sensor, the associated exhaust valve (EV-12) shall be in its minimum position. When the fume hood is in use, as sensed by the fume hood presence sensor, the associated exhaust valve (EV-12) shall be at its maximum position. If the fume hood face velocity detects a face velocity less than 78 fpm while “in use” then an alarm shall be activated.

“High” Airflow Activation: The system shall be manually indexed to “high” airflow via the wall mounted ventilation air switch. Once manually activated to “high” airflow, the system shall be timed to operate at high airflow for 4 hours (adj) before automatically being indexed back to “low” airflow by the building automation system.

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at “low” airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their “offset” to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

133 – GENERAL LAB

System consists of:

- Supply air variable air volume terminal (VAV-2-5) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating temperature control valve.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-6 – General Autopsy Exhaust
  - EV-5 - Fume Hood
- Fume Hood with Occupancy Presence Sensor
- DDC Space Thermostat with override button
- Wall Mounted High/Low Ventilation Air Switch
  - Low Ventilation Switch with Amber Pilot Light
  - High Ventilation Switch with Green Pilot Light
  - Red Pilot Light - Alarm

This space shall always be at a negative pressure in relation to the adjacent surrounding spaces.

The space shall have 8 airflow modes of operation:

- A1 – Day / Occupied Building – "Inactive" – Low Ventilation and No Fume Hood Use
- A2 – Day / Occupied Building – "Inactive" – Low Ventilation with Fume Hood Use
- A3 – Day / Occupied Building - "Active" – High Ventilation and No Fume Hood Use.
- A4 – Day / Occupied Building - "Active" – High Ventilation with Fume Hood Use.
- B1 – Night / Unoccupied Building – "Inactive" – Low Ventilation and No Fume Hood Use
- B2 – Night / Unoccupied Building – "Inactive" – Low Ventilation with Fume Hood Use
- B3 – Day / Occupied Building - "Active" – High Ventilation and No Fume Hood Use.
- B4 – Day / Occupied Building - "Active" – High Ventilation with Fume Hood Use.

Wall mounted high/low ventilation switch shall be labelled as follows:

- High Airflow – Green Pilot Light
- Low Airflow – Amber Pilot Light
- Alarm – Red Pilot Light

At all times, the pilot lights shall reflect current space airflow ("low" or "high").

Design Intent: During periods when the lab is actively used, the airflow shall be "high". During periods when the lab is inactive, the airflow shall be "low". The fume hood airflow shall be controlled via the occupancy presence sensor.

Airflow Schedule (Adj.): The schedule shall default to "low" airflow at all times.

- VAV-2-5 shall be at minimum airflow.
- EV-6 shall be at minimum airflow.
- EV-5 shall be at minimum airflow (unless activated by the zone presence sensor).

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building "Occupied": 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building "Unoccupied": 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in "high" airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 72º

Fume Hood: When the fume hood is not in use, as sensed by the fume hood presence sensor, the associated exhaust valve (EV-5) shall be in its minimum position. When the fume hood is in use, as sensed by the fume hood presence sensor, the associated exhaust valve (EV-5) shall be at its maximum position. If the fume hood face velocity detects a face velocity less than 78 fpm while "in use" then an alarm shall be activated.

"High" Airflow Activation: The system shall be manually indexed to "high" airflow via the wall mounted ventilation air switch. Once manually activated to "high" airflow, the system shall be timed to operate at high airflow for 4 hours (adj) before automatically being indexed back to "low" airflow by the building automation system.

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at "low" airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their "offset" to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

<u>138A/138B – LONG TERM STORAGE AND PROPERTY STORAGE</u>
<u>(134 – TISSUE STORAGE & 135/137 TOILETS SIMILAR)</u>
Each system consists of:

- Supply air variable air volume terminal with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Exhaust air valve
  - General Exhaust
- DDC Space Thermostat with temperature override button.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint the radiant floor valve shall open to maintain setpoint. If setpoint cannot be maintained, the reheat coil valve shall modulate open.

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

Exhaust valve maintain offset from VAV terminal.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.).

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

When the space is "unoccupied", the infloor radiation shall be the source of "unoccupied" heating.

The radiant floor hot water valve shall be locked out whenever outside air is above 50º F (adj.).

<u>141 – X-RAY</u>

System consists of:

- Supply air variable air volume terminals (VAV-2-10) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-13 – General Exhaust
- DDC Space Thermostat with temperature override button.
- Wall Mounted High/Low Ventilation Air Switch
  - Low Ventilation Switch with Amber Pilot Light
  - High Ventilation Switch with Green Pilot Light
  - Red Pilot Light - Alarm

This space shall always be at a negative pressure in relation to the adjacent space.

The space shall have 4 airflow modes of operation:

- A1 – Day / Occupied Building – "Inactive" – Low Ventilation.
- A2 – Day / Occupied Building - "Active" – High Ventilation.
- B1 – Night / Unoccupied Building – "Inactive" – Low Ventilation.
- B2 – Night / Unoccupied Building – "Active" – High Ventilation.

Wall mounted high/low ventilation switch shall be labelled as follows:

- High Airflow – Green Pilot Light
- Low Airflow – Amber Pilot Light
- Alarm – Red Pilot Light

At all times, the pilot lights shall reflect current space airflow ("low" or "high").

Design Intent: During periods where procedures are being performed in the space, the airflow shall be "high". During periods when the space is inactive, the airflow shall be "low".

Airflow Schedule (Adj.): The schedule shall default to "low" airflow at all times.

- VAV-2-10 shall be at minimum airflow.
- EV-13 shall be at minimum airflow.

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building "Occupied": 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building "Unoccupied": 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in "high" airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 68º

"High" Airflow Activation: The system shall be manually indexed to "high" airflow via the wall mounted ventilation air switch. Once manually activated to "high" airflow, the system shall be timed to operate at high airflow for 4 hours (adj) before automatically being indexed back to "low" airflow by the building automation system.

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at "low" airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their "offset" to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

<u>144 – BODY RECEIVING / PROCESSING & 144A &144B – CART WASH AND LAUNDRY</u>

System consists of:

- Supply air variable air volume terminals (VAV-2-11) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-14 – General Exhaust
- DDC Space Thermostat with temperature override button.

This space shall always be at a negative pressure in relation to the adjacent space.

Airflow Schedule (Adj.): The schedule shall default to "low" airflow at all times.

- VAV-2-10 shall be at minimum airflow.
- EV-13 shall be at minimum airflow.

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building "Occupied": 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building "Unoccupied": 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in "high" airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 68º

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at "low" airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their "offset" to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

<u>144C – MORGUE TECH</u>

System consists of:

- Supply air variable air volume terminal with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- DDC Space Thermostat with temperature override button.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint the radiant floor valve shall open to maintain setpoint. If setpoint cannot be maintained, the reheat coil valve shall modulate open.

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

Airflow shall remain constant for pressurization.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.).

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

The radiant floor hot water valve shall be locked out whenever outside air is above 50º F (adj.).

144D – TISSUE RECOVERY

System consists of:

- Supply air variable air volume terminals (VAV-2-12) with:
  - Hot water reheat coil and associated 2-way or 3-way modulating TCV.
  - Discharge air temperature sensor.
- Infloor hot water radiation with:
  - 2-way modulating temperature control valve.
  - In-floor temperature sensor.
- Exhaust air valves
  - EV-11 – General Exhaust
- DDC Space Thermostat with temperature override button.
- DDC Space Humidistat
- Wall Mounted High/Low Ventilation Air Switch
  - Low Ventilation Switch with Amber Pilot Light
  - High Ventilation Switch with Green Pilot Light
  - Red Pilot Light – Alarm
- Wall Mounted Pressure Switch
  - Negative Ventilation Switch with Red Pilot Light
  - Positive Ventilation Switch with Green Pilot Light

Design Intent: This space shall primarily function as a positively pressurized space in relation to the adjacent space. When activated by the wall mounted pressure switch, the space will change from positive pressure to negative pressure in related to the adjacent space.

During periods where procedures being performed in the space, the airflow shall be “high”. During periods when the space is inactive, the airflow shall be “low”.

During periods where tissue recovery is being performed in the space, the space shall be at a positive pressure in relation to the adjacent spaces.

During periods where the space is being used as an autopsy room, the space shall be at a negative pressure in relation to the adjacent space.

When the space is positively pressurized, 200 cfm shall transfer out of the space.

When the space is negatively pressurized, 525 cfm shall transfer into the space.

The space shall have 4 airflow modes of operation:

- A1 – Day / Occupied Building – “Inactive” – Low Ventilation – Positive Pressure
- A2 – Day / Occupied Building - “Active” – High Ventilation – Positive Pressure.
- A3 – Day / Occupied Building – “Active” – High Ventilation – Negative Pressure.
- B1 – Night / Unoccupied Building – “Inactive” – Low Ventilation. – Positive Pressure
- B2 – Night / Unoccupied Building – “Active” – High Ventilation – Positive Pressure.
- B3 – Night / Unoccupied Building – “Active” – High Ventilation – Negative Pressure.

Wall mounted high/low ventilation switch shall be labelled as follows:

- "High Airflow" – Green Pilot Light
- "Low Airflow" – Amber Pilot Light
- "Alarm" – Red Pilot Light

At all times, the pilot lights shall reflect current space airflow ("low" or "high").

Wall mounted pressure switch shall be labelled as follows:

- "Negative Pressure" – Red Pilot Light
- "Positive Pressure" – Green Pilot Light

At all times, the pilot lights shall reflect current space pressure ("negative" or "positive").

Airflow Schedule (Adj.): The schedule shall default to "low" airflow and positive pressure at all times.

- VAV-2-12 shall be at minimum airflow.
- EV-11 shall be at minimum airflow.

Temperature Schedule: The temperature schedule shall be as follows (adj.):

- Building "Occupied": 6:00am – 6:00pm
  - Heating Setpoint: 68º
  - Cooling Setpoint: 75º
- Building "Unoccupied": 6:00pm – 6:00am
  - Heating Setpoint: 65º
  - Cooling Setpoint: 78º
- Whenever in "high" airflow mode:
  - Heating Setpoint: 68º
  - Cooling Setpoint: 72º

"High" Airflow Positive Pressure Activation: The system shall be manually indexed to "high" airflow and positive pressure via the wall mounted ventilation and air pressure switches. Once manually activated to "high" airflow, the system shall be timed to operate at high airflow and positive pressure for 4 hours (adj) before automatically being indexed back to "low" airflow and positive pressure by the building automation system.

"High" Airflow Negative Pressure Activation: The system shall be manually indexed to "high" airflow and negative pressure via the wall mounted ventilation and air pressure switches. Once manually activated to "high" airflow, the system shall be timed to operate at high airflow and positive pressure for 4 hours (adj) before automatically being indexed back to "low" airflow and positive pressure by the building automation system.

Provide a DDC space temperature sensor to control, in sequence, a VAV modulating electronic control valves (in parallel) for the hot water reheat coil and radiant floor electronic control valve.

When space temperature is below setpoint, the hot water radiation floor valve shall modulate open as a first source of heat to maintain space temperature. On a further drop in space temperature, the reheat coil valves shall modulate open in parallel. The reverse shall occur when space temperature is above setpoint. Provide a discharge air temperature sensor for monitoring purposes.

When the space temperature rises above setpoint, and the space is at "low" airflow, the supply air terminals and exhaust air terminals shall modulate open in parallel, maintaining their "offset" to maintain space temperature setpoint. On a drop in space temperature below setpoint, the reverse shall occur until the supply air terminals and exhaust air terminals reach their minimum airflows.

The radiant floor control valve shall be locked out whenever the outside air is above 50º F (adj.).

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

CHILLER ROOM VENTILATION (EF-5 and UH-9)

The ventilation system consists of:

- Variable volume exhaust fan with motorized damper and variable frequency drive VFD-12 (motorized damper by 23 34 00).
- Motorized 2 position outside air intake damper (damper by Section 23 09 14).
- Hot water unit heater.
- 2-way, 2 position low voltage control valve for UH-9 by 23 09 14.
- Strap on thermostat for unit heater.
- DDC temperature sensors for EF-5 / UH-9.
- Refrigeration detection and monitoring system.

When the space temperature rises above setpoint (85°F adj.), the motorized outside air damper shall open, the exhaust fan motorized damper shall open and the fan shall be energized at its lowest fan speed. On a continued rise in space temperature above setpoint, the fan speed shall increase proportionally until the variable speed drive is at 100%. At all times UH-9 shall be off and control valve closed.

On a drop in space setpoint temperature, the reverse shall occur until the exhaust fan is "off", exhaust fan motorized damper is closed and outside air damper is closed.

On a further drop below space temperature setpoint (65°F adj.), and hot water is available, the hot water unit heater control valve shall open and the unit heater fan shall cycle on. The reverse shall occur on a rise in space temperature above setpoint.

When the refrigerant detection and monitoring system senses a refrigerant leak, three different levels of alarm will be initiated by the refrigerant detection and monitoring system.

- Level 1 Alarm: The refrigeration and detection system will notify the BAS. The BAS will initiate an alarm.
- Level 2 Alarm: The refrigeration and detection system will notify the BAS. The BAS will initiate an alarm. The outside air damper shall open, the exhaust fan motorized damper shall open and the exhaust fan shall be energized at its maximum speed. Upon the alarm being "cleared", the exhaust fan shall turn "off", the exhaust fan motorized damper shall close and the outside air damper shall close.
- Level 3 Alarm: The refrigeration and detection system will notify the BAS. The BAS will initiate an alarm. The outside air damper shall open, the exhaust fan motorized damper shall open and the exhaust fan shall be energized at its maximum speed. Upon the alarm being "cleared", the exhaust fan shall turn "off", the exhaust fan motorized damper shall close and the outside air damper shall close.

EXHAUST FAN (EF-1)

System consists of:

- Roof mounted exhaust fan.
- Motorized backdraft damper (normally closed)

The exhaust fan shall be interlocked with AHU-1. When AHU-1 is in the "occupied" mode, EF-1 motorized damper shall open and fan shall energize.

When AHU-1 is in the "unoccupied" mode, EF-1 shall turn "off" and motorized damper shall close.

EXHAUST FAN (EF-2)

This is a variable air volume exhaust system serves laboratory exhaust.

System consists of:

- Two exhaust fans with variable frequency drives.
- Two isolation air dampers (dampers by 23 34 00, actuators by 23 09 14).
- Two outside air bleed dampers (dampers by 23 34 00, actuators by 23 09 14).
- Sensors:
    - Exhaust duct static pressure sensor.
    - Exhaust duct high static limit sensor.

FAN CONTROL:

Current Status Switch: Provide for all exhaust fans and set up as described under GENERAL, Current Switch Setup, in this Section.

Start/Stop: The DDC system shall start the exhaust fans via their VFD's. One exhaust fan shall operate and second fan will be a standby fan that shall only run if required by a failure of first fan.

Lead Fan Selection: There will be one fan designated lead and one standby fan. Lead fan selection shall be based on rotational sequencing. Provide a single software point that shall designate the lead fan.

Shutdown Service Switch: Provide a software point and hardware switch located inside the control panel for each fan to be taken out of service that will initiate the shutdown sequence for the fan. If the lag fan is available, it's start sequence shall be initiated and come into control before the shutdown sequence for the fan being taken out of service is stopped.

Exhaust Fan Start/Stop Sequencing: Sequence fans on based on exhaust fan flow and outside air bleed damper position in the order designated by the Lead Fan Selection sequence. If a fan has failed or has been designated "out of service" per the sequence below, the next fan in sequence will initiate its start sequence without delay.

Minimum exhaust fan speed shall maintain minimum exhaust ejection velocity by maintaining a minimum flow of 6875 CFM. The DDC controller shall prevent the exhaust fan from falling below this minimum speed to prevent the ejection velocity from falling below design.

When starting a fan, command the fan to start and run at minimum speed set in the VFD. When fan status is proven on, command the isolation damper open and release the fan to control. If a fan status does not prove on or the isolation damper end switch does not prove open within 2 minutes (adj.) of the fan start or damper open commands, command the exhaust fan off and the isolation damper closed, latch out this exhaust fan, and send an exhaust fan failure alarm through the DDC system. Provide a manual push-button switch located in the control panel and a software point to reset the shutdown latch out of the fan.

When stopping a lag fan, command the damper to close and ramp the fan down to minimum speed at the same rate as the damper actuator stroke time (typically 90 seconds). After the fan is at minimum speed and the damper end switch indicates the damper is closed, command the fan off.

When switching lead fans and stopping a lag fan, prove operation of the new lead fan and allow 2 minutes (adj.) for the fan to come up to speed before initiating the stop fan sequence. Provide a software point for each fan to be taken out of service that will initiate the shutdown sequence for the fan. If there is a lag fan that is available, the fan start sequence shall be initiated and come into control before the shutdown sequence for the fan being taken out of service is stopped.

The above sequences may need to be modified to prevent static pressure variances as specified General, Parallel Fan Bumpless Transfer sequence. This may entail adjusting minimum speeds and/or ramping dampers or fans at different rates than specified above.

STATIC PRESSURE CONTROL:

Exhaust Fan Speed Control: The purpose of the exhaust fan control is to maintain a minimum static pressure in the exhaust ductwork to insure proper terminal air box operation. Install a static pressure sensing probe(s in the main exhaust duct located at approximately ¾ of the way down the main exhaust duct and the reference input shall sense the actual space served by the air system located in the ceiling below the duct probe. Pipe to the differential pressure transmitter that shall be located in the unit temperature control panel. The DDC system shall modulate the exhaust fan VFD's and outside air bleed dampers in sequence to maintain the static pressure setpoint as sensed by the static pressure probe(s). As exhaust airflow requirements decrease and the static pressure becomes more negative than setpoint, decrease the exhaust fans VFD speed signals simultaneously and in parallel to maintain the static pressure setpoint until the minimum fan flow setpoint is reached. If the static pressure continues to fall, modulate open the outside air bleed dampers (in parallel, if more than one) to maintain the static pressure setpoint. If static pressure continues to fall below setpoint, stage off a lag exhaust fan as described in the Exhaust Fan Start/Stop Sequencing.

As exhaust airflow requirements increase and duct static pressure becomes less negative than setpoint, the fans will continue to operate at their minimum fan flow setpoints and the outside air bleed dampers shall be modulated closed to maintain duct static setpoint. When the outside air bleed dampers are fully closed, the exhaust fans will then be modulated up in speed to maintain static. If exhaust airflow requirements continue to increase and duct static pressure cannot be maintained, initiate the start sequence for the next lag fan as described in the Exhaust Fan Start/Stop Sequencing.

If multiple sensors are used, the DDC system shall maintain the static pressure setpoint at the lowest reading sensor. If the static sensors deviate by more than 0.5 in. w.c. (adj.), an alarm shall be sent through the DDC system. Static pressure setpoint shall be as described in the Static Pressure Setpoint Control below.

Constant Static Pressure Setpoint Control: The duct static pressure shall be controlled to maintain a negative 1.0 in. w.c. Final setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

Static Pressure Setpoint Reset Control: Static pressure setpoint shall be reset using Trim & Respond logic within the range of negative 0.6 in. w.c. to 1.3 in. w.c. When the fan is off, the setpoint shall be reset to 1.0 in. w.c. (adj.) and this setpoint shall be used on system start up. While the fan is proven on, every two minutes, trim the setpoint by raising the setpoint 0.04 in. w.c. if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by lowering the setpoint by 0.06 in. w.c.

A zone pressure request is generated when an exhaust VAV damper is greater than 95% open until it drops to 80% open. Provide a binary data enable point for each zone to enable/disable the zone damper in the trim and respond algorithm. All setpoints, timers, and zone pressure request threshold for the static pressure reset shall be adjustable. Tune the reset to prevent cyclic instability after the space is occupied. Provide a trend graph to show the relative stability of the static pressure setpoint. Final maximum setpoint shall be determined by the Balancing Contractor to satisfy the worst case zone at maximum design condition.

Exhaust Plenum High Static Pressure Control: Install a static pressure probe located in the exhaust fan plenum or common exhaust ductwork between the fan isolation dampers and the heat reclaim coil outlet isolation dampers and pipe to a differential pressure sensor located in the temperature control panel. This sensor shall override the speed signal to exhaust fan VFD's to limit the static pressure to negative 6" w.c. (adj.) (this setpoint should be set to the pressure class of the ductwork). This override control shall reduce the speed below the minimum exhaust fan minimum flow setpoints if necessary. If this control is invoked, send an exhaust plenum low pressure alarm to the DDC system.

Exhaust System Low Pressure Limit: Install a static pressure probe located in the exhaust fan plenum or common exhaust ductwork between the fan isolation dampers and the heat reclaim coil outlet isolation damper and pipe to a differential pressure switch located in the temperature control panel. Wire in series with the safety circuit of the exhaust fans VFD's. Differential pressure switch shall be a manual reset type and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be - negative 8.0" w.c. (adj.) (this setpoint should be set to two inches more negative than the pressure class of the ductwork).

EXHAUST FAN (EF-3)

System consists of:

- Indoor mounted in-line exhaust fan.
- Motorized backdraft damper (normally closed)

The exhaust fan shall operate continuously 24 hrs day / 7 days week / 365 days year.

When the fan is "on", the motorized damper shall be open. When the fan is "off", the motorized damper shall be closed.

EXHAUST FAN (EF-6)

System consists of:

- Roof mounted exhaust fan.
- Motorized backdraft damper (normally closed)

The exhaust fan shall be interlocked with AHU-3. When AHU-3 is in the "occupied" mode, EF-6 motorized damper shall open and fan shall energize.

When AHU-3 is in the "unoccupied" mode, EF-6 shall turn "off" and motorized damper shall close.

EXHAUST FAN (EF-7)

This system serves the electrical room.

System consists of:

- Roof mounted exhaust fan.
- Motorized backdraft damper (normally closed)
- Motorized outside air damper (normally closed).
- DDC Space Thermostat.

Fan shall be normally "off", fan motorized damper closed and outside air damper closed.

When the space temperature rises above setpoint (85°F adj.), the motorized outside air damper shall open, the exhaust fan motorized damper shall open and the fan shall be energized. At all times UH-10 shall be off and control valve closed.

On a drop in space setpoint temperature, the reverse shall occur until the exhaust fan is "off", exhaust fan motorized damper is closed and outside air damper is closed.

CABINET UNIT HEATERS (CUH-1 and CUH-2):

Each system consists of:

- DDC space thermostat by 23 09 14.
- 2-way, 2 position low voltage control valve by 23 09 14.
- Strap on pipe thermostat.

Cabinet unit heaters shall be controlled thru the BAS.

On a drop below space temperature setpoint (65°F adj.), and hot water is available, the control valve shall open and the fan shall cycle on. The reverse shall occur on a rise in space temperature above setpoint.

The strap on thermostat shall be mounted on the hot water return line, set at 100º F (adj.). The unit fan shall not be permitted to run unless the hot water temperature is above strap on thermostat setpoint.

HOT WATER UNIT HEATERS (UH-1 thru UH-8 and UH-10)

Each system consists of:

- Hot water unit heater.
- DDC space thermostat by 23 09 14.
- 2-way, 2 position low voltage control valve by 23 09 14.
- Strap on pipe thermostat.

Unit heaters shall be controlled thru the BAS.

Cabinet unit heaters shall be controlled thru the BAS.

On a drop below space temperature setpoint (60°F adj.), and hot water is available, the control valve shall open and the fan shall cycle on. The reverse shall occur on a rise in space temperature above setpoint.

The strap on thermostat shall be mounted on the hot water return line, set at 100º F (adj.). The unit fan shall not be permitted to run unless the hot water temperature is above strap on thermostat setpoint.

Unit heaters shall be locked out and not operate at outside air temperatures above 60º F (adj.).

CONVECTORS (C-1 and C-2):

Each system consists of:

- DDC space thermostat by 23 09 14.
- 2-way, 2 position low voltage control valve by 23 09 14.

Convectors shall be controlled thru the BAS.

On a drop below space temperature setpoint (65°F adj.), the control valve shall open. The reverse shall occur on a rise in space temperature above setpoint.

EMERGENCY GENERATOR STAGING / OPERATION:

When the emergency generator is indicted to be in operation, as sensed by the state of the emergency generator transfer switch, the building automation system shall stage “on” HVAC equipment as follows:

Group 1

- All exhaust fans, supply fans and air handlers.

Group 2

- All CRAC units and associated condensing units.

Group 3

- All heating pumps and boilers.

Group 4

- Chiller, associated condensing units and all chilled water pumps.

Group 5

- All other HVAC motors and equipment.

Coordinate all time delays between groups and motor groups with generator manufacturer and electrical contractor.

END OF SECTION

DDC INPUT / OUTPUT SUMMARY TABLE

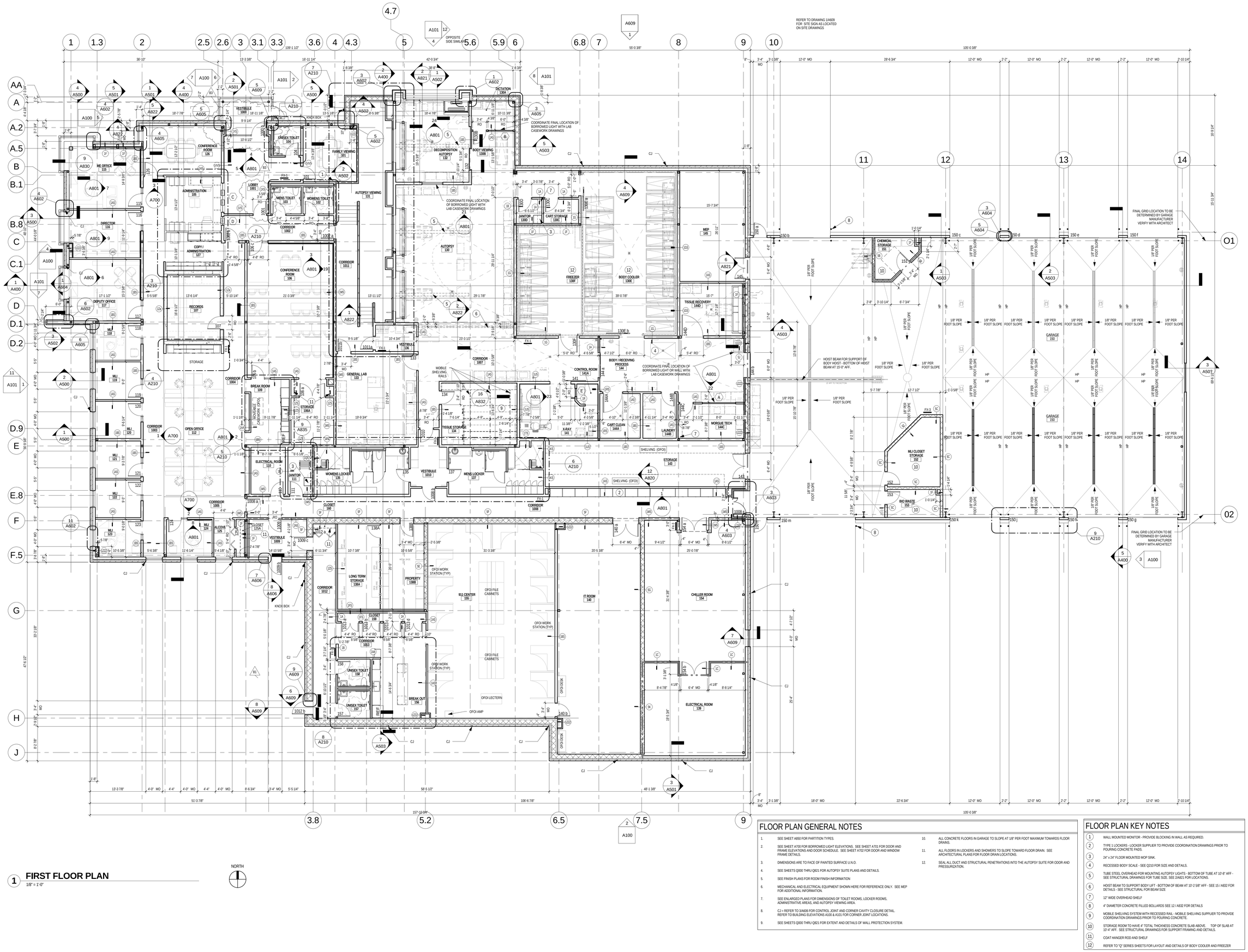
| PROJECT: Medical Examiner Office Bldg | HARDWARE | | | | | | | | | | | | | | | | | | SOFTWARE | | | | | | | | | | | | | | | | | |

DDC INPUT / OUTPUT SUMMARY TABLE

PROJECT: Medical Examiner Office Bldg	HARDWARE																		SOFTWARE																												
LOCATION: Madison, WI	OUTPUT								INPUT										ALARMS						ENERGY MANAGEMENT SYSTEM FUNCTIONS																						
	DIGITAL				ANALOG				DIGITAL						ANALOG						DIGITAL			ANALOG																								
SYSTEM: AHU-1	Control Relay	24VAC	Contactor	2-Pos Actuator	Tri-State Actuator	Duration Adjust Actuator	4-20 mA	0-10 VDC	Current Sensing Switch	Control Relay Contact	Switch Closure	Auxiliary Contact	Diff Pressure Switch	Flow Switch	Temperature	Relative Humidity	Differential Pressure	Gauge Pressure	Static Pressure	Flow	Equipment Status	Maintenance	Pressure	High Limit	Low Limit	Maintenance	Day/Night Setback	Demand Limiting	Dial-up I/O	Duty Cycling	Optimum Start/Stop	Scheduled Start/Stop	Totalization	Trend	Lighting Integration	Fire Alarm Integration	Security/Access Integration	Elect PQM Integration	Chiller Integration	DB Economizer	HW/OA Reset	CHW Reset	Smoke Control	Fire Alarm Override	Comments
POINT DESCRIPTION																																													
Supply Air Temperature															X									X	X								X												
Heating Coil Discharge Air															X									X	X								X												
Mixed Air Temperature															X									X	X								X												
Return Air Temperature															X									X	X								X												
Return Air Relative Humidity																X																														
Supply Air Flow																				X				X										X												
Hot Water Coil Valve								X																										X												
Chilled Water Coil Valve								X																										X												
Return Air Damper								X																										X							X					
Relief Air Damper								X																										X							X					
Outside Air Damper								X																										X							X					
Supply Fan VFD Speed								X																																						
Supply Fan VFD Status									X												X													X												
Supply Fan VFD Start/Stop	X																														X	X												
Supply Fan VFD Fault																						X																								
Supply Air Static Pressure																			X					X	X									X												
Return Fan VFD Speed								X																																						
Return Fan Status									X												X													X												
Return Fan Start/Stop	X																														X	X												
Return Fan VFD Fault																						X																								
Return Air Flow																				X				X										X												
Return Air Static Pressure																			X					X	X									X												
SA High Prs Static Shutdown												X									X		X																								
RA High Prs Static Shutdown												X									X		X																								
Freeze Stat												X									X																									Electric freezestat
Fire Alarm Shutdown												X									X																								X	
Service Shutdown Switch											X																																			
Occupied / Unoccupied Switch											X																								x											

DDC INPUT / OUTPUT SUMMARY TABLE

PROJECT: Medical Examiner Office Bldg	HARDWARE																		SOFTWARE																												
LOCATION: Madison, WI	OUTPUT									INPUT									ALARMS						ENERGY MANAGEMENT SYSTEM FUNCTIONS																						
	DIGITAL				ANALOG					DIGITAL					ANALOG						DIGITAL			ANALOG																								
SYSTEM: AHU-3	Control Relay	24VAC	Contactor	2-Pos Actuator	Tri-State Actuator	Duration Adjust Actuator	4-20 mA	0-10 VDC		Current Sensing Switch	Control Relay Contact	Switch Closure	Auxiliary Contact	Diff Pressure Switch	Flow Switch		Temperature	Relative Humidity	Differential Pressure	Gauge Pressure	Static Pressure	Flow		Equipment Status	Maintenance	Pressure		High Limit	Low Limit	Maintenance			Day/Night Setback	Demand Limiting	Dial-up I/O	Duty Cycling	Optimum Start/Stop	Scheduled Start/Stop	Totalization	Trend		Lighting Integration	Fire Alarm Integration	Security/Access Integration	Elect PQM Integration	Chiller Integration	DB Economizer	HW/OA Reset	CHW Reset	Smoke Control	Fire Alarm Override	Comments
POINT DESCRIPTION																																													
Supply Air Temperature																	X										X	X										X									
Heating Coil Discharge Air																	X										X	X										X									
Mixed Air Temperature																	X										X	X										X									
Return Air Temperature																	X										X	X										X									
Return Air Relative Humidity																		X																													
Supply Air Flow																						X					X											X									
Hot Water Coil Valve								X																															X									
Chilled Water Coil Valve								X																															X									
Return Air Damper								X																															X							X		
Relief Air Damper								X																															X							X		
Outside Air Damper								X																															X							X		
Supply Fan VFD Speed								X																																							
Supply Fan VFD Status										X													X																X									
Supply Fan VFD Start/Stop	X																																				X	X									
Supply Fan VFD Fault																								X																							
Return Fan VFD Speed								X																																							
Return Fan Status										X													X																X									
Return Fan Start/Stop	X																																				X	X									
Return Fan VFD Fault																								X																							
Return Air Flow																						X					X											X									
Freeze Stat													X										X																							Electric freezestat
Fire Alarm Shutdown													X										X																							X	
Service Shutdown Switch												X																																		



1 FIRST FLOOR PLAN

1/8" = 1'-0"

NORTH

FLOOR PLAN GENERAL NOTES

1. SEE SHEET A850 FOR PARTITION TYPES.
2. SEE SHEET A700 FOR BORROWED LIGHT ELEVATIONS. SEE SHEET A701 FOR DOOR AND FRAME ELEVATIONS AND DOOR SCHEDULE. SEE SHEET A702 FOR DOOR AND WINDOW FRAME DETAILS.
3. DIMENSIONS ARE TO FACE OF PAINTED SURFACE U.N.O.
4. SEE SHEETS Q000 THRU Q821 FOR AUTOPSY SUITE PLANS AND DETAILS.
5. SEE FINISH PLANS FOR ROOM FINISH INFORMATION
6. MECHANICAL AND ELECTRICAL EQUIPMENT SHOWN HERE FOR REFERENCE ONLY. SEE MEP FOR ADDITIONAL INFORMATION.
7. SEE ENLARGED PLANS FOR DIMENSIONS OF TOILET ROOMS, LOCKER ROOMS, ADMINISTRATIVE AREAS, AND AUTOPSY VIEWING AREA.
8. CJ = REFER TO 3/A606 FOR CONTROL JOINT AND CORNER CAVITY CLOSURE DETAIL. REFER TO BUILDING ELEVATIONS A100 & A101 FOR CORNER JOINT LOCATIONS.
9. SEE SHEETS Q000 THRU Q821 FOR EXTENT AND DETAILS OF WALL PROTECTION SYSTEM.
10. ALL CONCRETE FLOORS IN GARAGE TO SLOPE AT 1/8" PER FOOT MAXIMUM TOWARDS FLOOR DRAINS.
11. ALL FLOORS IN LOCKERS AND SHOWERS TO SLOPE TOWARD FLOOR DRAIN. SEE ARCHITECTURAL PLANS FOR FLOOR DRAIN LOCATIONS.
12. SEAL ALL DUCT AND STRUCTURAL PENETRATIONS INTO THE AUTOPSY SUITE FOR ODOR AND PRESSURIZATION.

FLOOR PLAN KEY NOTES

1. WALL MOUNTED MONITOR - PROVIDE BLOCKING IN WALL AS REQUIRED.
2. TYPE 1 LOCKERS - LOCKER SUPPLIER TO PROVIDE COORDINATION DRAWINGS PRIOR TO POURING CONCRETE PADS.
3. 24" x 24" FLOOR MOUNTED MOP SINK.
4. RECESSED BODY SCALE - SEE Q210 FOR SIZE AND DETAILS.
5. TUBE STEEL OVERHEAD FOR MOUNTING AUTOPSY LIGHTS - BOTTOM OF TUBE AT 10'-8" AFF - SEE STRUCTURAL DRAWINGS FOR TUBE SIZE. SEE 2/A821 FOR LOCATIONS.
6. HOIST BEAM TO SUPPORT BODY LIFT - BOTTOM OF BEAM AT 10'-2 5/8" AFF - SEE 15 / A832 FOR DETAILS - SEE STRUCTURAL FOR BEAM SIZE
7. 12" WIDE OVERHEAD SHELF
8. 4" DIAMETER CONCRETE FILLED BOLLARDS SEE 12 / A832 FOR DETAILS
9. MOBILE SHELVING SYSTEM WITH RECESSED RAIL - MOBILE SHELVING SUPPLIER TO PROVIDE COORDINATION DRAWINGS PRIOR TO POURING CONCRETE.
10. STORAGE ROOM TO HAVE 4" TOTAL THICKNESS CONCRETE SLAB ABOVE. TOP OF SLAB AT 10'-4" AFF. SEE STRUCTURAL DRAWINGS FOR SUPPORT FRAMING AND DETAILS.
11. COAT HANGER ROD AND SHELF
12. REFER TO "Q" SERIES SHEETS FOR LAYOUT AND DETAILS OF BODY COOLER AND FREEZER

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01.12.15	CONSTRUCTION DOCUMENTS
02.12.15	ADDENDUM B1
02.23.15	ADDENDUM B3

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
FIRST FLOOR PLAN

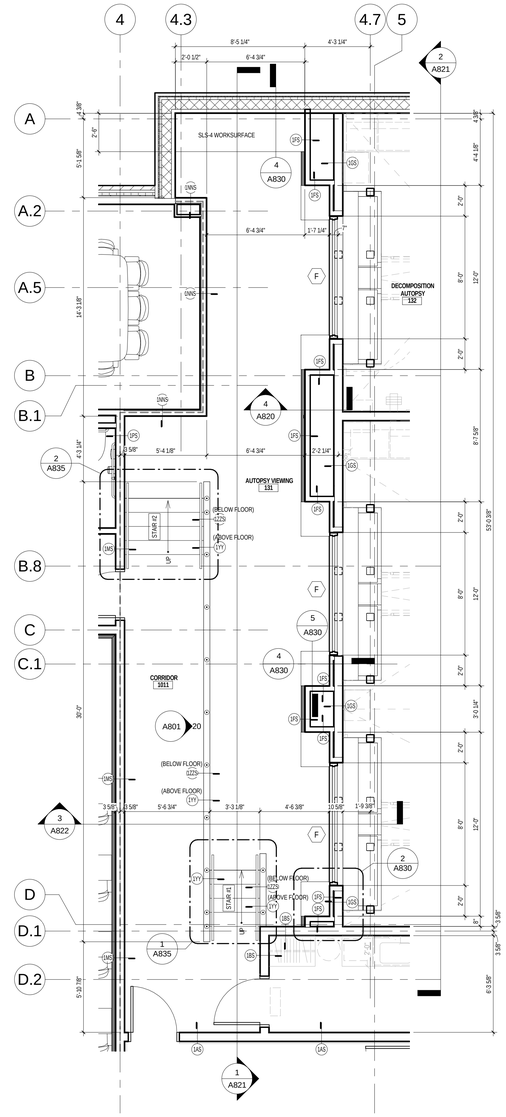
DATE
01.12.15

FLOOR PLAN GENERAL NOTES

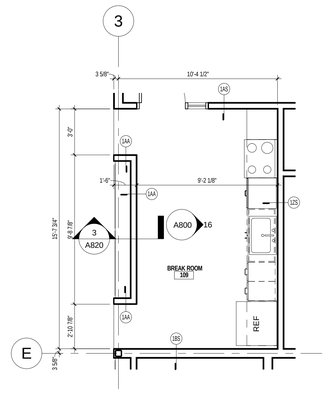
1. SEE SHEET A850 FOR PARTITION TYPES.
2. SEE SHEET A700 FOR BORROWED LIGHT ELEVATIONS. SEE SHEET A701 FOR DOOR AND FRAME ELEVATIONS AND DOOR SCHEDULE. SEE SHEET A702 FOR DOOR AND WINDOW FRAME DETAILS.
3. DIMENSIONS ARE TO FACE OF PAINTED SURFACE U.N.O.
4. SEE SHEETS Q000 THRU Q821 FOR AUTOPSY SUITE PLANS AND DETAILS.
5. SEE FINISH PLANS FOR ROOM FINISH INFORMATION AND EXTENT OF WALL PROTECTION SYSTEMS.
6. MECHANICAL AND ELECTRICAL EQUIPMENT SHOWN HERE FOR REFERENCE ONLY. SEE MEP DRAWINGS FOR ADDITIONAL INFORMATION.
7. SEE ENLARGED PLANS FOR DIMENSIONS OF TOILET ROOMS, LOCKER ROOMS, ADMINISTRATIVE AREAS, AND AUTOPSY VIEWING AREA.
8. CJ = REFER TO 3/A606 FOR CONTROL JOINT AND CORNER CAVITY CLOSURE DETAIL. REFER TO BUILDING ELEVATIONS A100 & A101 FOR CORNER JOINT LOCATIONS.
9. SLOPE ALL FLOORS IN LOCKER ROOMS AND BATHROOMS TO FLOOR DRAINS SHOWN.

FLOOR PLAN KEY NOTES

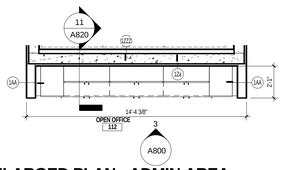
1. TYPE 2 LOCKERS - LOCKER SUPPLIER TO PROVIDE COORDINATION DRAWINGS PRIOR TO POURING CONCRETE PADS.
2. 72" LONG X 20" WIDE WALL MOUNTED BENCH.
3. 60" LONG X 20" WIDEWALL MOUNTED BENCH.



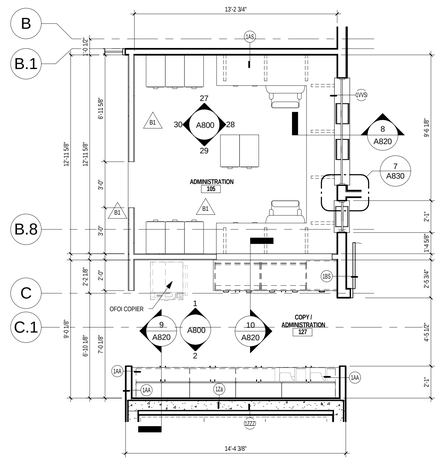
7 ENLARGED PLAN - AUTOPSY VIEWING AREA
1/4" = 1'-0"



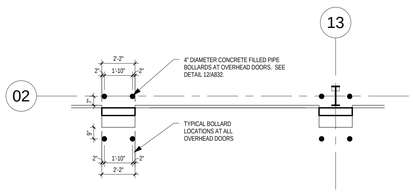
5 BREAK ROOM
1/4" = 1'-0"



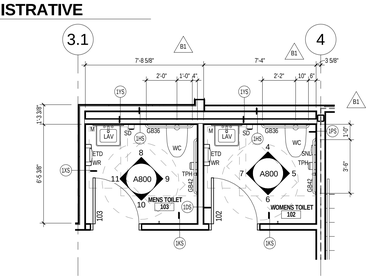
4 ENLARGED PLAN - ADMIN AREA
1/4" = 1'-0"



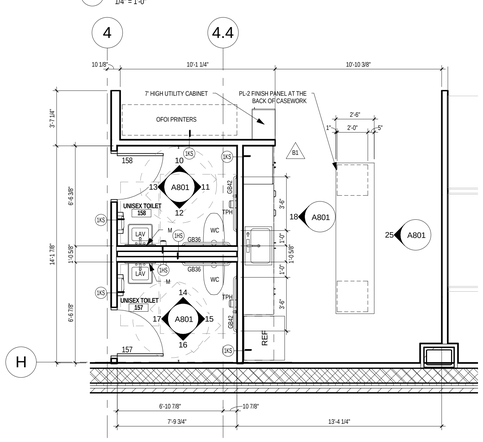
3 COPY / ADMINISTRATIVE
1/4" = 1'-0"



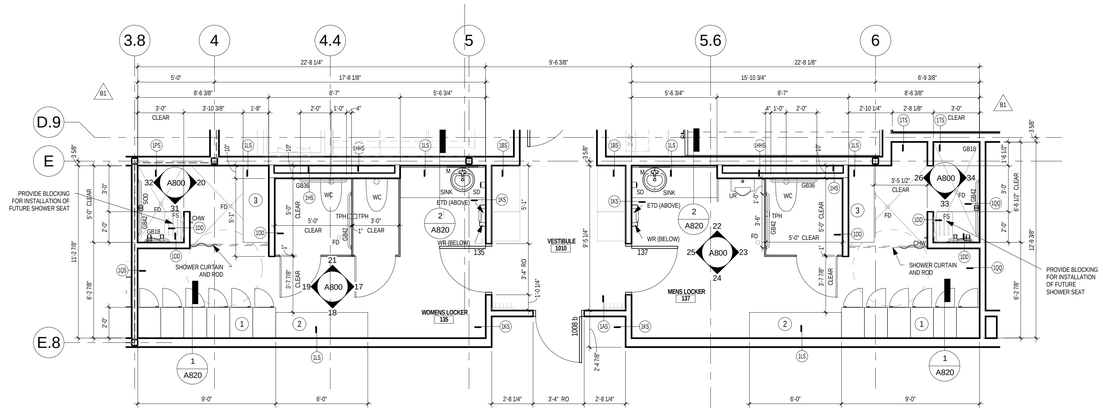
9 TYPICAL BOLLARD LOCATIONS
1/4" = 1'-0"



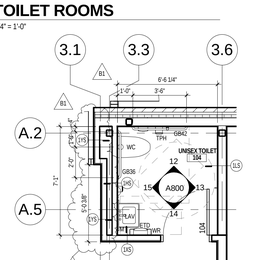
2 TOILET ROOMS
1/4" = 1'-0"



8 UNISEX TOILETS
1/4" = 1'-0"



6 MENS AND WOMENS LOCKERS
1/4" = 1'-0"



1 UNISEX TOILET
1/4" = 1'-0"

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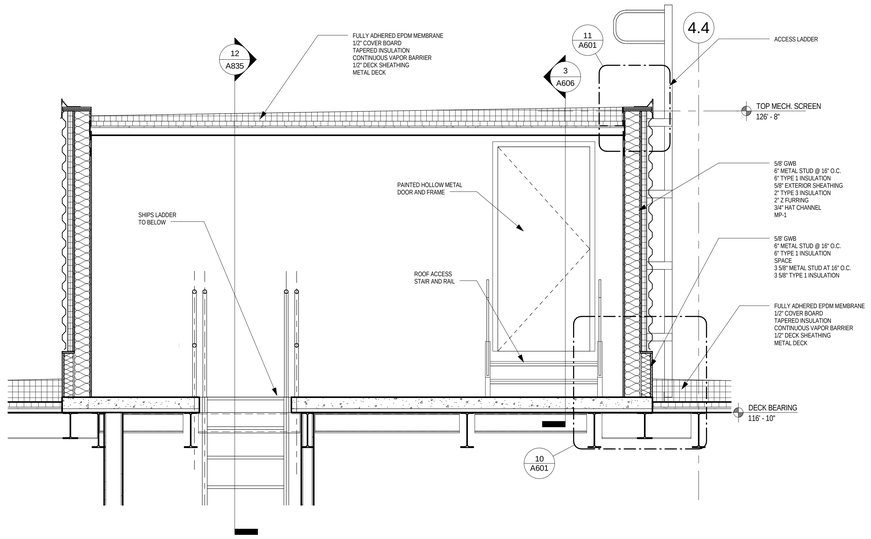
PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

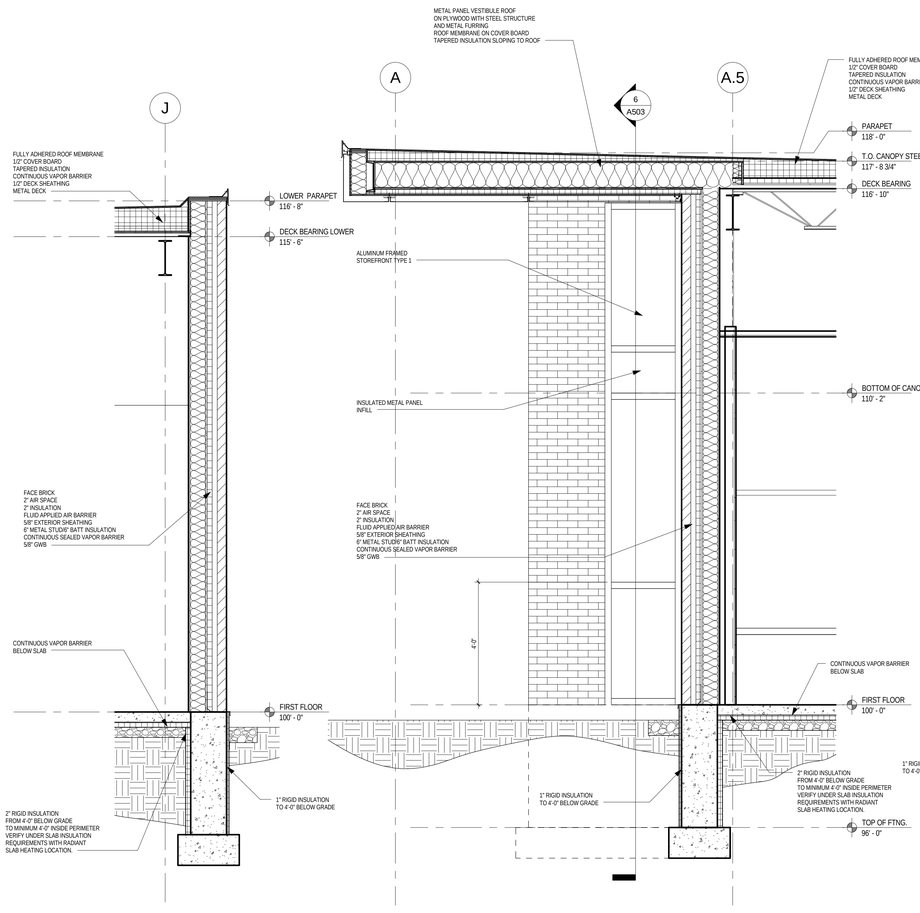
BID NO.
313083

DRAWING
ENLARGED FLOOR PLANS

DATE
01.12.15

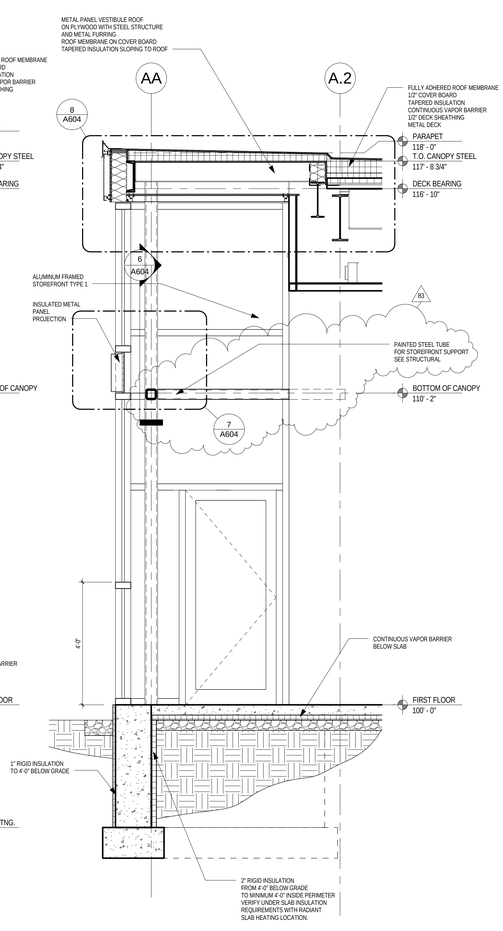


4 WALL SECTION
1/2" = 1'-0"

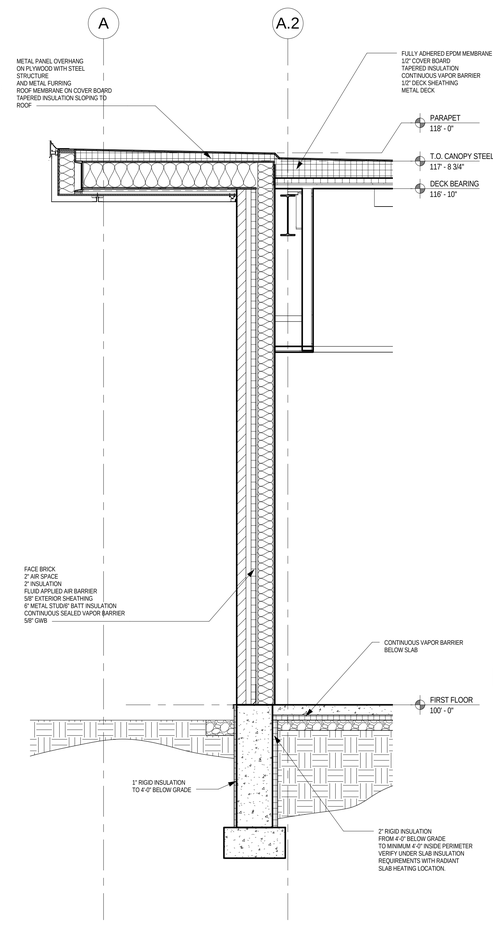


3 WALL SECTION
1/2" = 1'-0"

5 WALL SECTION
1/2" = 1'-0"



2 WALL SECTION
1/2" = 1'-0"



1 WALL SECTION
1/2" = 1'-0"

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PROJECT
MEDICAL EXAMINER OFFICE
BUILDING (BID PACKAGE B)

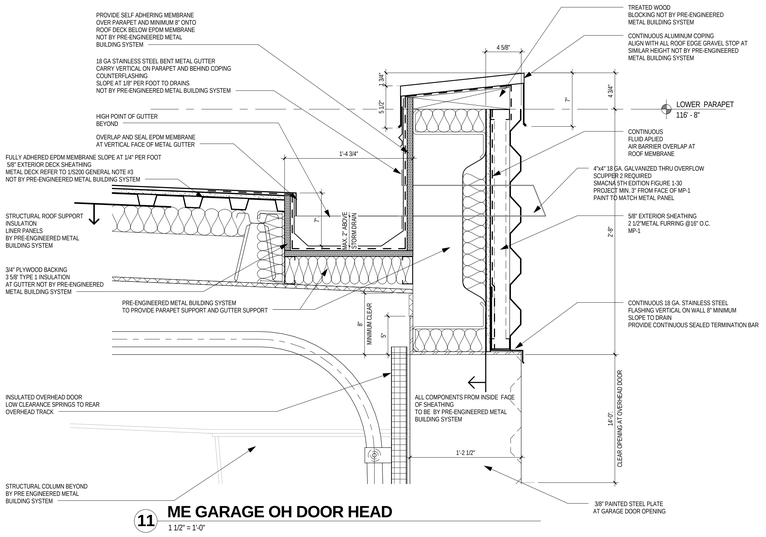
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

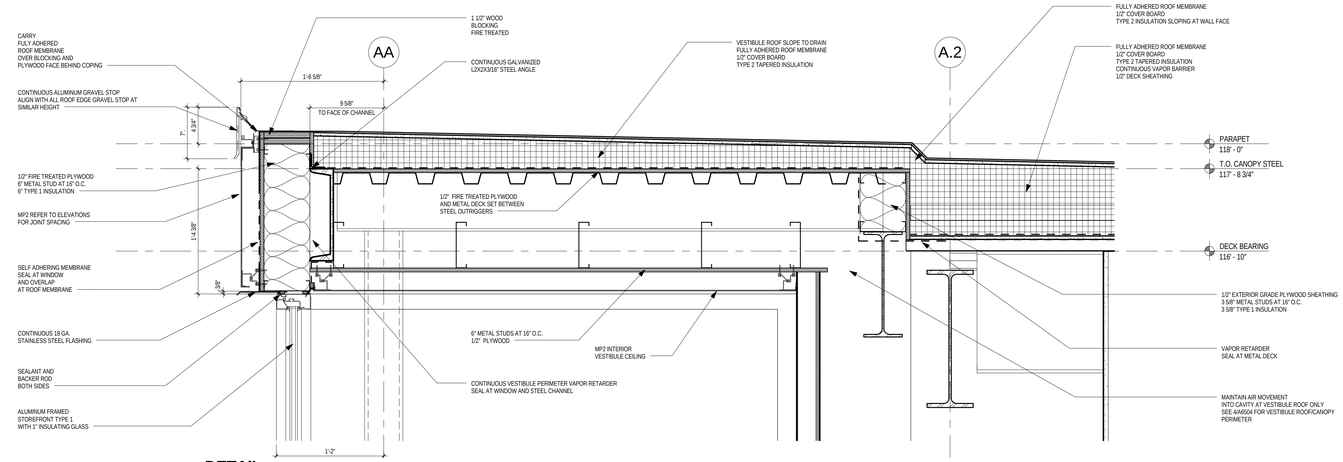
DRAWING
EXTERIOR WALL SECTIONS

DATE
01.12.15

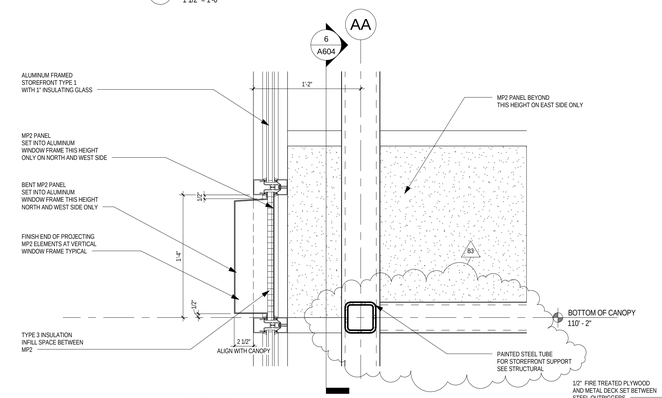
A501



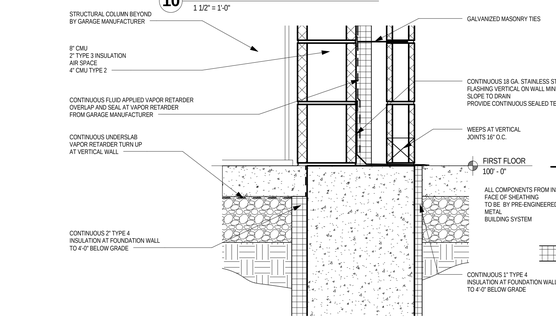
11 ME GARAGE OH DOOR HEAD
1 1/2" = 1'-0"



8 DETAIL
1 1/2" = 1'-0"

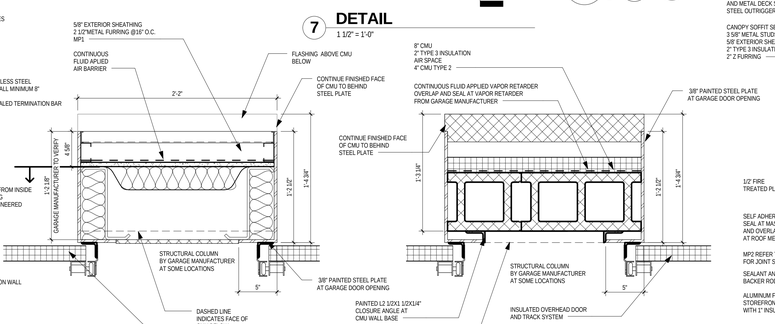


7 DETAIL
1 1/2" = 1'-0"



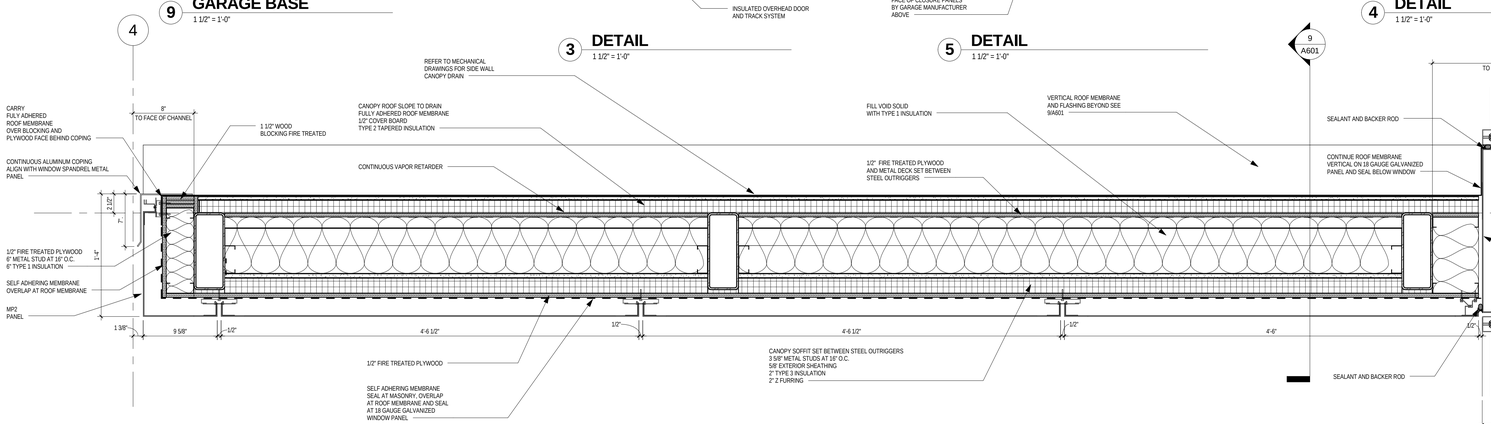
10 GARAGE SILL
1 1/2" = 1'-0"

9 GARAGE BASE
1 1/2" = 1'-0"



3 DETAIL
1 1/2" = 1'-0"

5 DETAIL
1 1/2" = 1'-0"



6 DETAIL
1 1/2" = 1'-0"

4 DETAIL
1 1/2" = 1'-0"

1 DETAIL
1 1/2" = 1'-0"

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BID NO.
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DRAWING
EXTERIOR DETAILS

DATE
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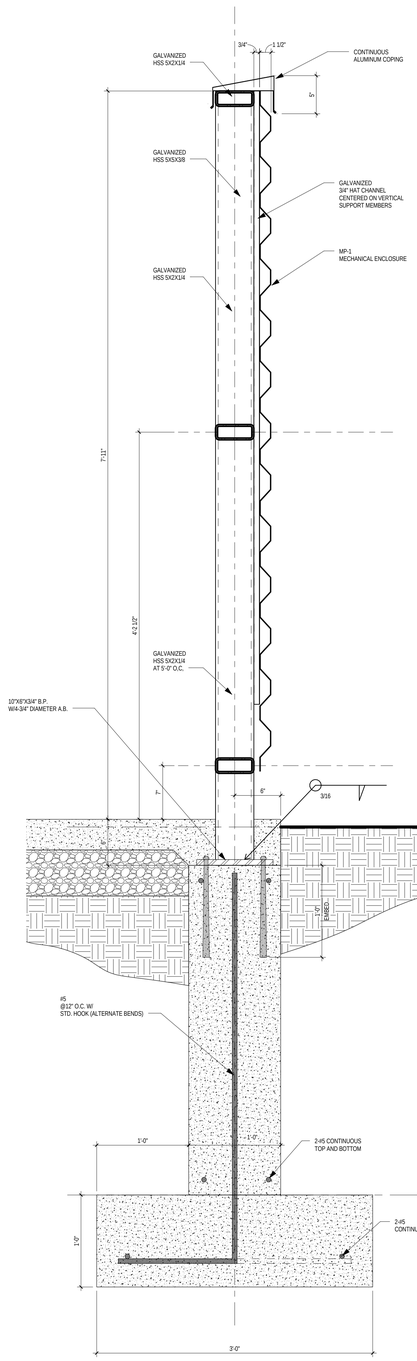
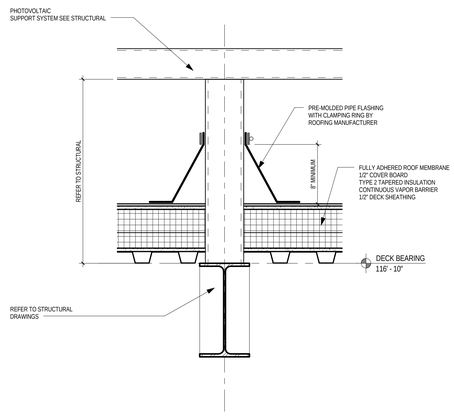
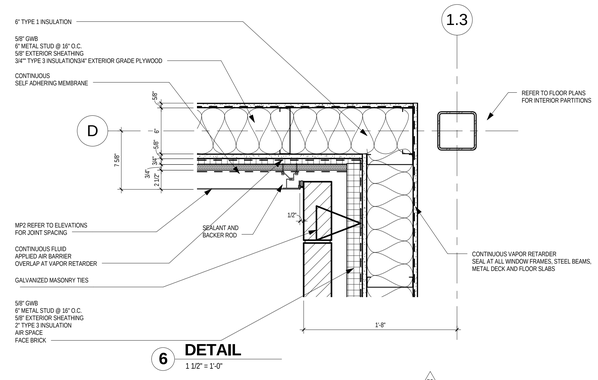


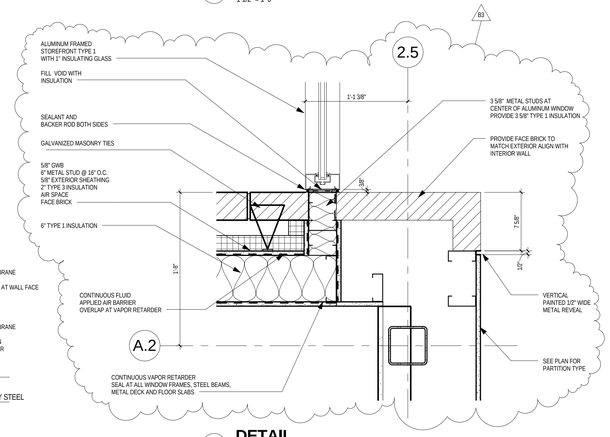
9 **DETAIL**
1 1/2" = 1'-0"



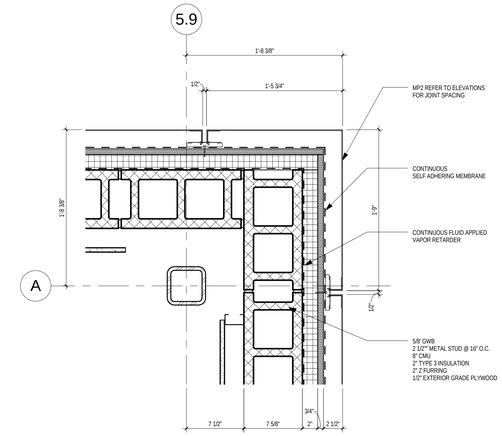
10 **DETAIL**
1 1/2" = 1'-0"



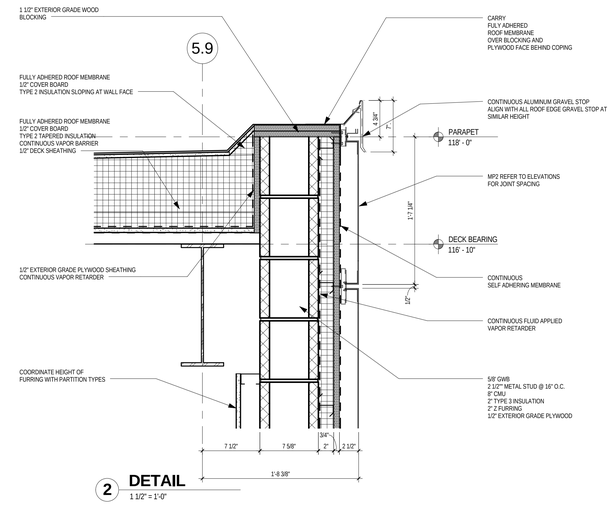
6 **DETAIL**
1 1/2" = 1'-0"



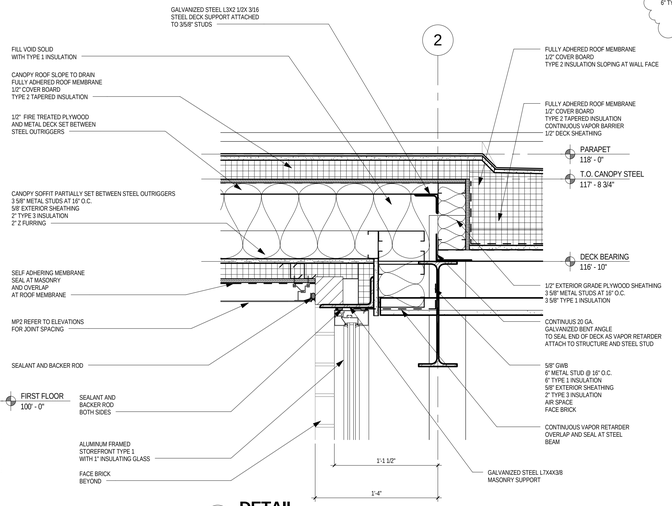
5 **DETAIL**
1 1/2" = 1'-0"



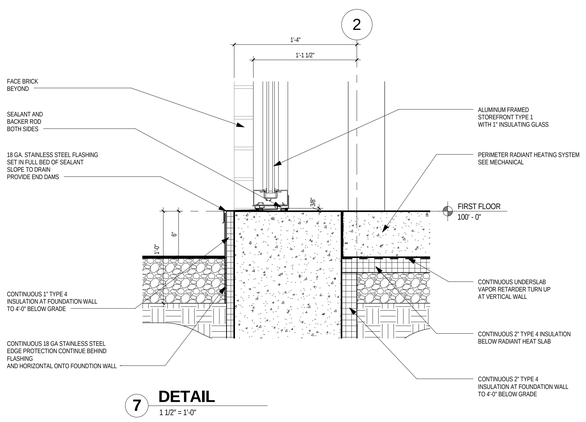
3 **DETAIL**
1 1/2" = 1'-0"



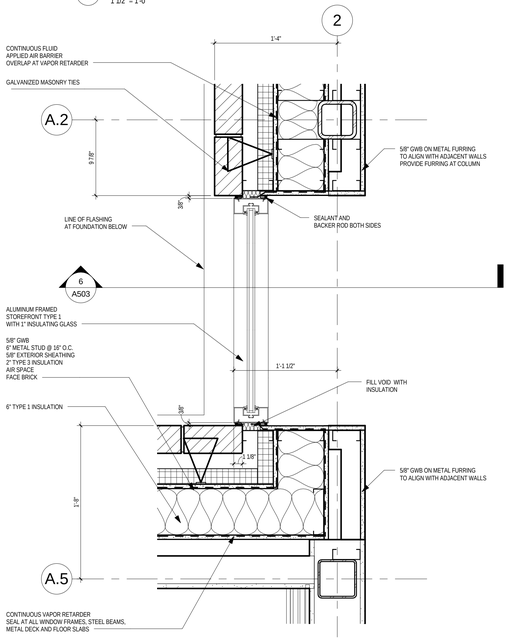
2 **DETAIL**
1 1/2" = 1'-0"



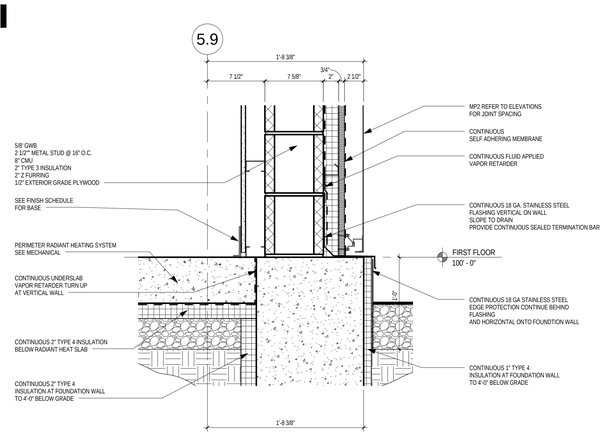
8 **DETAIL**
1 1/2" = 1'-0"



7 **DETAIL**
1 1/2" = 1'-0"



4 **DETAIL**
1 1/2" = 1'-0"



1 **DETAIL**
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ISSUE

01.12.15	CONSTRUCTION DOCUMENTS
02.23.15	ADDENDUM B3

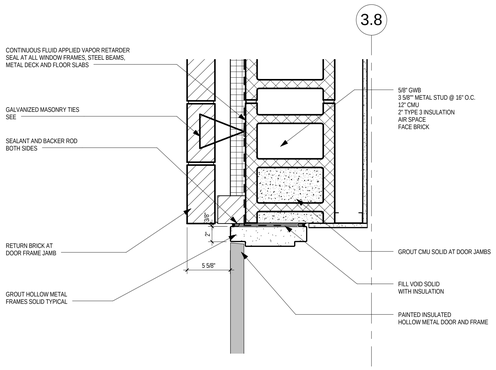
PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

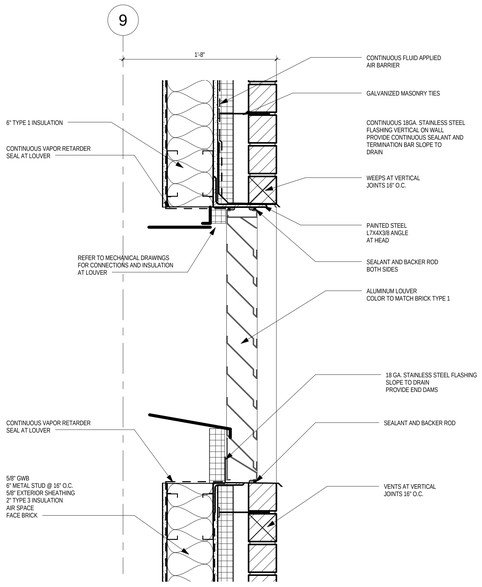
BID NO.
313083

DRAWING
EXTERIOR DETAILS

DATE
01.12.15



9 DETAIL
1 1/2" = 1'-0"



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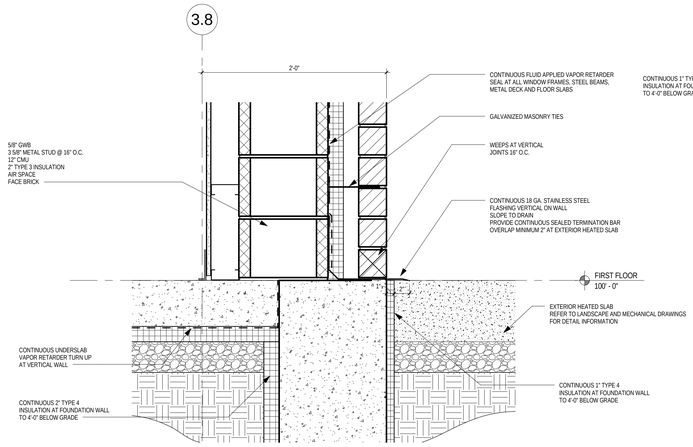

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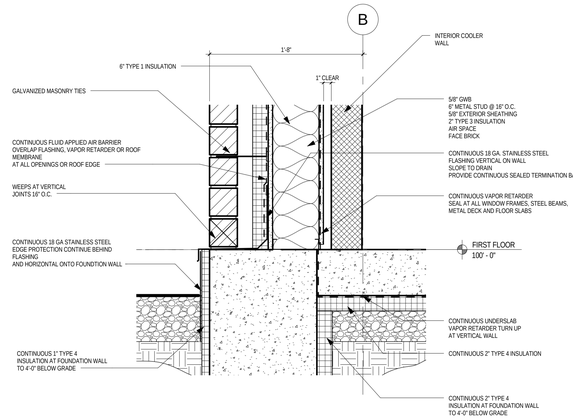

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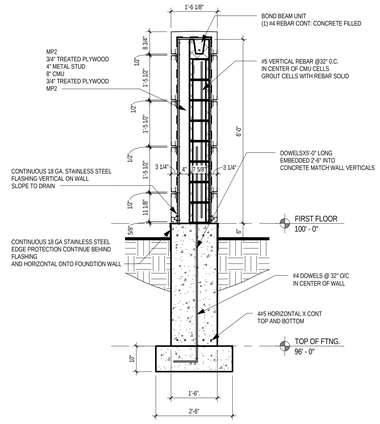

3 SITE SIGN SECTION
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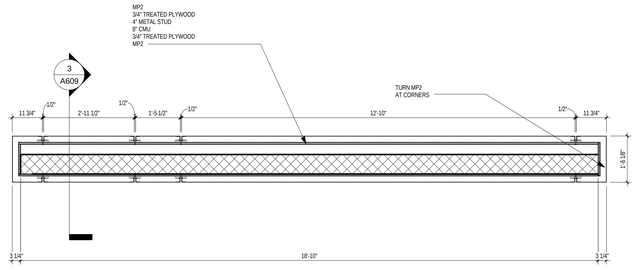

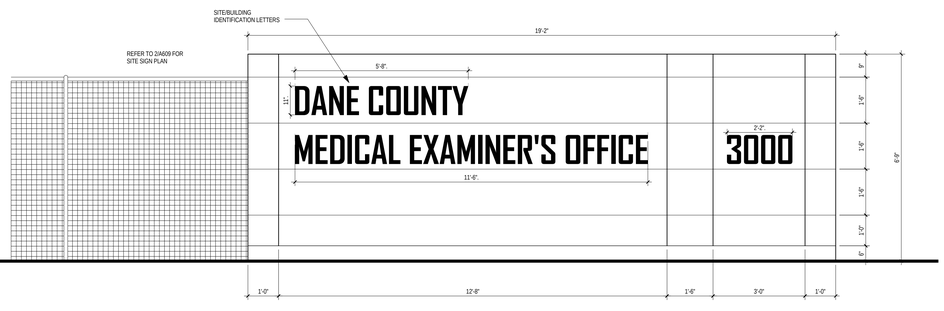

2 SITE SIGN PLAN
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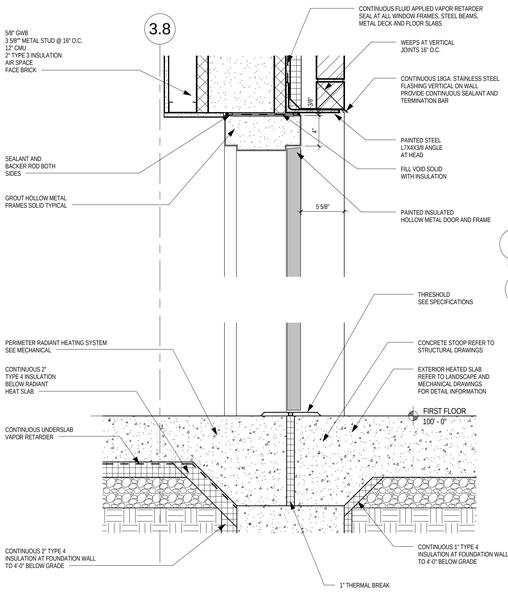

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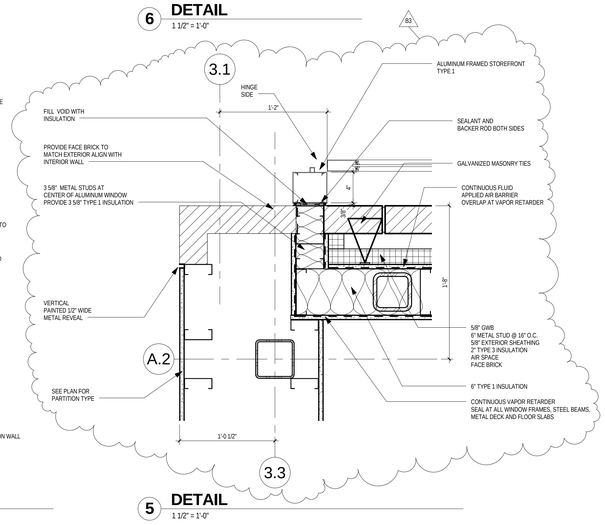

5 DETAIL
1 1/2" = 1'-0"

1 SITE SIGN ELEVATION
1/2" = 1'-0"

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3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
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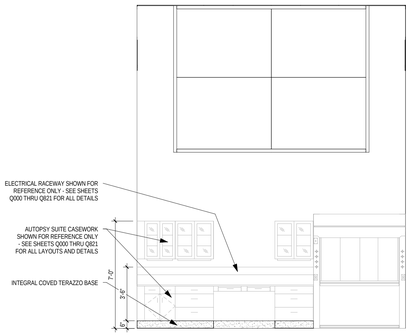

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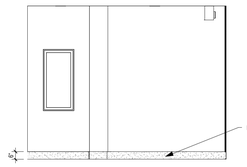

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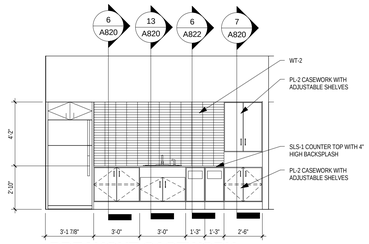

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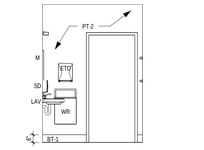

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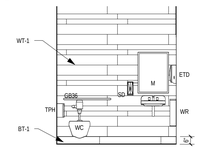

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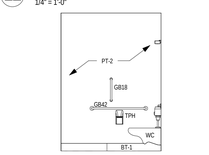

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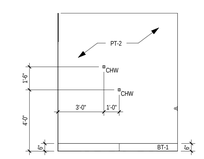

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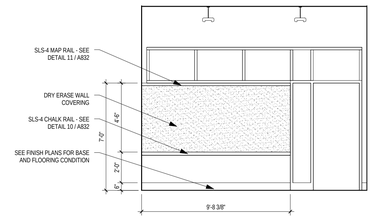

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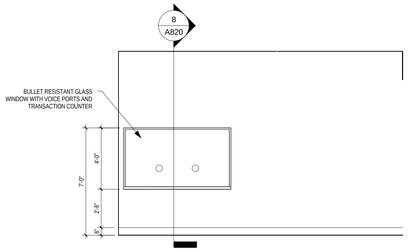

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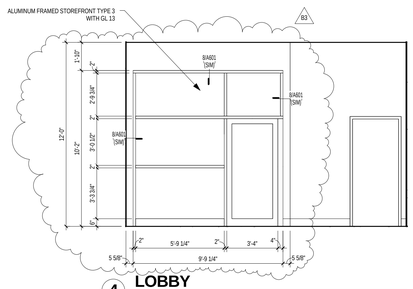

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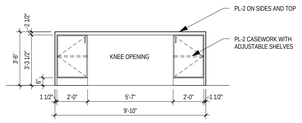
1/4" = 1'-0"



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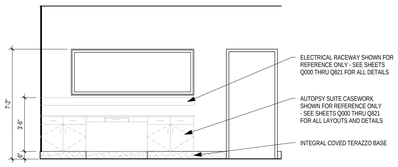

22 BODY / RECEIVING PROCESS
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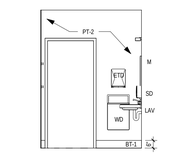

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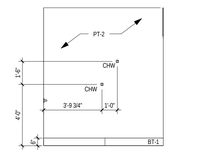

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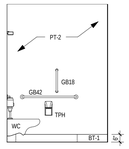

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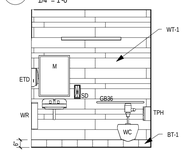

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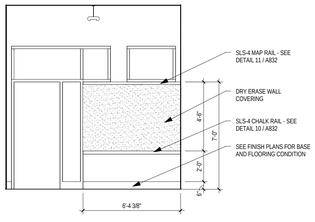
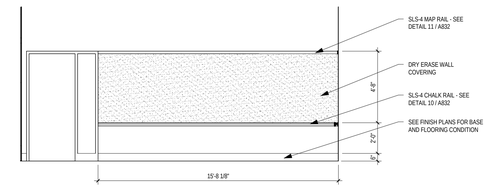
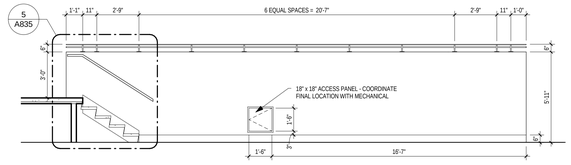


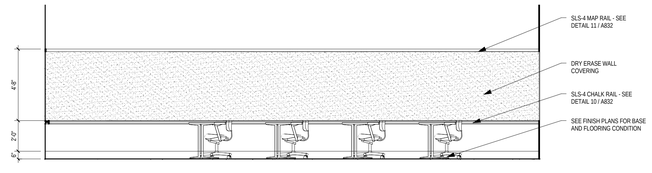
9 DIRECTOR
1/4" = 1'-0"



3 LARGE CONFERENCE ROOM
1/4" = 1'-0"



20 RAILING ELEVATION
1/4" = 1'-0"



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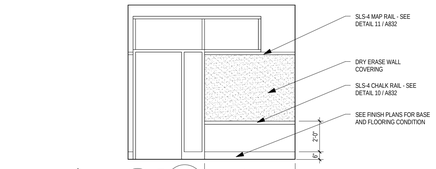
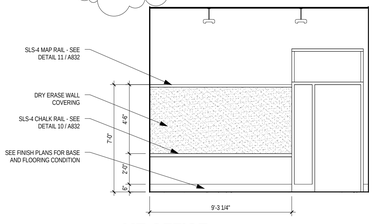
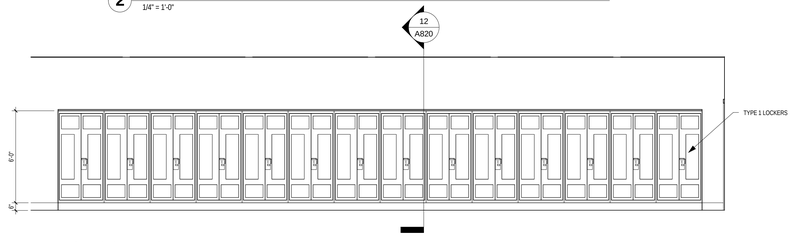


8 MLI 124
1/4" = 1'-0"



7 ME OFFICE
1/4" = 1'-0"

2 BOOKSHELVES
1/4" = 1'-0"



1 MLI LOCKERS
1/4" = 1'-0"

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PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
INTERIOR ELEVATIONS

DATE
01.12.15

A801

NOTES FOR FRAMING OF PRE-ENGINEERED METAL BUILDING GARAGE

1. USE 5psf COLLATERAL LOADING TO PURLINS AND MAIN FRAMES.
2. END WALL FRAME IS NOT EXPANDABLE.
3. THERE IS AN EXPANSION JOINT ALONG GRID 9 BETWEEN THE METAL BUILDING AND THE MAIN BUILDING. METAL BUILDING CONSTRUCTION WILL NOT RELY ON CMU WALL FOR VERTICAL OR LATERAL SUPPORT.
4. THE MAXIMUM ALLOWED PURLIN SPACING SHALL BE 5' - 6" BASED ON THE METAL DECK SPECIFIED. THE SPACING IS MEASURED ALONG THE SLOPE OF THE ROOF.

ROOF FRAMING PLAN KEYED NOTES

MARK	DESCRIPTION
(1)	PROVIDE HSS4x4x1/4 OUTRIGGERS ON A DIAGONAL OFF BUILDING COLUMN FOR OUTBOARD WINDOW SUPPORT.
(2)	BEAM COPED FOR 2 1/2" DEEP BEARING SEAT. SEE DETAIL 10/S400.
(3)	ROOF SCREEN, SEE 1/S402, 2/S402, 3/S402 & 4/S402 FOR FRAMING.
(4)	CONCRETE TOPPING ON TYPICAL METAL ROOF DECK FLOORING SYSTEM. CONCRETE SLAB SHALL BE 4" TOTAL THICKNESS (2 1/2" OVER THE DECK). REINFORCE SLAB w/ 6x6 - 6/6. TOP OF SLAB ELEVATION = 116'-4". ROOF DECK REMAINS WIDE FLANGE DOWN.
(5)	SEE 11/S400 FOR WINDOW BUMPOUT FRAMING.
(6)	1 1/2" x 18 GA GALVANIZED WIDE RIB METAL DECK @ CANOPIES. TOP OF DECK IS DROPPED TO BE 1/2" BELOW THE TOP OF TUBE SUPPORTS, TYP. THIS IS TO ALLOW THE 1/2" PLYWOOD TO FLUSH OUT WITH THE TUBE SUPPORTS.
(7)	STEEL BEAM FRAMES INTO SIDE OF CONCRETE SHELTER PER DETAIL 1/SA01.
(8)	CONCRETE CAP OF SHELTER CONSTRUCTION. SEE DETAIL 8/S301.
(9)	4" TOTAL THICKNESS CONC. SLAB ON 1 1/2"x22 GA GALV. METAL FORMED DECK. REINFORCED w/ 6x6-6/6 WWF. TSLAB ELEVATION = 116'-4". SUPPORT FOR AHU UNIT. NOT USED FOR STORAGE SUPPORT. SLAB ON 800/200-97 @ 24"OC COLD-FORMED JOISTS. BRIDGE @ MIDSPAN.
(10)	8" CMU BELOW.
(11)	W10X26 TROLLEY SUPPORT BEAM. TROLLEY BEAM AND SUPPORTS BY METAL BUILDING SUPPLIER. DESIGN LIFT CAPACITY IS 2000# w/o IMPACT. THE TROLLEY SUPPORT BEAM SHALL BE SUPPORTED VERTICALLY AND LATERALLY ON BOTH AXIS AT THE MAIN FRAME SUPPORTS. PROVIDE L3x3x1/4 EACH END TO SERVE AS TROLLEY STOPS. BOTTOM OF TROLLEY BEAM ELEVATION = 15'-0" AFF. VERIFY w/ ARCH DWGS.
(12)	METAL BUILDING SUPPLIER TO PROVIDE SUPPORT FOR EQUIPMENT.
(13)	DOUBLE JOIST OF TYPICAL SIZE FOR SNOW DRIFT.
(14)	HSS8x4x1/4 w/ DECK BRG ANGLE ALONG WALL. (117'-8 3/4") TO FLUSH w/ TOP OF PLYWOOD.
(15)	HSS10x10x5/8 COLUMN. THIS COLUMN IS OFF GRID.
(16)	CAMBER UP STEEL @ CORNER 1".
(17)	HSS12x6x1/2 COLUMN / OUTRIGGER ASSEMBLY.
(18)	HSS5x5x1/2 COLUMN w/ HSS12x4x1/2 OUTRIGGER (HIGH) (117'-8 3/4") AND HSS10x4x1/4 OUTRIGGER (LOW) (111'-3 1/2"). PROVIDE TYPICAL RECESSED METAL DECK AT BOTH LEVELS.
(19)	HSS5x5x1/2 COLUMN / HSS12x4x1/2 OUTRIGGER (117'-8 3/4") ASSEMBLY.
(20)	HSS12x8x1/2 (LSV) OUTRIGGER (117'-8 3/4").
(21)	ODOR LINE INDICATED w/ HATCHING.
(22)	DECK BEARING ANGLE PER 8/S301.
(23)	POSITION JOIST IN ALIGNMENT w/ INSIDE FACE OF CONCRETE WALL.
(24)	C8x11.5
(25)	ANCHOR STEEL COLUMN TO CMU WALL w/ ADJUSTABLE STRAP ANCHORS @ 16"OC.
(26)	HSS12x6x1/2 COLUMN / HSS12x4x1/2 OUTRIGGER ASSEMBLY. TOP OF OUTRIGGER ASSEMBLY = 117'-8 3/4".
(27)	PROVIDE WINDOW OUTRIGGER TUBES AT THIS CANOPY COLUMN PER 11/S400.
(28)	OFFSET W21x TO NORTH 1/2" FROM COLUMN CENTERLINE. (THUS 4 5/8" SOUTH OF GRID D.)
(29)	MC8x20 BETWEEN ROOF JOISTS (116'-10") TO SUPPORT POP UP ROOF WALLS.
(30)	HSS5x5x1/2 COLUMNS AT ALL FOUR CORNERS. SEE DETAIL 22/S401.
(31)	AHU-2 WEIGHT = 8,500#
(32)	HSS6x6x1/4 TUBES @ AUTOPSY ROOM. REFER TO 10/S410, 2/A821 AND 6/A821.
(33)	4' - 6" WIDE OPENING IN ROOF FOR HV. VERIFY SIZE.
(34)	EF-2 WEIGHT = 12,000#. FRAME OUT OPENINGS PER 2/S400.
(35)	ACC UNITS WEIGHT = 350#
(36)	EF-1 WEIGHT 200#, FRAME OUT OPENING PER 2/S400.
(37)	CHANNELS ON TOP OF DECK FOR UNIT LEGS PER 1/S400.
(38)	HSS8x6x1/4 FOR LIGHT SUPPORT, SEE DETAIL 9/S402.
(39)	MULTI WYTHE WALL PER ARCH DRAWINGS. THE 8" CMU BACK UP WILL BE GROUTED AND REINFORCED w/ #4 REBAR AT 48"OC VERTICALLY IN THE CENTER OF THE 8" WALL. LAP SPLICE 2'-0" ON THE REBAR. THIS WILL OCCUR THE FULL LENGTH OF THE WALL.
(40)	VERIFY w/ OPENING DIMENSION REQUIRED.
(41)	FRAME OUT FOR STAIR OPENING.
(42)	FRAME OUT FOR ROOF MONITOR. SEE 3/S201.
(43)	ONE SIDE CONNECTION DUE TO FRAMING OFFSET. USE 1- L4x3 1/2x5/16 x 1'-2 1/2" w/ 5- 7/8"Ø A325 BOLTS IN FIELD CONNECTION.
(44)	HSS8x4x1/4 (117'-8 3/4") ON COLUMN CENTERLINE w/ DECK SUPPORT ANGLE, SEE 7/S401 (SIM).
(45)	W10x22 (116'-10") AROUND PERIMETER OF POP-UP ROOF.
(46)	TROLLEY SUPPORT BEAM W10x26. BOTTOM OF BEAM EL = 110'-2 5/8". BEAM SIZED FOR 1000 # LIFT. SEE ARCH FOR POSITION. SEE 1/S403 FOR SUPPORT DETAIL @ COLUMNS D.1-4.7, D.1-5.8. PROVIDE L3x3x1/4 SHOP WELDED ANGLE @ EACH END AS TROLLEY STOP.
(47)	DECK SPAN DIRECTION @ CANOPY.
(48)	THIS SCREEN WALL COLUMN WILL STRADDLE THE BEAM JOINT.
(49)	ROOF MOUNTED PV CELLS. REFER TO SHEET S202 &DETAILS 9/S403 & 10/S403 FOR ATTACHMENT. PROVIDE HSS 4.0 x .250 @ POST LOCATIONS SHOWN. REFER TO 11/S403 FOR TYP. FRAMING OF RACK SUPPORTS. (SUPPORTED ON METAL BLDG ROOF MEMBERS @ SIM)
(50)	RTU. SEE PLAN FOR WEIGHTS.
(51)	ROOF OPENING. VERIFY SIZE & LOCATION w/ MECH DWGS. REFER TO 2/S400.
(52)	COORDINATE X-BRACES w/ LOUVER OPENINGS IN WALLS.
(53)	W14x22 (116'-10") ON CMU WALL CENTERLINE.
(54)	3/8" x 10" SQUARE BEARING PLATE w/ 2- 1/2"Ø x 4" HEADED STUDS BELOW. BEAR ON SOLID GROUTED CMU DOWN 3- COURSES.
(55)	DIAGONAL BRACES @ EQUIPMENT SCREEN COLUMNS.
(56)	DOUBLE COLUMNS @ EQUIPMENT SCREEN. SPACE @ 10"OC. NO HORIZONTAL MEMBERS BETWEEN. THIS GAP TO ALLOW EXPANSION/CONTRACTION DUE TO TEMPERATURE CHANGES
(57)	COPE BEAM ENDS PER 12/S403.
(58)	L3x3x1/4 DECK BEARING ANGLE. ANCHOR TO GROUT FILLED CMU w/ 1/2"Ø x 4" SIMPSON TITEN HD (OR EQUAL) @ 24"OC.
(59)	MCW20 (116'-10"), NORTH & SOUTH SIDE OF OPENING.
(60)	OPENING IN PRECAST PLAN FOR 1FT DUCT. VERTIFY SIZE & LOCATION w/ MECH DRAWINGS. PRECASTER TO DESIGN AND SUPPLY STEEL HEADER.
(61)	ROOF TOP ACCU UNIT. WEIGHT = 500lbs (4) THUS. PROVIDE INTERNAL JOIST REINFORCING PER DETAIL 1/S400
(62)	STR. STEEL SUPPLIERS SHALL SUPPLY LOOSE ANGLES SIM TO DETAIL 18/S301 FOR SUPPORT OF CORD REELS. METAL BUILDING SUPPLIER SHALL NOTE EXISTENCE OF CORD REELS.
(63)	METAL ROOF DECK OVER THE GARAGE AREA SHALL BE SUPPLIED AND ERECTED UNDER SPEC SECTION 052100. DECK SHALL BE AS DEFINED UNDER GENERAL NOTE 3 ON THIS PAGE AND ANCHORED PER THE STEEL DECK NOTES NUMBER 7.

1 S200 ROOF FRAMING PLAN

SCALE : 1/8" = 1'-0"

NOTES:
1. SEE SHEET S001 FOR ALL STRUCTURAL NOTES & SCHEDULES.
2. TOP OF STEEL ELEVATION = JOIST BEARING ELEVATION = 116'-7 1/2", UNLESS NOTED OTHERWISE, i.e. RELATIVE (2 1/2") OR ACTUAL (117'-8 3/4"). AT LOW ROOF: TOP OF STEEL ELEVATION = JOIST BEARING ELEVATION = 115'-3 1/2", UNLESS NOTED OTHERWISE, i.e. RELATIVE (2 1/2") OR ACTUAL (117'-8 3/4").
3. ~~ROOF DECK SHALL BE 1-1/2" x 22 GA GALVANIZED WIDE RIB METAL DECK. PER C-1(I) SPANS OR (4) SPACES (MIN.) ANCHOR PER SDI.~~
4. CERTAIN OF THE STRUCTURAL STEEL ELEMENTS ARE TO BE AESS. THIS WOULD INCLUDE THE EXPOSED STRUCTURAL STEEL IN ROOM NUMBERS: VESTIBULE 1000, OFFICE 115, DECOMP AUTOPSY 132 AND AUTOPSY 130. REFER TO SPECIFICATION. THE REQUEST FOR AESS DOES NOT ENCOMPASS STEEL JOISTS.

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PE PROJECT: 1364-2

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
ROOF FRAMING PLAN

DATE
01.12.15

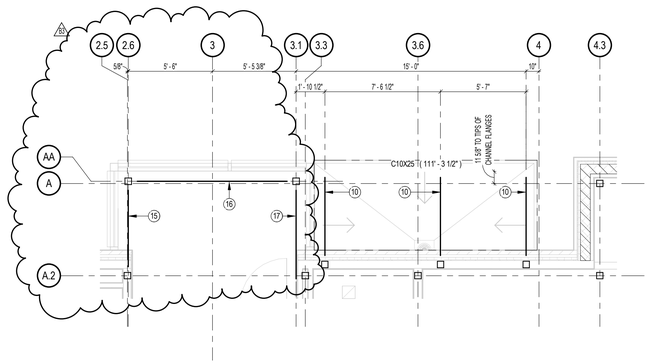
S200

MISC. FRAMING PLAN KEYED NOTES

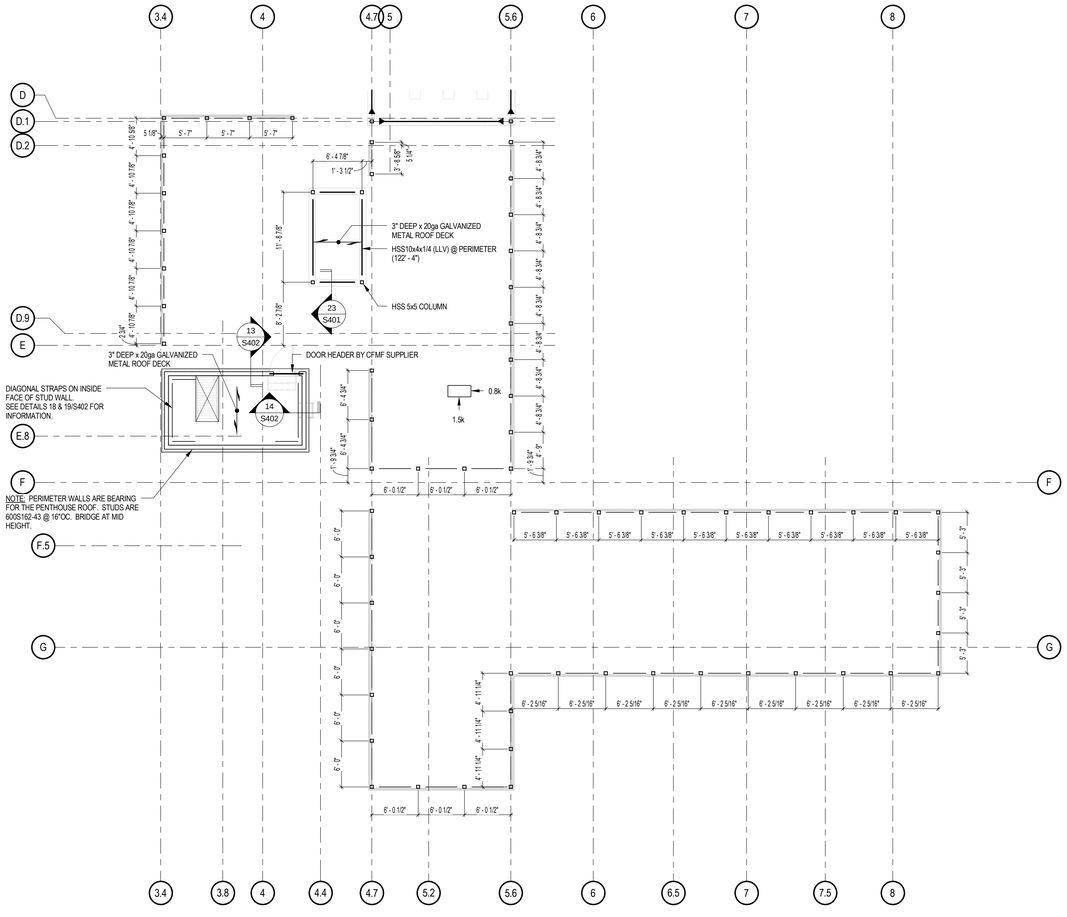
MARK	DESCRIPTION
1	BUILDING COLUMN.
2	WINDOW FRAME COLUMN.
3	HSS4x4 OUTRIGGERS (104'-0").
4	LOW OUTRIGGERS CONCEALED BY A BUILT-IN BENCH.
5	L4x4x1/4 x CONT. FOR WINDOW SUPPORT / STABILIZATION @ 104' - 0".
6	1 1/2" x 22 GA PAINTED WIDE RIB METAL ROOF DECK. ERECT 3- SPANS OR 4- SUPPORTS (MIN). ANCHOR PER S200.
7	TOP OF COLUMN = TOP OF METAL DECK. PLACE 20 GA x 2'-0" SQUARE COVER PLATE ON DECK.
8	SECTION OF W12x22 SHOP WELDED TO COLUMN AS AN OUTRIGGER.
9	HSS4x4x1/4 (104'-0").
10	HSS10x4x1/4 (111'-3 1/2").
11	HSS8x3x3/8 LSV (115'-6").
12	L4x3x1/4 LLH FOR WINDOW SUPPORT / STABILIZATION.
13	HSS3x3x1/4 OUTRIGGERS (115'-3").
14	CORD REEL BELOW, SEE 11/S401 FOR SUPPORT DETAIL.
15	HSS4x4x3/8. BOTTOM OF STEEL EL = 109' - 11 1/2". SHIP LOOSE. FIELD WELD TO COLUMNS ALL AROUND. THE TUBE IS ON GRID 2.6.
16	HSS4x4x3/8. BOTTOM OF STEEL EL = 109' - 11 1/2". SHIP LOOSE. FIELD WELD TO COLUMNS ALL AROUND. THE TUBE IS ON GRID AA.
17	HSS4x4x3/8. BOTTOM OF STEEL EL = 109' - 11 1/2". SHIP LOOSE. FIELD WELD TO COLUMN AT NORTH END. SEE DETAIL 16/S403 FOR CONNECTION TO COLUMN ON GRID A.2-3.3 @ SOUTH END. THIS IS ON GRID 3.1.

VIEWING PLATFORM FRAMING NOTES

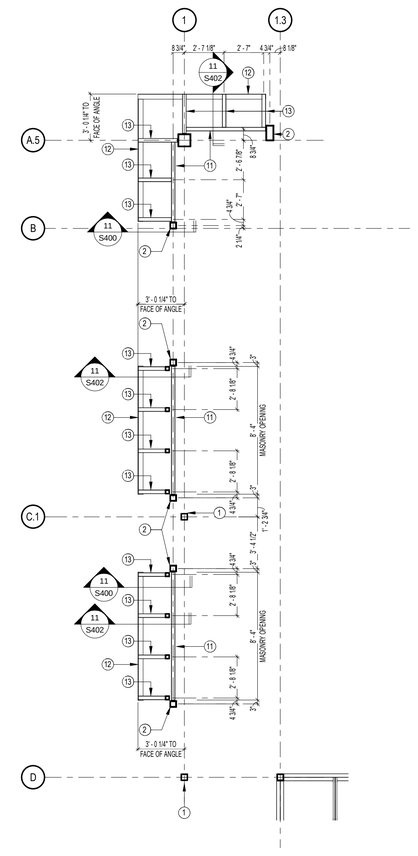
1. EXTEND CONCRETE SLAB ON GRADE UNDER RAISED VIEWING AREA.
2. PROVIDE METAL STUD WALLS AROUND ENTIRE PERIMETER OF RAISED VIEWING PLATFORM AND AT MAX 3'-0"OC INTERNALLY.
3. PROVIDE DIAGONAL X BRACE PANELS WHERE SHOWN ON PLAN. USE 2"x14ga STRAP ON EACH SIDE OF WALL PLACED IN AN X SHAPE. SEE DETAIL 22/S402.
4. RAISED FLOOR SYSTEM IS 4 1/2" TOTAL THICKNESS CONCRETE SLAB ON 1 1/2" x 22ga GALVANIZED METAL FORM DECK INSTALLED WIDE FLUTES UP. REINFORCE w/ 6x6 - 6/6 WWF.



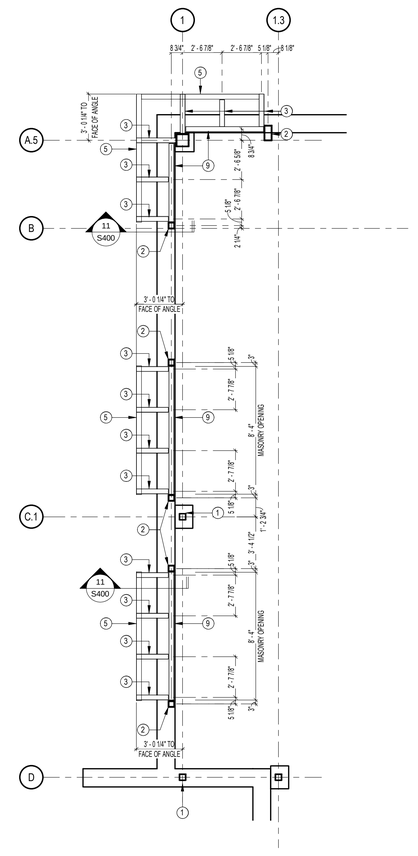
6 S201 LOWER CANOPY FRAMING PLAN
SCALE : 1/4" = 1'-0"



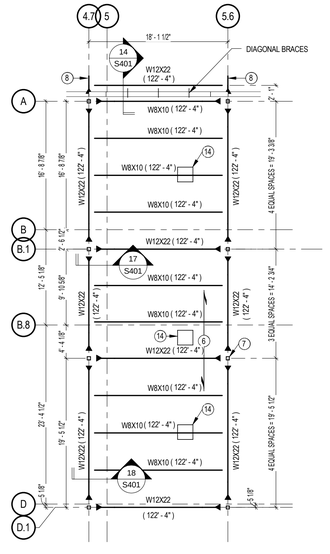
3 S201 HIGH ROOF FRAMING PLAN
SCALE: NTS



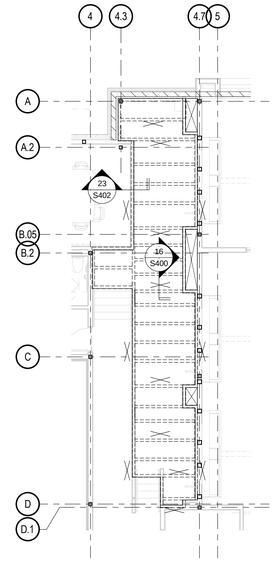
5 S201 WINDOW LEVEL FRAMING (HIGH)
SCALE : 1/4" = 1'-0"



4 S201 WINDOW LEVEL FRAMING (LOW)
SCALE : 1/4" = 1'-0"



2 S201 LIGHT MONITOR ROOF FRAMING PLAN
SCALE : 1/8" = 1'-0"



1 S201 VIEWING PLATFORM FRAMING PLAN
SCALE : 1/8" = 1'-0"

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PE PROJECT 13642

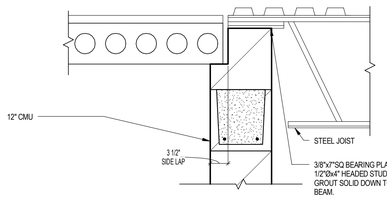
PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

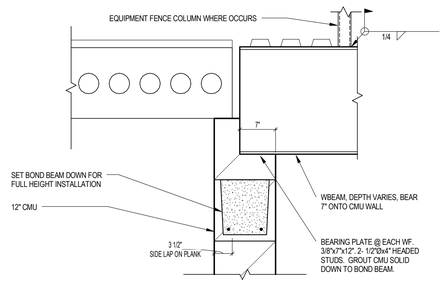
BID NO.
313083

DRAWING
MISC FRAMING PLANS

DATE
01.12.15



15 S403 SECTION
SCALE: NTS



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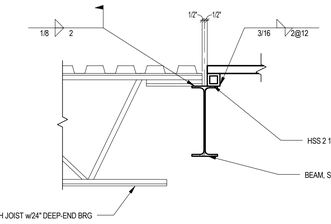
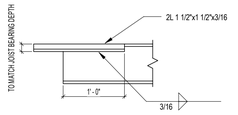
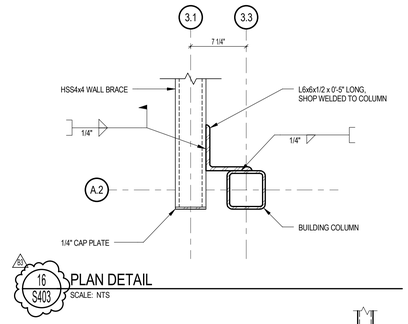
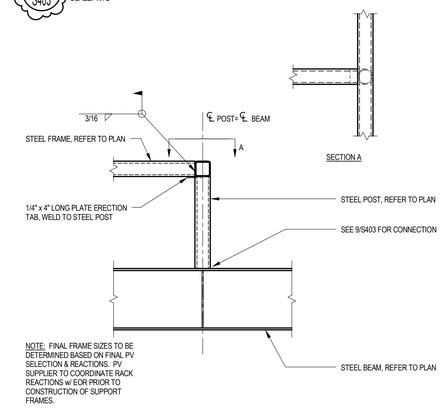


13 S403 DECK DETAIL @ CHANGE IN DECK DIRECTION
SCALE: NTS



12 S403 BEAM COPE
SCALE: NTS





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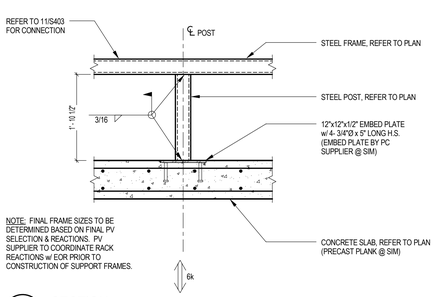

10 S403 SECTION
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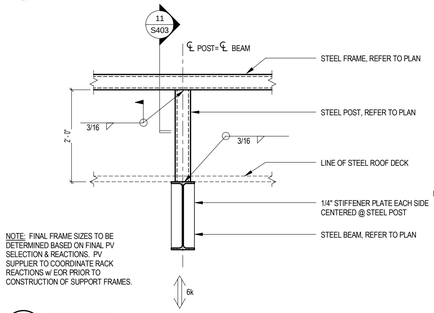

9 S403 SECTION
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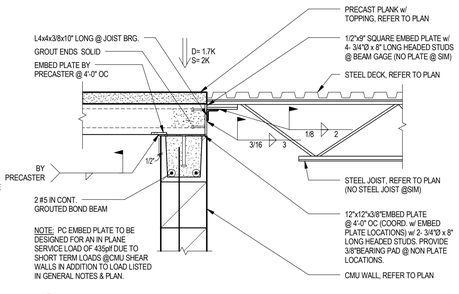

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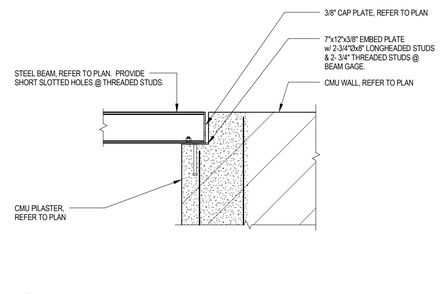

7 S403 SECTION
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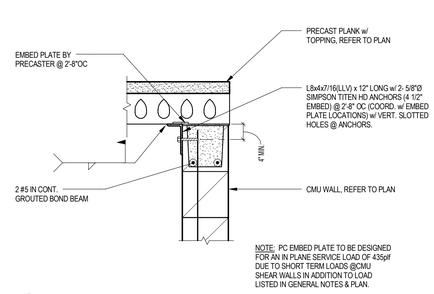

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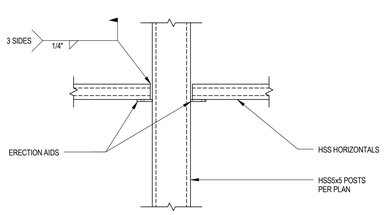

5 S403 SECTION
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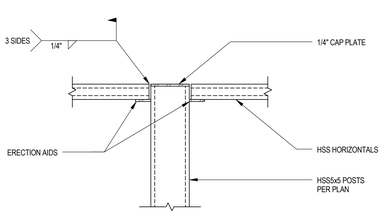

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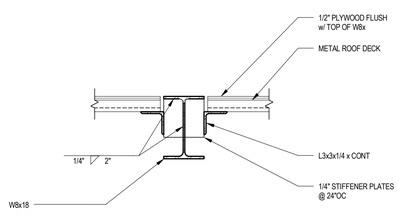

3 S403 SECTION
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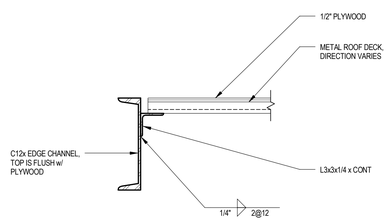
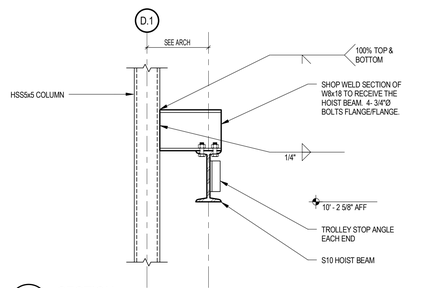


2 S403 CANOPY EDGE CHANNEL
SCALE: NTS



1 S403 SECTION
SCALE: NTS

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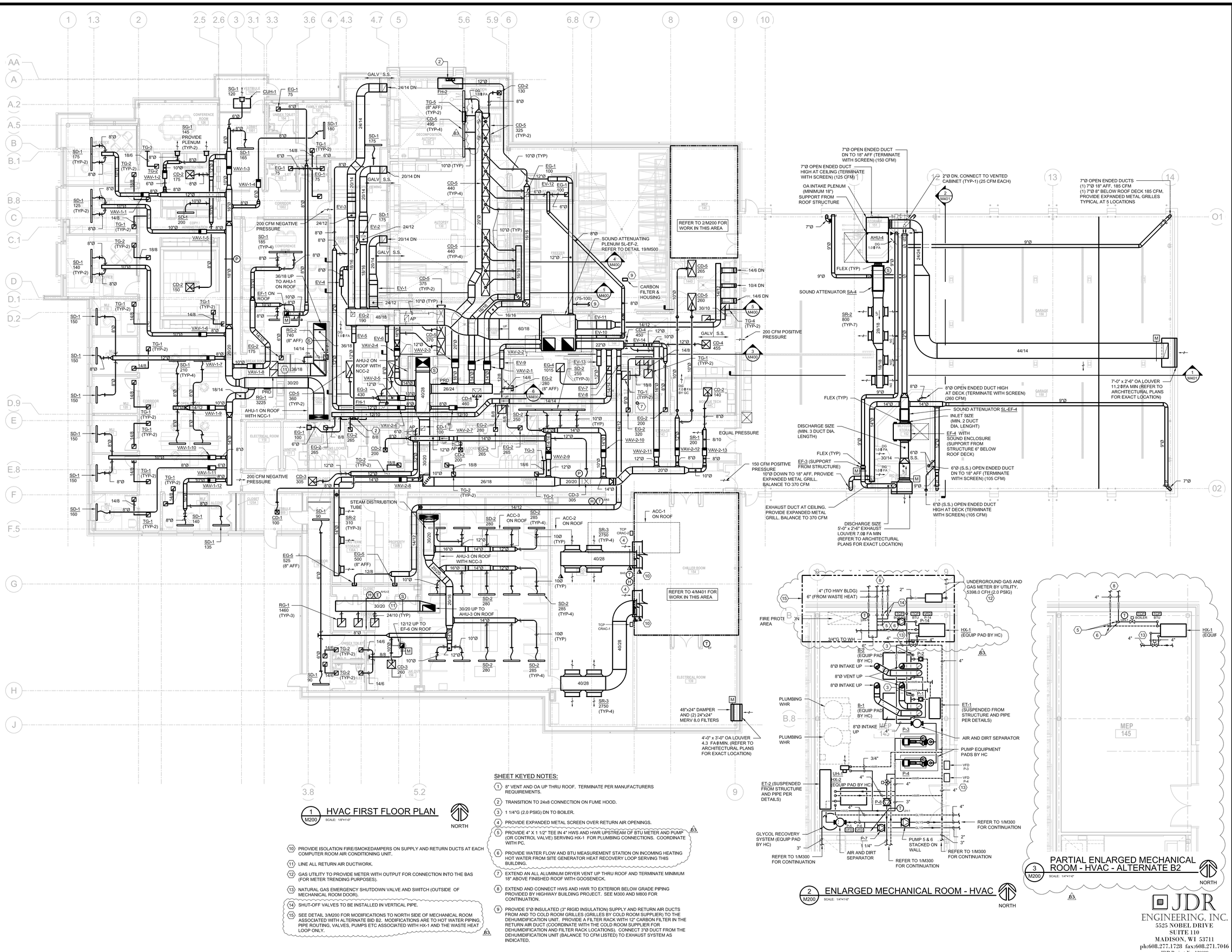
PE PROJECT: 1356-12

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
FRAMING DETAILS

DATE
01.12.15



1 M200 HVAC FIRST FLOOR PLAN

SCALE: 1/8"=1'-0"

NORTH

2 M200 ENLARGED MECHANICAL ROOM - HVAC

SCALE: 1/4"=1'-0"

NORTH

3 M200 PARTIAL ENLARGED MECHANICAL ROOM - HVAC - ALTERNATE B2

SCALE: 1/4"=1'-0"

NORTH

SHEET KEYED NOTES:

1. 8" VENT AND OA UP THRU ROOF. TERMINATE PER MANUFACTURERS REQUIREMENTS.
2. TRANSITION TO 24x8 CONNECTION ON FUME HOOD.
3. 1 1/4"G (2.0 PSIG) DN TO BOILER.
4. PROVIDE EXPANDED METAL SCREEN OVER RETURN AIR OPENINGS.
5. PROVIDE 4" X 1 1/2" TEE IN 4" HWS AND HWR UPSTREAM OF BTU METER AND PUMP (OR CONTROL VALVE) SERVING HX-1 FOR PLUMBING CONNECTIONS. COORDINATE WITH PC.
6. PROVIDE WATER FLOW AND BTU MEASUREMENT STATION ON INCOMING HEATING HOT WATER FROM SITE GENERATOR HEAT RECOVERY LOOP SERVING THIS BUILDING.
7. EXTEND AN ALL ALUMINUM DRYER VENT UP THRU ROOF AND TERMINATE MINIMUM 18" ABOVE FINISHED ROOF WITH GOOSENECK.
8. EXTEND AND CONNECT HWS AND HWR TO EXTERIOR BELOW GRADE PIPING PROVIDED BY HIGHWAY BUILDING PROJECT. SEE M300 AND M800 FOR CONTINUATION.
9. PROVIDE 5"Ø INSULATED (3" RIGID INSULATION) SUPPLY AND RETURN AIR DUCTS FROM AND TO COLD ROOM GRILLES (GRILLES BY COLD ROOM SUPPLIER) TO THE DEHUMIDIFICATION UNIT. PROVIDE A FILTER RACK WITH 12" CARBON FILTER IN THE RETURN AIR DUCT (COORDINATE WITH THE COLD ROOM SUPPLIER FOR DEHUMIDIFICATION AND FILTER RACK LOCATIONS). CONNECT 3"Ø DUCT FROM THE DEHUMIDIFICATION UNIT (BALANCE TO CFM LISTED) TO EXHAUST SYSTEM AS INDICATED.
10. PROVIDE ISOLATION FIRE/SMOKEDAMPERS ON SUPPLY AND RETURN DUCTS AT EACH COMPUTER ROOM AIR CONDITIONING UNIT.
11. LINE ALL RETURN AIR DUCTWORK.
12. GAS UTILITY TO PROVIDE METER WITH OUTPUT FOR CONNECTION INTO THE BAS (FOR METER TRENDING PURPOSES).
13. NATURAL GAS EMERGENCY SHUTDOWN VALVE AND SWITCH (OUTSIDE OF MECHANICAL ROOM DOOR).
14. SHUT-OFF VALVES TO BE INSTALLED IN VERTICAL PIPE.
15. SEE DETAIL 3/M200 FOR MODIFICATIONS TO NORTH SIDE OF MECHANICAL ROOM ASSOCIATED WITH ALTERNATE BID B2. MODIFICATIONS ARE TO HOT WATER PIPING, PIPE ROUTING, VALVES, PUMPS ETC ASSOCIATED WITH HX-1 AND THE WASTE HEAT LOOP ONLY.

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PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC FIRST FLOOR PLAN

DATE
01.12.15

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JDR Project No. 130099

M200

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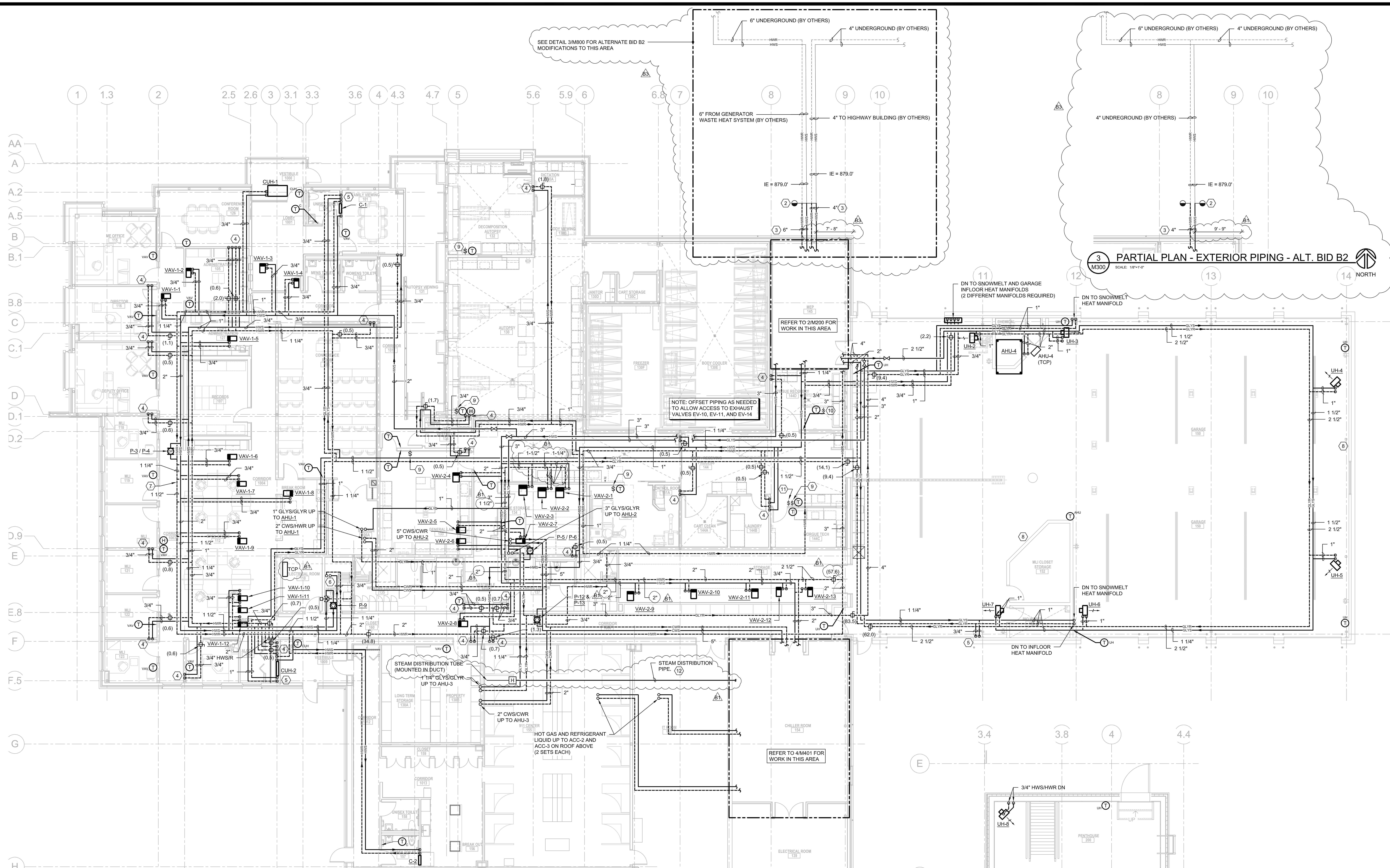

3 PARTIAL PLAN - EXTERIOR PIPING - ALT. BID B2
M300 SCALE: 1/8"=1'-0"
NORTH

1 HVAC PIPING FIRST FLOOR PLAN
M300 SCALE: 1/8"=1'-0"
NORTH

2 HVAC PENTHOUSE FLOOR PLAN
M300 SCALE: 1/4"=1'-0"
NORTH

GENERAL NOTES:

1. ALL BRANCH PIPING TO BE 3/4" UNLESS OTHERWISE NOTED.
2. ADJUST/SET INFLOOR HEAT BALANCING VALVES TO GPM NOTED.

KEYED NOTES:

1. UNDERGROUND HWS/HWR PIPING PROVIDED AND INSTALLED BY OTHERS FROM LANDFILL EMERGENCY GENERATORS TO PROJECT SITE.
2. HWY BUILDING CONTRACTOR TO RUN PIPING TO 5'-0" OUTSIDE BUILDING FOOTPRINT. THIS CONTRACTOR TO CONNECT TO UNDERGROUND PIPING LEFT BY HWY BUILDING CONTRACTOR WITH LIKE MATERIAL AND ROUT PIPING INTO BUILDING. (B3)
3. UNDERGROUND HWS/HWR PIPING ROUTED INTO BUILDING. THIS CONTRACTOR SHALL PROVIDE ALL NEW UNDERGROUND PIPING, CONNECTIONS TO EXISTING HWS/HWR PIPING , EXCAVATION, BACKFILL AND OPENINGS THRU FOUNDATION WALL INTO MECHANICAL ROOM.
4. DROP PIPING IN WALL DOWN TO INTERIOR INFLOOR RADIANT HEAT. SEE M301 FOR CONTINUATION.
5. DROP PIPING IN WALL DOWN TO EXTERIOR SNOWMELT HEAT. SEE M301 FOR CONTINUATION.
6. 3/4" HWS/HWR PIPING UP TO PENTHOUSE. SEE 2/M300 FOR CONTINUATION.
7. LOCATION OF HW SYSTEM BY-PASS VALVE.
8. LOCATION OF GAS DETECTION SENSOR. PROVIDE QUANTITY OF SENSORS REQUIRED FOR COMPLETE COVERAGE OF FLOOR AREA.
9. LOW/HIGH VENTILATION AIR SWITCH.
10. POSITIVE/NEGATIVE AIR SWITCH.
11. AHU-2 OVERRIDE SWITCH LOCATION.
12. STEAM DISTRIBUTION TUBE. SIZE PER MANUFACTURERS RECOMMENDATIONS. PITCH TUBING BACK TO HUMIDIFIER. RUN TUBING IN PVC CONDUIT ACROSS IT ROOM. INSULATE DISTRIBUTION TUBE. (B1)

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02.12.15	ADDENDUM B1
02.23.15	ADDENDUM B3

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC PIPING FIRST FLOOR AND PENTHOUSE PLANS

DATE
01.12.15

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
ph:608.277.1728 fax:608.271.7046
JDR Project No. 130099

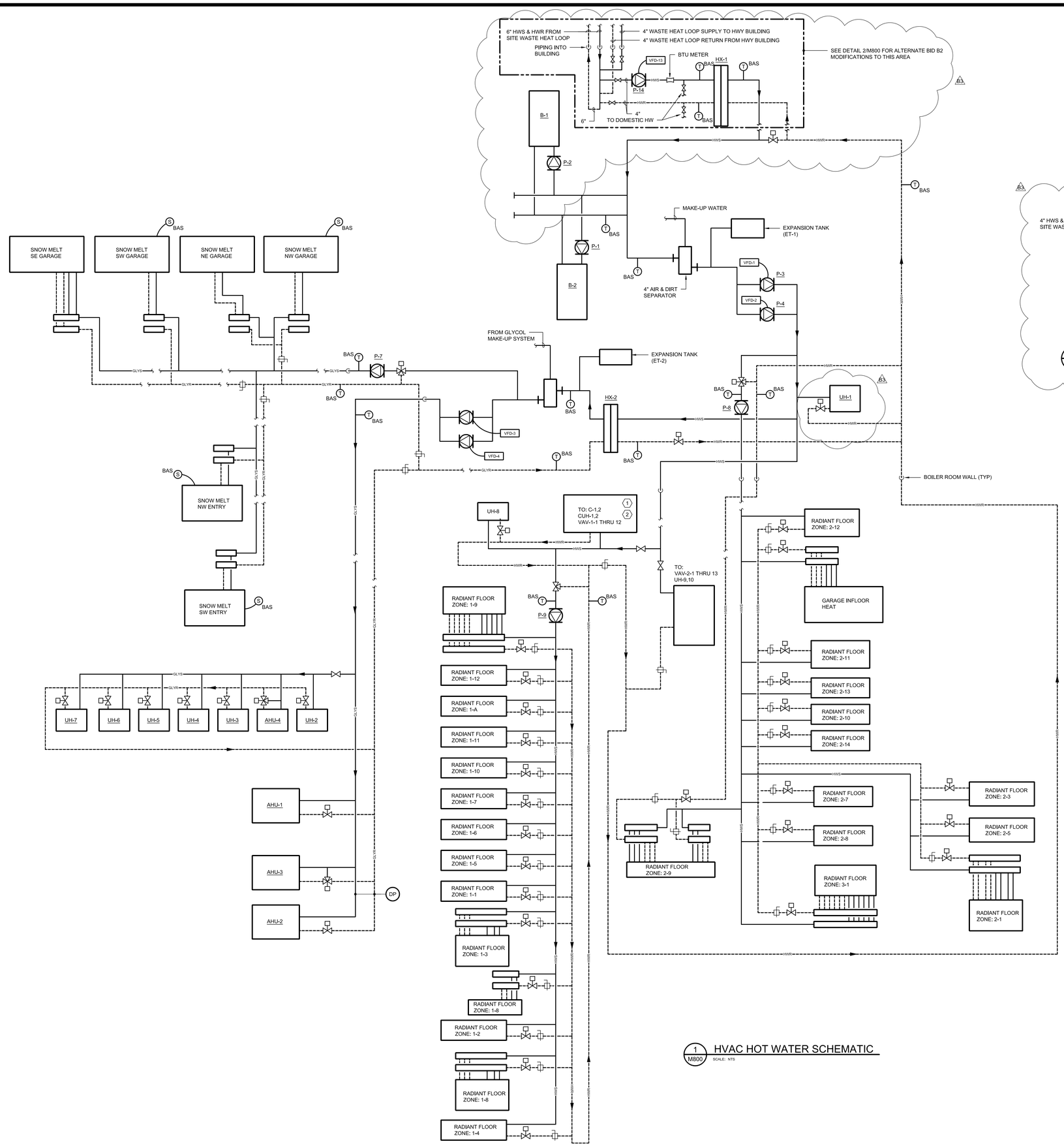
GENERAL NOTES:

1. SEE DRAWINGS M600 AND M601 FOR ADDITIONAL DETAILS FOR ALL EQUIPMENT.

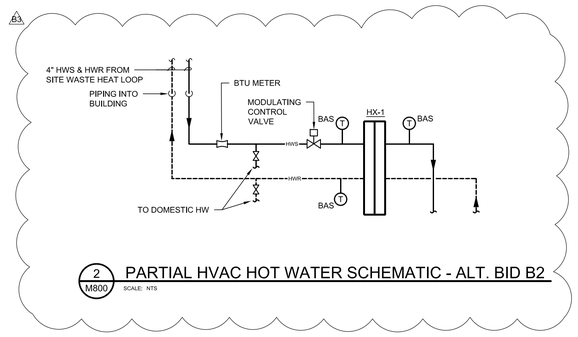
KEYED NOTES:

(1) LOCATION OF HW BY-PASS VALVE. SEE M300 FOR EXACT LOCATION.

(2) LOCATION OF P-3 / P-4 DIFFERENTIAL PRESSURE SENSOR.



1 M800 HVAC HOT WATER SCHEMATIC
SCALE: NTS



2 M800 PARTIAL HVAC HOT WATER SCHEMATIC - ALT. BID B2
SCALE: NTS

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PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC HOT WATER SCHEMATIC

DATE
01.12.15

JDR
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SUITE 110
MADISON, WI 53711
ph:608.277.1728 fax:608.271.7046
JDR Project No. 130099

AIR DEVICE SCHEDULE

EG - 1 (3)
12x12/10"ø
300

UNIT NUMBER
THROW (IF OTHER THAN NORMAL)
NECK SIZE (SQ/RO)
CFM

SG = SUPPLY GRILLE
RG = RETURN GRILLE
EG = EXHAUST GRILLE

LD = LINEAR DIFFUSER (SUPPLY)
CD = CEILING DIFFUSER (SUPPLY)
TG = TRANSFER GRILLE

UNIT NO.	SD-1	SD-2	CD-1	CD-2	CD-3	CD-4	CD-5	SG-1	SG-2	SR-1	SR-2	SR-3	RG-1	RG-2	EG-1	EG-2	EG-3	EG-4	EG-5	TG-1	TG-2	TG-3	TG-4	TG-5
MANUFACTURER	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS	TITUS
MODEL NO.	TBDI-30	TBDI-30	TDCA-A	TDCA-A	TDCA-A	TDCA-A	TRI-TEC SS	300 FS	300 FS	300 FS	300 FS	300 FS	50F	63FS	350FL	350FL	350FL	50F	33R	350FL	350FL	350FL	50F	350RL-SS
FACE STYLE	SLOTTED	SLOTTED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LAMINAR	DOUBLE DEFLECT	DOUBLE DEFLECT	DOUBLE DEFLECT	DOUBLE DEFLECT	DOUBLE DEFLECT	EGGCRATE	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	LOUVERED	EGGCRATE	LOUVERED
MATERIAL	STEEL	STEEL	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	STAINLESS STEEL	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	STEEL	ALUMINUM	ALUMINUM	ALUMINUM	ALUMINUM	STAINLESS STEEL
SIZE (FACE/NECK)	1 / 8"ø	2 / 10"ø	9x9 / 6"ø	12x12 / 8"ø	12x12 / 10"ø	15x15 / 12"ø	48x24 / 12"ø	20x8 / 18x6	14x10 / 12x8	14x8 / 12x6	24x10 / 22x8	44x22 / 42x20	24x24 / 22x22	14x32 / 12x30	10x10 / 8x8	14x14 / 12x12	20x20 / 18x18	24x24 / 22x22	12x20 / 10x18	14x14 / 12x12	14x14 / 12x12	20x8 / 18x6	24x24 / 22x22	38x20 / 36x18
CFM RANGE	125 - 210	215 - 360	75 - 105	110 - 245	250 - 330	340 - 475	200 - 500	75 - 150	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	75 - 140	145 - 325	570 - 655	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS
MOUNTING	CEILING	CEILING	CEILING	CEILING	CEILING	CEILING	CEILING	SIDEWALL	SIDEWALL	SIDEWALL	DUCT	DUCT	CEILING	SIDEWALL	CEILING	CEILING OR SIDEWALL	CEILING	CEILING	SIDEWALL	CEILING	CEILING	CEILING	CEILING	CEILING
DAMPER	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
REMARKS			3	3	3	3	4, 63																	

GENERAL NOTES:
1. CONTRACTOR SHALL VERIFY MOUNTING SURFACE / FRAME REQUIREMENTS.
2. BRANCH DUCT SIZE TO DIFFUSER SHALL BE THE NECK SIZE OF THE DIFFUSER UNLESS NOTED OTHERWISE.
3. SEE SPECIFICATION FOR GRILLE, REGISTER, AND DIFFUSER FINISHES.
4. MAXIMUM STATIC PRESSURE DROP THROUGH GRILLE, REGISTER, OR DIFFUSER SHALL NOT EXCEED 0.1".
5. MAXIMUM NC LEVELS FOR GRILLES, REGISTERS, OR DIFFUSERS SHALL NOT EXCEED 25.
6. UNLESS THROW IS NOTED OTHERWISE, ALL DIFFUSERS SHALL BE 4-WAY THROW.

KEYED NOTES:
1. (2) 3/4" SLOTS x 48"L.
2. (4) 3/4" SLOTS x 48"L.
3. PROVIDE 24x24 PANEL FOR LAY-IN APPLICATIONS AND BEVELED FRAME FOR HARD CEILING APPLICATIONS.
4. PROVIDE VOLUME DAMPERS IN THE NECKS OF THE (2) CD-5/325 SERVING ROOM 130B (BODY VIEWING). PROVIDE VOLUME DAMPERS IN THE NECKS OF THE (4) CD-5/495 SERVING ROOM 132 (DECOMPOSITION AUTOPSY) 63

VAV TERMINAL UNIT WITH HOT WATER REHEAT SCHEDULE

UNIT NO.		VAV-1-1	VAV-1-2	VAV-1-3	VAV-1-4	VAV-1-5	VAV-1-6	VAV-1-7	VAV-1-8	VAV-1-9	VAV-1-10	VAV-1-11	VAV-1-12	VAV-2-1	VAV-2-2	VAV-2-3	VAV-2-4	VAV-2-5	VAV-2-6	VAV-2-7	VAV-2-8	VAV-2-9	VAV-2-10	VAV-2-11	VAV-2-12	VAV-2-13
SERVICE		SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS
INLET SIZE		6	8	10	6	6	6	8	10	10	6	6	6	14	14	16	12	10	6	8	12	10	10	10	8	6
MAX PD (" WC)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
AIRFLOW (CFM)	MAXIMUM	350	290	810	180	250	280	450	740	840	300	160	275	1760	1760	2760	1120	720	350	460	925	1210	1015	905	525	340
	MINIMUM	105	90	240	55	75	85	135	220	250	90	50	85	475	475	555	570	555	0	460	925	1210	270	905	140	340
	HEATING CFM	350	290	810	180	250	280	450	740	840	300	160	275	1760	1760	2760	1120	720	350	460	925	1210	1015	905	525	340
HOT WATER REHEAT COIL DATA	EWT (°F)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
	LWT (°F)	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
	EAT (°F)	55	55	55	55	55	55	55	55	55	55	55	55	48	48	48	48	48	48	48	48	48	48	48	48	48
	LAT (°F)	116.0	107.0	93.0	106.0	104.0	107.0	100.0	93.0	98.0	100.0	112.0	106.0	85.0	85.0	85.0	83.7	86.8	110.5	79.4	90.0	92.0	85.0	90.5	87.0	95.6
	CAPACITY (MBH)	23.0	16.3	33.3	9.9	13.2	15.8	21.8	30.6	39.3	14.5	9.9	15.3	57.0	57.0	90.0	34.9	23.0	23.6	15.6	42.0	57.6	33.0	41.5	18.2	17.5
	GPM	1.5	1.1	2.2	0.7	0.9	1.1	1.5	2.0	2.6	1.0	0.7	1.0	3.8	3.8	6.8	2.3	1.5	1.6	1.0	2.8	3.8	2.2	2.8	1.25	1.2
	MAX. WPD (FT WC)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	TCV TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY
REMARKS		1	1		1	1	1		1	1		1	1						1							

KEYED NOTES:
1. VAV BOX TO BE INTERLOCKED AND CONTROLLED WITH OCCUPANCY SENSOR LOCATED IN THE SPACE.

ELECTRIC STEAM HUMIDIFIER SCHEDULE

UNIT NO.	H-1	
SERVICE	155 - 911 CENTER	
LOCATION	154	
TYPE	ELECTRIC	
MANUFACTURER	DRI-STEEM	
MODEL NO.	VAPORSTEAM	
CAPACITY (LBS/HR)	17.8	
AIRFLOW (CFM)	4,000	
DESIGN CONDITIONS	72°F / 30% RH	
MAX ABSORPTION DISTANCE	18"	
DUCT/UNIT SIZE (IN)	30 / 20	
# DISTRIBUTING TUBES	1	
KW INPUT	9.0	
STAGE OF CAPACITY	1	
VOLTS	460	
PHASE	3	
REMARKS	1, 2	

KEYED NOTES:
1. PROVIDE UNIT WITH MOUNTING STAND, DRAIN / CONDENSATE COOLER, ALL DISTRIBUTION PIPING, AND DUCT MOUNTED STEAM DISTRIBUTION TUBE.
2. CONTRACTOR TO CONNECT WATER TO UNIT, FROM POINT LEFT BY PLUMBING CONTRACTOR. PROVIDE ISOLATION VALVE, DRAIN VALVE AND SHOCK ARRESTOR. PROVIDE ALL DRAIN PIPING BETWEEN UNIT, DRAIN COOLER AND DRAIN.

FAN SCHEDULE

SF = SUPPLY FAN
RF = RETURN FAN
EF = EXHAUST FAN
TF = TRANSFER FAN
CF = CEILING (DESTRATIFICATION) FAN
CEF = CEILING EXHAUST FAN

UNIT NO.		EF-1	EF-2	EF-3	EF-4	EF-5	EF-6	EF-7
LOCATION		ROOF	ROOF	GARAGE	GARAGE	ROOF	ROOF	ROOF
SERVICE		TLT/JC	LAB AREA	CHEM STORAGE	GARAGE	CHILLER RM	911 TOILETS	ELECT RM
FAN TYPE		ROOF	MIXED FLOW	INLINE	MIXED FLOW	ROOF	ROOF	ROOF
ARRANGEMENT		DOWN BLAST	UP BLAST	HORIZONTAL	HORIZONTAL	DOWN BLAST	DOWN BLAST	DOWN BLAST
DESIGN CFM		400,0	13800	300	5650	2120	300	940
EXT. SP (IN WC)		0.375	1.0	0.5	0.75	0.375	0.25	0.375
FAN WHEEL TYPE		BI	MIXED FLOW	-	MIXED FLOW	BI	BI	BI
FAN DIAMETER (IN)		9.0	-	8.0	16.0	16.0	8.0	9.0
APPROXIMATE FAN RPM		1000	1200	2750	1750	920	910	1511
BHP		0.07	9,6	-	2,0	0.35	0.05	0,16
MOTOR HP (W)		1/4	(2) 10.0	122W	3.0	1/2	1/4	1/4
VOLTS/PHASE		120/1	460/3	120/1	460/3	460/3	120/1	120/1
DRIVE		BELT	DIRECT	DIRECT	BELT	DIRECT	BELT	DIRECT
TWO SPEED		NO	NO	NO	NO	NO	NO	NO
VFD/FSC		NO	NO	FSC	NO	VFD	NO	FSC
MAX. SONES		5,6	-	-	22.0	10,6	3.8	10.7
MAX. FAN INLET AIR SOUND DATA (WITHOUT DUCT) OCTAVE BAND (dB)	1	69	-	-	72	73	65	73
	2	67	-	-	76	76	63	76
	3	65	-	-	80	77	60	76
	4	58	-	-	80	68	53	68
	5	53	-	-	76	64	49	64
	6	51	-	-	74	60	43	63
	7	45	-	-	72	55	37	57
	8	42	-	-	63	49	34	51
REMARKS			1	2	3			

KEYED NOTES:
1. THIS FAN IS MADE UP OF TWO FANS, ON FAN OPERATES 24/7 AND THE OTHER IS REDUNDANT TO THE FIRST.
2. FAN TO BE EQUAL TO FANTECH MODEL FR-200 WITH BACKDRAFT DAMPER RSK-08.
3. PROVIDE FAN WITH BELT TUBE AND SOUND ENCLOSURE.

PUMP SCHEDULE

UNIT NO.	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	P-10	P-11	P-12	P-13	P-14
SERVICE	BOILER (B-1)	BOILER (B-2)	HEATING HW	HEATING HW	GLYCOL HW	GLYCOL HW	SNOW MELT	INFLOOR (AHU-2)	INFLOOR (AHU-1)	WC-1 (PRIMARY)	WC-1 (PRIMARY)	WC-1 (SECONDARY)	WC-1 (SECONDARY)	Hx-1
LOCATION	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	MECHANICAL RM	RM 111	RM 154	RM 154	RM 154	RM 154	MECHANICAL RM
TYPE	INLINE	INLINE	BASE MOUNTED	BASE MOUNTED	INLINE	INLINE	INLINE	INLINE	INLINE	INLINE	INLINE	BASE MOUNTED	BASE MOUNTED	INLINE
CAPACITY GPM	108.0	108.0	227.0	227.0	144.0	144.0	24.0	13.0	10.0	331.0	331.0	375.0	375.0	216
PRESSURE HEAD (FT)	25.0	25.0	55.0	55.0	55.0	55.0	60.0	28.0	25.0	30.0	30.0	75.0	75.0	25.0
GLYCOL TYPE / %	N/A	N/A	N/A	N/A	PROP / 40%	PROP / 40%	PROP / 40%	N/A	N/A	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%
INLET/OUTLET (IN)	3.0 / 3.0	3.0 / 3.0	2.5 / 2.0	2.5 / 2.0	2.5 / 2.5	2.5 / 2.5	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5	5.0 / 5.0	5.0 / 5.0	4.0 / 3.0	4.0 / 3.0	3.0 / 3.0
IMPELLER DIAMETER	5.25	5.25	8.5	8.5	8.125	8.125	7.875	-	-	6.0	6.0	8.75	8.75	6.25
MIN. EFF. %	66%	66%	72%	72%	56%	56%	40%	-	-	64%	64%	71%	71%	60.0%
RPM	1750	1750	1750	1750	1750	1750	1750	3300	3300	1750	1750	1750	1750	1750
BHP	0.96	0.96	4.2	4.2	3.8	3.8	1.2	-	-	3.8	3.8	8.5	8.5	2.35
HP	1.5	1.5	7.5	7.5	5.0	5.0	3.0	1/6	1/6	5.0	5.0	15.0	15.0	5.0
VOLTAGE/PHASE	460/3	460/3	460/3	460/3	460/3	460/3	460/3	120/1	120/1	460/3	460/3	460/3	460/3	460/3
UNIT WEIGHT (LBS)	90.0	90.0	250.0	250.0	225.0	225.0	180.0	13.0	13.0	275.0	275.0	460.0	460.0	225
REMARKS														1

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KEYED NOTES:
1. PROVIDE AS PART OF ALTERNATE BID B2 ONLY. 63

EXHAUST VALVE SCHEDULE

UNIT NO.	EV-1	EV-2	EV-3	EV-4	EV-5	EV-6	EV-7
SERVICE	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS
INLET SIZE	DUAL 12	DUAL 12	DUAL 14	8	12	8	14
MAX. AIR PRESSURE DROP (WC)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
MAXIMUM CFM	2000	2000	2550	190	650	430	1160
MINIMUM CFM	575	575	400	0	650	100	1160
REMARKS							

EXHAUST VALVE SCHEDULE

UNIT NO.	EV-8	EV-9	EV-10	EV-11	EV-12	EV-13	EV-14
SERVICE	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS	SEE PLANS
INLET SIZE	12	12	8	12	12	12	8
MAX. AIR PRESSURE DROP (WC)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
MAXIMUM CFM	1025	560	200	1050	650	1015	520
MINIMUM CFM	1025	560	200	325	325	270	320
REMARKS							

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ISSUE
01.12.15 CONSTRUCTION DOCUMENTS
02.12.15 ADDENDUM B1
02.23.15 ADDENDUM B3

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)
3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC SCHEDULES

DATE
01.12.15

HOT WATER UNIT HEATER SCHEDULE

UNIT NO.	UH-1	UH-2	UH-3	UH-4	UH-5	UH-6	UH-7	UH-8	UH-9	UH-10
LOCATION	MECH RM	GARAGE	GARAGE	GARAGE	GARAGE	GARAGE	GARAGE	PENTHOUSE	CHILLER RM	ELECT RM
CAPACITY (MBH)	15.6	38.8	38.8	38.8	38.8	38.8	38.8	11.7	172.0	15.6
AIR FLOW	380	630.0	630.0	630.0	630.0	630.0	630.0	350.0	4200.0	380
FLUID	WATER	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%	WATER	WATER	WATER
GPM	1.8	4.5	4.5	4.5	4.5	4.5	4.5	1.3	21.0	1.8
EWT/LWT (CFM)	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0	175.0 / 147.0
WPD (FT)	0.14	0.17	0.17	0.17	0.17	0.17	0.17	0.0005	1.33	0.14
EAT (°F)	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	-15.0	60.0
MOTOR HP	9.0W	1/20	1/20	1/20	1/20	1/20	1/20	9.0W	1/3	9.0W
FAN SPEED (RPM)	1350.0	900.0	900.0	900.0	900.0	900.0	900.0	1350.0	1140.0	1350.0
MOUNTING	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL
TCV TYPE	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY	2-WAY
REMARKS										

WATER TO WATER HEAT EXCHANGER SCHEDULE

	UNIT NO. (A3)	HX-1	HX-2	
	SERVICE	BLDG HTG	GLYCOL SYSTEM	
	TYPE	PLATE & FRAME	PLATE & FRAME	
	MBH	3085.0	2396.0	
HOT SIDE DATA	FLUID	PROP / 40%	WATER	
HOT SIDE DATA	EWT (°F)	200.0	180.0	
HOT SIDE DATA	LWT (°F)	175.0	150.0	
HOT SIDE DATA	GPM	200.0	165.0	
HOT SIDE DATA	WATER PD (FT. WC)	9.7	8.5	
HOT SIDE DATA	FOULING FACTOR	0.000005	0.00004	
COLD SIDE DATA	FLUID	WATER	PROP / 40%	
COLD SIDE DATA	EWT (°F)	150.0	147.0	
COLD SIDE DATA	LWT (°F)	180.0	175.0	
COLD SIDE DATA	GPM	216.0	144.0	
COLD SIDE DATA	WATER PD (FT. WC)	11.2	11.4	
COLD SIDE DATA	FOULING FACTOR	0.000005	0.00004	
	UNIT WEIGHT (LBS)	690.0 / 750.0	3525 / 3840.0	
	REMARKS			

AIR COOLED WATER CHILLER SCHEDULE

	UNIT NO.	CH-1		
	SERVICE	BUILDING		
	LOCATION	MECHANICAL RM		
	COOLING CAPACITY (TONS)	154.0		
	COMPRESSOR TYPE	SCREW		
	NUMBER OF COMPRESSORS	2.0		
	NUMBER OF CIRCUITS	2.0		
	REFRIGERANT TYPE	R-134A		
	ASSOCIATED CONDENSOR	ACC-1		
	INPUT POWER	178.6		
	FULL KW/TON	1.163		
	IPLV/NPLV	1.031		
	EVAPORATOR FLOW RATE (GPM)	331.0		
	EWT (°F)	54.0		
	LWT (°F)	42.0		
	GLYCOL / %	PROP / 40%		
	FOULING FACTOR	0.0001		
UNIT ELECT. DATA	VOLTS	460.0		
UNIT ELECT. DATA	PHASE	3.0		
UNIT ELECT. DATA	MCA	318.0		
UNIT ELECT. DATA	MOCP	400.0		
	UNIT WEIGHT (LBS)	7022.0		
	REMARKS			

COMPUTER ROOM AIR CONDITIONING UNIT SCHEDULE

UNIT NO.	CRAC-1	CRAC-2
SERVICE	IT ROOM	IT ROOM
MANUFACTURER	LIEBERT	LIEBERT
MODEL NO.	VS077DUAOEI	VS077DUAOEI
AIR FLOW DATA		
AIR FLOW (CFM)	11000.0	11000.0
OA (CFM)	0.0	0.0
EXT. STATIC PRESSURE (IN)	0.4	0.4
FILTER TYPE	4" MERV 8	4" MERV 8
MOTOR HP	7.5	7.5
SUPPLY FAN VFD	YES	YES
HEATING DATA		
TYPE	FINNED TUBE SS	FINNED TUBE SS
CAPACITY (MBH)	85350.0	85350.0
KW / STAGE	25.0 / 3.0	25.0 / 3.0
HUMIDIFIER DATA		
TYPE	CANISTER	CANISTER
CAPACITY (LBS/HR)	11.0	11.0
KW	3.5	3.5
DX COOLING COIL DATA		
COOLING TYPE	R407C	R407C
TOTAL CAPACITY (MBH)	250.6	250.6
SENSIBLE CAPACITY (MBH)	238.2	238.2
EAT(°F) DB/WB	80.0	80.0
LAT (°F) DB/WB	67.2	67.2
COOLING COIL AREA	24.65	24.65
FACE VELOCITY (FPM)	446.0	446.0
MATED CONDENSING UNIT	ACC-2	ACC-3
CHILLED WATER COOLING COIL DATA		
FLUID	CHILLED WATER	CHILLED WATER
TOTAL CAPACITY (MBH)	255.2	255.2
SENSIBLE CAPACITY (MBH)	197.9	197.9
GPM	52.0	52.0
PERCENT GLYCOL	40% PROP GLYCOL	40% PROP GLYCOL
EWT (°F) / LWT (°F)	42.0 / 54.0	42.0 / 54.0
FLUID PRESSURE DROP (FT)	28.3	28.3
VALVE TYPE	3-WAY	3-WAY
INDOOR UNIT ELECTRIC DATA		
VOLTS/PHASE	460/3	460/3
FULL LOAD AMPS	64.4	64.4
WSA / OPD	77.8 / 90.0	77.8 / 90.0
REMARKS	(1)	(1)

KEYED NOTES:

(1) UNIT TO HAVE (2) SOURCES OF COOLING. DX/REFRIGERANT AND BUILDING CHILLED WATER.

AIR HANDLING UNIT SCHEDULE

UNIT NO.	AHU-1	AHU-2	AHU-3	AHU-4
SERVICE	OFFICE AREA	LAB AREA	911 CENTER	GARAGE
LOCATION	ROOF	ROOF	ROOF	GARAGE
AHU UNIT WEIGHT (LBS)	5400.0	8500.0	5450.0	1200.0
AIR FLOW (CFM) (1)	4925.0 / 1480.0	13850.0 / 6875.0	4680.0 / 1400.0	5600.0 / 5600.0
MIN. OA (CFM)	960.0	13850.0	300.0	5600.0
EXT. SP ("WG) (2)	1.4	1.75	0.75	1.5
TOTAL SP ("WG)	4.4	5.75	4.0	2.5
UNIT ARRANGEMENT	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL
UNIT FACE & BYPASS	N/A	N/A	N/A	N/A
VIBRATION ISOLATOR TYPE	INTEGRAL	INTEGRAL	INTEGRAL	INTEGRAL
VIBRATION ISOLATOR DEFLECTION	-	-	-	-
SUPPLY AIR FAN				
FAN TYPE/DIAMETER	AF / 15.0	AF / 21.6	FC / 15	FC / 15
FAN RPM	3000.0	2345.0	2820.0	1090.0
MOTOR BHP	6.0	20.8	5.0	3.9
MOTOR HP	10.0	30.0	7.5	5.0
VOLTAGE/PHASE	460/3	460/3	460/3	460/3
VARIABLE FREQUENCY DRIVE (VFD)	YES	YES	NO	NO
RETURN AIR FAN				
FAN TYPE/DIAMETER	AF / 16.0	N/A	FC / 13.0	N/A
AIR FLOW (CFM) / ESP (IN WC)	3665.0 / 0.25	N/A	4380.0 / 0.25	N/A
FAN RPM	1480.0	N/A	2760.0	N/A
MOTOR BHP	0.98	N/A	2.5	N/A
MOTOR HP	1.5	N/A	5.0	N/A
VOLTAGE/PHASE	460/3	N/A	460/3	N/A
VARIABLE FREQUENCY DRIVE (VFD)	YES	N/A	YES	N/A
AIR FILTER (PRE-FILTER)				
MAX. FACE VELOCITY (FPM)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)
DEPTH (IN)	4.0	2.0	2.0	2.0
MERV	8.0	8.0	8.0	8.0
SP DROP (IN) CLEAN/DIRTY	0.35/1.0	0.08/0.60	0.08/0.60	0.08/0.60
AIR FILTER				
MAX. FACE VELOCITY (FPM)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)
DEPTH (IN)	4.0	4.0	4.0	4.0
MERV	13.0	13.0	13.0	13.0
SP DROP (IN) CLEAN/DIRTY	0.6 / 1.0	0.6 / 1.0	0.6 / 1.0	0.6 / 1.0
AIR FILTER (CHARCOAL)				
MAX. FACE VELOCITY (FPM)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)	500.0 (MAX)
DEPTH (IN)	12"	12"	12"	12"
MERV	15.0	15.0	15.0	15.0
SP DROP (IN) CLEAN/DIRTY	0.4/1.0	0.4/1.0	0.4/1.0	0.4/1.0
CHILLED WATER COOLING COIL				
EAT DB (°F)	78.1	95.0	76.0	N/A
EAT WB (°F)	64.9	75.0	63.3	N/A
LAT DB (°F)	55.0	48.0	55.0	N/A
LAT WB (°F)	54.0	47.0	54.0	N/A
MAX FINS / INCH - ROWS	12.0 / 5.0	12.0 / 12.0	8.0 / 8.0	N/A
TOTAL CAPACITY (MBH)	159.6	1203.2	128.8	N/A
SENSIBLE CAPACITY (MBH)	125.3	712.0	109.0	N/A
MAX FACE VELOCITY (FPM)	550	550	550	N/A
MAX APD (IN WC)	0.75	1.5	0.75	N/A
GPM	34.0	262.0	27.0	N/A
EWT DB (°F)	42	42	42.0	N/A
LWT DB (°F)	54.0	54.0	54.0	N/A
GLYCOL TYPE / %	PROP / 40%	PROP / 40%	PROP / 40%	N/A
MAX WPD (FT)	12.0	30.0	12.0	N/A
VALVE TYPE	3-WAY	2-WAY	3-WAY	N/A
HOT WATER HEATING COIL				
HEATING AIR FLOW (CFM)	1475	13850.0	4680.0	5600.0
EAT (°F)	14.7	-15.0	64.6	-15.0
LAT (°F)	55.0	55.0	90.0	70.0
CAPACITY (MBH)	64.5	1052.0	129.2	516.5
MAX. FACE VELOCITY (FPM)	600.0	600.0	600.0	600.0
MAX. APD (IN WC)	0.30	0.30	0.30	0.30
HOT WATER (GPM)	4.5	70.0	9.0	35.0
EWT (°F)	180.0	180.0	180.0	180.0
LWT (°F)	140.0	140.0	140.0	140.0
GLYCOL TYPE / %	PROP / 40%	PROP / 40%	PROP / 40%	PROP / 40%
MAX WPD (FT)	5.0	6.5	5.0	5.0
VALVE TYPE	2-WAY	2-WAY	3-WAY	3-WAY
REMARKS	(3)	(4)	(3)	(4)

KEYED NOTES:

(1) FIRST CFM IS THE UNIT MAX CFM AND THE SECOND IS THE MINIMUM FLOW CFM.

(2) ESP TO EXCLUDE PD OF UNIT COMPONENTS FURNISHED BY UNIT MANUFACTURER SUCH AS COILS, FILTERS.

(3) OUTSIDE AIR, RETURN AIR AND RELIEF AIR DAMPERS BY UNIT MANUFACTURER. ACTUATORS BY SECTION 23 09 14.

(4) OUTSIDE AIR DAMPER BY UNIT MANUFACTURER. ACTUATORS BY SECTION 23 09 14.

HOT WATER CABINET UNIT HEATER SCHEDULE

UNIT NO.	CUH-1	CUH-2	
LOCATION	VESTIBULE	VESTIBULE	
NOMINAL SIZE	04	04	
CAPACITY (MBH)	25.8	25.8	
AIR FLOW (CFM)	345.0	345.0	
GPM	2.5	2.5	
EWT/LWT (°F)	200.0 / 170.0	200.0 / 170.0	
WPD (FT)	0.41	0.41	
EAT (°F)	60	60	
MOTOR HP	1/10	1/10	
FAN SPEED	845.0	845.0	
INVERTED FLOW	N/A	YES	
MOUNTING	CEILING	WALL	
RECESS (IN)	FULL	N/A	
TCV SIZE	2-WAY	2-WAY	
REMARKS			

HOT WATER BOILER SCHEDULE

UNIT NO.	B-1	B-2	
SERVICE	HW HEAT	HW HEAT	
LOCATION	BOILER ROOM	BOILER ROOM	
TYPE	SEALED COMB.	SEALED COMB.	
GAS TYPE	NATURAL	NATURAL	
GAS INPUT (CFH)	2500.0	2500.0	
RATED IBR/AGA OUTPUT (MBH)	2170.0	2170.0	
EWT (°F)	170.0	170.0	
LWT (°F)	200.0	200.0	
HOT WATER (GPM)	145.0	145.0	
GLYCOL (%)	0.0	0.0	
VENT/INTAKE DIA (IN)	8.0 / 8.0	8.0 / 8.0	
WATER CONNECTION DIA (IN)	4"	4"	
VOLTAGE/PHASE	460/3	460/3	
MINIMUM CIRC AMPS (MCA)	3.7	3.7	
UNIT WEIGHT (LBS)	2052.0	2052.0	
REMARKS	(1)	(1)	

KEYED NOTES:

(1) PROVIDE GAS REGULATORS AS REQUIRED.

AIR COOLED CONDENSER SCHEDULE

UNIT NO.	ACC-1	ACC-2	ACC-3
SERVICE	CH-1	CRAC-1	CRAC-2
LOCATION	ROOF	ROOF	ROOF
REFRIGERANT TYPE	R134A	R407C	R407C
COOLING CAPACITY (TONS)	154.0	22.8	22.8
# OF CIRCUITS	2.0	2.0	2.0
AMBIENT AIR TEMPERATURE	95.0	95.0	95.0
NUMBER OF FANS	12.0	2.0	2.0
FAN HP (EACH)	1.5	-	-
FAN RPM	1140.0	-	-
COIL (ROWS/FPI)	1.0 / 14.0	-	-
UNIT ELECT. DATA — VOLTS	460.0	460.0	460.0
UNIT ELECT. DATA — PHASE	3	3	3
UNIT ELECT. DATA — MCA	43.0	3.3	3.3
UNIT ELECT. DATA — MOCP	50.0	15.0	15.0
UNIT WEIGHT (LBS)	4915.0	441.0	441.0
REMARKS			

EXPANSION TANK SCHEDULE

UNIT NO.	ET-1	ET-2	ET-3
LOCATION	MECH RM	MECH RM	CHILLER RM
SYSTEM	HWS/HWR	GLYS/GLYR	CWS/CWR
RELIEF VALVE SETTING	50 PSIG	50 PSIG	50 PSIG
PERCENT GLYCOL	N/A	40%	40%
MIN. TANK VOLUME (GAL)	16.5	25.9	20.3
ACCEPTANCE VOLUME (GAL)	9.7	15.8	12.4
DIAMETER (IN)	16.0	16.0	16.0
HEIGHT OR LENGTH (IN)	30.0	57	57.0
DESIGN CODE (ANSI/ASME)	ASME	ASME	ASME
SUPPORT	STRUCTURE	STRUCTURE	STRUCTURE
REMARKS			

HOT WATER CONVECTOR SCHEDULE

UNIT NO.	C-1	C-2	
LOCATION	104	157	
MOUNTING	WALL	WALL	
RECESS	FULL	FULL	
SIZE (LxWxD)	24x18x4	24x18x4	
EAT (°F)	65	65	
CAPACITY (MBH)	2.4	2.4	
GPM	0.5	0.5	
EWT/LWT (°F)	180 / 160	180 / 160	
TCV TYPE	2-WAY	2-WAY	
REMARKS			

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ISSUE

01.12.15	CONSTRUCTION DOCUMENTS
02.12.15	ADDENDUM B1
02.23.15	ADDENDUM B3

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC SCHEDULES

DATE
01.12.15

JDR
ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
ph:608.277.1728 fax:608.271.7046
JDR Project No. 130099

VARIABLE FREQUENCY DRIVE SCHEDULE

B3

UNIT NO.	VFD-1	VFD-2	VFD-3	VFD-4	VFD-5	VFD-6	VFD-7	VFD-8	VFD-9	VFD-10	VFD-11	VFD-12	VFD-13
SERVICE	P-3	P-4	P-5	P-6	P-12	P-13	AHU-1 (SF)	AHU-1 (RF)	AHU-2	AHU-3 (SF)	AHU-3 (RF)	EF-5	P-14
LOCATION	MECH RM	MECH RM	MECH RM	MECH RM	CHILLER RM	CHILLER RM	ROOF	ROOF	ROOF	ROOF	ROOF	CHILLER RM	MECH RM
BYPASS REQUIRED	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	NO	YES
HP	7.5	7.5	5.0	5.0	15.0	15.0	7.5	1.5	25.0	7.5	3.0	0.5	5.0
VOLTS	460	460	460	460	460	460	460	460	460	460	460	460	460
PHASE	3	3	3	3	3	3	3	3	3	3	3	3	3
REMARKS													

SILENCER SCHEDULE

TAG	QTY	FAN SYSTEM	FAN DIMENSION W (IN)	FAN DIMENSION H (IN)	LENGTH (IN)	FLOW CFM	VELOCITY FT/MIN	SILENCER P.D. (IN WG)	P.D. INCL. SYSTEM EFFECTS (IN WG)	DYNAMIC INSERTION LOSS 63	125	250	500	1000	2000	4000	8000	VIBRO-ACOUSTICS MODEL	NOTES
SL-EF-4	1	EF-4	20 ID	28 OD	20	5650	-2590	0.05	0.13	2	3	9	14	22	20	14	7	CD-HV-F2	1,2,3,4
										46	33	32	38	16	15	31	33		
SL-EF-2A	1	EF-2	104	95	28	13850	-1539	0.09	0.3	16	22	24	22	22	18	17	14	PLN-MHV-FX	1,2,3,4,5
										56	52	51	51	52	49	38	29		
SA-4	1	AHU-4	28	28	84	5600	1029	0.1	0.17	6	8	19	36	44	33	22	18	RD-HV-F8	1,2,3,4
										56	46	38	37	37	35	24	24		

KEYED NOTES:

1. CONTRACTOR/SILENCER MANUFACTURER SHALL PROVIDE ACOUSTICAL ANALYSIS SHOWING SILENCER MEETS NC LEVEL AS SCHEDULED.
2. CONTRACTOR/SILENCER MANUFACTURER MUST PROVIDE PRESSURE DROP CALCULATIONS WITH PE STAMP TO DEMONSTRATE THE PRESSURE DROP INCLUDING SYSTEM EFFECT AS SCHEDULED DURING SUBMITTAL REVIEW.
3. ALTERNATIVE SILENCER MANUFACTURER MUST PROVIDE SILENCER INTERNAL GEOMETRY FOR ENGINEER'S APPROVAL DURING SUBMITTAL REVIEW.
4. FOR NON-BASIS OF DESIGN PRODUCT SUPPLIED, CONTRACTOR IS FINANCIALLY RESPONSIBLE TO ENSURE NOISE CONTROL SOLUTION IS DELIVERED AS PER NC LEVELS IN SPACES.
5. CUSTOM BUILT PLENUM SILENCER: MULTIPLE INLETS PER PLANS AND LAYOUT DRAWING AND (2) 36(48)x36 OUTLETS.

NOISE CONTROL CURB SCHEDULE

UNIT TAG	NCC-1 (AHU-1)	NCC-2 (AHU-2)	NCC-3 (AHU-3)		
TYPE	NC-VCR(SL)	NC-RC(SL)	NC-VCR(SL)		
CURB HEIGHT (IN)	30	14	30		
SUPPLY SILENCER					
PRESSURE DROP (IN WG)	0.14	0.29	0.2		
WIDTH (IN)	60	28	20		
HEIGHT (IN)	14	40(52)	30		
LENGTH (IN)	30	96	96		
RETURN SILENCER					
PRESSURE DROP (IN WG)	0.24	N/A	0.11		
WIDTH (IN)	18	N/A	20		
HEIGHT (IN)	36	N/A	30		
LENGTH (IN)	84	N/A	84		
MINIMUM DEFLECTION (IN)	3	N/A	3		
SEISMIC RESTRAINT REQUIRED	YES	YES	YES		
SEISMIC COMPONENT IMPORTANCE FACTOR (Ip)	1.5	1.5	1.5		
SEISMIC COMPONENT AMPLIFICATION FACTOR (Ap)	-	-	-		
REMARKS	1,3,4,5,8,9	1,2,3,4,6,7,8,9	1,2,3,4,6,7,8,9		

TYPE:

NC-VCR(SL) - ADJUSTABLE SPRING NOISE CONTROL CURB C/W SILENCERS AND ACOUTIC BARRIER.

NC-RC(SL) - NOISE CONTROL CURB WITH SILENCER AND ACOUSTIC BARRIER.

NOTES:

1. BASIS OF DESIGN: VIBRO-ACOUSTICS.
2. THER IS 10" PRE-CAST PLANK BELOW AHU-3, NO ACOUSTIC BARRIER IS REQUIRED.
3. INTERNAL ISOLATORS IN THE AHU HAVE TO BE EITHER REMOVED OR LOCKED UP
4. CURB MOUNTED AIR HANDLING UNITS SHALL BE MOUNTED ON VIBRO-ACOUSTICS TYPE VCR ROOF TOP SPRING ISOLATION AND SOUND CONTROL CURB CONSISTING OF GALVANIZED CURB SECTIONS WITH INTEGRAL VERTICAL AND LATERALLY RESTRAINED ISOLATORS FORMED TO FIT THE CONTRACTOR SUPPLIED ROOFTOP EQUIPMENT. THE SPRING ISOLATION CURB AND ACOUSTICAL TREATMENT PACKAGE SHALL PROVIDE A SPACE AND ADJACENT SPACE NOISE CRITERIA (NC) AS SCHEDULED.
   a. SUBMIT ACOUSTICAL CALCULATIONS TO DEMONSTRATE RESULTANT DUCTBORNE NOISE LEVELS IN THE OCCUPIED SPACES MEET SCHEDULED NC LEVEL.
   b. SUBMIT ACOUSTICAL CALCULATIONS TO DEMONSTRATE RESULTANT DUCT BREAKOUT NOISE LEVELS IN THE OCCUPIED SPACES MEET SCHEDULED NC LEVEL.
   c. SUBMIT ANALYSIS TO DEMONSTRATE THAT NOISE TRANSMISSION THROUGH THE ROOF WILL NOT EXCEED SCHEDULED NC LEVEL.
   d. SUBMIT ANALYSIS TO DEMONSTRATE THAT VIBRATION TRANSMISSION THROUGH THE BUILDING STRUCTURE WILL NOT CONTRIBUTE TO LEVELS IN EXCESS OF SCHEDULED NC LEVEL.
   e. SUBMIT CALCULATIONS AND PE STAMP TO DEMONSTRATE THAT CODE REQUIREMENTS HAVE BEEN MET FOR SEISMIC RESTRAINT DESIGN.
   f. SUBMIT CALCULATIONS AND PE STAMP TO DEMONSTRATE THAT CODE REQUIREMENTS HAVE BEEN MET FOR WIND RESTRAINT DESIGN.
   g. SUBMIT CALCULATIONS TO DEMONSTRATE THAT INSTALLED PRESSURE DROP WILL BE NO GREATER THAN SCHEDULED VALUES FOR SUPPLY AND RETURN AIR PATHS.
5. AHU-1 RETURN AIR SILENCER IS CUSTOM BUILT TRANSITIONAL ELBOW SILENCER: INLET 18x36; OUTLET: 14x34; CASING TO BE HTL EQUIVALENT TO 12 GAUGE DUCT WALL TO CONTROL BREAKOUT NOISE.
6. AHU-3 SUPPLY AIR SILENCER IS CUSTOM BUILT TRANSITIONAL ELBOW SILENCER: INLET 14x60; OUTLET 20x30; CASING TO BE HTL EQUIVALENT TO 18 GAUGE DUCT WALL TO CONTROL BREAKOUT NOISE.
7. AHU-3 RETURN AIR SILENCER IS CUSTOM TRANSITIONAL ELBOW SILENCER: INLET 20x30; OUTLET 34x14.
8. SUBMIT PRESSURE DROP INCLUDING SYSTEM EFFECTS.
9. AHU-2 SUPPLY SILENCER IS CUSTOM BUILT ELBOW SILENCER C/W RLP ACOUSTIC LINING; 28x40(52); CASING TO BE HTL EQUIVALENT TO 8 GAUGE DUCT WALL TO CONTROL BREAKOUT. A PORTION OF THE SILENCER EXTENDS IN THE CURB; THE LINING SHALL CONSIST OF MEDIA, AND SPECIFIED MEDIA PROTECTION, PROTECTED BY A GALVANIZED PERFORATED METAL LINER. IT IS NOT ACCEPTABLE TO SUPPLY A STANDARD SILENCER WITH TE SCHEDULED CASING SIZE AND A REDUCER TO THE SCHEDULED CONNECTION SIZE. ANY ALTERNATE TO RLP WILL NOT BE CONSIDERED AND WILL BE REJECTED.
10. SUBMIT WRITTEN GUARANTEE THAT SPACE NOISE LEVEL DUE TO DUCT BORNE, BREAKOUT, VIBRATION AND NOISE TRANSMISSION THROUGH ROOF WILL NOT EXCEED SPECIFIED LEVELS. IF THE NOISE LEVEL IN THE OCCUPIED SPACES EXCEEDS THE SPECIFIED NOISE CRITERIA (NC) LEVEL, IT WILL BE THE FINANCIAL RESPONSIBILITY OF THE NOISE CONTROL CURB MANUFACTURER TO PROVIDE PRODUCT AND LABOR TO ACHIEVE THE SPECIFIED CRITERIA. ADDITIONAL NOISE CONTROL REQUIRED AS A RESULT OF THE PURCHASE OF NOISIER AIR HANDLING UNITS WILL BE THE FINANCIAL RESPONSIBILITY OF THE PURCHASING CONTRACTOR. THE CONTRIBUTION OF OTHER NOISE SOURCES, INCLUDING BUT NOT LIMITED TO DAMPERS, DUCT REGENERATED NOISE, AND DIFFUSERS IS EXCLUDED FROM THIS GUARANTEE. THE TOTAL NOISE CONTRIBUTION FROM SOURCE OTHER THAN THE AHU'S MUST BE AT LEAST 5 dB BELOW THE SPECIFIED NOISE CRITERIA.

EQUIPMENT SOUND POWER SCHEDULE

UNIT NO.		AHU-1	AHU-2	AHU-3	AHU-4
MAXIMUM SOUND POWER BY OCTAVE BAND (DB RADIATED AT CASING)	63HZ	75	84	75	74
	125HZ	82	91	82	81
	250HZ	73	81	72	71
	500HZ	70	79	70	69
	1K HZ	63	72	63	82
	2K HZ	51	60	51	50
	4K HZ	37	46	37	36
	8K HZ	28	37	28	27
MAXIMUM SOUND POWER BY OCTAVE BAND (DB AT UNIT INLET)	63HZ	76	84	76	83
	125HZ	82	91	82	85
	250HZ	78	81	75	82
	500HZ	73	79	76	81
	1K HZ	70	72	70	70
	2K HZ	64	60	64	58
	4K HZ	80	46	60	48
	8K HZ	52	37	52	28
MAXIMUM SOUND POWER BY OCTAVE BAND (DB AT UNIT DISCHARGE)	63HZ	82	91	81	86
	125HZ	84	93	83	88
	250HZ	81	90	80	86
	500HZ	82	91	81	87
	1K HZ	76	85	75	81
	2K HZ	70	79	69	75
	4K HZ	66	75	65	71
	8K HZ	58	67	57	63
REMARKS					

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ISSUE

01.12.15	CONSTRUCTION DOCUMENTS
02.12.15	ADDENDUM B1
02.23.15	ADDENDUM B3

PROJECT
MEDICAL EXAMINER OFFICE BUILDING (BID PACKAGE B)

3562 COUNTY HIGHWAY AB
MC FARLAND, WI 53558

BID NO.
313083

DRAWING
HVAC SCHEDULES

DATE
01.12.15

M902

ADDENDUM B3 BID QUESTIONS AND ANSWERS

1. QUESTION/COMMENT
   a. Spec 23 05 00: Can copper Pro-Press piping fittings be used for less than 2" heating hot water and chilled water piping?

   AE RESPONSE
   a. Pro-Press Piping Fittings not allowed in HVAC Systems.

2. QUESTION/COMMENT
   a. Spec 23 05 00: Can grooved piping connections be used on heating hot water and chilled water piping?

   AE RESPONSE
   a. Grooved piping connections will be allowed in the Mechanical Rooms (See Info in Addendum 3).

3. QUESTION/COMMENT
   a. Detail 13/M500: Please specify if sleeves for all piping and duct work penetrations through interior walls for order mitigation is necessary or can these penetrations be caulked to the drywall without a sleeve.

   AE RESPONSE
   a. Sleeves are required as detailed and specified.

2. QUESTION/COMMENT
   a. Room 224 MLI (sheet A200) calls out Chalk and Map Rails, is this to be assumed typical for all of the 7 MLI Rooms or just the one?

   AE RESPONSE
   a. Refer to Addendum for clarification of drawing name on sheet A801.

3. QUESTION/COMMENT
   a. Details 1, 2, and 3/A503 dated 2/12/15 – From a pre-engineered metal building stand point there is no structure for the top z-girt at elevation 116'-8" to attach to. At a minimum the top of the wall should be detailed with a conventional light gage wall system by other trades. Normal metal building framing does not work as detailed. To avoid an odd connection detail between metal building girt and conventional framing is light gauge metal stud framing from the top of the masonry at elevation 104-0" to the top of parapet acceptable? If so, now that the framing is vertical can the 2-1/2" metal furring shown on the outside of the girts be eliminated? We'd also need spec's on depth, gauge and standard spacing of the studs to meet imposed loads.
   b. Detail 3/A604 – A related detail to the wall system above appears to show z-girts mounted in a vertical orientation between garage doors. Z-girts are installed in a horizontal orientation. We'd suggest this be detailed as a conventional light gage wall system.
   c. Detail 11/A604 - Using batt insulation in the roof system of the metal building will be problematic and won't guarantee dry vinyl faced insulation material by the time the roof is sealed. There is no way to protect the insulation from the water/weather during the phasing of the roof construction (i.e. metal deck installer and the roofer) potential creating a mold condition when trapped above the vinyl facing. Is it possible to install rigid board insulation of a similar R-value on top of the metal deck similar to other project details? Since the underside of the metal deck would then be exposed, painting or another finish method may be required.

   AE RESPONSE
   a. For a. and b: The pre-engineered building is designed by the pre-engineered building manufacturer. The drawings indicated aesthetic, volume, and overall dimensional criteria. The specification is a performance specification. All components related to the scope of this work shall be designed by the pre-engineered building manufacturer including steel frame, girts (studs) and supports.
   b. For c: This can be reviewed during shop drawings.

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4. QUESTION/COMMENT
   a. Plan sheet S200 - Please provided the weight of the EF-3 unit along column line 11 of the Garage?

   AE RESPONSE
   a. Refer to addendum.

5. QUESTION/COMMENT
   a. Plan sheet S200 - We cannot find the weight of the solar panels that are to be mounted on the roof. Please provide the weight of the solar panels that attach to the tube steel framing that is sized.

   AE RESPONSE
   a. Refer to the construction documents detail 10/S403. The assumed post load from the solar panels is given.

6. QUESTION/COMMENT/REQUEST
   a. Specification Section 08 34 16: Can Model 3200 from Clopay Building products be considered as an approved equal for Sectional Overhead Doors?

   AE RESPONSE
   a. No, bid as per Contract Documents. Did not receive all requested product information; therefore, it does not meet all the specification requirements.

7. QUESTION/COMMENT
   a. In Vestibule 1000 will there be a structural steel horizontal at the approximate midpoint that we can tie into for wind load. As a rule of thumb, we can't normally go beyond approximately 10' in height unless we use curtain wall or have steel to tie into to limit our deflection to L/175 at 20 psf.
   b. In the large "bumped out windows that are approximately 9'-4" wide by 11'-0" high, would we be able to add an intermediate vertical mullion to carry the dead load of the glass weight. The span of the horizontal mullion is too wide for our dead load charts. Splitting the width in half would accommodate the dead load requirements for a storefront system. These windows are in rooms 115, 116, and 117.

   AE RESPONSE
   a. Item a: Refer to Addendum for modification of structure and layout of Vestibule 1000 to accommodate storefront wind load requirements.
   b. Item b: Bid as per Contract Documents. Suggested modifications can be reviewed at Shop Drawing review.

8. QUESTION/COMMENT
   a. Section 32 92 00 - 2.03 Mulches specifies "Compost Mulch" for seeded turf areas. Will Straw &/or Hay mulch be acceptable? (Bid Package "A", Section 32 90 00 - 3.3 E. 4. d. specifies "clean straw or marsh hay".)

   AE RESPONSE
   a. No, bid as per Contract Documents. Straw & hay mulch are not acceptable. "Compost mulch" is intentionally specified and is different from the master plan/'Bid Package A' seeding mulching materials.

9. QUESTION/COMMENT
   a. Section 32 92 00 - 2.04 Erosion Control Materials refers to Section 32 25 00 Erosion Control, which does not appear to exist in the specifications. Do we have any obligation for erosion control mat on this project?

   AE RESPONSE
   a. Refer to Addendum for clarification in specifications.

11. QUESTION/COMMENT
   a. Creative Sign Company requested to be approved equal for the signs found in Information Specialties, 10 14 00.

   AE RESPONSE

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a. No, bid as per Contract Documents. The submitted product information did not meet all the specification requirements.

12. QUESTION/COMMENT
    a. Question on sheet S200 the load diagram for joist 22KSP1.

    AE RESPONSE
    a. Refer to addendum.

13. QUESTION/COMMENT
    a. Question on sheet S200 and the application of detail 2/S200.

    AE RESPONSE
    a. Refer to addendum.

14. QUESTION/COMMENT
    a. Belden was approved for cabling, would their connectivity be approved as well?

    AE RESPONSE
    b. Refer to addendum.

15. QUESTION/COMMENT
    a. Can Corbin Russwin CL3300 & ED5200 be used as a substitute for locks and exit devices respectively, and Norton 7500 for the closers, or is it to be an Alegion no sub package?

    AE RESPONSE
    b. No, bid as per Contract Documents. Refer to 08 71 00 3.05 Hardware Schedule. Product Data demonstrating equivalency was not submitted.

16. QUESTION/COMMENT
    a. Please consider the following manufacturers for Bullet Resistant Doors. 1. AMBICO Limited, 2. Oshkosh Door Company, 3. Maiman –Fine Architectural Doors, as ASSA ABLOY Company.

    AE RESPONSE
    b. No, bid as per Contract Documents. Specific product data was requested but was not provided.

END OF ATTACHMENT

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