ADDENDUM NO. 3

April 6, 2023

North Central High School Additions and Renovations – Phase 3
1801 East 86th Street
Indianapolis, IN 46240

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications, and the Drawings dated March 22, 2023, by Schmidt Associates. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 3-1 through ADD 3-2 and attached Schmidt Associates Addendum No. 3.3, dated April 5, 2023, consisting of 7 pages, 586 attached Addendum Drawing Sheets.

A. GENERAL INFORMATION:

1. Reference attached drawing details clarifying wood blocking questions/scope for Bid Category No. 2 and Bid Category No. 6.

B. SPECIFICATION SECTION 01 12 00 MULTIPLE CONTRACT SUMMARY

3.03 Bid Categories

B. BID CATEGORY NO. 2 – GENERAL TRADES

Add the following clarifications:

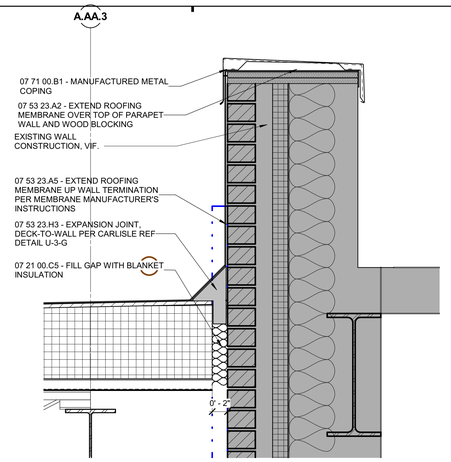
15. Provide door hardware retrofit on all existing doors (aluminum, wood, and metal). Reference drawing sheet A-602.3.

C. SPECIFICATION SECTION 01 23 00 ALTERNATES

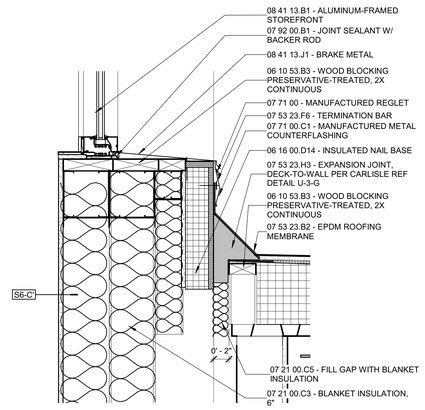
1.04 SCHEDULE OF ALTERNATES

Add the following Alternate:

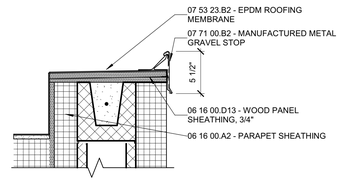
N. ALTERNATE NO. 14: Telescoping Stands
State the premium to provide Hussey MAXAM telescoping stands as identified in specification section 12 66 00 if NOT already included in base bid.



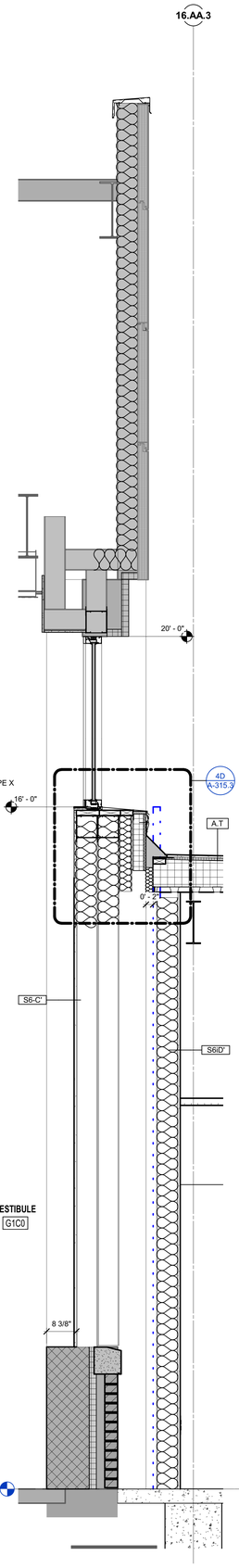
5D EXPANSION JOINT @ EXISTING BUILDING POOL ENTRY
1 1/2" = 1'-0"

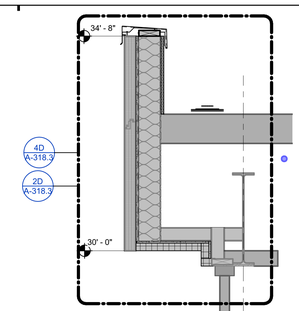


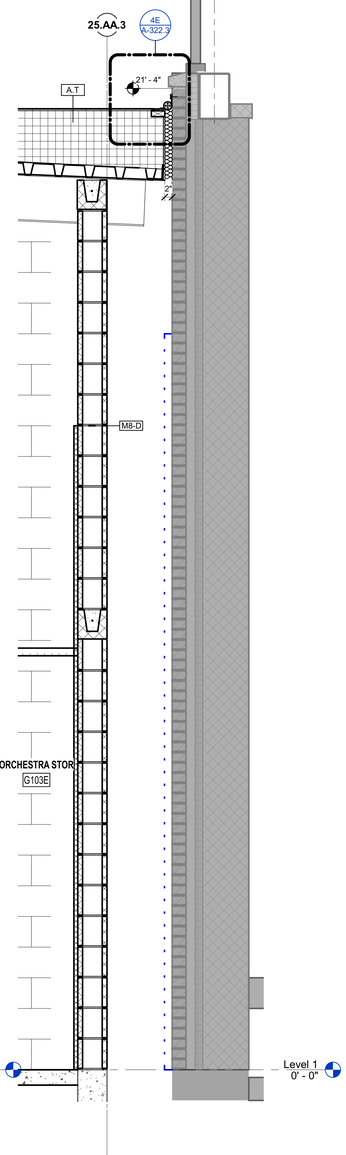
4D SECTION DETAIL @ EXPANSION INSTRUMENT STOR.
1 1/2" = 1'-0"

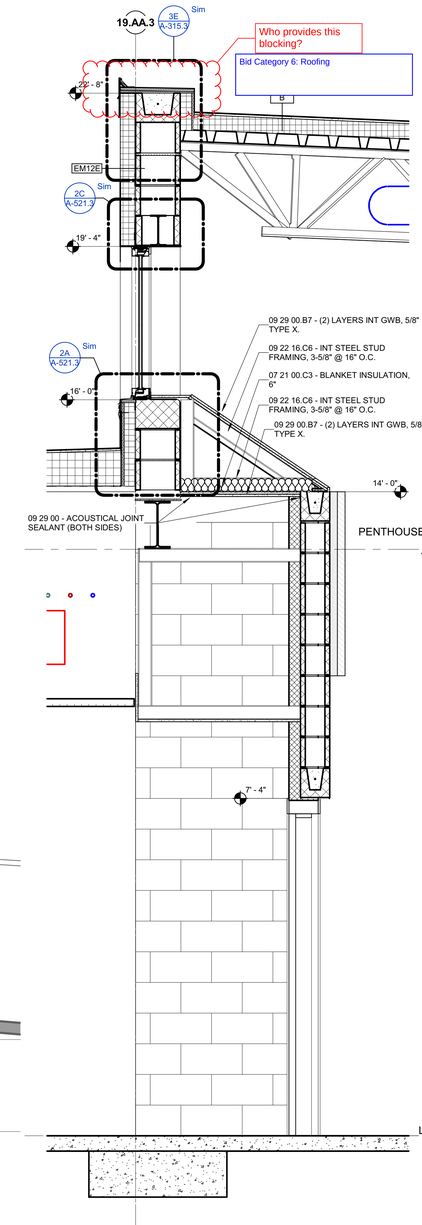


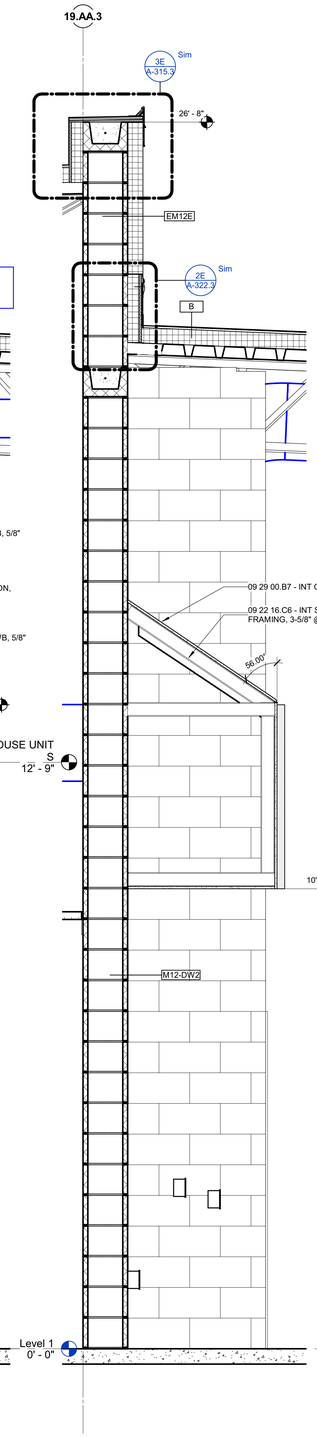
3E ROOF EDGE EM8E
1 1/2" = 1'-0"

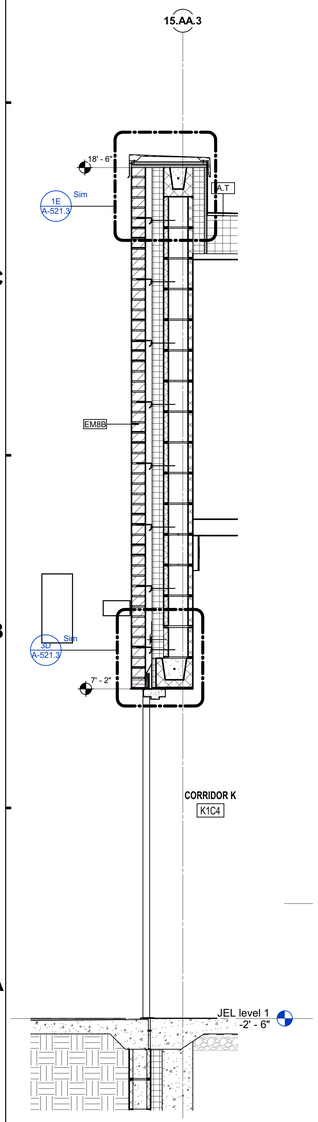


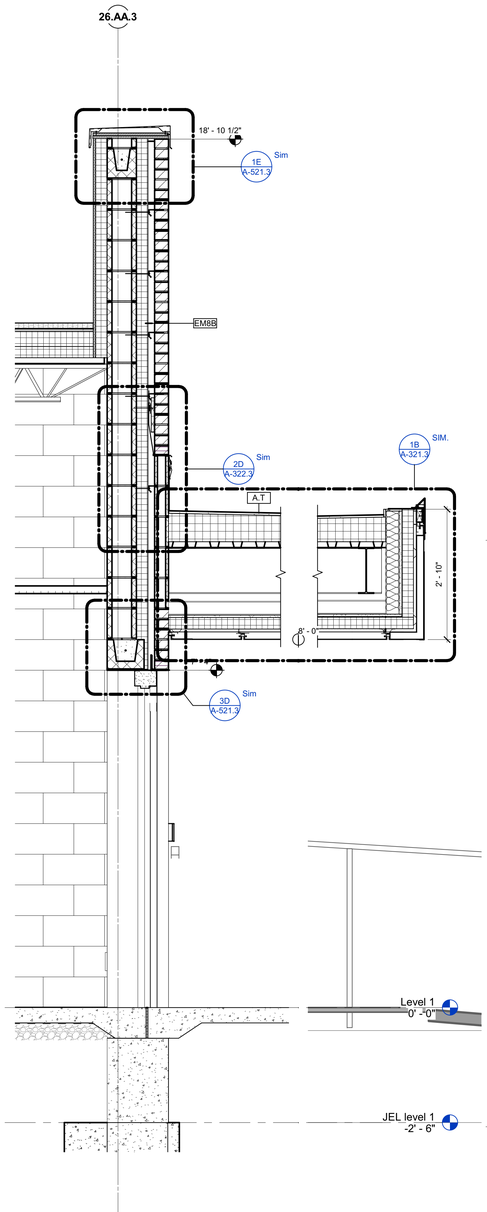












6A WALL SECTION
3/4" = 1'-0"

5A WALL SECTION
3/4" = 1'-0"

4A WALL SECTION @ ORCHESTRA
3/4" = 1'-0"

3A WALL SECTION @ ORCHESTRA
3/4" = 1'-0"

2A WALL SECTION @ INSTRUMENT STOR.
3/4" = 1'-0"

1A WALL SECTION @ POOL NORTH WALL
3/4" = 1'-0"

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced SLS HEL

SARAH KATHLEEN HEMPSTEAD REGISTERED STATE NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date

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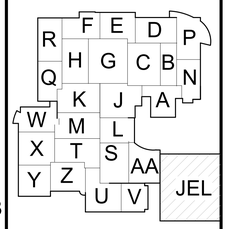

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

WALL SECTIONS

A-315.3

A-315.3_WALL SECTIONS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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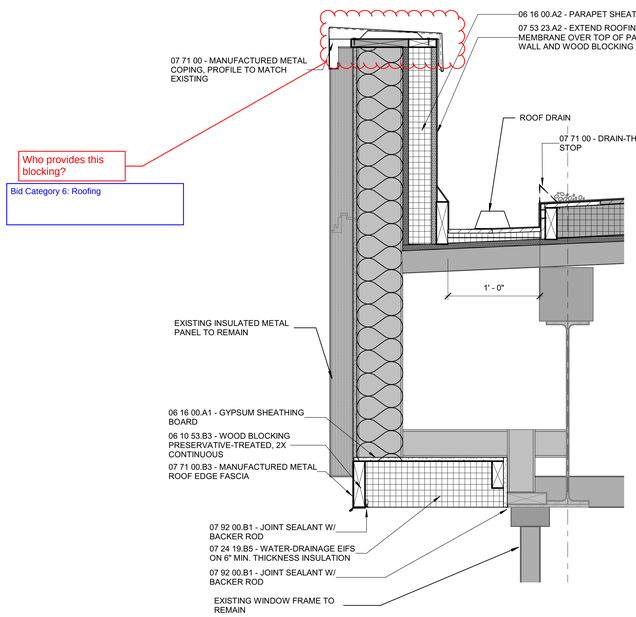
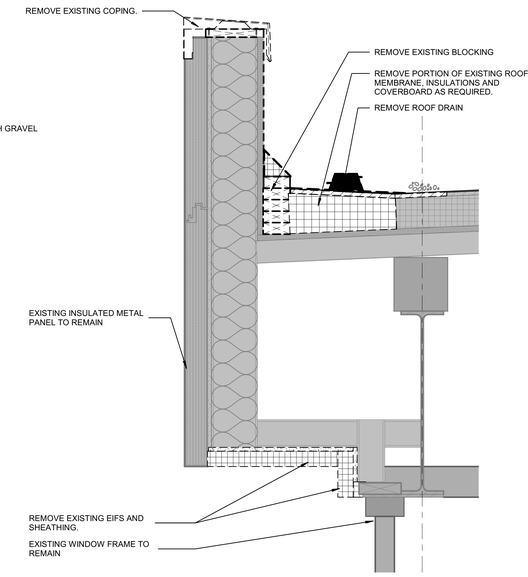
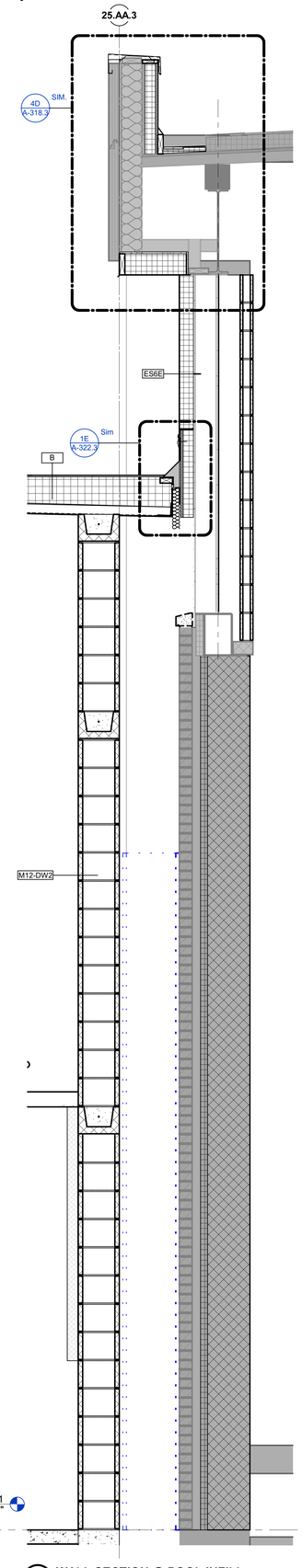
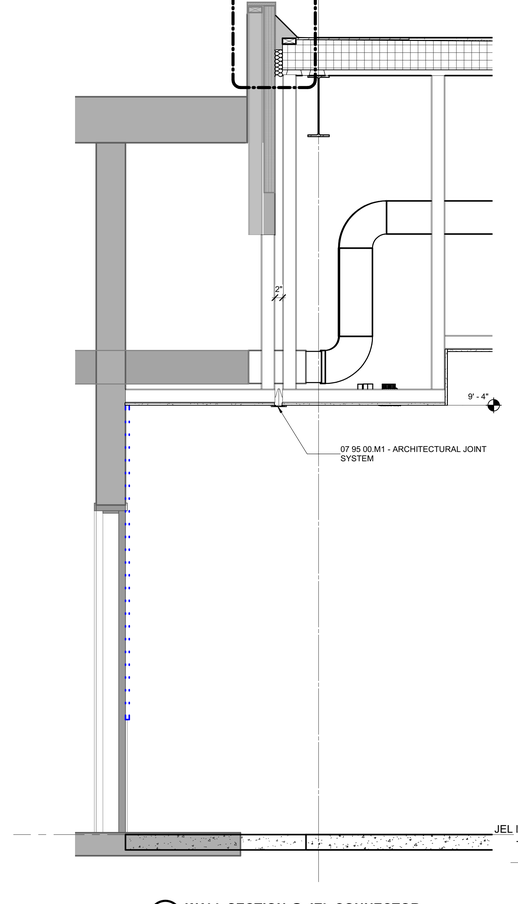


4D WALL SECTION @ POOL SOFFIT/ROOF
1 1/2" = 1'-0"



2D WALL SECTION @ POOL SOFFIT/ROOF DEMO
1 1/2" = 1'-0"





2A WALL SECTION @ JEL CONNECTOR
3/4" = 1'-0"

1A WALL SECTION @ POOL INFILL
3/4" = 1'-0"

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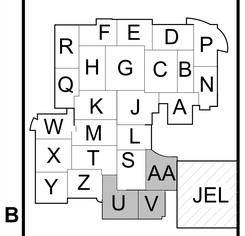

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

WALL SECTIONS

A-318.3

A-318.3_WALL SECTIONS
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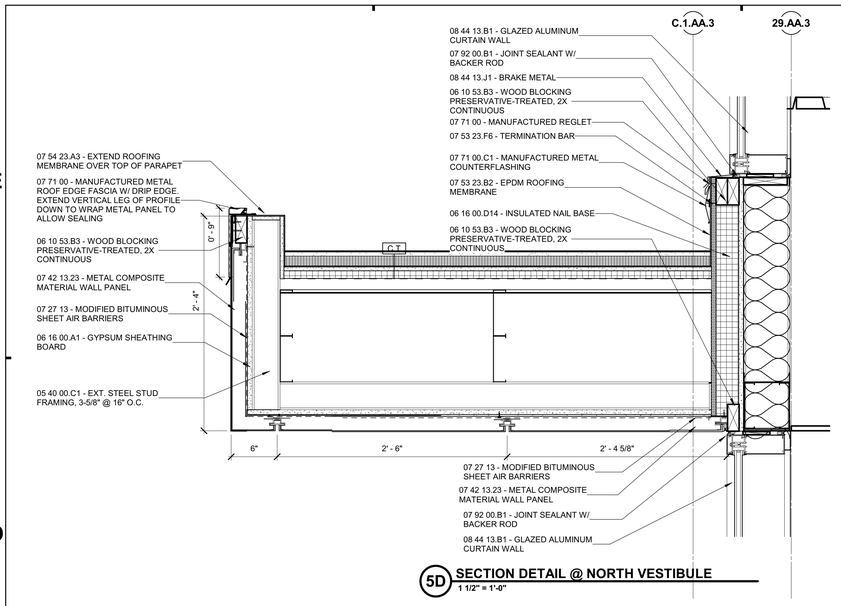
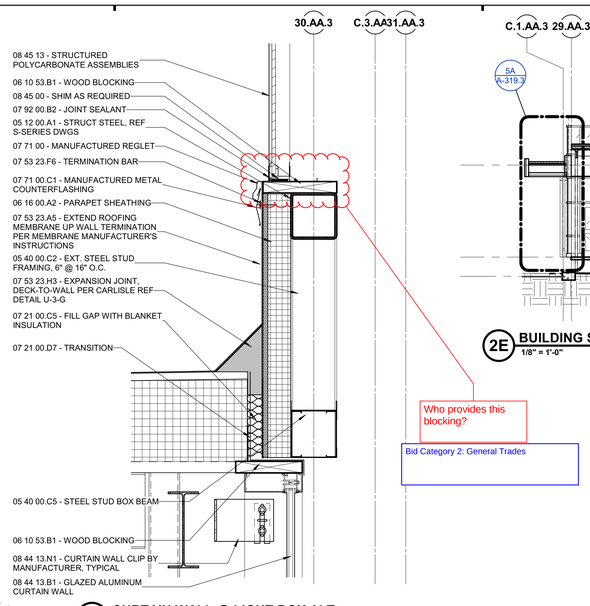


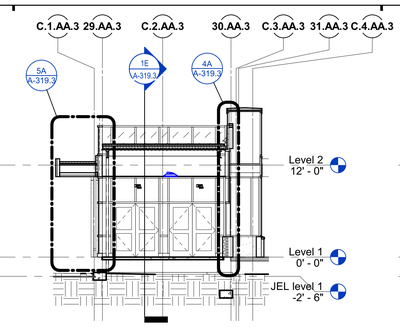
5D SECTION DETAIL @ NORTH VESTIBULE
1 1/2" = 1'-0"



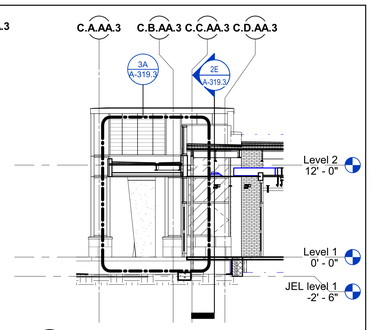
Who provides this blocking?

Bid Category 2: General Trades

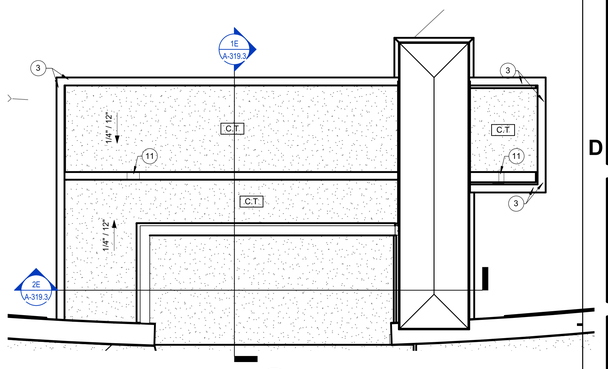
3D CURTAIN WALL @ LIGHT BOX ALT
1 1/2" = 1'-0"



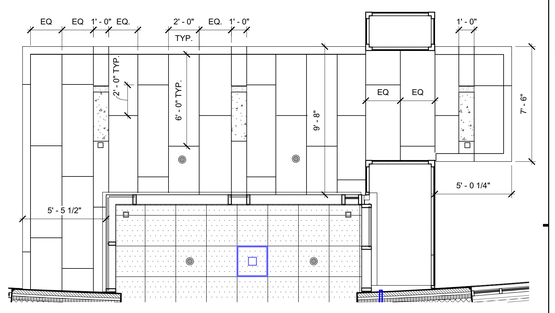
2E BUILDING SECTION E/W VESTIBULE ALT.
1/8" = 1'-0"



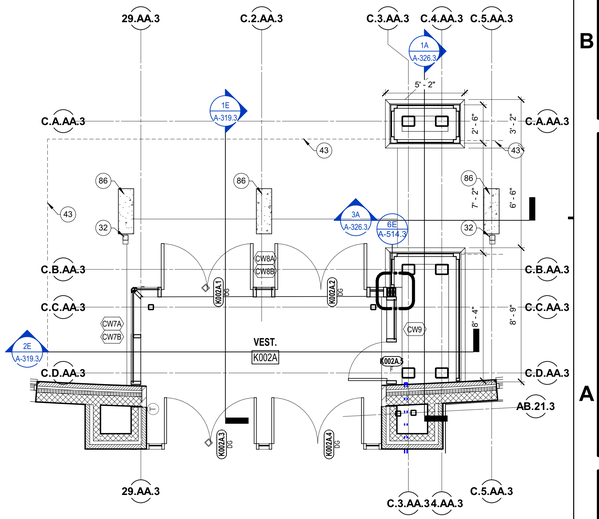
1E BUILDING SECTION N/S VESTIBULE ALT
1/8" = 1'-0"



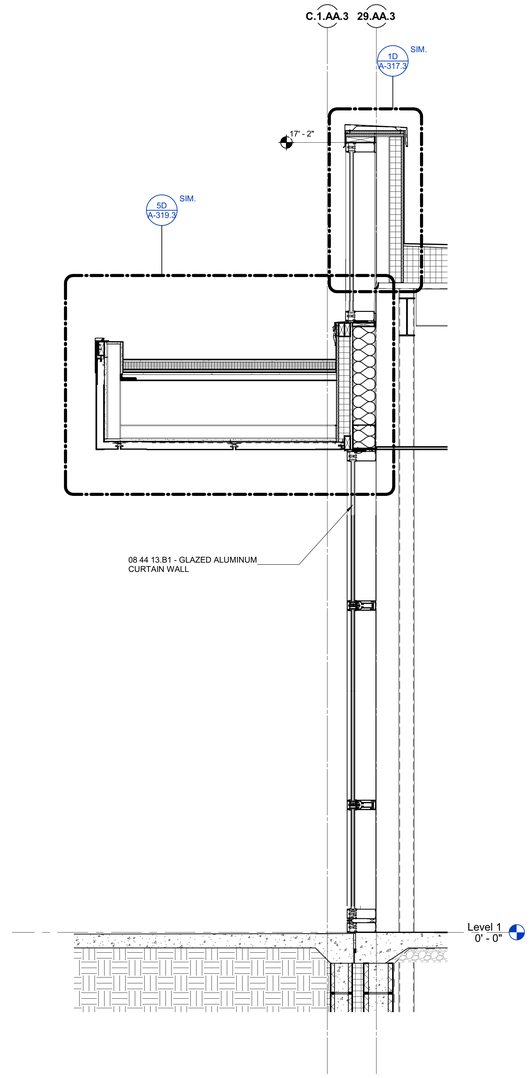
1D ROOF PLAN - ALTERNATE
1/4" = 1'-0"



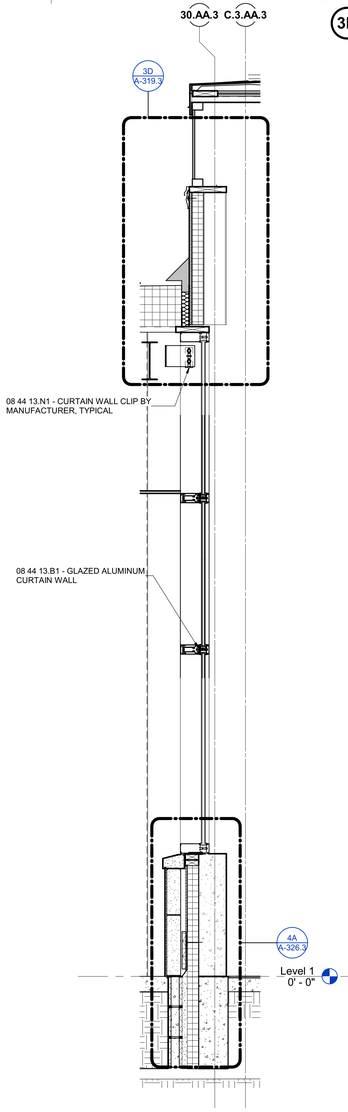
1B ENLARGED RCP - ALTERNATE
1/4" = 1'-0"



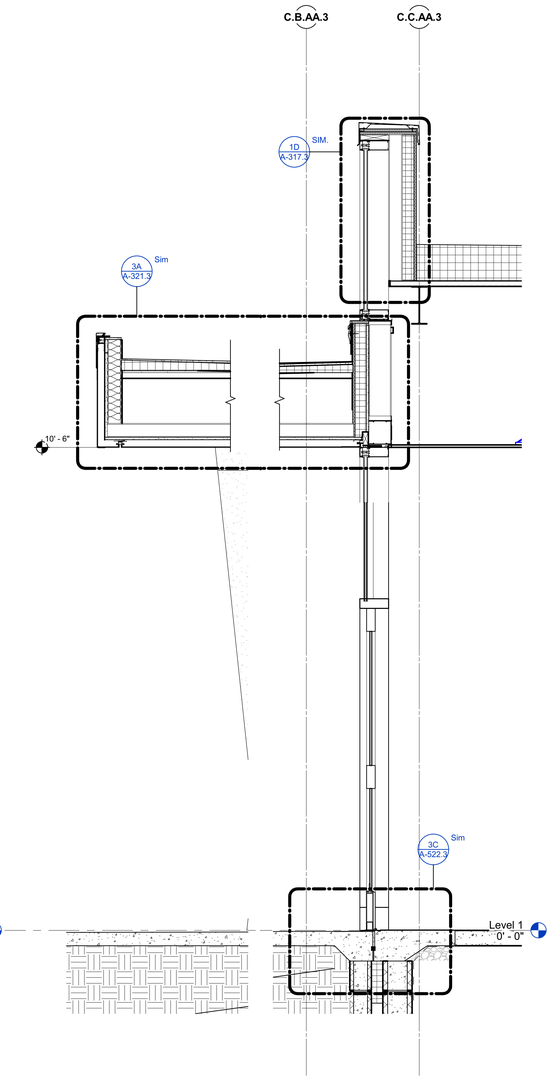
1A ENLARGED PLAN - ALTERNATE
1/4" = 1'-0"



5A WALL SECTION @ UNIT AA VESTIBULE NORTH ALT.
3/4" = 1'-0"



4A WALL SECTION @ UNIT AA VESTIBULE ALT
3/4" = 1'-0"



3A WALL SECTION @ UNIT AA ENTRY ALT.
3/4" = 1'-0"

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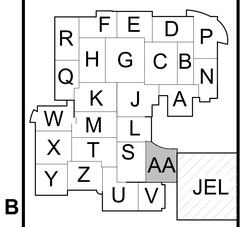

KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

WALL SECTIONS

A-319.3

A-319.3, WALL SECTIONS
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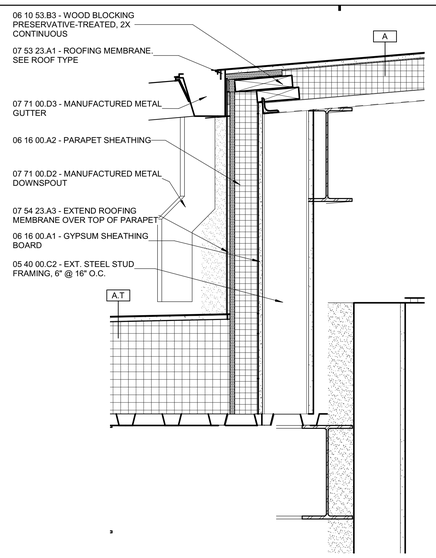
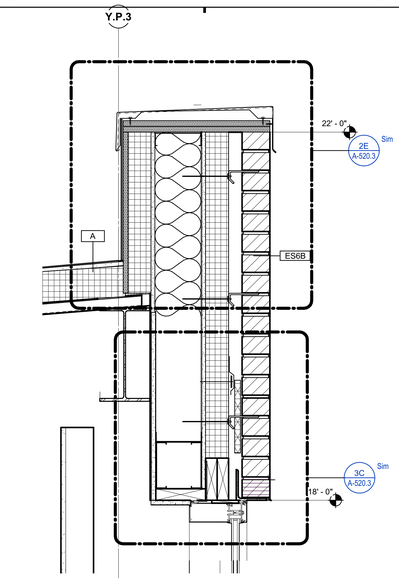
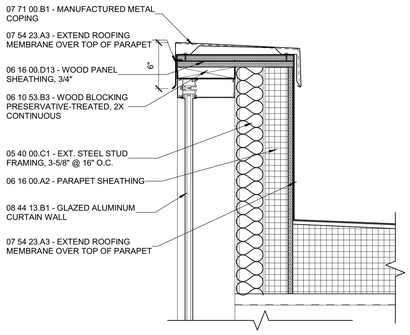


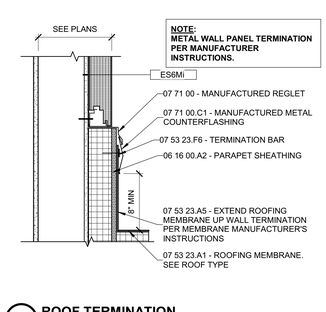
6D SECTION DETAIL - GUTTER
1 1/2" = 1'-0"



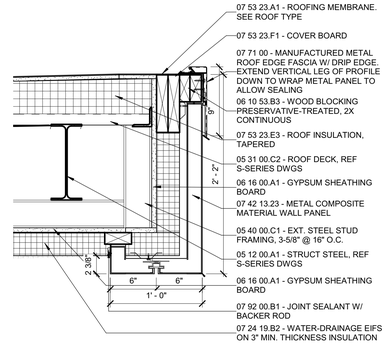
5D SECTION DETAIL - VESTIBULE PARAPET
1 1/2" = 1'-0"



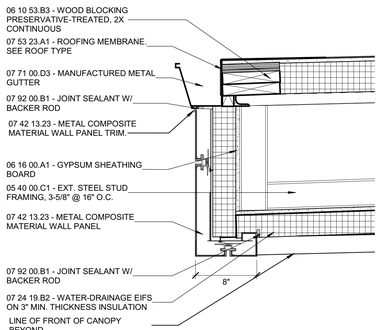
3D CURTAIN WALL PARAPET
1 1/2" = 1'-0"



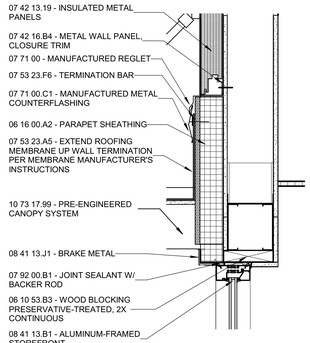
2E ROOF TERMINATION
1 1/2" = 1'-0"



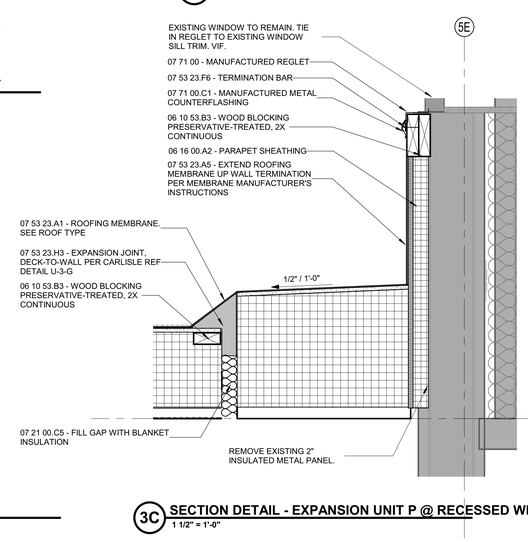
1D SECTION DETAIL - TYP EXTERIOR CANOPY
1 1/2" = 1'-0"



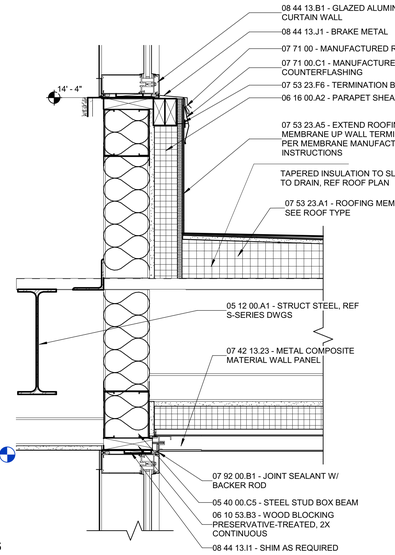
6C SECTION DETAIL @ END OF CANOPY
1 1/2" = 1'-0"



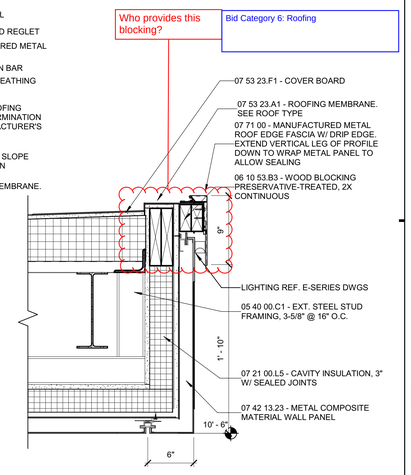
5C SECTION DETAIL @ CANOPY UNIT E
1 1/2" = 1'-0"

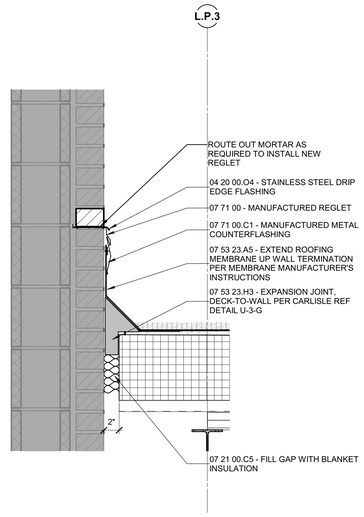


3C SECTION DETAIL - EXPANSION UNIT P @ RECESSED WINDOWS
1 1/2" = 1'-0"

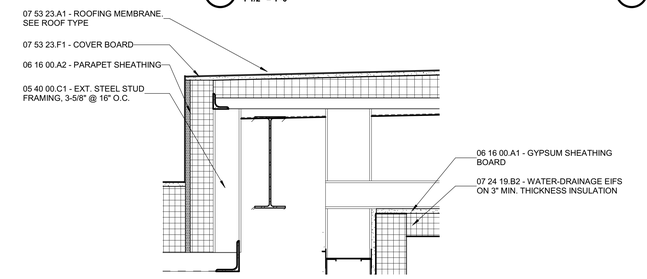


1C SECTION DETAIL - EXTERIOR CANOPY
1 1/2" = 1'-0"

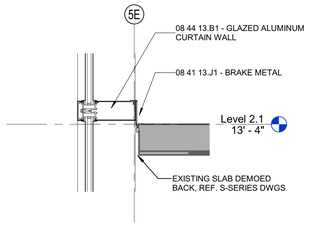




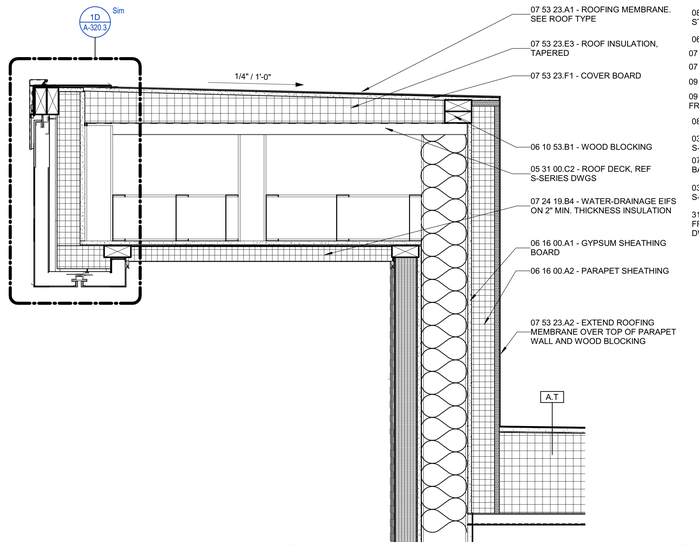
6A SECTION DETAIL @ BRICK EXPANSION JOINT
1 1/2" = 1'-0"



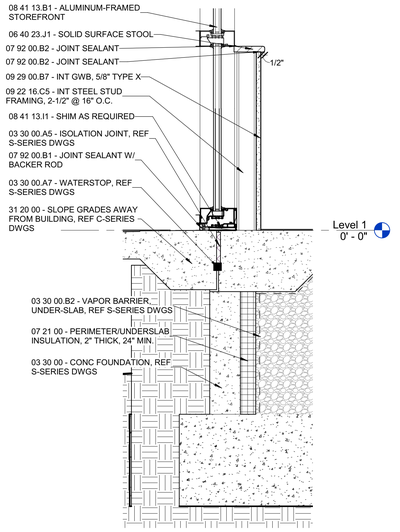
5B SECTION DETAIL @ MAIN ENTRY BACKSIDE CANOPY
1 1/2" = 1'-0"



5A SECTION DETAIL @ CURTAIN WALL UNIT P
1 1/2" = 1'-0"



2A SECTION DETAIL - PARAPET
1 1/2" = 1'-0"



1A SECTION DETAIL - STOREFRONT FOUNDATION
1 1/2" = 1'-0"

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced SLS HEL

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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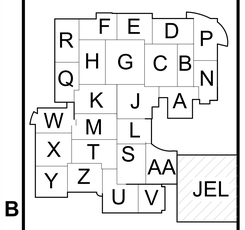
#	Revision	Date

1801 East 86th Street
Indianapolis, IN 46240



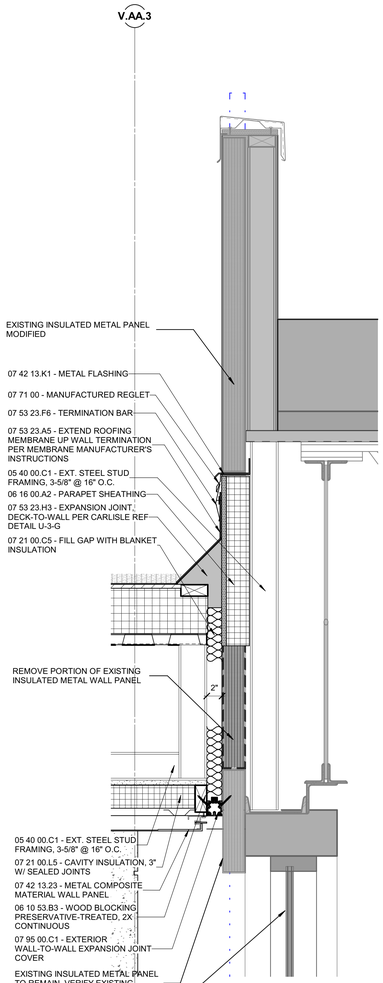
M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

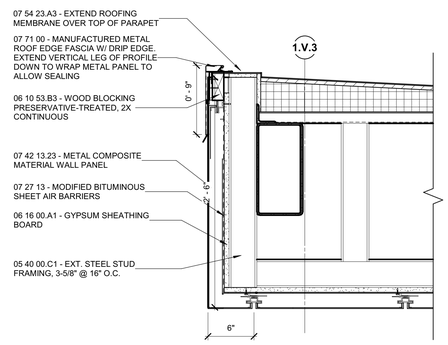
WALL SECTION DETAILS

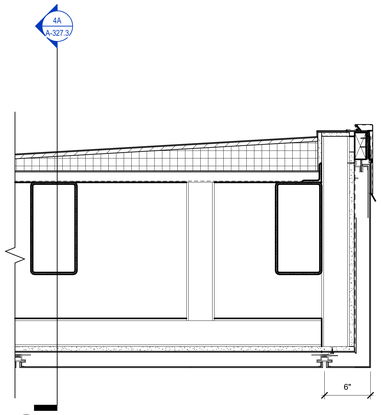
A-320.3

A-320.3_WALL SECTION DETAILS
2019-067.NCH_A-E-S of Washington Township_North Central High School Renovation_
C:\Users\sarah.hempstead\Documents\Revit\2019-067.NCH_Bidset_A_2023-03-03_central.rvt
© Schmidt Associates

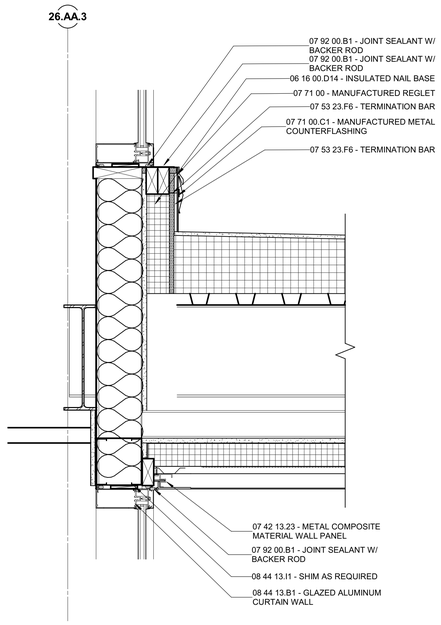


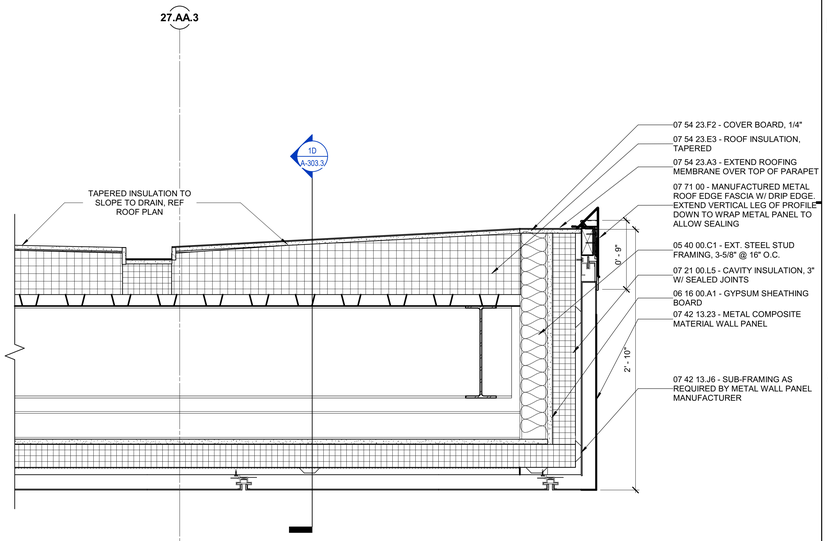
6B WALL SECTION @ CANOPY JEL
1 1/2" = 1'-0"



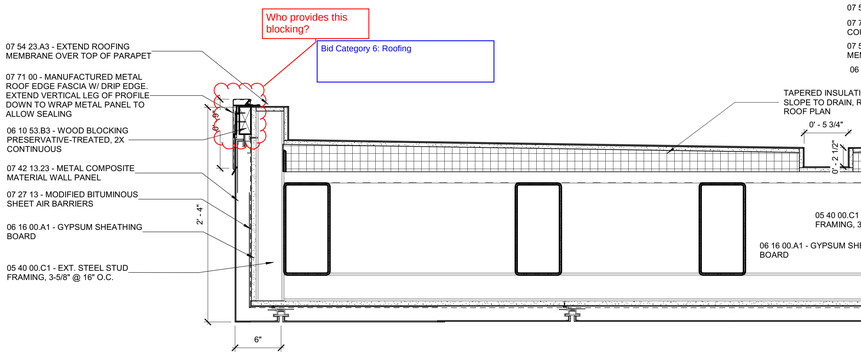


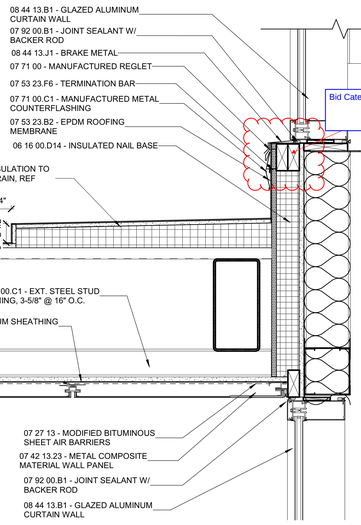
1D SECTION DETAIL - SOUTH CANOPY ALTERNATE
1 1/2" = 1'-0"



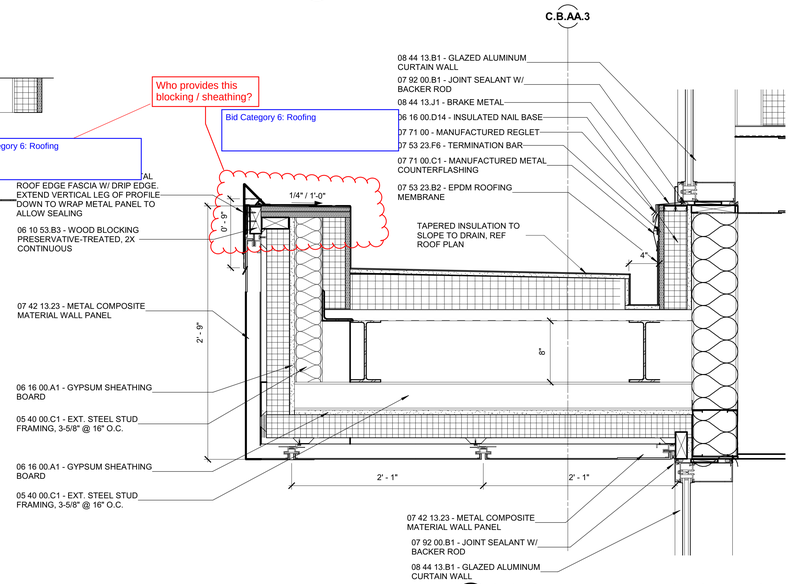


1B SECTION DETAIL @ SOUTH CANOPY
1 1/2" = 1'-0"





3A SECTION DETAIL @ UNIT AA CANOPY ALTERNATE
1 1/2" = 1'-0"



1A SECTION DETAIL - UNIT AA CANOPY - BASE BID
1 1/2" = 1'-0"

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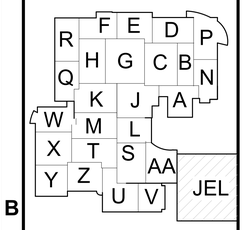

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECTION DETAILS

A-321.3

A-321.3_ SECTION DETAILS
2019-067.NCH_A-321.3 of Washington Township North Central High School Renovation_
C:\Users\SLS\Documents\2019-067.NCH_Section_A_20220309-1MP-NCH_Section_A_2022_sheleven.rvt
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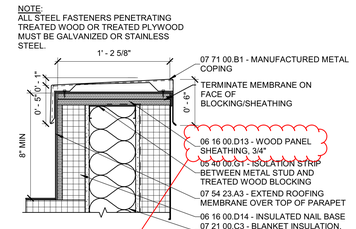
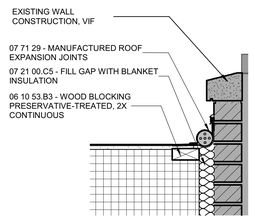
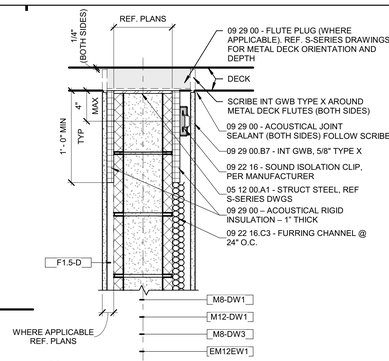


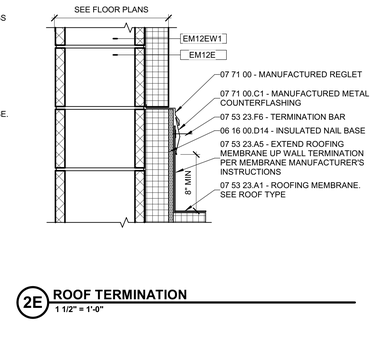
5E **METAL COPING**
1 1/2" = 1'-0"



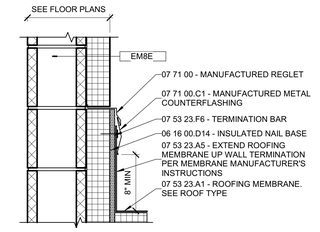
4E **SECTION DETAIL**
1 1/2" = 1'-0"



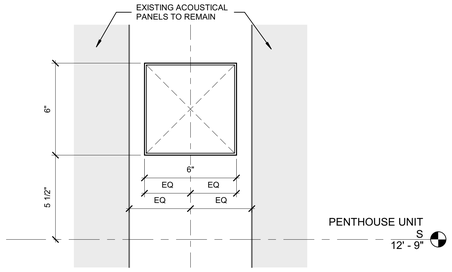
3E **TYPICAL ACOUSTICAL TOP OF WALL DETAIL**
1 1/2" = 1'-0"



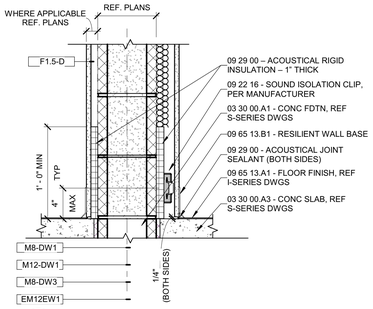
2E **ROOF TERMINATION**
1 1/2" = 1'-0"



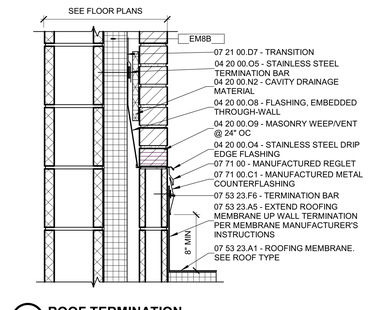
1E **ROOF TERMINATION**
1 1/2" = 1'-0"



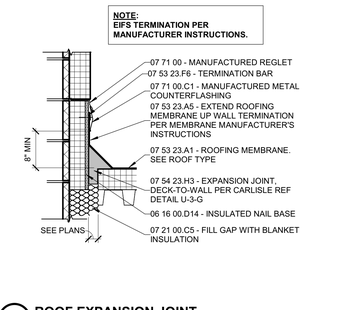
4D **PAC ADDITIONAL WORK ALTERNATE - NEW PROJECTOR OPENING**
3" = 1'-0"



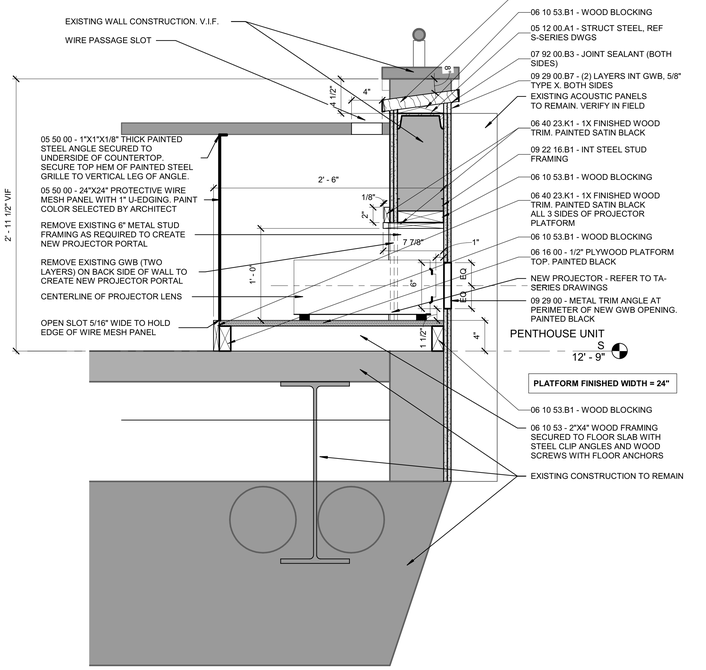
3D **TYPICAL ACOUSTICAL BASE OF WALL DETAIL**
1 1/2" = 1'-0"



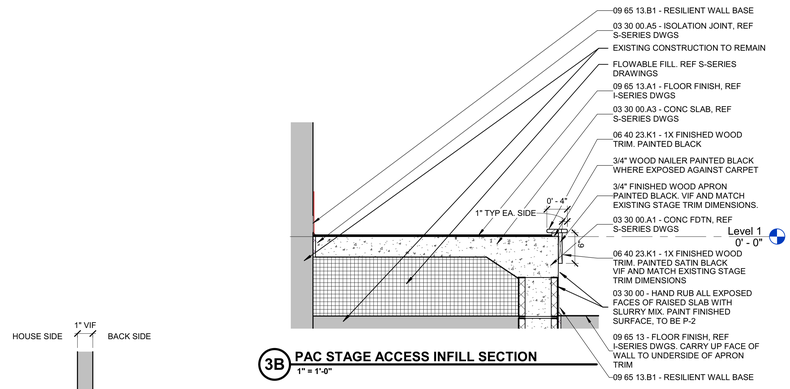
2D **ROOF TERMINATION**
1 1/2" = 1'-0"



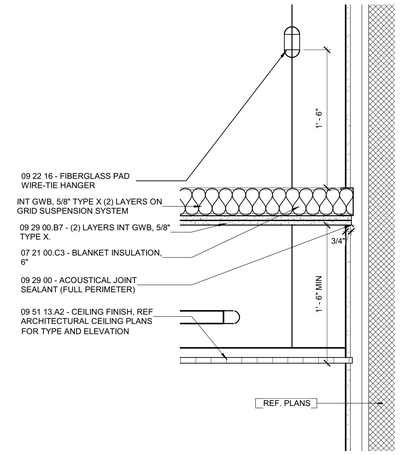
1D **ROOF EXPANSION JOINT**
1" = 1'-0"



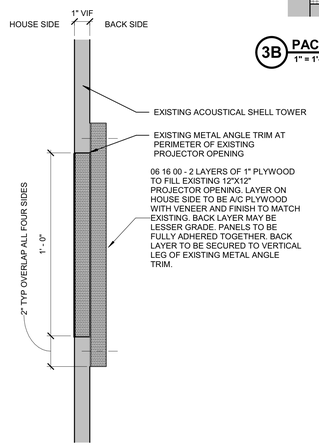
5A **PAC ADDITIONAL WORK ALTERNATE - NEW PROJECTOR OPENING**
1 1/2" = 1'-0"



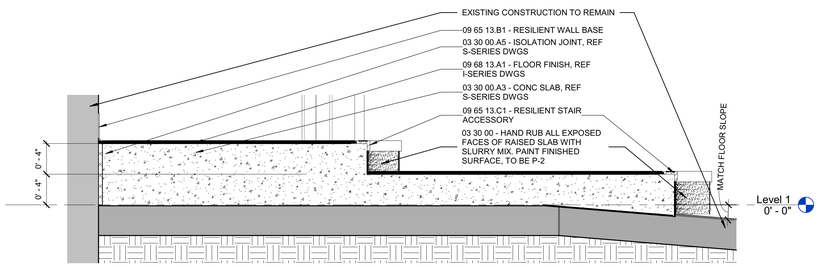
3B **PAC STAGE ACCESS INFILL SECTION**
1" = 1'-0"



1B **TYPICAL ACOUSTICAL CAP AND DROP CEILING**
1 1/2" = 1'-0"



3A **PAC ADDITIONAL WORK ALTERNATE - EXISTING PROJECTOR HOLE CAP**
3" = 1'-0"



1A **PAC ADDITONAL WORK ALTERNATE - RISER SECTION**
1 1/2" = 1'-0"

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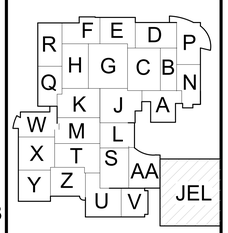

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECTION DETAILS

A-322.3

A-322.3 - SECTION DETAILS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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5/4/2023 2:14:06 PM

ADDENDUM NO. 3.3
APRIL 5, 2023

PREPARED BY SCHMIDT ASSOCIATES FOR:
NORTH CENTRAL HIGH SCHOOL RENOVATION
WASHINGTON TOWNSHIP, M.S.D. OF

This Addendum consists of 7 Addendum page(s) and 121 attachment pages totaling 128 pages.

Acknowledge receipt of this Addendum by inserting its number on the Bid Form. Failure to do so may subject the Bid to disqualification. This Addendum is part of the Contract Documents.

Bidder is encouraged to verify with reprographer of record all Addenda issued (do not rely exclusively on third party plan room services).

PART 1 - CHANGES TO PRIOR ADDENDA (NOT APPLICABLE)

PART 2 - CHANGES TO THE PROJECT MANUAL

Modifications described herein shall be incorporated in the Project Manual. All other Work shall remain unchanged.

2.1 DIVISION 11 – EQUIPMENT

A. **Section 114000 "FOODSERVICE EQUIPMENT"**

1. DELETE AND REPLACE Item #156 as follows:

"**ITEM #156 PORTABLE WALK-IN COOLER 8x20**
MFGR: Polar King or Approved Equal
MODEL: Rental
QUANTITY: One (1)

KEC to furnish (1) Walk-in Cooler Rental for the duration of the project that the existing walk-ins are not in operation.

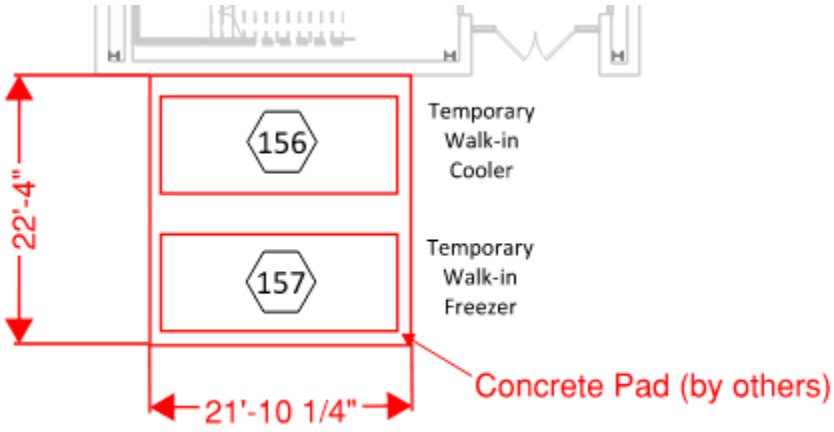
a. Size: 8x20
b. Power Requirements: 208v-1ph, 30a circuit"

2. DELETE AND REPLACE Item #157 as follows:

" **ITEM #157 PORTABLE WALK-IN FREEZER 8x20**
MFGR: Polar King or Approved Equal
MODEL: Rental
QUANTITY: One (1)

KEC to furnish (1) Walk-in Freezer Rental for the duration of the project that the existing walk-ins are not in operation.

a. Size: 8x20
b. Power Requirements: 208v-1ph, 30a circuit



B. **Section 123200 "MANUFACTURED WOOD CASEWORK"**

1. Insert Subparagraph 2.8, 1., b. & c., As Follows:

b. Avenue A-Frame Table w/ industrial caster(s) and Maple butcher block top.

1. Maple Butcher Block Top: 1-3/4-inch face-glued hardwood strips with clear coat finish.

2. Dimensions: 48inch width by 30inch deep by 30inch high.

a) Model: AFT48307ND30C

b) Color" Dark Gray

c. Apprentice Angle Iron Workbench w/ solid maple legs and shelf, angle iron edge.

1. Maple Butcher Block Top: 2-1/4inch face-glued hardwood strips with clear coat finish.

2. Dimensions: 72inch wide by 24inch deep by 37-1/4inch high

a) Model: A37-6W

2.2 DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

A. **Section 230900.99 "DIRECT DIGITAL CONTROL SYSTEMS"**

1. MODIFY Section 2.11.E.3 as follows:

"3. Low-limit thermostats. Low-limit air stream thermostats shall be UL listed, vapor pressure type, with an element of 6 m (20 ft) minimum length. Element shall respond to the lowest temperature sensed by any 30 cm (1 ft) section. Provide the appropriate number of thermostats to provide adequate coverage per the manufacturer recommendation. Install on the discharge side of the first heating water coil one or more low-limit thermostat(s) to protect the water coils in all air streams subject to unconditioned outside air whether indicated in the drawings or not. Provide hardwired interlock interruption of equipment operation and a separate hardwired BAS signal for monitoring and alarm. Provide DPDT snap acting 16A@120VAC rated contacts set for 38F or above. The low-limit thermostat shall be automatic reset only. Approved Manufacturer: Johnson A70 or approved equal."

B. Section 230900.99 "**DIRECT DIGITAL CONTROL SYSTEMS**"

1. ADD Article 4.1 per the attached.

"Article 4.1 includes 466 pages of 11x17 Temperature Control Services (TCS) drawings dated 04/06/2023 under TCS job number J-2304001 that includes installation standards, riser diagrams, and temperature control schematics including points and wiring diagram details that shall be installed by the controls installation contractor (CIC) as performed by the mechanical, technology, and electrical contractors and indicated on the M-701.3 to M731.3 drawings."

PART 3 - CHANGES TO THE DRAWINGS

Modifications described herein shall be incorporated in the Drawings. All other Work shall remain unchanged.

3.1 DRAWING SHEETS: ADDITIONS, DELETIONS AND REPLACEMENTS

DRAWING NO.	INDICATE ACTION: ADD (A), DELETE (D), DELETE & REPLACE (R),
G-SERIES DRAWINGS	
G101.3	DELETE AND REPLACE
G102.3	DELETE AND REPLACE
S-SERIES DRAWINGS	
S-531.3	DELETE AND REPLACE
A-SERIES DRAWINGS	
AD1H2.3	DELETE AND REPLACE
AF1H2.3	DELETE AND REPLACE
AF1N1.3	DELETE AND REPLACE
AF1Q1.3	DELETE AND REPLACE
AF1Q2.3	DELETE AND REPLACE
AF1R1.3	DELETE AND REPLACE
A-510.3	DELETE AND REPLACE

I-SERIES DRAWINGS

IN1N1.3	DELETE AND REPLACE
IN1Q1.3	DELETE AND REPLACE
IN1Q2.3	DELETE AND REPLACE
IN1R1.3	DELETE AND REPLACE
IN1T2.3	DELETE AND REPLACE
I-402.3	DELETE AND REPLACE

M-SERIES DRAWINGS

MD1G1.3	DELETE AND REPLACE
MD1G2.3	DELETE AND REPLACE
MD1J1.3	DELETE AND REPLACE
MD1K1.3	DELETE AND REPLACE
MD1K2.3	DELETE AND REPLACE
MD1M2.3	DELETE AND REPLACE
MD1N1.3	DELETE AND REPLACE
MD1Q1.3	DELETE AND REPLACE
MD1Q2.3	DELETE AND REPLACE
MD1R1.3	DELETE AND REPLACE
MD1R2.3	DELETE AND REPLACE
MD1T1.3	DELETE AND REPLACE
MD1T2.3	DELETE AND REPLACE
MH1C1.3	DELETE AND REPLACE
MH1C2.3	DELETE AND REPLACE
MH1D1.3	DELETE AND REPLACE
MH1E2.3	DELETE AND REPLACE
MH1H2.3	DELETE AND REPLACE
MH1M1.3	DELETE AND REPLACE
MH1M2.3	DELETE AND REPLACE
MH1N1.3	DELETE AND REPLACE
MH1P1.3	DELETE AND REPLACE
MH1Q1.3	DELETE AND REPLACE
MH1S1.3	DELETE AND REPLACE
MH1AA1.3	DELETE AND REPLACE
MP1J2.3	DELETE AND REPLACE
MP1K1.3	DELETE AND REPLACE
MP1M1.3	DELETE AND REPLACE
MP1P1.3	DELETE AND REPLACE
MP1P2.3	DELETE AND REPLACE
MP1Q1.3	DELETE AND REPLACE
MP1Q2.3	DELETE AND REPLACE
MP1R1.3	DELETE AND REPLACE
MP1R2.3	DELETE AND REPLACE
MP1S1.3	DELETE AND REPLACE
MP1AA1.3	DELETE AND REPLACE
MR101.3	DELETE AND REPLACE
MR102.3	DELETE AND REPLACE
M-401.3 TO M-417.3	DELETE AND REPLACE
M-501.3 TO M-503.3	DELETE AND REPLACE

M-603.3	DELETE AND REPLACE
M-701.3 to M-731.3	DELETE AND REPLACE

P-SERIES DRAWINGS

PF1G1.3	DELETE AND REPLACE
PF1G2.3	DELETE AND REPLACE
PF1H1.3	DELETE AND REPLACE
PF1H2.3	DELETE AND REPLACE
PF1K0.3	DELETE AND REPLACE
PF1K1.3	DELETE AND REPLACE
PF1Q1.3	DELETE AND REPLACE
PF1Q2.3	DELETE AND REPLACE
PF1S0.3	DELETE AND REPLACE
PF1S1.3	DELETE AND REPLACE
P-601.3	DELETE AND REPLACE

E-SERIES DRAWINGS

E-001-3	DELETE AND REPLACE
EL101-3	DELETE AND REPLACE
EP100-3	DELETE AND REPLACE
EP101-3	DELETE AND REPLACE

3.2 S-SERIES DRAWINGS

A. **Sheet Number S-001.3**

1. MODIFY Note 01002 EXISTING STRUCTURE NOTES: ES-4 in its entirety and replace with the following:

   "Existing structural information has been obtained from drawings prepared by EVERETT I. BROWN COMPANY, dated 1961, 1970, 1981, 1992, by ARSEE ENGINEERS INC., dated 2007."

3.3 A-SERIES DRAWINGS

A. **All Applicable A-Series Sheets**

1. MODIFY PENTHOUSE UNIT S level designation on all drawings to read "13'-4" V.I.F." in lieu of "12'-9".

B. **Sheet Number AF1D1.3**

1. MODIFY Wall type tag in CORRIDOR A – #A1C0 on east wall adjacent to room DEAN - #B110E from "S4-T" to "S4-C'".

C. **Sheet Number AC1C1.3**

1. ADD ceiling tag to bulkheads around center area of Cafeteria B111 as follows: "EXIST'G GWB. 9'-2" A.F.F., V.I.F."

D. **Sheet Number AC1G1.3**

1. ADD ceiling tag to bulkheads in Student Commons B1C2 identified with Reflected Ceiling Plan Note 1, as follows:
"EXIST'G GWB. 9'-2" A.F.F., V.I.F."

3.4 M-SERIES DRAWINGS

A. **Sheet Number ALL "MD" SERIES SHEETS**

1. ADD General Note D as follows:

"ALL FAN POWERED BOXES, EXHAUST FANS, DIFFUSERS AND GRILLES SHALL BE REMOVED UNLESS NOTED OTHERWISE. CAP EXHAUST FAN CURBS AS REQUIRED. CAP PIPING AND/OR PREP FOR NEW EQUIPMENT AS REQUIRED. REFER TO "MH" SERIES DRAWINGS FOR MORE INFORMATION"

B. **Sheet Number ALL "MH" SERIES SHEETS**

1. ADD General Note A as follows:

"ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE"

2. ADD General Note B as follows:

"ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN"

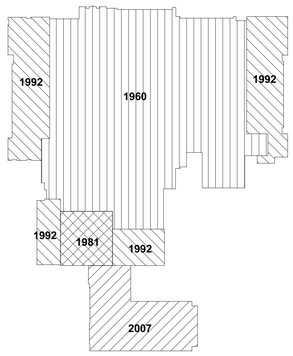
3. ADD General Note C as follows:

"ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN"

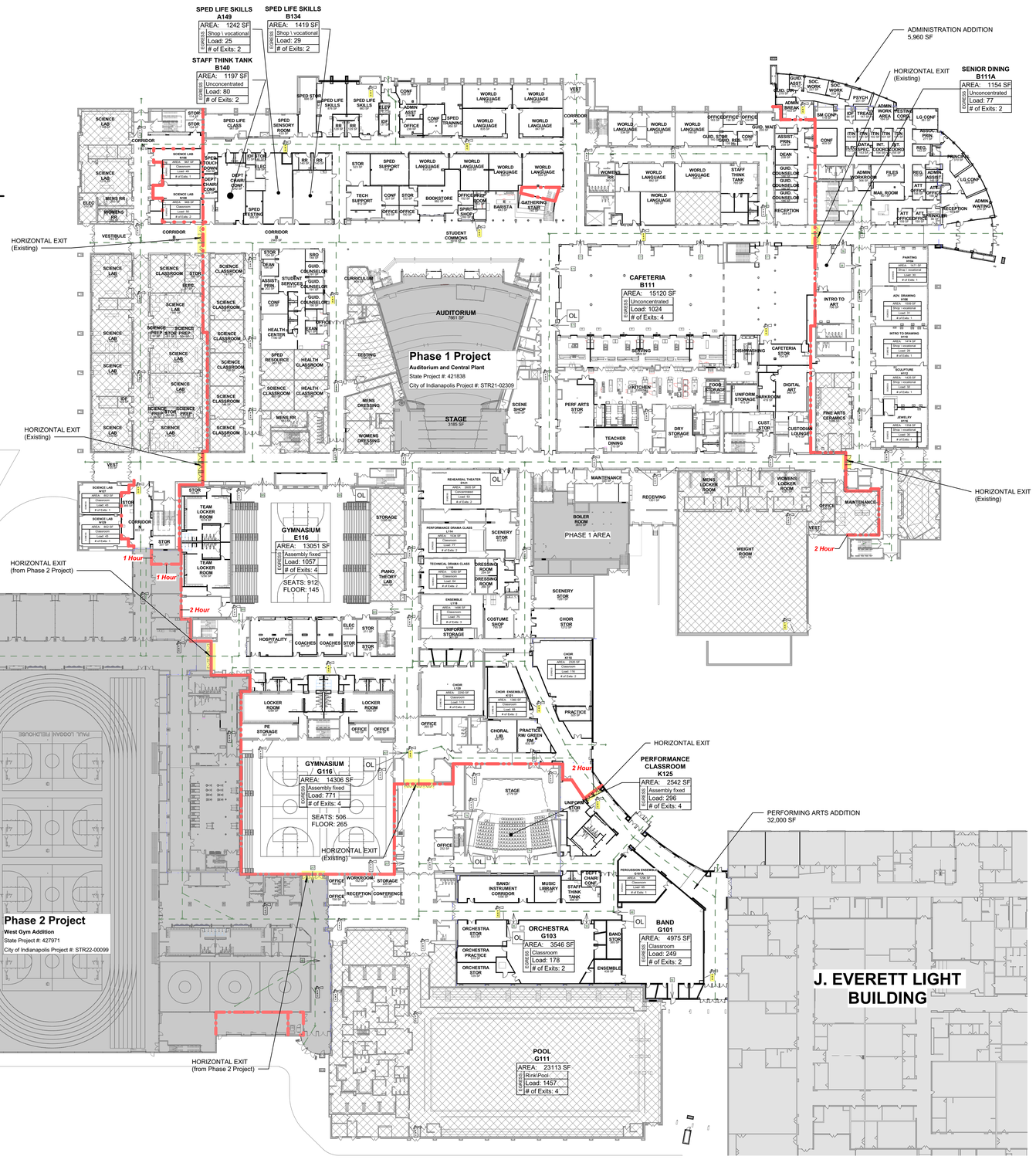
4. ADD General Note D as follows:

"ALL CONTROLS DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION"

END OF ADDENDUM 3.3



6D YEARS OF CONSTRUCTION
1" = 160'-0"



2A FIRST FLOOR FIRE AND LIFE SAFETY PLAN - PHASE 3
1" = 40'-0"

CODE SUMMARY

APPLICABLE CODE:	2014 Indiana Building Code 2014 Indiana Mechanical Code 2012 Indiana Plumbing Code 2009 Indiana Electrical Code 2010 Indiana Energy Conservation Code 2014 Indiana Fire Code ICC/ANSI A-117.1 Standard, 2009 Edition Indianapolis-Marion County Fire Protection Code (MCFPC) General Administrative Rules (GAR)
SCOPE OF PROJECT:	The Phase 3 project scope involves construction of a 1-story addition of approximately 32,200 sq ft at the southeast corner of the existing high school that will connect to the existing J Everett Light Career Center, as well as a 1-story administrative addition of approximately 5,960 sq ft at the northeast corner of the existing high school. The project scope also includes selective renovation of portions of the existing high school.
CODE STRATEGY:	The addition will be added to existing sq footage that includes the original 1960 building and portions of additions constructed in 1992 and 2007. The addition will be provided with automatic sprinkler protection. The existing high school is provided with an automatic sprinkler system throughout. The overall building is designed as an unlimited area building.
PROPOSED VARIANCE REQUEST:	A2.3 "PROPOSED VARIANCE REQUESTS (INDIANA #22423): 1. Delete requirement for trap seal primer valve to be provided for floor drains 2. Allow egress travel distance to exceed code minimum in portions of the 1st and 2nd floors. 3. Allow horizontal exits to exceed the permitted 50% of required exits." 4. Allow the proposed additions to NCHS to connect to existing JEL building which is currently non-sprinklered.
OCCUPANCY CLASSIFICATIONS:	Educational use and assembly areas associated with the E Occupancy - E Occupancy [305.1, 303.1.3] Assembly uses accessory to Group E are not considered separate occupancies [303.1.3] Office - accessory occupancy less than 10% of the building area - B Occupancy [304.1, 508.2]
CONSTRUCTION TYPE:	Type IIB (noncombustible, unprotected) Construction permitted based upon unlimited area for E Occupancy buildings protected throughout with an automatic sprinkler system and surrounded by at least 60 feet of open space - variance will be requested to permit the sprinkler system installation in the J Everett Light Center to be completed in 2025
ALLOWABLE HEIGHT:	2 stories permitted, 2 stories actual [507.4]
BUILDING ELEMENTS FIRE RESISTIVE REQUIREMENTS:	Building elements, including structural frame and roof are permitted to be of noncombustible, unprotected construction [Table 601]
	Exterior walls of the additions are permitted to be nonrated, noncombustible, since having at least 10 feet of fire separation distance [Table 602]
FIRE BARRIER:	The existing 2-hour fire barrier will be extended through the southeast addition in order to maintain egress travel distances from existing areas
OCCUPANCY SEPARATIONS:	Occupancy separations not required, based upon classification of assembly uses accessory to an educational occupancy as E Occupancy areas [303.1.3] B Occupancy office areas are not required to be separated based upon compliance as accessory occupancy [508.2]
FLOOR OPENINGS AND PENETRATIONS, AND SHAFTS:	Egress stairs connecting only 2 floors are permitted to be unenclosed [1009.3, exc. 1] Ducts are permitted to connect up to 2 floor levels where floors are nonrated without shaft protection, where the annular space is filled with a noncombustible material [717.6.3] Noncombustible penetrating items (excluding ducts) are permitted to connect up floor levels where floors are nonrated without shaft protection, where the annular space is filled with a noncombustible material [714.4.2.1]
INCIDENTAL USE SEPARATION:	Walls for these areas are required to terminate at the deck or a 1-hour ceiling, with self-closing doors - Boiler and furnace rooms with equipment sized as indicated in Table 509 [Table 509, Sec. 509.4.2] Fire and/or smoke dampers are not required in duct penetrations of these separations
FIRE DAMPERS:	Fire dampers are required at duct penetrations of fire-rated shafts and at duct penetrations of fire barriers required to have more than 1-hour fire rating. [717.5]
OCCUPANT LOAD FACTORS:	Band and Choir 15 sf per occupant Classrooms 20 sf per occupant Locker rooms, wrestling 50 sf per occupant Office 100 sf per occupant Storage/Mechanical 300 sf per occupant
EGRESS CORRIDORS:	Egress corridors are permitted to be nonrated based upon automatic sprinkler protection throughout. [1018.1]
PANIC HARDWARE:	Panic hardware is required on all means of egress doors serving an occupant load of 50 or more in E Occupancy areas [1008.1.10]
EGRESS TRAVEL DISTANCE:	The travel distance to an exterior exit is permitted to be a maximum of 250 feet [1016.2]
AUTOMATIC SPRINKLERS:	Automatic sprinklers are required throughout, based upon an E Occupancy fire area exceeding 12,000 sf [903.2.3]
FIRE ALARM SYSTEM:	Fire alarm system required [907.2.3] Manual pull stations are not required based upon initiation of the alarm system by sprinkler water flow
SMOKE DETECTORS:	Smoke detectors are required for HVAC shutdown for systems delivering in excess of 2,000 cfm [606.1, IMC]
FIRE HYDRANT:	Fire hydrant required within 600 feet of all portions of the exterior walls of the building [507.5.1, IFC - Sec. 591-406, MCFPC]
FIRE EXTINGUISHERS:	Fire extinguishers required throughout the addition [Sec. 591-402, MCFPC]

LIFE SAFETY PLAN LEGEND

Room name
101
AREA: 150 SF
EGRESS: Occupancy; Load: ##; # of Exits: #

- EGRESS INFORMATION TAG
- OL — OCCUPANT LOAD SIGN
- FIRE EXTINGUISHER CABINET (NEW)
- FIRE EXTINGUISHER CABINET (EXISTING)
- NON-RATED INCIDENTAL-USE WALL [508.2.2.1]
- 1-HOUR FB RATED WALL
- 2-HOUR FB RATED WALL
- 4-HOUR FB RATED WALL
- 1-HOUR FIRE PARTITION [419, 1017.1]

EGRESS CAPACITY - CHAPTER 10

COMPONENT	SIZE	USABLE	CAPACITY	TOTAL
SINGLE DOOR	36"	34"	.15/INCH	227
SINGLE DOOR	45"	43"	.15/INCH	286
DOUBLE DOOR	72"	68"	.15/INCH	453

PLUMBING FIXTURES - CHAPTER 29

E OCCUPANCY - 4,000 STUDENTS TOTAL

FIXTURE TYPE	REQUIRED	COUNT	OCCUPANTS
MEN	1:50	106	
WOMEN	1:50	123	
LAVATORIES	1:50	99	

A-3 OCCUPANCY - 3200 SPECTATORS MAX

FIXTURE TYPE	REQUIRED	COUNT	OCCUPANTS
MEN	1:125	106	
WOMEN	1:65	123	
LAVATORIES	1:200	99	

AREAS OF MINIMAL TO NO RENOVATION - EXISTING EGRESS IS NOT AFFECTED

PHASE 3 PROJECT AREAS	
EXISTING NORTH CENTRAL HIGH SCHOOL (INCLUDING PHASE 2 ADDITION)	868,144
PHASE 3 ADDITIONS	39,220
TOTAL BUILDING AREA	907,364

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced SLS MM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Hempstead

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A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
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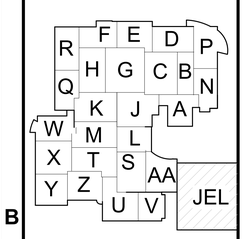

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovations - Additions Phase 3

A3.3

FIRE AND LIFE SAFETY PLAN LEVEL 1

G-101.3

G:\R17_FIRE AND LIFE SAFETY PLAN_LEVEL 1
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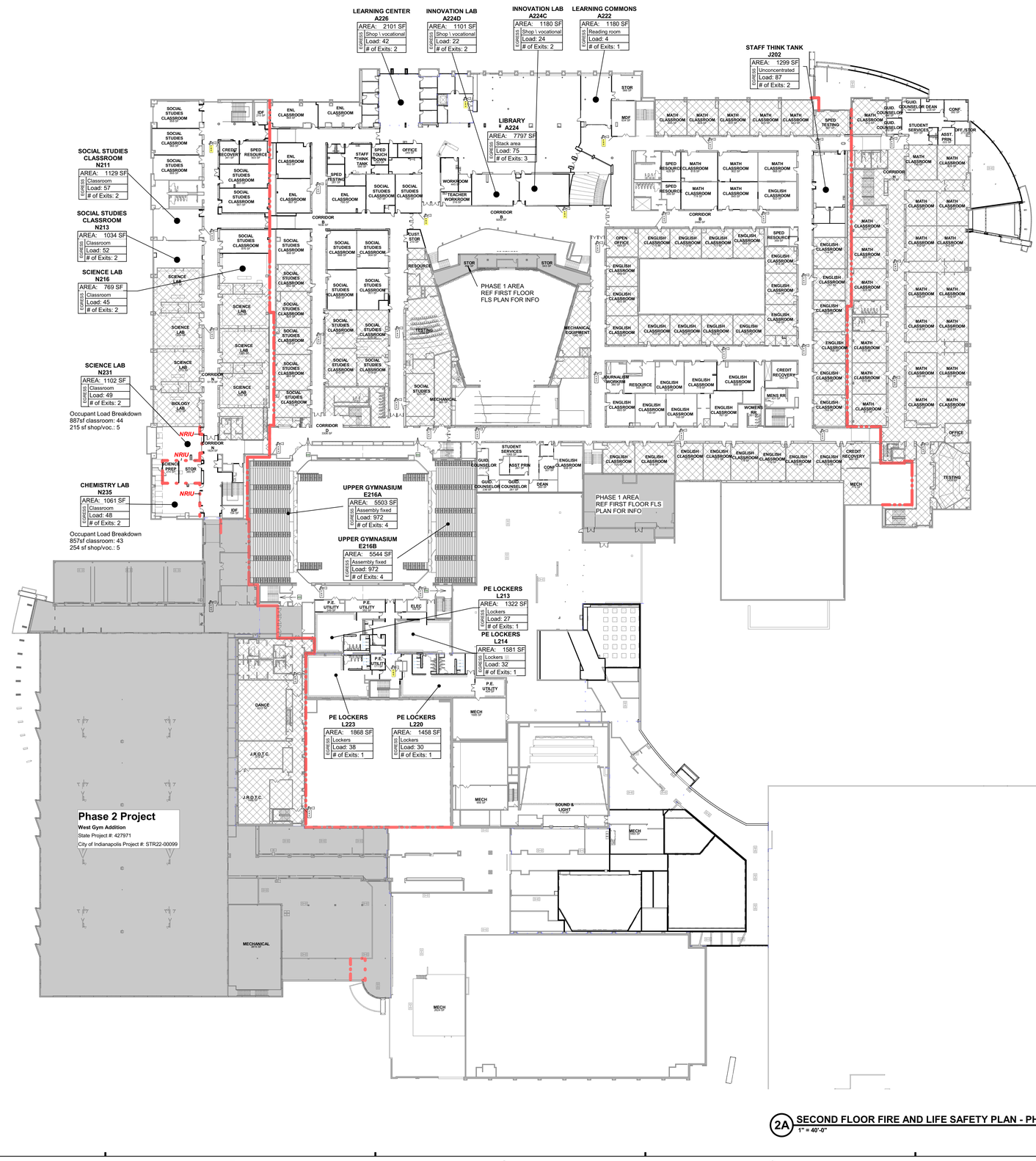

2A **SECOND FLOOR FIRE AND LIFE SAFETY PLAN - PHASE 3**
1" = 40'-0"

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LIFE SAFETY PLAN LEGEND

Room name
101
AREA: 150 SF
EGRESS: Occupancy
Load: ##
# of Exits: #

EGRESS INFORMATION TAG

OL — OCCUPANT LOAD SIGN

FEC — FIRE EXTINGUISHER CABINET (NEW)

FEC — FIRE EXTINGUISHER CABINET (EXISTING)

NON-RATED INCIDENTAL-USE WALL [508.2.2.1]

1-HOUR FB RATED WALL

2-HOUR FB RATED WALL

4-HOUR FB RATED WALL

1-HOUR FIRE PARTITION [419, 1017.1]

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PHASE 3 ADDITIONS	39,220
TOTAL BUILDING AREA	907,364

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SARAH KATHLEEN HEMPSTEAD — REGISTERED — NO. AR10400134 — STATE OF INDIANA — ARCHITECT
Sarah K Hempstead

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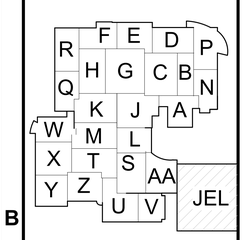

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovations - Additions Phase 3

A3.3

FIRE AND LIFE SAFETY PLAN LEVEL 2

G-102.3

© 2023, J. HNE IMSC LAFT SAFETY PLAN LEVEL 2
2019-067.NCH_A3.3_of Washington Township_North Central High School Renovations_
Additions_Phase 3_2019-067.NCH_Bidg001_R_20220315.rvt
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COLUMN BASE PLATE SCHEDULE

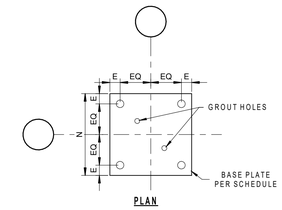
MARK	PLATE SIZE B" X N" X T"	ANCHOR RODS QTY	ANCHOR RODS DIA	BASE PLATE TYPE	SHEAR LUGS LENGTH	SHEAR LUGS DEPTH	SHEAR LUGS THICKNESS	REMARKS
BP1	12" X 12" X 3/4"	4	3/4"	CASE 1				
BP2	14" X 14" X 3/4"	4	3/4"	CASE 1				
BP2A	14" X 14" X 3/4"	4	3/4"	CASE 1				HILTI HIT-HY 200 W/ HIT-Z ROD MIN EMBED 8"
BP3	16" X 16" X 3/4"	4	3/4"	CASE 1				
BP4	16" X 16" X 3/4"	4	1"	CASE 1				
BP4A	16" X 16" X 1"	4	1"	CASE 1				
BP5	16" X 12" X 3/4"	4	3/4"	CASE 1				
BP6	18" X 14" X 3/4"	4	3/4"	CASE 1				
BP7	20" X 12" X 3/4"	4	3/4"	CASE 1				
BP8	20" X 14" X 3/4"	4	3/4"	CASE 1				
BP9	24" X 20" X 1-5/8"	N/A	N/A	CASE 2	20"	4"	1"	50 KSI PLATE, SHEAR LUG 1"x4"xCONT. SEE NOTE 4
BP10	8" X 5" x 1/2"	4	1/2"	CASE 1				

ANCHOR ROD TABLE

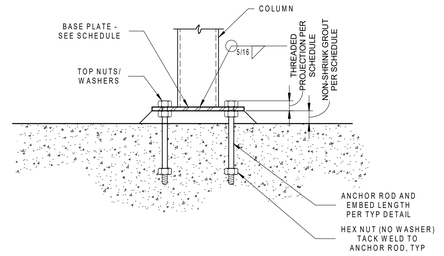
ANCHOR ROD DIA	BASEPLATE HOLE DIA	MINIMUM WASHER SIZE	MINIMUM WASHER THICKNESS	MINIMUM PROJ ABOVE T/CONC	NON-SHRINK GROUT BED THK	MIN EDGE DISTANCE, E
3/4"	1 5/16"	2"	1/4"	8"	2"	1 1/2"
1"	1 13/16"	3"	3/8"	8"	2"	2"

NOTES:

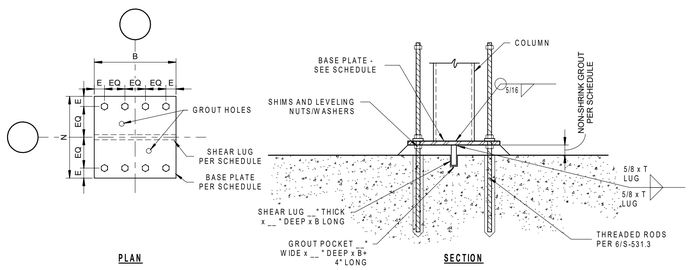
1. ANCHOR RODS ARE ASTM F1554 GR. 36 UNO.
2. PROVIDE WELDED PLATE WASHERS IN ACCORDANCE WITH TYPICAL DETAIL AT ALL STEEL BRACED FRAMES AND MOMENT FRAMES, UNO.
3. REFER TO DETAIL 3/S-531.3 FOR ANCHOR ROD EMBEDMENT DEPTH.
4. SEE 1/S-531.3 FOR CASE 1 BASE PLATE TYPE. SEE 4/S-531.3, 5/S-531.3 AND 6/S-531.3 FOR CASE 2 BASE PLATE TYPE.



PLAN



1 / S-531.3 **COLUMN BASE DETAIL TYP CASE 1**
SCALE: 1" = 1'-0"

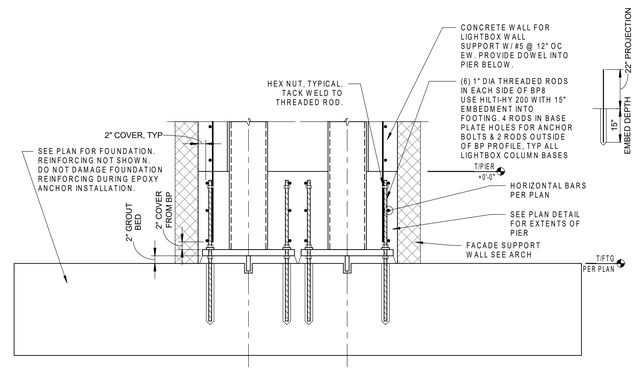


PLAN SECTION

NOTES:

1. IT IS THE CONTRACTORS RESPONSIBILITY TO PROVIDE SUFFICIENT TEMPORARY SUPPORT OF COLUMN BASE PLATES USING LEVELING PLATES, LEVELING NUTS/WASHERS OR STEEL SHIMS (OR COMBINATION THEREOF PRIOR TO PLACEMENT AND CURING ON NON-SHRINK GROUT.
2. SHEAR LUGS THAT ARE NOT THE FULL WIDTH OF THE BASE PLATE PER SCHEDULE SHOULD BE CENTERED ON THE BASE PLATE.

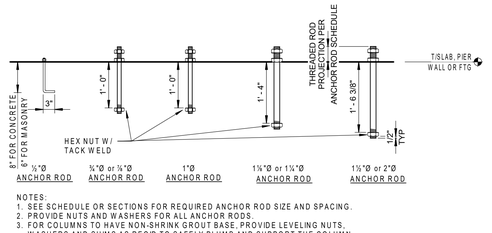
4 / S-531.3 **COLUMN BASE DETAIL TYP CASE 2**
SCALE: 1" = 1'-0"



6 / S-531.3 **LIGHTWALL BASE CONNECTION SECTION VIEW TYP CASE 2**
SCALE: 3/4" = 1'-0"

PLATE WASHER DIMENSIONS

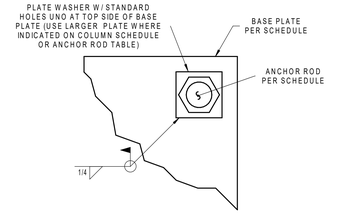
ANCHOR ROD DIA	REQD PLATE WASHER
<= 3/4"	1/4x2-1/2x2-1/2
1"	3/8x3-1/2x3-1/2
>1" TO 1.5"	1/2x3-1/2x3-1/2
> 1.5"	1/2x4x4



NOTES:

1. SEE SCHEDULE OR SECTIONS FOR REQUIRED ANCHOR ROD SIZE AND SPACING.
2. PROVIDE NUTS AND WASHERS FOR ALL ANCHOR RODS.
3. FOR COLUMNS TO HAVE NON-SHRINK GROUT BASE, PROVIDE LEVELING NUTS, WASHERS AND SHIMS AS REQ'D TO SAFELY PLUMB AND SUPPORT THE COLUMN UNTIL GROUT HAS ATTAINED 28-DAY COMPRESSIVE STRENGTH

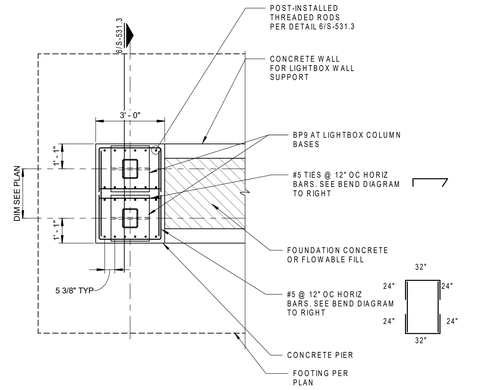
3 / S-531.3 **TYPICAL ANCHOR ROD DETAILS**
SCALE: 3/4" = 1'-0"



NOTES:

1. THIS DETAIL APPLIES AT ALL COLUMN ANCHOR RODS AT BRACED FRAMES AND MOMENT FRAMES UNO.

2 / S-531.3 **PLATE WASHER DIMENSIONS**
SCALE: 1/2" = 1'-0"



5 / S-531.3 **LIGHTWALL BASE CONNECTION PLAN VIEW TYP CASE 2**
SCALE: 3/8" = 1'-0"

SCHMIDT ASSOCIATES
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DYLAN SEESMAN REGISTERED No. PE11900810 STATE OF INDIANA PROFESSIONAL ENGINEER
03.03.2023

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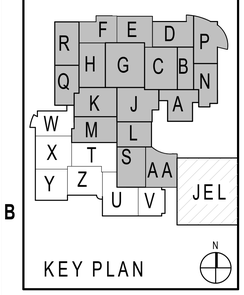

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

COLUMN SCHEDULE, SECTIONS, & DETAILS

S-531.3

S-531_3_COLUMN SCHEDULE, SECTIONS, & DETAILS
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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4/6/2023 4:48:37 PM

3A SECOND FLOOR DEMOLITION PLAN-UNIT H
1/8" = 1'-0"

DEMOLITION FLOOR PLAN NOTES

Refer to sheet A-001.3 for general demolition notes that apply to all demo work.

#	NOTE
1	REMOVE EXISTING EXTERIOR WALL CONSTRUCTION TO 8" BELOW FINISH FLOOR LINE IN ITS ENTIRETY TO LIMITS INDICATED. REMOVE ALL DOORS, FRAMES, WINDOWS AND MISCELLANEOUS FRAMING IN ITS ENTIRETY. PROTECT ALL EXISTING STRUCTURAL MEMBERS TO REMAIN. PREPARE ADJACENT SURFACES TO REMAIN FOR NEW WORK. REFERENCE A-SERIES AND I-SERIES FLOOR PLANS FOR FINISH CONDITIONS. REFER TO SECTION(S) FOR FURTHER DEFINITION OF DEMOLITION WORK.
2	REMOVE EXISTING INTERIOR WALL CONSTRUCTION IN ITS ENTIRETY TO LIMITS INDICATED INCLUDING, BUT NOT LIMITED TO, DOORS, FRAMES, WINDOWS AND ALL MISCELLANEOUS FRAMING. FIELD VERIFY ALL EXISTING WALL CONSTRUCTION PRIOR TO DEMOLITION. REFER TO ARCHITECTURAL AND INTERIOR FLOOR PLANS FOR FINISH CONDITIONS AND DIMENSIONS. NEW CONSTRUCTION TO TOOTH-IN TO EXISTING MASONRY COURSING WHERE APPLICABLE. PATCH AND REPAIR EXISTING ADJACENT SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION.
3	REMOVE EXISTING SUSPENDED LAY-IN PANEL CEILING SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE CEILING PADS, GRID, SUSPENSION WIRES, AND ALL RELATED ANCHORS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
4	REMOVE EXISTING GYPSUM BOARD CEILING SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE GYPSUM BOARD, SUSPENDED FRAMING AND ALL RELATED ANCHORS/FASTENERS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
5	EXISTING EXPOSED STRUCTURE AND ROOF DECK TO REMAIN. PREP FOR NEW CONSTRUCTION, REFERENCE AC-SERIES DRAWINGS FOR NEW CEILING(S) AND I-SERIES DRAWINGS FOR NEW FINISH(ES).
6	REMOVE EXISTING GYPSUM BOARD BULKHEAD IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE GYPSUM BOARD, STUD FRAMING AND ALL ASSOCIATED ANCHORS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
7	REMOVE EXISTING STOREFRONT/ENTRY SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE GLAZING, FRAMING, SEALANTS, DOORS, HARDWARE AND ALL RELATED ANCHORS. PATCH AND REPAIR ADJACENT SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
8	REMOVE SLAB IN HATCHED AREA AS REQUIRED FOR NEW SLAB/PLATFORM. REFER TO S-SERIES DRAWINGS
9	REMOVE EXISTING DOOR SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE DOOR, FRAME, SIDELIGHTS, GLAZING, HARDWARE AND ALL RELATED ANCHORS. PREP EXISTING OPENING FOR NEW CONSTRUCTION. PATCH AND REPAIR ALL ADJACENT SURFACES TO REMAIN FOR NEW CONSTRUCTION/FINISH.
10	REMOVE EXISTING FIRE EXTINGUISHER CABINET AND EXTINGUISHER AND TURN THEM OVER TO THE OWNER IN GOOD WORKING CONDITION
11	REMOVE EXISTING OPERABLE PARTITION SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE OPERABLE PARTITION PANELS, TRIMS, TRACK, SUPPORTS AND ALL RELATED ANCHORS. PATCH AND REPAIR ADJACENT SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
12	REMOVE EXISTING STOREFRONT AND/OR CURTAINWALL SYSTEM IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE GLAZING, SPANDREL PANELS, WINDOW FRAME, SEALANTS, AND ALL RELATED ANCHORS. PATCH AND REPAIR ADJACENT SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
13	REMOVE EXISTING CORRIDOR LOCKER(S) IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE LOCKERS, TRIMS, CURB, BULKHEAD AND ALL ASSOCIATED ANCHORS TO LIMITS INDICATED. PROTECT ADJACENT LOCKERS, CURBS AND BULKHEAD TO REMAIN. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION.
14	REMOVE EXISTING LOCKER(S) IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE LOCKERS, TRIMS, SLOPED TOPS, CURB AND ALL ASSOCIATED ANCHORS TO LIMITS INDICATED. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION.
15	REMOVE EXISTING WOOD BENCHES IN THEIR ENTIRETY INCLUDING, BUT NOT LIMITED TO THE BENCH, STEEL PEDESTALS, STEEL MOUNTING PLATES AND ALL RELATED ANCHORS. PATCH AND REPAIR EXISTING FLOOR SURFACES AND PREP FOR NEW CONSTRUCTION/FINISH.
16	REMOVE EXISTING WALL MOUNTED TACK BOARDS, MARKERBOARDS, CHALKBOARDS ADHESIVES, ANCHORS AND ALL RELATED ACCESSORIES IN THEIR ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH. SEE A-SERIES AND I-SERIES DRAWINGS.
17	REMOVE EXISTING TOILET PARTITIONS AND URINAL PARTITIONS IN THEIR ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
18	REMOVE EXISTING TOILETS, SINKS, URINALS AND ALL RELATED ACCESSORIES IN THEIR ENTIRETY INCLUDING, BUT NOT LIMITED TO TOILET PAPER DISPENSERS, GRAB BARS, MIRRORS AND SOAP DISPENSERS. PATCH AND REPAIR ALL EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION/FINISH. SEE P-SERIES DRAWINGS FOR PLUMBING SCOPE.
19	REMOVE EXISTING DRINKING FOUNTAIN(S) IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE DRINKING FOUNTAIN, SEALANTS, PIPING, POWER AND ALL RELATED ANCHORS. SEE P-SERIES DRAWINGS.
20	REMOVE FREEZER/COOLER UNITS IN THEIR ENTIRETY. PREPARE AREA FOR NEW CONSTRUCTION.
21	REMOVE EXISTING SERVICE SINK IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH. SEE P-SERIES DRAWINGS FOR PLUMBING SCOPE.
22	REMOVE EXISTING CASEWORK IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO WALL CABINETS, BASE CABINETS, COUNTERTOPS, FILL PANELS, SINKS AND ALL RELATED TRIMS. PATCH AND REPAIR ALL EXISTING ADJACENT SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
23	REMOVE EXISTING COUNTERTOP AND SUPPORT BRACKETS IN THEIR ENTIRETY AND ALL RELATED ANCHORS AND SEALANTS. PATCH AND REPAIR EXISTING WALL SURFACE TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
24	REMOVE EXISTING RAMP/STAIR, RAILING, LANDING IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACE TO REMAIN. PREP FOR NEW CONSTRUCTION. COORDINATE DEMOLITION WITH S-SERIES DWGS.
25	REMOVE EXISTING CONCRETE FLOOR SLAB IN ITS ENTIRETY TO LIMITS INDICATED. REFERENCE MEP-SERIES DRAWINGS FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING BUILDING CONDITIONS IN THE FIELD.
26	REMOVE EXISTING WOOD STEP/BENCH CONSTRUCTION, INCLUDING BUT NOT LIMITED TO ANY ASSOCIATED BLOCKING, ADHESIVE, AND FLOOR FINISH. PREP REMAINING CONSTRUCTION FOR NEW WORK
27	REMOVE EXISTING DISPLAY CASE IN ITS ENTIRETY, INCLUDING BUT NOT LIMITED TO DOORS, SHELVES, AND ANY ASSOCIATED ACCESSORIES. PREP OPENING FOR NEW CONSTRUCTION
28	REMOVE EXISTING RECEPTION DESK IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE COUNTERTOP, BASE CABINETS, CMU/STUD SUPPORT WALLS, WALL BASE AND ALL RELATED ANCHORS. PATCH AND REPAIR EXISTING WALL AND FLOOR SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
29	REMOVE EXISTING OVERHEAD COILING COUNTERTOP DOOR OR GRILLE INCLUDING, BUT NOT LIMITED TO, DOOR, TRACK, OPERATOR, AND ANY ASSOCIATED HANGERS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP OPENING FOR NEW CONSTRUCTION
30	REMOVE EXISTING OVERHEAD COILING DOOR OR GRILLE INCLUDING BUT NOT LIMITED TO DOOR, TRACK, OPERATOR, AND ANY ASSOCIATED HANGERS OR OTHER ACCESSORIES. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP OPENING FOR NEW CONSTRUCTION.
31	REMOVE EXISTING DUMBWAITER SYSTEM INCLUDING BUT NOT LIMITED TO DOORS, CARRIAGE, MECHANICAL COMPONENTS, AND TRACK.
32	REMOVE EXISTING SINK BASIN(S), INCLUDING COUNTERTOP AND SUPPORT BRACKETS. PATCH AND REPAIR ALL EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION/FINISH. SEE P-SERIES DRAWINGS FOR PLUMBING SCOPE.
33	REMOVE EXISTING WALL BELOW OPENING TO 8" BELOW FLOOR. REMOVE WALL AT TOP OF OPENING TO FORM RIGHT ANGLES AT BOTH CORNERS.PREP SURFACES FOR NEW CONSTRUCTION. REF INTERIOR ELEVATIONS.
34	REMOVE EXISTING RAILING IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACE TO REMAIN. PREP FOR NEW CONSTRUCTION.
35	REMOVE EXISTING CARPET FLOOR FINISH IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO THE CARPET, ADHESIVES/TACK STRIPS, TRANSITION STRIPS AND ALL ASSOCIATED WALL BASE. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
36	REMOVE EXISTING WALL/COVERING IN ITS ENTIRETY INCLUDING ADHESIVES. PATCH AND REPAIR ALL EXISTING SURFACES TO REMAIN. PREP EXISTING SURFACES FOR NEW CONSTRUCTION/FINISH.
37	REMOVE EXISTING CONCRETE TIERS AND ASSOCIATED FRAMING/SUPPORT SYSTEM IN ITS ENTIRETY TO LIMITS INDICATED. REFERENCE MEP-SERIES DRAWINGS FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING BUILDING CONDITIONS IN THE FIELD.

DEMOLITION HATCHING LEGEND

24, 53, 6, 37, 86 Concrete Floor Slabs/Tiers Demolition		50 Composite Slab Demolition	
60, 26, 100 Platform/Wood Construction Demolition		51, 95, 42, 70 Miscellaneous Demolition	
98, 74 Structural Demolition		72, 55, 80 Protect During Demolition/ Construction	

DEMOLITION FLOOR PLAN NOTES

Refer to sheet A-001.3 for general demolition notes that apply to all demo work.

#	NOTE
38	REMOVE EXISTING RAMP/STAIR, RAILING, LANDING IN ITS ENTIRETY ON FIRST AND SECOND FLOOR. LOWER LEVEL RAMP/STAIR, RAILING, LANDING, AND SECOND FLOOR LANDING TO REMAIN. PATCH AND REPAIR EXISTING SURFACE TO REMAIN. PREP FOR NEW CONSTRUCTION.
39	REMOVE ART HOOD. PREPARE HOOD DUCTWORK TO RECEIVE NEW CONSTRUCTION. REFER TO M-SERIES DWGS
40	REMOVE BLEACHERS IN THEIR ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION.
41	REMOVE EXISTING URINAL(S) AND ALL RELATED ACCESSORIES IN THEIR ENTIRETY. PATCH AND REPAIR ALL EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION/FINISH. SEE P-SERIES DRAWINGS FOR PLUMBING SCOPE.
42	09 30 00 - REPLACE DAMAGED FLOOR/WALL TILES IN SHADED AREA WITH TILES AND PATTERN TO MATCH EXISTING. PROVIDE "X" SQUARE FEET ("X" INDICATED ON DEMO PLANS) OF TILE REPLACEMENT AT LOCATIONS INDICATED. CONFIRM TILE TYPE AND PATTERN IN THE FIELD. CONFIRM FINAL EXTENTS AT EACH AREA OF CRACKED TILE WITH ARCHITECT IN THE FIELD.
43	REMOVE QUARRY TILE FLOORING AND ASSOCIATED SETTING BED AND BASE. PREPARE AREA TO RECEIVE NEW CONSTRUCTION
44	REMOVE CERAMIC WALL TILE ON ALL WALLS IN THIS ROOM. PREPARE SURFACES TO RECEIVE NEW FINISH.
45	REMOVE FOOD SERVICE EQUIPMENT. STORE AND PROTECT ITEMS TO BE RELOCATED PER QK SERIES DWGS.
46	GENERAL CLASSROOM INTERIOR FINISHES ALTERNATE - APPLY DEMO NOTES 3, 22, 35, AND 36 TO THIS ROOM.
47	REMOVE VCT FLOORING IN ITS ENTIRETY INCLUDING ADHESIVES, TRANSITIONS, AND ALL ASSOCIATED WALL BASE. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION.
48	REMOVE CERAMIC COVE BASE WALL TILE ON ALL WALL BASES IN THIS ROOM. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP TO RECEIVE NEW CONSTRUCTION/FINISH.
49	REMOVE EXISTING SHOWER CURB IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH.
50	REMOVE COMPOSITE FLOOR SLAB AND ASSOCIATED FRAMING IN HATCHED AREA. REFER TO S-SERIES DWGS.
51	REMOVE RECESSED FLOOR MAT IN ITS ENTIRETY. INFILL RECESS WITH TOPPING SLAB TO LEVEL OUT TO EXISTING ADJACENT FLOOR. PREPARE AREA TO RECEIVE NEW CONSTRUCTION.
52	REMOVE ALL LIBRARY SHELVING FROM THIS ROOM. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION/FINISH
53	REMOVE SLAB ON GRADE IN HATCHED AREAS FOR INSTALLATION OF NEW FOOTINGS, ETC. REFER TO S-SERIES DWGS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
54	REMOVE PORCELAIN WALL TILE AND ASSOCIATED ADHESIVE AND TACKWALL. PREPARE SURFACES FOR NEW CONSTRUCTION.
55	PROTECT TERRAZZO MEDALLION DURING CONSTRUCTION.
56	REMOVE 3-SIDED GLASS DISPLAY CASE IN ITS ENTIRETY INCLUDING BASE. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP FOR NEW FINISH
57	REMOVE PANTHER SCULPTURE - STORE AND PROTECT FOR RELOCATION INTO PHASE 2 UNIT W SECOND FLOOR.
58	REMOVE INTERIOR PLANTS AND ASSOCIATED SOIL. PREPARE PLANTERS TO RECEIVE NEW CONSTRUCTION.
59	REMOVE SCHOOL WOOD CREST - STORE AND PROTECT FOR RELOCATION IN NEW CONSTRUCTION.
60	REMOVE WOOD PANELING SYSTEM INCLUDING FASTENERS, ADHESIVES, TRIM, ETC. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
61	WALL ELEVATOR ALTERNATE: REMOVE TRACTION ELEVATOR IN ITS ENTIRETY INCLUDING ALL ASSOCIATED COMPONENTS AND MACHINERY. PREPARE SHAFT TO RECEIVE NEW ELEVATOR CONSTRUCTION.
62	REMOVE ACOUSTICAL CEILING PANELS FROM EXISTING GRID (ABOVE). PREPARE GRID TO RECEIVE NEW CEILING PANELS.
63	REMOVE BUILDING PLAQUE. STORE AND PROTECT FOR RELOCATION IN NEW CONSTRUCTION.
64	REMOVE DOOR PANEL(S) AND ASSOCIATED HARDWARE FROM EXISTING FRAME TO REMAIN. PREP FRAME TO RECEIVE NEW DOOR PANEL(S) - REFER TO DOOR SCHEDULE.
65	REMOVE PLATFORM CONSTRUCTION IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREP FOR NEW CONSTRUCTION/FINISH
66	REMOVE CERAMIC TILE MOSAIC FLOORING IN ITS ENTIRETY INCLUDING GROUT, ADHESIVE, AND ASSOCIATED WALL BASE. PREP AREA TO RECEIVE NEW FLOORING. MOSAIC FLOOR TILE WALL BASE TO REMAIN AROUND CORRIDOR DRINKING FOUNTAIN LOCATIONS. REFERENCE I-501.3 FOR SCOPE OF WORK AND TYPICAL CORRIDOR DRINKING FOUNTAIN CONDITIONS.
67	MAIN GYM RAILING ALTERNATE: REMOVE EXISTING RAILING IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACE TO REMAIN. PREP FOR NEW CONSTRUCTION.
68	REMOVE ELEC. AIR DRYER. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
69	REMOVE PREFABRICATED MUSIC PRACTICE ROOM, PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
70	REMOVE BLEACHERS IN THEIR ENTIRETY. TAKE CARE TO DISCONNECT SPRINKLER LINES UNDER THE BLEACHERS PRIOR TO REMOVAL. COORDINATE WITH CM AND SPRINKLER CONTRACTOR. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREPARE TO RECEIVE NEW BLEACHER CONSTRUCTION.
71	REMOVE WALL PADS IN THEIR ENTIRETY AND ASSOCIATED FASTENERS, ADHESIVES, ETC. PATCH AND REPAIR EXISTING SURFACES TO REMAIN. PREPARE AREA TO RECEIVE NEW CONSTRUCTION.
72	BASE BID: REMOVE GATE(S)/RAILING(S) TO EXTENTS INDICATED. REFERENCE AF1K2.3 FOR DETAILS. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND PREP FOR NEW CONSTRUCTION/FINISH
73	COORDINATE REMOVAL OF BANNERS AND OTHER WALL ADORNMENTS WITH OWNER AS REQUIRED FOR RE-PAINTING OF WALLS IN THIS ROOM.
74	02 41 16 - SELECTIVE STRUCTURAL DEMOLITION. REF S-SERIES DRAWINGS FOR EXTENTS. COORD. W/ MEPT SERIES DWGS FOR REMOVAL OF UTILITIES AND WHICH SYSTEMS TO REMAIN INTACT DURING CONSTRUCTION.
75	EXISTING PLUMBING PIPE TO REMAIN. PROTECT LINE DURING DEMOLITION OF ADJACENT CONSTRUCTION. REFER TO P-SERIES DWGS.
76	REMOVE ALL WALL MOUNTED ITEMS IN THIS ROOM ON WALLS SHOWN TO REMAIN, INCLUDING BUT NOT LIMITED TO MARKERBOARDS, TACKBOARDS, SHELVES, BRACKETS, ETC. PATCH AND REPAIR EXISTING SURFACES TO REMAIN
77	REMOVE COLUMN ENCLOSURE WALL CONSTRUCTION IN ITS ENTIRETY.
78	REMOVE EXISTING RECESSED CAN LIGHTS AND PREPARE OPENING TO RECEIVE NEW FLUSH PLASTER CEILING INFILL. REFER TO E-SERIES AND T-SERIES DWGS.
79	REMOVE EXISTING CEILING MOUNTED PIPE BATTENS IN THEIR ENTIRETY AND PREPARE SUPPORT LEG OPENINGS TO RECEIVE NEW FINISH PLASTER CEILING INFILL. REFER TO E-SERIES AND T-SERIES DWGS.
80	PROTECT ATHLETIC WOOD FLOORING DURING CONSTRUCTION
81	REMOVE EXTERIOR DOOR SIGNAGE. PREPARE WALL SURFACE FOR NEW SIGNAGE. REFER TO UNIT FLOOR PLANS.
82	EXTENSIVE SLAB DEMOLITION IN THIS AREA. REFER TO P-SERIES DWGS FOR EXTENTS.
83	REMOVE WIRE MESH PARTITION SYSTEM IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
84	REMOVE LIMESTONE SCHOOL CREST. STORE AND PROTECT FOR RELOCATION IN NEW CONSTRUCTION. PATCH AND REPAIR EXISTING SURFACES TO REMAIN AND TO MATCH EXISTING ADJACENT WALL CONSTRUCTION.
85	REMOVE EXISTING METAL PANEL OVERHANG AND ASSOCIATED FRAMING/STRUCTURE. REFER TO S-SERIES DWGS AND WALL SECTIONS.
86	REMOVE CONCRETE FLOOR SLAB TO ALIGN WITH NEW EXTERIOR WALL FACE - REFER TO WALL SECTIONS IN THIS AREA.
87	REMOVE EXISTING FUME HOOD IN ITS ENTIRETY INCLUDING BUT NOT LIMITED TO BASE CABINET, PIPING, DUCTWORK, SHROUDS, ETC. REFER TO MEP SERIES DWGS FOR WORK TO ASSOCIATED SERVICES. STORE AND PROTECT DURING CONSTRUCTION FOR RELOCATION
88	REMOVE FIXED AUDIENCE SEATING. PREPARE AREA TO RECEIVE NEW SEATING - REFER TO TR-SERIES DWGS.
89	REMOVE MECH RETURN GRILLES - STORE AND PROTECT FOR REINSTALLATION IN SAME WALL AT DIFFERENT ELEVATION. REFER TO INT. ELEVS.
90	REMOVE BATTING CAGE NETTING SYSTEM IN ITS ENTIRETY INCLUDING BUT NOT LIMITED TO SUPPORT STRUCTURE, WINCHES, ETC.
91	REMOVE TENNIS WALL STRUCTURE IN ITS ENTIRETY INCLUDING BUT NOT LIMITED TO SUPPORT STRUCTURE, ANCHORAGE, ADHESIVES, ETC. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
92	REMOVE EIFS SOFFIT AT ROOF OVERHANG - REFER TO NEW ROOF EDGE DETAIL FOR ASSOCIATED WORK.
93	REMOVE DIVING BOARD AND ASSOCIATED BASE IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
94	REMOVE PORTION OF STORAGE BENCH TO JOINT OF HINGED TOP PANEL AS REQUIRED FOR ACCESS TO NEW DOOR OPENING IN EXTERIOR WALL. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
95	REMOVE CRACKED TILES ON POOL DECK - REFER TO UNIT FLOOR PLAN FOR FURTHER DEFINITION OF AREAS.
96	REMOVE WOOD WAINSCOT FROM WALL SURFACE. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
97	REMOVE WOOD BLOCKING AROUND LOADING DOCK OPENING. PREPARE WALL SURFACE TO RECEIVE NEW LOADING DOCK SEALS.
98	02 41 16 - STRUCTURAL DEMOLITION: REMOVE BUILDING CONNECTION (HATCHED AREA) IN ITS ENTIRETY, INCLUDING FOUNDATIONS, SLABS, ROOFING, AND ASSOCIATED STRUCTURE. MAINTAIN HVAC PIPING FROM THE HIGH SCHOOLTO J.E.L BUILDING - REFER TO M-SERIES DWGS FOR SCOPE OF WORK WITH THESE PIPES. COORDINATE STRUCTURE DEMOLITION WITH CONSTRUCTION MANAGER TO KEEP SERVICES INTACT FOR J.E.L. BUILDING AS REQUIRED. REFER TO MEPT SERIES DWGS FOR ASSOCIATED DEMOLITION SCOPE. PATCH AND REPAIR EXISTING SURFACES TO REMAIN.
99	REMOVE DECORATIVE GLAZING FROM APPLICABLE PANES. PREPARE FRAME TO RECEIVE NEW GLAZING IN THESE OPENINGS.
100	REMOVE WOOD FLOORING IN ITS ENTIRETY. PATCH AND REPAIR EXISTING SURFACES TO REMAIN, PREP AREA TO RECEIVE NEW FLOOR FINISH.
101	NOT USED - REFER TO DOOR SCHEDULE.
102	REMOVE DOOR PANEL AND ASSOCIATED HARDWARE FROM EXISTING FRAME TO REMAIN. PATCH AND REPAIR FRAME TO REMAIN.
103	SCIENCE CLASSROOM INTERIOR FINISHES ALTERNATE - APPLY DEMO NOTES 3, 36, AND 35/47 (DEPENDING ON EXISTING CONDITIONS - VIF) TO THIS ROOM. TEMPORARILY DISCONNECT TABLES AS NEEDED TO DEMOLISH FLOOR FINISH
104	REMOVE EXISTING DARK ROOM SINK BASIN, INCLUDING COUNTERTOP AND SUPPORT BRACKETS. STORE AND PROTECT FOR RELOCATION IN NEW CONSTRUCTION, REF P-SERIES DRAWINGS FOR PLUMBING SCOPE.

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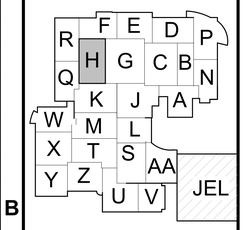
#	Revision	Date
A2.3	ADDENDUM 2.3	03.22.2023
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR DEMOLITION PLAN-UNIT H

AD1H2.3

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2019-067.NCH, A3.3 of Washington Township, North Central High School Renovation,
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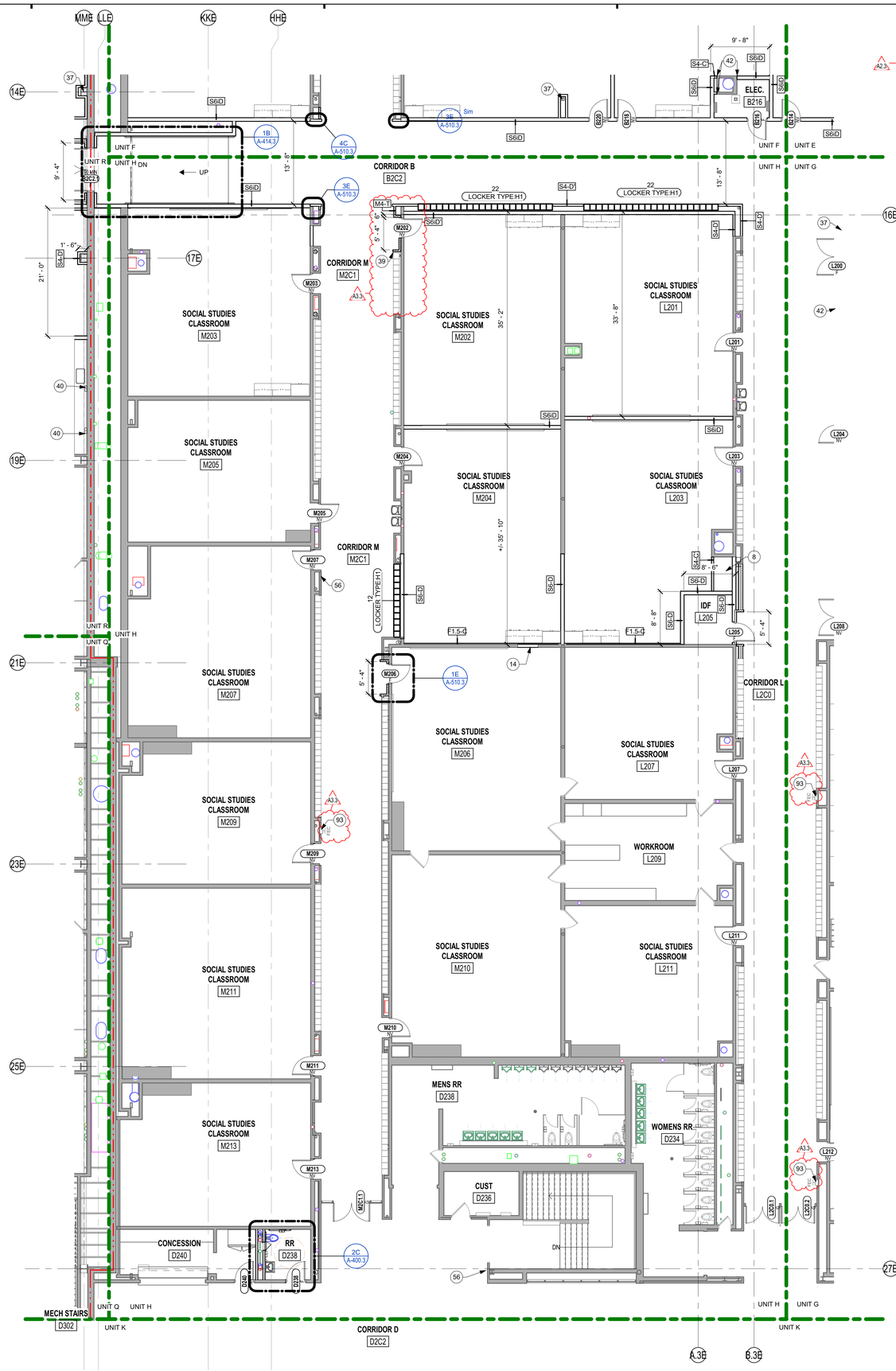

FLOOR PLAN NOTES

Refer to sheet A-001.3 for general plan notes that apply to all plan work.

#	Note
1	NEW FLOOR SLAB - REF S-SERIES DWGS
2	057500 - METAL COLUMN COVER, 16" DIAMETER.
3	FLOOR INFILL - REFER TO S-SERIES DWGS
4	079500 - INTERIOR FLOOR-TO-FLOOR EXPANSION JOINT SYSTEM.
5	102219 - FOLDING PANEL PARTITION
6	111316 - NEW LOADING DOCK SEALS ON EXISTING OPENING.
7	EXISTING TRASH COMPACTOR TO REMAIN
8	CUT EXISTING FLOOR SLAB FOR NEW MECHANICAL CHASE, REF S-SERIES DWGS
9	WASHER AND DRYER, OWNER PROVIDED
10	114000 - FOOD SERVICE EQUIPMENT- REF Q-SERIES DWGS
11	033000 - TOPPING SLAB INFILL OF RECESSED FLOOR MAT AREA. PREP AREA TO RECEIVE NEW FLOOR MATERIAL.
12	088300 - WALL MIRRORS 6'-0" TALL, 3'-3" WIDE MAX. EQUALLY SPACE JOINTS. MOUNT 1'-0" A.F.F.
13	122200 - WALL MOUNTED TRACK CURTAINS. LENGTH TO CONCEAL MIRRORS. MOUNT TRACK AT 10'-0" A.F.F.
14	INFILL OPENING WITH WALL TO MATCH SURROUNDING/ADJACENT WALL CONSTRUCTION. VERIFY EXISTING WALL CONDITIONS/CONSTRUCTION AND DIMENSIONS IN THE FIELD. ALIGN THE FACE OF THE NEW INFILL WALL WITH THE ADJACENT EXISTING WALL FACE. TOOTH NEW MASONRY INTO EXISTING CONSTRUCTION WHERE APPLICABLE
15	088300 - 48" X 54" MIRROR MOUNTED AT 2'-6" A.F.F.
16	088300 - 24" H CONTINUOUS MIRROR MOUNTED 4" ABOVE COUNTERTOP. 40" MAX TO BOTTOM OF REFLECTIVE SURFACE
17	BASE BID: INFILL EXISTING OPENING TO MATCH ADJACENT RAILING. MODIFY GUARDRAIL AS REQUIRED TO CREATE SEAMLESS TRANSITION.
18	079500 - INTERIOR FLOOR-TO-WALL EXPANSION JOINT SYSTEM. EXTEND LENGTH OF WALL.
19	116623 - GYMNASIUM ATHLETIC WALL PADS
20	079500 - INTERIOR WALL-TO-WALL EXPANSION JOINT SYSTEM. EXTEND FROM FLOOR TO CEILING.
21	NEW OPENING IN EXISTING WALL. REF DEMO PLANS AND INTERIOR ELEVATIONS
22	120890.99 - INDUSTRIAL SHELVING UNITS, 72"W X 24"D X 96" H EACH
23	120890.99 - INDUSTRIAL SHELVING UNITS, 48"W X 24"D X 96" H EACH
24	055300 - FLOOR GRATING OVER RECESS IN SLAB. REF SECTION DETAIL
25	102213 - WIRE MESH PARTITION AND GATE - FLOOR TO DECK ABOVE
26	042000 - 56" TALL 8" CMU WALL WITH DOUBLE BULLNOSE SOLID CMU CAP. CONFIRM LOCATION OF WALL WITH FOOD SERVICE EQUIPMENT LAYOUT.
27	033000 - 4" CONCRETE FLOOR SLAB - COORDINATE DEPTH WITH FOODSERVICE EQUIPMENT REQUIREMENTS
28	033000 - 4" CONCRETE SLAB, REF S SERIES DWGS
29	033000 - TOPPING SLAB OF RECESSED FLOOR MAT AREA. PREP AREA TO RECEIVE NEW FLOOR MATERIAL.
30	079500 - EXTERIOR WALL TO WALL EXPANSON JOINT COVER
31	079500 - INTERIOR WALL TO WALL CORNER EXPANSION JOINT COVER
32	077100 - METAL DOWNSPOUT, REF ROOF PLAN FOR SIZE. COORD WITH C-SERIES DWGS FOR BOOT CONNECTION.
33	033000 - 4" CONCRETE FLOOR SLAB. REF S-SERIES DWGS
34	033000 - RECESSED 4" CONCRETE SLAB. COORDINATE DEPTH WITH FOOD SERVICE EQUIPMENT REQUIREMENTS
35	092713 - GFRC TAPERED PIER - REF TYPICAL DETAILS, A-500 SERIES DWGS
36	057500 - METAL COLUMN COVER, 24" DIAMETER.
37	NEW ENCLOSURE AROUND EXISTING COLUMN USING WALL TYPE S4-C', MAINTAIN 1" MIN. CLEAR AROUND COLUMN. DO NOT ATTACH TO COLUMN.
38	084113 - BRAKE METAL CLOSURE TRIM FROM WALL TO MULLION.
39	105113 - LOCKER TRIM
40	PAPER TOWEL AND SOAP DISPENSERS - OWNER FURNISHED, CONTRACTOR INSTALLED. COORD LOCATION IN FIELD.
41	BASE BID: NEW GATE OPENINGS IN EXISTING RAILING. REF DETAILS. MAIN GYM RAILING ALTERNATE: NEW GUARDRAIL TYPE A WITH OPERABLE GATES.
42	ALIGN FACE OF WALLS
43	LINE OF CANOPY ABOVE
44	CENTER NEW WALL CONSTRUCTION ON COLUMN CENTERLINE
45	092713 - GFRC COLUMN WRAP - REF TYPICAL DETAILS, A-500 SERIES DWGS
46	077100 - 2X2 DOWNSPOUT TO SPLASH BLOCK AT GRADE.
47	K HALL ELEVATOR ALTERNATE: 142400 - NEW ELEVATOR IN EXISTING ELEVATOR SHAFT, REF ENLARGED PLANS AND SECTIONS. V.I.F.
48	064023 - SOLID SURFACE OVER EXISTING PLANTER, REF ENLARGED PLANS AND DETAILS.
49	BALCONY RAILING ALTERNATE: 057300 - GLASS RETROFIT GUARDRAIL ATTACHED TO EXISTING ALUMINUM RAILING, REF TYP DETAILS
50	057300 - STAINLESS STEEL HANDRAIL - REF ENLARGED PLANS AND DETAILS
51	ALIGN RAIL WITH CENTERLINE OF EXISTING AUDITORIUM DOORS.
52	RELOCATED EXISTING FUME HOOD, REF M-SERIES DWGS
53	ALIGN NEW OPENING WITH OPENING ACROSS THE HALL
54	102123 - CUBICLE CURTAIN AND TRACK
55	033000 - COMPOSITE FLOOR INFILL. REF S-SERIES DWGS
56	055000 - CUSTOM FIRE ALARM PULL COVER, REF TYPICAL DETAILS, A-500 DWGS.
57	083323 - OVERHEAD COILING SERVICE DOOR. REF DOOR SCHEDULE AND DETAILS
58	126600 - TELESCOPING STANDS, BANK A
59	126600 - MEDIA PLATFORM
60	096468.99 - REFINISH GYM WOOD FLOORING. REF I-SERIES DWGS FOR FLOOR PATTERNS, ETC.
61	057300 - RAILING TYPE A. REF RAIL TYPES SHEET AND DETAILS
62	126600 - TELESCOPING STANDS, BANK B
63	126600 - TELESCOPING STANDS, BANK C
64	126600 - TELESCOPING STANDS, BANK D
65	NOT USED
66	SHOWER TRENCH DRAIN, REF DETAIL IN A-400 SERIES DWGS. COORD WITH P-SERIES DWGS
67	126600 - TELESCOPING STANDS, BANK E
68	NOT USED
69	SOUTH CANOPY ALTERNATE: CANOPY AND LIGHT WALL CONSTRUCTED AS SHOWN.
70	EAST PERFORMING ARTS ENTRANCE ALTERNATE: REF SHEET A324.3 FOR ALTERNATE
71	NOT USED
72	REMOVE EXISTING STORAGE BENCH AS REQUIRED FOR NEW DOOR. DEMO TO EXISTING SEAM LOCATION. PATCH AND REPAIR WALL SURFACE TO REMAIN. CAP END OF BENCH AND FINISH TO MATCH EXISTING.
73	PAC ADDITIONAL WORK ALTERNATE: 126124 - NEW AUDIENCE SEATING AS SHOWN, REF TS-SEERIES DWGS
74	BASE BID: CONSTRUCT STAGE ACCESS AND STAIR AS SHOWN, MODIFY EXISTING AUDIENCE SEATING AS REQUIRED FOR NEW CONSTRUCTION. REF A-400 SERIES DWGS.
75	REF SHEET AF1S2 FOR CLERESTORY PLAN OF THIS ROOM
76	09 30 00 - REPLACE DAMAGED FLOOR/WALL TILES IN SHADED AREA WITH TILES AND PATTERN TO MATCH EXISTING. PROVIDE "X" SQUARE FEET ("X" INDICATED ON DEMO PLANS) OF TILE REPLACEMENT AT LOCATIONS INDICATED. CONFIRM TILE TYPE AND PATTERN IN THE FIELD. CONFIRM FINAL EXTENTS AT EACH AREA OF CRACKED TILE WITH ARCHITECT IN THE FIELD.
77	064023 - WOOD PANELING AND WAINSCOT, ALL SIDES OF COLUMN WRAP
78	CENTER PIER ON FACE OF WALL
79	DISPLAY WALL - REF I-SERIES DWGS
80	EXISTING RAIL TO REMAIN
81	EXTERIOR COLUMN WRAP PILASTER- REF A-500 SERIES DWGS FOR ELEVATION
82	EXTERIOR DECORATIVE PILASTER- REF A-500 SERIES DWGS FOR ELEVATION
83	033000 - CONCRETE TOPPING FLOOR SLAB TO BRING FINISH FLOOR ELEVATION TO MATCH EXISTING, REF I-SERIES DWGS FOR FINISH TYPE.
84	WALL IS CONCENTRIC TO EXTERIOR WALL; REF AF201.3 FOR GRADUATED DIMENSIONS OF EXTERIOR CURVE.
85	PAC ADDITIONAL WORK ALTERNATE: NEW COUNTERTOP AND WALL CAP, REF A-322.3
86	034100 - PRECAST CONCRETE EXTERIOR COLUMN, REF PILASTER PROFILES
87	087100 - AUTOMATIC DOOR OPENER PADDLE
88	RELOCATED WOODEN CREST (FROM AUDITORIUM ENTRANCE). FIELD VERIFY MOUNING LOCATION AND PROVISIONS WITH ARCHITECT/CM IN FIELD
89	RELOCATED DARK ROOM SINK. REF P-SERIES DRAWINGS
90	087100 - AUTOMATIC DOOR OPENER PADDLE ON BOLLARD
91	083436 - DARKROOM DOOR
92	104413 - SEMI-RECESSED FIRE EXTINGUISHER CABINET (FEC)
93	EXISTING FIRE EXTINGUISHER CABINET (FEC) TO REMAIN

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced SLS MM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Hempstead

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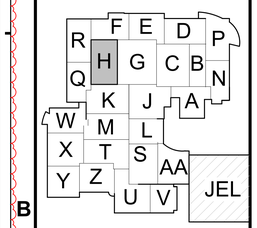
#	Revision	Date
A2.3	ADDENDUM 2.3	03.22.2023
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PLAN - UNIT H

AF1H2.3

AF1H2.3_SECOND FLOOR PLAN - UNIT H
2019-067.NCH_S.S. (1 of Washington Township, North Central High School Renovation_...
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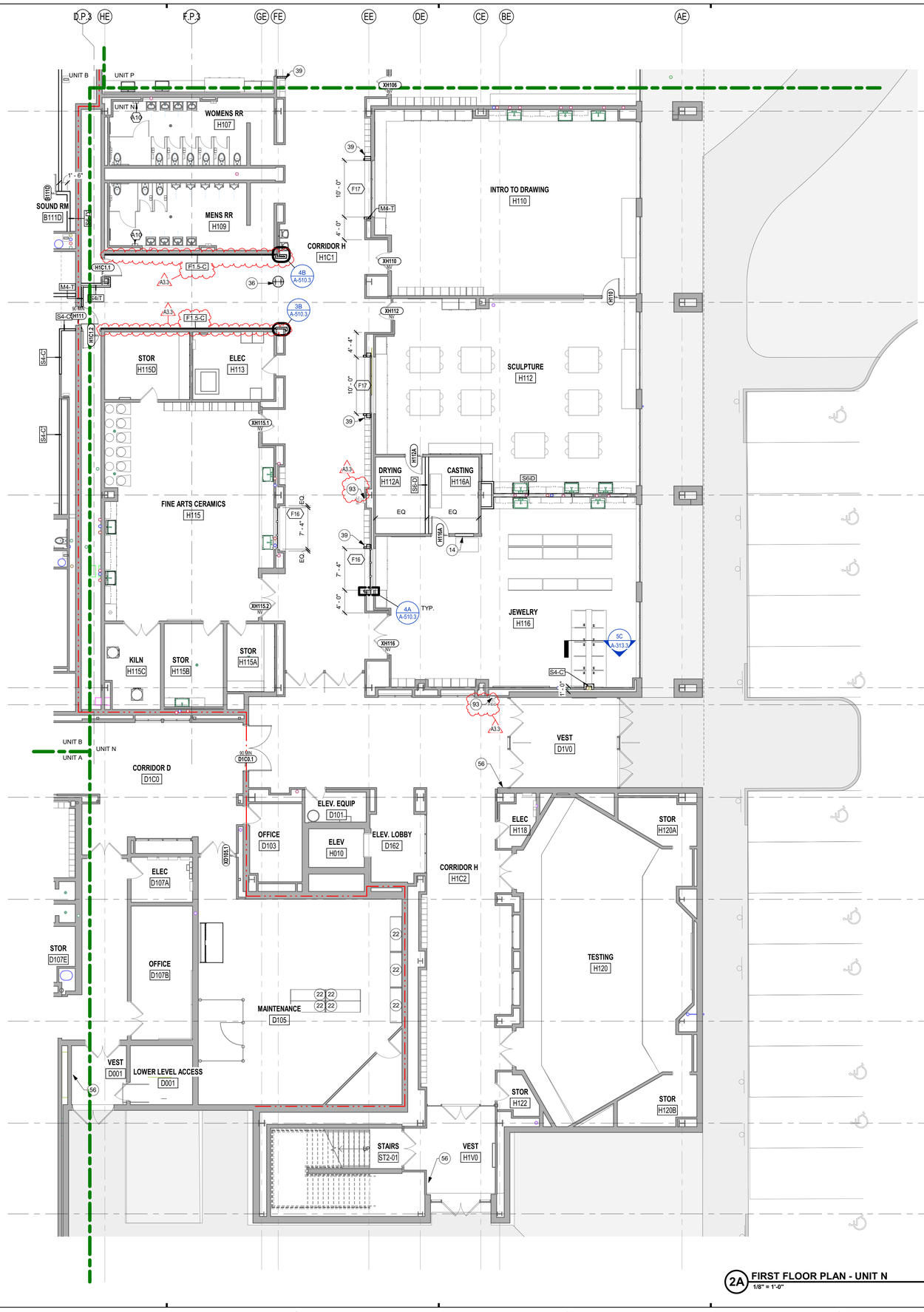

2A **FIRST FLOOR PLAN - UNIT N**
1/8" = 1'-0"

FLOOR PLAN NOTES

Refer to sheet A-001.3 for general plan notes that apply to all plan work.

#	Note
1	NEW FLOOR SLAB - REF S-SERIES DWGS
2	057500 - METAL COLUMN COVER, 16" DIAMETER.
3	FLOOR INFILL - REFER TO S-SERIES DWGS
4	079500 - INTERIOR FLOOR-TO-FLOOR EXPANSION JOINT SYSTEM.
5	102219 - FOLDING PANEL PARTITION
6	111316 - NEW LOADING DOCK SEALS ON EXISTING OPENING.
7	EXISTING TRASH COMPACTOR TO REMAIN
8	CUT EXISTING FLOOR SLAB FOR NEW MECHANICAL CHASE, REF S-SERIES DWGS
9	WASHER AND DRYER, OWNER PROVIDED
10	114000 - FOOD SERVICE EQUIPMENT- REF Q-SERIES DWGS
11	033000 - TOPPING SLAB INFILL OF RECESSED FLOOR MAT AREA. PREP AREA TO RECEIVE NEW FLOOR MATERIAL.
12	088300 - WALL MIRRORS 6'-0" TALL, 3'-3" WIDE MAX. EQUALLY SPACE JOINTS. MOUNT 1'-0" A.F.F.
13	122200 - WALL MOUNTED TRACK CURTAINS. LENGTH TO CONCEAL MIRRORS. MOUNT TRACK AT 10'-0" A.F.F.
14	INFILL OPENING WITH WALL TO MATCH SURROUNDING/ADJACENT WALL CONSTRUCTION. VERIFY EXISTING WALL CONDITIONS/CONSTRUCTION AND DIMENSIONS IN THE FIELD. ALIGN THE FACE OF THE NEW INFILL WALL WITH THE ADJACENT EXISTING WALL FACE. TOOTH NEW MASONRY INTO EXISTING CONSTRUCTION WHERE APPLICABLE
15	088300 - 48" X 54" MIRROR MOUNTED AT 2'-6" A.F.F.
16	088300 - 24" H CONTINUOUS MIRROR MOUNTED 4" ABOVE COUNTERTOP. 40" MAX TO BOTTOM OF REFLECTIVE SURFACE
17	BASE BID: INFILL EXISTING OPENING TO MATCH ADJACENT RAILING. MODIFY GUARDRAIL AS REQUIRED TO CREATE SEAMLESS TRANSITION.
18	079500 - INTERIOR FLOOR-TO-WALL EXPANSION JOINT SYSTEM. EXTEND LENGTH OF WALL.
19	116623 - GYMNASIUM ATHLETIC WALL PADS
20	079500 - INTERIOR WALL-TO-WALL EXPANSION JOINT SYSTEM. EXTEND FROM FLOOR TO CEILING.
21	NEW OPENING IN EXISTING WALL. REF DEMO PLANS AND INTERIOR ELEVATIONS
22	120890.99 - INDUSTRIAL SHELVING UNITS, 72"W X 24"D X 96" H EACH
23	120890.99 - INDUSTRIAL SHELVING UNITS, 48"W X 24"D X 96" H EACH
24	055300 - FLOOR GRATING OVER RECESS IN SLAB. REF SECTION DETAIL
25	102213 - WIRE MESH PARTITION AND GATE - FLOOR TO DECK ABOVE
26	042000 - 56" TALL 8" CMU WALL WITH DOUBLE BULLNOSE SOLID CMU CAP. CONFIRM LOCATION OF WALL WITH FOOD SERVICE EQUIPMENT LAYOUT.
27	033000 - 4" CONCRETE FLOOR SLAB - COORDINATE DEPTH WITH FOODSERVICE EQUIPMENT REQUIREMENTS
28	033000 - 4" CONCRETE SLAB, REF S SERIES DWGS
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30	079500 - EXTERIOR WALL TO WALL EXPANSON JOINT COVER
31	079500 - INTERIOR WALL TO WALL CORNER EXPANSION JOINT COVER
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36	057500 - METAL COLUMN COVER, 24" DIAMETER.
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38	084113 - BRAKE METAL CLOSURE TRIM FROM WALL TO MULLION.
39	105113 - LOCKER TRIM
40	PAPER TOWEL AND SOAP DISPENSERS - OWNER FURNISHED, CONTRACTOR INSTALLED. COORD LOCATION IN FIELD.
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42	ALIGN FACE OF WALLS
43	LINE OF CANOPY ABOVE
44	CENTER NEW WALL CONSTRUCTION ON COLUMN CENTERLINE
45	092713 - GFRC COLUMN WRAP - REF TYPICAL DETAILS, A-500 SERIES DWGS
46	077100 - 2X2 DOWNSPOUT TO SPLASH BLOCK AT GRADE.
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48	064023 - SOLID SURFACE OVER EXISTING PLANTER, REF ENLARGED PLANS AND DETAILS.
49	BALCONY RAILING ALTERNATE: 057300 - GLASS RETROFIT GUARDRAIL ATTACHED TO EXISTING ALUMINUM RAILING, REF TYP DETAILS
50	057300 - STAINLESS STEEL HANDRAIL - REF ENLARGED PLANS AND DETAILS
51	ALIGN RAIL WITH CENTERLINE OF EXISTING AUDITORIUM DOORS.
52	RELOCATED EXISTING FUME HOOD, REF M-SERIES DWGS
53	ALIGN NEW OPENING WITH OPENING ACROSS THE HALL
54	102123 - CUBICLE CURTAIN AND TRACK
55	033000 - COMPOSITE FLOOR INFILL. REF S-SERIES DWGS
56	055000 - CUSTOM FIRE ALARM PULL COVER, REF TYPICAL DETAILS, A-500 DWGS.
57	083323 - OVERHEAD COILING SERVICE DOOR. REF DOOR SCHEDULE AND DETAILS
58	126600 - TELESCOPING STANDS, BANK A
59	126600 - MEDIA PLATFORM
60	096468.99 - REFINISH GYM WOOD FLOORING. REF I-SERIES DWGS FOR FLOOR PATTERNS, ETC.
61	057300 - RAILING TYPE A, REF RAIL TYPES SHEET AND DETAILS
62	126600 - TELESCOPING STANDS, BANK B
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64	126600 - TELESCOPING STANDS, BANK D
65	NOT USED
66	SHOWER TRENCH DRAIN, REF DETAIL IN A-400 SERIES DWGS. COORD WITH P-SERIES DWGS
67	126600 - TELESCOPING STANDS, BANK E
68	NOT USED
69	SOUTH CANOPY ALTERNATE: CANOPY AND LIGHT WALL CONSTRUCTED AS SHOWN.
70	EAST PERFORMING ARTS ENTRANCE ALTERNATE: REF SHEET A324.3 FOR ALTERNATE
71	NOT USED
72	REMOVE EXISTING STORAGE BENCH AS REQUIRED FOR NEW DOOR. DEMO TO EXISTING SEAM LOCATION. PATCH AND REPAIR WALL SURFACE TO REMAIN. CAP END OF BENCH AND FINISH TO MATCH EXISTING.
73	PAC ADDITIONAL WORK ALTERNATE: 126124 - NEW AUDIENCE SEATING AS SHOWN, REF TS-SEERIES DWGS
74	BASE BID: CONSTRUCT STAGE ACCESS AND STAIR AS SHOWN, MODIFY EXISTING AUDIENCE SEATING AS REQUIRED FOR NEW CONSTRUCTION. REF A-400 SERIES DWGS.
75	REF SHEET AF152 FOR CLERESTORY PLAN OF THIS ROOM
76	09 30 00 - REPLACE DAMAGED FLOOR/WALL TILES IN SHADED AREA WITH TILES AND PATTERN TO MATCH EXISTING. PROVIDE "X" SQUARE FEET ("X" INDICATED ON DEMO PLANS) OF TILE REPLACEMENT AT LOCATIONS INDICATED. CONFIRM TILE TYPE AND PATTERN IN THE FIELD. CONFIRM FINAL EXTENTS AT EACH AREA OF CRACKED TILE WITH ARCHITECT IN THE FIELD.
77	064023 - WOOD PANELING AND WAINSCOT, ALL SIDES OF COLUMN WRAP
78	CENTER PIER ON FACE OF WALL
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83	033000 - CONCRETE TOPPING FLOOR SLAB TO BRING FINISH FLOOR ELEVATION TO MATCH EXISTING, REF I-SERIES DWGS FOR FINISH TYPE.
84	WALL IS CONCENTRIC TO EXTERIOR WALL; REF AF2D1.3 FOR GRADUATED DIMENSIONS OF EXTERIOR CURVE.
85	PAC ADDITIONAL WORK ALTERNATE: NEW COUNTERTOP AND WALL CAP, REF A-322.3
86	034100 - PRECAST CONCRETE EXTERIOR COLUMN, REF PILASTER PROFILES
87	087100 - AUTOMATIC DOOR OPENER PADDLE
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Bid Set 03
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SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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A3.3	ADDENDUM 3.3	04.06.2023

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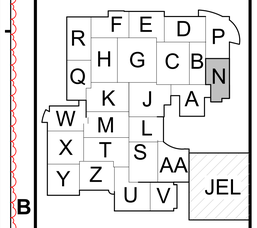

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FIRST FLOOR PLAN - UNIT N

AF1N1.3

AF1N1.3_FIRST FLOOR PLAN - UNIT N
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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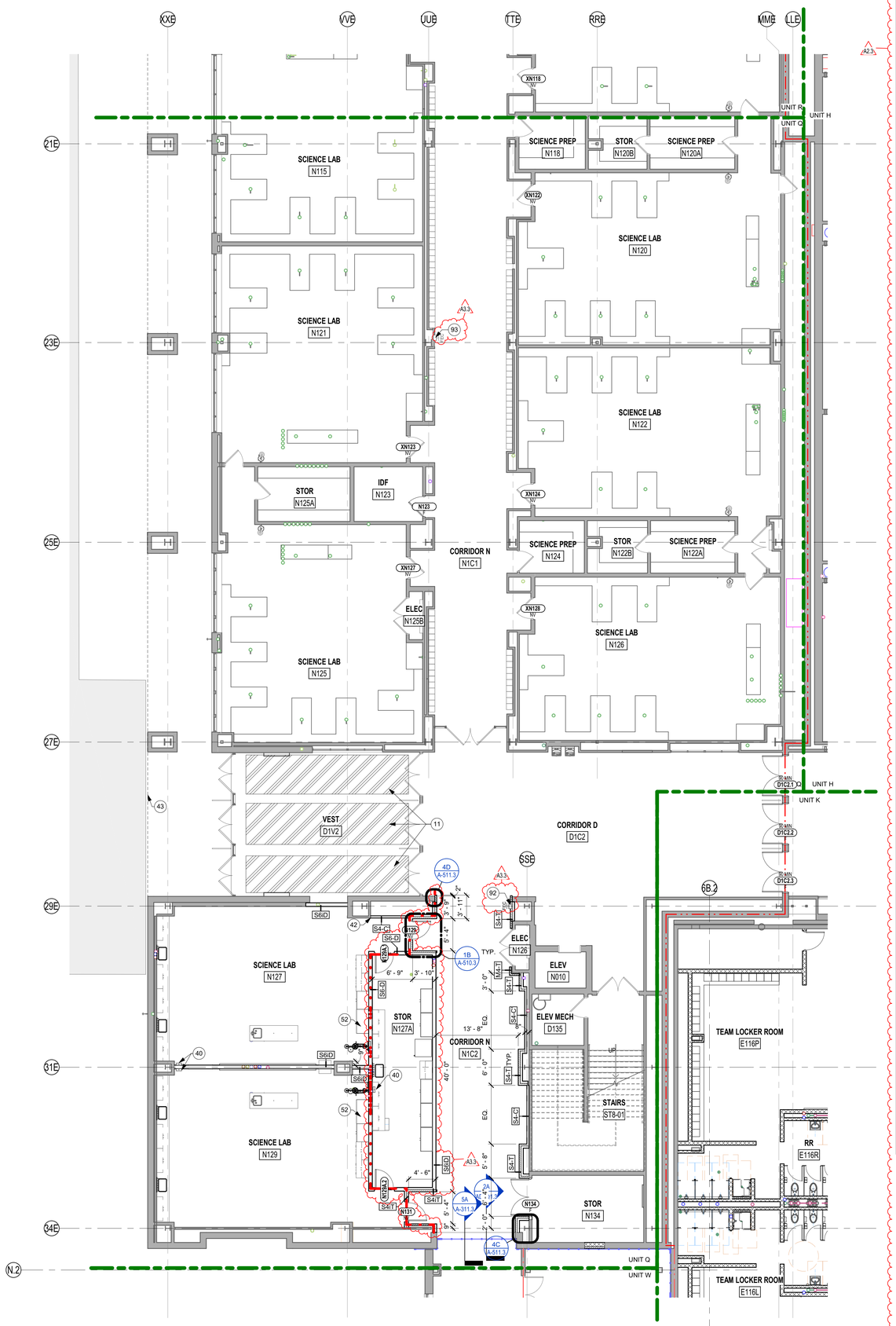

FLOOR PLAN NOTES

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#	Note
1	NEW FLOOR SLAB - REF S-SERIES DWGS
2	057500 - METAL COLUMN COVER, 16" DIAMETER.
3	FLOOR INFILL - REFER TO S-SERIES DWGS
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68	NOT USED
69	SOUTH CANOPY ALTERNATE: CANOPY AND LIGHT WALL CONSTRUCTED AS SHOWN.
70	EAST PERFORMING ARTS ENTRANCE ALTERNATE: REF SHEET A324.3 FOR ALTERNATE
71	NOT USED
72	REMOVE EXISTING STORAGE BENCH AS REQUIRED FOR NEW DOOR. DEMO TO EXISTING SEAM LOCATION. PATCH AND REPAIR WALL SURFACE TO REMAIN. CAP END OF BENCH AND FINISH TO MATCH EXISTING.
73	PAC ADDITIONAL WORK ALTERNATE: 126124 - NEW AUDIENCE SEATING AS SHOWN, REF TS-SERIES DWGS
74	BASE BID: CONSTRUCT STAGE ACCESS AND STAIR AS SHOWN, MODIFY EXISTING AUDIENCE SEATING AS REQUIRED FOR NEW CONSTRUCTION. REF A-400 SERIES DWGS.
75	REF SHEET AF1S2 FOR CLERESTORY PLAN OF THIS ROOM
76	09 30 00 - REPLACE DAMAGED FLOOR/WALL TILES IN SHADED AREA WITH TILES AND PATTERN TO MATCH EXISTING. PROVIDE "X" SQUARE FEET ("X" INDICATED ON DEMO PLANS) OF TILE REPLACEMENT AT LOCATIONS INDICATED. CONFIRM TILE TYPE AND PATTERN IN THE FIELD. CONFIRM FINAL EXTENTS AT EACH AREA OF CRACKED TILE WITH ARCHITECT IN THE FIELD.
77	064023 - WOOD PANELING AND WAINSCOT, ALL SIDES OF COLUMN WRAP
78	CENTER PIER ON FACE OF WALL
79	DISPLAY WALL - REF I-SERIES DWGS
80	EXISTING RAIL TO REMAIN
81	EXTERIOR COLUMN WRAP PILASTER- REF A-500 SERIES DWGS FOR ELEVATION
82	EXTERIOR DECORATIVE PILASTER. REF A-500 SERIES DWGS FOR ELEVATION
83	033000 - CONCRETE TOPPING FLOOR SLAB TO BRING FINISH FLOOR ELEVATION TO MATCH EXISTING, REF I-SERIES DWGS FOR FINISH TYPE.
84	WALL IS CONCENTRIC TO EXTERIOR WALL; REF AF2D1.3 FOR GRADUATED DIMENSIONS OF EXTERIOR CURVE.
85	PAC ADDITIONAL WORK ALTERNATE: NEW COUNTERTOP AND WALL CAP, REF A-322.3
86	034100 - PRECAST CONCRETE EXTERIOR COLUMN, REF PILASTER PROFILES
87	087100 - AUTOMATIC DOOR OPENER PADDLE
88	RELOCATED WOODEN CREST (FROM AUDITORIUM ENTRANCE). FIELD VERIFY MOUNING LOCATION AND PROVISIONS WITH ARCHITECT/CM IN FIELD
89	RELOCATED DARK ROOM SINK. REF P-SERIES DRAWINGS
90	087100 - AUTOMATIC DOOR OPENER PADDLE ON BOLLARD
91	083436 - DARKROOM DOOR
92	104413 - SEMI-RECESSED FIRE EXTINGUISHER CABINET (FEC)
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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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A2.3	ADDENDUM 2.3	03.22.2023
A3.3	ADDENDUM 3.3	04.06.2023

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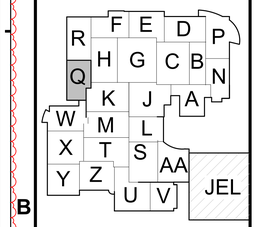

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FIRST FLOOR PLAN - UNIT Q

AF1Q1.3

AF1Q1_1 FIRST FLOOR PLAN - UNIT Q
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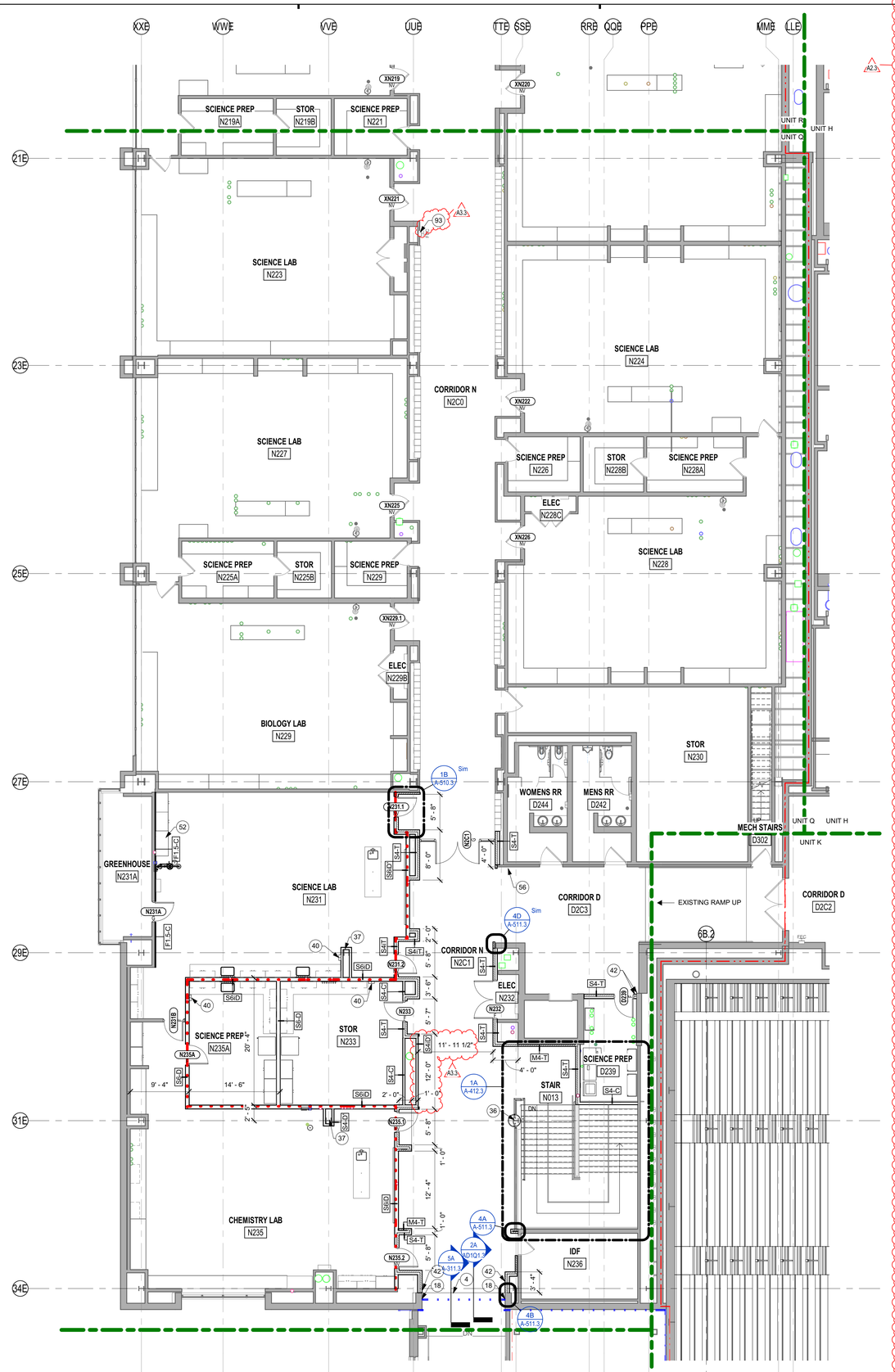

2A **SECOND FLOOR PLAN - UNIT Q**
1/8" = 1'-0"

FLOOR PLAN NOTES

Refer to sheet A-001.3 for general plan notes that apply to all plan work.

#	Note
1	NEW FLOOR SLAB - REF S-SERIES DWGS
2	057500 - METAL COLUMN COVER, 16" DIAMETER.
3	FLOOR INFILL - REFER TO S-SERIES DWGS
4	079500 - INTERIOR FLOOR-TO-FLOOR EXPANSION JOINT SYSTEM.
5	102219 - FOLDING PANEL PARTITION
6	111316 - NEW LOADING DOCK SEALS ON EXISTING OPENING.
7	EXISTING TRASH COMPACTOR TO REMAIN
8	CUT EXISTING FLOOR SLAB FOR NEW MECHANICAL CHASE, REF S-SERIES DWGS
9	WASHER AND DRYER, OWNER PROVIDED
10	114000 - FOOD SERVICE EQUIPMENT- REF Q-SERIES DWGS
11	033000 - TOPPING SLAB INFILL OF RECESSED FLOOR MAT AREA. PREP AREA TO RECEIVE NEW FLOOR MATERIAL
12	088300 - WALL MIRRORS 6'-0" TALL, 3'-3" WIDE MAX. EQUALLY SPACE JOINTS. MOUNT 1'-0" A.F.F.
13	122200 - WALL MOUNTED TRACK CURTAINS. LENGTH TO CONCEAL MIRRORS. MOUNT TRACK AT 10'-0" A.F.F.
14	INFILL OPENING WITH WALL TO MATCH SURROUNDING/ADJACENT WALL CONSTRUCTION. VERIFY EXISTING WALL CONDITIONS/CONSTRUCTION AND DIMENSIONS IN THE FIELD. ALIGN THE FACE OF THE NEW INFILL WALL WITH THE ADJACENT EXISTING WALL FACE. TOOTH NEW MASONRY INTO EXISTING CONSTRUCTION WHERE APPLICABLE
15	088300 - 48" X 54" MIRROR MOUNTED AT 2'-6" A.F.F.
16	088300 - 24" H CONTINUOUS MIRROR MOUNTED 4" ABOVE COUNTERTOP. 40" MAX TO BOTTOM OF REFLECTIVE SURFACE
17	BASE BID: INFILL EXISTING OPENING TO MATCH ADJACENT RAILING. MODIFY GUARDRAIL AS REQUIRED TO CREATE SEAMLESS TRANSITION.
18	079500 - INTERIOR FLOOR-TO-WALL EXPANSION JOINT SYSTEM. EXTEND LENGTH OF WALL.
19	116623 - GYMNASIUM ATHLETIC WALL PADS
20	079500 - INTERIOR WALL-TO-WALL EXPANSION JOINT SYSTEM. EXTEND FROM FLOOR TO CEILING.
21	NEW OPENING IN EXISTING WALL. REF DEMO PLANS AND INTERIOR ELEVATIONS
22	120890.99 - INDUSTRIAL SHELVING UNITS, 72"W X 24"D X 96" H EACH
23	120890.99 - INDUSTRIAL SHELVING UNITS, 48"W X 24"D X 96" H EACH
24	055300 - FLOOR GRATING OVER RECESS IN SLAB. REF SECTION DETAIL
25	102213 - WIRE MESH PARTITION AND GATE - FLOOR TO DECK ABOVE
26	042000 - 56" TALL 8" CMU WALL WITH DOUBLE BULLNOSE SOLID CMU CAP. CONFIRM LOCATION OF WALL WITH FOOD SERVICE EQUIPMENT LAYOUT.
27	033000 - 4" CONCRETE FLOOR SLAB - COORDINATE DEPTH WITH FOODSERVICE EQUIPMENT REQUIREMENTS
28	033000 - 4" CONCRETE SLAB, REF S SERIES DWGS
29	033000 - TOPPING SLAB OF RECESSED FLOOR MAT AREA. PREP AREA TO RECEIVE NEW FLOOR MATERIAL
30	079500 - EXTERIOR WALL TO WALL EXPANSON JOINT COVER
31	079500 - INTERIOR WALL TO WALL CORNER EXPANSION JOINT COVER
32	077100 - METAL DOWNSPOUT, REF ROOF PLAN FOR SIZE. COORD WITH C-SERIES DWGS FOR BOOT CONNECTION.
33	033000 - 4" CONCRETE FLOOR SLAB. REF S-SERIES DWGS
34	033000 - RECESSED 4" CONCRETE SLAB. COORDINATE DEPTH WITH FOOD SERVICE EQUIPMENT REQUIREMENTS
35	092713 - GFRC TAPERED PIER - REF TYPICAL DETAILS, A-500 SERIES DWGS
36	057500 - METAL COLUMN COVER, 24" DIAMETER.
37	NEW ENCLOSURE AROUND EXISTING COLUMN USING WALL TYPE S4-C', MAINTAIN 1" MIN. CLEAR AROUND COLUMN. DO NOT ATTACH TO COLUMN.
38	084113 - BRAKE METAL CLOSURE TRIM FROM WALL TO MULLION.
39	105113 - LOCKER TRIM
40	PAPER TOWEL AND SOAP DISPENSERS - OWNER FURNISHED, CONTRACTOR INSTALLED. COORD LOCATION IN FIELD.
41	BASE BID: NEW GATE OPENINGS IN EXISTING RAILING. REF DETAILS. MAIN GYM RAILING ALTERNATE: NEW GUARDRAIL TYPE A WITH OPERABLE GATES.
42	ALIGN FACE OF WALLS
43	LINE OF CANOPY ABOVE
44	CENTER NEW WALL CONSTRUCTION ON COLUMN CENTERLINE
45	092713 - GFRC COLUMN WRAP - REF TYPICAL DETAILS, A-500 SERIES DWGS
46	077100 - 2X2 DOWNSPOUT TO SPLASH BLOCK AT GRADE.
47	K HALL ELEVATOR ALTERNATE: 142400 - NEW ELEVATOR IN EXISTING ELEVATOR SHAFT, REF ENLARGED PLANS AND SECTIONS. V.I.F.
48	064023 - SOLID SURFACE OVER EXISTING PLANTER, REF ENLARGED PLANS AND DETAILS.
49	BALCONY RAILING ALTERNATE: 057300 - GLASS RETROFIT GUARDRAIL ATTACHED TO EXISTING ALUMINUM RAILING, REF TYP DETAILS
50	057300 - STAINLESS STEEL HANDRAIL - REF ENLARGED PLANS AND DETAILS
51	ALIGN RAIL WITH CENTERLINE OF EXISTING AUDITORIUM DOORS.
52	RELOCATED EXISTING FUME HOOD, REF M-SERIES DWGS
53	ALIGN NEW OPENING WITH OPENING ACROSS THE HALL
54	102123 - CUBICLE CURTAIN AND TRACK
55	033000 - COMPOSITE FLOOR INFILL. REF S-SERIES DWGS
56	055000 - CUSTOM FIRE ALARM PULL COVER, REF TYPICAL DETAILS, A-500 DWGS.
57	083323 - OVERHEAD COILING SERVICE DOOR. REF DOOR SCHEDULE AND DETAILS
58	126600 - TELESCOPING STANDS, BANK A
59	126600 - MEDIA PLATFORM
60	096468.99 - REFINISH GYM WOOD FLOORING. REF I-SERIES DWGS FOR FLOOR PATTERNS, ETC.
61	057300 - RAILING TYPE A, REF RAIL TYPES SHEET AND DETAILS
62	126600 - TELESCOPING STANDS, BANK B
63	126600 - TELESCOPING STANDS, BANK C
64	126600 - TELESCOPING STANDS, BANK D
65	NOT USED
66	SHOWER TRENCH DRAIN, REF DETAIL IN A-400 SERIES DWGS. COORD WITH P-SERIES DWGS
67	126600 - TELESCOPING STANDS, BANK E
68	NOT USED
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71	NOT USED
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73	PAC ADDITIONAL WORK ALTERNATE: 126124 - NEW AUDIENCE SEATING AS SHOWN, REF TS-SERIES DWGS
74	BASE BID: CONSTRUCT STAGE ACCESS AND STAIR AS SHOWN, MODIFY EXISTING AUDIENCE SEATING AS REQUIRED FOR NEW CONSTRUCTION. REF A-400 SERIES DWGS.
75	REF SHEET AF1S2 FOR CLERESTORY PLAN OF THIS ROOM
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SARAH KATHLEEN HEMPSTEAD
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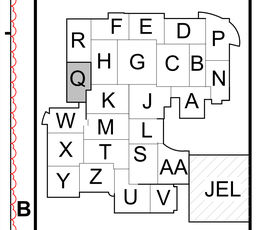

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PLAN - UNIT Q

AF1Q2.3

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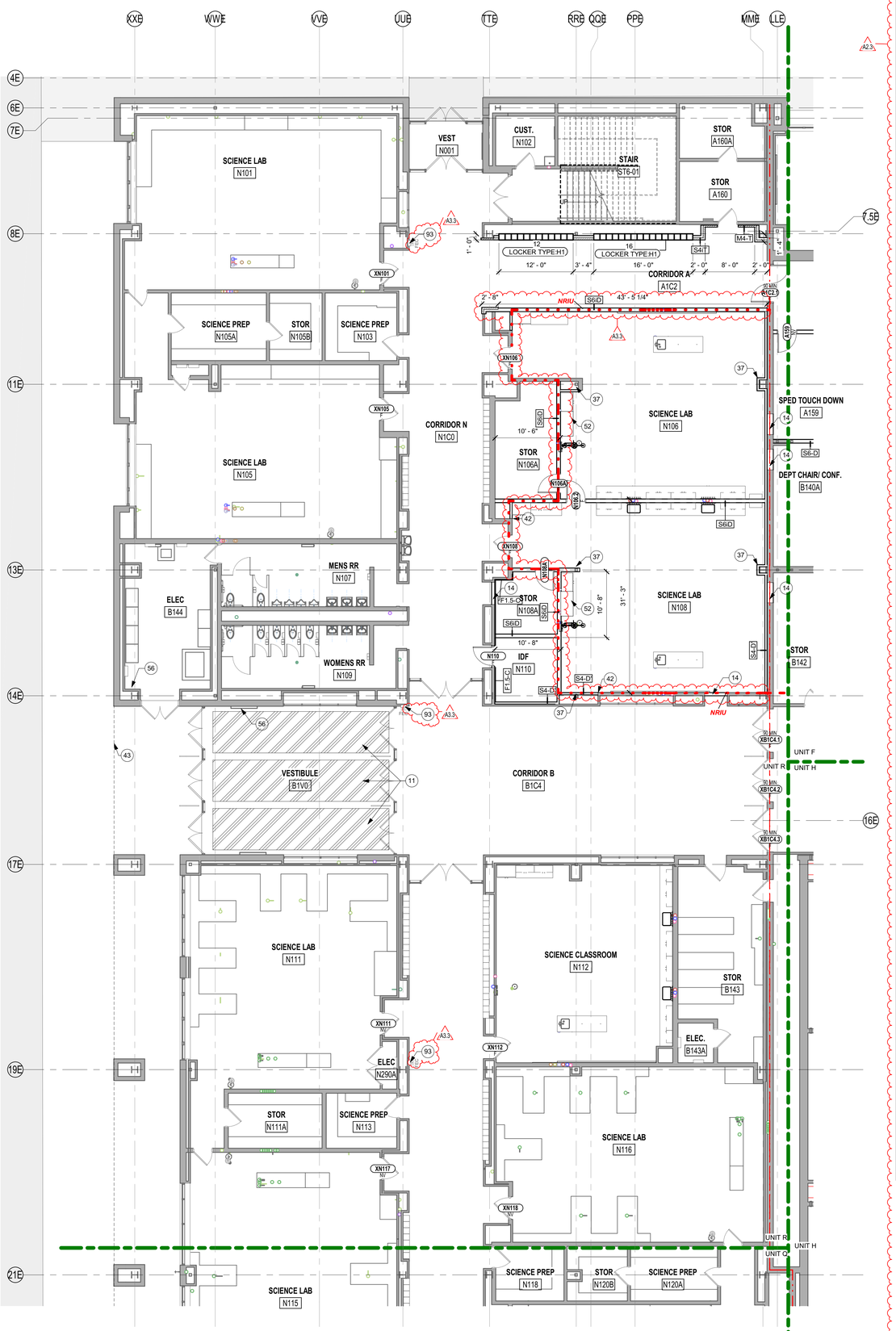

2A FIRST FLOOR PLAN - UNIT R
1/8" = 1'-0"

FLOOR PLAN NOTES

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1801 East 86th Street
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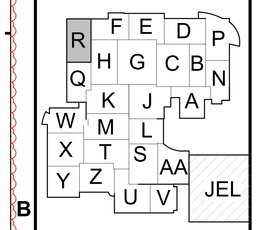

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLAN - UNIT R

AF1R1.3

AF1R1.3_FIRST FLOOR PLAN - UNIT R
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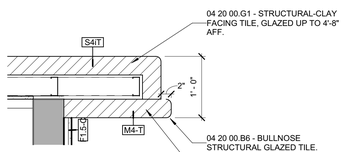
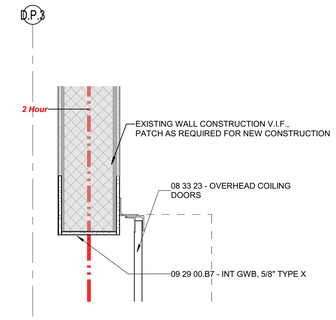
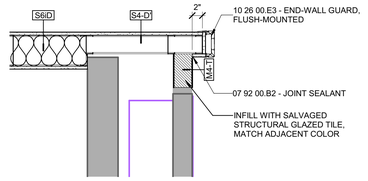


5E PLAN DETAIL
1" = 1'-0"



4E PLAN DETAIL - PARTITION
1" = 1'-0"



3E PLAN DETAIL
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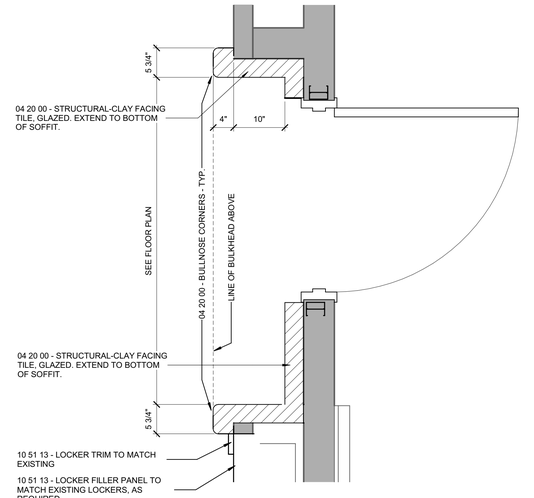

1E PLAN DETAIL - TYPICAL NEW DOOR RECESS_2
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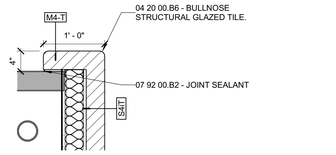

4D PLAN DETAIL - CAFETERIA & B CORRIDIR
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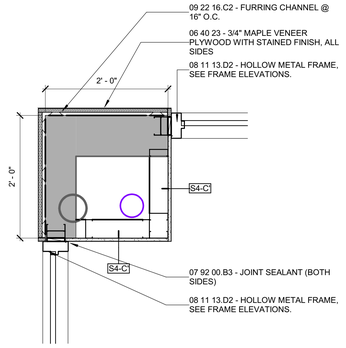

3D PLAN DETAIL
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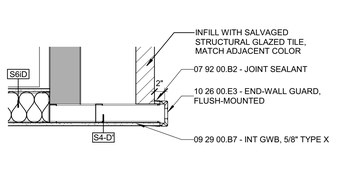
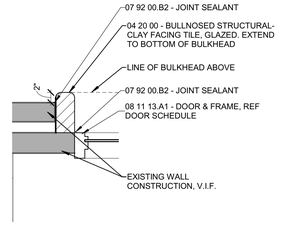
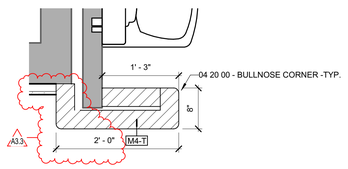


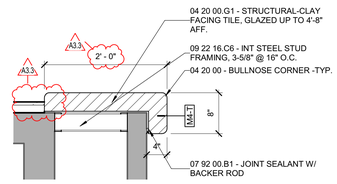
4C PLAN DETAIL
1" = 1'-0"



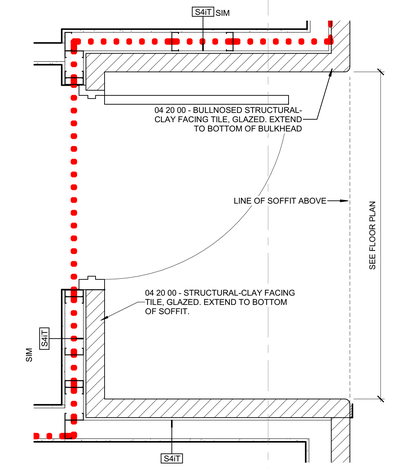
3C PLAN DETAIL
1" = 1'-0"



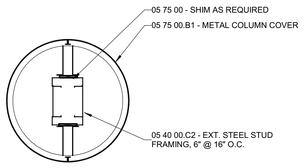
4B PLAN DETAIL
1" = 1'-0"



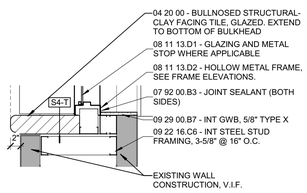
3B PLAN DETAIL
1" = 1'-0"



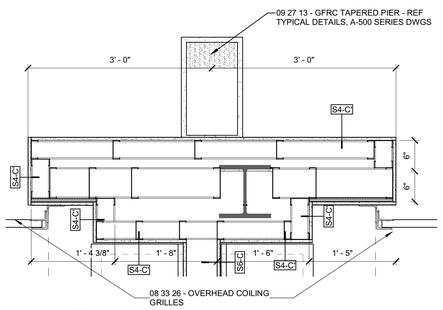
1B PLAN DETAIL - TYPICAL NEW DOOR RECESS
1" = 1'-0"



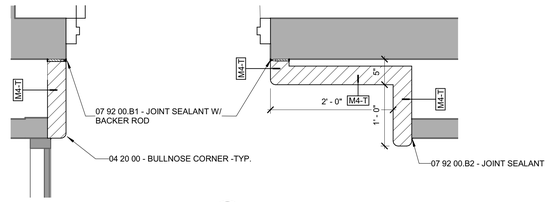
5A PLAN DETAIL
1" = 1'-0"



4A PLAN DETAIL
1" = 1'-0"



3A PLAN DETAIL - SERVING PILASTER
1" = 1'-0"



1A PLAN DETAIL - LOUNGE
1" = 1'-0"

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

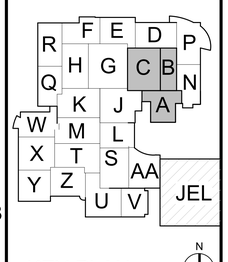
Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced SLS HEL

SARAH KATHLEEN HEMPSTEAD REGISTERED LANDSCAPE ARCHITECT NO. AR10400134 STATE OF INDIANA

These Drawings and Specifications, and all copies thereof are and shall remain the property and copyright of the Architect. They shall be used only with respect to this Project and are not to be used on any other Project or Work without prior written permission from the Architect.

#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

PLAN DETAILS

A-510.3

A-510.3_PLAN DETAILS
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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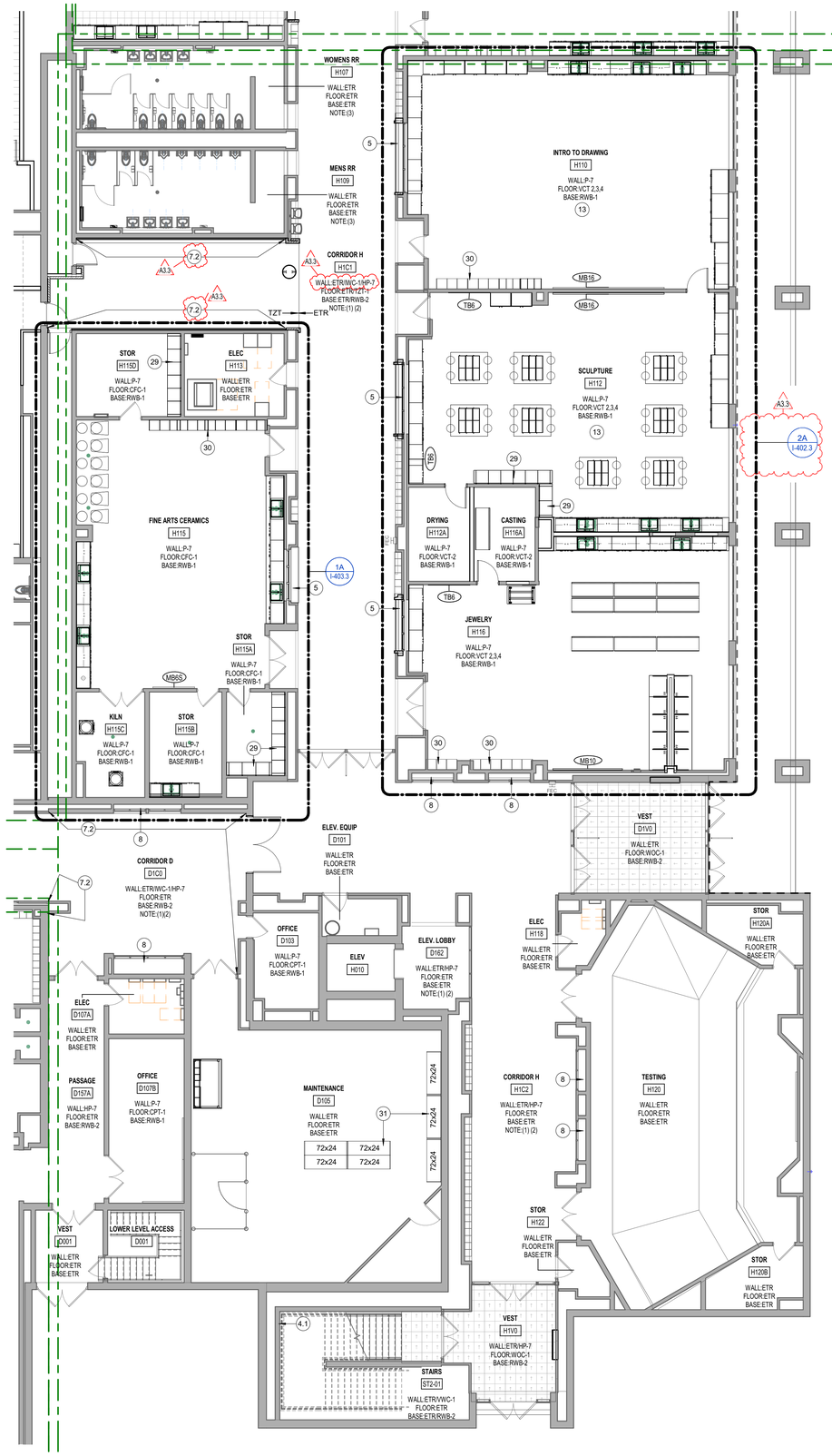

2A FIRST FLOOR INTERIOR FINISH PLAN - UNIT N
1/8" = 1'-0"

INTERIOR GENERAL NOTES

REFERENCE A-001 FOR GENERAL PLAN NOTES. ALL NOTES MAY NOT APPLY TO THIS SHEET.

1. FINISHES PRIOR TO START & FINAL COMPLETION OF WORK
   - Where existing finishes are to remain outside scope of work, patch & repair any area damaged or effected by renovation, to return to like new condition, matching adjacent finishes. This includes, but is not limited to doors & associated hardware, door frames, wall finishes, wall base, floor finish including floor transitions & thresholds, etc. It is the responsibility of the contractor to verify conditions in field prior to start & completion of work.
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   - Walls are to be prepped removing any existing wallcovering & residue, holes patched, and surface smoothed prior to new paint or wallcovering being installed.
   - Vinyl Wall Base over gyp. - Prior to removal of existing vinyl wall base, score wall above top of base to minimize damage to drywall.
3. Reference architectural ceilings plans for ceiling heights and bulkhead color designations. Paint all bulkheads P-10 unless specifically noted otherwise. Bulkheads that are flush with walls provide color to match adjacent wall color.
4. Paint interior hollow metal door frames HP-2.
   - Where existing conditions remain, split face finish, painting only side impacted by renovation.
5. Paint general walls HP-7 or P-7 (Neutral) unless specifically noted otherwise.
   - Athletics - Gymnasiums/Locker Rooms walls to be painted HP-1or P-1, unless specifically noted otherwise.
6. Paint all exposed conduit, piping, and associated assemblies to match adjacent paint finish. Applies to all new & existing to remain in areas of renovation.
7. Visual Display Markerboards & Tackboards- All existing to remain unless room(s) indicate new visual display to be installed or otherwise noted.
8. Corridor Walls
   - All Structural Glazed Block Walls and Cove Base are existing to remain unless noted otherwise on A-series dwgs.
   - Walls not Structural Glazing shall receive impact wallcovering wainscot. This includes any portion of wall below wainscot height not specifically called out.
9. ROOM FINISH TAG NOTES
   (1) Existing glazed block walls to remain. Walls above to be patched and repaired to make ready to receive new finish.
   (2) Existing terrazzo floors to remain.
   (3) 09 30 00 - Where existing mosaic & porcelain floor tile is to remain, clean & seal grout.
   (4) Stairs - Existing mosaic wall tile to remain.
10. ROOM FINISH TAG ABBREVIATIONS

P - paint	VCT - vinyl tile	TZ - epoxy terrazzo
HP - high performance paint	LVT - luxury vinyl tile	RWB - rubber wall base
CWT - ceramic wall tile	PWT - porcelain wall tile	PFT - porcelain floor tile
VWC - type II wallcovering	MFT - mosaic floor tile	CPT carpet tile
IWC - type III wallcovering	MWT - mosaic wall tile	CPB - broadloom carpet
RSF - resinous flooring	WOC - walk-off carpet	VSF - vinyl sheet flooring
SGC - structural glazed cove	CFC - concrete floor coating	

INTERIOR FLOOR PLAN NOTES PH3

#	NOTE
1	NO NEW FINISHES. EXISTING TO REMAIN.
1.1	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-1/HP-1.
1.2	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-2/HP-2.
1.3	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-3/HP-3.
1.4	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-4.
1.5	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-5.
1.7	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-7/HP-7.
1.8	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-8.
2.2	09 30 00 - WALL TO RECEIVE CERAMIC WALL TILE, REFERENCE 1E/I-501.3 FOR TYPICAL ELEVATION.
2.3	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-10,11. REFERENCE SHEET 221.3 FOR RESTROOM ELEVATIONS.
2.4	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-5. BRICK INSTALL.
2.5	09 30 00 - WALL BELOW CONCRETE BENCH TO RECEIVE CERAMIC WALL TILE, TO BE CWT-11.
3.1	12 24 13 - PROVIDE MANUAL ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
3.2	12 24 13 - PROVIDE MOTORIZED ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
4.1	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW CUSTOM VINYL WALLCOVERING (VWC-1).
4.2	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-2).
4.3	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-3).
5	12 36 61.16 - PROVIDE SOLID SURFACE WINDOW STOOL TI BE (SS-1)
6	EXISTING TERRAZZO STAIR TREADS, RISERS, & MOSIC WALL TILE ARE EXISTING TO REMAIN. NEW RESILIENT WALL BASE TO BE INSTALLED OVER MOSAIC WALL BASE.
6.1	09 66 23 - STAIR TREADS TO BE TERRAZZO
7.1	10 26 00 - PROVIDE SURFACE MOUNTED CORNER GUARDS, (CG-1). REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
7.2	10 26 00 - PROVIDE IMPACT WALLCOVERING WAINSCOTT ALONG FULL EXTENT OF WALL UNLESS LEADERS INDICATED OTHERWISE. TO BE (IWC-1). PROVIDE EDGE TRIM ACCESSORIES AS REQUIRED BY MFR. PROVIDE NEW RUBBER WALL BASE, RWB-2 ALONG EXTENTS.
8	EXISTING DISPLAY CASES. NO NEW WORK.
8.1	10 11 00 - VISUAL DISPLAY SURFACES. CUSTOM DISPLAY CASES TO RECEIVE FABRIC WRAPPED TACKBOARD TO BE (UPH-X). REFER TO A-SERIES DRAWINGS.
9	EXISTING TERRAZZO FLOOR TO REMAIN. CLEAN AND BUFF PROTECTED FLOORS.
10	CONCRETE BENCHES TO BE SEALED, (CFC-1).
11	12 32 00 - TYPICAL CLASSROOM STORAGE. REFER TO ELEVATION 6C/I-207.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
12	12 32 00 - TYPICAL RESOURCE STORAGE. REFER TO ELEVATION 3B/I-205.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
13	REFERENCE SHEET I-501 FOR FLOOR PATTERNS.
14	06 40 23 - SEATED RISERS TO BE PORCELAIN TILE ON TOP AND FRONT FACE. INSTALL 1/3 RUNNING BOND LENGTHWISE. PROVIDE METAL STAIR NOSING. SEE A-SERIES DRAWINGS FOR SECTION.
15	REFERENCE 2A/I-404.3 FOR TYPICAL SCIENCE ISLAND CASEWORK ELEVATIONS.
16	09 66 23 - PATCH -IN NEW RESINIOUS MATRIX TERRAZZO FLOOR TO MATCH ADJACENT FLOOR. PROVIDE PHYSICAL SAMPLE TO VERIFY COLOR IN FIELD. COLOR MAY VARY.
17	12 35 53 - TYPICAL SCIENCE CLASSROOM STORAGE. REFER TO ELEVATION 2D/I-215.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
18	REFERENCE 2B/I-210.3 & 2C/I-210.3 FOR TYPICAL SCIENCE DEMONSTRATION ISLAND CASEWORK ELEVATIONS.
19	06 40 23 - BUILT-IN BENCH. REFER TO A-SERIES DRAWINGS FOR DETAIL.
20	NEW FLOOR FINISHES IN PHASE 3. ALL OTHER FINISH SCOPE INCLUDED IN PHASE 2.
21	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW CASEWORK IN EXISTING LOCATION. SEE ELEVATION 6E/I-211.3 FOR TYPICAL.
22	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO CARPET, PAINT, WALL BASE, AND CASEWORK. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
23	ALTERNATE SCIENCE CLASSROOM FINISHES : PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO VCT, PAINT, AND WALL BASE. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
24	10 11 00 - PROVIDE FABRIC WRAPPED TACKBOARD TO FILL RECESS ABOVE WALL BASE, IN ITS ENTIRETY. VERIFY DIMENSIONS IN FIELD.
25	12 32 00 - TYPICAL WELLNESS CASEWORK. REFER TO ELEVATION 6E/I-401.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
26	09 30 00 - PROVIDE PORCELAIN FLOOR TILE W/ METAL EDGE TRIM AT ALL EXPOSED EDGES. TO BE PFT-1.
27	ALIGN ACCENT FLOOR PATTERN WITH BULKHEAD ABOVE. CPT-4
28	APPLIED WALL FINISH IS EXISTING TO REMAIN. PROTECT SURFACE(S) THROUGH RENOVATION & CONTRSTRUCTION.
29	15"D ADJUSTABLE SHELVES W/ KV BRACKETS. SEE DETAIL 2B/I-301.3 FOR ADDITIONAL INFORMATION.
30	EXISTING RELOCATED METAL STUDENT ART LOCKERS.
31	12 00 80.99 - PROVIDE UTILITY SHELVING REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATON.
32	10 21 33 - PROVIDE CUBICLE CURTAIN AND TRACK.
33	CONTINUE CARPET TILE ON RAISED PLATFORM. PROVIDE RUBBER NOSING ON EXPOSED EDGES.
34	EXISTING NON-GYPSUM BOARD WALLS TO BE PAINTED. REFER TO ELEVATIONS REFERENCED FOR PAINT COLOR LOCATIONS, TYPICAL.
35	OWNER PROVIDED EQUIPMENT, N.I.C.
36	09 30 00 - PATCH AND REPAIR AREAS OF BROKEN MOSAIC FLOOR TILE. MATCH EXISTING TILE AND GROUT. VERIFY CONDITIONS AND LOCATIONS IN FIELD.
37	12 32 00 - PROVIDE PLASTIC LAMINATE COUNTERTOP W/ WIRE MANAGEMENT LINEAR CHANNEL W/ BRUSH. SIZE 2 BY 60 INCHES. BASIS OF DESIGN: MOCKETT-BREXT MODEL BRKIT, MATTE BLACK. (QTY-4). MOUNT AT 30"AFF W/ RAKKS EH-1824 SUPPORT BRACKETS SPACED MAX 42 INCHES APART. SEE DETAIL 5A/A-327.3
38	NOT USED.
39	09 68 16 - PROVIDE NEW BROADLOOM CARPET ALONG AISLE. PATTERN DIRECTION TO RUN NORTH & SOUTH, LENGTH OF ROLL, TO BE (CPB-1). REFER TO E-SERIES DRAWINGS FOR ILLUMINATED EDGE TRIM FOR LIGHTED AISLE.
40	PROVIDE RUBBER STAIR TREAD & RISER, RAISED DISK, TO BE SELECTED BY ARCHITECT FROM MFR FULL COLOR RANGE.

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced LGK

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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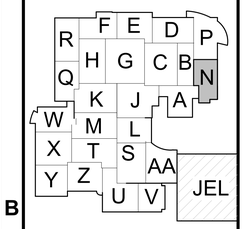

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FIRST FLOOR INTERIOR FINISH PLAN - UNIT N

IN1N1.3

WIN1_1_FIRST FLOOR INTERIOR FINISH PLAN_UNIT N
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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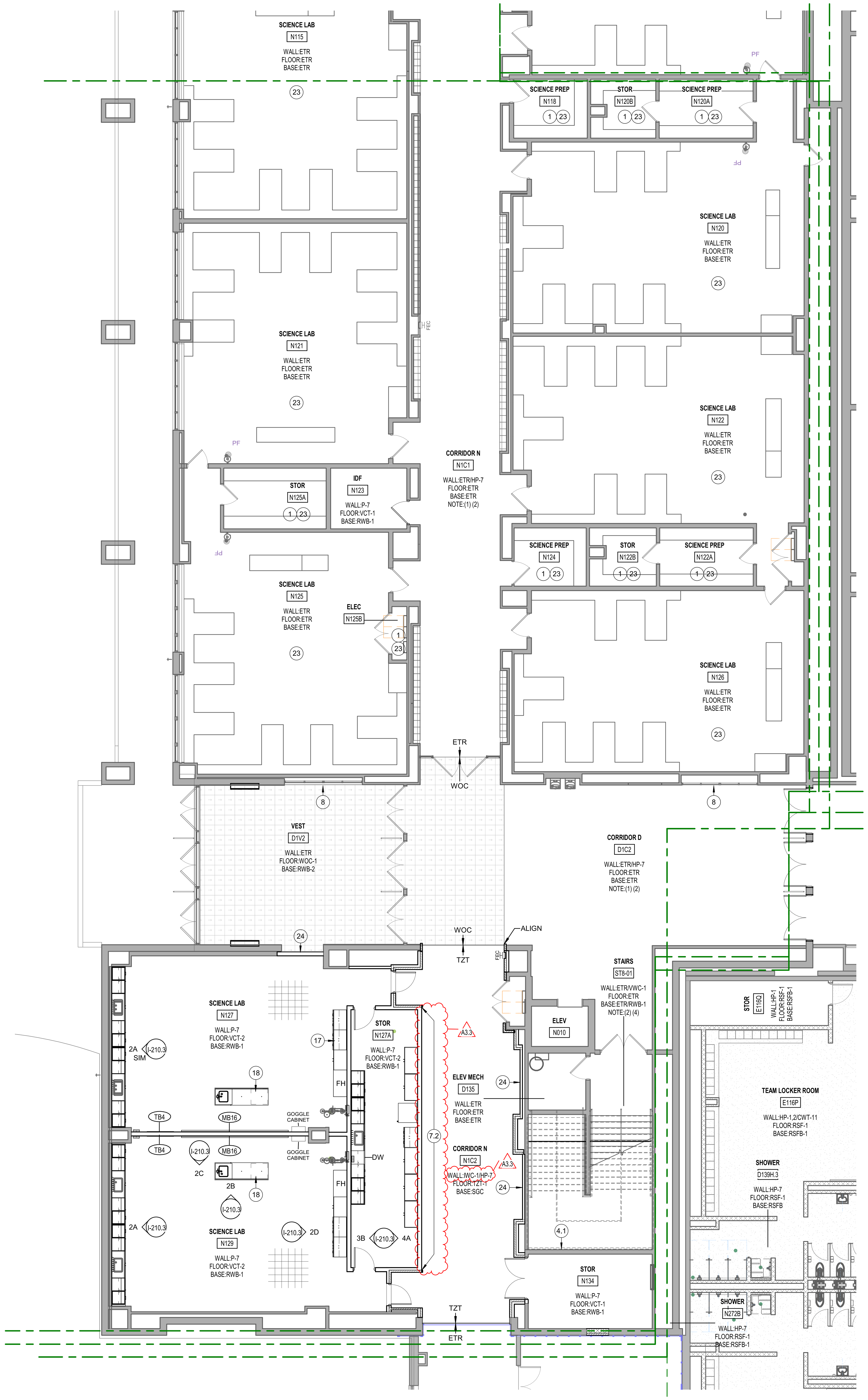

2A FIRST FLOOR INTERIOR FINISH PLAN - UNIT Q
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INTERIOR FLOOR PLAN NOTES PH3

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1	NO NEW FINISHES. EXISTING TO REMAIN.
1.1	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-1/HP-1.
1.2	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-2/HP-2.
1.3	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-3/HP-3.
1.4	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-4.
1.5	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-5.
1.7	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-7/HP-7.
1.8	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-8.
2.2	09 30 00 - WALL TO RECEIVE CERAMIC WALL TILE, REFERENCE 1E/I-501.3 FOR TYPICAL ELEVATION.
2.3	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-10,11. REFERENCE SHEET 221.3 FOR RESTROOM ELEVATIONS.
2.4	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-5. BRICK INSTALL.
2.5	09 30 00 - WALL BELOW CONCRETE BENCH TO RECEIVE CERAMIC WALL TILE, TO BE CWT-11.
3.1	12 24 13 - PROVIDE MANUAL ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
3.2	12 24 13 - PROVIDE MOTORIZED ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
4.1	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW CUSTOM VINYL WALLCOVERING (VWC-1).
4.2	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-2).
4.3	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-3).
5	12 36 61.16 - PROVIDE SOLID SURFACE WINDOW STOOL TI BE (SS-1)
6	EXISTING TERRAZZO STAIR TREADS, RISERS, & MOSIC WALL TILE ARE EXISTING TO REMAIN. NEW RESILIENT WALL BASE TO BE INSTALLED OVER MOSAIC WALL BASE.
6.1	09 66 23 - STAIR TREADS TO BE TERRAZZO
7.1	10 26 00 - PROVIDE SURFACE MOUNTED CORNER GUARDS, (CG-1). REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
7.2	10 26 00 - PROVIDE IMPACT WALLCOVERING WAINSCOTT ALONG FULL EXTENT OF WALL UNLESS LEADERS INDICATED OTHERWISE. TO BE (IWC-1). PROVIDE EDGE TRIM ACCESSORIES AS REQUIRED BY MFR. PROVIDE NEW RUBBER WALL BASE, RWB-2 ALONG EXTENTS.
8	EXISTING DISPLAY CASES. NO NEW WORK.
8.1	10 11 00 - VISUAL DISPLAY SURFACES. CUSTOM DISPLAY CASES TO RECEIVE FABRIC WRAPPED TACKBOARD TO BE (UPH-X). REFER TO A-SERIES DRAWINGS.
9	EXISTING TERRAZZO FLOOR TO REMAIN. CLEAN AND BUFF PROTECTED FLOORS.
10	CONCRETE BENCHES TO BE SEALED, (CFC-1).
11	12 32 00 - TYPICAL CLASSROOM STORAGE. REFER TO ELEVATION 6C/I-207.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
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13	REFERENCE SHEET I-501 FOR FLOOR PATTERNS.
14	06 40 23 - SEATED RISERS TO BE PORCELAIN TILE ON TOP AND FRONT FACE. INSTALL 1/3 RUNNING BOND LENGTHWISE. PROVIDE METAL STAIR NOSING. SEE A-SERIES DRAWINGS FOR SECTION.
15	REFERENCE 2A/I-404.3 FOR TYPICAL SCIENCE ISLAND CASEWORK ELEVATIONS.
16	09 66 23 - PATCH -IN NEW RESINIOUS MATRIX TERRAZZO FLOOR TO MATCH ADJACENT FLOOR. PROVIDE PHYSICAL SAMPLE TO VERIFY COLOR IN FIELD. COLOR MAY VARY.
17	12 35 53 - TYPICAL SCIENCE CLASSROOM STORAGE. REFER TO ELEVATION 2D/I-215.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
18	REFERENCE 2B/I-210.3 & 2C/I-210.3 FOR TYPICAL SCIENCE DEMONSTRATION ISLAND CASEWORK ELEVATIONS.
19	06 40 23 - BUILT-IN BENCH. REFER TO A-SERIES DRAWINGS FOR DETAIL.
20	NEW FLOOR FINISHES IN PHASE 3. ALL OTHER FINISH SCOPE INCLUDED IN PHASE 2.
21	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW CASEWORK IN EXISTING LOCATION. SEE ELEVATION 6E/I-211.3 FOR TYPICAL.
22	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO CARPET, PAINT, WALL BASE, AND CASEWORK. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
23	ALTERNATE SCIENCE CLASSROOM FINISHES : PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO VCT, PAINT, AND WALL BASE. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
24	10 11 00 - PROVIDE FABRIC WRAPPED TACKBOARD TO FILL RECESS ABOVE WALL BASE, IN ITS ENTIRETY. VERIFY DIMENSIONS IN FIELD.
25	12 32 00 - TYPICAL WELLNESS CASEWORK. REFER TO ELEVATION 6E/I-401.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
26	09 30 00 - PROVIDE PORCELAIN FLOOR TILE W/ METAL EDGE TRIM AT ALL EXPOSED EDGES. TO BE PFT-1.
27	ALIGN ACCENT FLOOR PATTERN WITH BULKHEAD ABOVE. CPT-4
28	APPLIED WALL FINISH IS EXISTING TO REMAIN. PROTECT SURFACE(S) THROUGH RENOVATION & CONTRSTRUCTION.
29	15"D ADJUSTABLE SHELVES W/ KV BRACKETS. SEE DETAIL 2B/I-301.3 FOR ADDITIONAL INFORMATION.
30	EXISTING RELOCATED METAL STUDENT ART LOCKERS.
31	12 00 80.99 - PROVIDE UTILITY SHELVING REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATON.
32	10 21 33 - PROVIDE CUBICLE CURTAIN AND TRACK.
33	CONTINUE CARPET TILE ON RAISED PLATFORM. PROVIDE RUBBER NOSING ON EXPOSED EDGES.
34	EXISTING NON-GYPSUM BOARD WALLS TO BE PAINTED. REFER TO ELEVATIONS REFERENCED FOR PAINT COLOR LOCATIONS, TYPICAL.
35	OWNER PROVIDED EQUIPMENT, N.I.C.
36	09 30 00 - PATCH AND REPAIR AREAS OF BROKEN MOSAIC FLOOR TILE. MATCH EXISTING TILE AND GROUT. VERIFY CONDITIONS AND LOCATIONS IN FIELD.
37	12 32 00 - PROVIDE PLASTIC LAMINATE COUNTERTOP W/ WIRE MANAGEMENT LINEAR CHANNEL W/ BRUSH. SIZE 2 BY 60 INCHES, BASIS OF DESIGN: MOCKETT-BREXT MODEL BRKIT, MATTE BLACK. (QTY:4). MOUNT AT 30"AFF W/ RAKKS EH-1824 SUPPORT BRACKETS SPACED MAX 42 INCHES APART. SEE DETAIL 5A/A-327.3
38	NOT USED.
39	09 68 16 - PROVIDE NEW BROADLOOM CARPET ALONG AISLE. PATTERN DIRECTION TO RUN NORTH & SOUTH, LENGTH OF ROLL, TO BE (CPB-1). REFER TO E-SERIES DRAWINGS FOR ILLUMINATED EDGE TRIM FOR LIGHTED AISLE.
40	PROVIDE RUBBER STAIR TREAD & RISER, RAISED DISK, TO BE SELECTED BY ARCHITECT FROM MFR FULL COLOR RANGE.

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced LGK

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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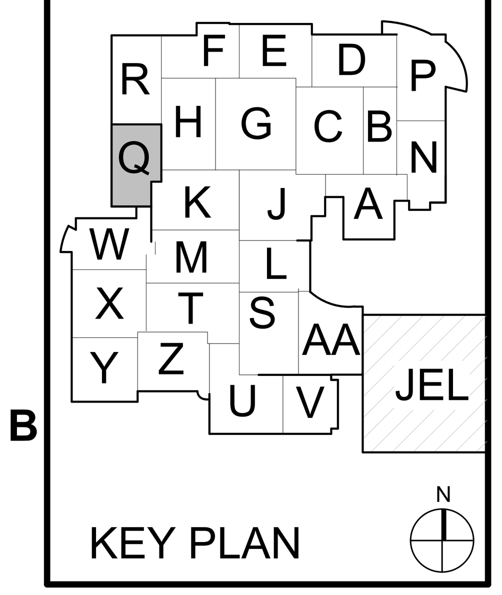
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR INTERIOR FINISH PLAN - UNIT Q

IN1Q1.3

IN1Q1.3_ FIRST FLOOR INTERIOR FINISH PLAN - UNIT Q
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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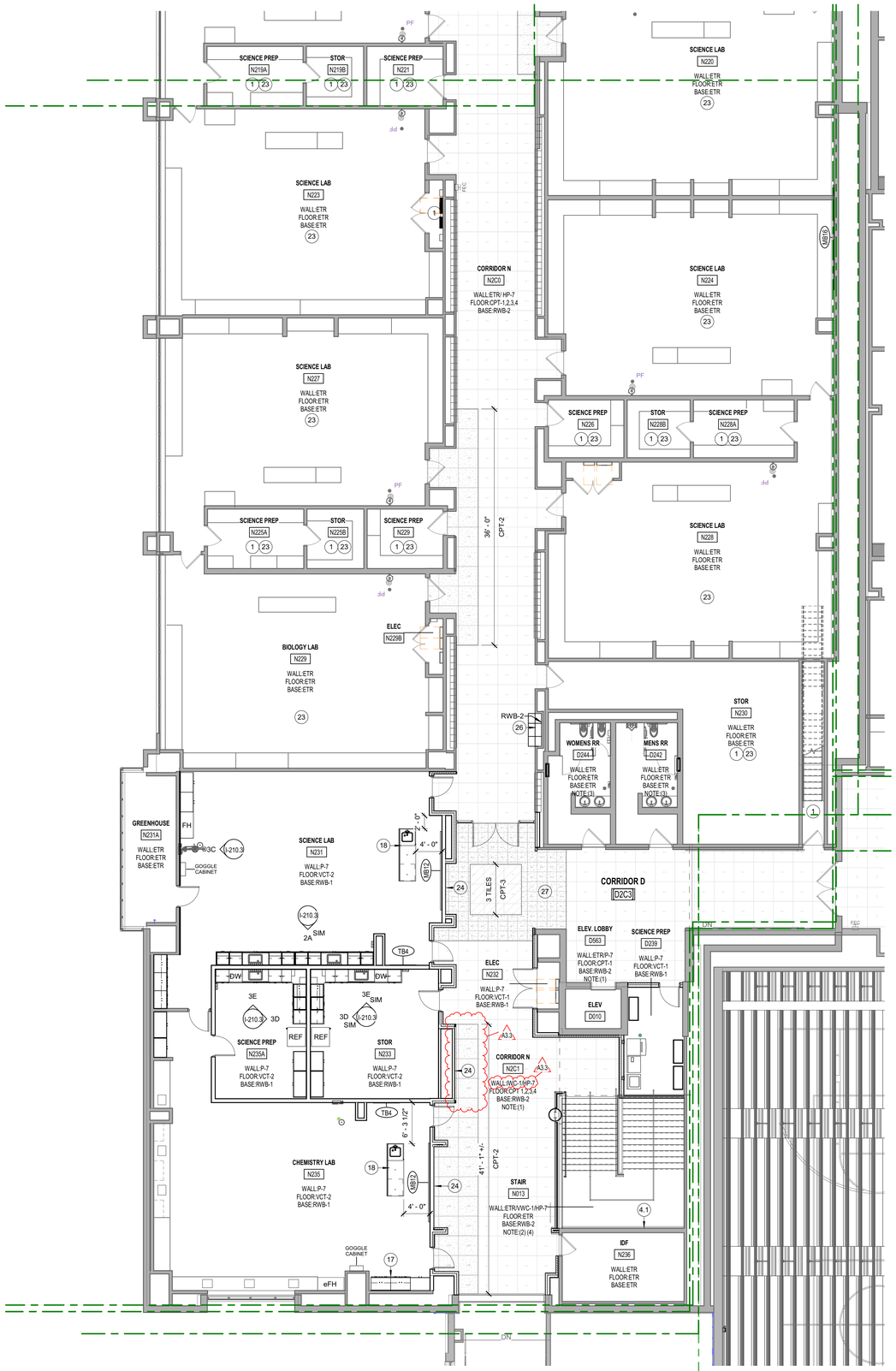

2A **SECOND FLOOR INTERIOR FINISH PLAN - UNIT Q**
1/8" = 1'-0"

INTERIOR GENERAL NOTES

REFERENCE A-001 FOR GENERAL PLAN NOTES. ALL NOTES MAY NOT APPLY TO THIS SHEET.

1. FINISHES PRIOR TO START & FINAL COMPLETION OF WORK
   - Where existing finishes are to remain outside scope of work, patch & repair any area damaged or effected by renovation, to return to like new condition, matching adjacent finishes. This includes, but is not limited to doors & associated hardware, door frames, wall finishes, wall base, floor finish including floor transitions & thresholds, etc. It is the responsibility of the contractor to verify conditions in field prior to start & completion of work.
2. Interior Painting/Wallcovering
   - Existing wall conditions that were not specifically noted to be patched and repaired, but are designated to receive new finishes, are to be repaired prior to new finishes being applied. It is the Contractors responsibility to confirm conditions in field prior to start of work.
   - Walls are to be prepped removing any existing wallcovering & residue, holes patched, and surface smoothed prior to new paint or wallcovering being installed.
   - Vinyl Wall Base over gyp. - Prior to removal of existing vinyl wall base, score wall above top of base to minimize damage to drywall.
3. Reference architectural ceilings plans for ceiling heights and bulkhead color designations. Paint all bulkheads P-10 unless specifically noted otherwise. Bulkheads that are flush with walls provide color to match adjacent wall color.
4. Paint interior hollow metal door frames HP-2.
   - Where existing conditions remain, split face finish, painting only side impacted by renovation.
5. Paint general walls HP-7 or P-7 (Neutral) unless specifically noted otherwise.
   - Athletics - Gymnasiums/Locker Rooms walls to be painted HP-1or P-1, unless specifically noted otherwise.
6. Paint all exposed conduit, piping, and associated assemblies to match adjacent paint finish. Applies to all new & existing to remain in areas of renovation.
7. Visual Display Markerboards & Tackboards- All existing to remain unless room(s) indicate new visual display to be installed or otherwise noted.
8. Corridor Walls
   - All Structural Glazed Block Walls and Cove Base are existing to remain unless noted otherwise on A-series dwgs.
   - Walls not Structural Glazing shall receive impact wallcovering wainscot. This includes any portion of wall below wainscot height not specifically called out.
9. ROOM FINISH TAG NOTES
   (1) Existing glazed block walls to remain. Walls above to be patched and repaired to make ready to receive new finish.
   (2) Existing terrazzo floors to remain.
   (3) 09 30 00 - Where existing mosaic & porcelain floor tile is to remain, clean & seal grout.
   (4) Stairs - Existing mosaic wall tile to remain.
10. ROOM FINISH TAG ABBREVIATIONS

P - paint	VCT - vinyl tile	TZ - epoxy terrazzo
HP - high performance paint	LVT - luxury vinyl tile	RWB - rubber wall base
CWT - ceramic wall tile	PWT - porcelain wall tile	PFT - porcelain floor tile
VWC - type II wallcovering	MFT - mosaic floor tile	CPT carpet tile
IWC - type III wallcovering	MWT - mosaic wall tile	CPB - broadloom carpet
RSF - resinous flooring	WOC - walk-off carpet	VSF - vinyl sheet flooring
SGC - structural glazed cove	CFC - concrete floor coating	

INTERIOR FLOOR PLAN NOTES PH3

#	NOTE
1	NO NEW FINISHES. EXISTING TO REMAIN.
1.1	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-1/HP-1.
1.2	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-2/HP-2.
1.3	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-3/HP-3.
1.4	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-4.
1.5	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-5.
1.7	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-7/HP-7.
1.8	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-8.
2.2	09 30 00 - WALL TO RECEIVE CERAMIC WALL TILE, REFERENCE 1E/I-501.3 FOR TYPICAL ELEVATION.
2.3	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-10,11. REFERENCE SHEET 221.3 FOR RESTROOM ELEVATIONS.
2.4	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-5. BRICK INSTALL.
2.5	09 30 00 - WALL BELOW CONCRETE BENCH TO RECEIVE CERAMIC WALL TILE, TO BE CWT-11.
3.1	12 24 13 - PROVIDE MANUAL ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
3.2	12 24 13 - PROVIDE MOTORIZED ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
4.1	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW CUSTOM VINYL WALLCOVERING (VWC-1).
4.2	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-2).
4.3	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-3).
5	12 36 61.16 - PROVIDE SOLID SURFACE WINDOW STOOL TI BE (SS-1)
6	EXISTING TERRAZZO STAIR TREADS, RISERS, & MOSIC WALL TILE ARE EXISTING TO REMAIN. NEW RESILIENT WALL BASE TO BE INSTALLED OVER MOSAIC WALL BASE.
6.1	09 66 23 - STAIR TREADS TO BE TERRAZZO
7.1	10 26 00 - PROVIDE SURFACE MOUNTED CORNER GUARDS, (CG-1). REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
7.2	10 26 00 - PROVIDE IMPACT WALLCOVERING WAINSCOTT ALONG FULL EXTENT OF WALL UNLESS LEADERS INDICATED OTHERWISE. TO BE (IWC-1). PROVIDE EDGE TRIM ACCESSORIES AS REQUIRED BY MFR. PROVIDE NEW RUBBER WALL BASE, RWB-2 ALONG EXTENTS.
8	EXISTING DISPLAY CASES. NO NEW WORK.
8.1	10 11 00 - VISUAL DISPLAY SURFACES. CUSTOM DISPLAY CASES TO RECEIVE FABRIC WRAPPED TACKBOARD TO BE (UPH-X). REFER TO A-SERIES DRAWINGS.
9	EXISTING TERRAZZO FLOOR TO REMAIN. CLEAN AND BUFF PROTECTED FLOORS.
10	CONCRETE BENCHES TO BE SEALED, (CFC-1).
11	12 32 00 - TYPICAL CLASSROOM STORAGE. REFER TO ELEVATION 6C/I-207.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
12	12 32 00 - TYPICAL RESOURCE STORAGE. REFER TO ELEVATION 3B/I-205.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
13	REFERENCE SHEET I-501 FOR FLOOR PATTERNS.
14	06 40 23 - SEATED RISERS TO BE PORCELAIN TILE ON TOP AND FRONT FACE. INSTALL 1/3 RUNNING BOND LENGTHWISE. PROVIDE METAL STAIR NOSING. SEE A-SERIES DRAWINGS FOR SECTION.
15	REFERENCE 2A/I-404.3 FOR TYPICAL SCIENCE ISLAND CASEWORK ELEVATIONS.
16	09 66 23 - PATCH -IN NEW RESINIOUS MATRIX TERRAZZO FLOOR TO MATCH ADJACENT FLOOR. PROVIDE PHYSICAL SAMPLE TO VERIFY COLOR IN FIELD. COLOR MAY VARY.
17	12 35 53 - TYPICAL SCIENCE CLASSROOM STORAGE. REFER TO ELEVATION 2D/I-215.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
18	REFERENCE 2B/I-210.3 & 2C/I-210.3 FOR TYPICAL SCIENCE DEMONSTRATION ISLAND CASEWORK ELEVATIONS.
19	06 40 23 - BUILT-IN BENCH. REFER TO A-SERIES DRAWINGS FOR DETAIL.
20	NEW FLOOR FINISHES IN PHASE 3. ALL OTHER FINISH SCOPE INCLUDED IN PHASE 2.
21	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW CASEWORK IN EXISTING LOCATION. SEE ELEVATION 6E/I-211.3 FOR TYPICAL.
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24	10 11 00 - PROVIDE FABRIC WRAPPED TACKBOARD TO FILL RECESS ABOVE WALL BASE, IN ITS ENTIRETY. VERIFY DIMENSIONS IN FIELD.
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26	09 30 00 - PROVIDE PORCELAIN FLOOR TILE W/ METAL EDGE TRIM AT ALL EXPOSED EDGES. TO BE PFT-1.
27	ALIGN ACCENT FLOOR PATTERN WITH BULKHEAD ABOVE. CPT-4
28	APPLIED WALL FINISH IS EXISTING TO REMAIN. PROTECT SURFACE(S) THROUGH RENOVATION & CONTRSTRUCTION.
29	15"D ADJUSTABLE SHELVES W/ KV BRACKETS. SEE DETAIL 2B/I-301.3 FOR ADDITIONAL INFORMATION.
30	EXISTING RELOCATED METAL STUDENT ART LOCKERS.
31	12 00 80.99 - PROVIDE UTILITY SHELVING REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATON.
32	10 21 33 - PROVIDE CUBICLE CURTAIN AND TRACK.
33	CONTINUE CARPET TILE ON RAISED PLATFORM. PROVIDE RUBBER NOSING ON EXPOSED EDGES.
34	EXISTING NON-GYPSUM BOARD WALLS TO BE PAINTED. REFER TO ELEVATIONS REFERENCED FOR PAINT COLOR LOCATIONS, TYPICAL.
35	OWNER PROVIDED EQUIPMENT, N.I.C.
36	09 30 00 - PATCH AND REPAIR AREAS OF BROKEN MOSAIC FLOOR TILE. MATCH EXISTING TILE AND GROUT. VERIFY CONDITIONS AND LOCATIONS IN FIELD.
37	12 32 00 - PROVIDE PLASTIC LAMINATE COUNTERTOP W/ WIRE MANAGEMENT LINEAR CHANNEL W/ BRUSH. SIZE 2 BY 60 INCHES. BASIS OF DESIGN: MOCKETT-BREXT MODEL BRKIT, MATTE BLACK. (QTY:4). MOUNT AT 30"AFF W/ RAKKS EH-1824 SUPPORT BRACKETS SPACED MAX 42 INCHES APART. SEE DETAIL 5A/A-327.3
38	NOT USED.
39	09 68 16 - PROVIDE NEW BROADLOOM CARPET ALONG AISLE. PATTERN DIRECTION TO RUN NORTH & SOUTH, LENGTH OF ROLL, TO BE (CPB-1). REFER TO E-SERIES DRAWINGS FOR ILLUMINATED EDGE TRIM FOR LIGHTED AISLE.
40	PROVIDE RUBBER STAIR TREAD & RISER, RAISED DISK, TO BE SELECTED BY ARCHITECT FROM MFR FULL COLOR RANGE.

SCHMIDT ASSOCIATES
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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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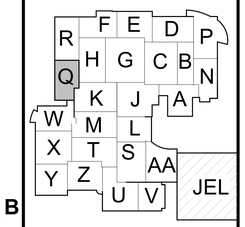
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR INTERIOR FINISH PLAN - UNIT Q

IN1Q2.3

IN1Q2.3 - SECOND FLOOR INTERIOR FINISH PLAN - UNIT Q
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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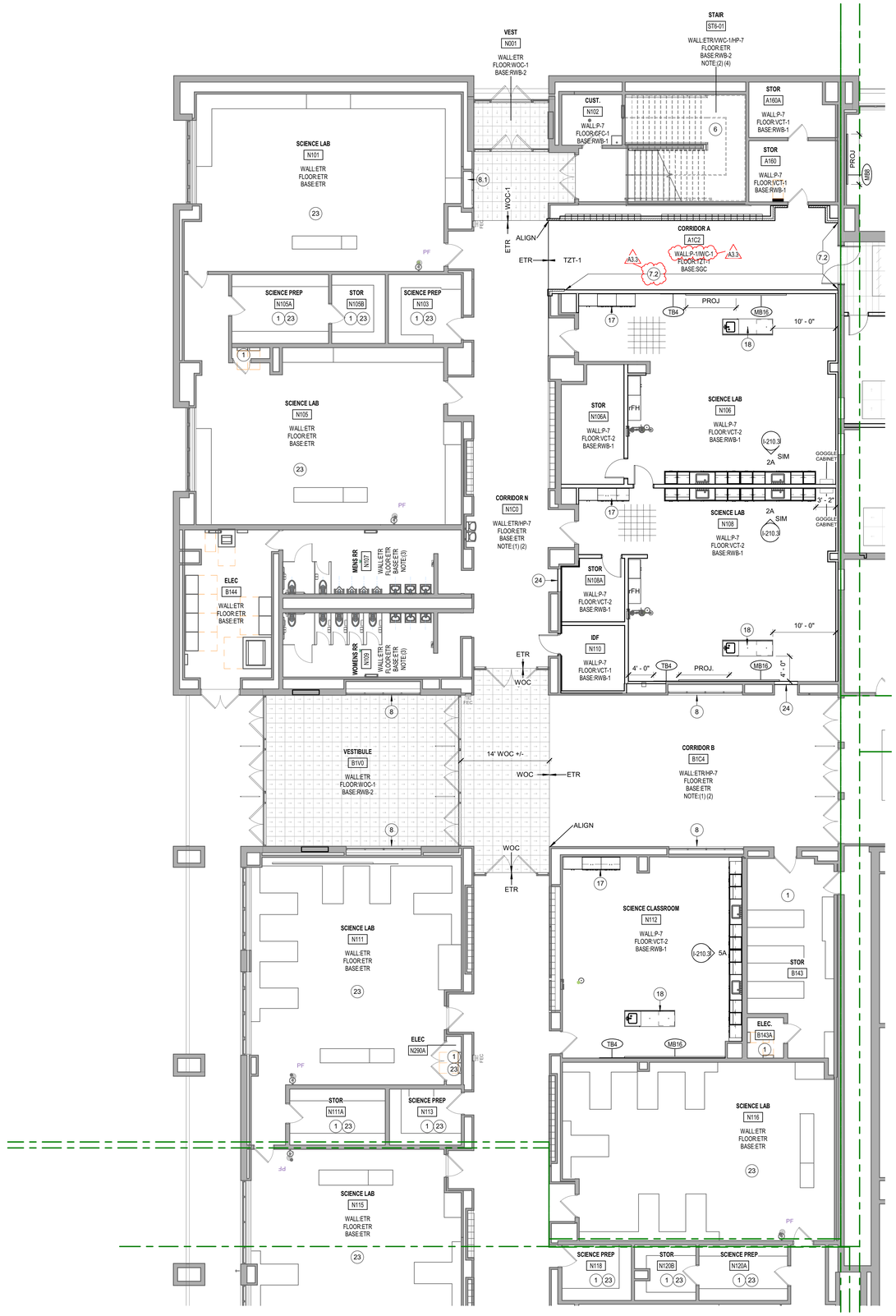

2A FIRST FLOOR INTERIOR FINISH PLAN - UNIT R
1/8" = 1'-0"

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   (1) Existing glazed block walls to remain. Walls above to be patched and repaired to make ready to receive new finish.
   (2) Existing terrazzo floors to remain.
   (3) 09 30 00 - Where existing mosaic & porcelain floor tile is to remain, clean & seal grout.
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RSF - resinous flooring	WOC - walk-off carpet	VSF - vinyl sheet flooring
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INTERIOR FLOOR PLAN NOTES PH3

#	NOTE
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1.7	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-7/HP-7.
1.8	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-8.
2.2	09 30 00 - WALL TO RECEIVE CERAMIC WALL TILE, REFERENCE 1E/I-501.3 FOR TYPICAL ELEVATION.
2.3	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-10,11. REFERENCE SHEET 221.3 FOR RESTROOM ELEVATIONS.
2.4	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-5. BRICK INSTALL.
2.5	09 30 00 - WALL BELOW CONCRETE BENCH TO RECEIVE CERAMIC WALL TILE, TO BE CWT-11.
3.1	12 24 13 - PROVIDE MANUAL ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
3.2	12 24 13 - PROVIDE MOTORIZED ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
4.1	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW CUSTOM VINYL WALLCOVERING (VWC-1).
4.2	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-2).
4.3	09 70 00 - FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-3).
5	12 36 61.16 - PROVIDE SOLID SURFACE WINDOW STOOL TI BE (SS-1)
6	EXISTING TERRAZZO STAIR TREADS, RISERS, & MOSIC WALL TILE ARE EXISTING TO REMAIN. NEW RESILIENT WALL BASE TO BE INSTALLED OVER MOSAIC WALL BASE.
6.1	09 66 23 - STAIR TREADS TO BE TERRAZZO
7.1	10 26 00 - PROVIDE SURFACE MOUNTED CORNER GUARDS, (CG-1). REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
7.2	10 26 00 - PROVIDE IMPACT WALLCOVERING WAINSCOTT ALONG FULL EXTENT OF WALL UNLESS LEADERS INDICATED OTHERWISE. TO BE (IWC-1). PROVIDE EDGE TRIM ACCESSORIES AS REQUIRED BY MFR. PROVIDE NEW RUBBER WALL BASE, RWB-2 ALONG EXTENTS.
8	EXISTING DISPLAY CASES. NO NEW WORK.
8.1	10 11 00 - VISUAL DISPLAY SURFACES. CUSTOM DISPLAY CASES TO RECEIVE FABRIC WRAPPED TACKBOARD TO BE (UPH-X). REFER TO A-SERIES DRAWINGS.
9	EXISTING TERRAZZO FLOOR TO REMAIN. CLEAN AND BUFF PROTECTED FLOORS.
10	CONCRETE BENCHES TO BE SEALED. (CFC-1).
11	12 32 00 - TYPICAL CLASSROOM STORAGE. REFER TO ELEVATION 6C/I-207.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
12	12 32 00 - TYPICAL RESOURCE STORAGE. REFER TO ELEVATION 3B/I-205.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
13	REFERENCE SHEET I-501 FOR FLOOR PATTERNS.
14	06 40 23 - SEATED RISERS TO BE PORCELAIN TILE ON TOP AND FRONT FACE. INSTALL 1/3 RUNNING BOND LENGTHWISE. PROVIDE METAL STAIR NOSING. SEE A-SERIES DRAWINGS FOR SECTION.
15	REFERENCE 2A/I-404.3 FOR TYPICAL SCIENCE ISLAND CASEWORK ELEVATIONS.
16	09 66 23 - PATCH -IN NEW RESINIOUS MATRIX TERRAZZO FLOOR TO MATCH ADJACENT FLOOR. PROVIDE PHYSICAL SAMPLE TO VERIFY COLOR IN FIELD. COLOR MAY VARY.
17	12 35 53 - TYPICAL SCIENCE CLASSROOM STORAGE. REFER TO ELEVATION 2D/I-215.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
18	REFERENCE 2B/I-210.3 & 2C/I-210.3 FOR TYPICAL SCIENCE DEMONSTRATION ISLAND CASEWORK ELEVATIONS.
19	06 40 23 - BUILT-IN BENCH. REFER TO A-SERIES DRAWINGS FOR DETAIL.
20	NEW FLOOR FINISHES IN PHASE 3. ALL OTHER FINISH SCOPE INCLUDED IN PHASE 2.
21	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW CASEWORK IN EXISTING LOCATION. SEE ELEVATION 6E/I-211.3 FOR TYPICAL.
22	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO CARPET, PAINT, WALL BASE, AND CASEWORK. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
23	ALTERNATE SCIENCE CLASSROOM FINISHES : PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO VCT, PAINT, AND WALL BASE. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
24	10 11 00 - PROVIDE FABRIC WRAPPED TACKBOARD TO FILL RECESS ABOVE WALL BASE. IN ITS ENTIRETY. VERIFY DIMENSIONS IN FIELD.
25	12 32 00 - TYPICAL WELLNESS CASEWORK. REFER TO ELEVATION 6E/I-401.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
26	09 30 00 - PROVIDE PORCELAIN FLOOR TILE W/ METAL EDGE TRIM AT ALL EXPOSED EDGES. TO BE PFT-1.
27	ALIGN ACCENT FLOOR PATTERN WITH BULKHEAD ABOVE. CPT-4
28	APPLIED WALL FINISH IS EXISTING TO REMAIN. PROTECT SURFACE(S) THROUGH RENOVATION & CONTRSTRUCTION.
29	15"D ADJUSTABLE SHELVES W/ KV BRACKETS. SEE DETAIL 2B/I-301.3 FOR ADDITIONAL INFORMATION.
30	EXISTING RELOCATED METAL STUDENT ART LOCKERS.
31	12 00 80.99 - PROVIDE UTILITY SHELVING REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATON.
32	10 21 33 - PROVIDE CUBICLE CURTAIN AND TRACK.
33	CONTINUE CARPET TILE ON RAISED PLATFORM. PROVIDE RUBBER NOSING ON EXPOSED EDGES.
34	EXISTING NON-GYPRUM BOARD WALLS TO BE PAINTED. REFER TO ELEVATIONS REFERENCED FOR PAINT COLOR LOCATIONS, TYPICAL.
35	OWNER PROVIDED EQUIPMENT, N.I.C.
36	09 30 00 - PATCH AND REPAIR AREAS OF BROKEN MOSAIC FLOOR TILE. MATCH EXISTING TILE AND GROUT. VERIFY CONDITIONS AND LOCATIONS IN FIELD.
37	12 32 00 - PROVIDE PLASTIC LAMINATE COUNTERTOP W/ WIRE MANAGEMENT LINEAR CHANNEL W/ BRUSH. SIZE 2 BY 60 INCHES. BASIS OF DESIGN: MOCKETT-BREXT MODEL BRKIT. MATTE BLACK. (QTY:4). MOUNT AT 30"AFF W/ RAKKS EH-1824 SUPPORT BRACKETS SPACED MAX 42 INCHES APART. SEE DETAIL 5A/A-327.3
38	NOT USED.
39	09 68 16 - PROVIDE NEW BROADLOOM CARPET ALONG AISLE. PATTERN DIRECTION TO RUN NORTH & SOUTH, LENGTH OF ROLL, TO BE (CPB-1). REFER TO E-SERIES DRAWINGS FOR ILLUMINATED EDGE TRIM FOR LIGHTED AISLE.
40	PROVIDE RUBBER STAIR TREAD & RISER, RAISED DISK, TO BE SELECTED BY ARCHITECT FROM MFR FULL COLOR RANGE.

SCHMIDT
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415 Massachusetts Avenue
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced LGK

KATHLEEN HEMPSTEAD SARAH REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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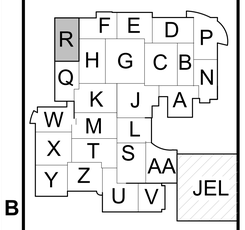
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FIRST FLOOR INTERIOR FINISH PLAN - UNIT R

IN1R1.3

IN1R1.3_FIRST FLOOR INTERIOR FINISH PLAN_UNIT R
2019-067.NCH_M.S.D. of Washington Township_Stefa Central High School Renovation_
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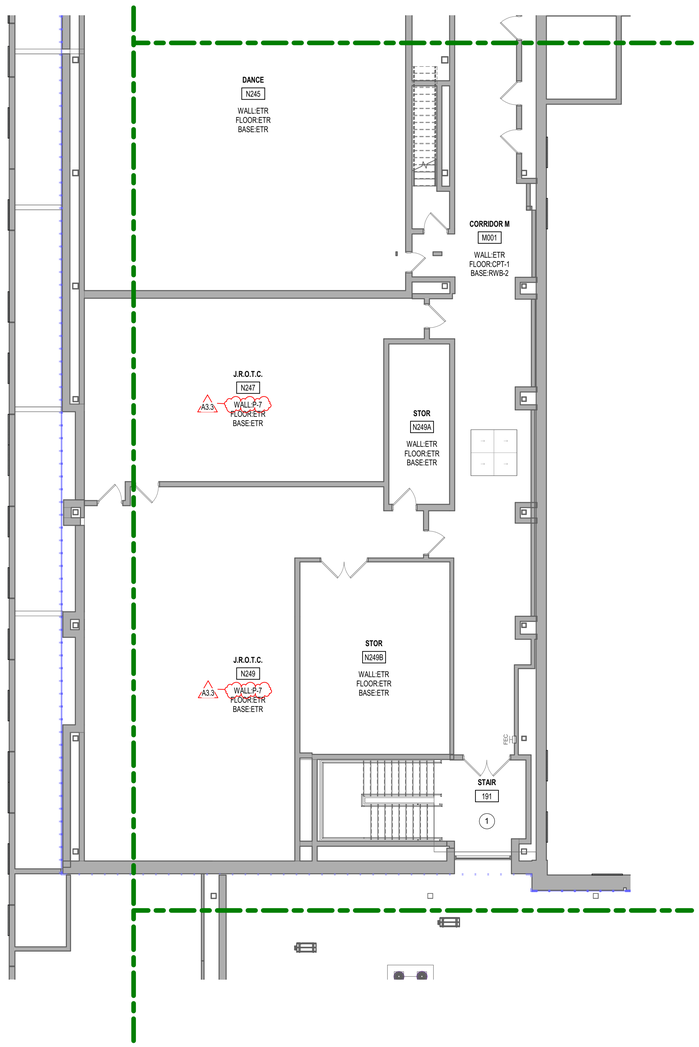

2A **SECOND FLOOR - INTERIOR FINISH PLAN - UNIT T**
1/8" = 1'-0"

INTERIOR GENERAL NOTES

REFERENCE A-001 FOR GENERAL PLAN NOTES. ALL NOTES MAY NOT APPLY TO THIS SHEET.

1. FINISHES PRIOR TO START & FINAL COMPLETION OF WORK
   - Where existing finishes are to remain outside scope of work, patch & repair any area damaged or effected by renovation, to return to like new condition, matching adjacent finishes. This includes, but is not limited to doors & associated hardware, door frames, wall finishes, wall base, floor finish including floor transitions & thresholds, etc. It is the responsibility of the contractor to verify conditions in field prior to start & completion of work.
2. Interior Painting/Wallcovering
   - Existing wall conditions that were not specifically noted to be patched and repaired, but are designated to receive new finishes, are to be repaired prior to new finishes being applied. It is the Contractors responsibility to confirm conditions in field prior to start of work.
   - Walls are to be prepped removing any existing wallcovering & residue, holes patched, and surface smoothed prior to new paint or wallcovering being installed.
   - Vinyl Wall Base over gyp. - Prior to removal of existing vinyl wall base, score wall above top of base to minimize damage to drywall.
3. Reference architectural ceilings plans for ceiling heights and bulkhead color designations. Paint all bulkheads P-10 unless specifically noted otherwise. Bulkheads that are flush with walls provide color to match adjacent wall color.
4. Paint interior hollow metal door frames HP-2.
5. • Where existing conditions remain, split face finish, painting only side impacted by renovation.
6. Paint general walls HP-7 or P-7 (Neutral) unless specifically noted otherwise.
   - Athletics - Gymnasiums/Locker Rooms walls to be painted HP-1or P-1, unless specifically noted otherwise.
7. Paint all exposed conduit, piping, and associated assemblies to match adjacent paint finish. Applies to all new & existing to remain in areas of renovation.

Corridor Walls
8. • All Structural Glazed Block Walls and Cove Base are existing to remain unless noted otherwise on A-series dwgs.
   - Walls not Structural Glazing shall receive impact wallcovering wainscott. This includes any portion of wall below wainscott height not specifically called out.

ROOM FINISH TAG NOTES
(1) Existing glazed block walls to remain. Walls above to be patched and repaired to make ready to receive new finish.
(2) Existing terrazzo floors to remain.
9. (3) 09 30 00 - Where existing mosaic & porcelain floor tile is to remain, clean & seal grout.
(4) Stairs - Existing mosaic wall tile to remain.

ROOM FINISH TAG ABBREVIATIONS

P - paint	VCT - vinyl tile	TZ - epoxy terrazzo
HP - high performance paint	LVT - luxury vinyl tile	RWB - rubber wall base
CWT - ceramic wall tile	PWT - porcelain wall tile	PFT - porcelain floot tile
VWC - type II wallcovering	MFT - mosaic floor tile	CPT carpet tile
IWC - type III wallcovering	MWT - mosaic wall tile	CPB - broadloom carpet
RSF - resinous flooring	WOC - walk-off carpet	VSF - vinyl sheet flooring
SGC - structural glazed cove	CFC - concrete floor coating	

Interior Plan Notes PH3

#	Note
1	PHASE ONE WORK. NO SCOPE.
1.1	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-1/HP-1.
1.2	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-2/HP-2.
1.3	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL, INSIDE CORNER TO INSIDE CORNER TO BE P-3/HP-3.
1.4	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-4.
1.5	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-5.
1.6	09 91 23.99 - EXPOSED STRUCTURE AND ASSOCIATED ASSEMBLIES TO BE PAINTED P-6.
1.7	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-7/HP-7.
1.8	09 91 23.99 - PAINT FULL HEIGHT OF ENTIRE WALL/COLUMN, INSIDE CORNER TO INSIDE CORNER TO BE P-8.
2.2	09 30 00 - WALL TO RECEIVE CERAMIC WALL TILE. REFERENCE 1E/I-501.3 FOR TYPICAL ELEVATION.
2.3	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-10,11. REFERENCE SHEET 221.3 FOR RESTROOM ELEVATIONS.
2.4	09 30 00 - ALL WALLS TO RECEIVE CERAMIC WALL TILE TO BE CWT-5. BRICK INSTALL.
2.5	09 30 00 - WALL BELOW CONCRETE BENCH TO RECEIVE CERAMIC WALL TILE, TO BE CWT-11.
3.1	12 24 13 - PROVIDE MANUAL ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
3.2	12 24 13 - PROVIDE MOTORIZED ROLLER WINDOW SHADES. VERIFY DIMENSIONS IN FIELD PRIOR TO ORDERING AND INSTALL.
4.1	FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-1).
4.2	FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-2).
4.3	FULL EXTENT OF WALL TO RECEIVE NEW VINYL WALLCOVERING (VWC-3).
5	12 36 61.16 - PROVIDE SOLID SURFACE WINDOW STOOL TI BE (SS-1)
6	EXISTING TERRAZZO STAIR TREADS, RISERS, & MOSIC WALL TILE ARE EXISTING TO REMAIN. NEW VINYL WALL BASE TO BE INSTALLED OVER MOSAIC WALL BASE.
6.1	STAIR TREADS TO BE TERRAZZO
7.1	10 26 00 - PROVIDE SURFACE MOUNTED CORNER GUARDS, (CG-1). REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
7.2	10 26 00 - PROVIDE IMPACT WALLCOVERING WAINSCOTT ALONG FULL EXTENT OF WALL UNLESS LEADERS INDICATED OTHERWISE. TO BE (IWC-1). PROVIDE EDGE TRIM ACCESSORIES AS REQUIRED BY MFR. PROVIDE NEW RUBBER WALL BASE, RWB-2 ALONG EXTENTS.
8	EXISTING DISPLAY CASES. NO NEW WORK.
8.1	10 11 00 - VISUAL DISPLAY SURFACES. CUSTOM DISPLAY CASES TO RECEIVE FABRIC WRAPPED TACKBOARD TO BE (UPH-X). REFER TO A-SERIES DRAWINGS.
9	EXISTING TERRAZZO FLOOR TO REMAIN. CLEAN AND BUFF PROTECTED FLOORS.
10	CONCRETE BENCHES TO BE SEALED. (CFC-1).
11	12 32 00 - TYPICAL CLASSROOM STORAGE. REFER TO ELEVATION 3B/I-205.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
12	12 32 00 - TYPICAL RESOURCE STORAGE. REFER TO ELEVATION 5A/I-205.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
13	EXISTING CASEWORK TO REMAIN.
14	06 40 23 - SEATED RISERS TO BE WOOD ON TOP AND FRONT FACE.
15	REFERENCE 2A/I-405.3 FOR TYPICAL SCIENCE ISLAND CASEWORK ELEVATIONS.
16	09 66 23 - PATCH -IN NEW RESINUOUS MATRIX TERRAZZO FLOOR TO MATCH ADJACENT FLOOR. PROVIDE PHYSICAL SAMPLE TO VERIFY COLOR IN FIELD. COLOR MAY VARY.
17	12 35 53 - TYPICAL SCIENCE CLASSROOM STORAGE. REFER TO ELEVATION 1A/I-210.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
18	REFERENCE 2B/I-210.3 & 2C/I-210.3 FOR TYPICAL SCIENCE DEMONSTRATION ISLAND CASEWORK ELEVATIONS.
19	06 40 23 - BUILT-IN BENCH TO BE WOOD ON TOP AND FRONT FACE.
20	NEW FLOOR FINISHES IN PHASE 3. ALL OTHER FINISH SCOPE INCLUDED IN PHASE 2.
21	ALTERNATE CLASSROOM FINISHES AND CASEWORK: PROVIDE NEW CASEWORK IN EXISTING LOCATION. SEE ELEVATION 6E/I-211.3 FOR TYPICAL
22	ALTERNATE: PROVIDE NEW FINISHES INCLUDING/BUT NOT LIMITED TO CARPET, PAINT, AND WALL BASE. REFER TO ALTERNATES DESIGNATED IN SPECIFICATION PROJECT MANUAL.
23	ALIGN CPT-4 WITH BULKHEAD ABOVE.
24	10 11 00 - PROVIDE FABRIC WRAPPED TACKBOARD TO FILL RECESS ABOVE WALL BASE, IN ITS ENTIRETY. VERIFY DIMENSIONS IN FIELD.
25	12 32 00 - TYPICAL WELLNESS CASEWORK. REFER TO ELEVATION 6E/I-401.3 FOR CLARIFICATION PROVIDE OPPOSITE HAND WHERE REQUIRED.
26	09 30 00 - PROVIDE PORCELAIN FLOOR TILE W/ METAL EDGE TRIM AT ALL EXPOSED EDGES. TO BE PFT-1.
27	ALIGN ACCENT FLOOR PATTERN WITH BULKHEAD ABOVE. CPT-4
28	APPLIED WALL FINISH IS EXISTING TO REMAIN. PROTECT SURFACE(S) THROUGH RENOVATION & CONTRSTRUCTION.
29	15"D ADJUSTABLE SHELVES W/ KV BRACKETS. SEE DETAIL 2B/I-301.3 FOR ADDITIONAL INFORMATION.
30	EXISTING RELOCATED METAL STUDENT ART LOCKERS.
31	12 00 80.99 - PROVIDE UTILITY SHELVING REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATON.
32	10 21 33 - PROVIDE CUBICLE CURTAIN AND TRACK.
33	CONTINUE CARPET TILE ON RAISED PLATFORM. PROVIDE RUBBER NOSING ON EXPOSED EDGES.
34	EXISTING NON-GYPSUM BOARD WALLS TO BE PAINTED. REFER TO ELEVATIONS REFERENCED FOR PAINT COLOR LOCATIONS, TYPICAL.
35	OWNER PROVIDED EQUIPMENT, N.I.C.
36	09 30 00 - PATCH AND REPAIR AREAS OF BROKEN MOSAIC FLOOR TILE. MATCH EXISTING TILE AND GROUT. VERIFY CONDITIONS AND LOCATIONS IN FIELD.
37	12 32 00 - PROVIDE PLASTIC LAMINATE COUNTERTOP W/ WIRE MANAGEMENT LINEAR CHANNEL W/ BRUSH. SIZE 2 BY 60 INCHES. BASIS OF DESIGN: MOCKETT-BREXT MODEL BRKIT, MATTE BLACK. (QTY:4). MOUNT AT 30"AFF W/ RAKKS EH-1824 SUPPORT BRACKETS SPACED MAX 42 INCHES APART. SEE DETAIL 5A/A-327.3
38	NOT USED
39	09 68 16 - PROVIDE NEW BROADLOOM CARPET ALONG AISLE. PATTERN DIRECTION TO RUN NORTH & SOUTH, LENGTH OF ROLL, TO BE (CPB-1). REFER TO E-SERIES DRAWINGS FOR ILLUMINATED EDGE TRIM FOR LIGHTED AISLE.
40	PROVIDE RUBBER STAIR TREAD & RISER, RAISED DISK, TO BE SELECTED BY ARCHITECT FROM MFR FULL COLOR RANGE.
41	BASE BID: CONSTRUCT STAGE ACCESS AND STAIR AS SHOWN, MODIFY EXISTING AUDIENCE SEATING AS REQUIRED FOR NEW CONSTRUCTION. PATCH & REPAIR AREA OF WALL AFFECTED BY CONSTRUCTION. REF A-400 SERIES DWGS.

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced LGK

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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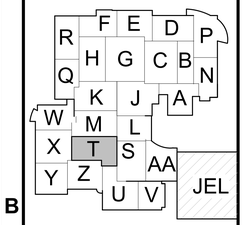
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

SECOND FLOOR
INTERIOR FINISH PLAN - UNIT T

IN1T2.3

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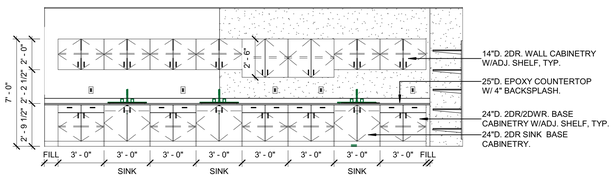
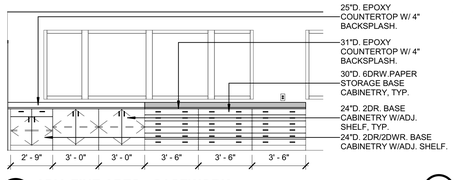


6E SINK ELEVATION TYP.
1/4" = 1'-0"



4E ADV. FINE ARTS - CASEWORK
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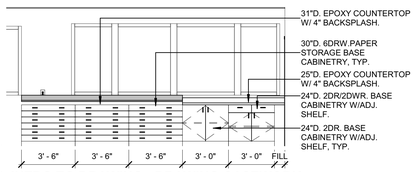

3E INTRO TO DRAWING - DRAWING CASEWORK
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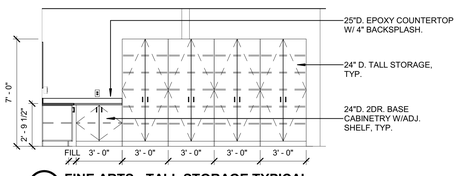

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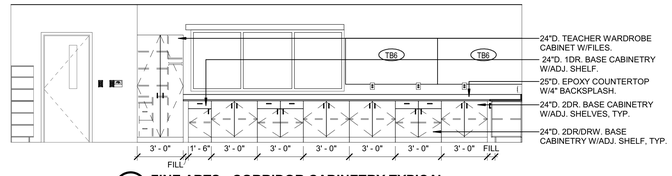
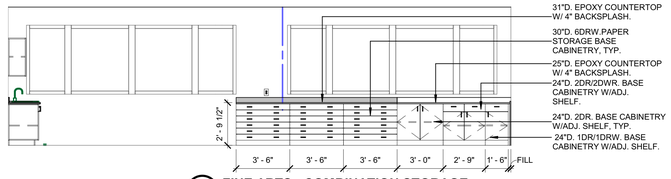


6D FINE ARTS - CORRIDOR CABINETRY TYPICAL
1/4" = 1'-0"



3D FINE ARTS - COMBINATION STORAGE
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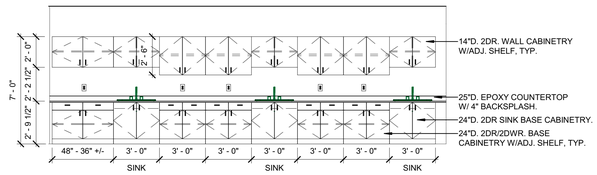

2D FINE ARTS - SINK CABINETRY TYPICAL
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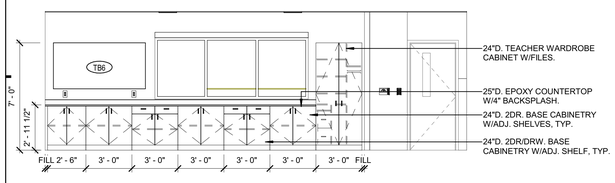

6C UNIT B - SCULPTURE WEST ELEVATION
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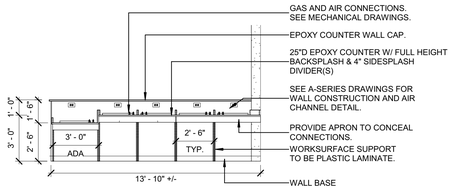
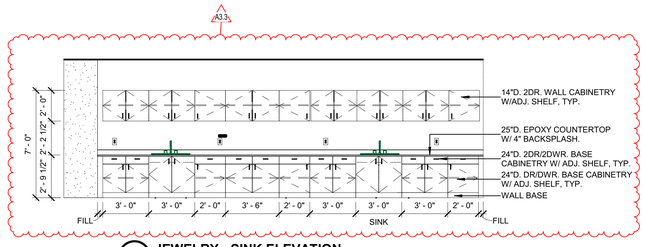
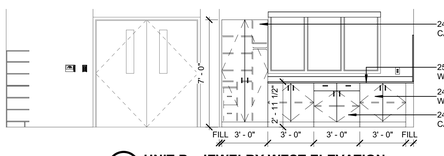


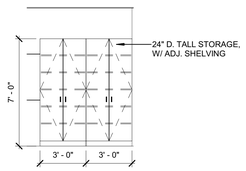
5C JEWELRY SOLDERING ELEVATION
1/4" = 1'-0"



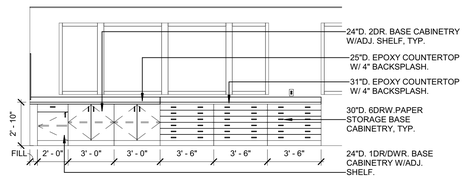
5B JEWELRY - SINK ELEVATION
1/4" = 1'-0"



6B UNIT B - JEWELRY WEST ELEVATION
1/4" = 1'-0"



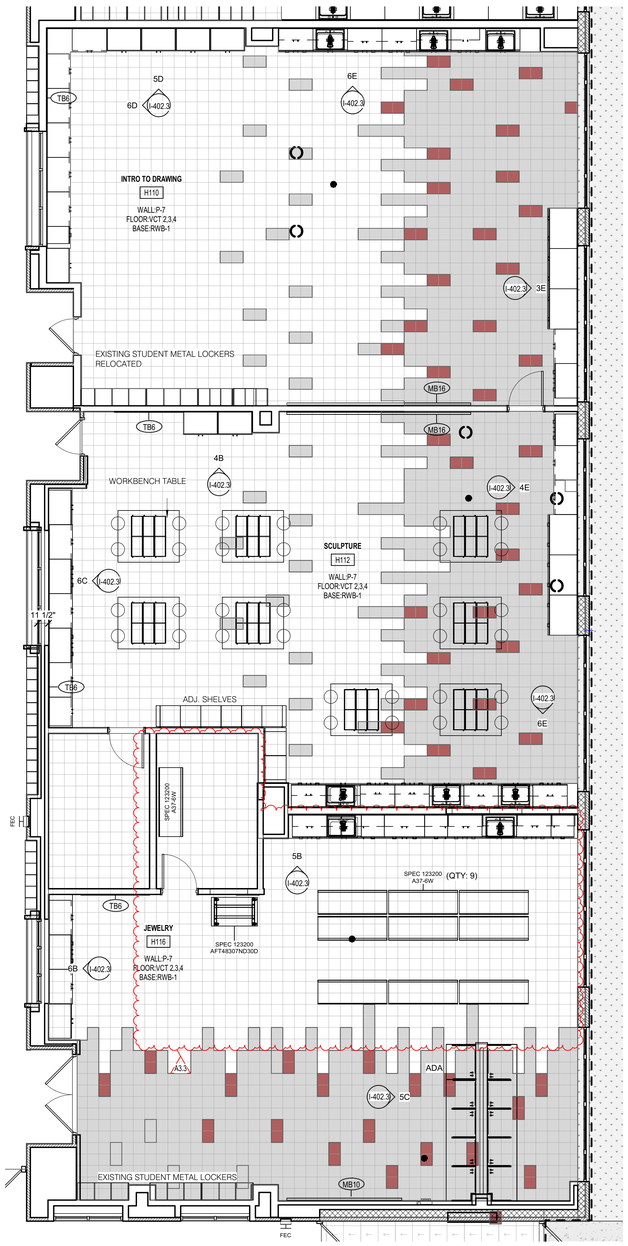
4B FINE ARTS - TALL CABINETS
1/4" = 1'-0"



6A ADV. DRAWING - CASEWORK
1/4" = 1'-0"

SPEC: 12 32 00
NEW WORKBENCH TABLE(S)

3A ADVANCED DRAWING ENLARGED PLAN
3/16" = 1'-0"



2A FINE ARTS ENLARGED PLANS
3/16" = 1'-0"

SCHMIDT
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415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced LGK

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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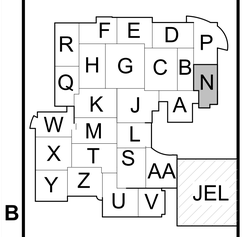
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED FINE ARTS PLANS

I-402.3

I:\IES_1 DRAWINGS FINE ARTS.dwg
2019-067.NCH_A13.3 of Washington Township,North Central High School Renovation_
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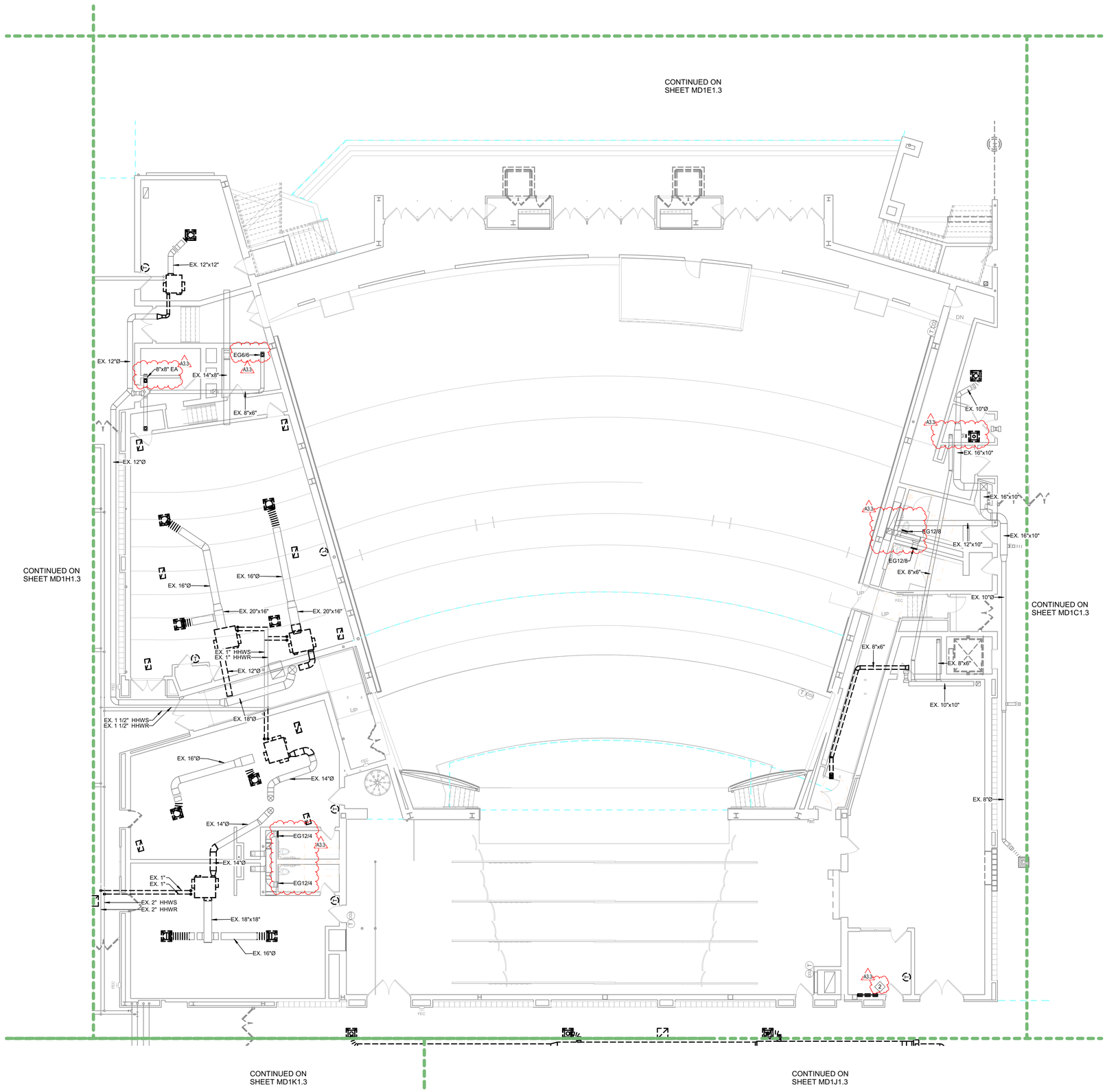

1 **UNIT G - FIRST FLOOR AUDITORIUM HVAC DEMOLITION PLAN**
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
2	REMOVE EXISTING FAN COIL. VALVE AND CAP ALL PIPING TERMINATIONS NEAR MAIN. A3.3
3	EXISTING EXHAUST DUCTWORK UP TO ROOF.
4	REMOVE EXISTING ROOF EXHAUST FAN. PROVIDE CURB CAP AND SEAL WATER TIGHT. SEE DETAIL 5B/M-502.3
5	REMOVE EXISTING RELIEF. PROVIDE CURB CAP AND SEAL WATER TIGHT. SEE DETAIL 5B/M-502.3
6	REMOVE EXISTING HEATER. REPLACE ISOLATION VALVE AND PREPARE FOR NEW HEATER.
7	REMOVE EXISTING HEATER AND DEMO EXISTING PIPING WHERE APPLICABLE. VALVE AND CAP ALL PIPING TERMINATIONS NEAR MAIN.

GENERAL DEMOLITION NOTES - PH3

#	NOTE
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Project No. 2019-067.NCH
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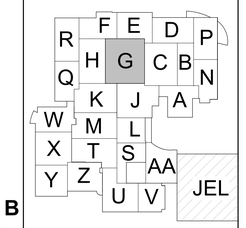

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR MECH DEMOLITION PLAN - UNIT G

MD1G1.3

MD1G1.3_FIRST FLOOR MECH DEMOLITION PLAN - UNIT G
2019-067.NCH_M.E.S. of Washington Township_North Central High School Renovation_
Autodesk Docs://2019-067.NCH - North Central High School/2019-067.NCH_Section1_M_2022_Central.rvt
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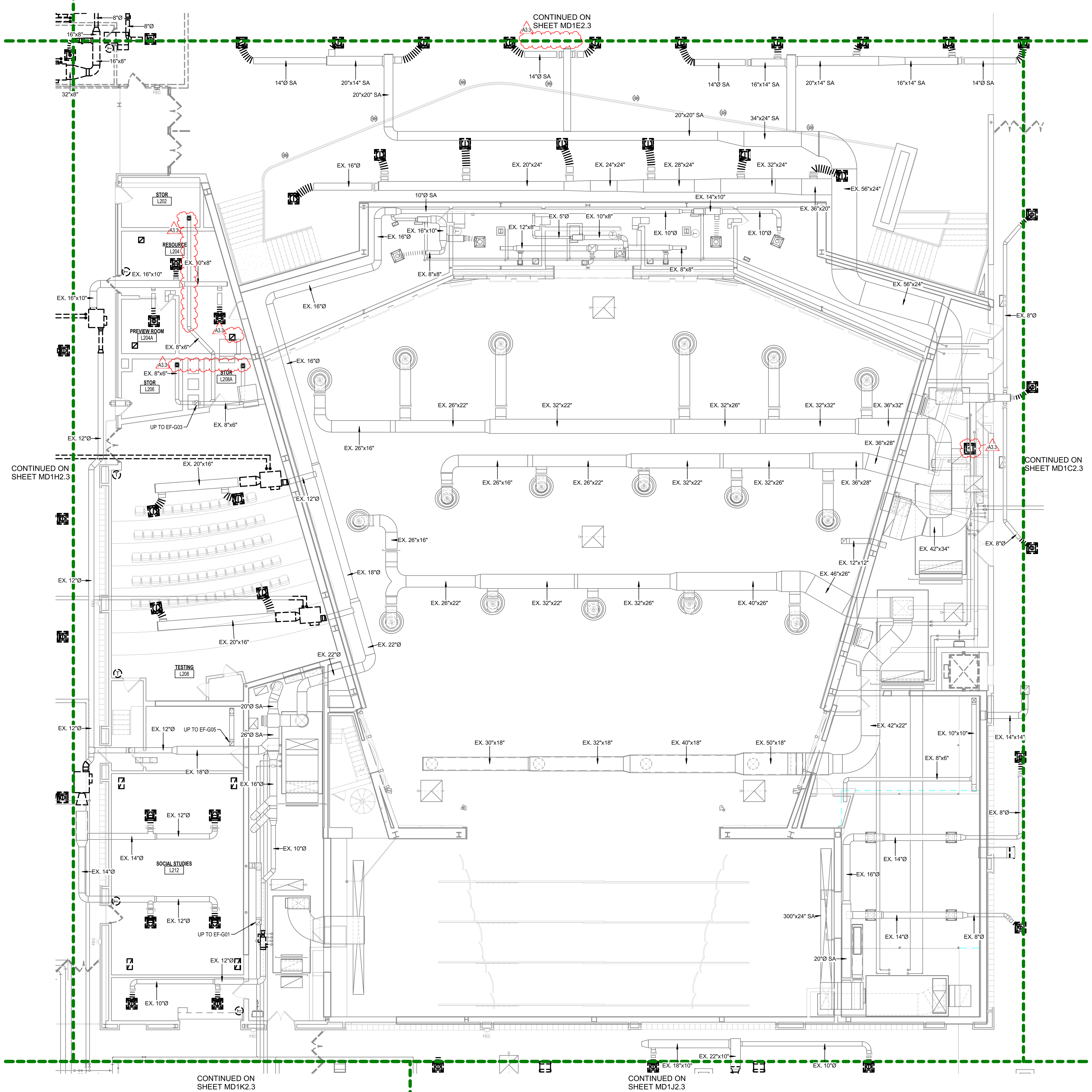

1 SECOND FLOOR MECHANICAL DEMOLITION PLAN - UNIT G
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
2	REMOVE EXISTING FAN COIL. VALVE AND CAP ALL PIPING TERMINATIONS NEAR MAIN.
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GENERAL DEMOLITION NOTES - PH3

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR MECH DEMOLITION PLAN - UNIT G

MD1G2.3

GENERAL DEMOLITION NOTES - PH3

#	NOTE
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DEMOLITION COMBINED PLAN NOTES - PH3

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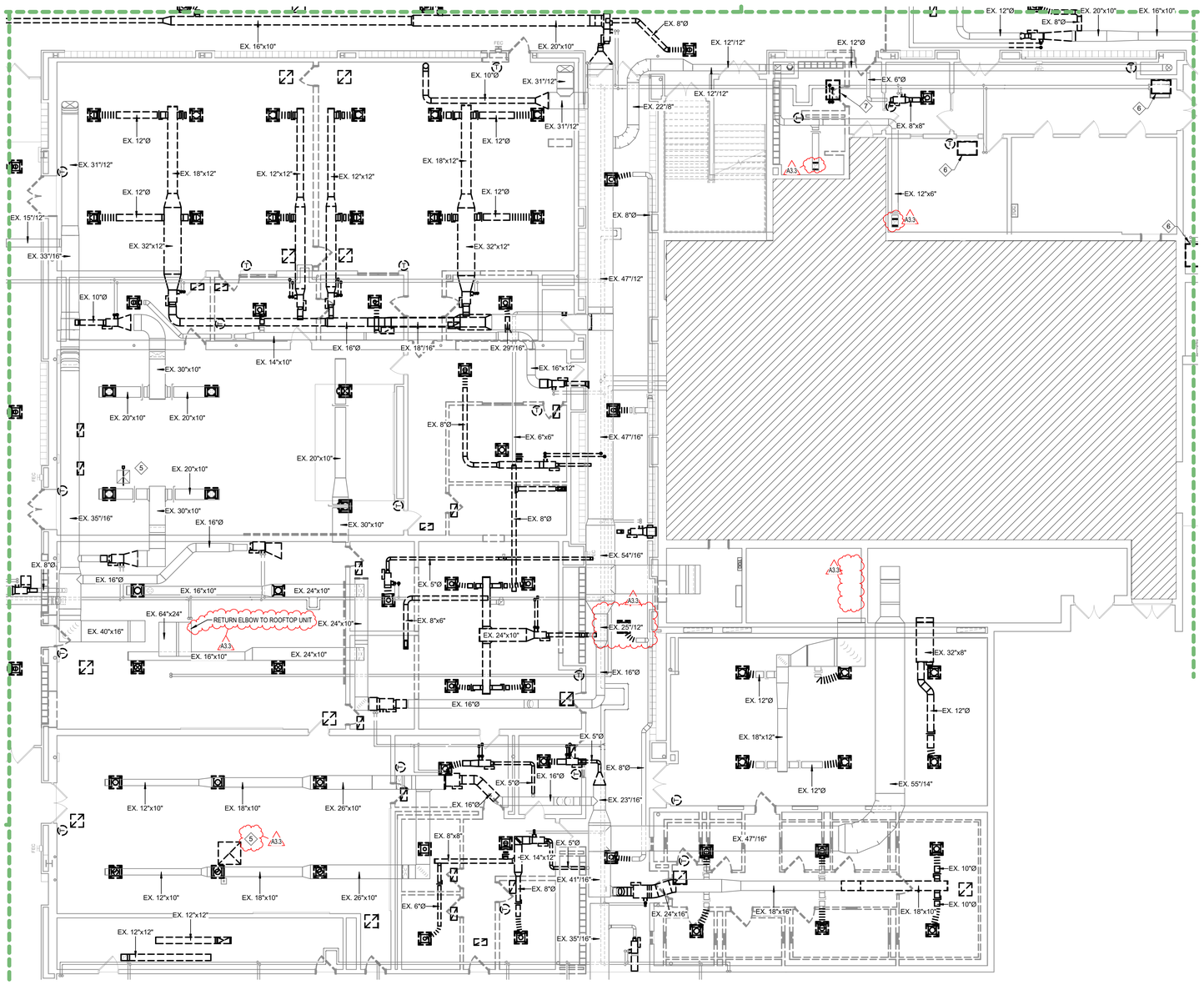
CONTINUED ON SHEET MD1G1.3

CONTINUED ON SHEET MD1C1.3



CONTINUED ON SHEET MD1A1.3

CONTINUED ON SHEET MD1K1.3

CONTINUED ON SHEET MD1M1.3

CONTINUED ON SHEET MD1L2.3

2A FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT J
1/8" = 1'-0"

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
Project Date 03.03.2023
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SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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1801 East 86th Street
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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR MECH DEMOLITION PLAN - UNIT J

MD1J1.3

MD1J1.3 - FIRST FLOOR MECH DEMOLITION PLAN - UNIT J
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
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A3.3

GENERAL DEMOLITION NOTES - PH3

#	NOTE
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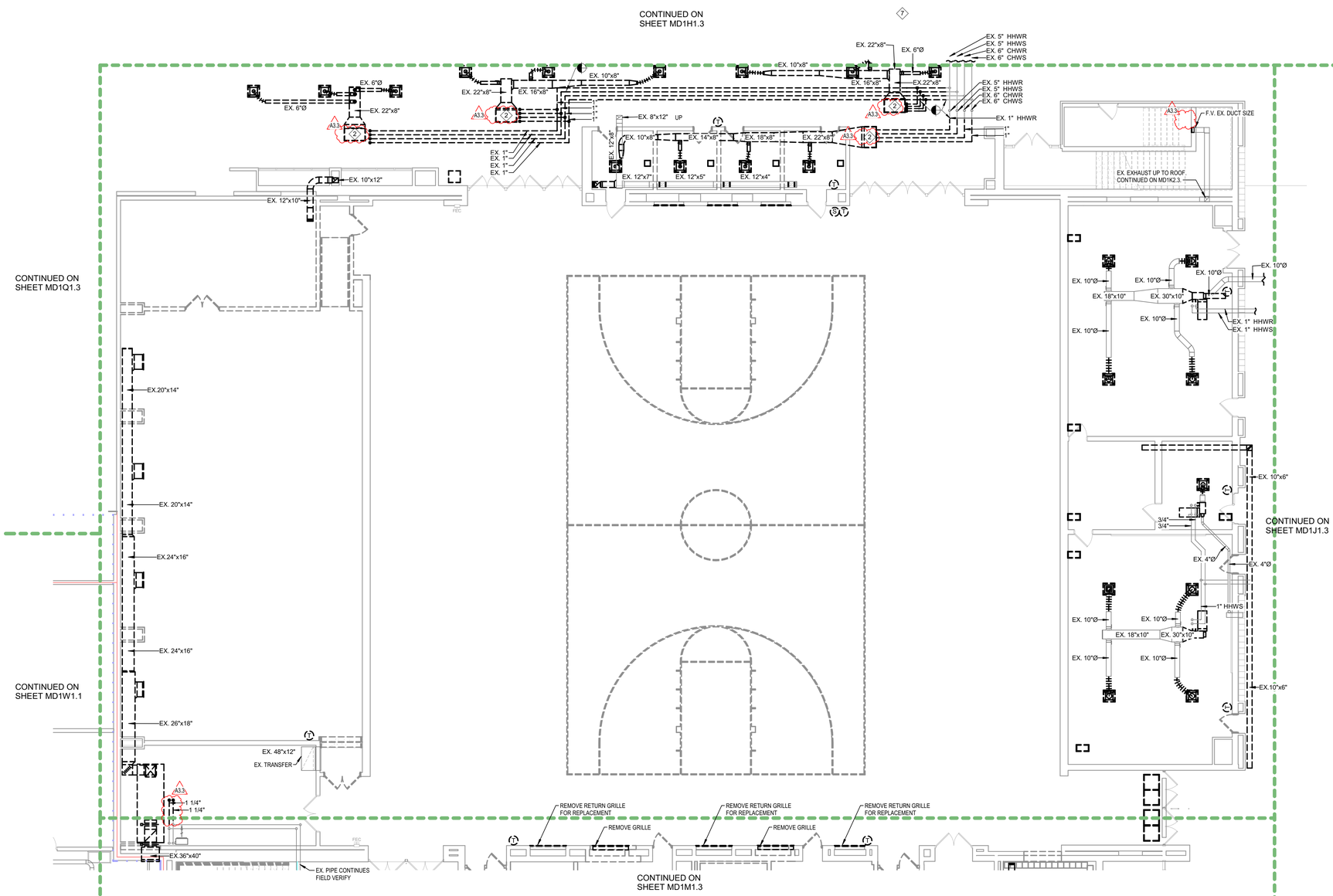
A3.3



1 **FIRST FLOOR DEMOLITION - UNIT K**
1/8" = 1'-0"

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415 Massachusetts Avenue
Indianapolis, IN 46204
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Project No. 2019-067.NCH
Project Date 03.03.2023
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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR DEMOLITION PLAN - UNIT K

MD1K1.3

M:\R\Y_1 FIRST FLOOR DEMOLITION PLAN - UNIT K
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
2019-067.NCH_M.S.D. of Washington Township_North Central High School@10.68.68.250%_Detach_A_2022_Cloud.rvt
4/4/2023 3:34:56 PM

DEMOLITION COMBINED PLAN NOTES - PH3	
#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
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GENERAL DEMOLITION NOTES - PH3	
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CONTINUED ON SHEET MD1H2.3

CONTINUED ON SHEET MD1Q2.3 (SECTOR 1)

CONTINUED ON SHEET M-413.3

CONTINUED ON SHEET MD1J2.3

CONTINUED ON SHEET MD1M2.3

EF-K1 INSTALLED IN PHASE 2 TO BE RELOCATED

EX.192"x38" OA

EX.96"x38" OA

EX.52"x28" SA

EX.48"x30" SA

EX.42"x34" SA

EX.40"x30" SA

EX.40"x24" SA

EX.38"x20" SA

EX.26"x18" SA

EX.26"x12" SA

HDRG48/24

(TYPICAL OF 50)

1A M-412.3

1A M-413.3

Z.01.E

FEC

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR DEMOLITION PLAN - UNIT K

MD1K2.3

1 SECOND FLOOR DEMOLITION PLAN - UNIT K
1/8" = 1'-0"

MD1K2.3 - SECOND FLOOR DEMOLITION PLAN - UNIT K
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Autodesk Docs://2019-067.NCH_North Central High School/2019-067.NCH_Bureau_8_2022_Drive.rvt
Autodesk Docs

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
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GENERAL DEMOLITION NOTES - PH3

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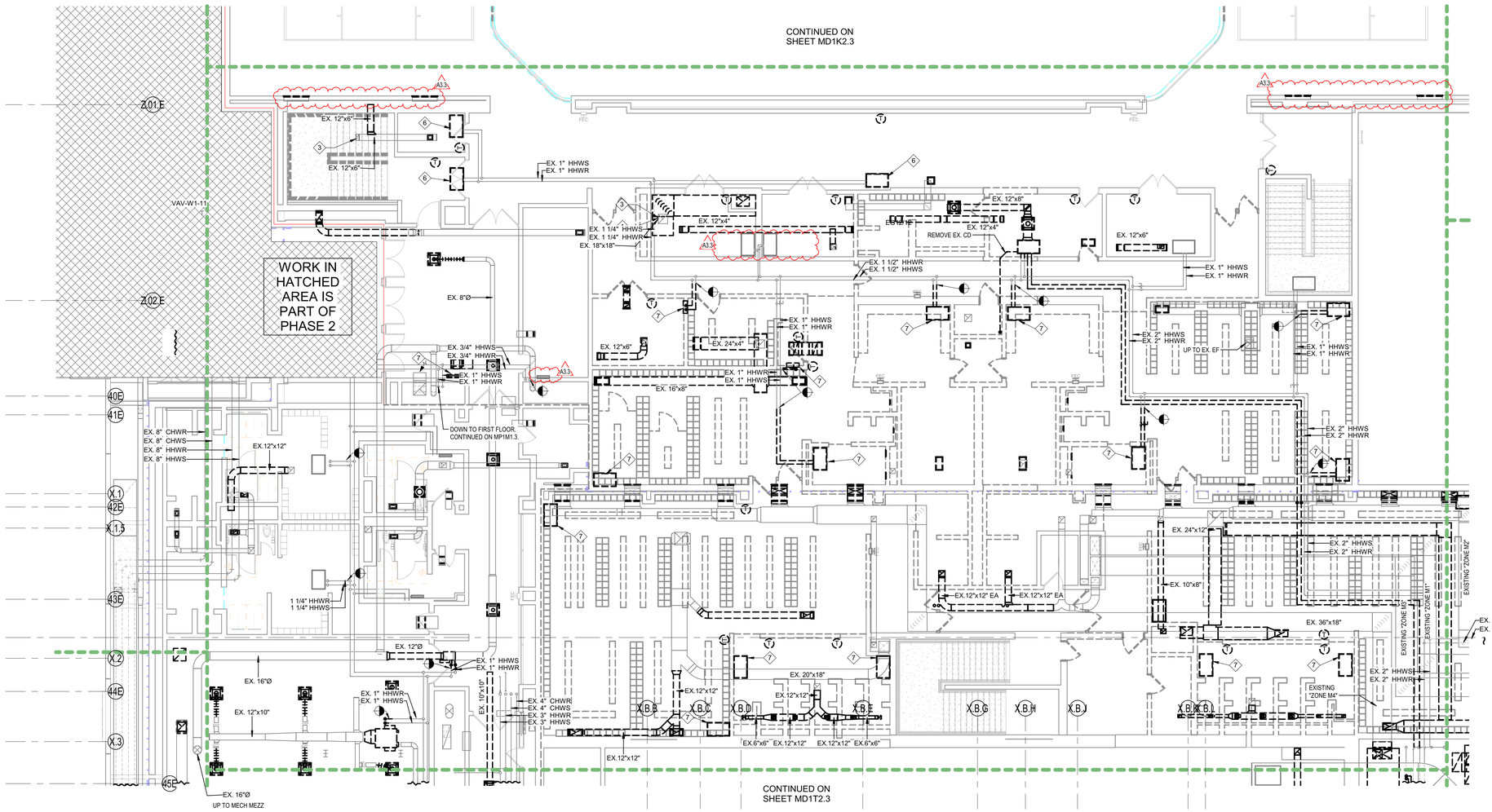

1 **SECOND FLOOR DEMOLITION PLAN - UNIT M**
1/8" = 1'-0"

SCHMIDT ASSOCIATES
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SARAH KATHLEEN HEMPSTEAD REGISTERED No. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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1801 East 86th Street
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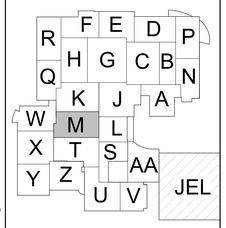

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR DEMOLITION PLAN - UNIT M

MD1M2.3

MD1M2_SECOND FLOOR DEMOLITION PLAN - UNIT M
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
Plotted: 3/6/2023 2:08:07 PM EST By: North Central High School 2019-067.NCH_Autosch_24_2022_Cloud.rvt
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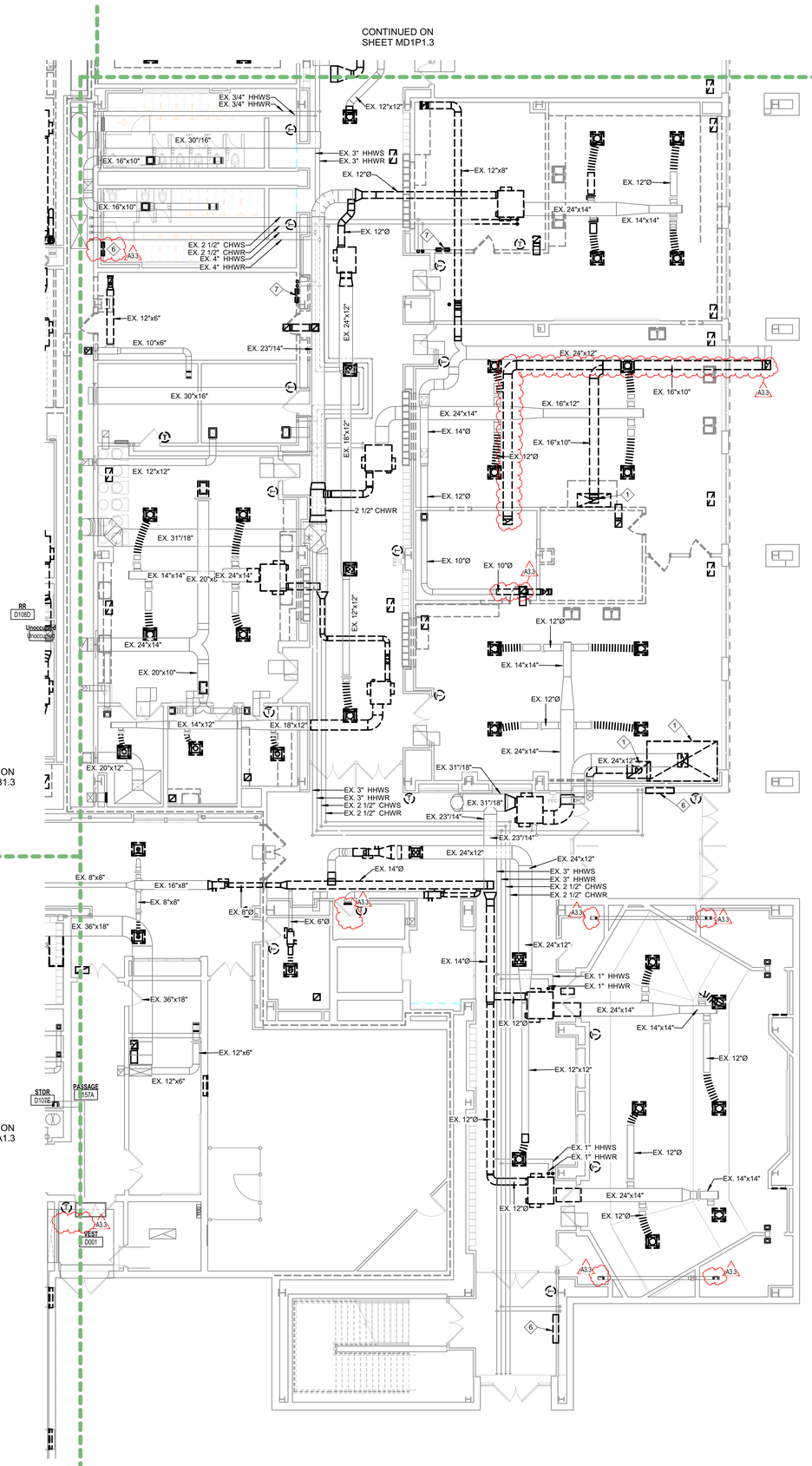

2A **FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT N**
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
2	REMOVE EXISTING FAN COIL. VALVE AND CAP ALL PIPING TERMINATIONS NEAR MAIN. A3.3
3	EXISTING EXHAUST DUCTWORK UP TO ROOF.
4	REMOVE EXISTING ROOF EXHAUST FAN. PROVIDE CURB CAP AND SEAL WATER TIGHT. SEE DETAIL 5B/M-502.3
5	REMOVE EXISTING RELIEF. PROVIDE CURB CAP AND SEAL WATER TIGHT. SEE DETAIL 5B/M-502.3
6	REMOVE EXISTING HEATER. REPLACE ISOLATION VALVE AND PREPARE FOR NEW HEATER.
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GENERAL DEMOLITION NOTES - PH3

#	NOTE
A	DARK DASHED LINES INDICATE EXISTING MECHANICAL EQUIPMENT, DUCTWORK, PIPING AND OR MECHANICAL ACCESSORIES TO BE DEMOLISHED COMPLETE. CONTRACTOR TO FIELD VERIFY ACTUAL EXISTING CONDITIONS PRIOR TO DEMOLITION AND BIDDING. CONTRACTOR TO INCLUDE ALL COST TO REMOVE ITEMS MADE OBSOLETE DUE TO NEW HVAC WORK. CONTRACTOR GIVES OWNER FIRST RIGHTS OF REFUSAL ON ANY EXISTING EQUIPMENT THEY OWNER MAY WANT TO KEEP. IF OWNER DECIDES SAID ITEM IS TO BE REMOVED THEN CONTRACTOR IS TO REMOVE FROM PROJECT SITE AS REQUIRED.
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR MECH DEMOLITION PLAN - UNIT N

MD1N1.3

MD1N1_1_FIRST FLOOR MECH DEMOLITION PLAN - UNIT N
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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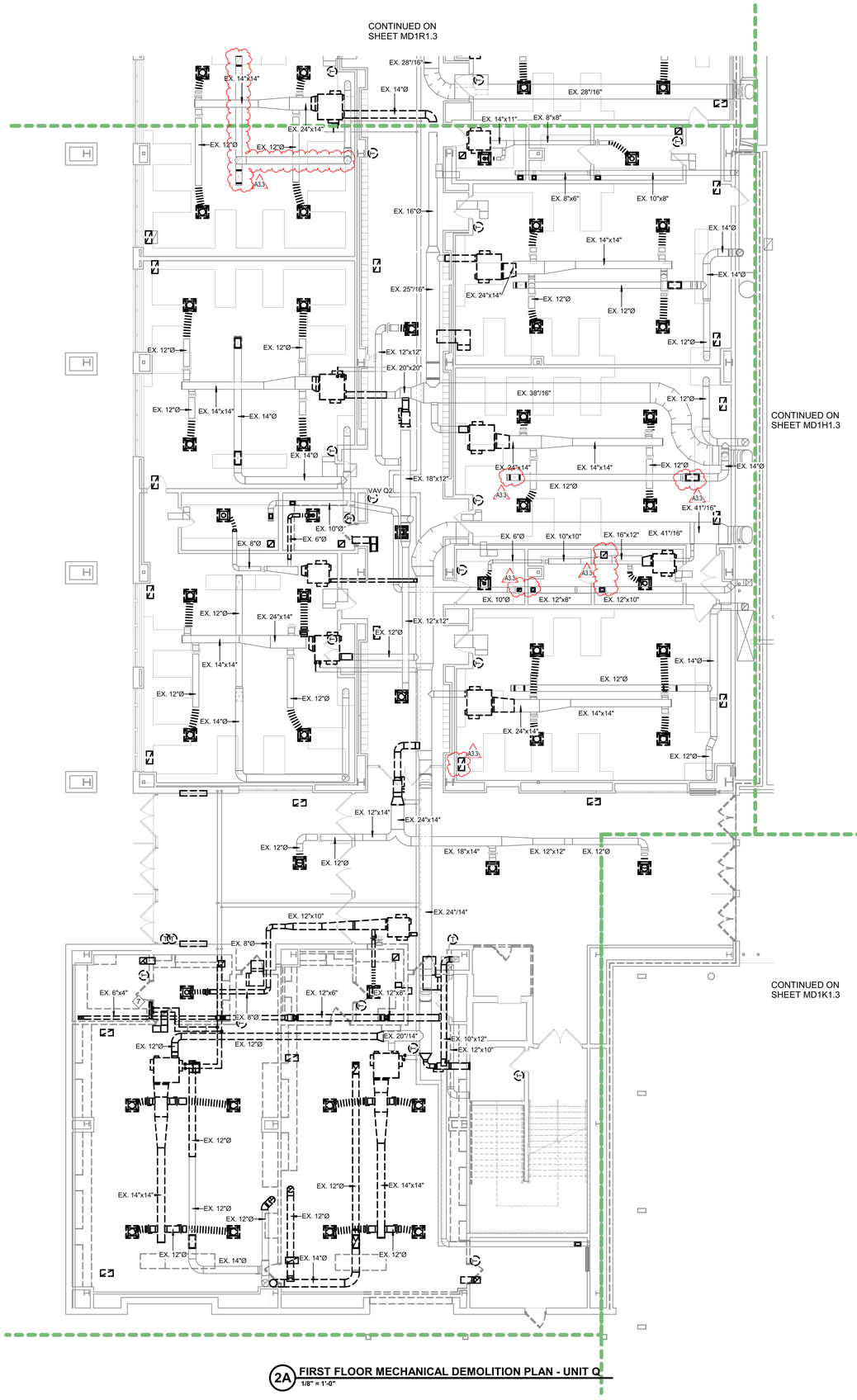

2A **FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT Q**
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
2	REMOVE EXISTING FAN COIL. VALVE AND CAP ALL PIPING TERMINATIONS NEAR MAIN. A3.3
3	EXISTING EXHAUST DUCTWORK UP TO ROOF.
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GENERAL DEMOLITION NOTES - PH3

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR MECH DEMOLITION PLAN - UNIT Q

MD1Q1.3

MD1Q1_1_FIRST FLOOR MECH DEMOLITION PLAN - UNIT Q
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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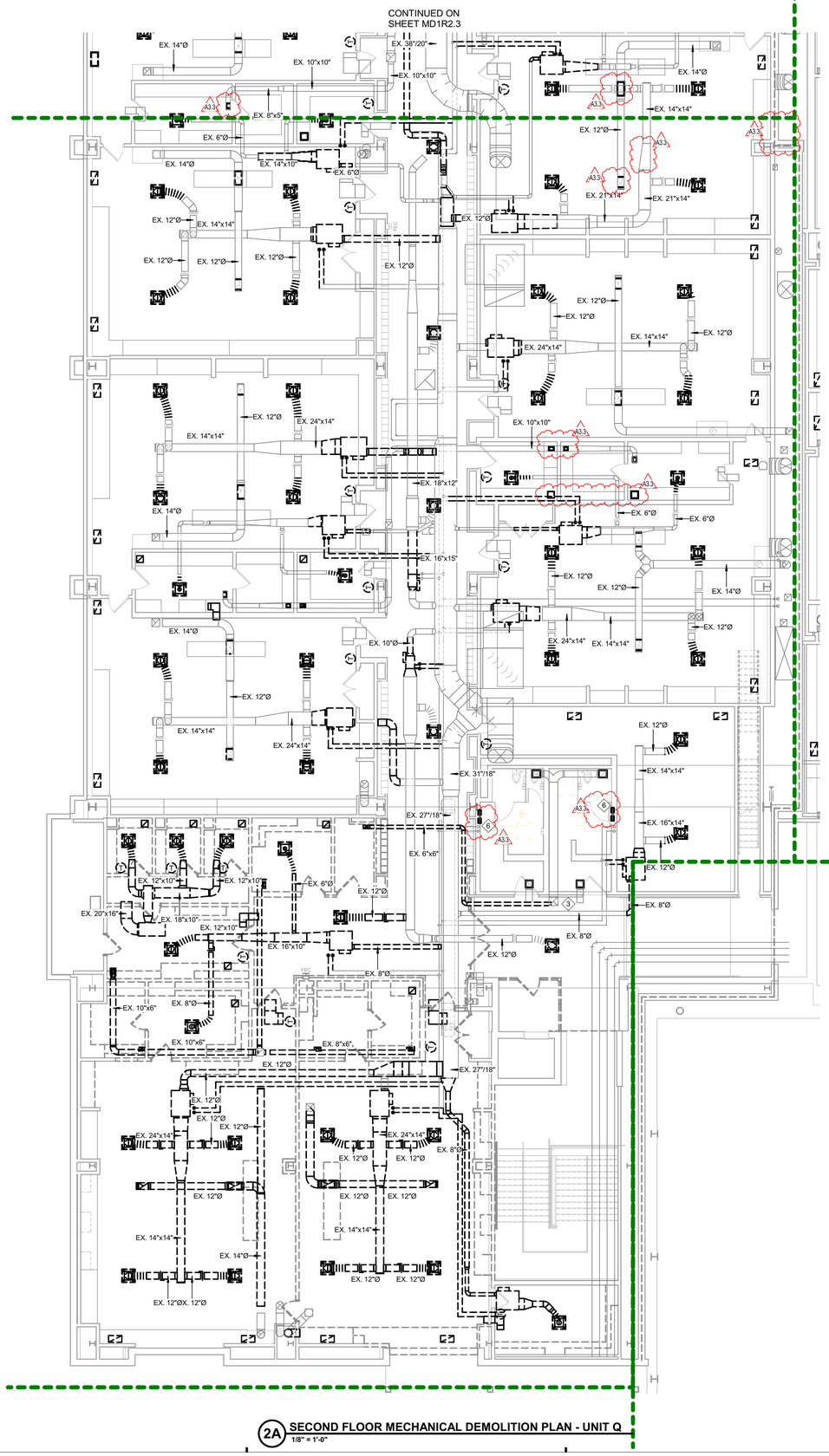

2A **SECOND FLOOR MECHANICAL DEMOLITION PLAN - UNIT Q**
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

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GENERAL DEMOLITION NOTES - PH3

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ARCHITECT

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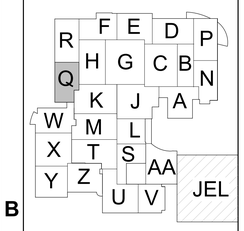

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR MECH DEMOLITION PLAN - UNIT Q

MD1Q2.3

MD1Q2.3 - 20220427-FLOOR MECH DEMOLITION PLAN - UNIT Q
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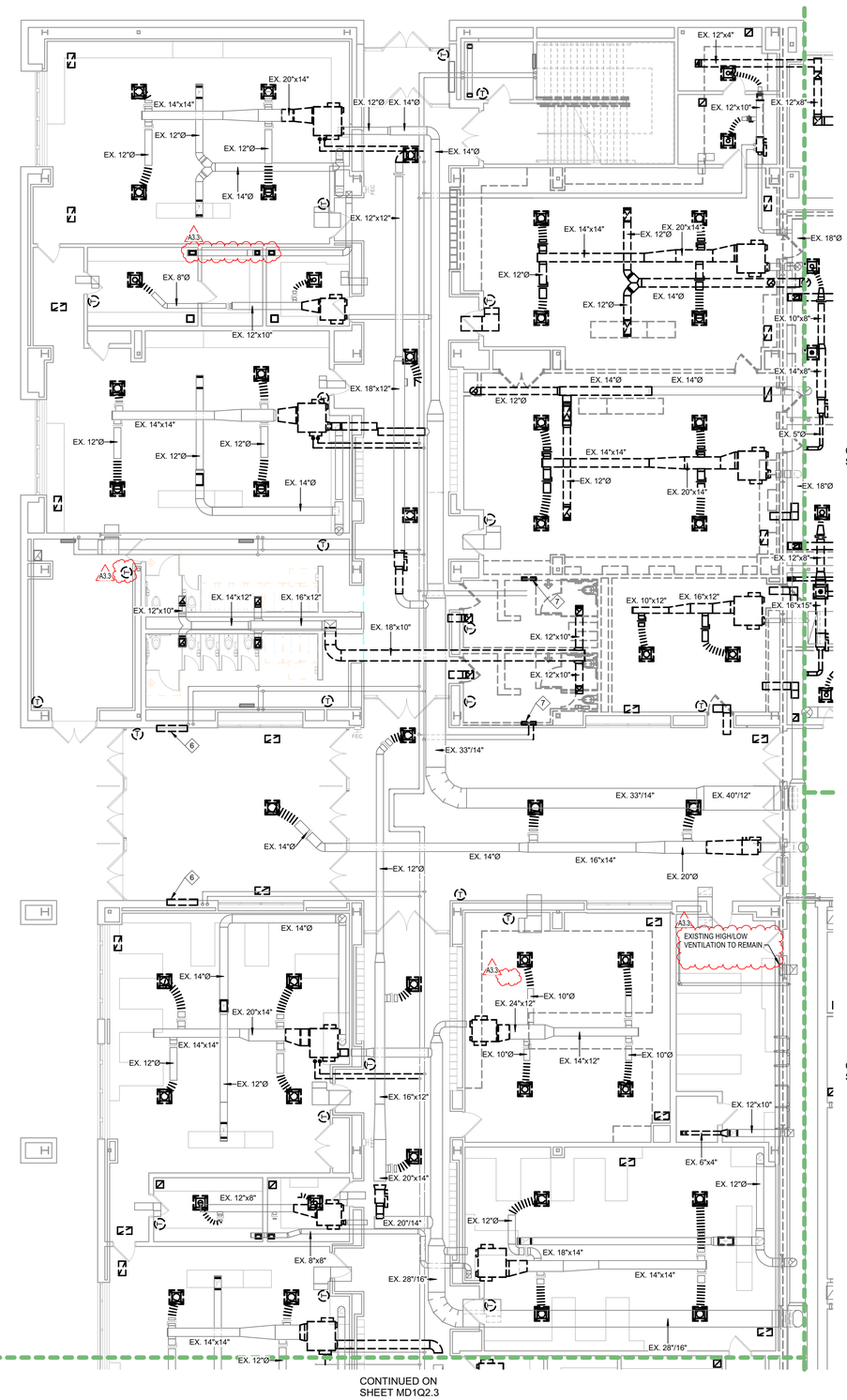

1 **FIRST FLOOR MECHANICAL DEMOLITION PLAN - UNIT R**
1/8" = 1'-0"

DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
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GENERAL DEMOLITION NOTES - PH3

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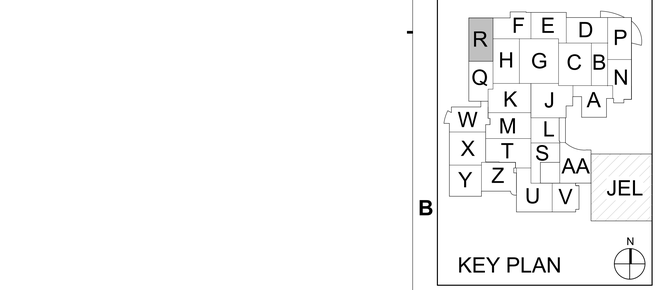

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR MECH DEMOLITION PLAN - UNIT R

MD1R1.3

MEP/FP_1_PART1-FLOOR-MECH-DEMOLITION-PLAN_UNIT-R
2019-067.NCH_M3.3 of Washington Township North Central High School Renovation_
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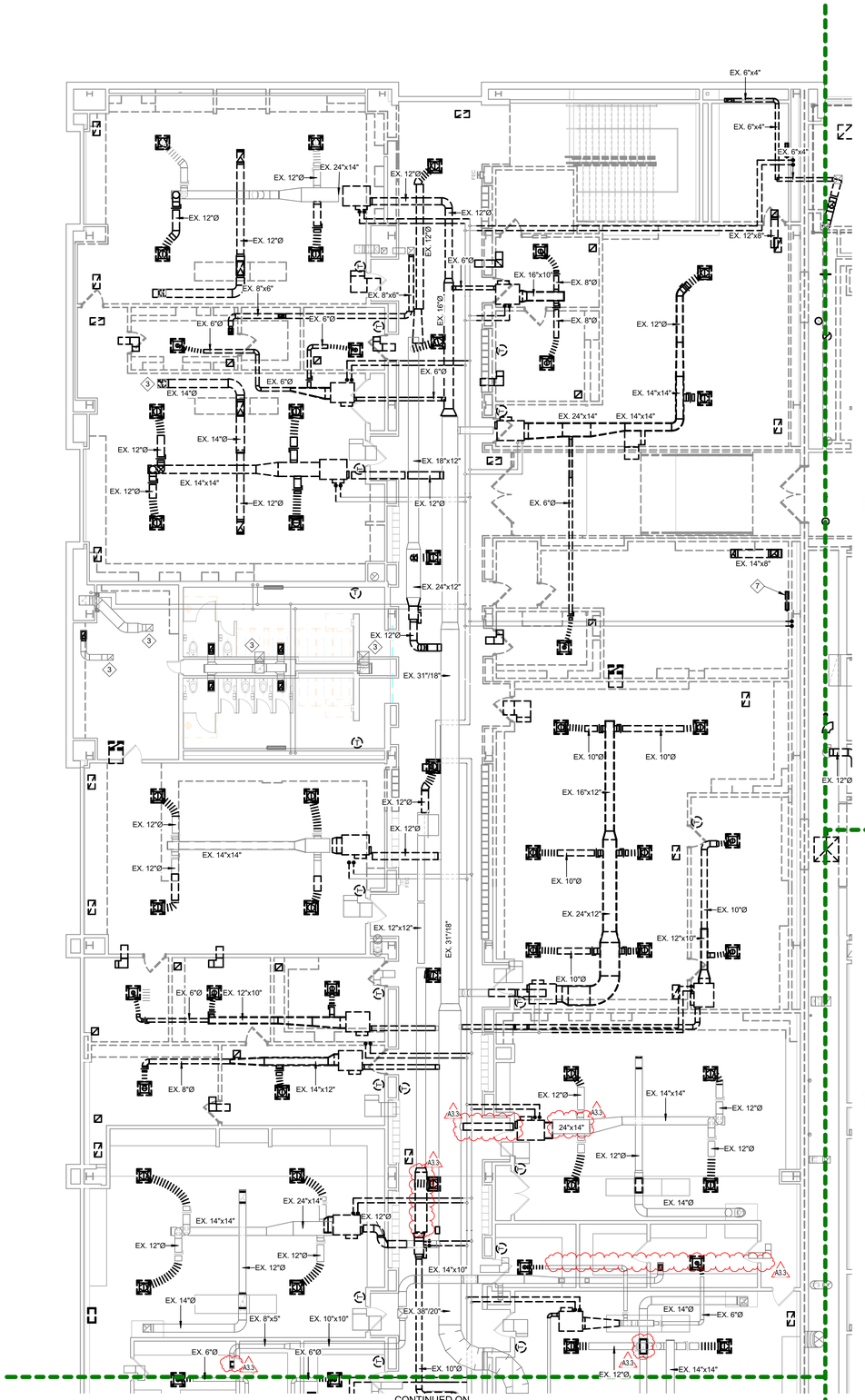

1 **SECOND FLOOR MECHANICAL DEMOLITION PLAN - UNIT R**
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DEMOLITION COMBINED PLAN NOTES - PH3

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GENERAL DEMOLITION NOTES - PH3

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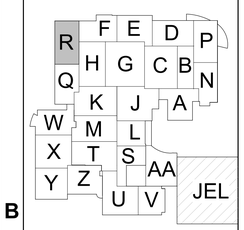

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR MECH DEMOLITION PLAN - UNIT R

MD1R2.3

MD1R2.3 - SECOND FLOOR MECH DEMOLITION PLAN - UNIT R
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DEMOLITION COMBINED PLAN NOTES - PH3

#	NOTE
1	REMOVE DUCTWORK AND HOODS. CAP EXISTING DUCT BELOW DECK.
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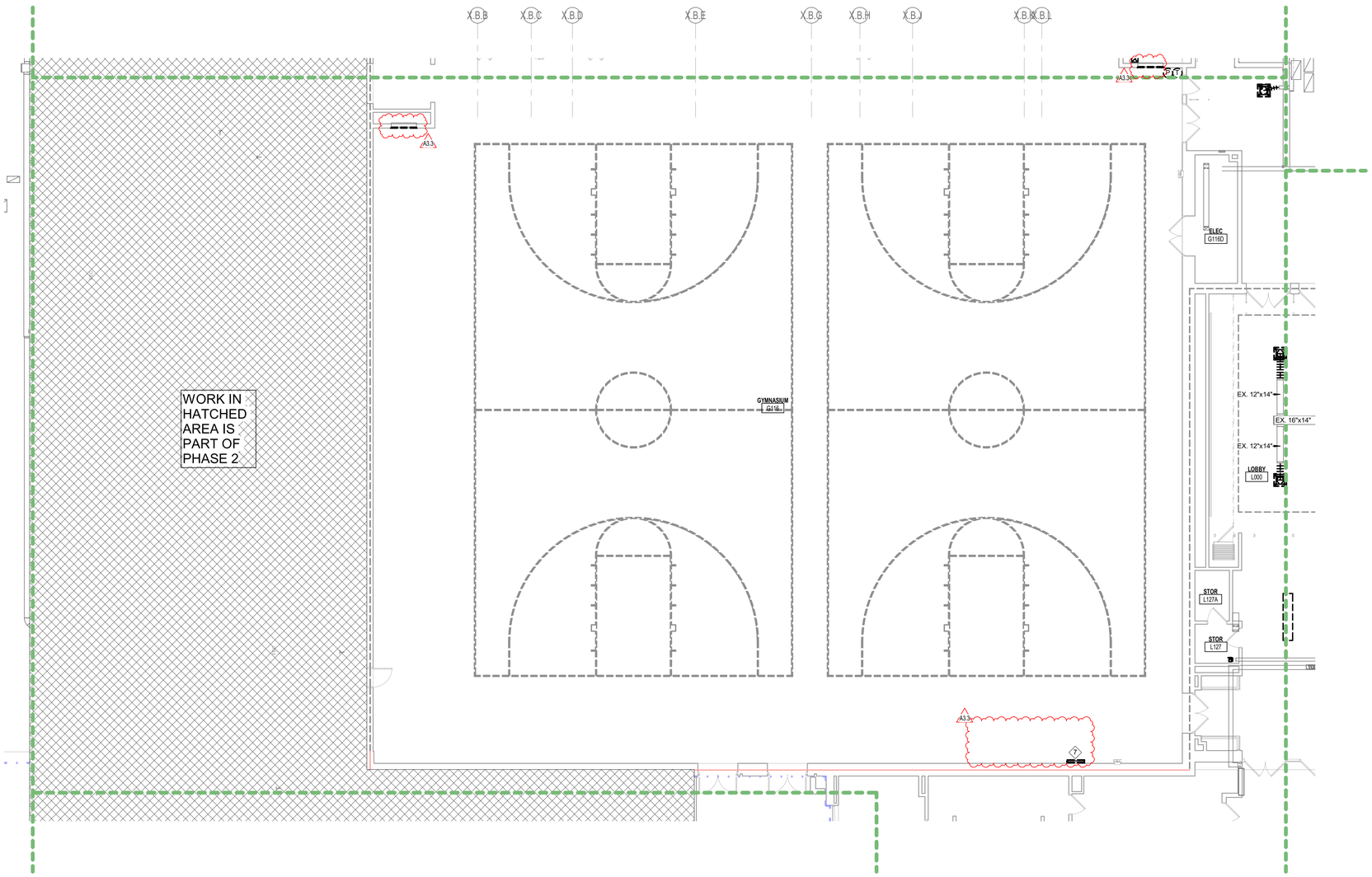

1 FIRST FLOOR DEMOLITION - UNIT T
1/8" = 1'-0"

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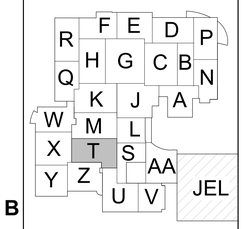

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR DEMOLITION PLAN - UNIT T

MD1T1.3

MD1T1.1_FIRST FLOOR DEMOLITION PLAN - UNIT T
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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3/3/2023 10:41:36 AM

DEMOLITION COMBINED PLAN NOTES - PH3

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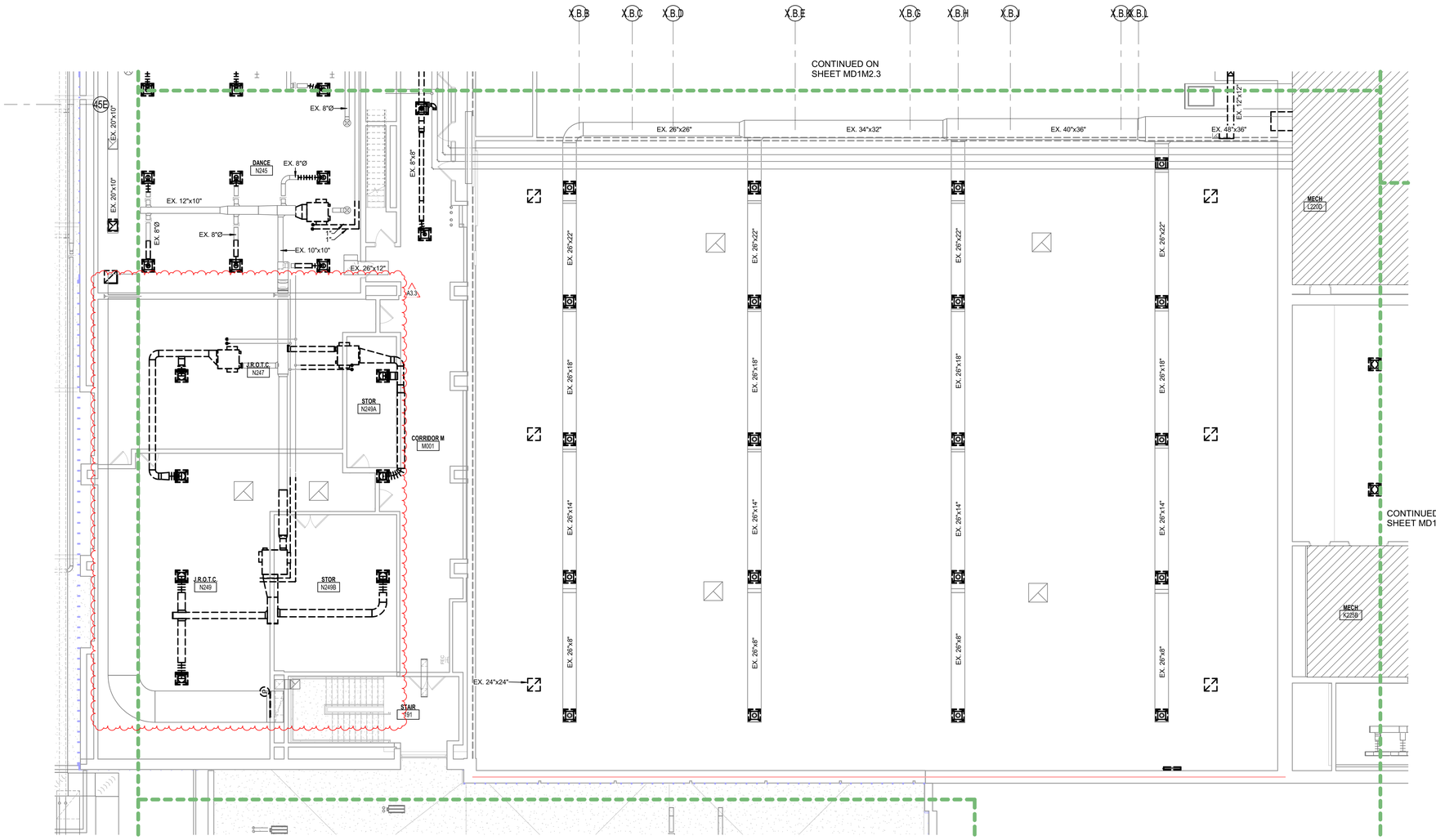
B	LIGHT SOLID LINES INDICATE EXISTING MECHANICAL EQUIPMENT, DUCTWORK, PIPING AND OR MECHANICAL ACCESSORIES TO REMAIN AS IS. CONTRACTOR TO FIELD VERIFY ACTUAL EXISTING CONDITIONS PRIOR TO DEMOLITION AND BIDDING.
C	ALL FAN POWERED BOXES, VAV BOXES, EXHAUST FANS, DIFFUSERS AND GRILLES SHALL BE REMOVED UNLESS NOTED OTHERWISE. CAP EXHAUST FAN CURBS AS REQUIRED. CAP PIPING AND/OR PREP FOR NEW EQUIPMENT AS REQUIRED. REFER TO "MH" SERIES DRAWINGS FOR MORE INFORMATION. A3.3



1 **SECOND FLOOR DEMOLITION PLAN - UNIT T**
1/8" = 1'-0"

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
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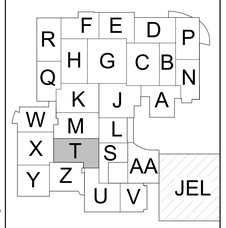
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR DEMOLITION PLAN - UNIT T

MD1T2.3

MD1T2.3_SECOND FLOOR DEMOLITION PLAN - UNIT T
2019-067.NCH_M.E.S.I.P.-Washington Township_North Central High School Renovation_
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GENERAL NOTES HVAC PLAN

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MECHANICAL HVAC PLAN NOTES - PH3

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7	UNDERCUT DOOR 1".
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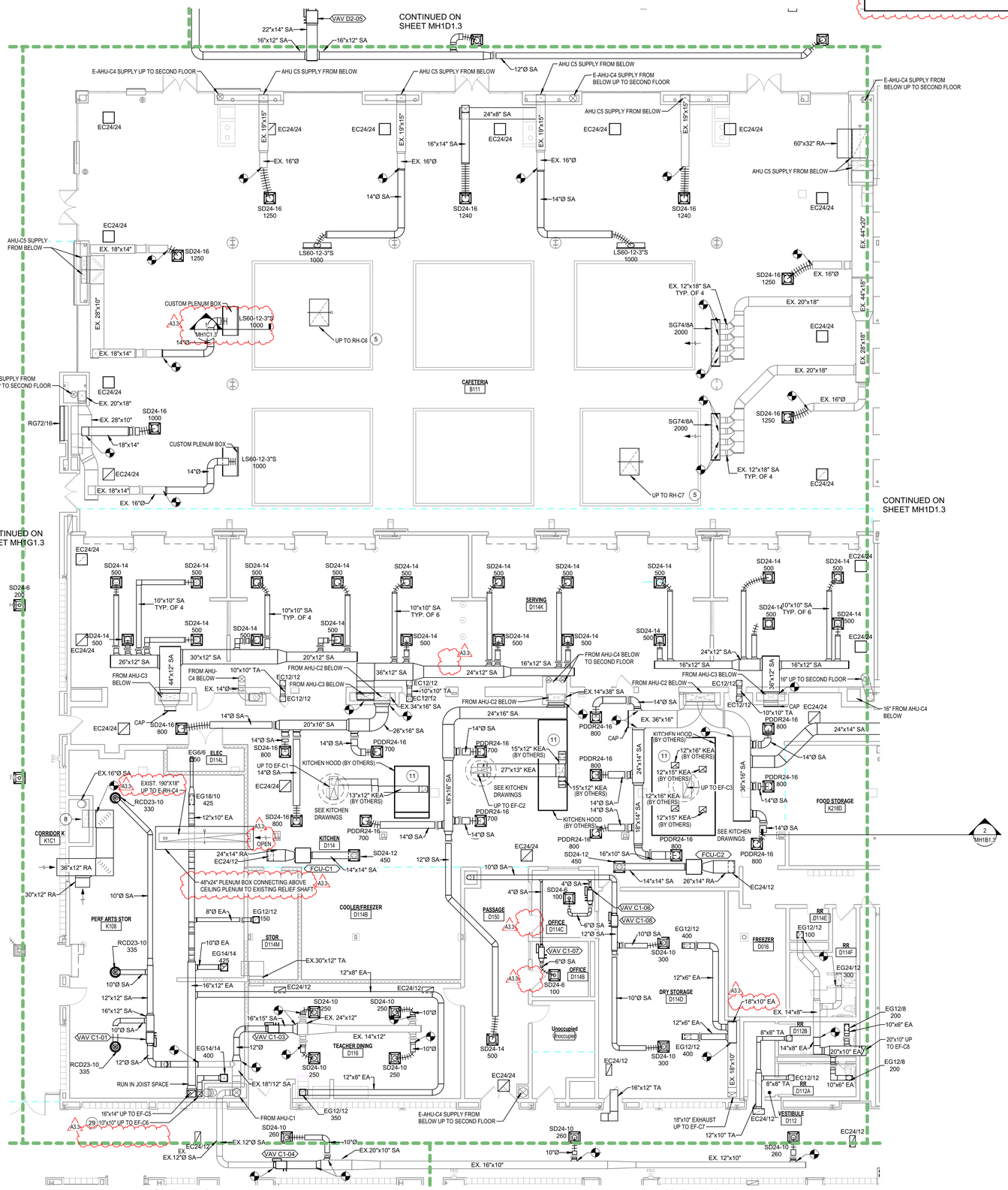
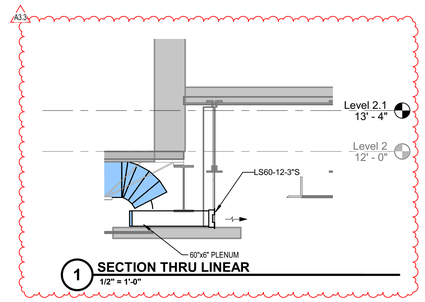


2A **FIRST FLOOR HVAC PLAN - UNIT C**
1/8" = 1'-0"



1 **SECTION THRU LINEAR**
1/2" = 1'-0"

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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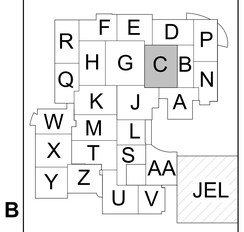

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT C

MH1C1.3

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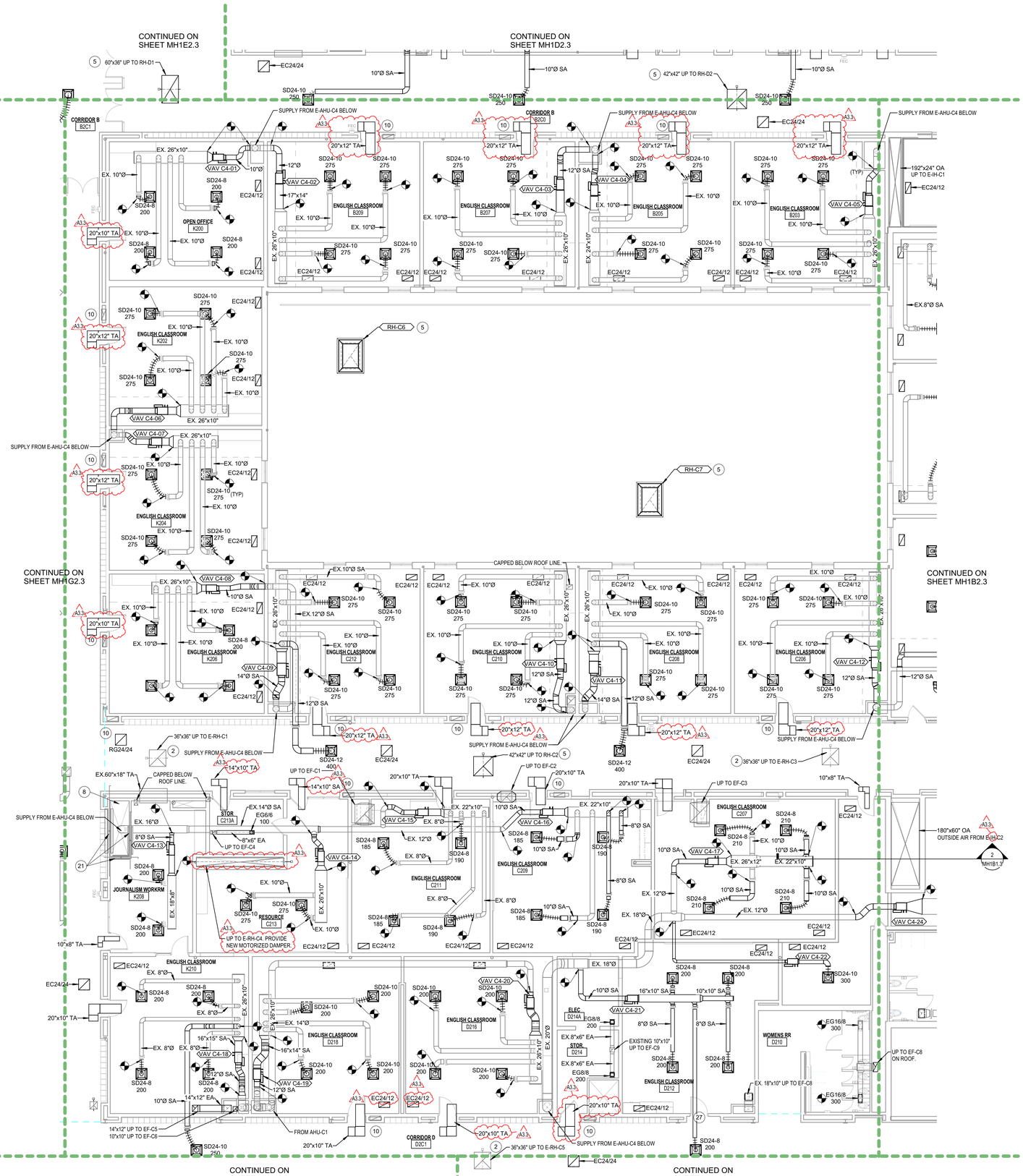

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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Hempstead

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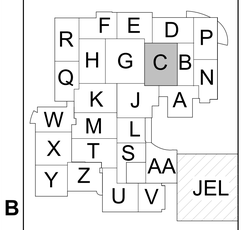

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR HVAC PLAN - UNIT C

MH1C2.3

MH1C2.3 - SECOND FLOOR HVAC PLAN - UNIT C
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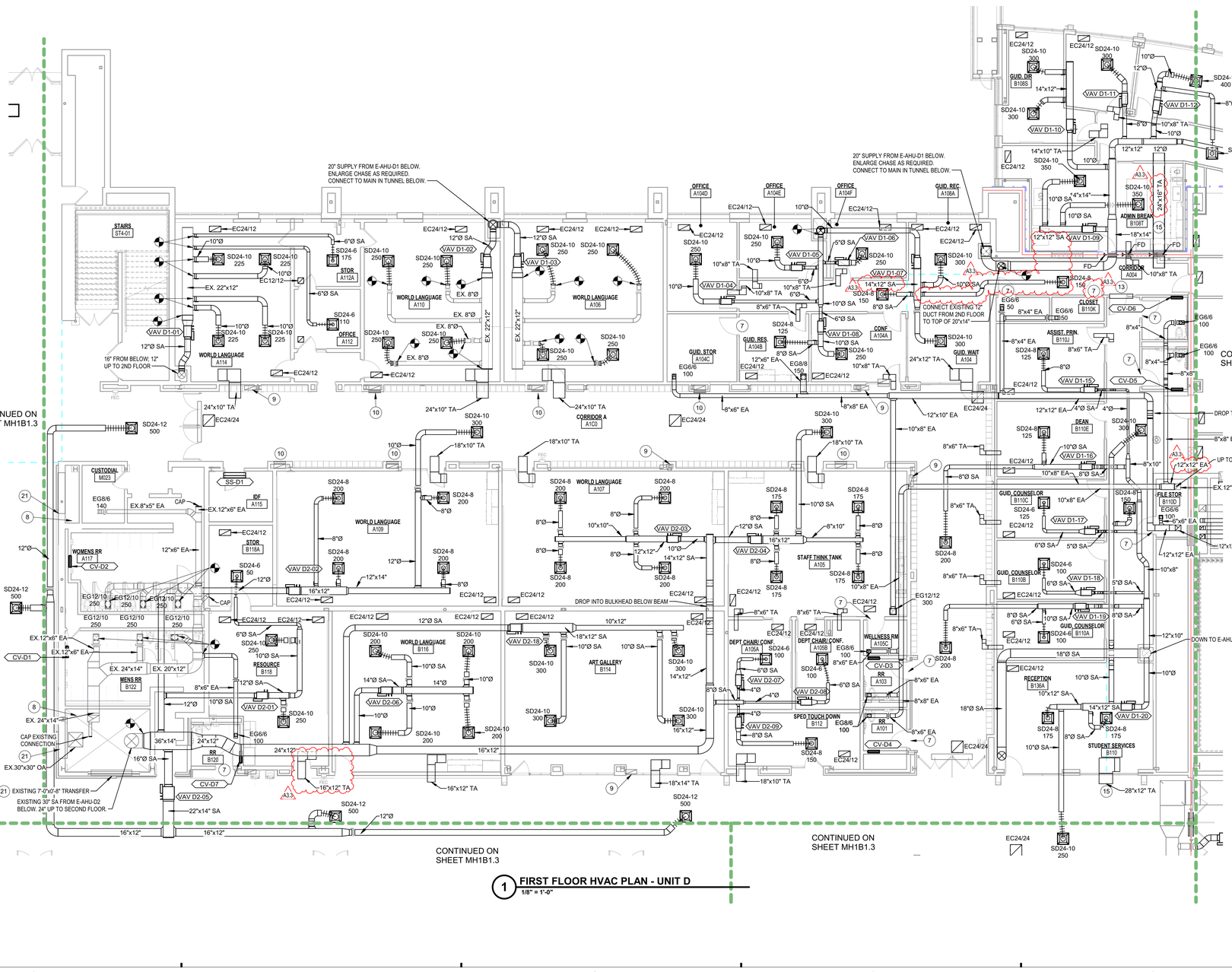

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT D

MH1D1.3

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GENERAL NOTES HVAC PLAN

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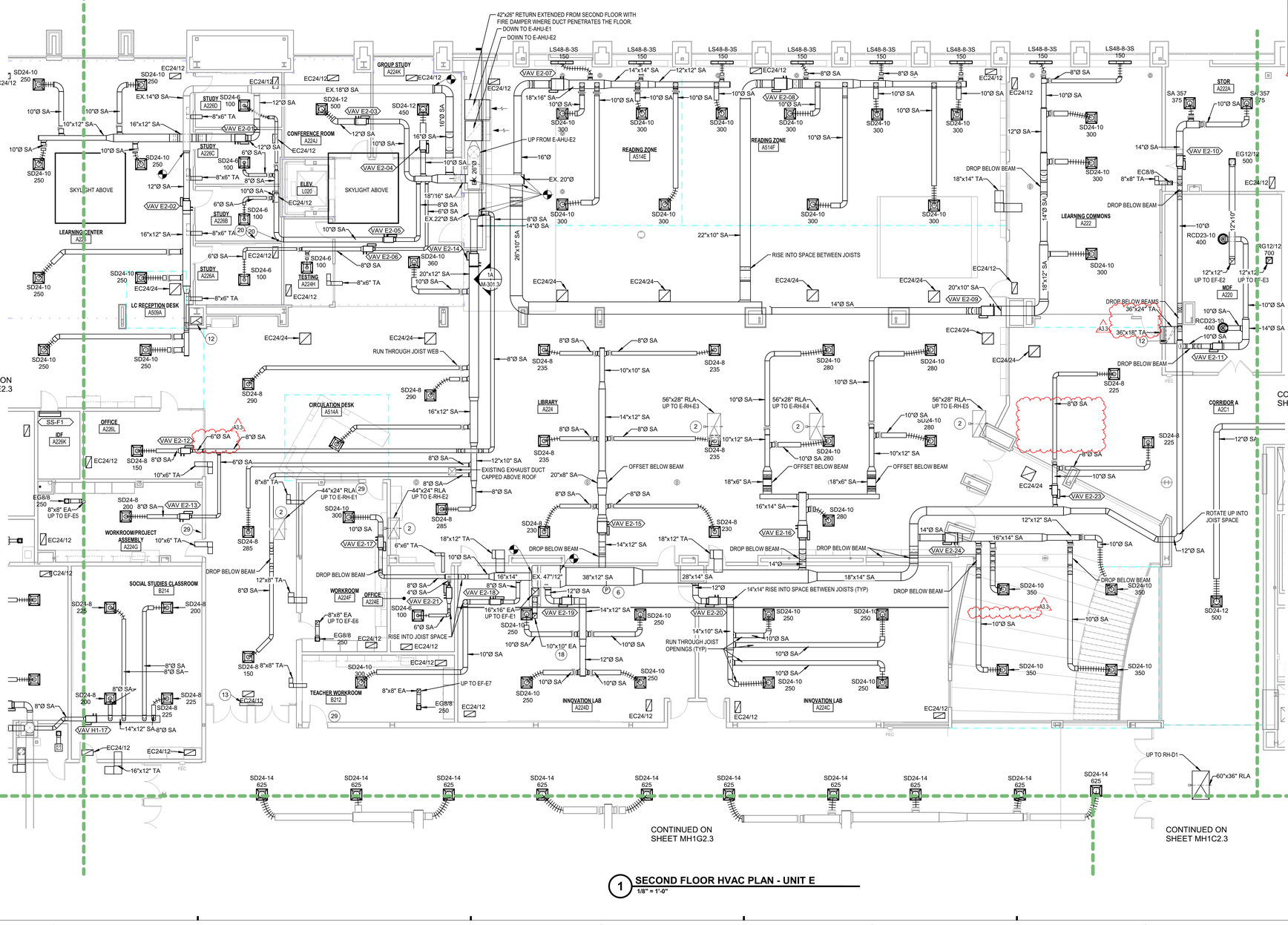
28	PROVIDE RETURN GRILLE SOUND TRAP. SEE MECHANICAL DETAILS FOR MORE INFORMATION.
29	PROVIDE SWITCH FOR EXHAUST FAN OPERATION.
30	PROVIDE ACOUSTICAL DUCT LINER IN RETURN DUCT AT AIR INLET DEVICE AND CONTINUING A MINIMUM OF TWENTY FEET DOWNSTREAM.
31	4" DRYER VENT FROM FLOOR BELOW. ROUTE DRYER VENT UP THROUGH ROOF TO GOOSENECK.
32	MOUNT DRYER BOOSTER FAN IN THE VERTICAL POSITION.
33	RESIDENTIAL DRYER EXHAUST DUCT UP THROUGH ROOF.
34	26"x8" RA CONNECTED TO EXISTING GRILLE AND ROUTED TO ABOVE CEILING, THEN BACK TO ABOVE CHOIR CEILING.
35	EXISTING FSK INSULATION SHALL BE PAINTED (TYPICAL) AS SHOWN ON ARCHITECTURAL DRAWINGS.
36	PROVIDE NEW CUSTOM 24" WIDE x 12" TALL x 4" DEEP SLOTTED FACE STAINLESS STEEL FUME COLLECTOR SIMILAR TO EXISTING RELOCATED COLLECTOR. TRANSITION STAINLESS 8" DUCT TO COLLECTOR AND ROUND ANY SHARP EDGES. BALANCE AIRFLOW TO 200 CFM EXHAUST. SEE IMAGE. A3.3 THIS SHEET.



1 **SECOND FLOOR HVAC PLAN - UNIT E**
1/8" = 1'-0"

SCHMIDT ASSOCIATES
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Indianapolis, IN 46204
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

KEY PLAN

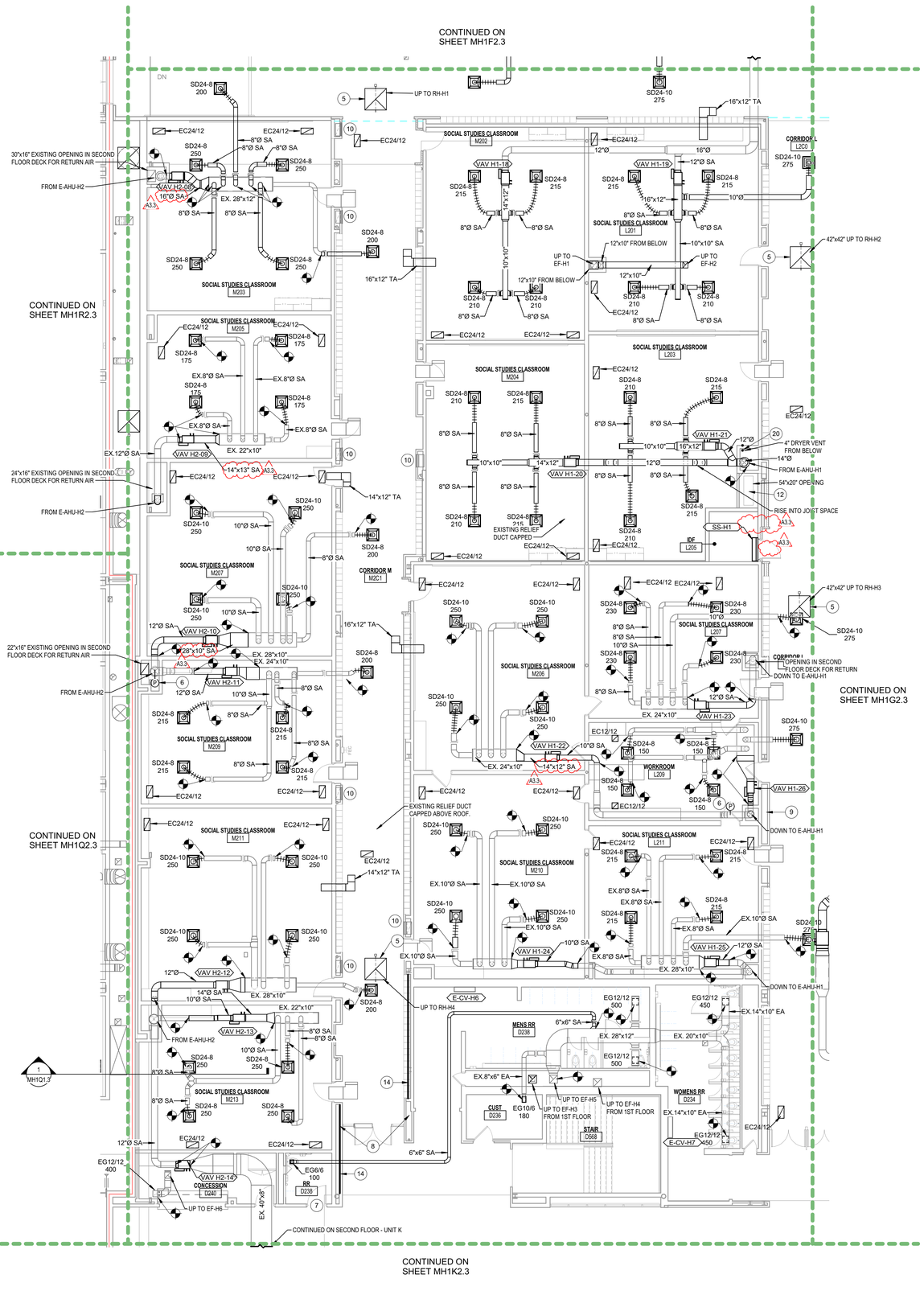
M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR HVAC PLAN - UNIT E

MH1E2.3

MH1E2.3_SECOND FLOOR HVAC PLAN - UNIT E
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_ Additions Phase 3
K:\2019\2019-067.NCH - North Central High School\03-BID SET\ACT_Sketch Up_2022_Cloud.rvt



MECHANICAL HVAC PLAN NOTES - PH3

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3	304 STAINLESS STEEL EXHAUST DUCT.
4	ROUTE EXHAUST DUCT DOWN TO HOOD. OPPOSED BLADE MOTORIZED DAMPERS SHALL BE INTERLOCKED SO THAT WHEN THE HOOD SWITCH IS ON, THE HOOD DAMPER IS OPEN AND THE CEILING DAMPER IS CLOSED. WHEN THE HOOD SWITCH IS OFF, THE HOOD DAMPER IS CLOSED AND THE CEILING DAMPER IS OPEN.
5	PROVIDE NEW RELIEF HOOD OR LOUVERED PENTHOUSE. SEE RELIEF VENT SCHEDULE FOR MORE INFORMATION.
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7	UNDERCUT DOOR 1"
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9	EXISTING AIR TRANSFER THROUGH SECOND FLOOR SLAB AND DECK.
10	EXISTING LOW WALL RETURN GRILLE TO REMAIN.
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A3.3	THIS SHEET

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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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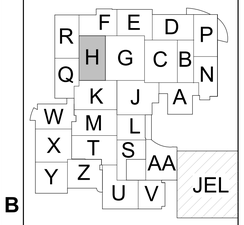

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR HVAC PLAN - UNIT H

MH1H2.3

MH1H2.3 - SECOND FLOOR HVAC PLAN - UNIT H
2019-067.NCH_M 3.3_c of Washington Township, North Central High School Renovation_
Date: Thursday, June 1, 2023 4:58:07 PM EDT - North Central High School/2019-067.NCH_Sketch 3_M_2023_Drive.rvt
Autodesk Docs://2019-067.NCH_North Central High School/2019-067.NCH_Sketch 3_M_2023_Drive.rvt

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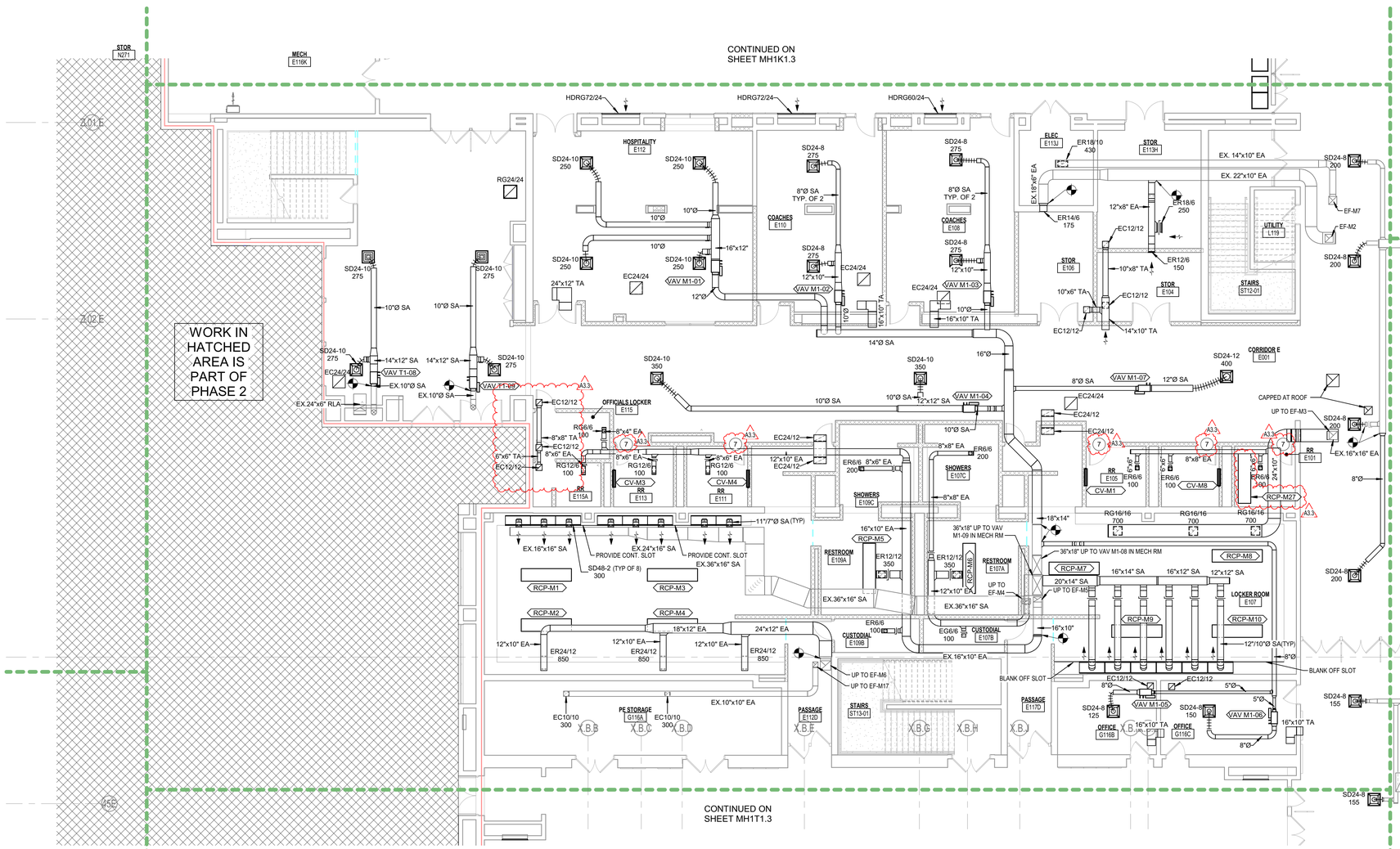

1 **FIRST FLOOR HVAC PLAN - UNIT M**
1/8" = 1'-0"

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT M

MH1M1.3

Model: K_PRPT-CLOR-HVAC_PLAN - UNIT M
2019-067.NCH_M-S.rvt Washington Township North Central High School Renovation_
Plotted: 3/3/2023 10:56:08 AM EST by: Brian Nelson
File Location: 2019-067.NCH - North Central High School\2019-067.NCH_Sarah\2_M_2022_Check.rvt

GENERAL NOTES HVAC PLAN

A3.3

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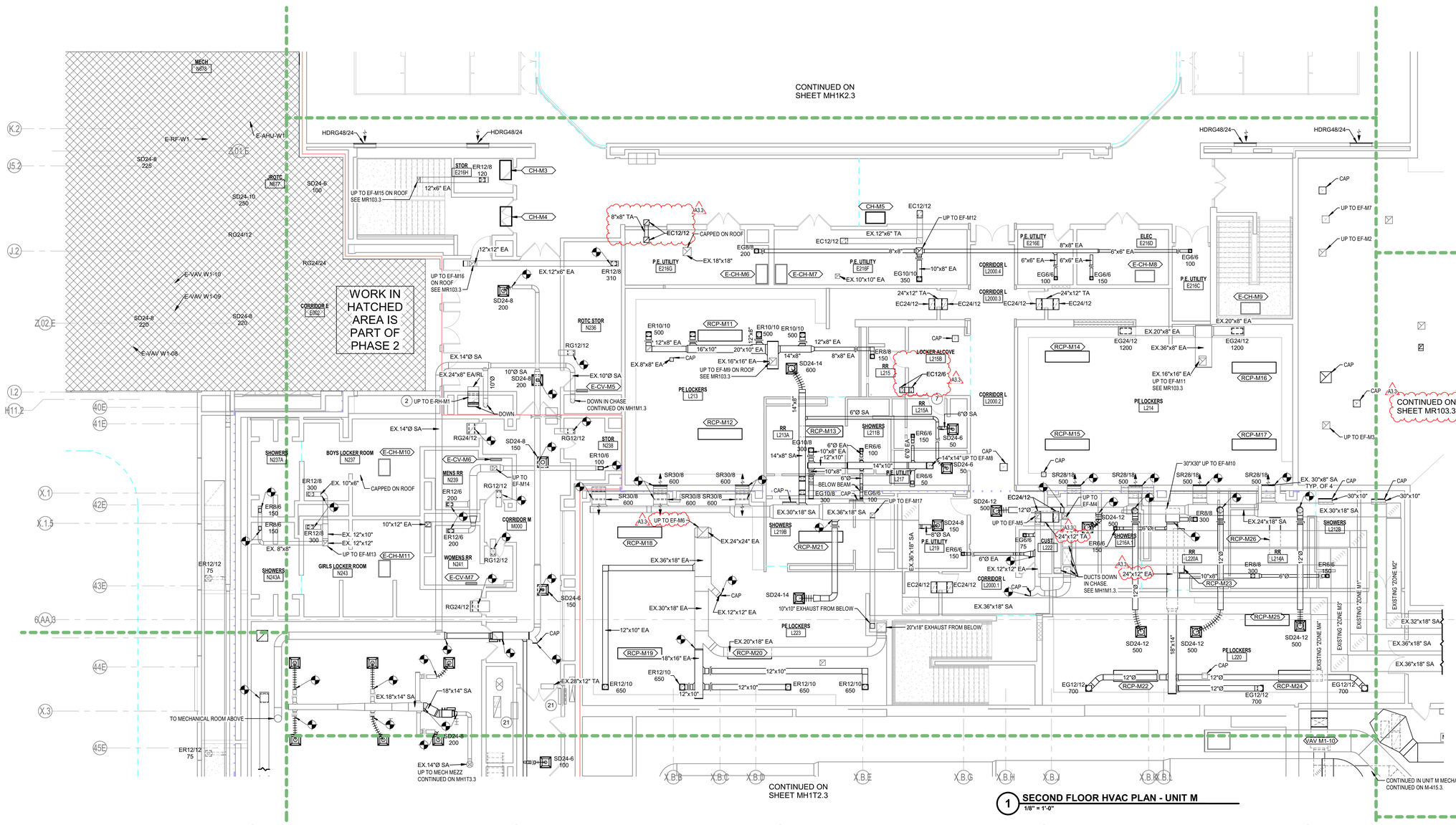

1 **SECOND FLOOR HVAC PLAN - UNIT M**
1/8" = 1'-0"

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR HVAC PLAN - UNIT M

MH1M2.3

SAVED: 3_SECOND FLOOR HVAC PLAN - UNIT M
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
Additions and Renovations_2019-067.NCH - North Central High School\2019-067.NCH_Special Fol_2022_Cloud.rvt
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CONTINUED ON SHEET MH1P1.3

CONTINUED ON SHEET MH1B1.3

CONTINUED ON SHEET MH1A1.3

2A **FIRST FLOOR HVAC PLAN - UNIT N**
1/8" = 1'-0"

MECHANICAL HVAC PLAN NOTES - PH3

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2 **FUME COLLECTION WORK TABLE**
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A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

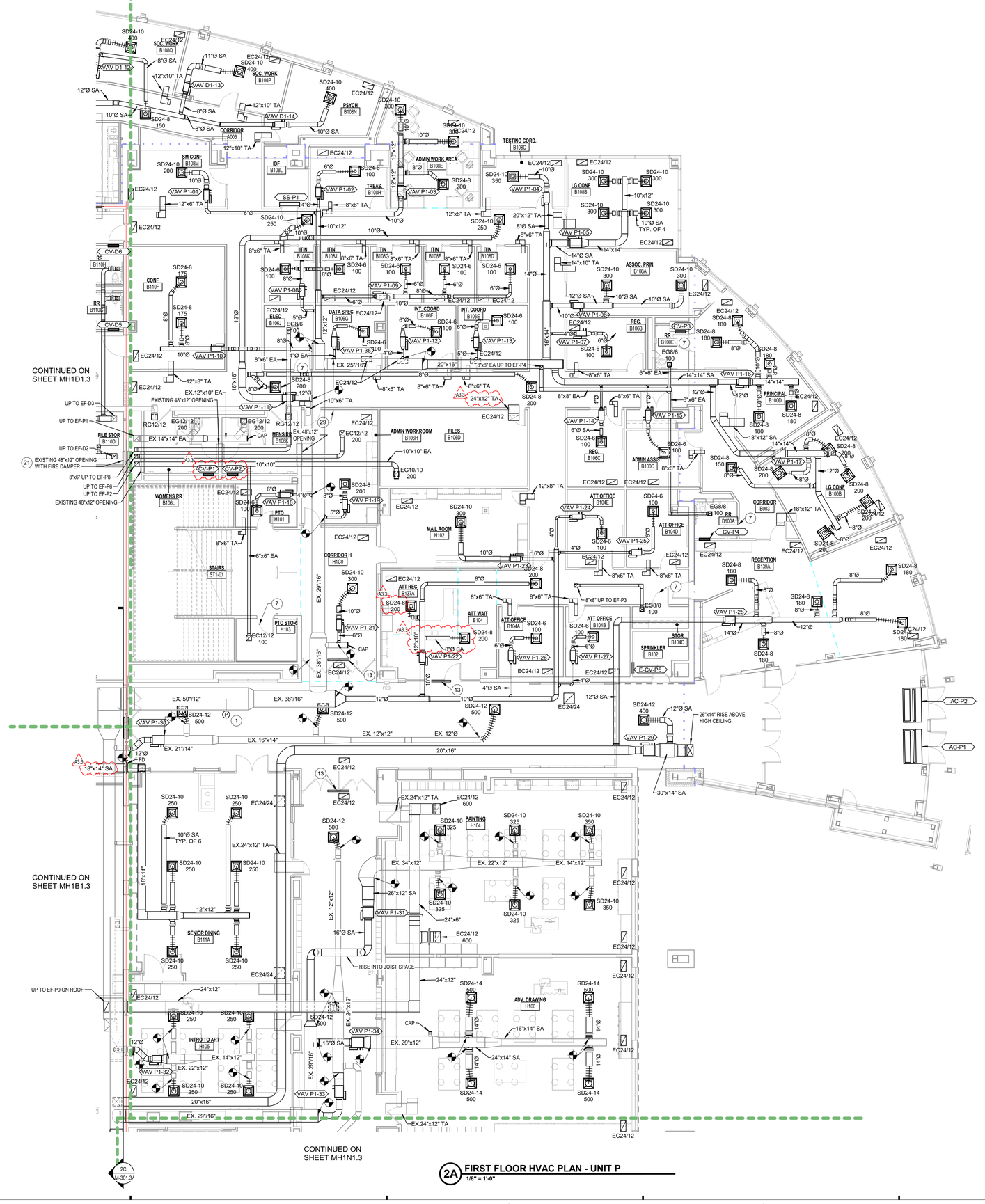
KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FIRST FLOOR HVAC PLAN - UNIT N

MH1N1.3



2A FIRST FLOOR HVAC PLAN - UNIT P

1/8" = 1'-0"

MECHANICAL HVAC PLAN NOTES - PH3

#	NOTE
1	REPLACE EXISTING STATIC PRESSURE SENSOR.
2	PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT EXISTING ROOF RELIEF. DAMPER SHALL BE CLEANED AND LUBRICATED TO LIKE NEW CONDITION. IF DAMPER CANNOT BE REPAIRED TO LIKE NEW, PROVIDE NEW DAMPER THAT MATCHES THE EXISTING DEVICE IN EVERY RESPECT. SEE M700 SERIES DRAWINGS FOR CONTROLS SCOPE.
3	304 STAINLESS STEEL EXHAUST DUCT.
4	ROUTE EXHAUST DUCT DOWN TO HOOD. OPPOSED BLADE MOTORIZED DAMPERS SHALL BE INTERLOCKED SO THAT WHEN THE HOOD SWITCH IS ON, THE HOOD DAMPER IS OPEN AND THE CEILING DAMPER IS CLOSED. WHEN THE HOOD SWITCH IS OFF, THE HOOD DAMPER IS CLOSED AND THE CEILING DAMPER IS OPEN.
5	PROVIDE NEW RELIEF HOOD OR LOUVERED PENTHOUSE. SEE RELIEF VENT SCHEDULE FOR MORE INFORMATION.
6	NEW STATIC PRESSURE SENSOR. SEE M700 SERIES DRAWINGS.
7	UNDERCUT DOOR 1".
8	EXISTING RETURN AIR OR OUTDOOR AIR DUCT OR CHASE DOWN TO TUNNELS / MECHANICAL ROOM.
9	EXISTING AIR TRANSFER THROUGH SECOND FLOOR SLAB AND DECK.
10	EXISTING LOW WALL RETURN GRILLE TO REMAIN.
11	KITCHEN HOOD, EXHAUST DUCT AND FANS SHOWN FOR REFERENCE. SEE KITCHEN VENDOR DRAWINGS FOR HOODS, EXHAUST DUCTS AND FANS.
12	PROVIDE NEW TRANSFER AIR PATH THROUGH SECOND FLOOR DECK.
13	PROVIDE TRANSFER OPENING IN WALL ABOVE CEILING - 48"x10" MINIMUM.
14	REMOVE LATHE/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	PROVIDE 1" CLOSED CELL INTERNALLY LINED TRANSFER AIR DUCT ABOVE CEILING.
16	PROVIDE TRANSFER OPENING IN WALL - 60"x16" MINIMUM.
17	PROVIDE 36"x18" RETURN AIR DUCT FROM MECHANICAL ROOM BELOW UP TO ABOVE CEILING.
18	EXHAUST DUCT FOR FUTURE BARISTA AREA. ROUTE 10"x8" DUCT AS SHOWN UP TO CURB AND CAP ON ROOF.
19	VENT PIPNG FOR FLAMMABLE STORAGE AND ACID STORAGE CABINETS. COORDINATE VENTING REQUIREMENTS WITH CABINET MANUFACTURER.
20	RESIDENTIAL DRYER EXHAUST DUCT UP THROUGH ROOF.
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26	CONNECT TO EXISTING MAKEUP AIR DUCT.
27	EXISTING LOUVERED DOOR TO REMAIN.
28	PROVIDE RETURN GRILLE SOUND TRAP. SEE MECHANICAL DETAILS FOR MORE INFORMATION.
29	PROVIDE SWITCH FOR EXHAUST FAN OPERATION.
30	PROVIDE ACOUSTICAL DUCT LINER IN RETURN DUCT AT AIR INLET DEVICE AND CONTINUING A MINIMUM OF TWENTY FEET DOWNSTREAM.
31	4" DRYER VENT FROM FLOOR BELOW. ROUTE DRYER VENT UP THROUGH ROOF TO GOOSENECK.
32	MOUNT DRYER BOOSTER FAN IN THE VERTICAL POSITION.
33	RESIDENTIAL DRYER EXHAUST DUCT UP THROUGH ROOF.
34	26"x8" RA CONNECTED TO EXISTING GRILLE AND ROUTED TO ABOVE CEILING, THEN BACK TO ABOVE CHOIR CEILING.
35	EXISTING FSK INSULATION SHALL BE PAINTED (TYPICAL) AS SHOWN ON ARCHITECTURAL DRAWINGS.
36	PROVIDE NEW CUSTOM 24" WIDE x 4" TALL x 4" DEEP SLOTTED FACE STAINLESS STEEL FUME COLLECTOR SIMILAR TO EXISTING RELOCATED COLLECTOR. TRANSITION STAINLESS 8" DUCT TO COLLECTOR AND ROUND ANY SHARP EDGES. BALANCE AIRFLOW TO 200 CFM EXHAUST. SEE IMAGE A3.3 ON THIS SHEET.

GENERAL NOTES HVAC PLAN

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
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www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT P

MH1P1.3

MHP1.3 - FIRST FLOOR HVAC PLAN - UNIT P
2019-067.NCH_M 03.3 of Washington Township, North Central High School Renovation_
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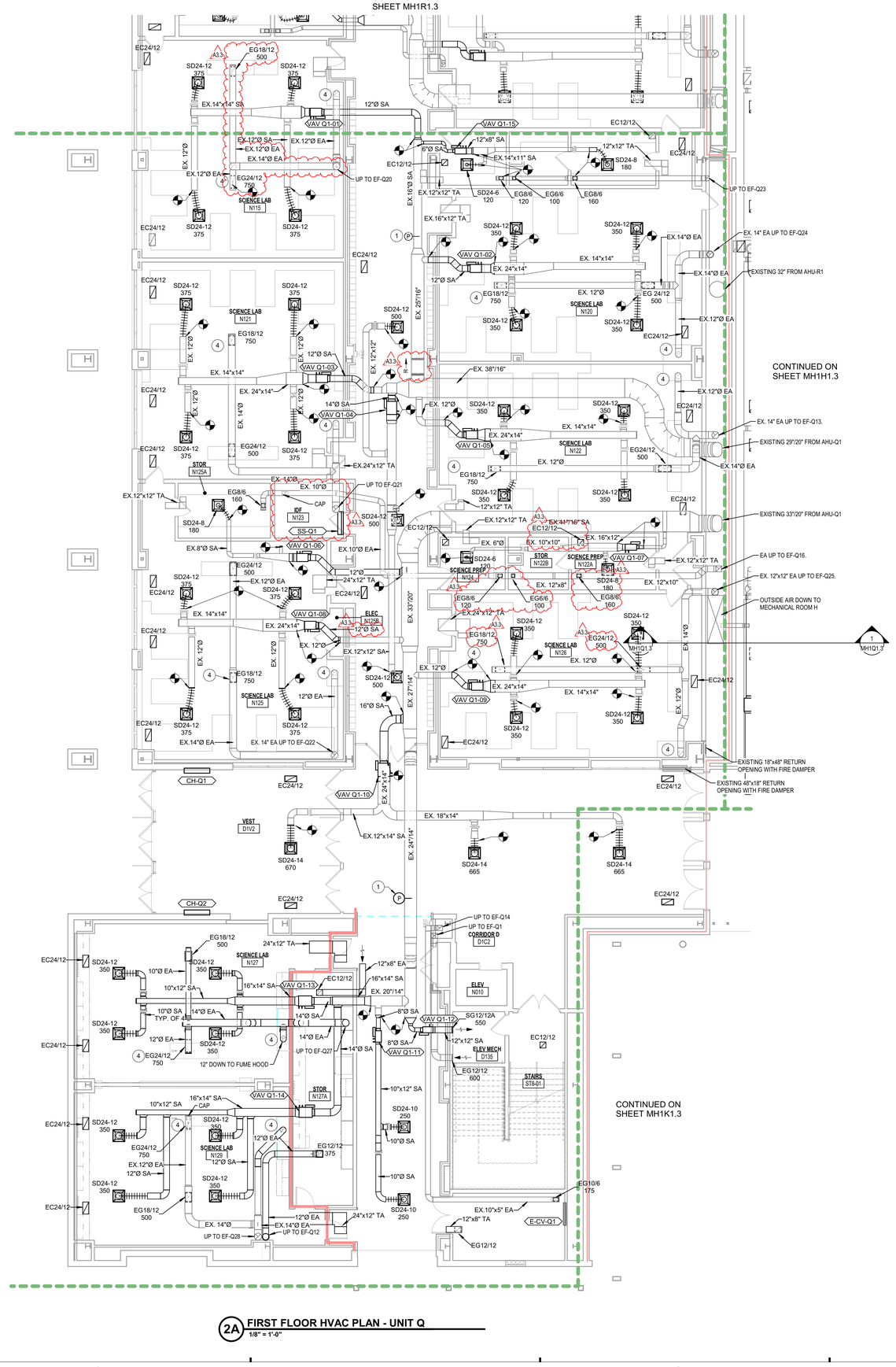

2A **FIRST FLOOR HVAC PLAN - UNIT Q**
1/8" = 1'-0"

GENERAL NOTES HVAC PLAN

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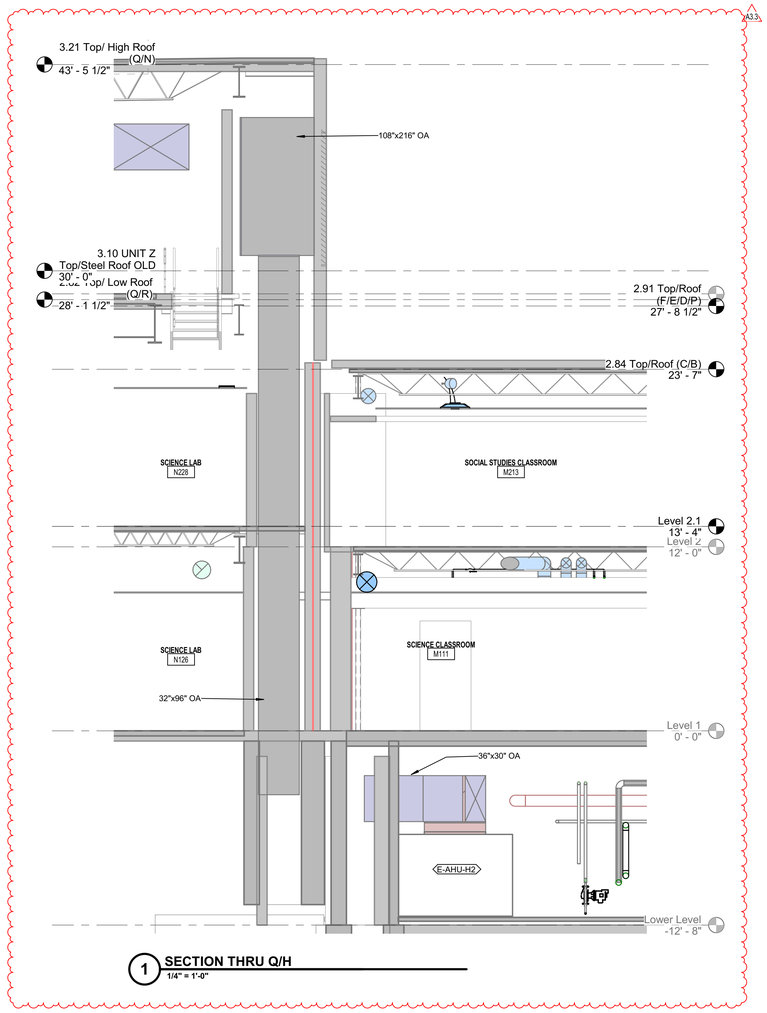

1 **SECTION THRU Q/H**
1/4" = 1'-0"

SCHMIDT ASSOCIATES
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Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Hempstead

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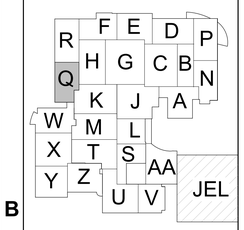

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT Q

MH1Q1.3

MH1Q1_1_FIRST FLOOR HVAC PLAN - UNIT Q
2019-067.NCH_M1S.D. of Washington Township, North Central High School Renovation_
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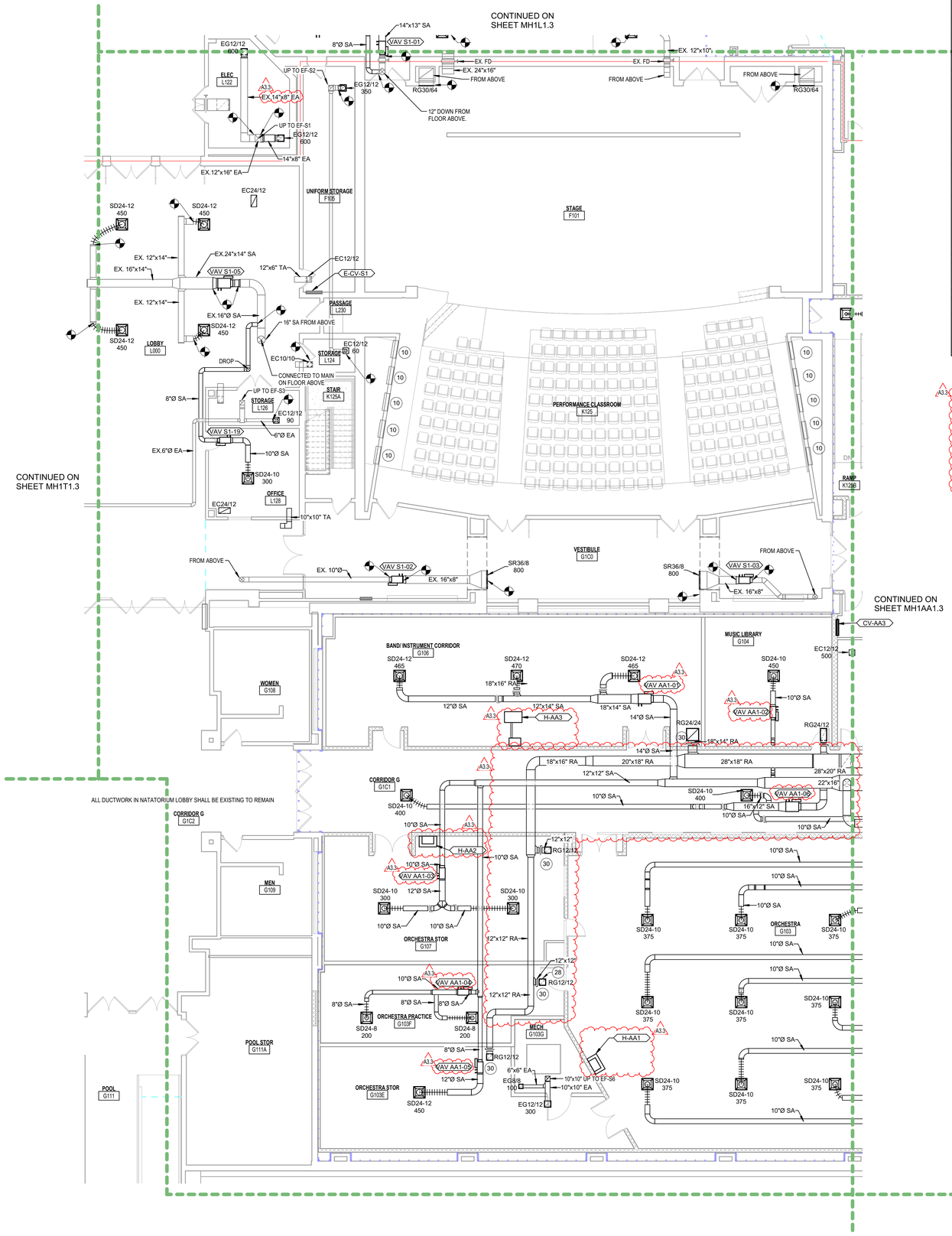

MECHANICAL HVAC PLAN NOTES - PH3

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A3.3

GENERAL NOTES HVAC PLAN

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2A **FIRST FLOOR HVAC PLAN - UNIT S**
1/8" = 1'-0"

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT S

MH1S1.3

MH1S1.1_FIRST FLOOR HVAC PLAN - UNIT S
2019-067.NCH_M3.0 of Washington Township North Central High School Renovation_
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MECHANICAL HVAC PLAN NOTES - PH3

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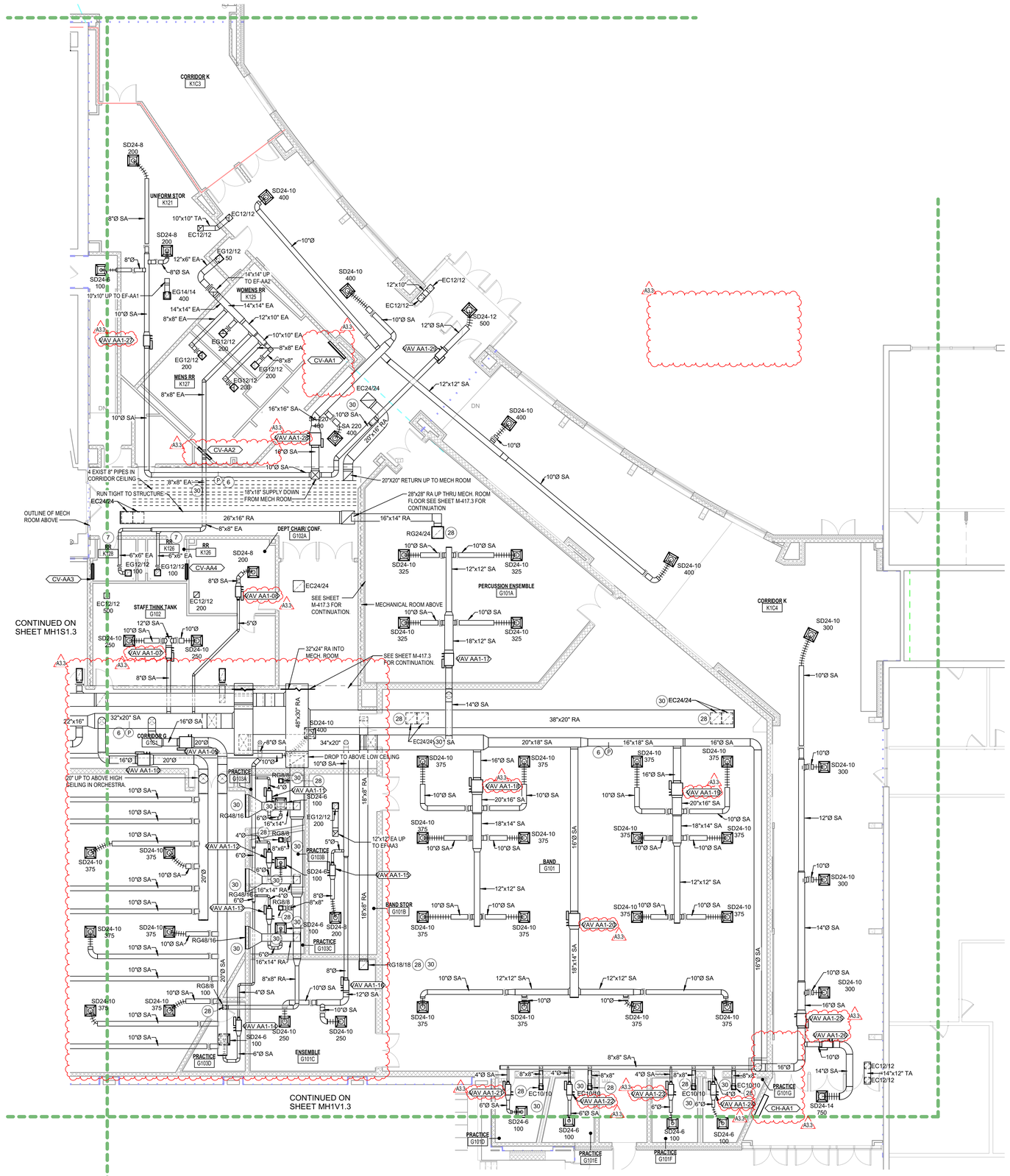

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR HVAC PLAN - UNIT AA

MH1AA1.3

Version: 1_FIRST FLOOR HVAC PLAN - UNIT AA
2019-067.NCH_M S.D. of Washington Township, North Central High School Renovation_
2019-067.NCH_M S.D. of Washington Township, North Central High School 2019-067.NCH_Revit_21_2022_Central.rvt
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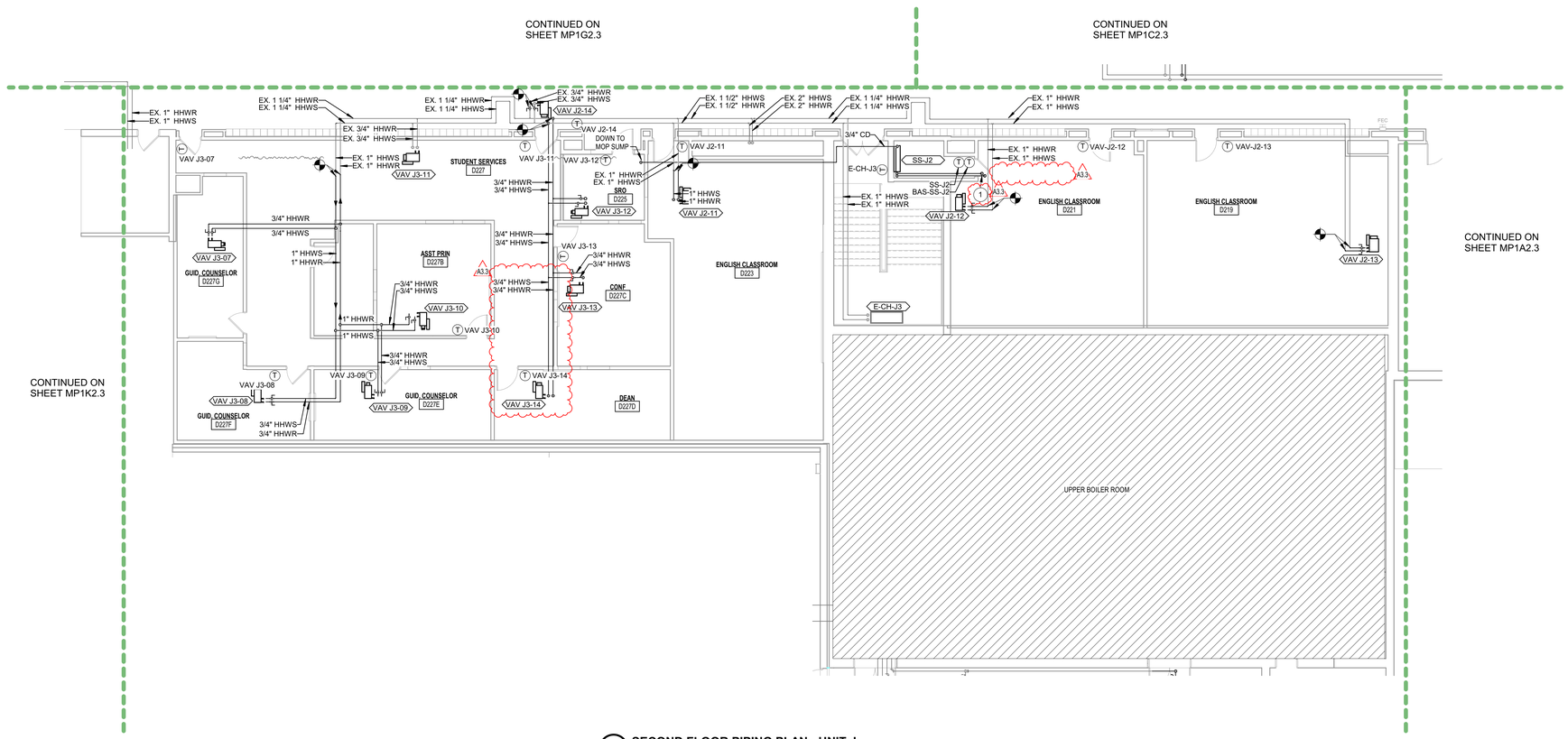
MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3DIM-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



1A **SECOND FLOOR PIPING PLAN - UNIT J**
1/8" = 1'-0"

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Indianapolis, IN 46204
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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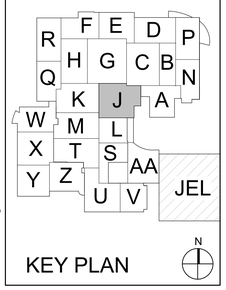
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

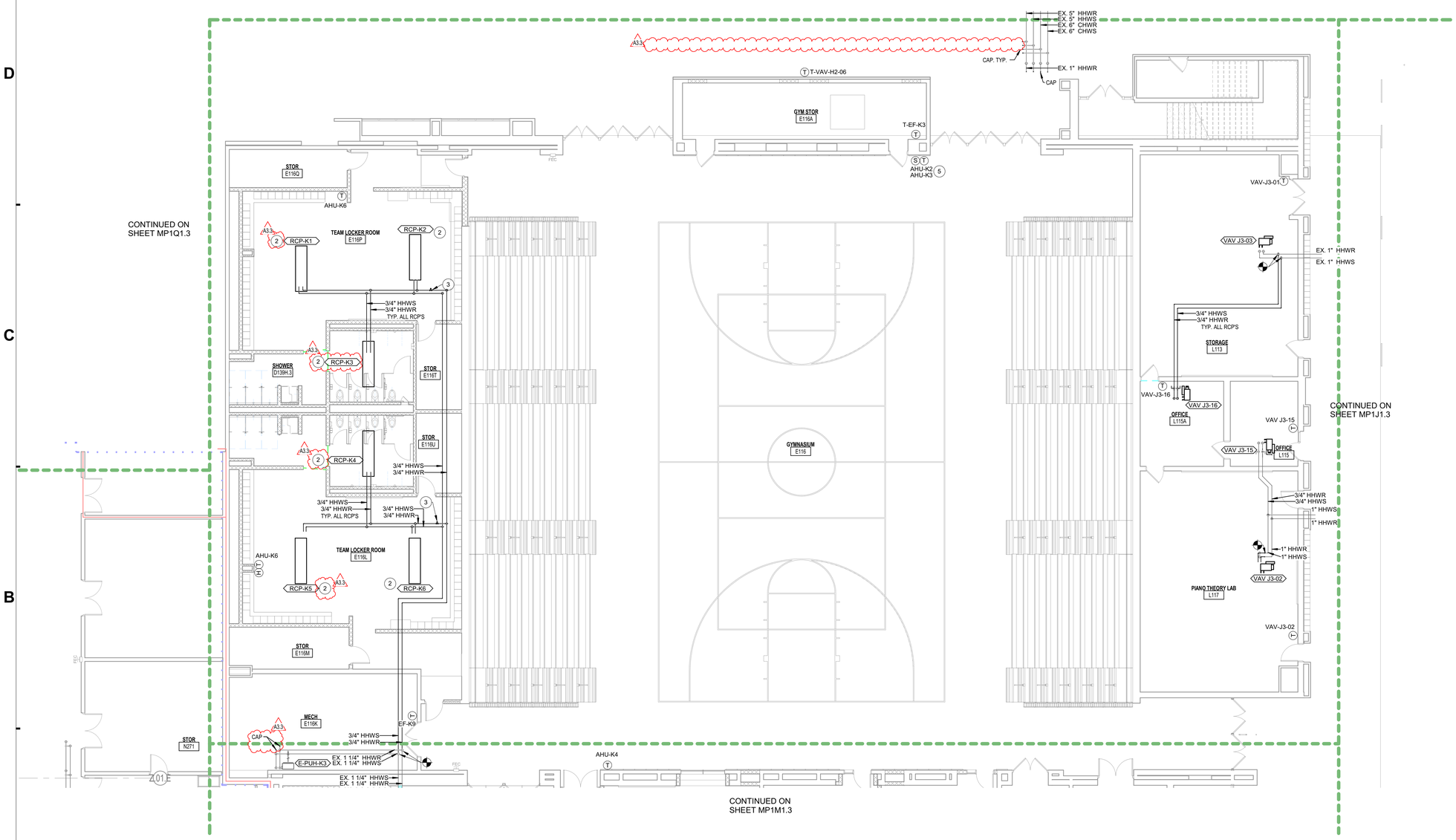
SECOND FLOOR PIPING PLAN - UNIT J

MP1J2.3

MP1J2.3 - SECOND FLOOR PIPING PLAN - UNIT J
2019.067.NCH, M.S.D. of Washington Township, North Central High School Renovation,
4.Addition Area 1 PH3\2019.067.NCH - North Central High School2019.067.NCH_Sketch_M_2022_Cmd.rvt
3/3/2023 3:04:17 PM

MECHANICAL PIPING PLAN NOTES - PH3

#	NOTE
1	PROPOSED REFRIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3. AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE. REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



1 **FIRST FLOOR PIPING PLAN - UNIT K**
1/8" = 1'-0"

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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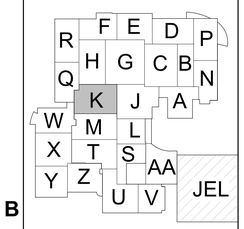


KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

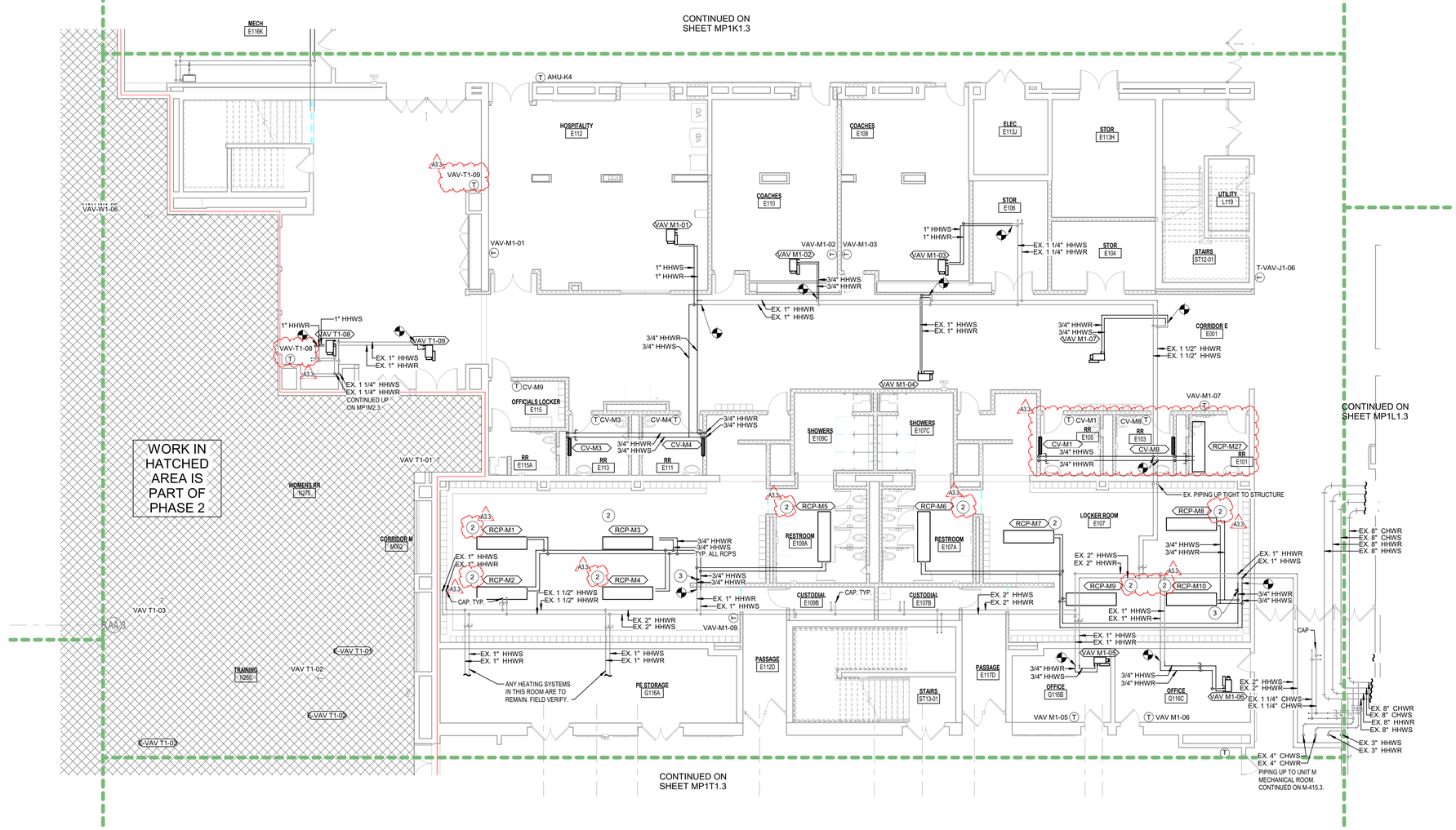
FIRST FLOOR PIPING PLAN - UNIT K

MP1K1.3

MP1K1_FIRST FLOOR PIPING PLAN - UNIT K
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
Plotted: 4/4/2023 8:46:38 AM EDT by Brian Wilson

MECHANICAL PIPING PLAN NOTES - PH3

#	NOTE
1	PROPOSED REFRIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3/M-501.3. AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE. REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



1 **FIRST FLOOR PIPING PLAN - UNIT M**
1/8" = 1'-0"

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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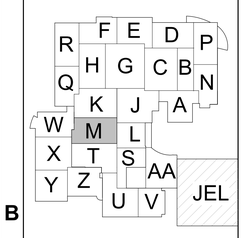

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PIPING PLAN - UNIT M

MP1M1.3

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR, SEE M-700 SERIES DRAWINGS.

CONTINUED ON SHEET MP1D1.3

CONTINUED ON SHEET MP1B1.3

CONTINUED ON SHEET MP1N1.3

2A **FIRST FLOOR PIPING PLAN - UNIT P**
1/8" = 1'-0"

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A3.3	ADDENDUM 3.3	04.06.2023

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PIPING PLAN - UNIT P

MP1P1.3

MP1P1.3_1/8"F1.1-FLOOR PIPING PLAN - UNIT P
2019-067.NCH_M.E.S.S of Washington Township_North Central High School Renovation_
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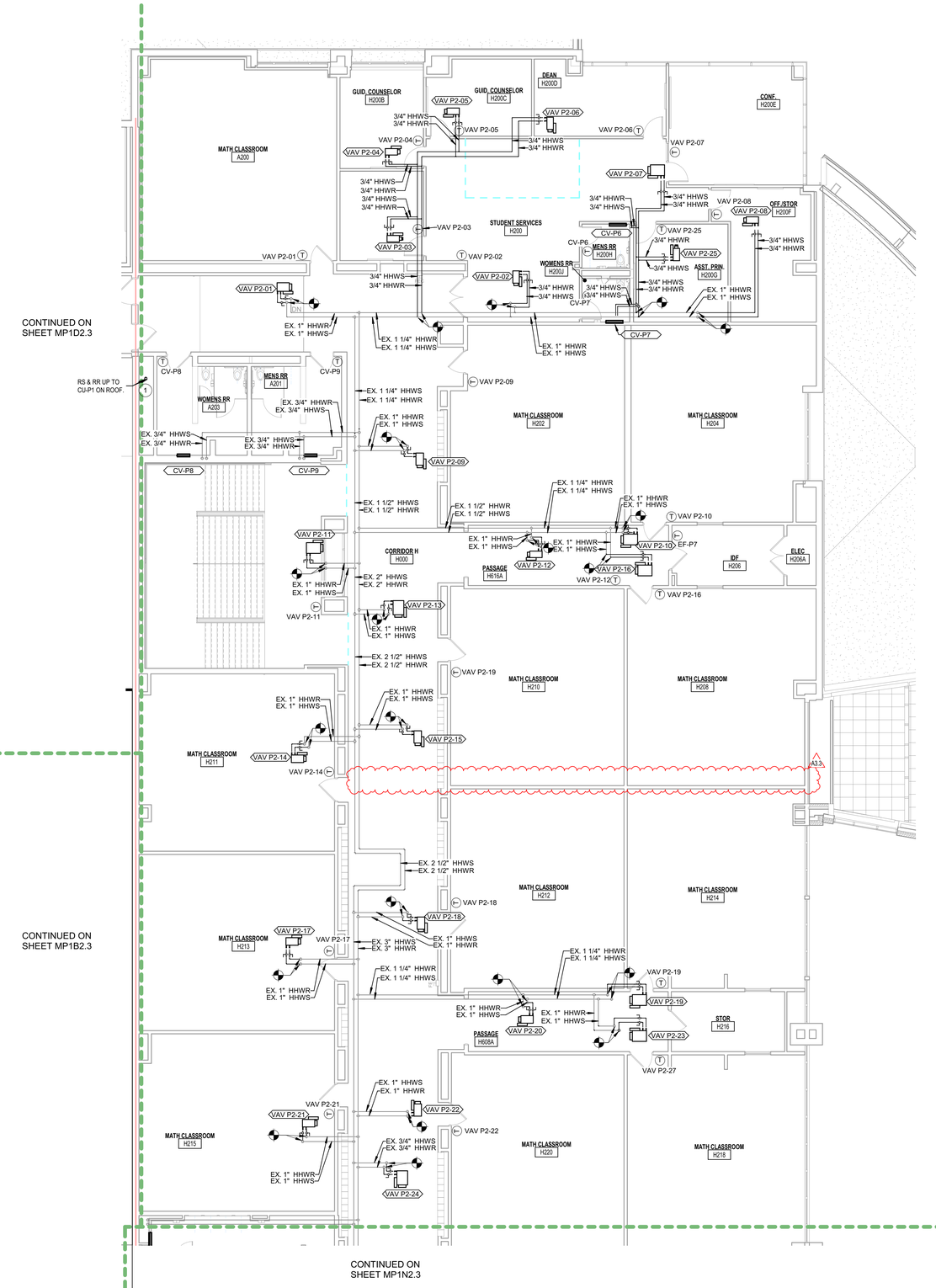

2A SECOND FLOOR PIPING PLAN - UNIT P

1/8" = 1'-0"

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.

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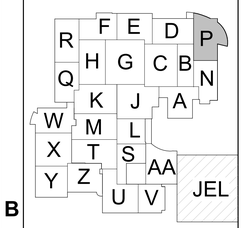

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PIPING PLAN - UNIT P

MP1P2.3

MP1P2.3 - SECOND FLOOR PIPING PLAN - UNIT P
2019-067.NCH_M.E.S. // Washington Township, North Central High School Renovation_
2019-067.NCH_M.E.S. // 2019-067.NCH - North Central High School\2019-067.NCH_Master_CA_2022_Cloud.rvt
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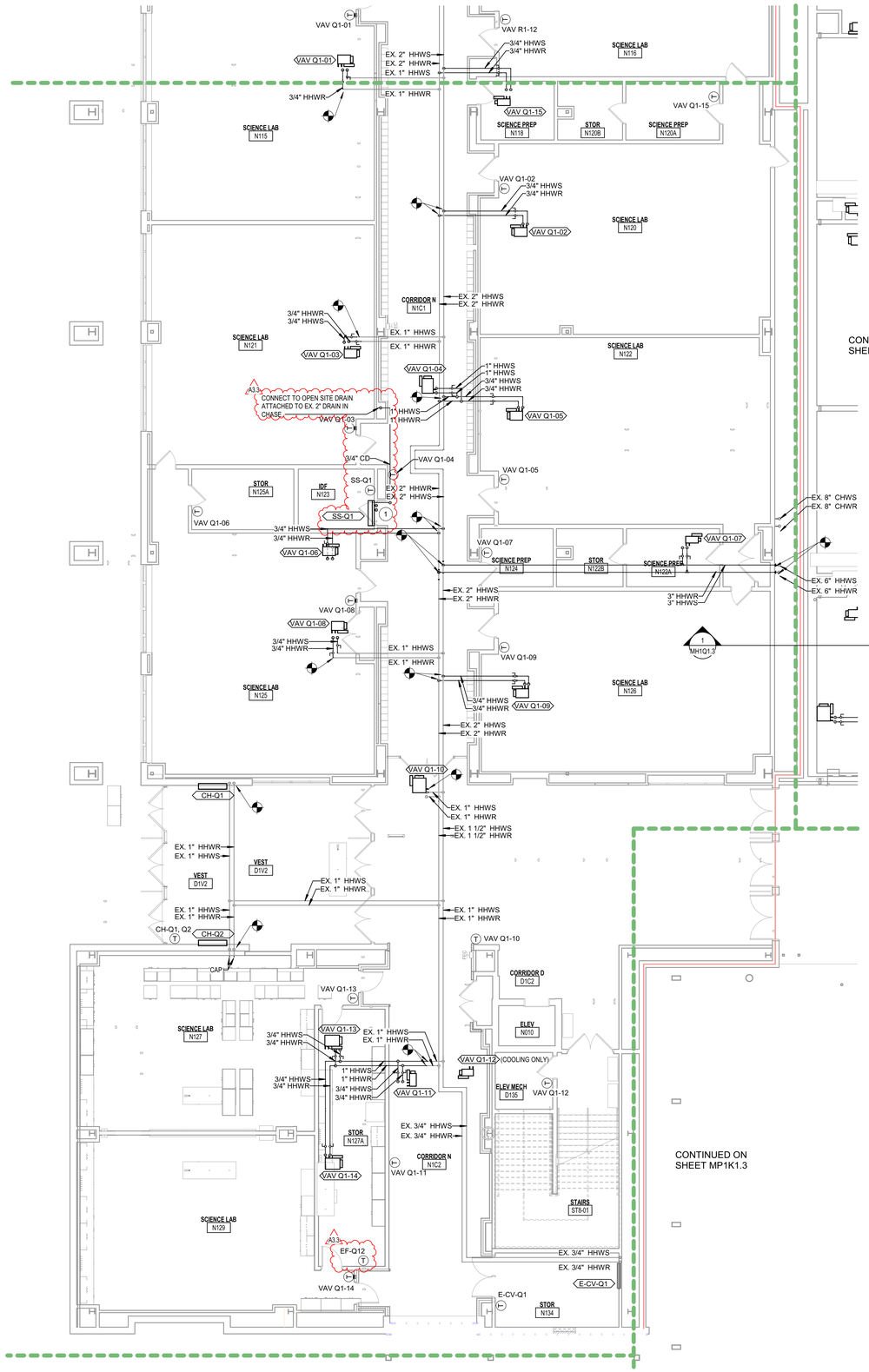

2A FIRST FLOOR PIPING PLAN - UNIT Q

1/8" = 1'-0"

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.

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Project Date 03.03.2023
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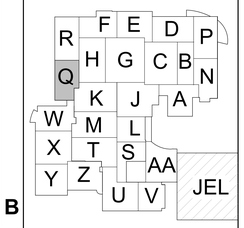

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PIPING PLAN - UNIT Q

MP1Q1.3

MP1Q1.3 - FIRST FLOOR PIPING PLAN - UNIT Q
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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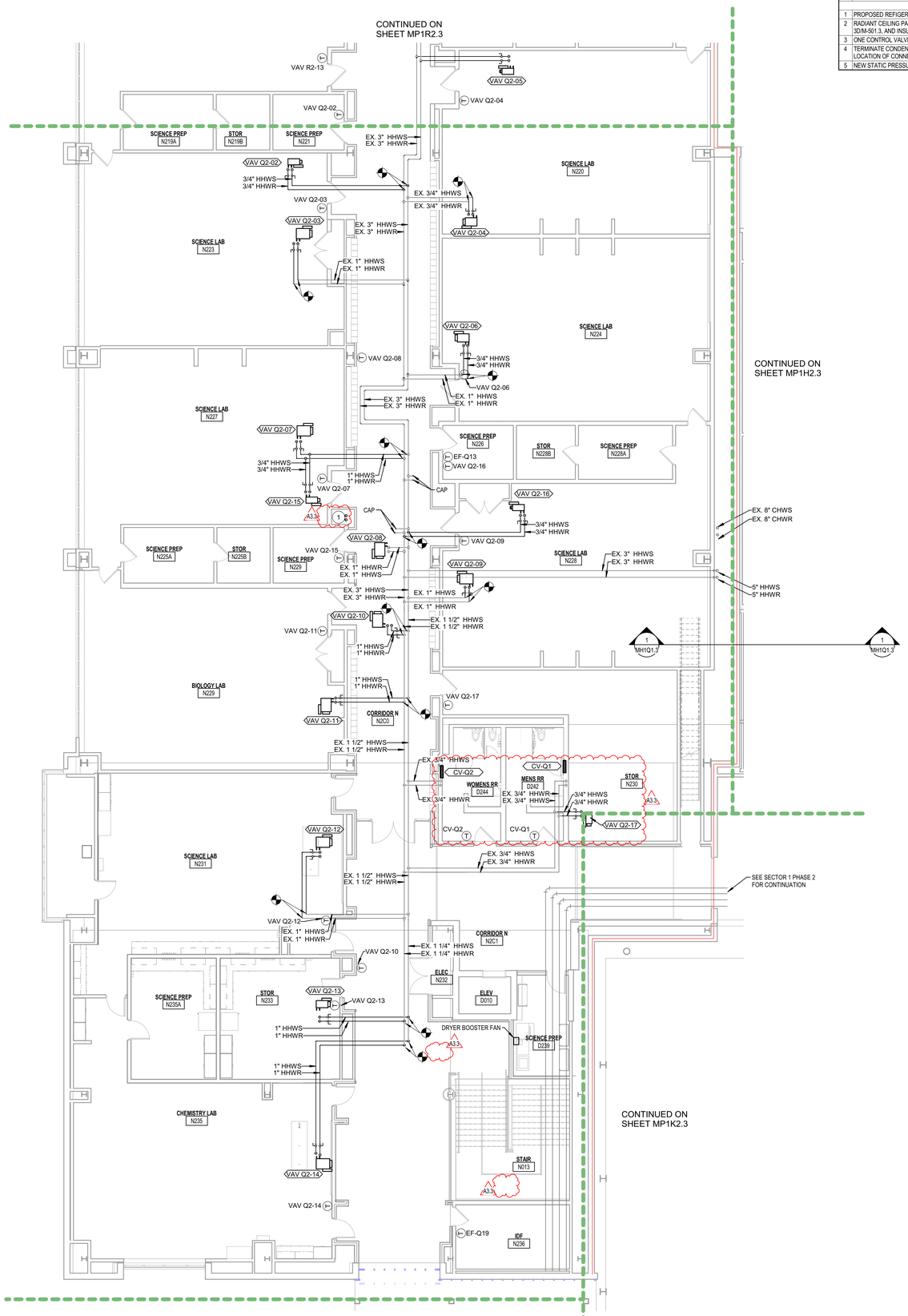
4/4/2023 2:59:04 PM

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID. PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



2A **SECOND FLOOR PIPING PLAN - UNIT Q**
1/8" = 1'-0"

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Project No. 2019-067.NCH
Project Date 03.03.2023
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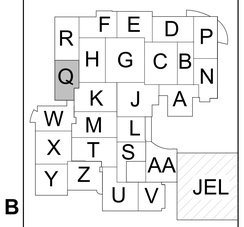


KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

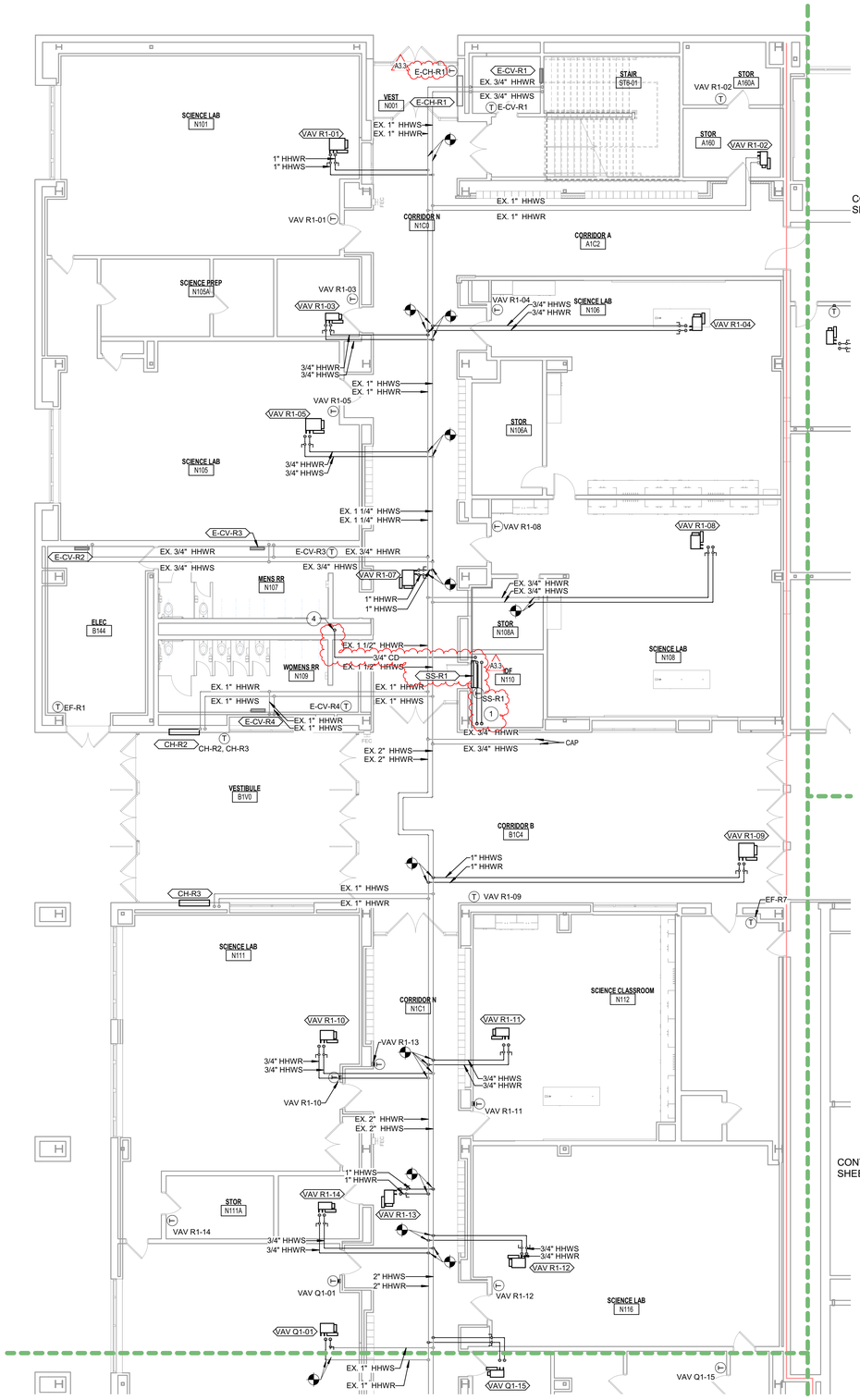
SECOND FLOOR PIPING PLAN - UNIT Q

MP1Q2.3

MP1Q2.3 - SECOND FLOOR PIPING PLAN - UNIT Q
2019-067.NCH_M 3.3 of (MSD of Washington Township, North Central High School Renovation...
Plotted: 3/6/2023 11:07:07 AM | By: Pete Wilson | File: North Central High School/2019-067.NCH_Sector1_LA_2022_Close.rvt
Analytical Link: 1:96

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



2A FIRST FLOOR PIPING PLAN - UNIT R
1/8" = 1'-0"

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Project No. 2019-067.NCH
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1801 East 86th Street
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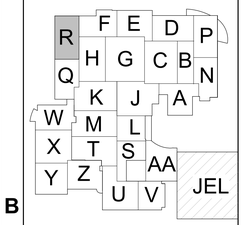


KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

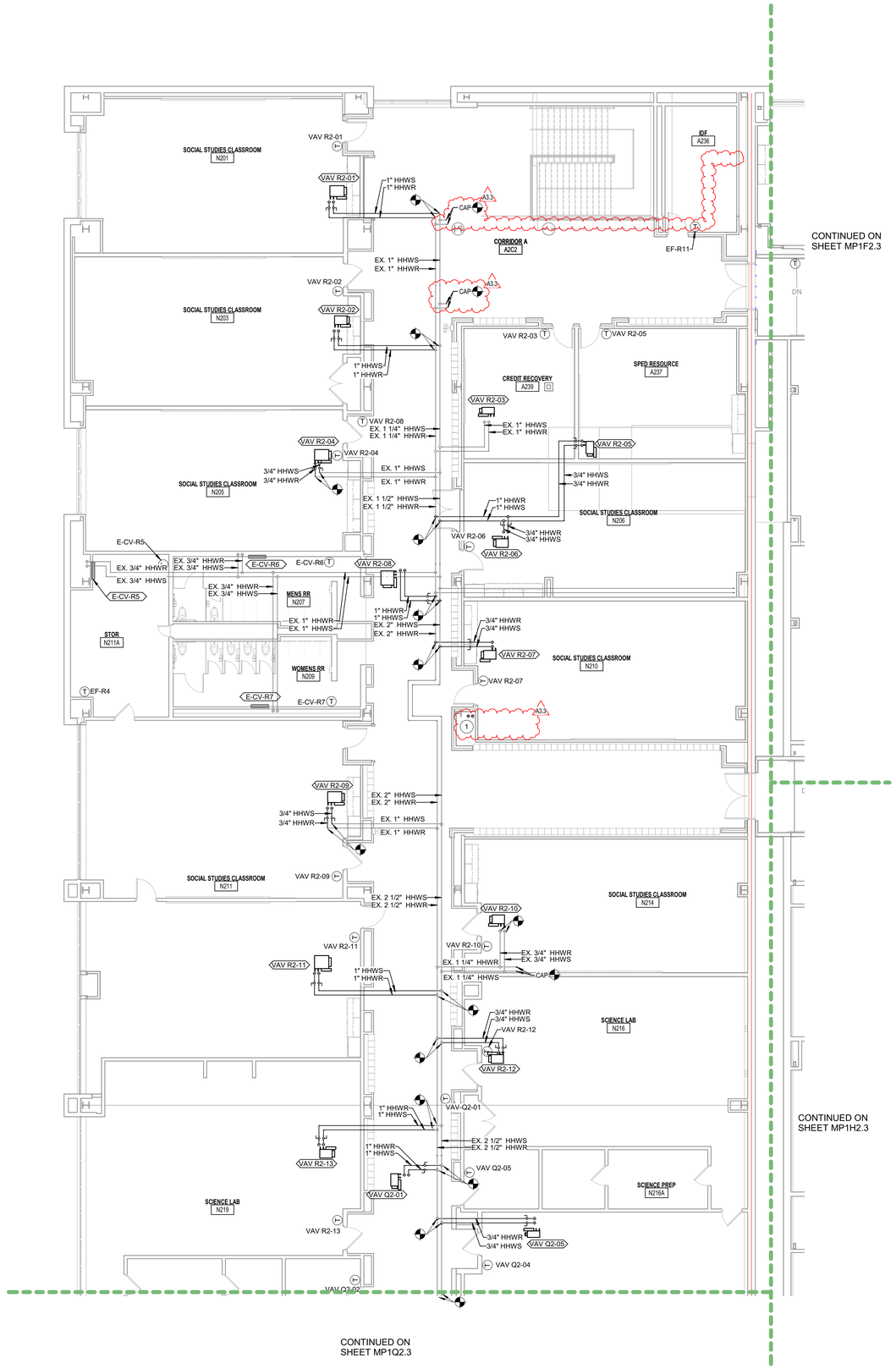
FIRST FLOOR PIPING PLAN - UNIT R

MP1R1.3

MP1R1.3 - FIRST FLOOR PIPING PLAN - UNIT R
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
Date Saved: 3/3/2023 1:09:17 PM EST - User Name: Sarah Hempstead

MECHANICAL PIPING PLAN NOTES (PH3)

#	NOTE
1	PROPOSED REFIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3, AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



1 **SECOND FLOOR PIPING PLAN - UNIT R**
1/8" = 1'-0"

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Project No. 2019-067.NCH
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1801 East 86th Street
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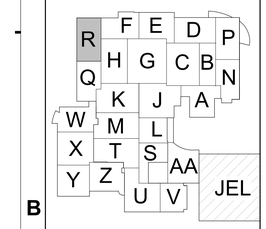

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PIPING PLAN - UNIT R

MP1R2.3

MP1R2.3_SECOND FLOOR PIPING PLAN - UNIT R
2019-067.NCH_R3.3 of Washington Township_North Central High School Renovation_
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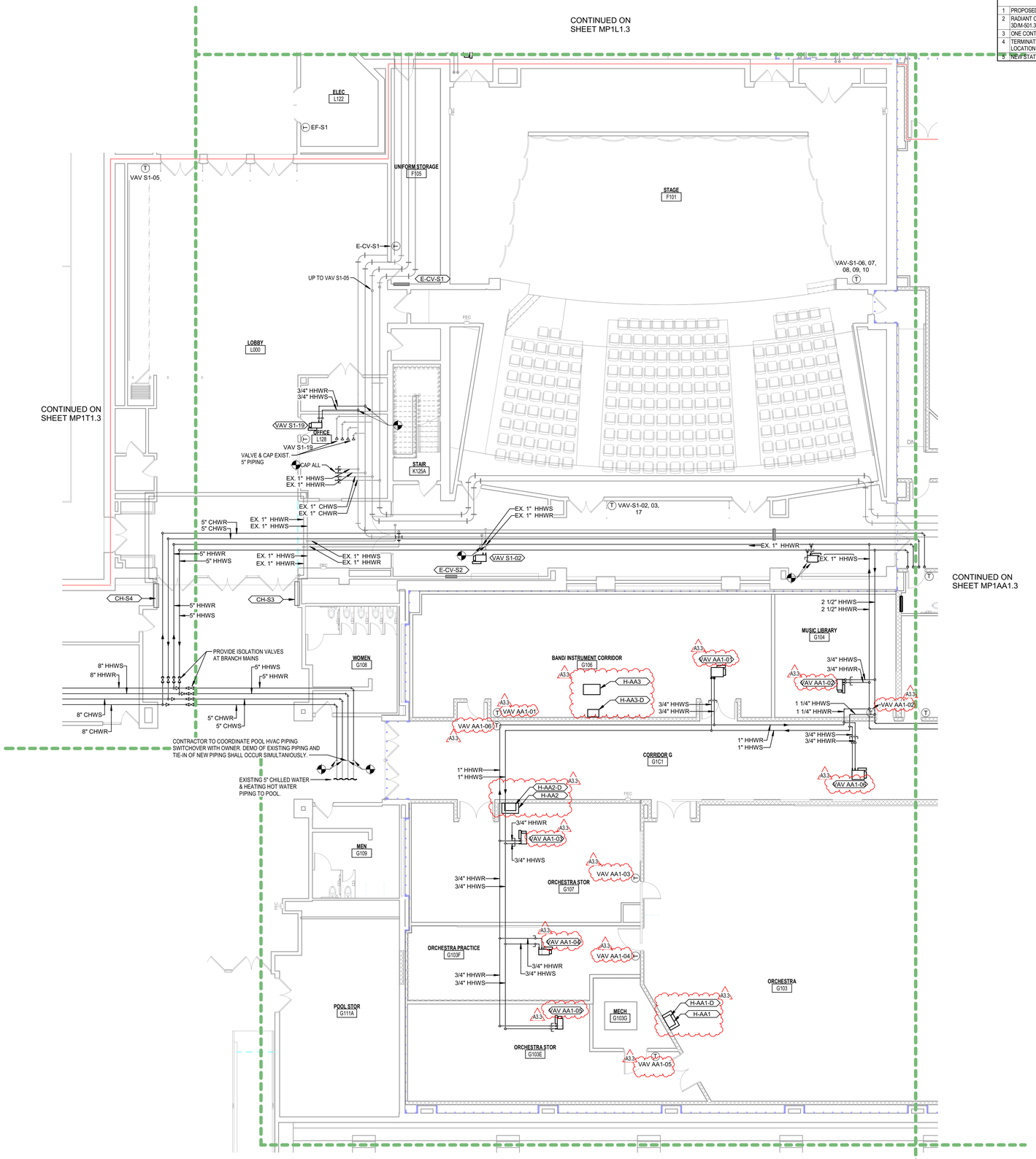
MECHANICAL PIPING PLAN NOTES - PH3

#	NOTE
1	PROPOSED REFRIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3. AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE. REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



2A FIRST FLOOR PIPING PLAN - UNIT S
1/8" = 1'-0"

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Project No. 2019-067.NCH
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1801 East 86th Street
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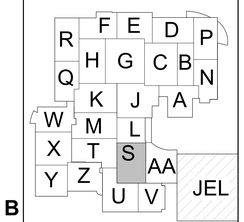


KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

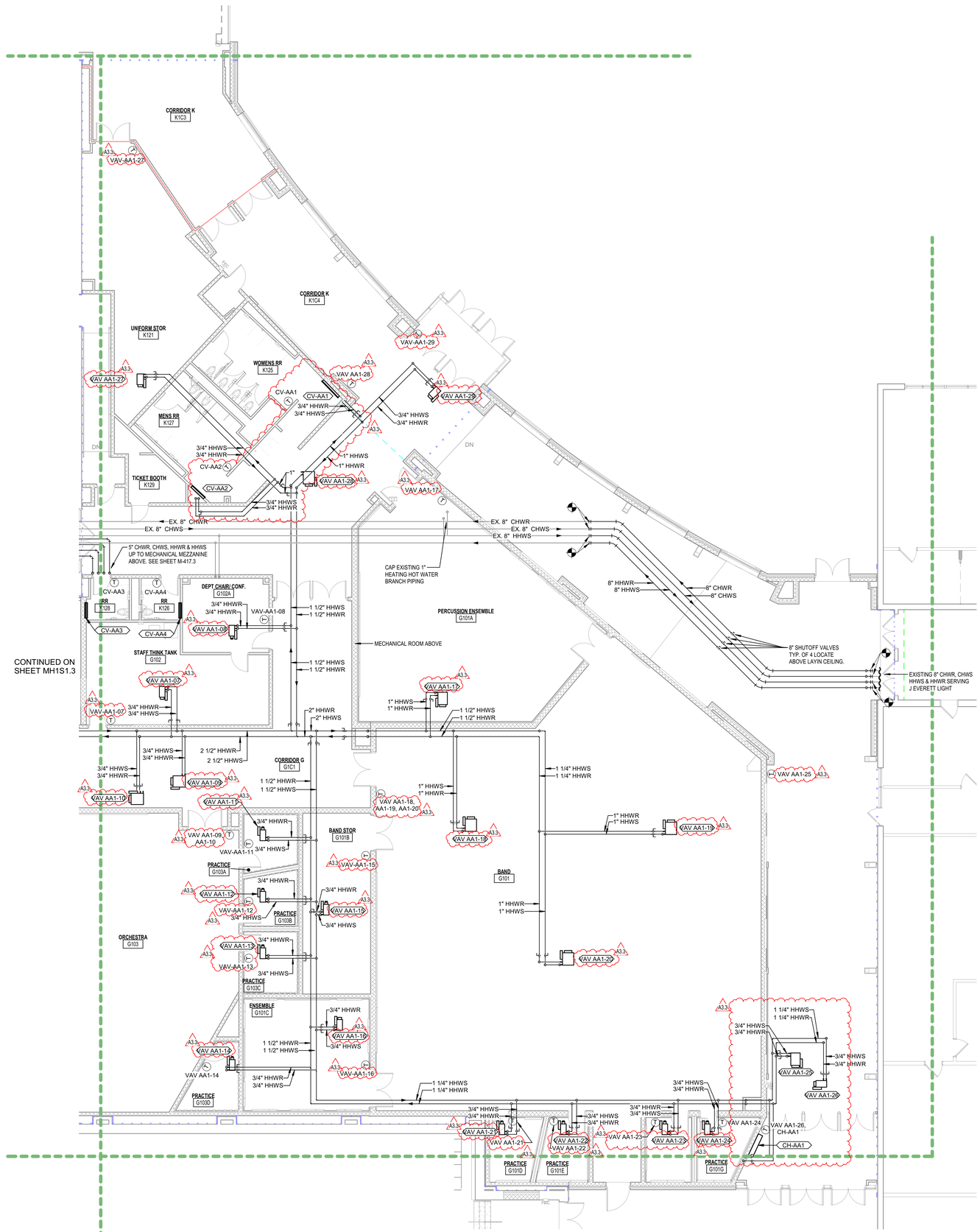
FIRST FLOOR PIPING PLAN - UNIT S

MP1S1.3

MP1S1.3 - FIRST FLOOR PIPING PLAN - UNIT S
2019-067.NCH, M.S.D. of Washington Township, North Central High School Renovation,
2019-067.NCH_North Central HS_2022_Central.rvt, North Central High School/2019-067.NCH_Central_R_2022_Cloud.rvt
4/4/2023 4:44:41 PM

MECHANICAL PIPING PLAN NOTES - PH3

#	NOTE
1	PROPOSED REFRIGERANT PIPING PATH.
2	RADIANT CEILING PANEL INSTALLED IN CEILING GRID, PIPED PER TWO-WAY COIL PIPING DETAIL 3D/M-501.3. AND INSULATED BY M.C. PER MANUFACTURER'S REQUIREMENTS. TYPICAL ALL RCP.
3	ONE CONTROL VALVE SERVES ALL RADIANT CEILING PANELS IN THIS ZONE.
4	TERMINATE CONDENSATE LINE AT PLUMBING FIXTURE. REFER TO PLUMBING DRAWINGS FOR LOCATION OF CONNECTION. MAINTAIN SERVICEABLE AIR GAP PER MECHANICAL CODE.
5	NEW STATIC PRESSURE SENSOR. SEE M-700 SERIES DRAWINGS.



2A **FIRST FLOOR PIPING PLAN - UNIT AA**
1/8" = 1'-0"

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415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW/ PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED ARCHITECT NO. AR10400134 STATE OF INDIANA

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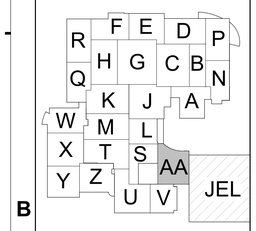
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PIPING PLAN - UNIT AA

MP1AA1.3

MP1AA1.3_FIRST FLOOR PIPING PLAN - UNIT AA
2019-067.NCH_R18 S of Washington Township_North Central High School Renovation_
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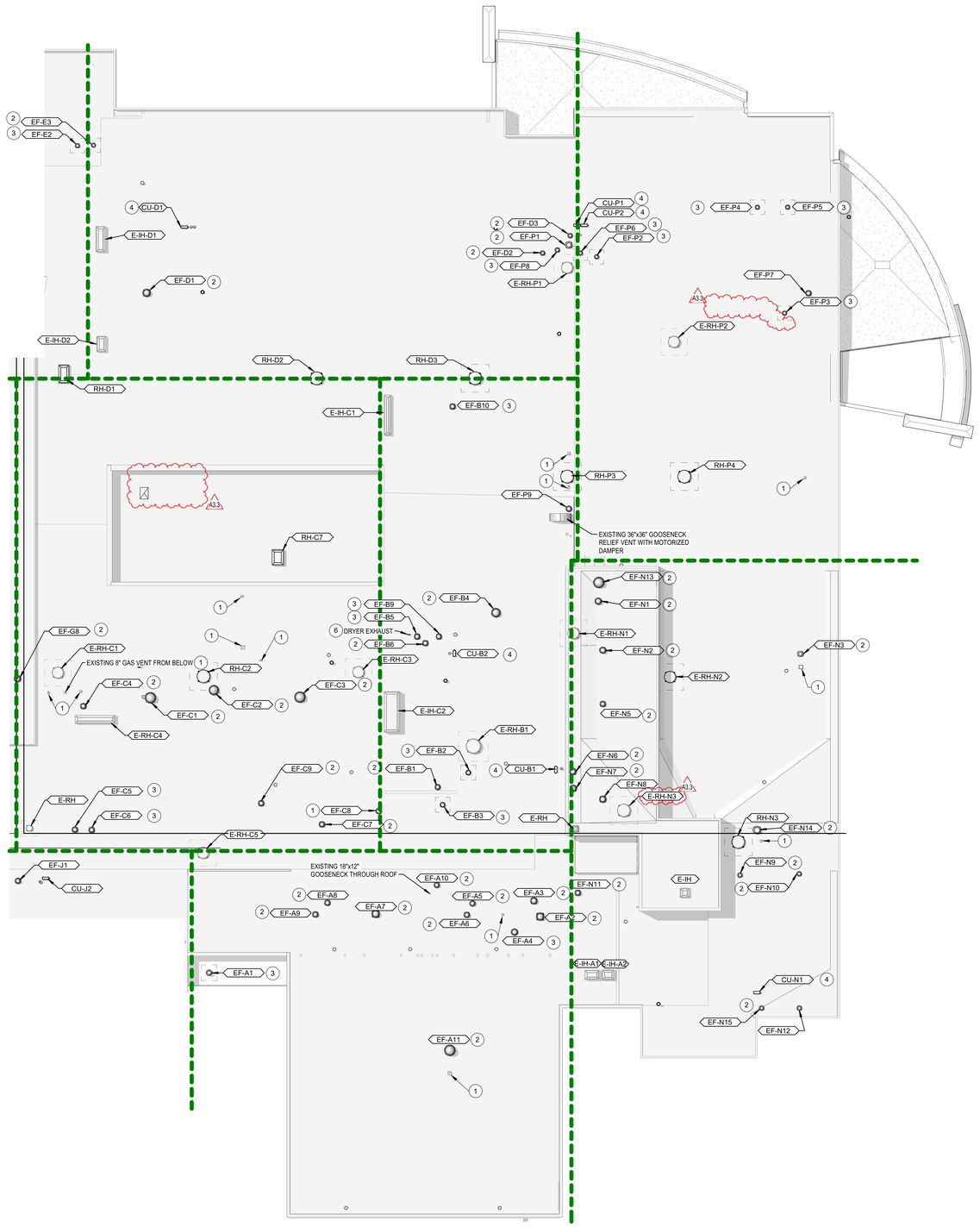
MECHANICAL ROOF PLAN NOTES (PH3)

#	NOTE
1	CAP EXISTING ROOF CURB PER DETAIL 5B/M-502.3.
2	NEW EXHAUST FAN ON EXISTING CURB PER DETAIL 1D/M-503.3. TRANSITION AS NECESSARY TO NEW FAN CONNECTION SIZE.
3	NEW EXHAUST FAN ON NEW CURB PER DETAIL 1D/M-503.3. COORDINATE WITH ROOFING CONTRACTOR FOR PENETRATION.
4	SPLIT SYSTEM AIR-COOLED CONDENSING UNIT AND REFRIGERANT PIPING PER DETAIL 5C/M-502.3. REFRIGERANT PIPING DOWN THROUGH CURB PER DETAIL 5D/M-501.3.
5	NEW LOUVERED PENTHOUSE ON NEW ROOF CURB PER DETAIL 3C/M-503.3. COORDINATE WITH ROOFING CONTRACTOR FOR ROOF PENETRATION.
6	INSTALL DRYER EXHAUST DUCT PER DETAIL 3A/M-503.3.



1 **ROOF MECHANICAL PLAN - AREA NORTHEAST**
3/64" = 1'-0"

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SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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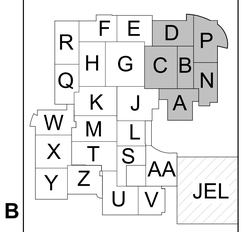

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

ROOF MECHANICAL PLAN - NORTHEAST

MR101.3

MR101.3 - ROOF MECHANICAL PLAN - NORTHEAST
2019-067.NCH_A3.3 of Washington Township, North Central High School Renovation_
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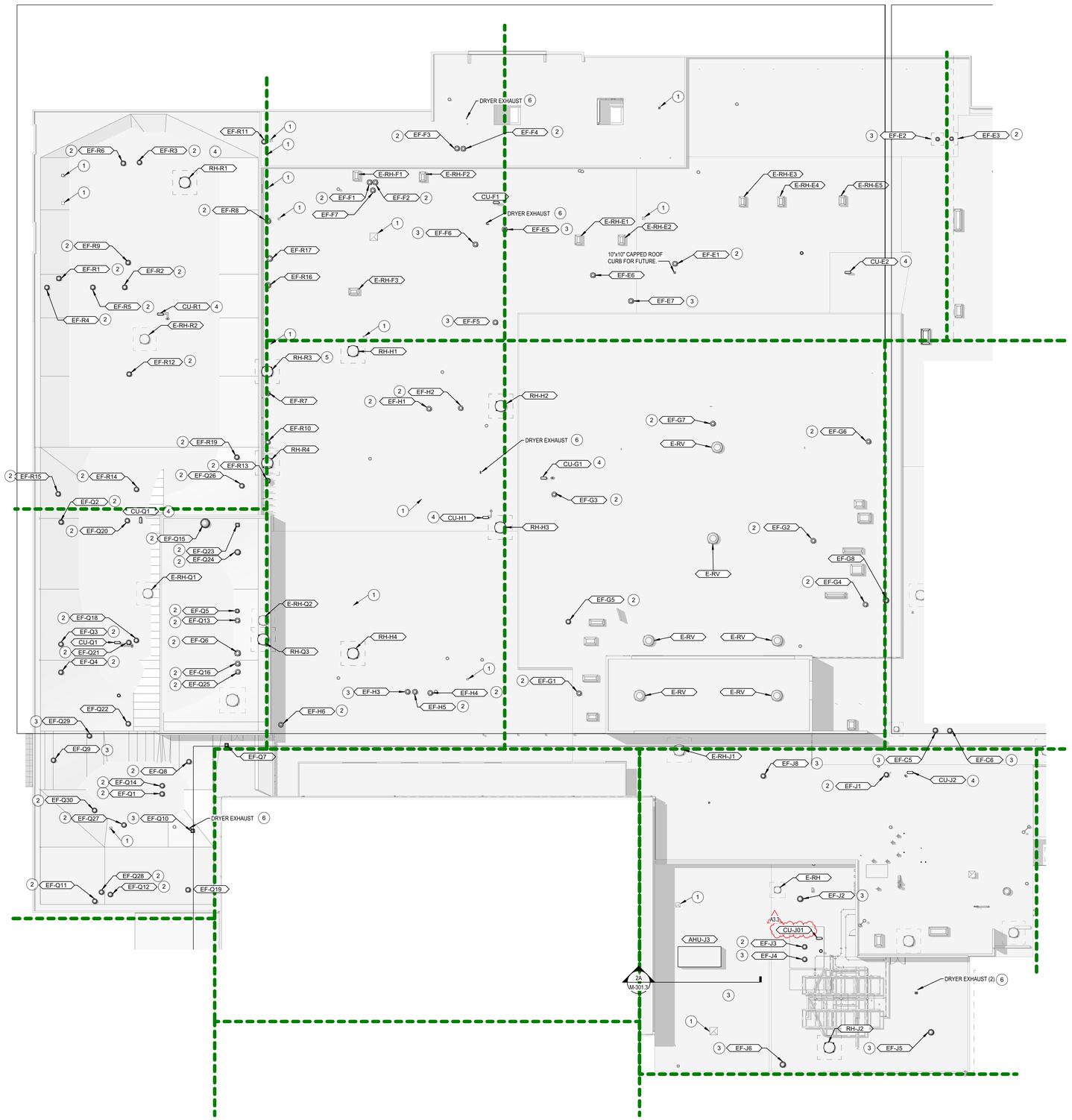

1 **ROOF MECHANICAL PLAN - AREA NORTHWEST**
3/64" = 1'-0"

MECHANICAL ROOF PLAN NOTES (PH3)

#	NOTE
1	CAP EXISTING ROOF CURB PER DETAIL 5B/M-502.3.
2	NEW EXHAUST FAN ON EXISTING CURB PER DETAIL 1D/M-503.3. TRANSITION AS NECESSARY TO NEW FAN CONNECTION SIZE.
3	NEW EXHAUST FAN ON NEW CURB PER DETAIL 1D/M-503.3. COORDINATE WITH ROOFING CONTRACTOR FOR PENETRATION.
4	SPLIT SYSTEM AIR-COOLED CONDENSING UNIT AND REFRIGERANT PIPING PER DETAIL 5C/M-502.3. REFRIGERANT PIPING DOWN THROUGH CURB PER DETAIL 5D/M-501.3.
5	NEW LOUVERED PENTHOUSE ON NEW ROOF CURB PER DETAIL 3C/M-503.3. COORDINATE WITH ROOFING CONTRACTOR FOR ROOF PENETRATION.
6	INSTALL DRYER EXHAUST DUCT PER DETAIL 3A/M-503.3.

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Project No. 2019-067.NCH
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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ROOF MECHANICAL PLAN - NORTHWEST

MR102.3

MR102.3 - ROOF MECHANICAL PLAN - NORTHWEST
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GENERAL NOTES HVAC PLAN

A3.3

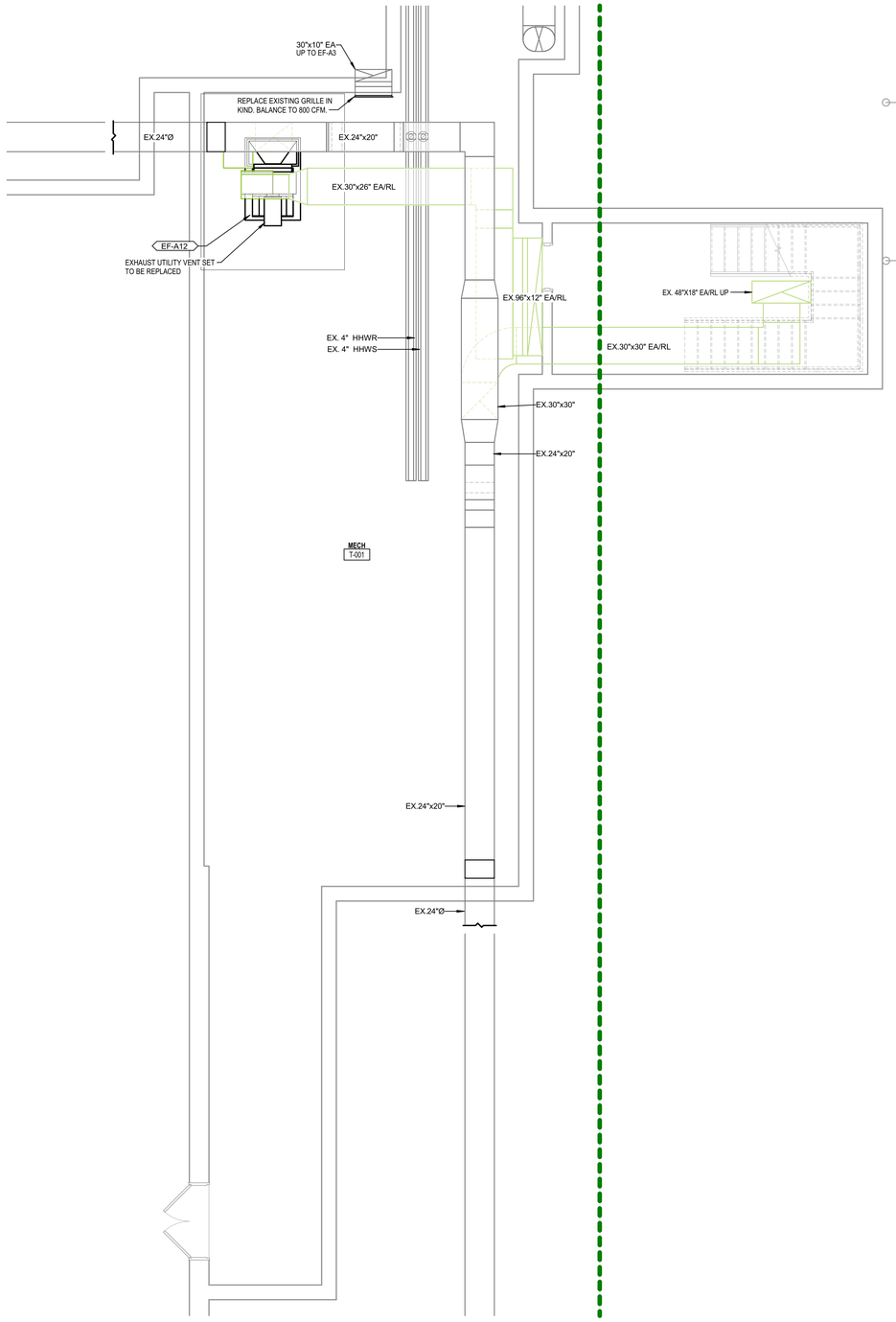
1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLANS.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. TC PANELS TO REMAIN.

DEMOLITION ENLARGED PLAN

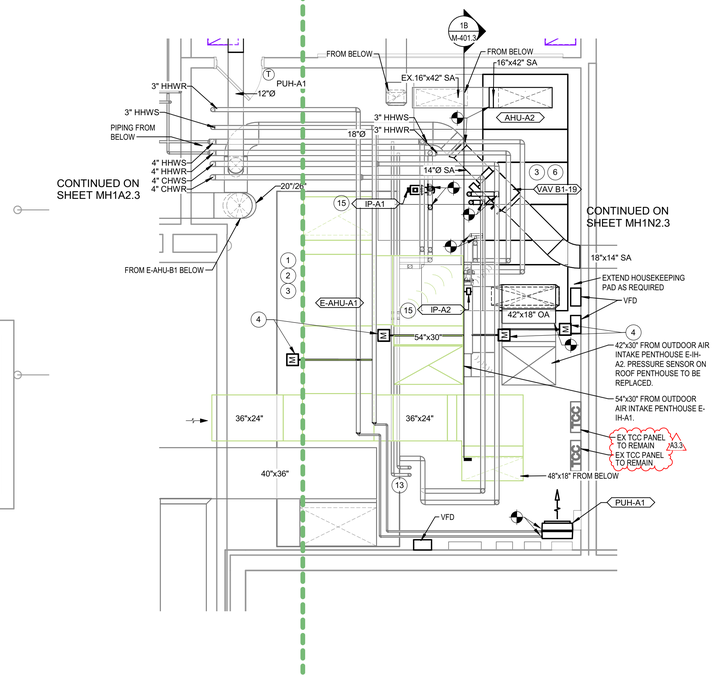
#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

ENLARGED COMBINED PLAN NOTES (PH3)

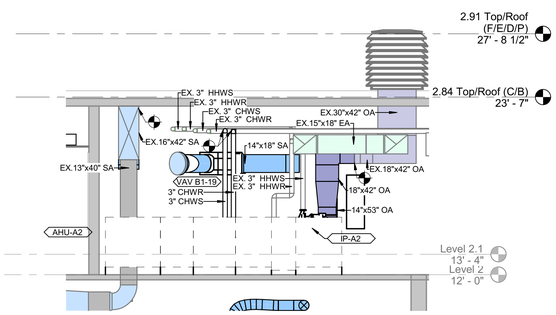
#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL COILS AND EXISTING TO REMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
2	PROVIDE NEW FAN MOTOR ISOLATOR SPRINGS, FLEXIBLE CONNECTIONS AND FAN BEARINGS. REPLACE FAN MOTOR AS REQUIRED PER EXISTING AIR HANDLING UNIT SCHEDULE.
3	REPLACE ALL BALANCING VALVES, ISOLATION VALVES, FLOW CONTROL VALVES, THERMOMETERS, PRESSURE GAUGES AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.
4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
5	REMOVE EXISTING DAMPER ACTUATOR AND PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT ROOF OUTDOOR AIR OR RELIEF AIR DAMPER. CLEAN AND LUBRICATE DAMPER.
6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
14	REMOVE LATH/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	TWO-WAY PUMPED PREHEAT COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 6E ON DRAWING M-502.3.



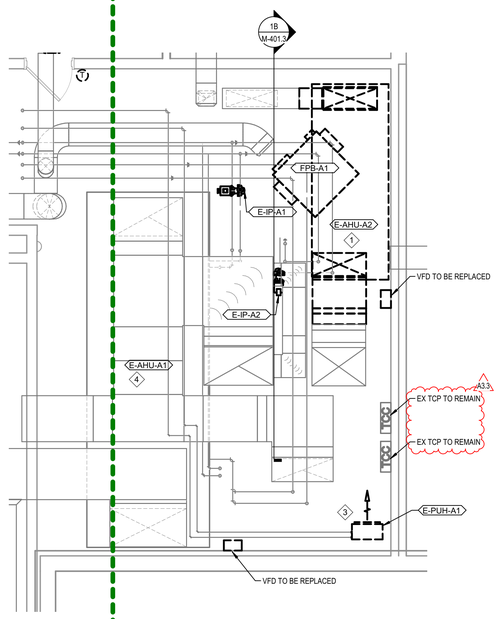
4A UNIT A POOL MECHANICAL ROOM
1/4" = 1'-0"



2C UNIT A MECHANICAL ROOM
1/4" = 1'-0"



1B AHU-A2 SECTION
1/4" = 1'-0"



2A UNIT A MECHANICAL ROOM DEMOLITION PLAN
1/4" = 1'-0"

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SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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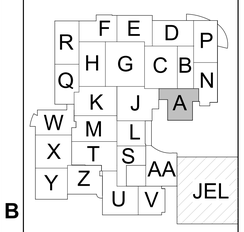

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT A

M-401.3

M-401.3, ENLARGED MECHANICAL ROOM PLAN - UNIT A
2019-067.NCH, M.S.D. of Washington Township, North Central High School Renovation - Additions Phase 3
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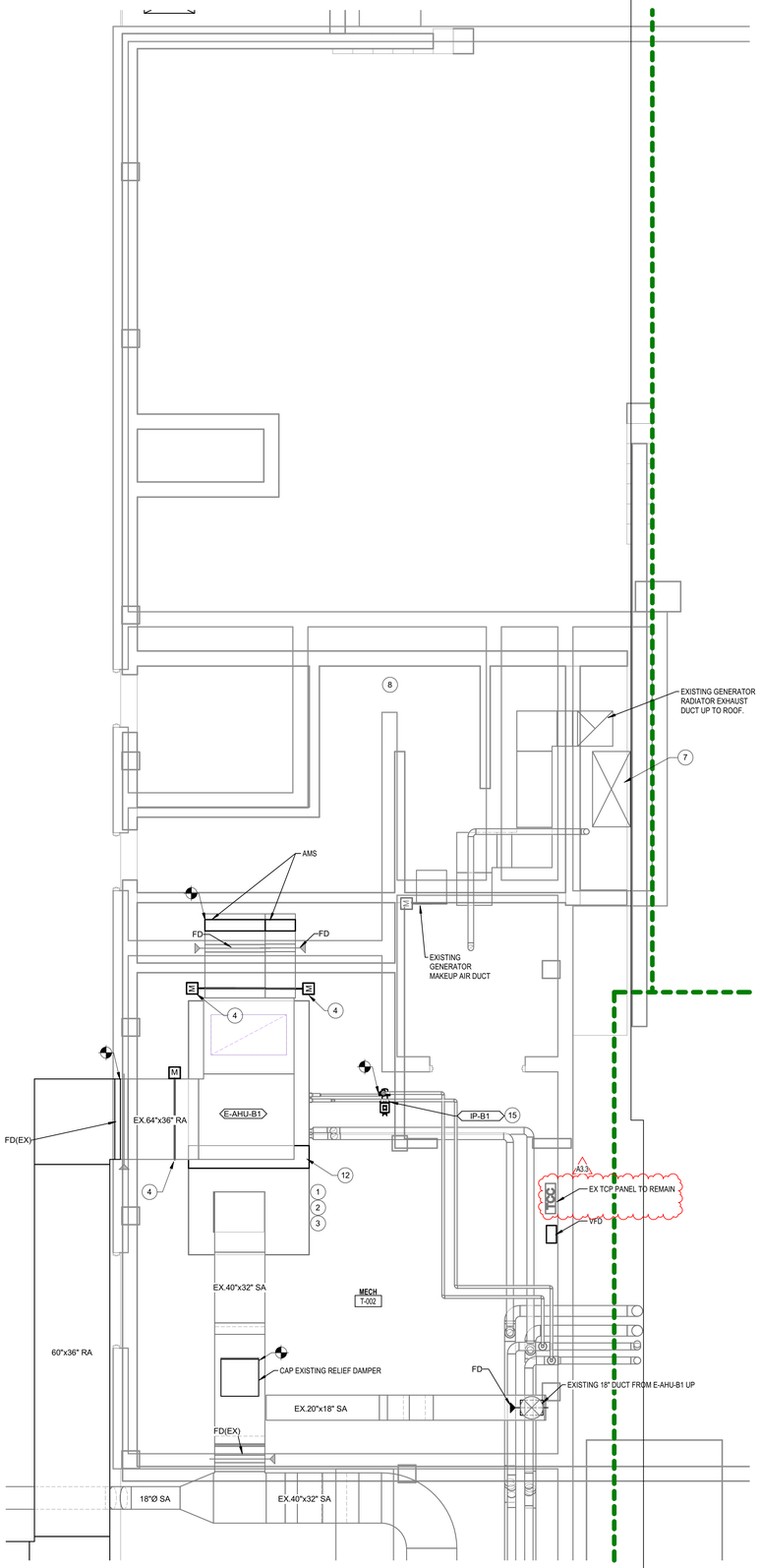
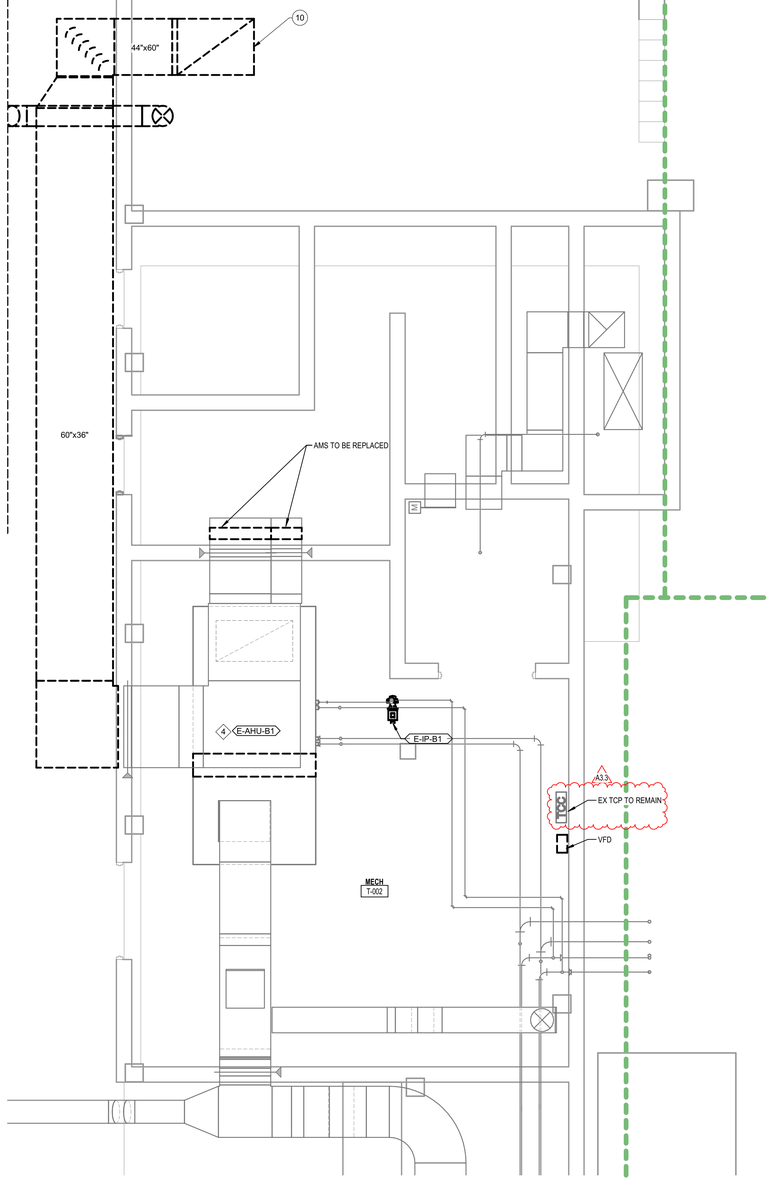


4A **UNIT B MECHANICAL ROOM**
1/4" = 1'-0"



2A **UNIT B MECHANICAL ROOM - DEMOLITION**
1/4" = 1'-0"

2C
M-301.3

ENLARGED COMBINED PLAN NOTES (PH3)

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL COILS AND EXISTING TO REMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
2	PROVIDE NEW FAN MOTOR ISOLATOR SPRINGS, FLEXIBLE CONNECTIONS AND FAN BEARINGS. REPLACE FAN MOTOR AS REQUIRED PER EXISTING AIR HANDLING UNIT SCHEDULE.
3	REPLACE ALL BALANCING VALVES, ISOLATION VALVES, FLOW CONTROL VALVES, THERMOMETERS, PRESSURE GAUGES AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.
4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
5	REMOVE EXISTING DAMPER ACTUATOR AND PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT ROOF OUTDOOR AIR OR RELIEF AIR DAMPER. CLEAN AND LUBRICATE DAMPER.
6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
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15	TWO-WAY PUMPED PREHEAT COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
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DEMOLITION ENLARGED PLAN

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

GENERAL NOTES HVAC PLAN

A3.3

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLANS.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE MT00 SERIES DRAWINGS FOR MORE INFORMATION. TC PANELS TO REMAIN.

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A3.3	ADDENDUM 3.3	04.06.2023

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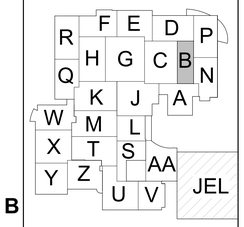

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT B

M-402.3

M-402.3_ENLARGED MECHANICAL ROOM PLAN - UNIT B
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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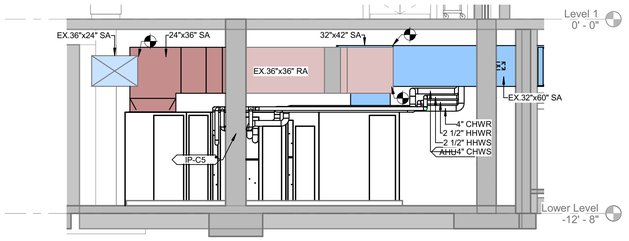
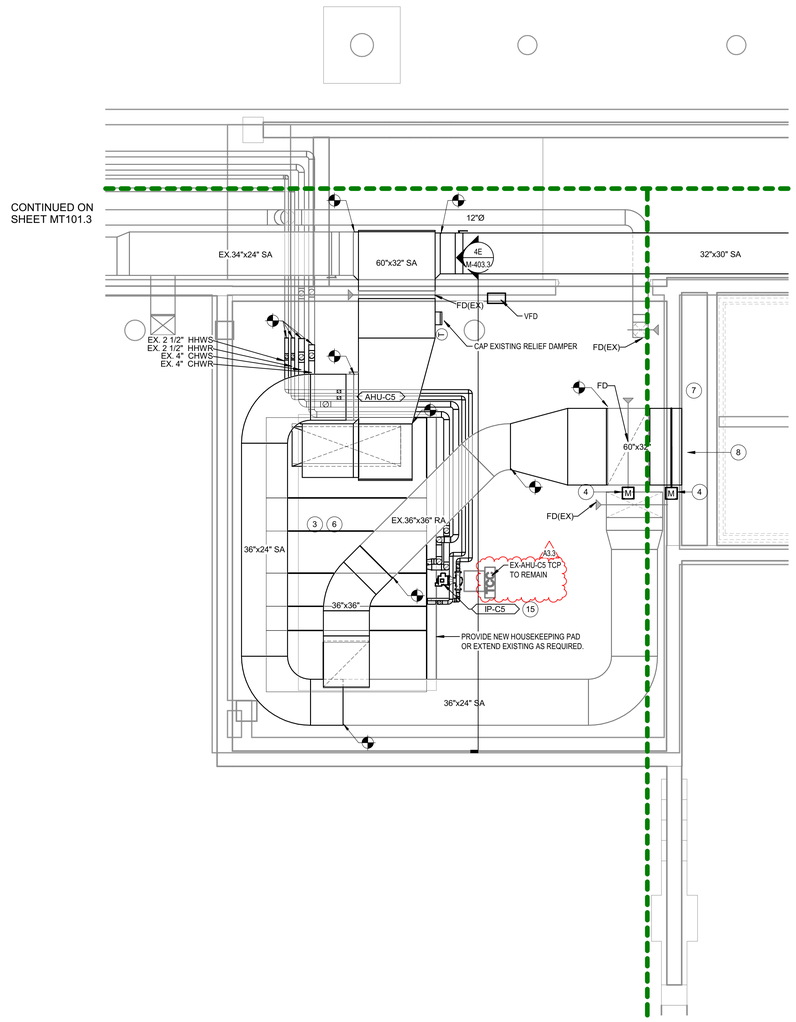
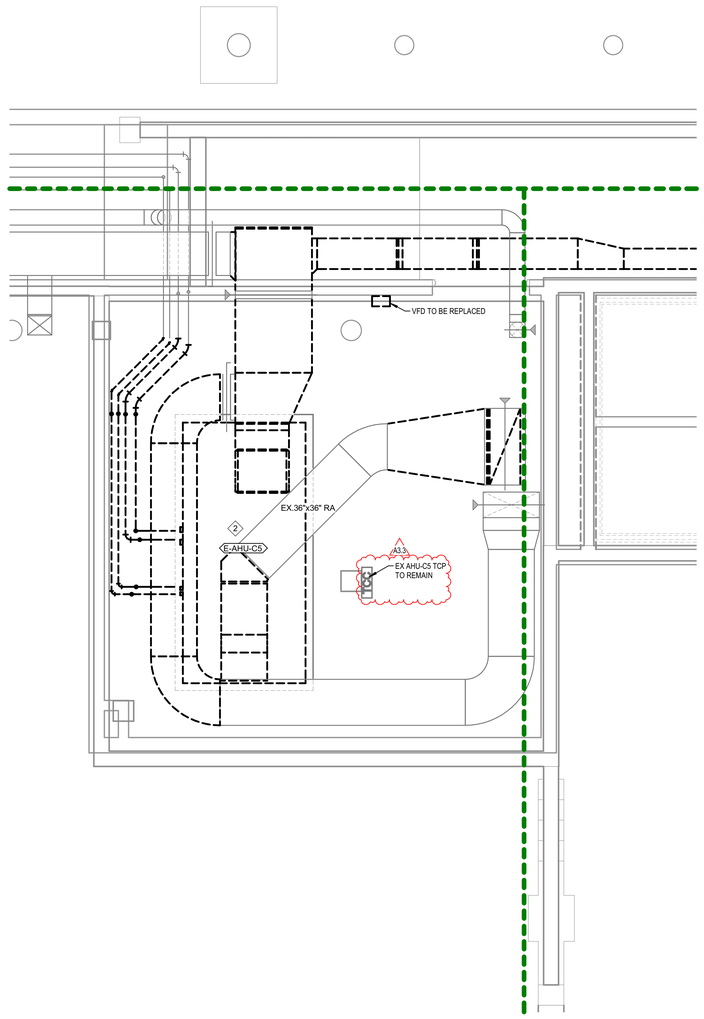


4E AHU-C5 SECTION
1/4" = 1'-0"



4A UNIT C5 MECHANICAL ROOM
1/4" = 1'-0"

CONTINUED ON SHEET MT101.3



2A UNIT C5 MECHANICAL ROOM DEMOLITION
1/4" = 1'-0"

GENERAL NOTES HVAC PLAN

A3.3

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLANS.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. TC PANELS TO REMAIN.

DEMOLITION ENLARGED PLAN

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

ENLARGED COMBINED PLAN NOTES (PH3)

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL COILS AND EXISTING TO REMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
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3	REPLACE ALL BALANCING VALVES, ISOLATION VALVES, FLOW CONTROL VALVES, THERMOMETERS, PRESSURE GAUGES AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.
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6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL REPLACEMENT.
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15	TWO-WAY PUMPED PREHEAT COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 6E ON DRAWING M-502.3.

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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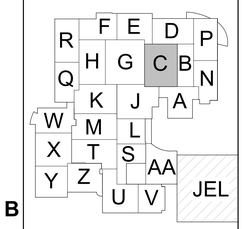
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT C5

M-403.3

M-403.3_ENLARGED MECHANICAL ROOM PLAN - UNIT C5
2019-067.NCH_3-M.S.D. of Washington Township_North Central High School Renovation_
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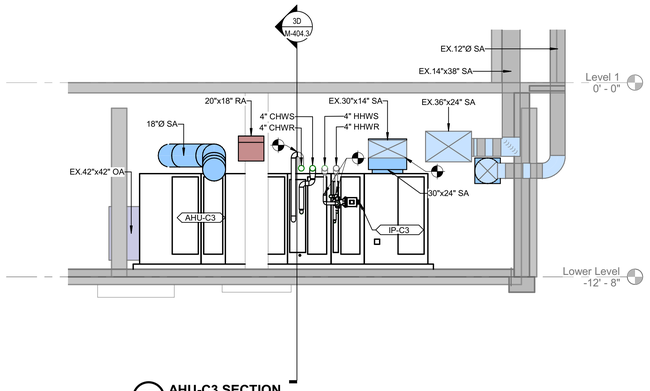

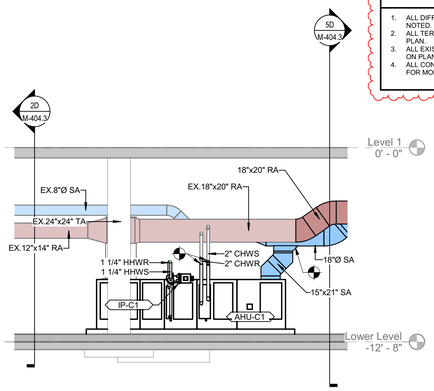

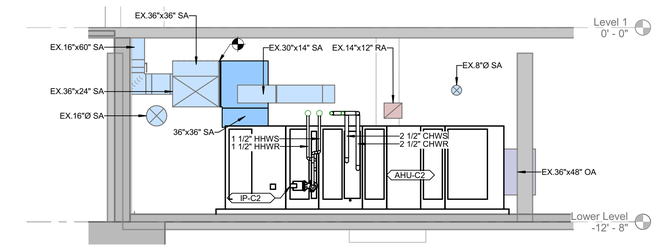

5D AHU-C3 SECTION
1/4" = 1'-0"

3D AHU-C1 SECTION
1/4" = 1'-0"

2D AHU-C2 SECTION
1/4" = 1'-0"

GENERAL NOTES HVAC PLAN

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
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DEMOLITION ENLARGED PLAN

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4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

ENLARGED COMBINED PLAN NOTES (PH3)

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17	NOT USED
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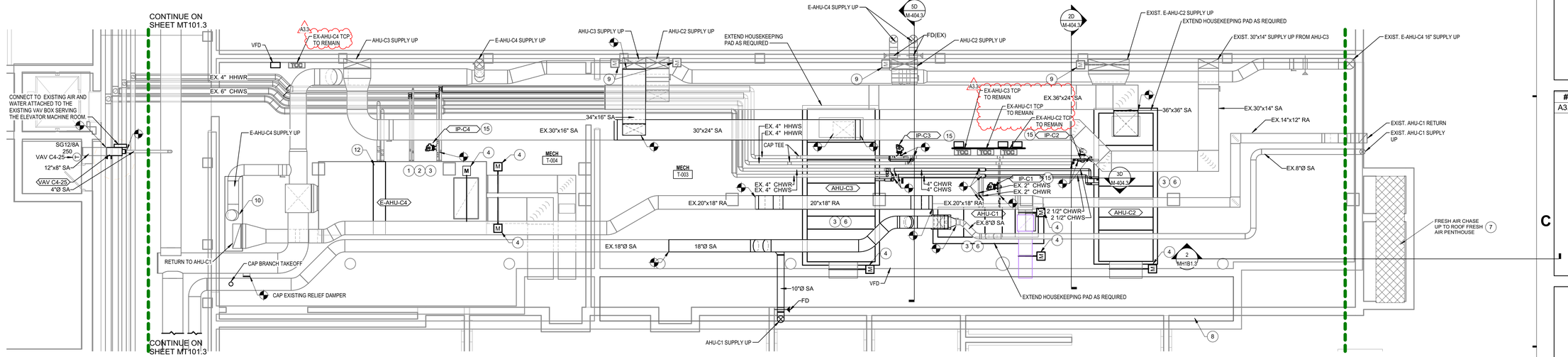
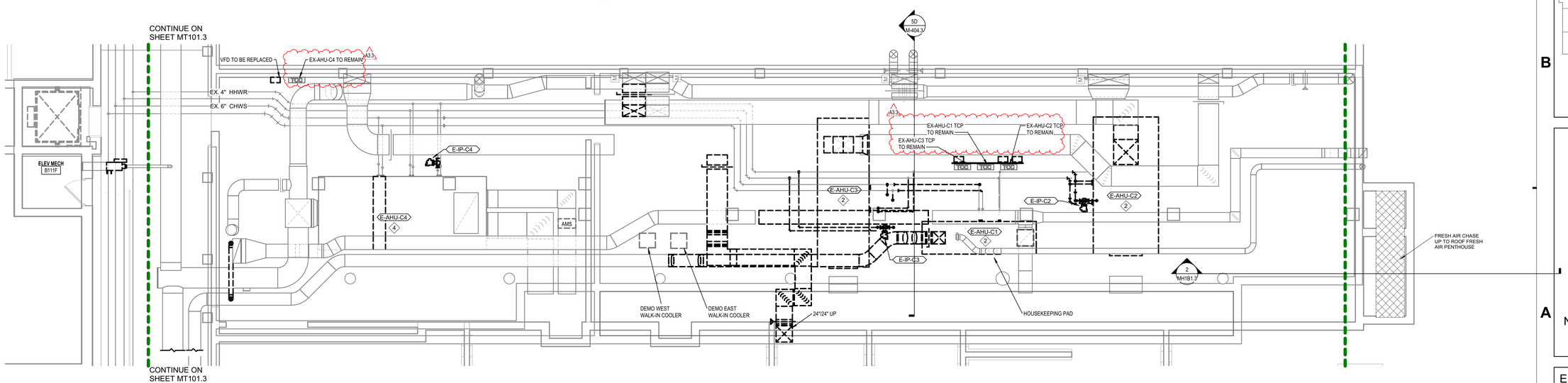


1C UNIT C MECHANICAL ROOM
3/16" = 1'-0"



1A UNIT C MECHANICAL ROOM - DEMOLITION
3/16" = 1'-0"

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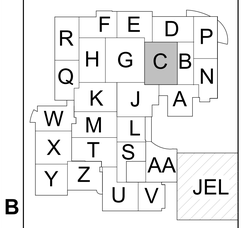

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT C

M-404.3

M-404.3_ENLARGED MECHANICAL ROOM PLAN - UNIT C
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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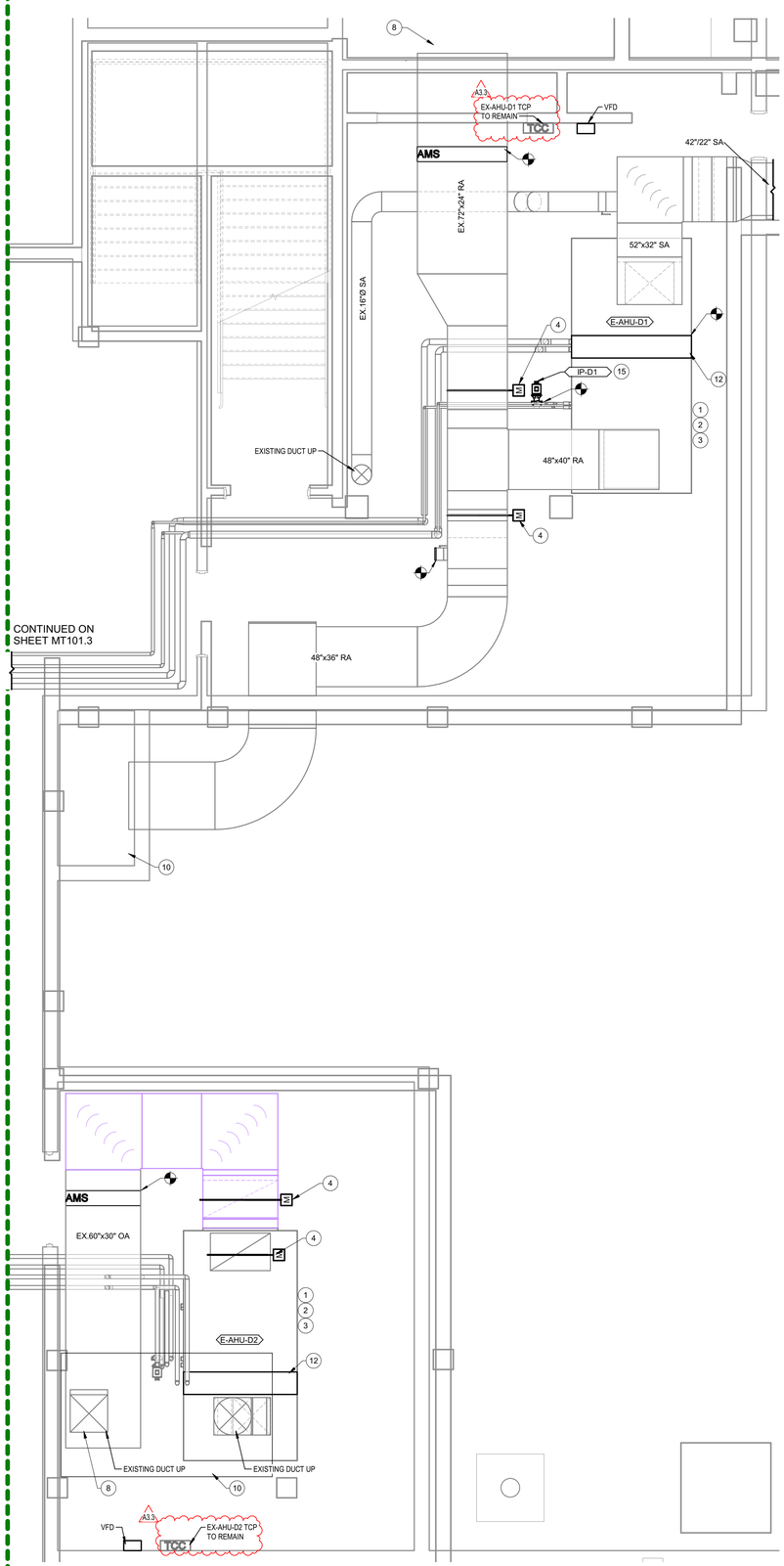

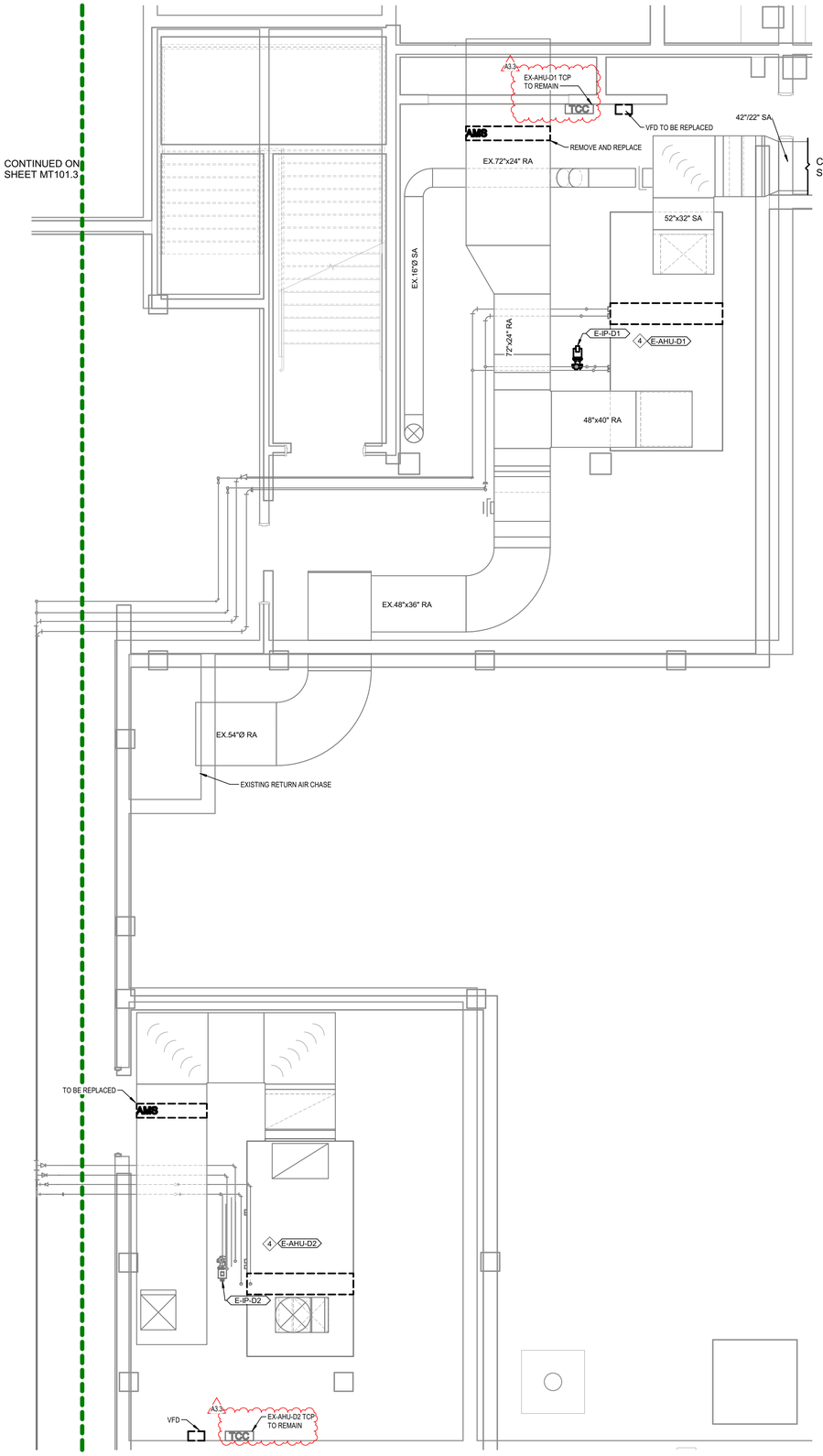

4A **UNIT D MECHANICAL ROOM**
1/4" = 1'-0"

2A **UNIT D MECHANICAL ROOM - DEMOLITION**
1/4" = 1'-0"

ENLARGED COMBINED PLAN NOTES (PH3)

#	NOTE
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DEMOLITION ENLARGED PLAN

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GENERAL NOTES HVAC PLAN

A3.3

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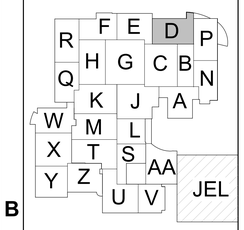

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT D

M-405.3

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2019-067.NCH_M.E.S. of Washington Township_North Central High School Renovation_
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GENERAL NOTES HVAC PLAN

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ENLARGED COMBINED PLAN NOTES (PH3)

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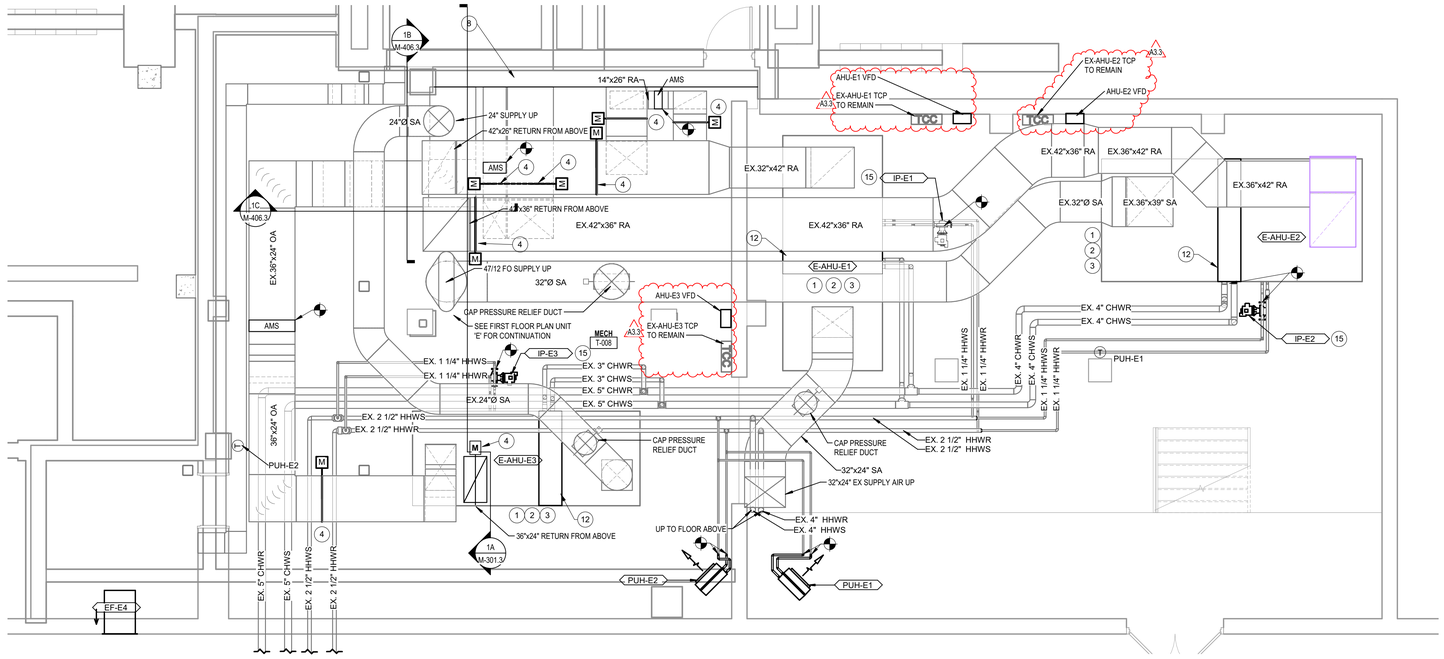

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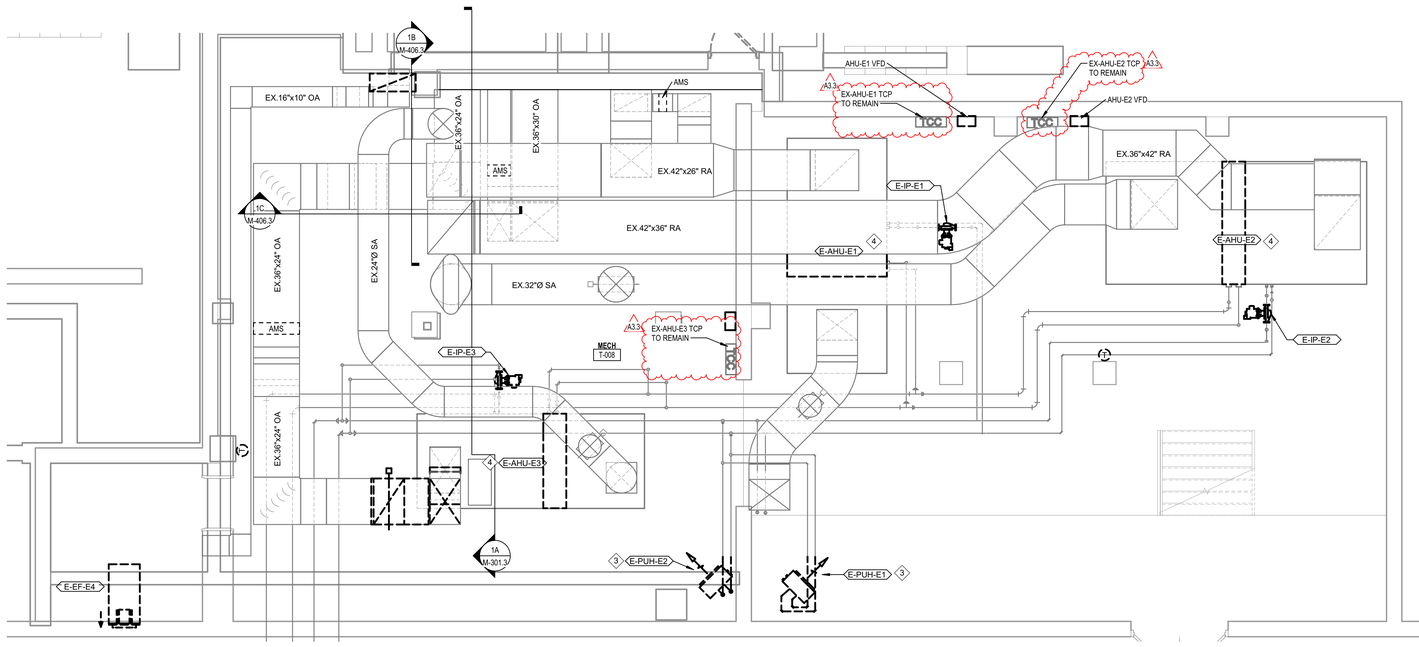
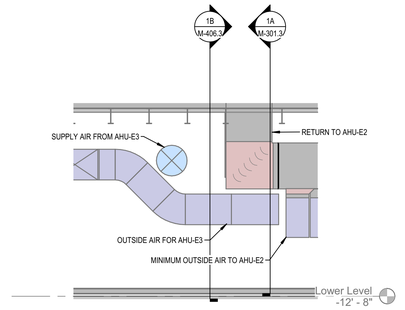
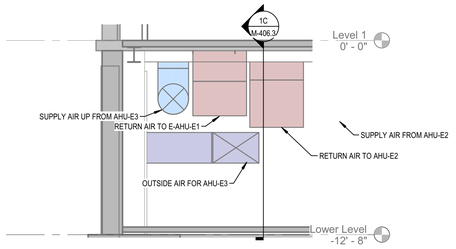
2C UNIT E MECHANICAL ROOM
1/4" = 1'-0"



2A UNIT E MECHANICAL ROOM - DEMOLITION
1/4" = 1'-0"

1C UNIT E MECHANICAL ROOM E/W SECTION
1/4" = 1'-0"





1B UNIT E MECHANICAL ROOM N/S SECTION
1/4" = 1'-0"

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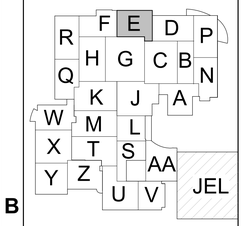

KEY PLAN

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M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT E

M-406.3

M-406.3_ENLARGED MECHANICAL ROOM PLAN - UNIT E
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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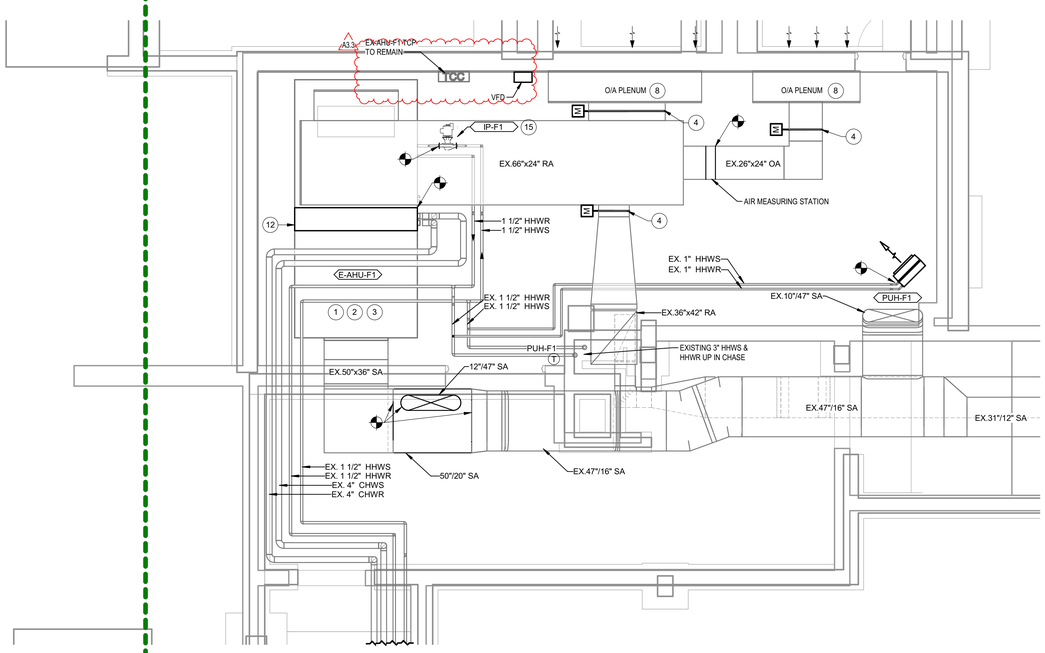
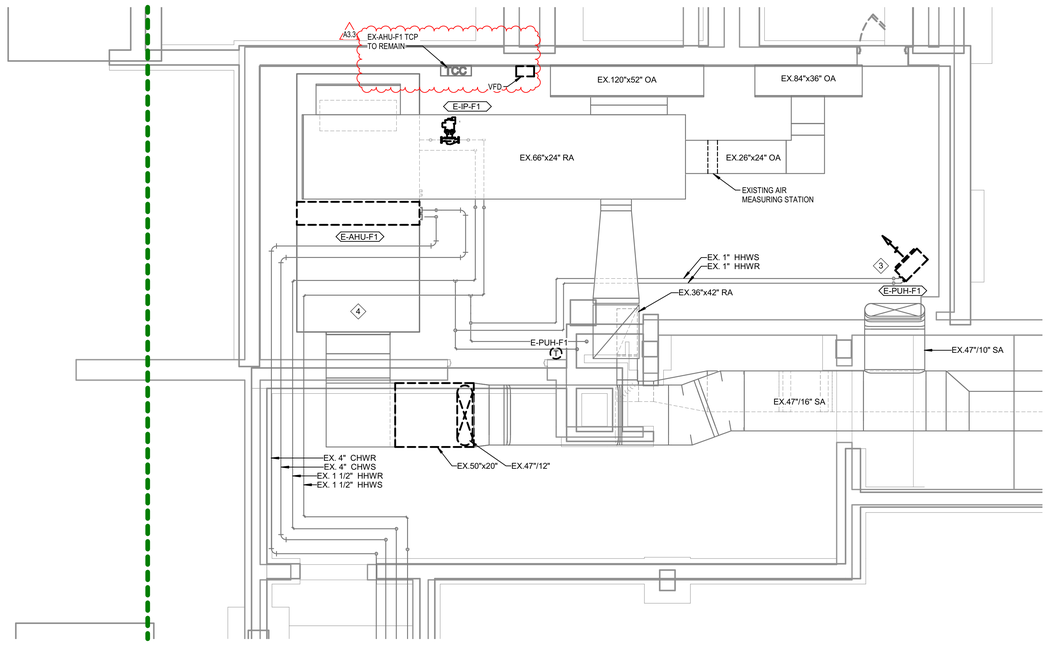


SEE DRAWING MT102.3 FOR
CONTINUATION IN TUNNEL

2C UNIT F MECHANICAL ROOM
1/4" = 1'-0"



2A UNIT F MECHANICAL ROOM - DEMOLITION
1/4" = 1'-0"

ENLARGED COMBINED PLAN NOTES (PH3)

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL COILS AND EXISTING TO REMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
2	PROVIDE NEW FAN MOTOR ISOLATOR SPRINGS, FLEXIBLE CONNECTIONS AND FAN BEARINGS. REPLACE FAN MOTOR AS REQUIRED PER EXISTING AIR HANDLING UNIT SCHEDULE.
3	REPLACE ALL BALANCING VALVES, ISOLATION VALVES, FLOW CONTROL VALVES, THERMOMETERS, PRESSURE GAUGES AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.
4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
5	REMOVE EXISTING DAMPER ACTUATOR AND PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT ROOF OUTDOOR AIR OR RELIEF AIR DAMPER. CLEAN AND LUBRICATE DAMPER.
6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
14	REMOVE LATH/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	TWO-WAY PUMPED PREHEAT COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 6E ON DRAWING M-502.3.

DEMOLITION ENLARGED PLAN

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

A3.3

GENERAL NOTES HVAC PLAN

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLANS.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. TC PANELS TO REMAIN.

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT F

M-407.3

M-407.3_ENLARGED MECHANICAL ROOM PLAN_UNIT F
2019-067.NCH_M-0.0 of Washington Township North Central High School Renovation_
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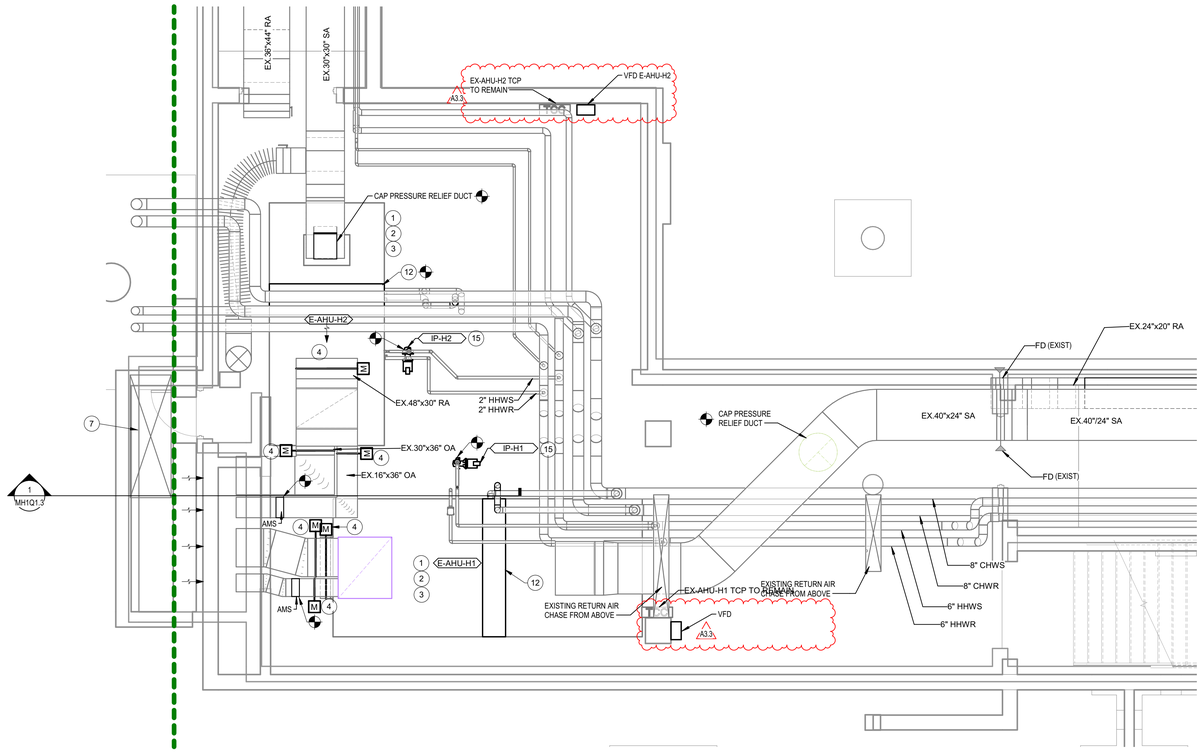
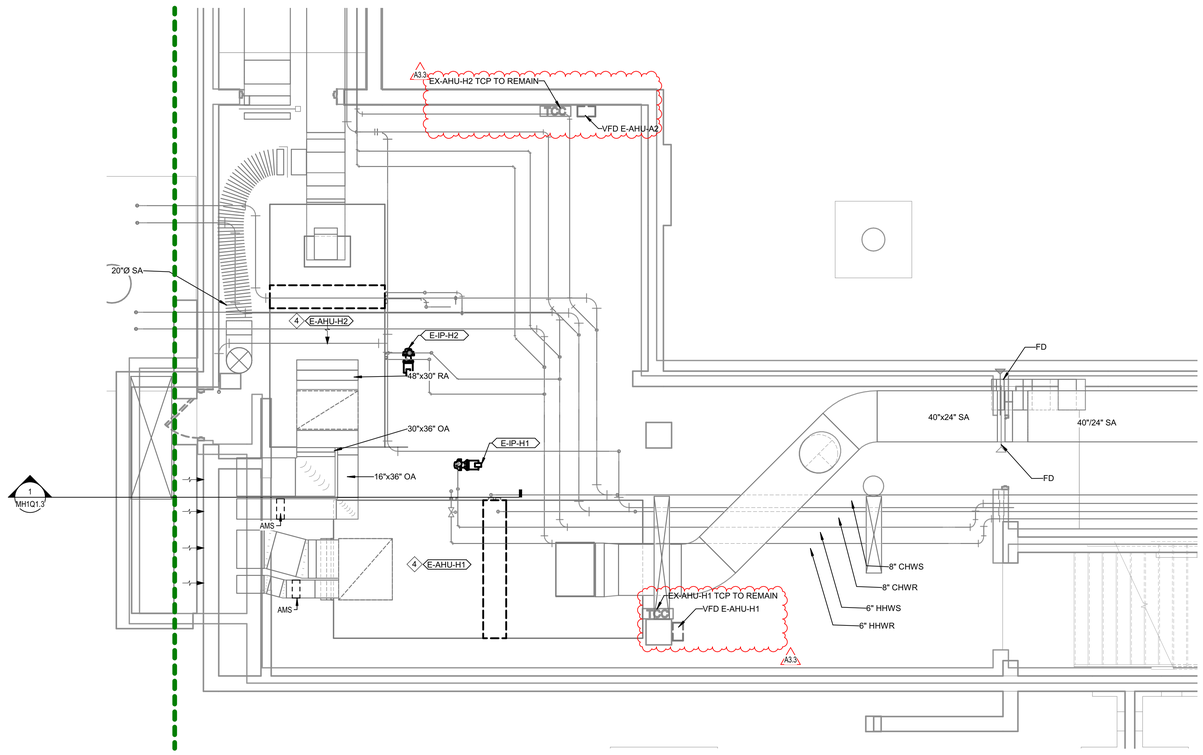


2C UNIT H MECHANICAL ROOM
1/4" = 1'-0"



2A UNIT H MECHANICAL ROOM - DEMOLITION
1/4" = 1'-0"

ENLARGED COMBINED PLAN NOTES (PH3)

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DEMOLITION ENLARGED PLAN

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GENERAL NOTES HVAC PLAN

A3.3

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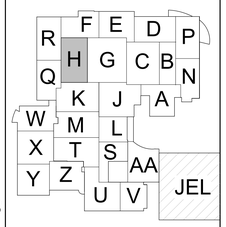

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT H

M-408.3

M-408.3_ENLARGED MECHANICAL ROOM PLAN - UNIT H
2019-067.NCH_M-3.3 of Washington Township, North Central High School Renovation_
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GENERAL NOTES HVAC PLAN

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ENLARGED COMBINED PLAN NOTES (PH3)

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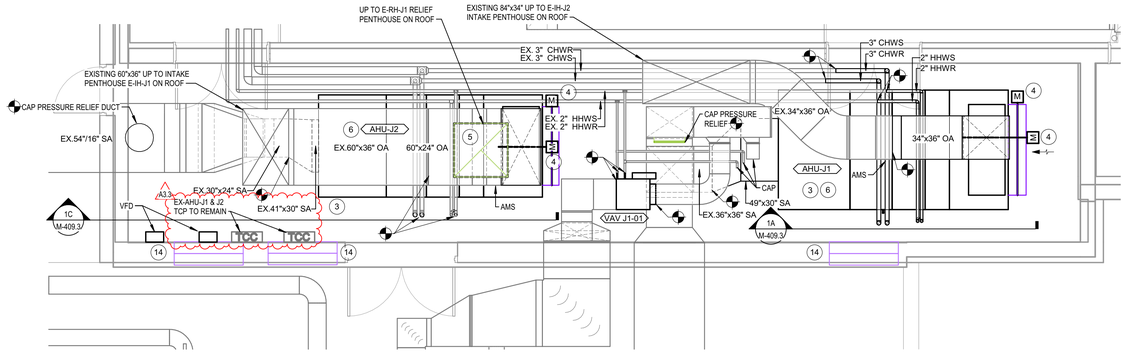
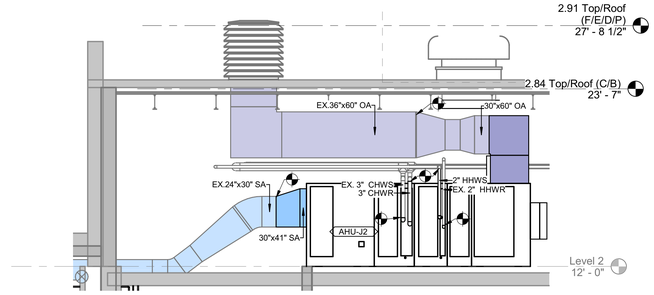
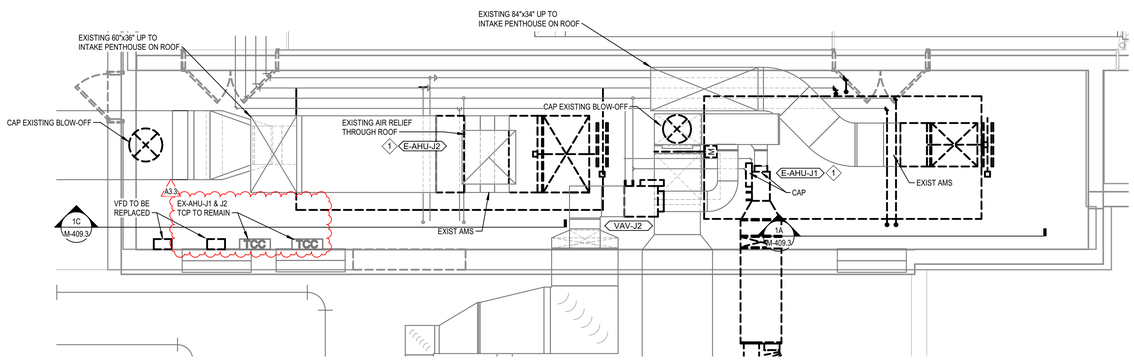


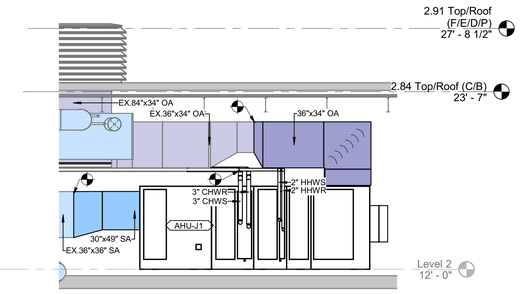
3C UNIT J MECHANICAL ROOM
1/4" = 1'-0"



1C AHU-J2 SECTION
1/4" = 1'-0"



3A UNIT J MECHANICAL ROOM - DEMOLITION
1/4" = 1'-0"



1A AHU-J1 SECTION
1/4" = 1'-0"

SCHMIDT ASSOCIATES
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Project No. 2019-067.NCH
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A3.3	ADDENDUM 3.3	04.06.2023

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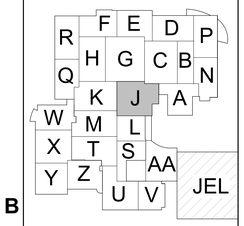

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT J

M-409.3

M-409.3_ENLARGED MECHANICAL ROOM PLAN - UNIT J
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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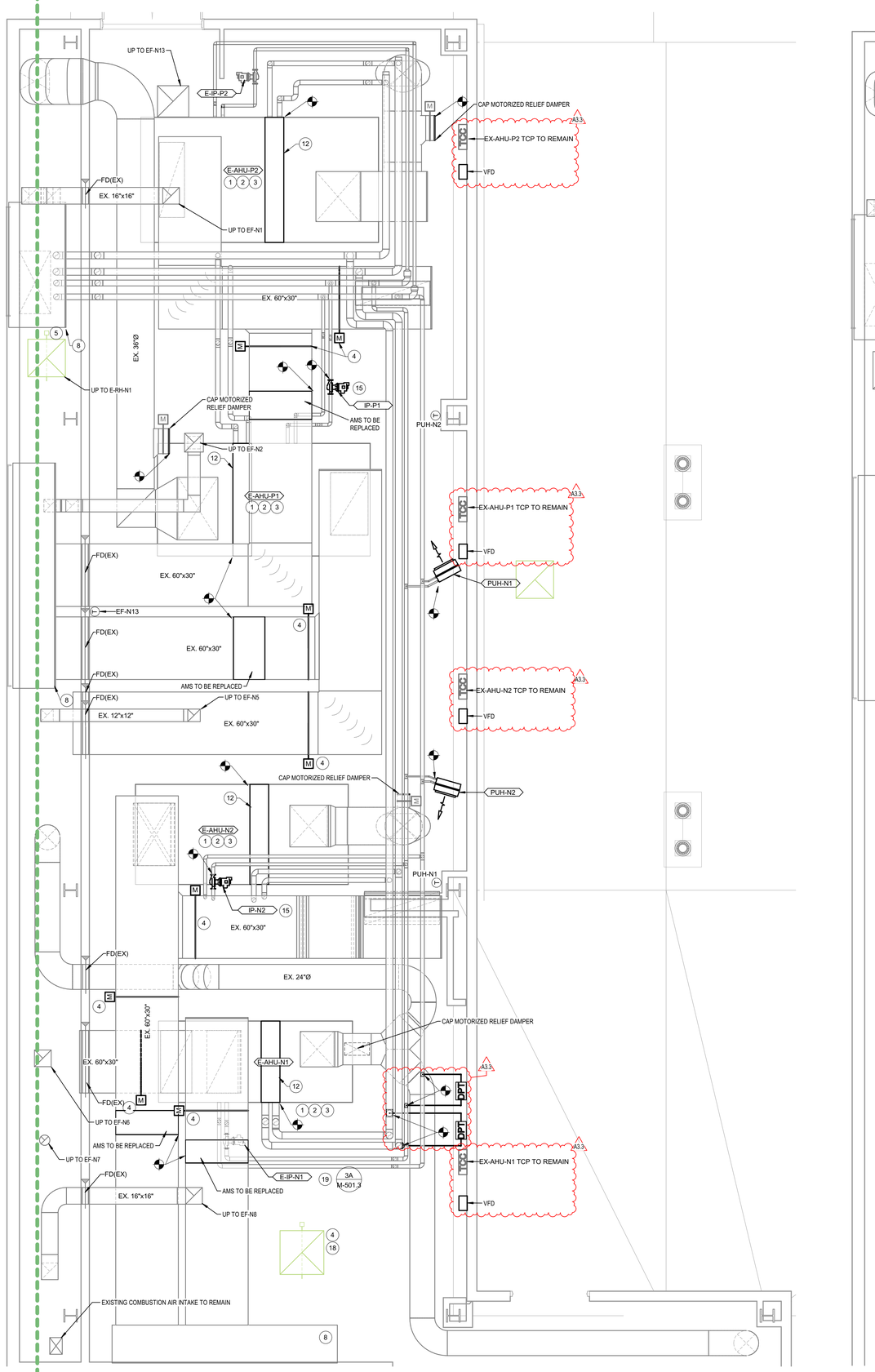
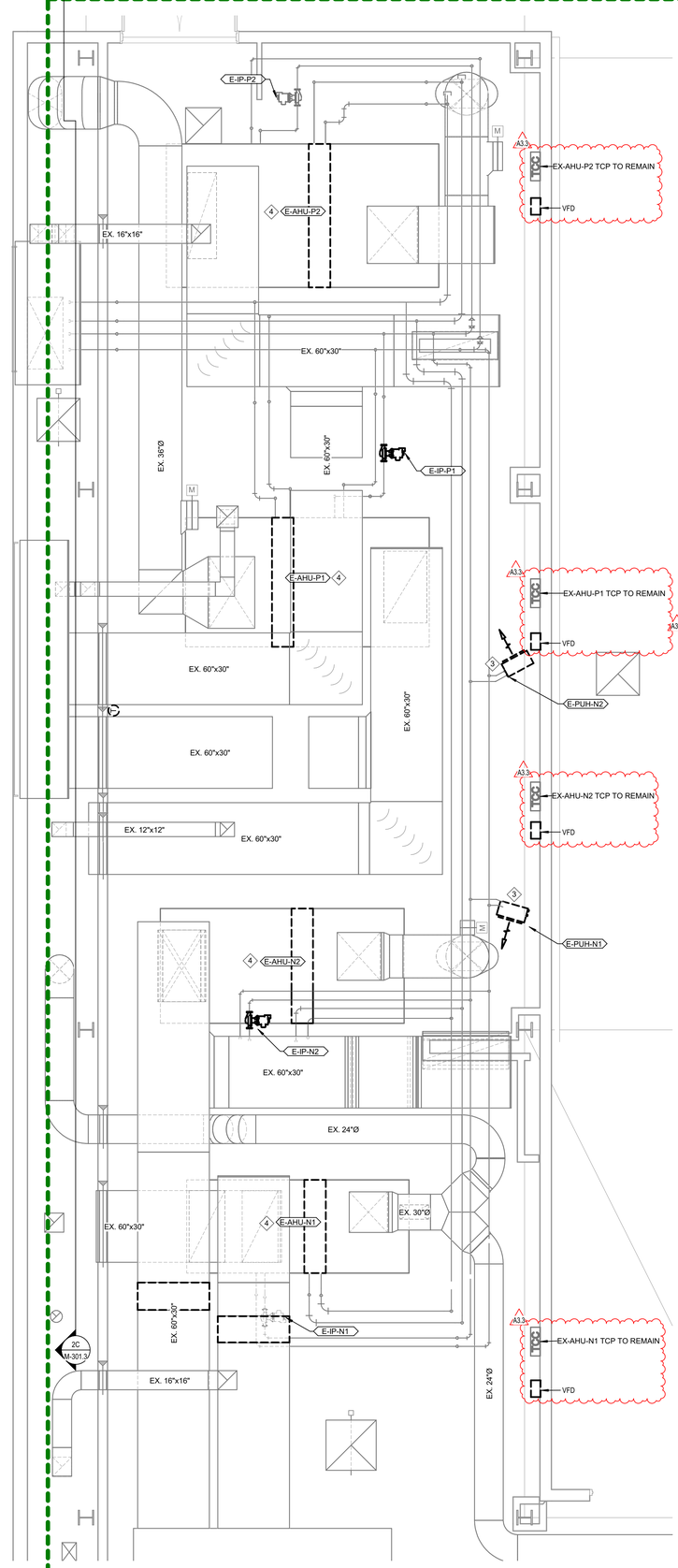


4A **UNIT N/P MECHANICAL PENTHOUSE**
1/4" = 1'-0"



2A **UNIT N/P MECHANICAL PENTHOUSE - DEMOLITION**
1/4" = 1'-0"

DEMOLITION ENLARGED PLAN

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ENLARGED COMBINED PLAN NOTES (PH3)

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KEY PLAN

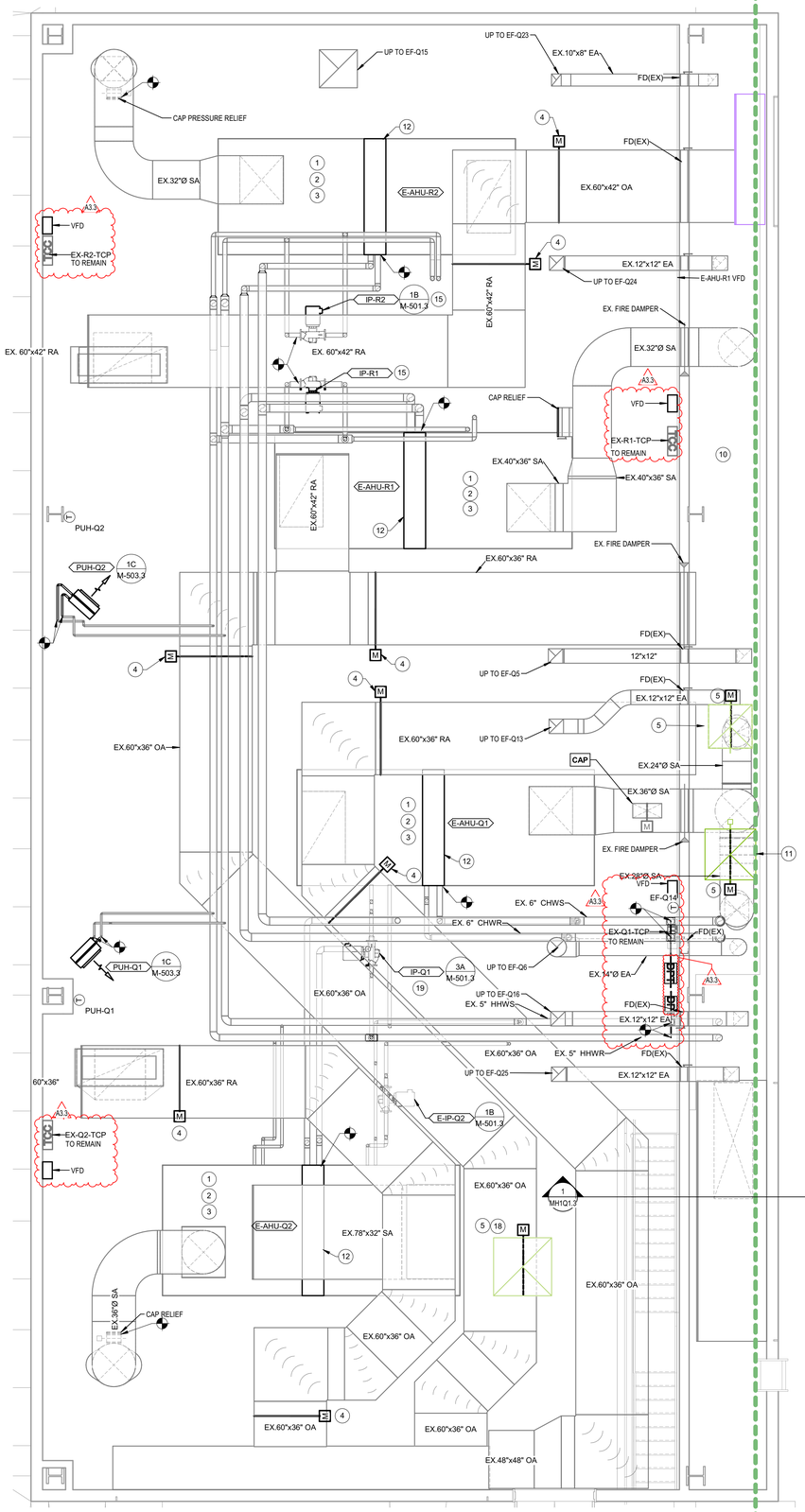
M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

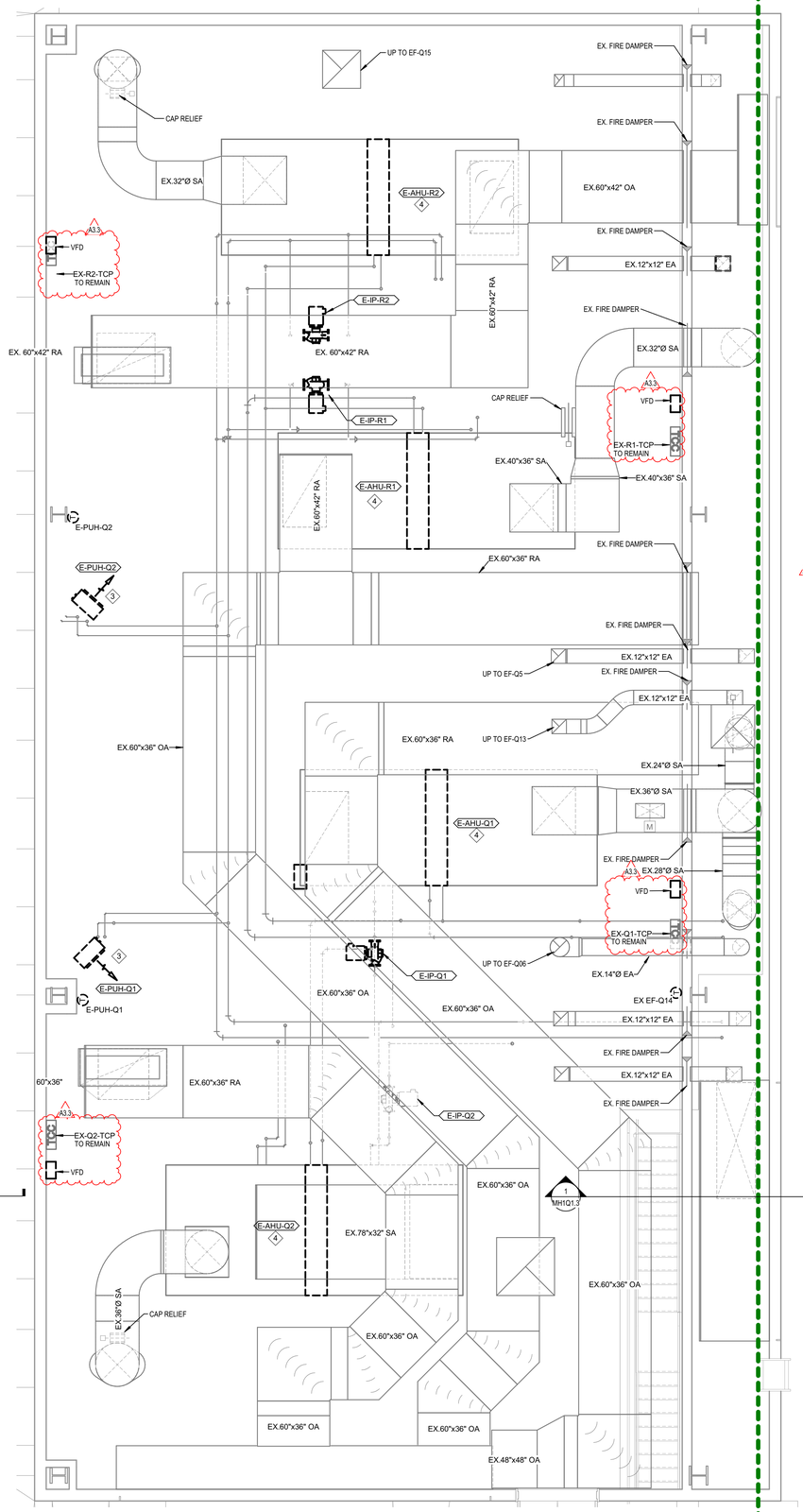
ENLARGED MECHANICAL ROOM PLAN - UNIT N/P

M-410.3

M-410_ENLARGED MECHANICAL ROOM PLAN - UNIT N/P
2019-067.NCH_A.E.S.-IT-PH3-Washington Township-North Central High School Renovation_
A:\2019\2019-067.NCH_North Central High School\2019-067.NCH_North Central High School.rvt 3/6/2023 7:53:23 PM



4A **UNIT Q/R MECHANICAL PENTHOUSE**
1/4" = 1'-0"



2A **UNIT Q/R MECHANICAL PENTHOUSE - DEMOLITION**
1/4" = 1'-0"

DEMOLITION ENLARGED PLAN

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.

ENLARGED COMBINED PLAN NOTES (PH3)

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL COILS AND EXISTING TO REMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
2	PROVIDE NEW FAN MOTOR ISOLATOR SPRINGS, FLEXIBLE CONNECTIONS AND FAN BEARINGS. REPLACE FAN MOTOR AS REQUIRED PER EXISTING AIR HANDLING UNIT SCHEDULE.
3	REPLACE ALL BALANCING VALVES, ISOLATION VALVES, FLOW CONTROL VALVES, THERMOMETERS, PRESSURE GAUGES AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.
4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
5	REMOVE EXISTING DAMPER ACTUATOR AND PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT ROOF OUTDOOR AIR OR RELIEF AIR DAMPER. CLEAN AND LUBRICATE DAMPER.
6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
14	REMOVE LATH/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	TWO-WAY PUMPED PREHEAT COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 8E ON DRAWING M-502.3.

GENERAL NOTES HVAC PLAN

A3.3

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS OTHERWISE NOTED.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLANS.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION. TC PANELS TO REMAIN.

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

KATHLEEN HEASTON SARAH REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Heasteed

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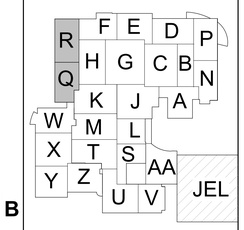
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT Q/R

M-411.3

M-411.3_ENLARGED MECHANICAL ROOM PLAN - UNIT Q/R
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
Additions Phase 3 PH3.rvt Plotted: North Central High School\2019-067.NCH_Sketch Up Files\2019-067.NCH_Sketch Up Files_2022_Cloud.rvt
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GENERAL NOTES HVAC PLAN

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE ASHOWN ON PLAN.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.

ENLARGED COMBINED PLAN NOTES - PH3

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL HEATING COILS AND EXISTING TOREMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
2	PROVIDE NEW FAN MOTOR ISOLATOR SPRINGS, FLEXIBLE CONNECTIONS, AND FAN BEARINGS. REPLACE FAN MOTOR AS REQUIRED PER EXISTING AIR HANDLING UNIT SCHEDULE.
3	REPLACE ALL HYDRONIC VALVES, THERMOMETERS, PRESSURE GAUGES, AND ACTUATORS. CLEAN AND LUBRICATE ALL DAMPERS OR REPLACE AS NECESSARY. ALL TEMPERATURE SENSORS, PRESSURE SENSORS, AND AIR FLOW MEASURING STATIONS SHALL BE REPLACED. SEE M-700 SERIES DRAWINGS FOR MORE INFORMATION.
4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M-700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
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7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM DUCTWORK
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL AND CONDENSATE PAN. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS, AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL AND CONDENSATE PAN REPLACEMENT.
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16	PROVIDE CONTINUOUS DUCT LINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
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GENERAL DEMOLITION NOTES - PH3

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2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
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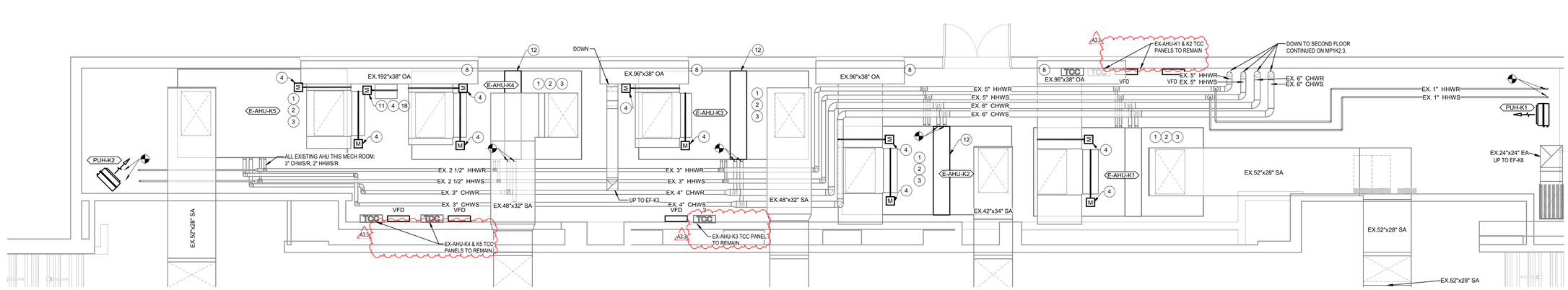
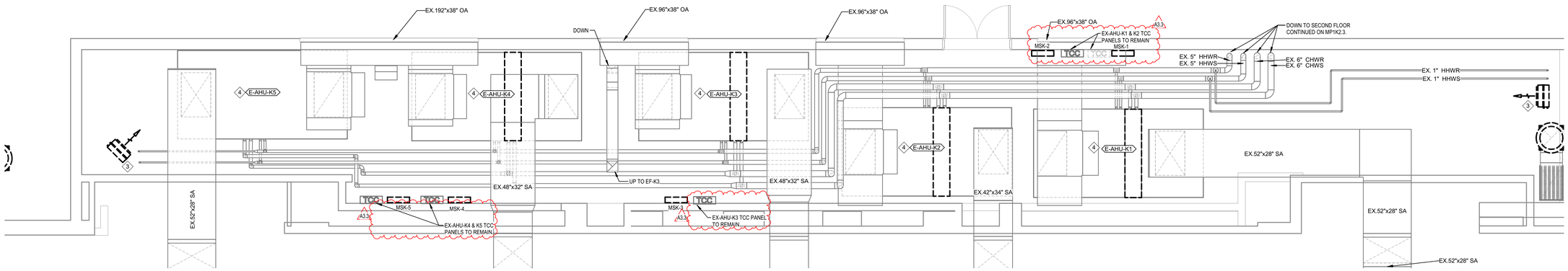
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.



2B UNIT K MECHANICAL ROOM PLAN
1/4" = 1'-0"



2A UNIT K MECHANICAL ROOM PLAN - DEMOLITION
1/4" = 1'-0"

SCHMIDT
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415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED No. AR10400134 STATE OF INDIANA ARCHITECT

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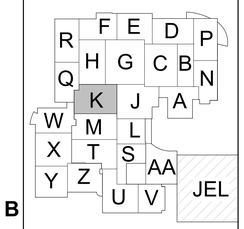
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT K

M-412.3

M-412.3_ENLARGED MECHANICAL ROOM PLAN - UNIT K
2019-067.NCH_M-3.3 of Washington Township_North Central High School Renovation_
K:\2019\2019-067.NCH - North Central High School\03 CAD\01 Sheets\M_M-412.3_ENLARGED MECHANICAL ROOM PLAN - UNIT K.dwg
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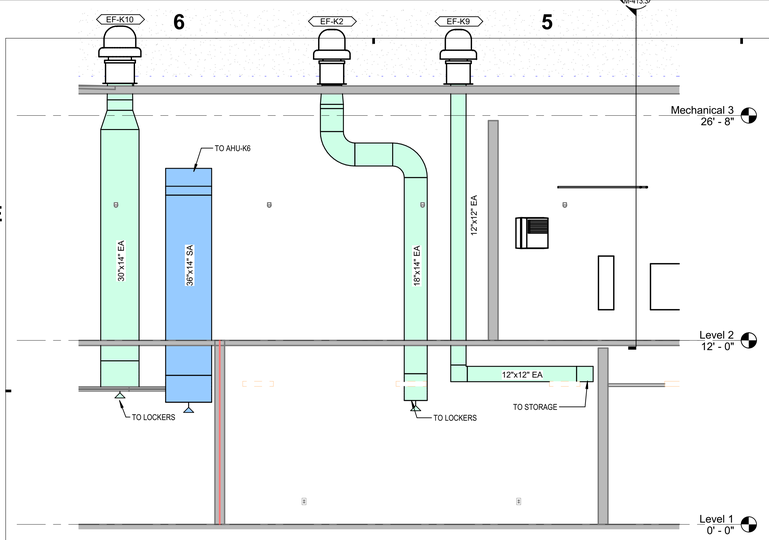
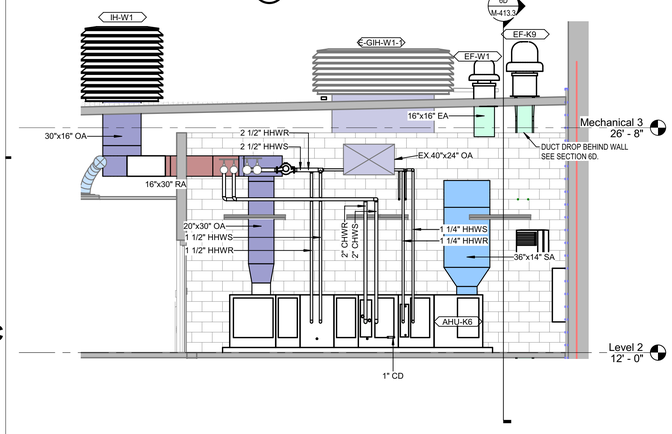
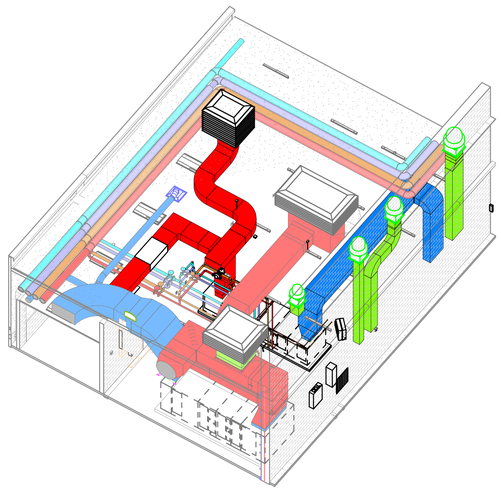


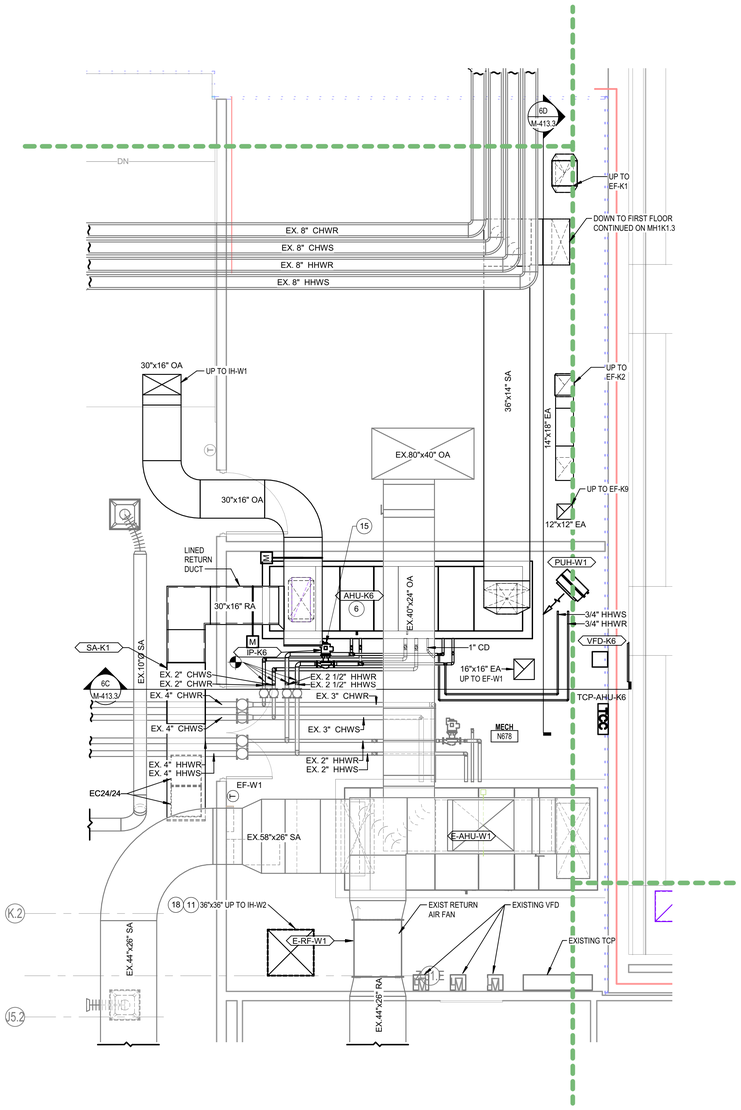
6D DUCTWORK SECTION
1/4" = 1'-0"



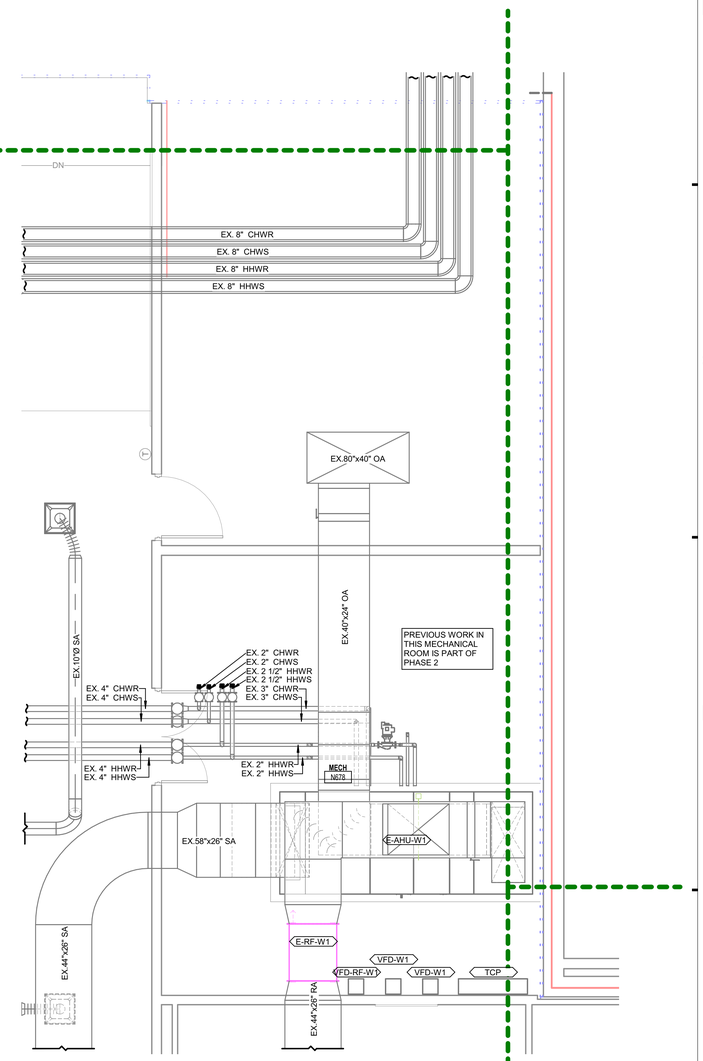
6C AHU-K6 SECTION
1/4" = 1'-0"



6A UNIT K6 MECHANICAL ROOM ISOMETRIC
NOT TO SCALE FOR REFERENCE ONLY



4A UNIT K6 MECHANICAL ROOM PLAN
1/4" = 1'-0"



1A UNIT K6 MECHANICAL ROOM PLAN - DEMOLITION
1/4" = 1'-0"

GENERAL NOTES HVAC PLAN

1. ALL DIFFUSERS AND GRILLES SHALL BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE.
2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
3. ALL EXISTING EXHAUST FANS SHALL BE REMOVED. REPLACE WHERE APPLICABLE ASHOWN ON PLAN.
4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.

ENLARGED COMBINED PLAN NOTES - PH3

#	NOTE
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4	REMOVE EXISTING RETURN AND OUTDOOR AIR DAMPER ACTUATORS AND PROVIDE NEW ELECTRONIC DAMPER ACTUATORS. SEE M-700 SERIES DRAWINGS FOR MORE INFORMATION. CLEAN AND LUBRICATE DAMPERS OR REPLACE AS NECESSARY.
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7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL AND CONDENSATE PAN. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS, AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL AND CONDENSATE PAN REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
14	REMOVE LATH/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	TWO-WAY PUMPED HEATING HOT WATER COIL PER DETAIL 1A/M-501.3.
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18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 6E ON DRAWING M-502.3.

GENERAL DEMOLITION NOTES - PH3

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
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Project No. 2019-067.NCH
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SARAH KATHLEEN HEMPSTEAD
REGISTERED
No. AR10400134
STATE OF INDIANA
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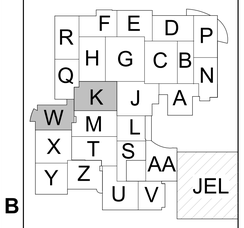

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT K6

M-413.3

M-413.3_ENLARGED MECHANICAL ROOM PLAN - UNIT K6
2019-067.NCH_M-S.D. of Washington Township_North Central High School Renovation_
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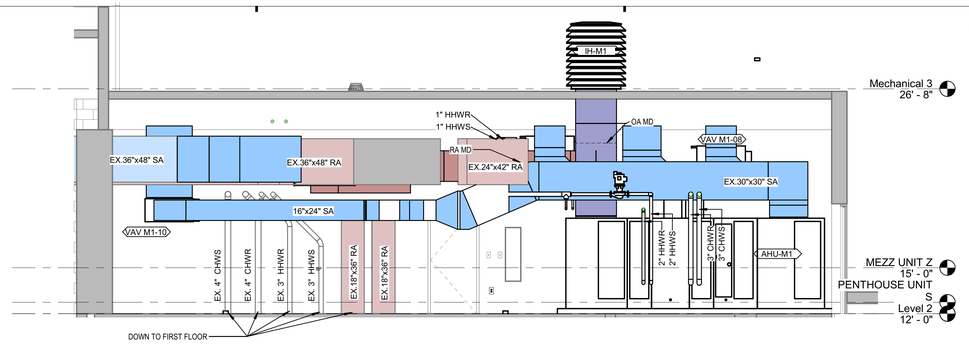
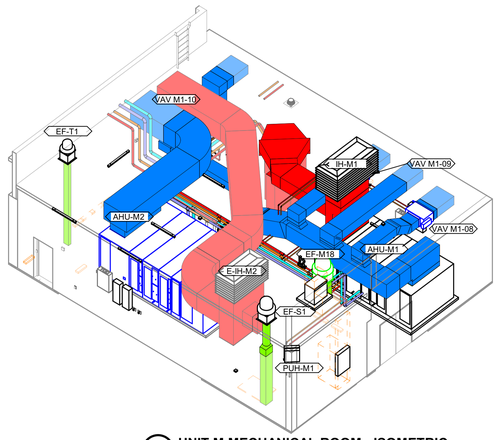
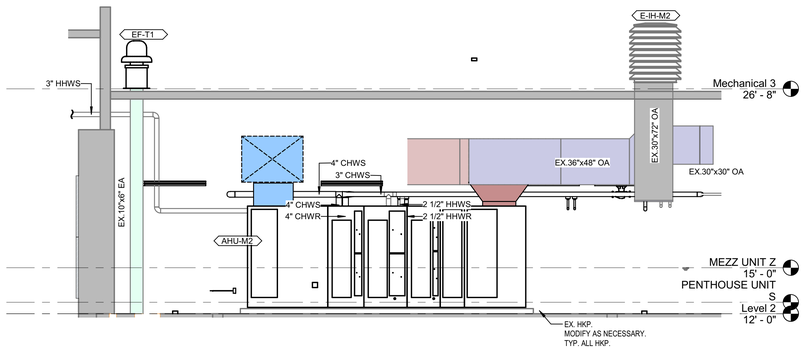


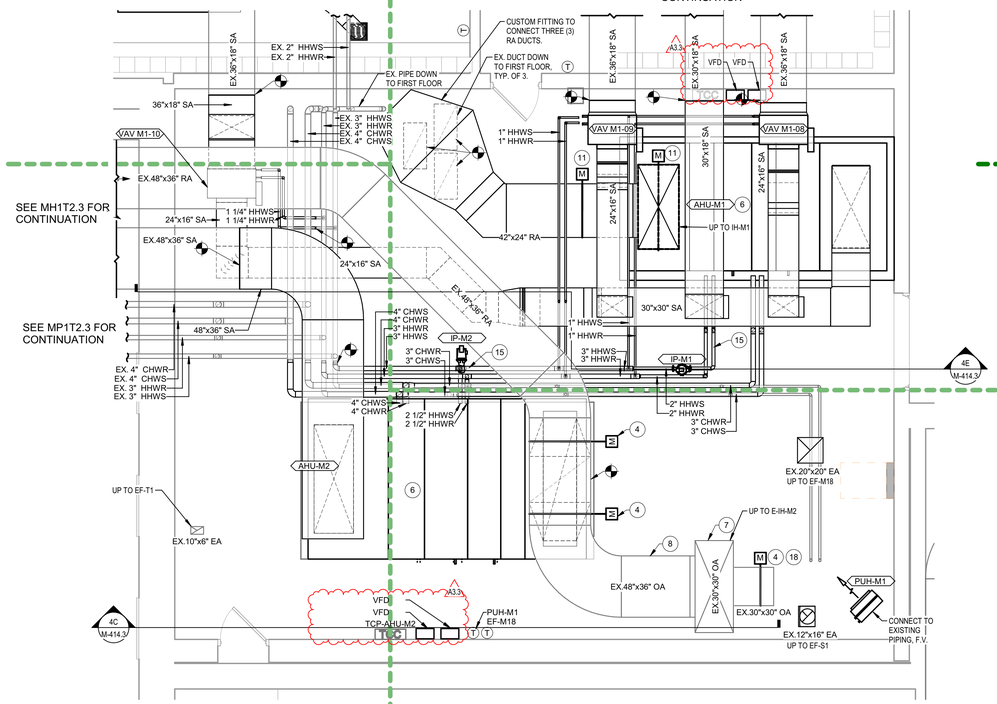
4E LOCKER ROOM AHU SECTION
1/4" = 1'-0"



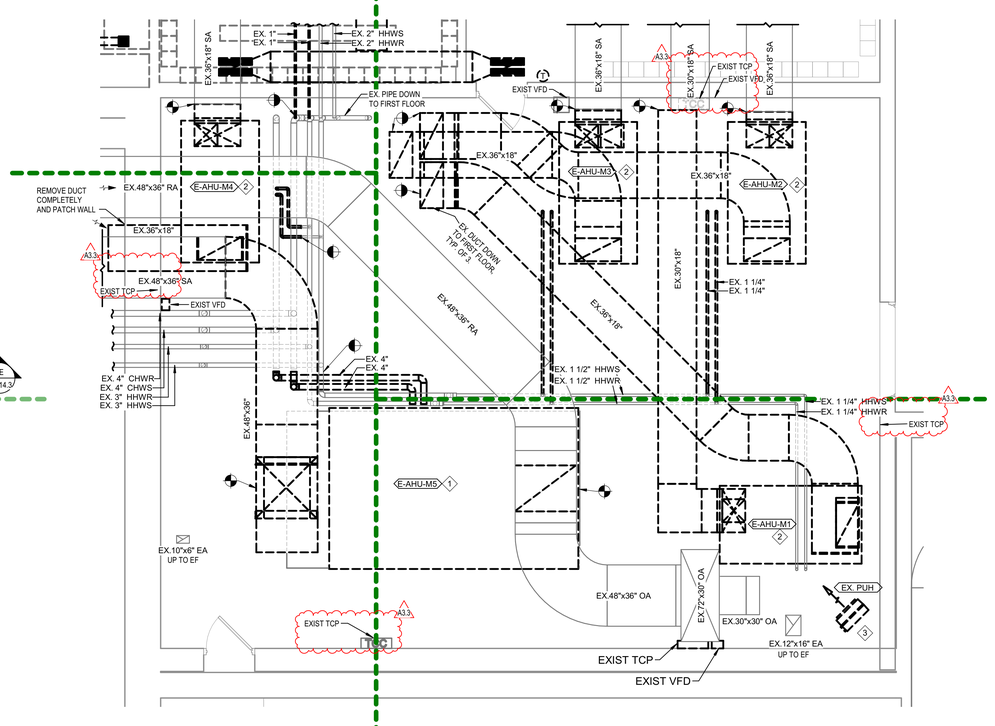
6C UNIT M MECHANICAL ROOM - ISOMETRIC
NOT TO SCALE - FOR REFERENCE ONLY



4C AHU-M2 SECTION
1/4" = 1'-0"



4A UNIT M MECHANICAL ROOM PLAN
1/4" = 1'-0"



2A UNIT M MECHANICAL ROOM PLAN - DEMOLITION
1/4" = 1'-0"

GENERAL NOTES HVAC PLAN

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GENERAL DEMOLITION NOTES - PH3

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5	REMOVE EXISTING DAMPER ACTUATOR AND PROVIDE NEW ELECTRONIC DAMPER ACTUATOR AT ROOF OUTDOOR AIR OR RELIEF AIR DAMPER. CLEAN AND LUBRICATE DAMPER.
6	PROVIDE NEW AIR HANDLING UNIT AS SCHEDULED. REUSE PIPING AND DUCT CONNECTIONS WHERE POSSIBLE.
7	EXISTING OUTDOOR AIR DUCT FROM ROOF DOWN TO AHU OUTDOOR AIR PLENUM SHALL REMAIN.
8	EXISTING OUTDOOR AIR PLENUM/DUCTWORK.
9	NOT USED
10	EXISTING RETURN AIR CHASE.
11	PROVIDE NEW MOTORIZED OUTDOOR AIR DAMPER. SEE PLAN FOR SIZE.
12	REPLACE EXISTING COOLING COIL AND CONDENSATE PAN. SEE EXISTING AIR HANDLING UNIT SCHEDULE FOR MORE INFORMATION. CONTRACTOR SHALL REMOVE AND REINSTALL ALL PIPING, DUCTWORK, PUMPS, AND OTHER OBSTRUCTIONS AS REQUIRED TO FACILITATE COIL AND CONDENSATE PAN REPLACEMENT.
13	EXISTING REHEAT COIL IS NOT CURRENTLY IN USE. REPLACE EXISTING VALVES AND CONTROLS, FLUSH AND CLEAN COIL FOR USE IN NEW DESIGN.
14	REMOVE LATH/PLASTER AND/OR DRYWALL AND PROVIDE CLEAR OPENING BETWEEN ABOVE CEILING PLENUM AND RETURN AIR CHASE.
15	TWO-WAY PUMPED HEATING HOT WATER COIL PER DETAIL 1A/M-501.3.
16	PROVIDE CONTINUOUS DUCTLINER FROM AHU TO TWENTY FEET UPSTREAM.
17	NOT USED
18	DAMPER SHALL BE IN THE OPEN POSITION WHEN THE MECHANICAL ROOM EXHAUST FAN OPERATES, AND IN THE CLOSED POSITION WHEN THE FAN IS OFF.
19	REMOVE 2-WAY VALVE AT HEATING COIL AND REVISE TO 3-WAY PUMPED COIL PER DETAIL 3A ON DRAWING M-501.3. REMOVE 2-WAY VALVE AT COOLING COIL AND REVISE TO 3-WAY COIL PER DETAIL 6E ON DRAWING M-502.3.

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
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SARAH KATHLEEN HEMPSTEAD REGISTERED No. AR10400134 STATE OF INDIANA ARCHITECT

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A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
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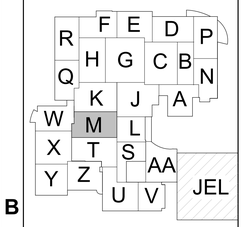

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT M

M-414.3

M-414.3_ENLARGED MECHANICAL ROOM PLAN - UNIT M
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
Additions Phase 3_CONSTRUCTION DOCS - North Central High School\2019-067.NCH_Sarah.Hempstead@SCHMIDT ARCHITECTS.ARCH_2022_Cloud.rvt
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GENERAL NOTES HVAC PLAN

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2. ALL TERMINAL BOXES SHALL BE REMOVED. REPLACE WHERE APPLICABLE AS SHOWN ON PLAN.
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4. ALL CONTROL DEVICES SHALL BE REMOVED AND REPLACED. SEE M700 SERIES DRAWINGS FOR MORE INFORMATION.

ENLARGED COMBINED PLAN NOTES - PH3

#	NOTE
1	CONTRACTOR SHALL CLEAN AND WIPE DOWN INTERIOR AND EXTERIOR OF AIR HANDLING UNIT USING CALCLEAN OR EQUAL COIL CLEANING PRODUCT. CLEAN ALL HEATING COILS AND EXISTING TOREMAIN COOLING COILS. CLEAN CONDENSATE PAN AND TRAPS.
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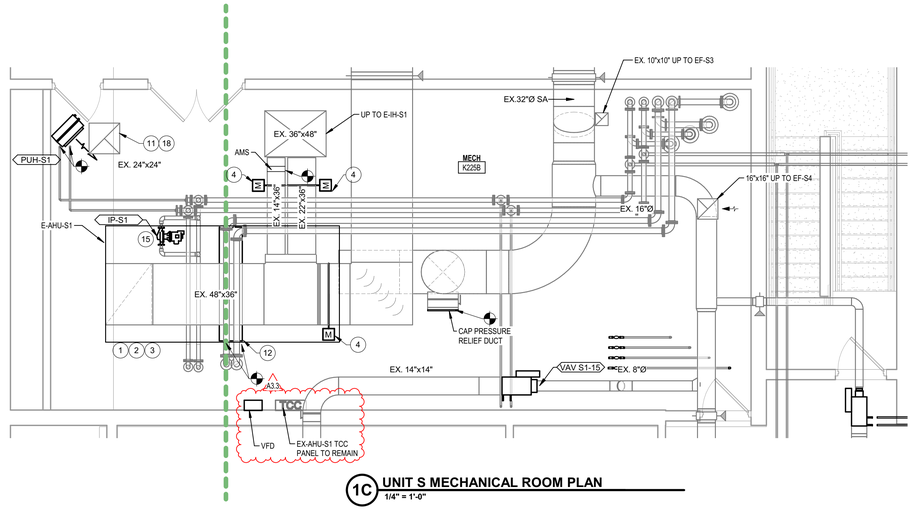
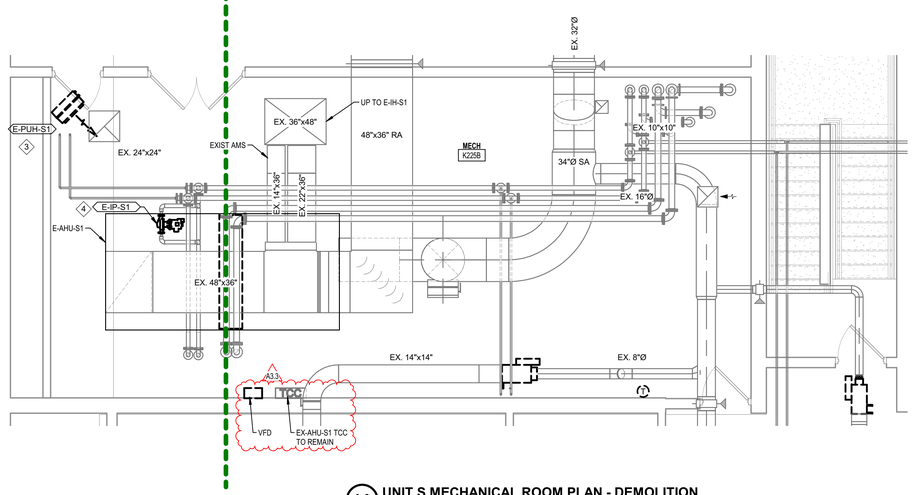
GENERAL DEMOLITION NOTES - PH3

#	NOTE
1	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. DISCONNECT DUCT CONNECTIONS AS NECESSARY TO ACCOMMODATE AHU REPLACEMENT. REFER TO NEW WORK PLANS.
2	REMOVE EXISTING AIR HANDLING UNIT COMPLETELY. REMOVE DUCTWORK TO POINT(S) INDICATED WITHIN MECHANICAL ROOM.
3	REMOVE EXISTING PROP HEATER IN PREPARATION FOR REPLACEMENT.
4	REFER TO EXISTING AHU SCHEDULE FOR SCOPE OF WORK ASSOCIATED WITH EXISTING-TO-REMAIN AHU.



1C **UNIT S MECHANICAL ROOM PLAN**
1/4" = 1'-0"



1A **UNIT S MECHANICAL ROOM PLAN - DEMOLITION**
1/4" = 1'-0"

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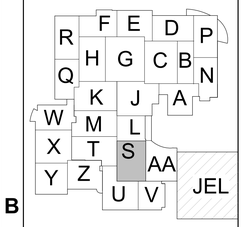

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT S

M-415.3

M-415_ENLARGED MECHANICAL ROOM PLAN - UNIT S
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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GENERAL NOTES HVAC PLAN

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ENLARGED COMBINED PLAN NOTES - PH3

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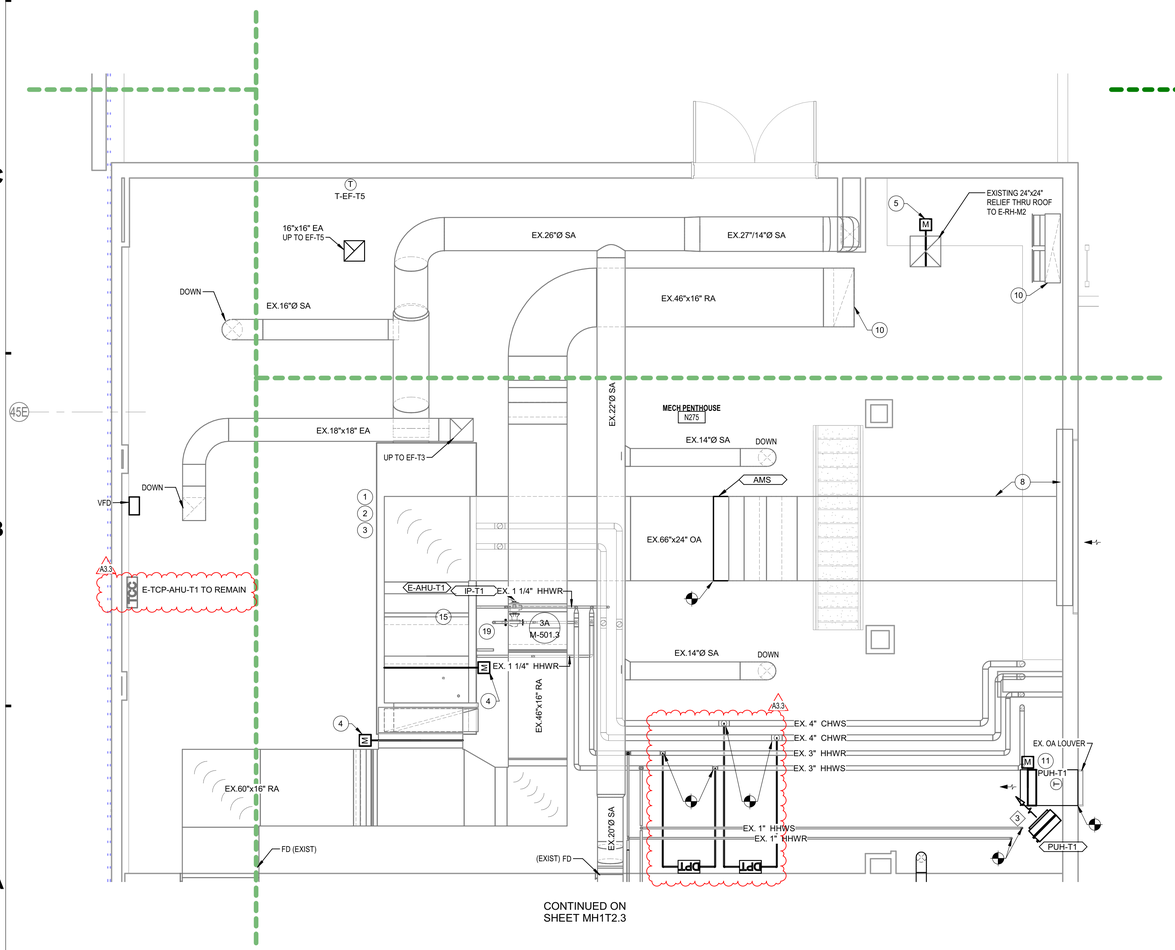
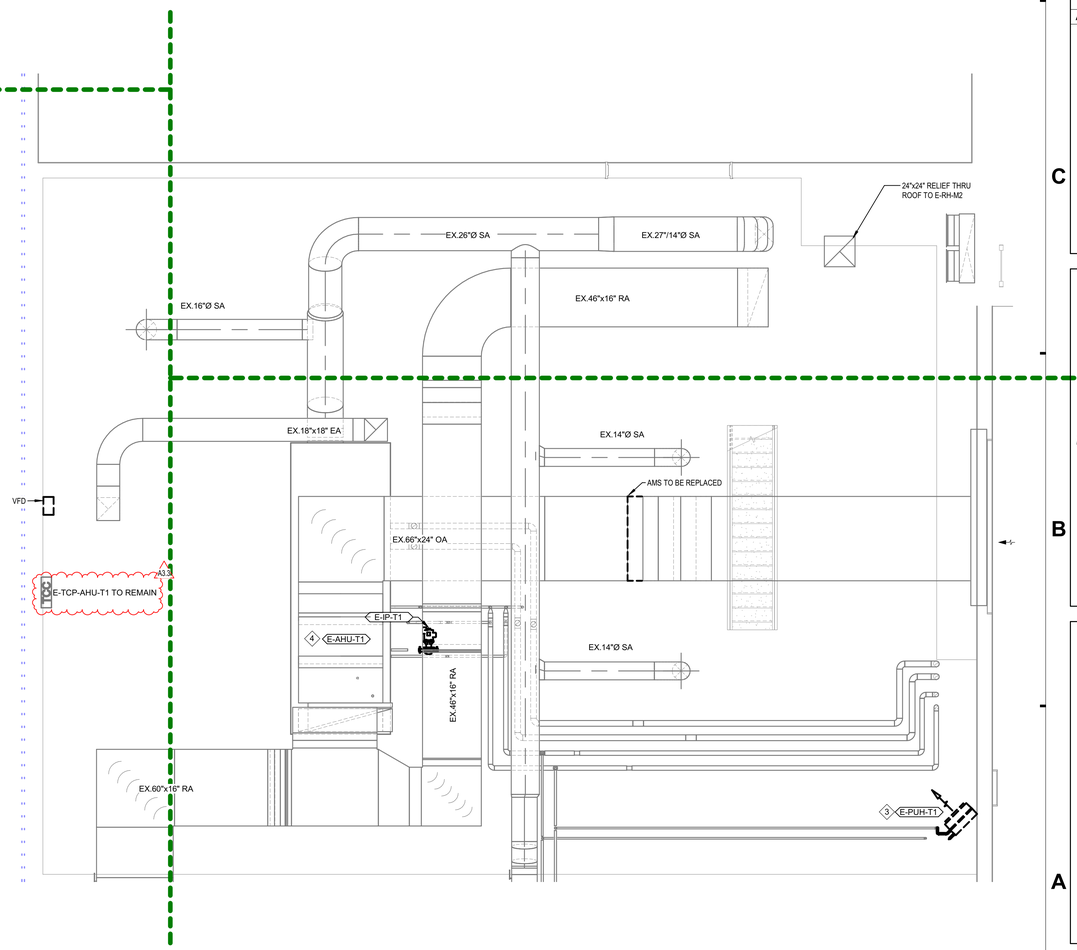


4A **UNIT T MECHANICAL ROOM PLAN**
1/4" = 1'-0"



1A **UNIT T MECHANICAL ROOM PLAN - DEMOLITION**
1/4" = 1'-0"

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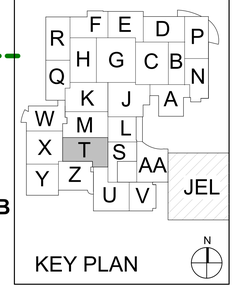

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT T

M-416.3

M-416.3, ENLARGED MECHANICAL ROOM PLAN - UNIT T
2019-067.NCH, M.S.D. of Washington Township, North Central High School Renovation - Additions Phase 3
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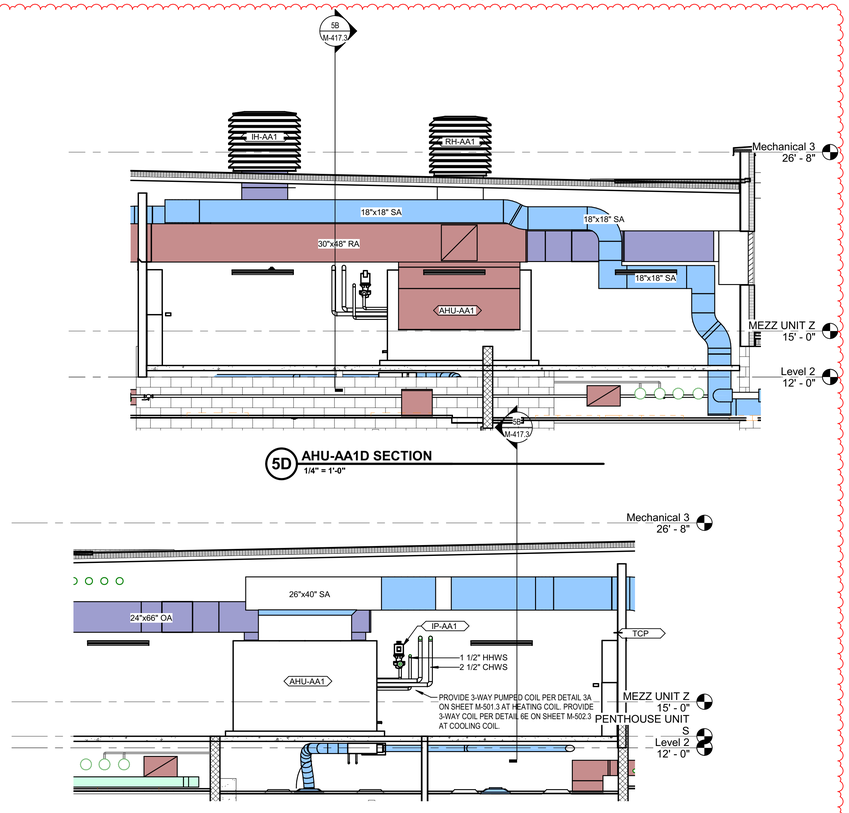
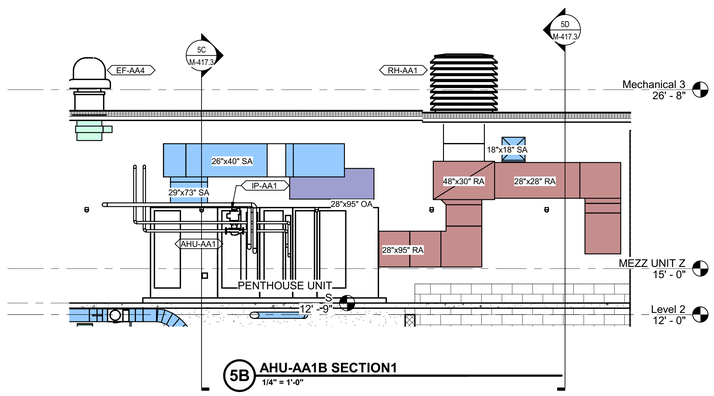
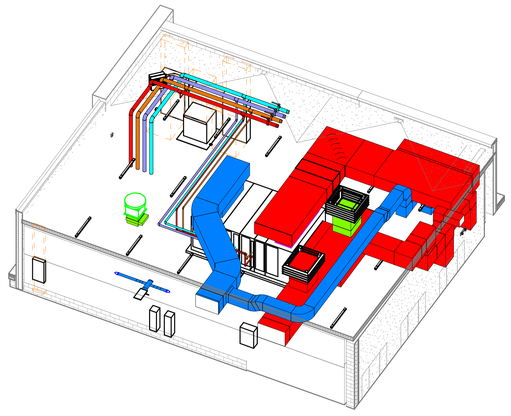


5D **AHU-AA1D SECTION**
1/4" = 1'-0"

5C **AHU-AA1C SECTION**
1/4" = 1'-0"



5B **AHU-AA1B SECTION1**
1/4" = 1'-0"



5A **UNIT AA MECHANICAL ROOM - ISOMETRIC**
NOT TO SCALE - FOR REFERENCE ONLY

GENERAL NOTES HVAC PLAN

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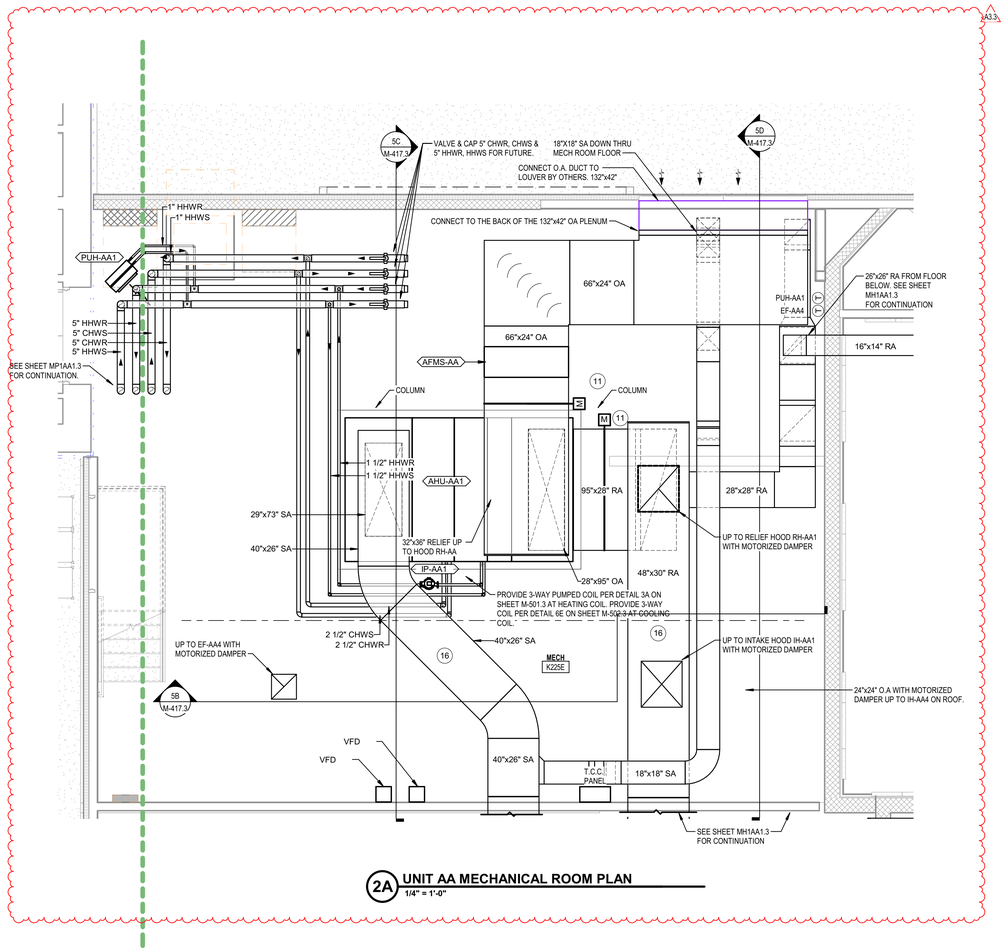

2A **UNIT AA MECHANICAL ROOM PLAN**
1/4" = 1'-0"

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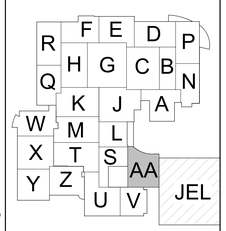

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ENLARGED MECHANICAL ROOM PLAN - UNIT AA

M-417.3

M-417.3 - ENLARGED MECHANICAL ROOM PLAN - UNIT AA
2019-067.NCH_M-E-P Washington Township_North Central High School Renovation_
2019-067.NCH_M-E-P_Washington Township_North Central High School2023-03-03_Sarah.Hempstead
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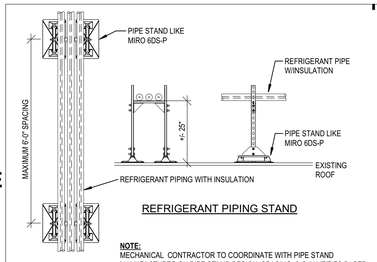
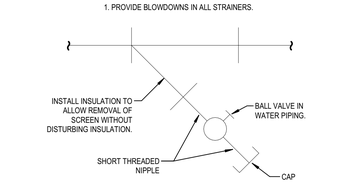


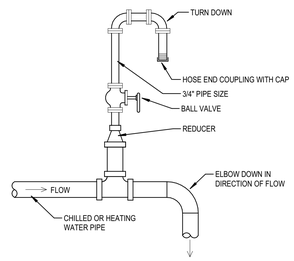
REFRIGERANT PIPING STAND

NOTE:
MECHANICAL CONTRACTOR TO COORDINATE WITH PIPE STAND MANUFACTURER ON PIPE STAND DESIGN, SPACING, & QUANTITIES BASED ON CONTRACT DOCUMENT DESIGN LAYOUT.

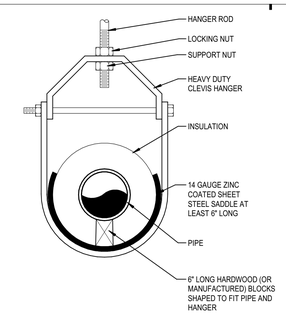
6E BSB & REFRIGERANT PIPE STAND DETAIL
NOT TO SCALE

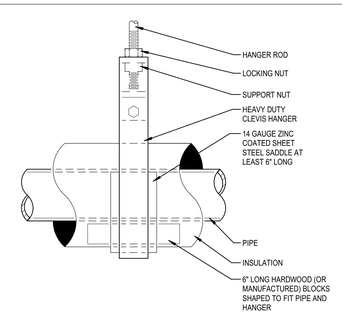


5E STRAINER BLOW DOWN DETAIL
NOT TO SCALE

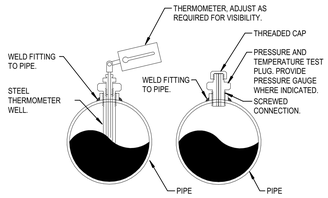


4E MANUAL AIR VENT DETAIL
NOT TO SCALE

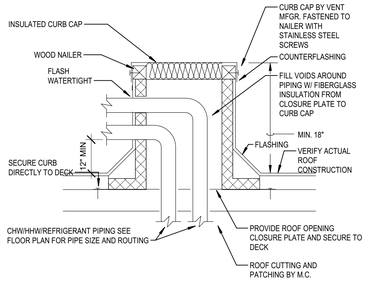




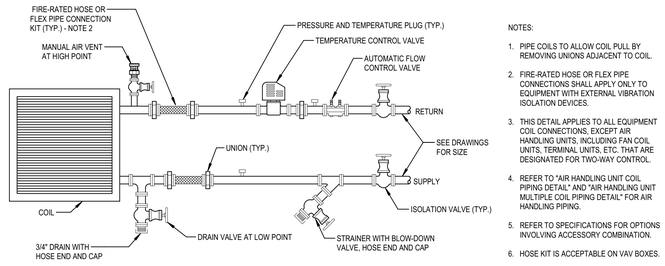
1E PIPE HANGER (6" AND SMALLER) DETAIL
NOT TO SCALE



6D THERMOMETER/PRESSURE AND THERMOMETER WELL DETAIL
NOT TO SCALE



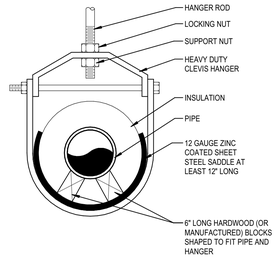
5D ROOFTOP PIPING INSTALLATION
NOT TO SCALE

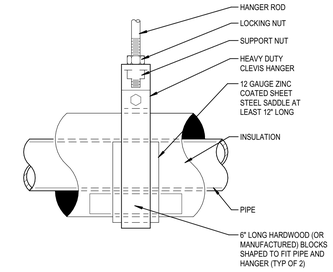


NOTES:

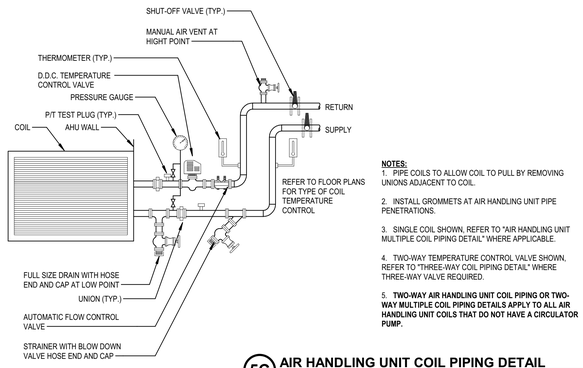
1. PIPE COILS TO ALLOW COIL PULL BY REMOVING UNIONS ADJACENT TO COIL.
2. FIRE-RATED HOSE OR FLEX PIPE CONNECTIONS SHALL APPLY ONLY TO EQUIPMENT WITH EXTERNAL VIBRATION ISOLATION DEVICES.
3. THIS DETAIL APPLIES TO ALL EQUIPMENT COIL CONNECTIONS, EXCEPT AIR HANDLING UNITS, INCLUDING FAN COIL UNITS, TERMINAL UNITS, ETC. THAT ARE DESIGNATED FOR TWO-WAY CONTROL.
4. REFER TO "AIR HANDLING UNIT COIL PIPING DETAIL" AND "AIR HANDLING UNIT MULTIPLE COIL PIPING DETAIL" FOR AIR HANDLING PIPING.
5. REFER TO SPECIFICATIONS FOR OPTIONS INVOLVING ACCESSORY COMBINATION.
6. HOSE KIT IS ACCEPTABLE ON VAV BOXES.

3D TWO WAY COIL PIPING DETAIL
NOT TO SCALE





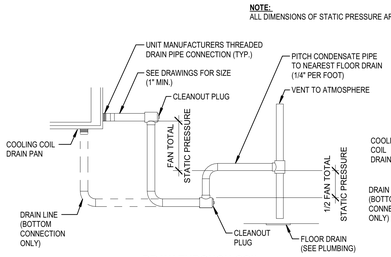
1D PIPE HANGER (8" AND LARGER) DETAIL
NOT TO SCALE



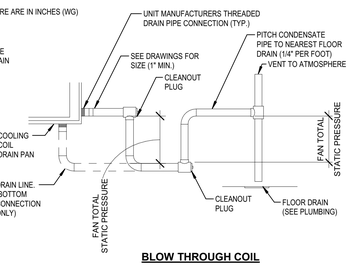
NOTES:
1. PIPE COILS TO ALLOW COIL TO PULL BY REMOVING UNIONS ADJACENT TO COIL.
2. INSTALL GROMMETS AT AIR HANDLING UNIT PIPE PENETRATIONS.
3. SINGLE COIL SHOWN, REFER TO "AIR HANDLING UNIT MULTIPLE COIL PIPING DETAIL" WHERE APPLICABLE.
4. TWO-WAY TEMPERATURE CONTROL VALVE SHOWN, REFER TO "THREE-WAY COIL PIPING DETAIL" WHERE THREE-WAY VALVE REQUIRED.
5. **TWO-WAY AIR HANDLING UNIT COIL PIPING OR TWO-WAY MULTIPLE COIL PIPING DETAILS APPLY TO ALL AIR HANDLING UNIT COILS THAT DO NOT HAVE A CIRCULATOR PUMP.**

5C AIR HANDLING UNIT COIL PIPING DETAIL
NOT TO SCALE

NOTE:
ALL DIMENSIONS OF STATIC PRESSURE ARE IN INCHES (WG)

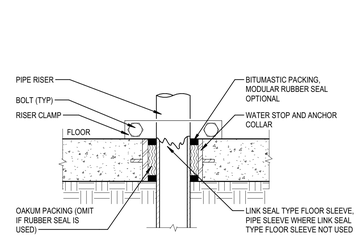


DRAW THROUGH COIL

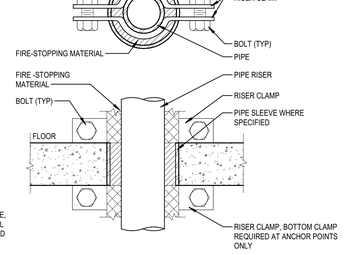


BLOW THROUGH COIL

3C CONDENSATE DRAIN PIPING DETAIL
NOT TO SCALE

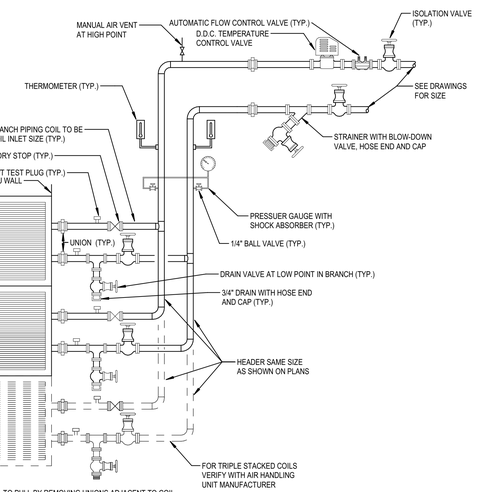


PENETRATION FROM BELOW GRADE



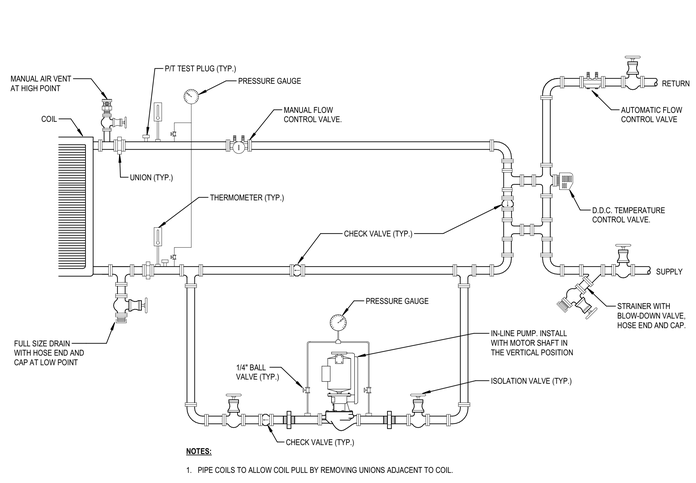
PENETRATION THROUGH FLOOR SLAB

1C PIPE FLOOR PENETRATION DETAIL
NOT TO SCALE



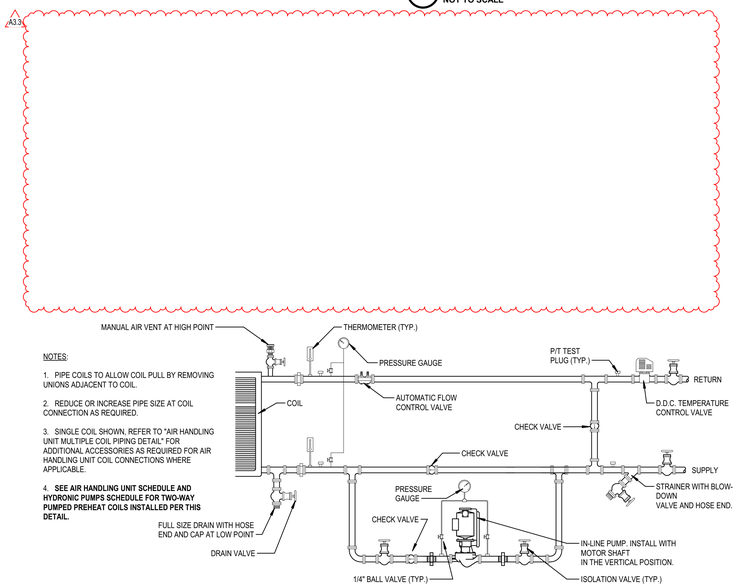
NOTES:
1. PIPE COILS TO ALLOW COIL TO PULL BY REMOVING UNIONS ADJACENT TO COIL.
2. INSTALL GROMMETS AT AIR HANDLING UNIT PIPE PENETRATIONS.
3. TWO-WAY TEMPERATURE CONTROL VALVE SHOWN, REFER TO "THREE-WAY COIL PIPING DETAIL" WHERE THREE-WAY VALVE REQUIRED.
4. **TWO-WAY AIR HANDLING UNIT COIL PIPING OR TWO-WAY MULTIPLE COIL PIPING DETAILS APPLY TO ALL AIR HANDLING UNIT COILS THAT DO NOT HAVE A CIRCULATOR PUMP.**

5A AIR HANDLING UNIT MULTIPLE COIL PIPING DETAIL
NOT TO SCALE



NOTES:
1. PIPE COILS TO ALLOW COIL PULL BY REMOVING UNIONS ADJACENT TO COIL.
2. SINGLE COIL SHOWN, REFER TO "AIR HANDLING UNIT MULTIPLE COIL PIPING DETAIL" FOR ADDITIONAL ACCESSORIES REQUIRED FOR AIR HANDLING UNIT COIL CONNECTIONS WHERE APPLICABLE.
3. **THIS DETAIL APPLIES TO AHU-Q1 AND AHU-N1 PREHEAT COILS**

3A THREE-WAY PUMPED AIR HANDLING UNIT COIL PIPING DETAIL
NOT TO SCALE



NOTES:
1. PIPE COILS TO ALLOW COIL PULL BY REMOVING UNIONS ADJACENT TO COIL.
2. REDUCE OR INCREASE PIPE SIZE AT COIL CONNECTION AS REQUIRED.
3. SINGLE COIL SHOWN, REFER TO "AIR HANDLING UNIT MULTIPLE COIL PIPING DETAIL" FOR ADDITIONAL ACCESSORIES AS REQUIRED FOR AIR HANDLING UNIT COIL CONNECTIONS WHERE APPLICABLE.
4. **SEE AIR HANDLING UNIT SCHEDULE AND HYDRONIC PUMPS SCHEDULE FOR TWO-WAY PUMPED PREHEAT COILS INSTALLED PER THIS DETAIL.**

1A TWO-WAY PUMP AIR HANDLING UNIT COIL PIPING DETAIL
NOT TO SCALE

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www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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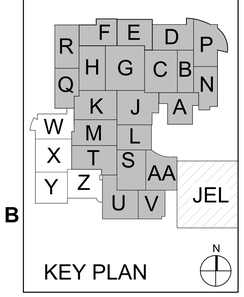
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

MECHANICAL DETAILS

M-501.3

M:\R.V.T._MECHANICAL DETAILS
2019-067 NCH_M 5.3 - of Washington Township, North Central High School Renovation_
2019-067 NCH_M 5.3 - North Central High School.rvt 4/27/2021 - North Central High School.rvt by BNW, Bidgett, M_ACAD_Cloudmd
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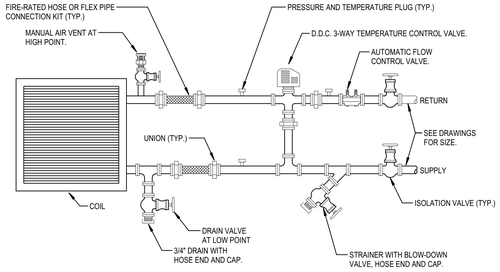

NOTES:

1. PIPE COILS TO ALLOW COIL PULL BY REMOVING UNIONS ADJACENT TO COIL.
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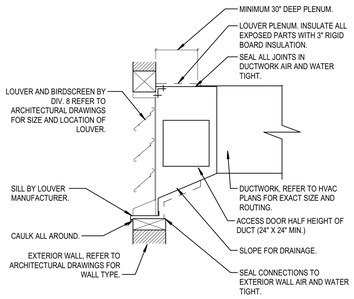
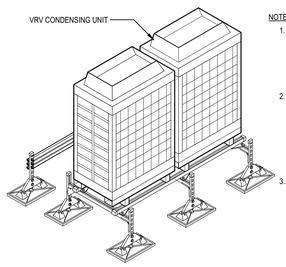
3. THIS DETAIL APPLIES TO ALL EQUIPMENT COIL CONNECTIONS, EXCEPT AIR HANDLING UNITS, INCLUDING FAN COIL UNITS, TERMINAL UNITS, ETC. THAT ARE DESIGNATED FOR THREE-WAY CONTROL.
4. REFER TO SPECIFICATIONS FOR OPTIONS INVOLVING ACCESSORY COMBINATIONS.
5. INSTALL GROMMETS AT AIR HANDLING UNIT PIPE PENETRATIONS.

6E THREE-WAY COIL PIPING DETAIL
NOT TO SCALE



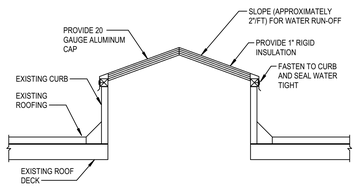
6D LOUVER CONNECTION DETAIL
NOT TO SCALE



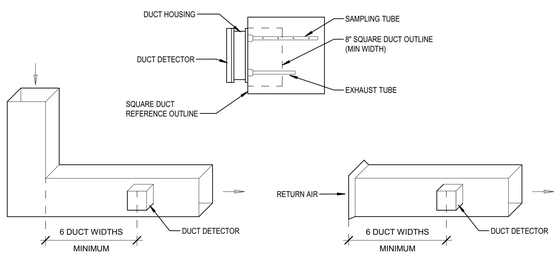
NOTES:

1. FRAMES TO BE 3/8" THICK SHEET STEEL CONSTRUCTION. CONTRACTOR TO PREP AND PAINT FRAME AS REQUIRED TO PREVENT RUST. FRAME TO BE PAINTED BLACK.
2. EQUIPMENT SUPPORT SYSTEM TO BE LIKE "MIRO HD." MANUFACTURER TO ENGINEER SYSTEM TO HANDLE EQUIPMENT WEIGHT AS REQUIRED. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
3. ALL EXPOSED REFRIGERANT LINES SHALL BE INSULATED WITH ARMACELL ACIACCOFLEX TUBE INSULATION WITH ALL JOINTS COVERED WITH 2" WIDE LAP SEAL TAPE, AND COVERED WITH PROTECTIVE ALUMINUM JACKET FOR UV PROTECTION OR OPTIONAL K-FLEX CLAD AL JACKETING WITH PROTECTIVE FITTING COVERS.

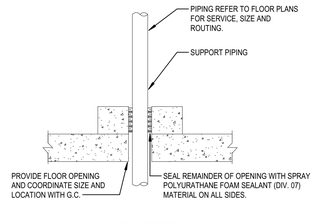
5C VRV CONDENSING UNIT FRAME SUPPORT
NOT TO SCALE



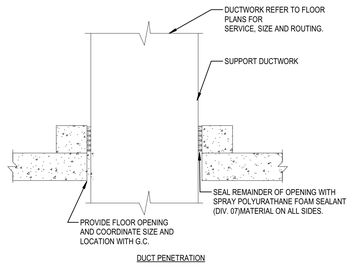
5B ROOF CURB CAP DETAIL
NOT TO SCALE



5A DUCT SMOKE DETECTOR DETAIL
NOT TO SCALE

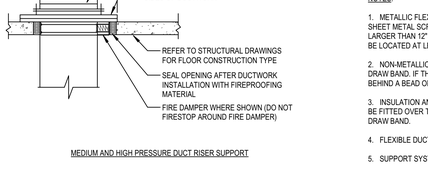


PIPING PENETRATION

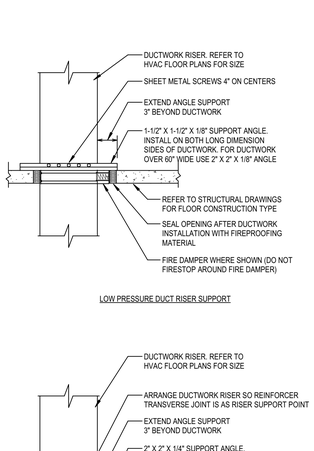


DUCT PENETRATION

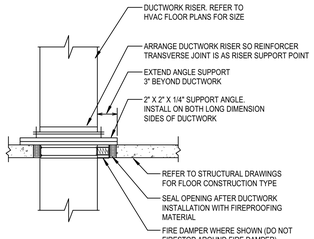
4D CONCRETE CURB DETAIL
NOT TO SCALE



4C FIRE DAMPER (WALL) DETAIL
NOT TO SCALE

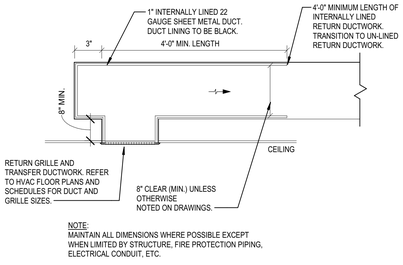


LOW PRESSURE DUCT RISER SUPPORT



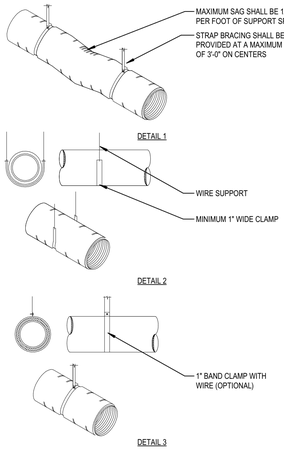
MEDIUM AND HIGH PRESSURE DUCT RISER SUPPORT

4A DUCTWORK RISER SUPPORT DETAIL
NOT TO SCALE



NOTE:
MAINTAIN ALL DIMENSIONS WHERE POSSIBLE EXCEPT WHEN LIMITED BY STRUCTURE, FIRE PROTECTION PIPING, ELECTRICAL CONDUIT, ETC.

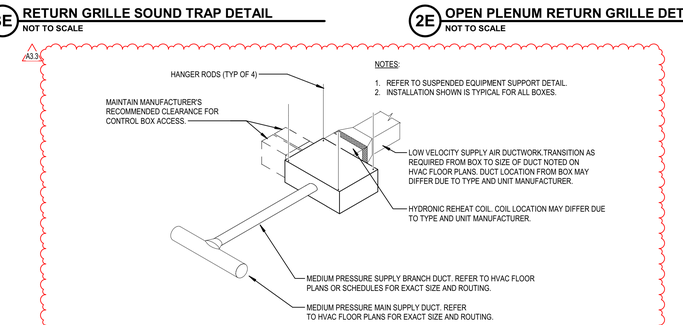
3E RETURN GRILLE SOUND TRAP DETAIL
NOT TO SCALE



NOTES:

1. METALLIC FLEXIBLE DUCTWORK SHALL BE ATTACHED USING A MINIMUM OF THREE (3) #8 SHEET METAL SCREWS EQUALLY SPACED AROUND THE DUCTWORK CIRCUMFERENCE. DUCTWORK LARGER THAN 12" SHALL HAVE A MINIMUM OF FIVE (5) #8 SHEET METAL SCREWS. SCREWS SHALL BE LOCATED AT LEAST 1/2" FROM THE DUCTWORK END.
2. NON-METALLIC FLEXIBLE DUCTWORK SHALL BE SECURED TO THE SLEEVE OR COLLAR USING A DRAW BAND. IF THE DUCTWORK COLLAR EXCEEDS 12" THE DRAW BAND MUST BE POSITIONED BEHIND A BEAD ON THE METAL COLLAR.
3. INSULATION AND VAPOR BARRIERS PRESENT ON FACTORY-FABRICATED DUCTWORK SHALL BE FITTED OVER THE CORE CONNECTION AND SHALL BE SUPPLEMENTALLY SECURED WITH A DRAW BAND.
4. FLEXIBLE DUCTWORK SEALING SHALL BE A CLASS "B" SEAL FOR LOW PRESSURE DUCTWORK.
5. SUPPORT SYSTEM SHALL NOT DAMAGE OR CAUSE OUT-OF-ROUND SHAPE.

3A INSULATED FLEXIBLE DUCTWORK DETAIL
NOT TO SCALE



NOTES:

1. REFER TO SUSPENDED EQUIPMENT SUPPORT DETAIL.
2. INSTALLATION SHOWN IS TYPICAL FOR ALL BOXES.

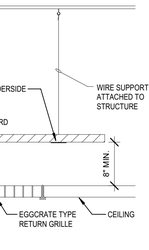
3D VAV TERMINAL BOX INSTALLATION DETAIL
NOT TO SCALE

NOTES:

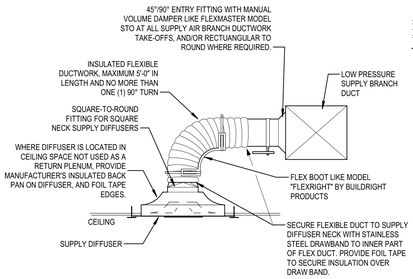
1. FIRE DAMPER INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND ALL UNDERWRITER'S LABORATORY (UL), FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.
2. FIRE DAMPER RATING SHALL MATCH FIRE RATING OF CHASE CONSTRUCTION. REFER TO ARCHITECTURAL DRAWINGS FOR RATING.
3. DIVISION 23 CONTRACTOR SHALL FURNISH AND INSTALL A HINGED ACCESS DOOR IN THE DUCTWORK SIZED IN ACCORDANCE WITH THE SCHEDULE AND LOCATED TO PERMIT REPLACEMENT OF FUSIBLE LINK. LABEL FIRE DAMPER ACCESS DOOR WITH "FIRE DAMPER ACCESS."
4. DIVISION 23 CONTRACTOR SHALL FURNISH ACCESS DOOR/PANEL FOR SOLID CEILING CONSTRUCTION IN ACCORDANCE WITH DIVISION 8 SPECIFICATION SECTION "ACCESS DOORS AND PANELS". ACCESS DOOR/PANEL LOCATED IN SOLID CEILING CONSTRUCTION SHALL BE NO SMALLER IN SIZE THAN THE ACCESS DOOR LOCATED IN THE DUCTWORK.

ACCESS DOOR / PANEL SCHEDULE	
DUCTWORK WIDTH	ACCESS DOOR
6"	6" x 6"
8" - 12"	8" x 8"
13" - 18"	12" x 12"
19" - 36"	18" x 18"
37" - UP	24" x 24"

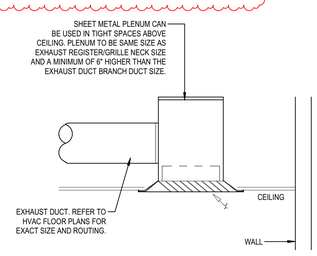
3C FIRE DAMPER (WALL) DETAIL
NOT TO SCALE



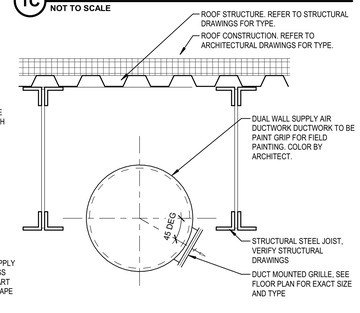
2E OPEN PLENUM RETURN GRILLE DETAIL
NOT TO SCALE



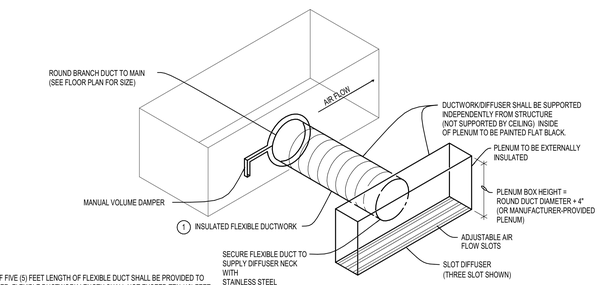
2C EXHAUST REGISTER/GRILLE INSTALLATION DETAIL
NOT TO SCALE



2B SUPPLY DIFFUSER FLEXIBLE DUCT CONNECTION DETAIL
NOT TO SCALE

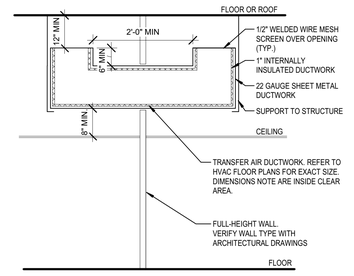


2A MULTI-PURPOSE SUPPLY GRILLE AND DUCTWORK DETAIL
NOT TO SCALE



1 A MINIMUM OF FIVE (5) FEET LENGTH OF FLEXIBLE DUCT SHALL BE PROVIDED TO EACH DIFFUSER. FLEXIBLE DUCTWORK LENGTH SHALL NOT EXCEED TEN (10) FEET EXCEPT WHERE SPECIFICALLY NOTED. FLEX DUCT SHALL NOT CONTACT CEILING AND SHALL BE PROPERLY SUPPORTED SO AS TO HAVE NO KINKS.

1A SLOT DIFFUSER DETAIL
NOT TO SCALE



1E RETURN AIR TRANSFER DUCT DETAIL
NOT TO SCALE

1D RETURN AIR TRANSFER DUCT DETAIL
NOT TO SCALE

1B MULTI-PURPOSE SUPPLY GRILLE AND DUCTWORK DETAIL
NOT TO SCALE

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

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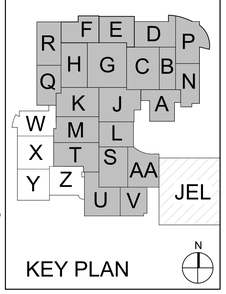
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

MECHANICAL DETAILS

M-502.3

M-502.3_MECHANICAL DETAILS
2019-067.NCH_3-8-23 of Washington Township North Central High School Renovation_
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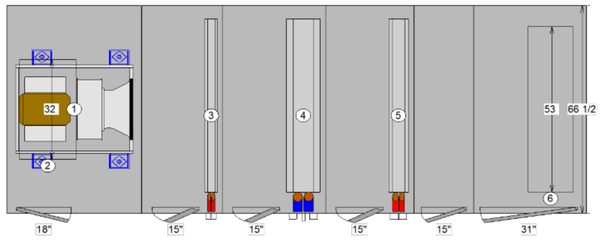
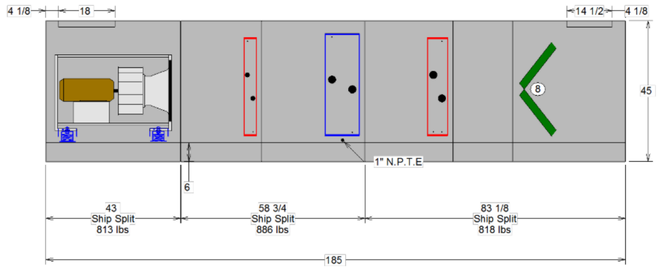
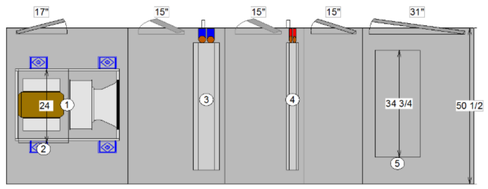


1 Plenum fan - 22.25in. dd plenum, 80% width, H press Supply fan 7.5 hp 460/3
2 Opening top 32 x 18
3 Heating coil - 1 Rows Coil type 5/8" Shipping Coil, General (5W)
4 Cooling coil - 8 Rows Coil type 1/2" Unit Optimized, High Water Flow(UU)
5 Heating coil - 2 Rows Coil type 5/8" Shipping Coil, General (5W)
6 Opening top 53 x 14.5
7 1" N.P.T.E.
8 Angled filters -

Doors
18 width x 35 height
15 width x 35 height
31 width x 35 height

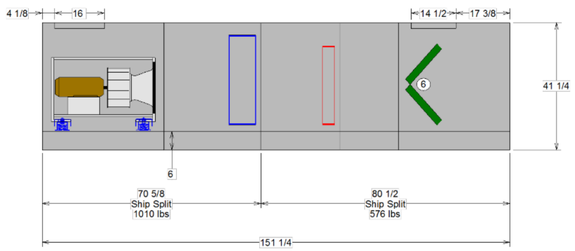


4C AHU-A2 DETAIL
NOT TO SCALE



1 Plenum fan - 18.25in. dd plenum, 80% width, M press Supply fan 5 hp 460/3 None
2 Opening top 24 x 16
3 Cooling coil - 6 Coil type UW
4 Heating coil - 1 Coil type TT
5 Opening top 34.75 x 14.5
6 Angled filters -

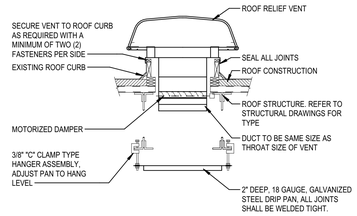
Doors
17 width x 31 height
15 width x 31 height
31 width x 31 height



For maneuvering purposes, include 1.125 inches to each ship split length for overlapping panel flange. Flange will not add to overall installed unit length shown

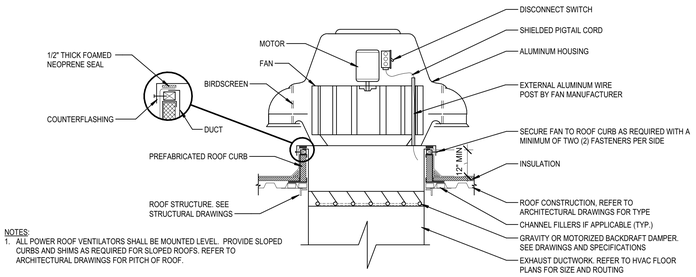
4A AHU-C1 DETAIL
NOT TO SCALE

A3.3



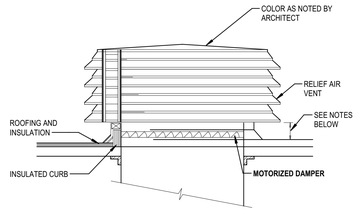
NOTE:
ALL INTAKE / RELIEF VENTS SHALL BE MOUNTED LEVEL. PROVIDE SLOPED CURBS AND SHIMS AS REQUIRED FOR SLOPED ROOFS. REFER TO ARCHITECTURAL DRAWINGS FOR PITCH OF ROOF.

1E RELIEF VENT INSTALLATION DETAIL
NOT TO SCALE



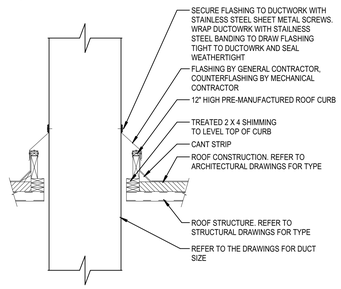
NOTES:
1. ALL POWER ROOF VENTILATORS SHALL BE MOUNTED LEVEL. PROVIDE SLOPED CURBS AND SHIMS AS REQUIRED FOR SLOPED ROOFS. REFER TO ARCHITECTURAL DRAWINGS FOR PITCH OF ROOF.

1D POWER ROOF VENTILATOR INSTALLATION DETAIL
NOT TO SCALE

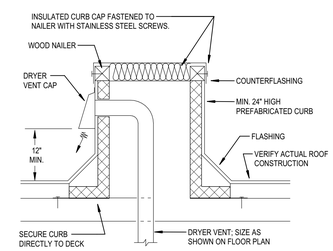


NOTES:
1. MINIMUM FOR AIR INTAKE IS 3' - 0"
2. MINIMUM FOR AIR RELIEF IS 1' - 6"

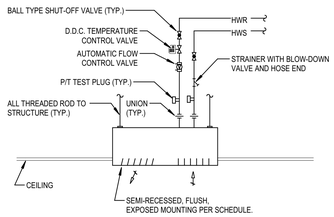
3C OUTDOOR AIR PENTHOUSE DETAIL
NOT TO SCALE



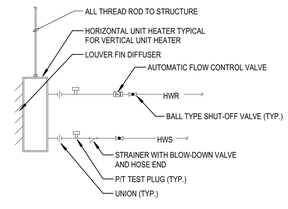
3B DUCTWORK ROOF PENETRATION DETAIL
NOT TO SCALE



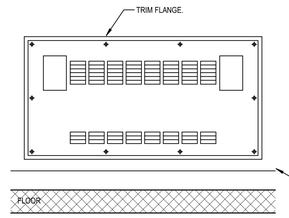
3A DRYER VENT DETAIL
NOT TO SCALE



2C HYDRONIC CABINET UNIT HEATER PIPING DETAIL
NOT TO SCALE

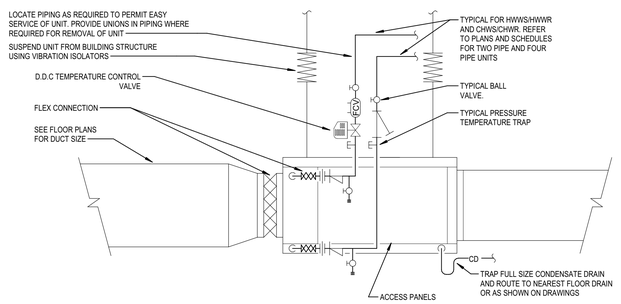


1C HYDRONIC PROPELLER UNIT HEATER PIPING DETAIL
NOT TO SCALE



NOTES:
1. ADJUST INSTALLED HEIGHT OF THE CABINET UNIT HEATER TO BE 3" ABOVE WALL BASE.
2. PANEL TO BE ATTACHED TO TRIM FLANGE, NOT DIRECTLY TO WALL.
3. DO NOT OVER TIGHTEN PANEL FINISH SCREWS TO AVOID PUCKERING OF PANEL.
4. REFER TO MANUFACTURERS INSTALLATION MATERIAL.
5. PROVIDE SECURITY SCREWS/LOCKS ON ALL ACCESS DOORS.
6. COLOR AS SELECTED BY ARCHITECT.

1B RECESSED WALL MOUNTED CUH OR FCU INSTALLATION DETAIL
NOT TO SCALE



1A HORIZONTAL FAN COIL UNIT DETAIL
NOT TO SCALE

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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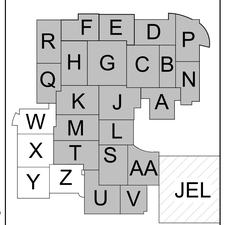
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

MECHANICAL DETAILS

M-503.3

M-503.3_MECHANICAL DETAILS
2019-067.NCH_M.S.D. of Washington Township North Central High School Renovation_
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4-PIPE HYDRONIC FAN COIL UNIT SCHEDULE - 23 82 19

IDENTITY DATA				DIMENSIONS			FAN DATA				COOLING DATA												HEATING DATA									ELECTRICAL DATA					
MARK	MANUFACTURER	MODEL	WEIGHT (LBS)	L	W	H	CFM	ESP (IN-WG)	W	SPEED	TOTAL (BTUH)	SENSIBLE (BTUH)	ROWS	GPM	EWT (°F)	LWT (°F)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	COIL WPD (FT-WG)	FLUID TYPE	TOTAL HEATING (BTUH)	ROWS	GPM	EWT (°F)	LWT (°F)	EDB (°F)	LDB (°F)	COIL WPD (FT-WG)	FLUID TYPE	VOLTS (V)	PH	FREQ (HZ)	FLA (A)	MOCP (A)	NOTES
FCU-A1	TRANE	FCCB030	81	33"	25"	10"	200	0.4	77	HIGH	7,600	5,410	4	1.3	44.0	56.0	80.0	67.0	55.0	54.6	3.1	WATER	4,840	1	0.5	160.0	140.0	68.0	90.0	0.1	WATER	115	1	60	2.8	15.0	[1-7]
FCU-A2	TRANE	FCCB030	81	33"	25"	10"	200	0.4	77	HIGH	7,600	5,410	4	1.3	44.0	56.0	80.0	67.0	55.0	54.6	3.1	WATER	4,840	1	0.5	160.0	140.0	68.0	90.0	0.1	WATER	115	1	60	2.8	15.0	[1-7]
FCU-C1	TRANE	FCCB060	139	47"	25"	10"	450	0.4	156	HIGH	16,740	12,070	4	2.8	44.0	56.0	80.0	67.0	55.0	54.8	2.8	WATER	9,900	1	0.7	160.0	130.0	68.0	88.0	0.7	WATER	115	1	60	3.9	15.0	[1-7]
FCU-C2	TRANE	FCCB060	139	47"	25"	10"	450	0.4	156	HIGH	16,740	12,070	4	2.8	44.0	56.0	80.0	67.0	55.0	54.8	2.8	WATER	9,900	1	0.7	160.0	130.0	68.0	88.0	0.7	WATER	115	1	60	3.9	15.0	[1-7]
FCU-G1	TRANE	FCHB030	78	36"	10"	30"	200	-	48	HIGH	7,600	5,410	4	1.3	44.0	56.0	80.0	67.0	55.0	54.6	3.1	WATER	4,840	1	0.5	160.0	140.0	68.0	90.0	0.1	WATER	115	1	60	2.8	15.0	[1-6,8]

HYDRONIC FAN COIL UNIT SCHEDULE NOTES:

1. DISCONNECT BY MANUFACTURER. FACTORY-INSTALLED TOGGLE DISCONNECT.
2. UNIT SELECTED FOR SCHEDULED SPEED SETTING. SCHEDULED CFM IS NOMINAL CFM. BALANCE FAN COIL UNIT TO AIRFLOW INDICATED ON PLANS.
3. COORDINATE COLOR WITH ARCHITECT.
4. HEATING COIL PROVIDED IN REHEAT POSITION.
5. 4-PIPE HEATING AND COOLING CABINET.
6. SEE M-700 SERIES SHEETS FOR TEMPERATURE CONTROL INFORMATION.
7. PROVIDE HORIZONTAL DUCTED CABINET.
8. PROVIDE VERITCAL, HIDEAWAY FULLY RECESSED CABINET.

HYDRONIC PROP UNIT HEATER SCHEDULE - 23 82 39.16

IDENTITY DATA				HEATING DATA							FAN DATA					ELECTRICAL DATA					
MARK	MANUFACTURER	MODEL	WEIGHT (LBS)	CAPACITY (BTUH)	EWT (°F)	LWT (°F)	WPD (FT-WG)	FLOW (GPM)	EAT (°F)	LAT (°F)	AIRFLOW (CFM)	FAN TYPE	DRIVE	HP	RPM	VOLTS (V)	PH	FREQ (HZ)	FLA (A)	MOCP (A)	NOTES
PUH-A1	TRANE	UHS-060	41	39,397	160	140	0.17	4.4	60	105	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-A2	TRANE	UHS-084	47	61,633	160	140	0.24	6.1	60	100	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	5.0	[1-3]
PUH-E1	TRANE	UHS-024	30	13,800	160	140	0.01	1.8	60	96	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	1.8	[1-3]
PUH-E2	TRANE	UHS-024	30	13,800	160	140	0.01	1.8	60	96	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	1.8	[1-3]
PUH-F1	TRANE	UHS-024	30	13,800	160	140	0.01	1.8	60	96	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	1.8	[1-3]
E-PUH-G1	EXISTING			34,320	160	140	-	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[4]
E-PUH-G2	EXISTING			34,320	160	140	-	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[4]
PUH-K1	TRANE	UHS-060	41	39,397	160	140	0.17	4.4	60	105	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-K2	TRANE	UHS-060	41	39,397	160	140	0.17	4.4	60	105	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
E-PUH-K3	EXISTING			19,300	160	140	-	2.0	60	103	425	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[4]
PUH-M1	TRANE	UHS-048	41	34,320	160	140	0.12	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-N1	TRANE	UHS-072	44	51,480	160	140	0.23	5.3	60	104	1,100	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-N2	TRANE	UHS-072	44	51,480	160	140	0.23	5.3	60	104	1,100	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-Q1	TRANE	UHS-084	47	61,633	160	140	0.24	6.1	60	100	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	5.0	[1-3]
PUH-Q2	TRANE	UHS-084	47	61,633	160	140	0.24	6.1	60	100	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	5.0	[1-3]
PUH-S1	TRANE	UHS-024	30	13,800	160	140	0.01	1.8	60	96	450	PROP	DIRECT	0.1	1,000	115	1	60	1.0	1.8	[1-3]
PUH-T1	TRANE	UHS-048	41	34,320	160	140	0.12	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-W1	TRANE	UHS-048	41	34,320	160	140	0.12	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]
PUH-AA1	TRANE	UHS-048	41	34,320	160	140	0.12	3.5	60	103	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	3.2	[1-3]

HYDRONIC PROP UNIT HEATER SCHEDULE NOTES:

1. DISCONNECT BY DIV 26.
2. SEE M-700 SERIES SHEETS FOR TEMPERATURE CONTROL INFORMATION.
3. PROVIDE NEW ISOLATION VALVES AND FLOW CONTROL VALVE.
4. EXISTING TO REMAIN, FOR REFERENCE ONLY

AIR CURTAIN SCHEDULE - 23 34 33

IDENTITY DATA				FAN DATA		ELECTRIC HEATING DATA	MOTOR DATA		ELECTRICAL DATA					
MARK	MANUFACTURER	MODEL	WEIGHT (LBS)	AIRFLOW (CFM)	NOZZLE WIDTH (IN)	CAPACITY (KW)	QTY.	HP EACH	VOLTS (V)	PH	FREQ (HZ)	MCA (A)	MOCP (A)	NOTES
AC-P1	BERNER	ARD12-2072E	200	3,174	6'-0"	28	2	0.5	480	3	60	28.3	40	1-6
AC-P2	BERNER	ARD12-2072E	200	3,174	6'-0"	28	2	0.5	480	3	60	28.3	40	1-6

AIR CURTAIN SCHEDULE NOTES:

1. MANUFACTURER-INSTALLED TOGGLE DISCONNECT.
3. ELECTRICAL CONNECTION TO BE FLEXIBLE.
4. STANDARD WHITE COLOR.
5. TWO SETS OF WASHABLE FILTERS BY MANUFACTURER.
6. DOOR SWITCH MAGNETIC REED. UNIT IS INTERLOCKED WITH DOOR POSITION SWITCH. COORDINATE WITH DOOR FRAME, SEE ARCHITECTURE SHEETS.

A3.3

ELECTRIC HUMIDIFIER SCHEDULE - 23 84 13

IDENTITY DATA						WATER DATA		ELECTRICAL DATA						
MARK	MANUFACTURER	MODEL	SERVES	WEIGHT (LBS)	OUTPUT (LB/H)	TYPE	FLOW (GPM)	CAP. (KW)	VOLTS (V)	PH	FREQ (HZ)	MCA (A)	MOCP (A)	NOTES
H-AA1	DRISTEEM	RX-63-1	ORCHESTRA	142	63.0	DCW	0.12	21	480	3	60	27.1	30.0	[1-5]
H-AA2	DRISTEEM	RX-12-1	ORCHESTRA STORAGE	94	12.0	DCW	<0.1	4	480	3	60	7.2	10.0	[1-5]
H-AA3	DRISTEEM	RX-6-1	BAND/INSTRUMENT CORRIDOR	93	18.0	DCW	<0.1	6	480	3	60	7.2	10.0	[1-5]

HUMIDIFIER SCHEDULE NOTES:

1. DISCONNECT BY MANUFACTURER.
2. PROVIDE WITH SPACE DISTRIBUTION UNIT TO REMOVE VAPOR TRAILS.
3. UNIT SHALL HAVE UNIVERSAL WATER CAPABILITIES (I.E. DCW, SOFTENED WATER, RO, DI WATER).
4. UNIT SHALL BE WALL MOUNTED. VERIFY CLEARANCE REQUIREMENTS WITH MANUFACTURER.
5. PROVIDE WITH CONDENSATE PUMPING STATION AND CONDENSATE COOLER.

DUCT SOUND ATTENUATOR SCHEDULE - 23 33 00

IDENTITY DATA					DIMENSIONS			AIRFLOW DATA			MIN INSERTION LOSSES (BY OCTAVE BAND)							
MARK	MANUFACTURER	MODEL	EQUIPMENT SERVED	DUCT SYSTEM	H	W	L	AIRFLOW (CFM)	APD (IN-WG)	FACE VELOCITY (FPM)	1	2	3	4	5	6	7	8
SA-K1	PRICE	RM48-9B	AHU-K6	RETURN	16"	30"	48"	3,100	0.05	930	4.0	7.0	11.0	18.0	14.0	11.0	8.0	6.0

SPLIT SYSTEM SCHEDULE - 23 81 26

INDOOR UNIT: IDENTITY DATA				DIMENSIONS			COOLING CAPACITY			AIRFLOW DATA				OUTDOOR UNIT: IDENTITY DATA				COOLING DATA		HEATING DATA		ENERGY DATA				ELECTRICAL DATA					
MARK	MANUFACTURER	MODEL	WEIGHT (LBS)	L	W	H	TOTAL (BTUH)	SENSIBLE (BTUH)	CAPACITY (BTUH)	MIN (CFM)	MAX (CFM)	DESIGN (CFM)	EXT. STATIC (IN-WG)	MARK	MODEL	SERVES	WEIGHT (LBS)	NOMINAL (BTUH)	AMBIENT (°F)	CAPACITY (BTUH)	AMBIENT (°F)	COP	EER	SEER	REF. TYPE	VOLTS (V)	PH	FREQ (HZ)	MCA (A)	MOCP (A)	NOTES
SS-B1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-B1	RKB09	SS-B1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-B2	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-B2	RKB09	SS-B2	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-D1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-D1	RKB09	SS-D1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-E1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-E1	RKB09	SS-E1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-F1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-F1	RKB09	SS-F1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-G1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-G1	RKB09	SS-H1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-H1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-H1	RKB09	SS-H1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-J1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-J1	RKB09	SS-J1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-J2	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-J2	RKB09	SS-J2	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-L1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-L1	RKB09	SS-P1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-P1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-P1	RKB09	SS-P1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-R1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-R1	RKB09	SS-P1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]
SS-Q1	DAIKIN	FTKB09	20	36"	9"	12"	8,800	7,165	8,800	215	330	330	-	CU-Q1	RKB09	SS-P1	53	0.75	95	-	-	-	11.0	17.0	R-410A	208	1	60	7.0	15.0	[1-4]

SPLIT SYSTEMS UNIT SCHEDULE NOTES:

1. DISCONNECT BY DIVISION 26.
2. PROVIDE WITH LOW AMBIENT CONTROLS.
3. SEE M-700 SERIES DRAWINGS FOR TEMPERATURE CONTROLS AND HIGH TEMPERATURE ALARM INFORMATION.
4. PROVIDE CONDENSATE PUMP FOR INDOOR UNIT.

CEILING FAN SCHEDULE - 23 34 39

IDENTITY DATA						ELECTRICAL DATA					
MARK	MANUFACTURER	MODEL	# OF BLADES	DIAMETER	WEIGHT (LBS)	VOLTS (V)	PH	FREQ (HZ)	MOCP (A)	HP	NOTES
CF-1	GREENHECK	DC-5	5	8'	100	120	1	60	20	1/4	1-5
CF-2	GREENHECK	DC-5	5	8'	100	120	1	60	20	1/4	1-5
CF-3	GREENHECK	DC-5	5	8'	100	120	1	60	20	1/4	1-5

CEILING FAN SCHEDULE NOTES:

1. CONTROLS: MANUFACTURER-PROVIDED CONTROLLER SHALL COMMUNICATE VIA BACNET. SEE M-700 SHEETS FOR TEMPERATURE CONTROLS INFORMATION.
2. CONTRACTOR TO COORDINATE DOWNROD LENGTH, MOUNTING BRACKET STYLE, AND GUY WIRE LENGTH TO ACHIEVE INSTALLED AIRFOIL HEIGHT AS INDICATED ON PLANS.
3. MANUFACTURER-PROVIDED TOGGLE DISCONNECT.
4. FAN CONSTRUCTION AND FINISH SHALL BE SUITABLE FOR DAMP AND CORROSIVE ENVIRONMENTS.
5. AIRFOIL COLOR SHALL BE MANUFACTURER'S STANDARD WHITE COLOR.

HYDRONIC RADIANT CEILING PANEL SCHEDULE - 23 82 36

IDENTITY DATA			HEATING DATA					PANEL			
MARK	MANUFACTURER	MODEL	BTUH/LF	TOTAL CAP. (BTUH)	EWT (°F)	LWT (°F)	FLOW (GPM)	WIDTH (IN)	LENGTH (FEET)	PASSES	NOTES
RCP-K1	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-K2	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-K3	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-K4	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-K5	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-K6	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M1	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M2	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M3	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M4	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M5	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M6	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M7	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M8	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M9	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M10	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M11	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M12	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M13	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M14	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M15	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M16	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M17	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M18	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M19	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M20	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M21	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M22	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M23	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M24	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M25	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M26	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5
RCP-M27	ZEHNDER	LINEAR	362	2,896	160	130	0.19	24"	8	4	1-5

HYDRONIC RADIANT CEILING PANEL SCHEDULE NOTES:

1. REFERENCE ARCHITECTURAL CEILING PLANS FOR CEILING TYPE.
2. SEE M-700 SERIES DRAWINGS FOR TEMPERATURE CONTROLS INFORMATION.
3. COORDINATE WITH M.C. FOR INSULATION REQUIRED FOR PROPER INSTALLATION.
4. 1/2" NOMINAL, TYPE L COPPER TUBING. ALUMINUM PANEL.
5. COLOR SELECTED BY ARCHITECT.

PUMP SCHEDULE - 23 21 23

IDENTITY DATA						FLUID DATA					MOTOR DATA			ELECTRICAL DATA			
MARK	MANUFACTURER	MODEL	SYSTEM SERVED	WEIGHT (LBS)	TYPE	FLUID TYPE	FLOW (GPM)	HEAD (FT-WG)	TEMP (°F)	EFF (%)	HP	BHP	SPEED (RPM)	VOLTS (V)	PH	FREQ (HZ)	NOTES
IP-A1	GRUNDFOS	UPS 50-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	75	20	160	48.1	0.75	-	3,500	460	3	60	[1-3]
IP-A2	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	55	20	160	46.8	0.75	-	3,500	460	3	60	[1-3]
IP-B1	GRUNDFOS	UPS 50-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	32	20	160	29.8	0.75	-	3,500	460	3	60	[1-3]
IP-C1	GRUNDFOS	UPS 32-80 F F	HHW	25	INLINE CIRCULATOR	WATER	5	20	160	6.8	0.50	-	3,500	460	3	60	[1-3]
IP-C2	GRUNDFOS	UPS 50-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	75	20	160	48.1	0.75	-	3,500	460	3	60	[1-3]
IP-C3	GRUNDFOS	UPS 50-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	65	20	160	47.1	0.75	-	3,500	460	3	60	[1-3]
IP-C4	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	50	20	160	45.3	0.75	-	3,500	460	3	60	[1-3]
IP-C5	GRUNDFOS	UPS 50-160 F	HHW	40	INLINE CIRCULATOR	WATER	150	20	160	37.4	3.00	-	3,500	460	3	60	[1-3]
IP-D1	GRUNDFOS	UPS 32-80 F	HHW	40	INLINE CIRCULATOR	WATER	25	20	160	38.9	0.50	-	3,500	460	3	60	[1-3]
E-IP-D2	EXISTING		HHW	-	INLINE CIRCULATOR	WATER	18	30	160	-	0.75	-	-	460	3	60	[3,4]
IP-E1	GRUNDFOS	UPS 40-80/2 F	HHW	25	INLINE CIRCULATOR	WATER	13	20	160	24.0	0.75	-	3,500	460	3	60	[1-3]
IP-E2	GRUNDFOS	UPS 40-80/2 F	HHW	25	INLINE CIRCULATOR	WATER	19	20	160	31.1	0.75	-	3,500	460	3	60	[1-3]
IP-E3	GRUNDFOS	UPS 32-80 F	HHW	40	INLINE CIRCULATOR	WATER	10	20	160	38.9	0.50	-	3,500	460	3	60	[1-3]
IP-F1	GRUNDFOS	UPS 40-80/2 F	HHW	25	INLINE CIRCULATOR	WATER	14	20	160	25.3	0.75	-	3,500	460	3	60	[1-3]
IP-H1	GRUNDFOS	UPS 32-80 F	HHW	40	INLINE CIRCULATOR	WATER	25	20	160	38.9	0.50	-	3,500	460	3	60	[1-3]
IP-H2	GRUNDFOS	UPS 40-80/2 F	HHW	25	INLINE CIRCULATOR	WATER	18	20	160	30.0	0.75	-	3,500	460	3	60	[1-3]
IP-J3	GRUNDFOS	UPS 32-160F	HHW	40	INLINE CIRCULATOR	WATER	40	20	160	36.6	0.75	-	3,500	460	3	60	[1-3]
IP-K6	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	20	20	160	32.0	0.75	-	3,500	460	3	60	[1-3]
IP-M1	GRUNDFOS	UPS 50-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	34	20	160	30.8	0.75	-	3,500	460	3	60	[1-3]
IP-M2	GRUNDFOS	UPS 75-69 F	HHW	54	INLINE CIRCULATOR	WATER	130	20	160	41.8	1.50	-	3,500	460	3	60	[1-3]
E-IP-N1	EXISTING		HHW	-	INLINE CIRCULATOR	WATER	25	30	160	-	0.75	-	-	460	3	60	[3,4]
IP-N2	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	35	20	160	45.7	0.75	-	3,500	460	3	60	[1-3]
IP-P1	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	37	20	160	46.4	0.75	-	3,500	460	3	60	[1-3]
E-IP-P2	EXISTING		HHW	-	INLINE CIRCULATOR	WATER	48	30	160	-	1.00	-	-	460	3	60	[3,4]
IP-Q1	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	50	20	160	32.9	0.75	-	3,500	460	3	60	[1-3]
E-IP-Q2	EXISTING		HHW	-	INLINE CIRCULATOR	WATER	57	30	160	-	1.00	-	-	460	3	60	[3,4]
IP-R1	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	50	20	160	32.9	0.75	-	3,500	460	3	60	[1-3]
IP-R2	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	47	20	160	48.6	0.75	-	3,500	460	3	60	[1-3]
IP-S1	GRUNDFOS	UPS 32-160 F	HHW	40	INLINE CIRCULATOR	WATER	57	20	160	36.6	0.75	-	3,500	460	3	60	[1-3]
IP-T1	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	50	20	160	32.9	0.75	-	3,500	460	3	60	[1-3]
IP-AA1	GRUNDFOS	UPS 40-80/2 F	HHW	40	INLINE CIRCULATOR	WATER	50	20	160	32.9	0.75	-	3,500	460	3	60	[1-3]

PUMP SCHEDULE NOTES:

1. REFER TO IN-LINE PUMP INSTALLATION DETAIL 1A/M-501.3.
2. 3-SPEED PUMP.
3. REFER TO M-700 SERIES FOR TEMPERATURE CONTROLS INFORMATION.
4. EXISTING INLINE PUMP TO REMAIN.

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Project No. 2019-067.NCH
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Produced BNW / PWF

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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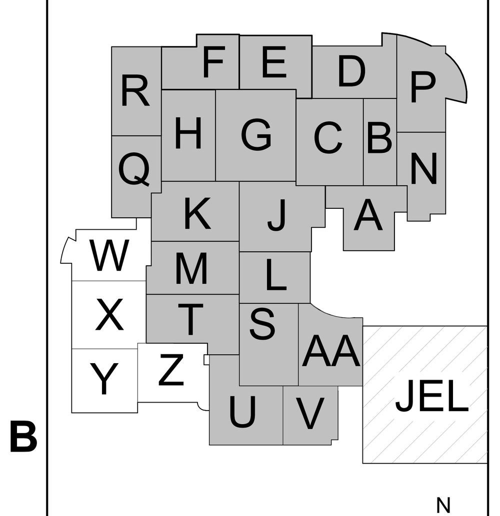
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

MECHANICAL SCHEDULES

M-603.3

M-603.3_ MECHANICAL SCHEDULES
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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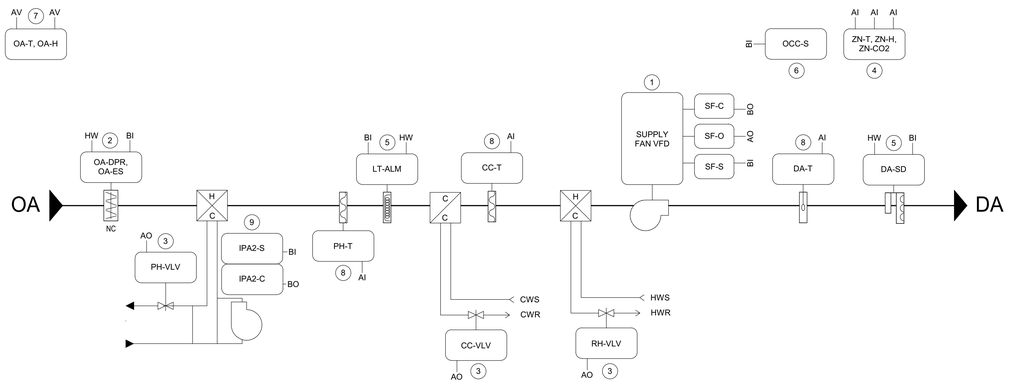


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS AND NUMBER OF FANS REQUIRED. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER ACTUATOR INCLUDING INTEGRAL END-SWITCH PROVIDED BY TCC. CIC TO PROVIDE AND INSTALL ACTUATOR INCLUDING CONTROL AND POWER WIRING AND INTERLOCK END-SWITCH WITH VARIABLE FREQUENCY DRIVE TO PREVENT OPERATION UNTIL PROVEN OPEN.
3. TCC SHALL PROVIDE COMPLETE VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS TO MECHANICAL CONTRACTOR FOR INSTALLATION. SEE MECHANICAL SCHEDULE FOR TWO AND THREE WAY REQUIREMENTS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AND CIC SHALL INSTALL ZONE SENSOR WITH TEMPERATURE, HUMIDITY, AND CO2 SENSING.
5. CIC SHALL PROVIDE AND WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
6. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
7. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.

1C AIR HANDLING UNIT AHU-A2
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFAn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATING THE PREHEAT VALVE AS NECESSARY. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

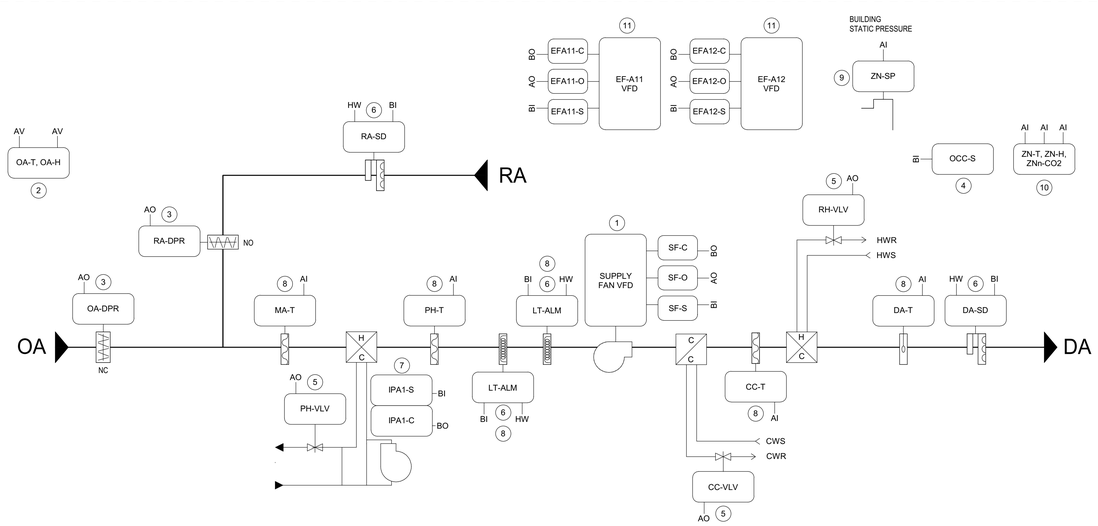
DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHIICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FAN SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
RehHeat Valve (RH-VLV)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Exhaust Fan Status (EFn-S)			x						x		x
Damper Endswitch (OA-ES)			x						x		x
Occupancy Sensor (OCC-S)			x						x		x
Inline Circulation Pump Status (IPA2-S)			x						x		x
Outside Air Damper (OA-DPR)				x					x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPA2-C)				x					x		x
Exhaust Fan Start/Stop (EFn-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND INDOOR AND OUTDOOR STATIC REFERENCE POINTS TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE AND CIC SHALL INSTALL ZONE SENSOR WITH TEMPERATURE, HUMIDITY, AND CO2 SENSING. CIC TO INSTALL NEW CONTROL WIRING TO SENSOR.
11. TCC SHALL PROVIDE VARIABLE FREQUENCY DRIVE TO CIC FOR LOW VOLTAGE WIRING. DIVISION 26 SHALL MOUNT DRIVE AND PROVIDE POWER. AREA EXHAUST FANS TO BE CONTROLLED PER M-603.3 AND CONTROL DIAGRAMS ON M-709.3.

1A AIR HANDLING UNIT E-AHU-A1
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), EF-A11 AND EF-A12 FANS SHALL START AND MODULATE IN UNISON TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE FANS SHALL STOP WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATING THE PREHEAT VALVE AS NECESSARY.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZNn-CO2) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED. UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Heating Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Exhaust Fan Speed (EFA11-O, EFA12-O)		x							x		x
Occupancy Sensor (OCC-S)			x						x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Exhaust Fan Status (EFA11-S, EFA12-S)			x						x		x
Inline Circulation Pump Status (IPA1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPA1-C)				x					x		x
Exhaust Fan Start/Stop (EFA11-C, EFA12-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project Date 03.03.2023
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Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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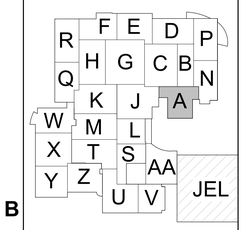
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-701.3

M701.3_TEMPERATURE CONTROLS SCHEMATICS
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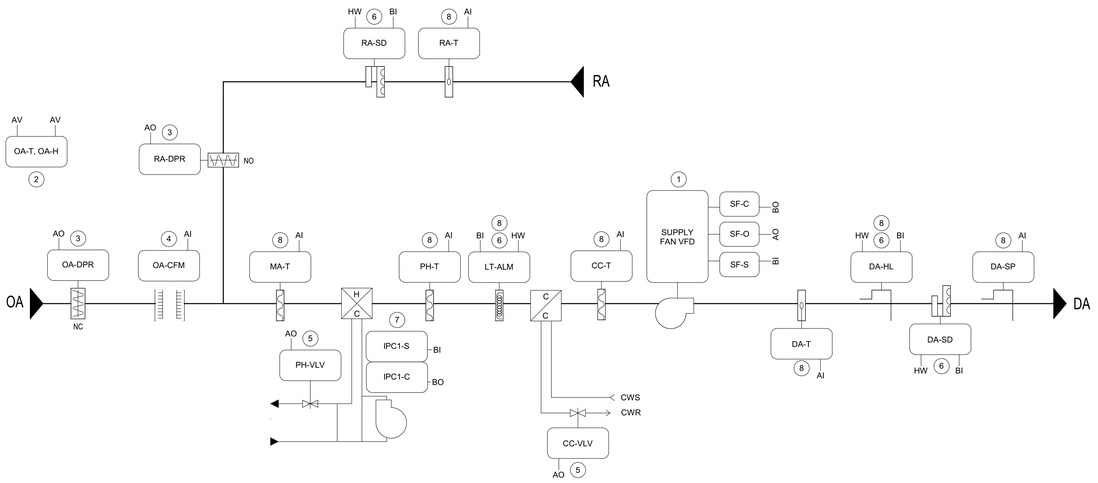


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE NEW CONTROL VALVE ASSEMBLY TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING. VALVE BODY CONFIGURATION PER M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1C AIR HANDLING UNIT AHU-C1

NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFCn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE OUTSIDE AIR DAMPER (OA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

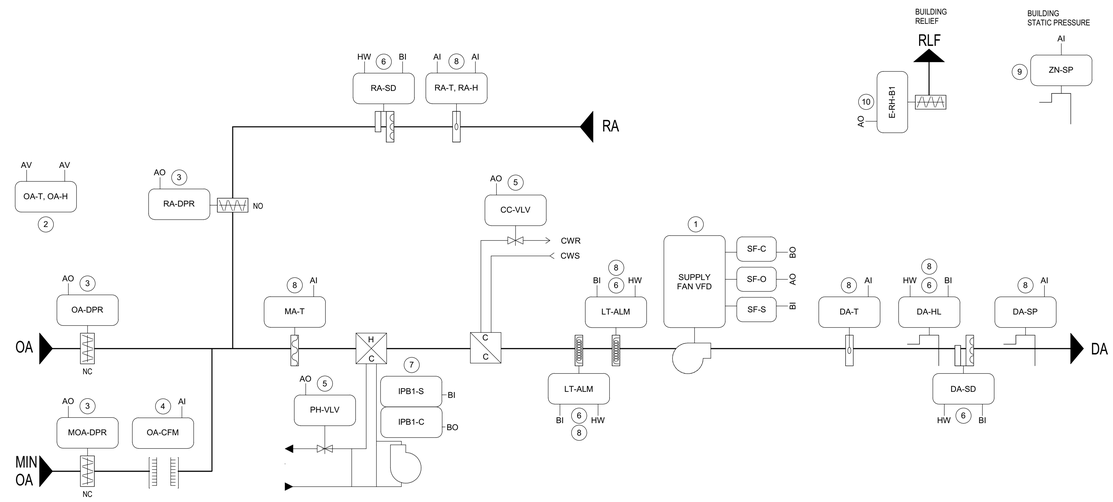
PREHEAT COIL CIRCULATING PUMP: PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Discharge Air Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD, SA-SD)			x						x	x	x
Discharge Air High Limit Switch (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPC1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPC1-C)				x					x		x
Zone Conditions (ZNn-T, ZNn-H, ZNn-CO2)					x				x		x



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5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
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9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND INDOOR AND OUTDOOR STATIC REFERENCE POINTS TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1A AIR HANDLING UNIT E-AHU-B1

NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

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EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFBn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

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OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (E-RH-B1)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPB1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPB1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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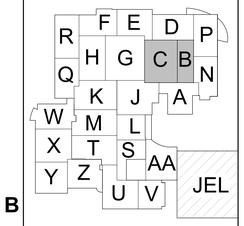
Indianapolis, IN 46240



KEY PLAN

N

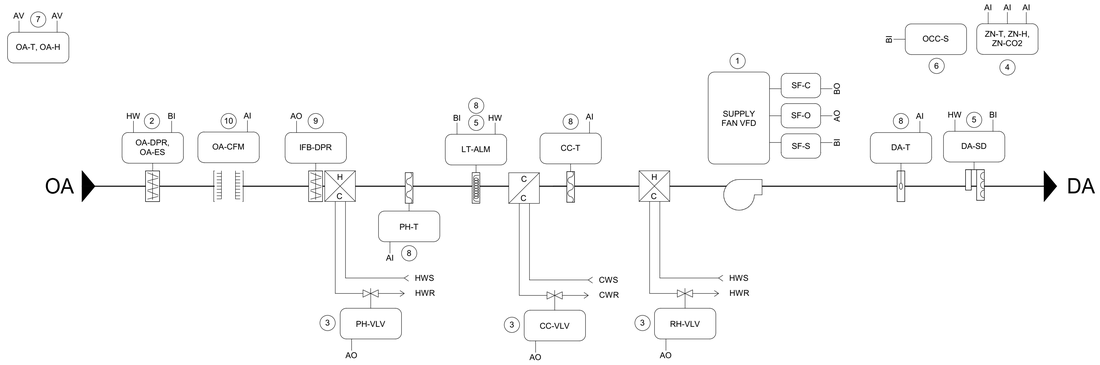
M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-702.3

M-702.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_Stark County High School Renovation_
Plotted: 04.06.2023 10:47:08 AM By: Hempstead, Kathleen



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS AND NUMBER OF FANS REQUIRED. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER ACTUATOR INCLUDING INTEGRAL END-SWITCH PROVIDED BY TCC. CIC TO PROVIDE AND INSTALL ACTUATOR INCLUDING CONTROL AND POWER WIRING AND INTERLOCK END-SWITCH WITH VARIABLE FREQUENCY DRIVE TO PREVENT OPERATION UNTIL PROVEN OPEN.
3. TCC SHALL PROVIDE COMPLETE VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS TO MECHANICAL CONTRACTOR FOR INSTALLATION. SEE MECHANICAL SCHEDULE FOR TWO AND THREE WAY REQUIREMENTS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AND CIC SHALL INSTALL ZONE SENSOR WITH TEMPERATURE, HUMIDITY, AND CO2 SENSING.
5. CIC SHALL PROVIDE AND WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
6. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
7. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
8. TCC SHALL PROVIDE NEW DEVICE FOR CIC INSTALLATION AND WIRING.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL DAMPER ACTUATOR. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
10. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.

1C AIR HANDLING UNIT AHU-C3
NOT TO SCALE

OUTDOOR AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT, FACE AND BYPASS DAMPER, AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

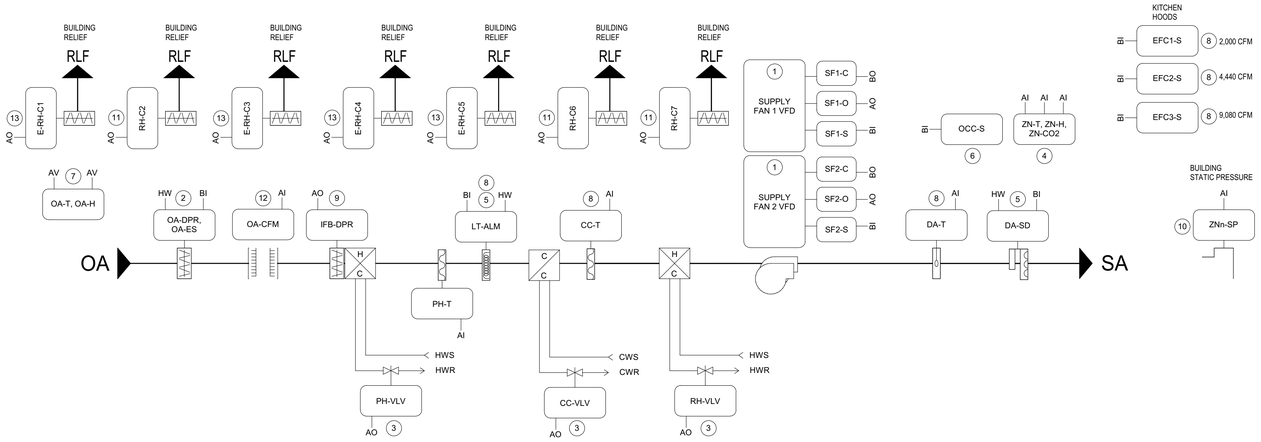
FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE PREHEAT CONTROL VALVE (PH-VLV) SHALL BE FULLY OPEN AND PREHEAT TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Outside Airflow (OA-CFM)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Integral Face and Bypass Damper (IFB-DPR)		x							x		x
Occupancy Sensor (OCC-S)			x						x		x
Freezestat (LT-ALM)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Damper Endswitch (OA-ES)			x						x		x
Outside Air Damper (OA-DPR)				x					x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS AND NUMBER OF FANS REQUIRED. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER ACTUATOR INCLUDING INTEGRAL END-SWITCH PROVIDED BY TCC. CIC TO PROVIDE AND INSTALL ACTUATOR INCLUDING CONTROL AND POWER WIRING AND INTERLOCK END-SWITCH WITH VARIABLE FREQUENCY DRIVE TO PREVENT OPERATION UNTIL PROVEN OPEN.
3. TCC SHALL PROVIDE COMPLETE VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS TO MECHANICAL CONTRACTOR FOR INSTALLATION. SEE MECHANICAL SCHEDULE FOR TWO AND THREE WAY REQUIREMENTS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AND CIC SHALL INSTALL ZONE SENSOR WITH TEMPERATURE, HUMIDITY, AND CO2 SENSING.
5. CIC SHALL PROVIDE AND WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
6. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
7. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
8. TCC SHALL PROVIDE NEW DEVICE FOR CIC INSTALLATION AND WIRING.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL DAMPER ACTUATOR. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
10. TCC SHALL PROVIDE AND CIC SHALL INSTALL THREE NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND INDOOR AND OUTDOOR STATIC REFERENCE POINTS TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
11. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.
12. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.
13. TCC SHALL PROVIDE ACTUATOR. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1A AIR HANDLING UNIT AHU-C2
NOT TO SCALE

OUTDOOR AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE KITCHEN HOOD OPERATION OR AS MANUALLY SELECTED BY THE OPERATOR, OR BY OCCUPANCY SENSOR (OCC-S). MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

RELIEF DAMPER CONTROL: AS SPACE PRESSURE (ZN-SP) INCREASES, THE RELIEF DAMPER (RLFn-DPR) SHALL BE MODULATED TO MAINTAIN A SETPOINT OF +0.03" W.C. (ADJ) IN THE SERVING LINE AND CAFETERIA AS COMPARED TO THE KITCHEN. ALL DAMPERS SHALL BE FULLY CLOSED WHEN THE ASSOCIATED AHUs ARE NOT RUNNING. PNEUMATIC SENSING TUBE, TERMINATION DEVICES, AND PRESSURE TRANSDUCER FIELD INSTALLED BY CIC.

TCC SHALL GENERATE AN ALARM IF ANY HOOD IS OPERATING AND MAKEUP AIR HANDLING UNIT IS NOT. IF ANY HOOD IS IN OPERATION, VARIABLE FREQUENCY DRIVES SHALL MODULATE IN ORDER TO DELIVER THE QUANTITY OF OUTSIDE AIR EQUAL TO THE TOTAL HOOD AIRFLOW OF EXHAUST FANS C1, C2, AND C3. IF NOT HOOD EXHAUST FANS ARE RUNNING, THE VARIABLE FREQUENCY DRIVE SPEED SHALL MODULATE TO MAINTAIN THE COOLING DEMAND OF THE SPACE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT COIL CONTROL, FACE AND BYPASS DAMPER, AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE PREHEAT CONTROL VALVE (PH-VLV) SHALL BE FULLY OPEN AND PREHEAT TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Zone Static Pressure (ZNn-SP) QTY 3	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Supply Fan VFD Speed (SFn-O) QTY 2		x							x		x
Integral Face and Bypass Damper (IFB-DPR)		x							x		x
Relief Damper (E-RH-C1, RH-C2, E-RH-C3 TO E-RH-C5, RH-C6, RH-C7)		x							x		x
Kitchen Hood Exhaust Fan Status (EFCn-S) QTY 3			x						x		x
Occupancy Sensor (OCC-S)			x						x		x
Freezestat (LT-ALM)			x						x	x	x
Supply Fan Status (SFn-S) QTY 2			x						x		x
Damper Endswitch (OA-ES)			x						x		x
Outside Air Damper (OA-DPR)				x					x		x
Supply Fan Start/Stop (SFn-C) QTY 2				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Sarah K Hempstead

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A3.3	ADDENDUM 3.3	04.06.2023

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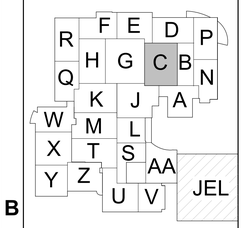

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-703.3

M-703.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_Stark Center High School Renovation_
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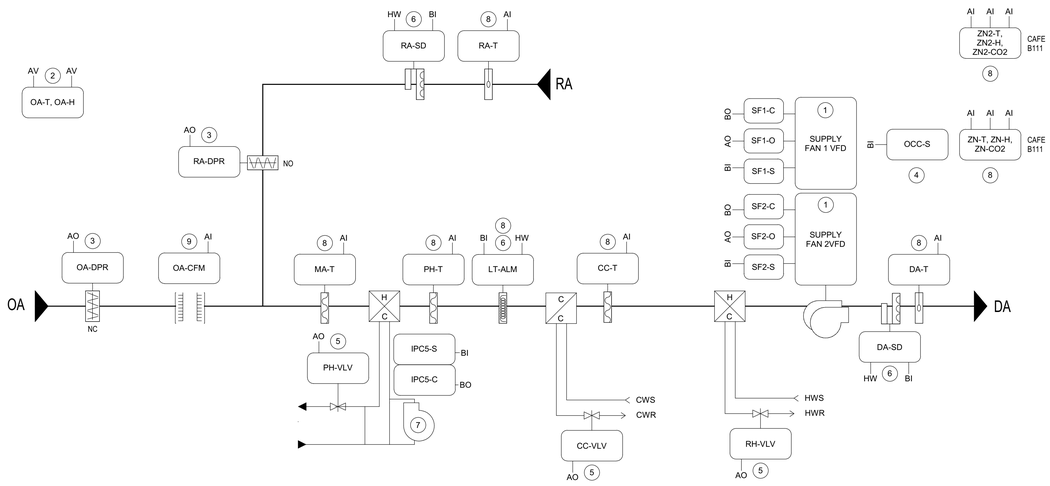


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVES PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING TO BOTH VFDs.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING.
4. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT. MULTIPLE SENSORS TO BE WIRED IN PARALLEL TO SINGLE MONITORING CONTACT.
5. TCC SHALL PROVIDE VALVE ASSEMBLY WITH ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO INSTALL NEW CONTROL AND POWER WIRING. VALVE BODY CONFIGURATIONS PER M-601.3 AIR HANDLING UNIT SCHEDULE NOTES.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.

1C VAV AIR HANDLING UNIT AHU-C5
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFCn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN AVERAGE OF THE TWO ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

WHEN ECONOMIZER IS DISABLED, OUTSIDE AIR DAMPER SHALL BE CONTROLLED TO PROVIDE AT LEAST THE SCHEDULED MINIMUM OUTSIDE AIRFLOW AS MEASURED BY THE OUTSIDE AIRFLOW MEASURING STATION (OA-CFM) AT ALL TIMES.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2, ZN2-CO2) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

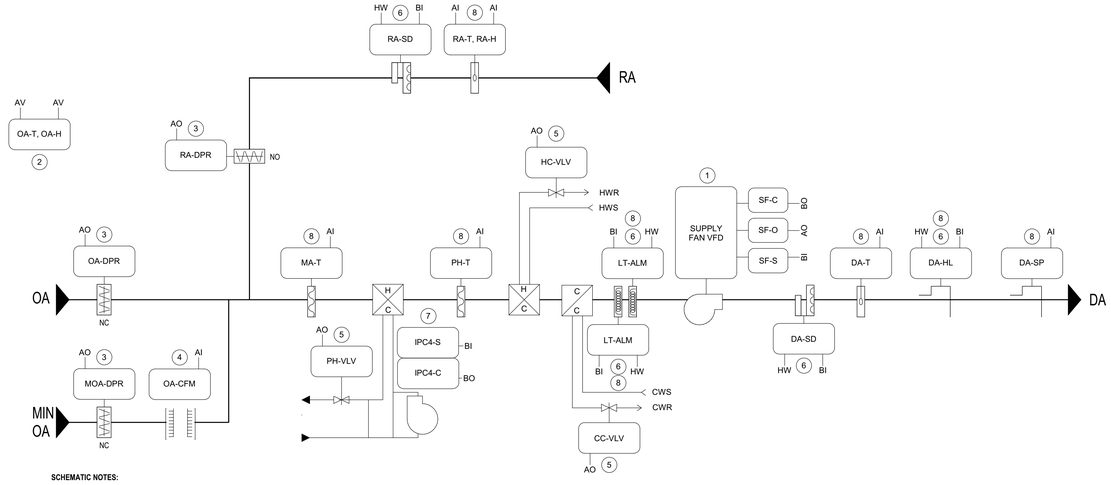
PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 95F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Heating Valve (RH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SFn-O) QTY 2		x							x		x
Mechanical Room Damper (MECH-DPR)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD)			x						x	x	x
Discharge Air High Limit Switch (DA-HL)			x						x	x	x
Supply Fan Status (SFn-S) QTY 2			x						x		x
Inline Circulation Pump Status (IPC5-S)			x						x		x
Occupancy Sensor (OCC-S)			x						x		x
Exhaust Fan Status (EFn-S)			x						x		x
Mechanical Room Damper EndSwitch (MECH-ES)			x						x		x
Supply Fan Start/Stop (SFn-C) QTY 2				x					x		x
Inline Circulation Pump Start/Stop (IPC5-C)				x					x		x
Exhaust Fan Start/Stop (EFn-C)				x					x		x



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1A AIR HANDLING UNIT E-AHU-C4
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), HEATING VALVE (HC-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	60F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, DA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
PREHEAT AND HEATING VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPC4-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPC4-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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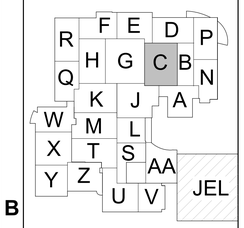
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-704.3

M:\R.A.\ TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_Stark County High School Renovation_
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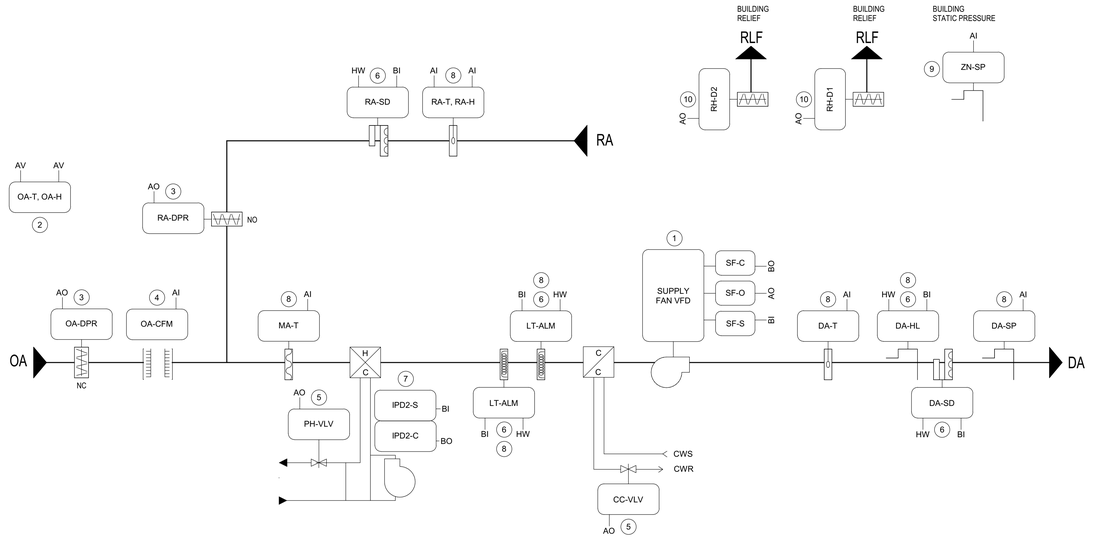


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1C AIR HANDLING UNIT E-AHU-D2
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-C) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

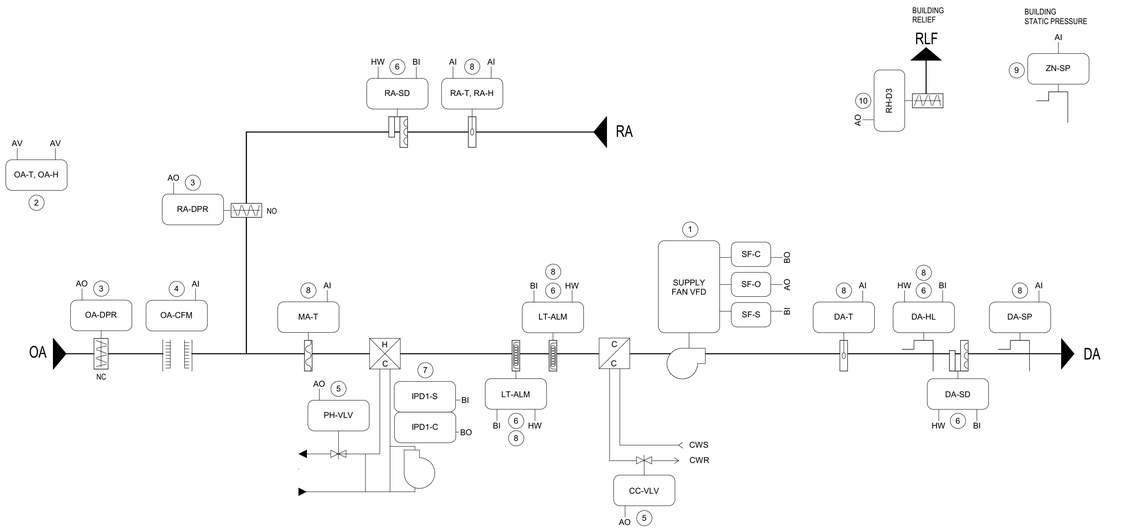
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Zone Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Relief Hood (RH-D1, RH-D2)		x							x		x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPD2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPD2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
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7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCER. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1A AIR HANDLING UNIT E-AHU-D1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFDn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Zone Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Hood (RH-D3)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPD1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPD1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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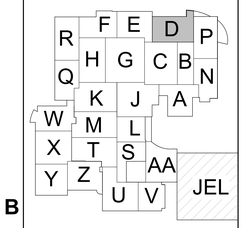
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



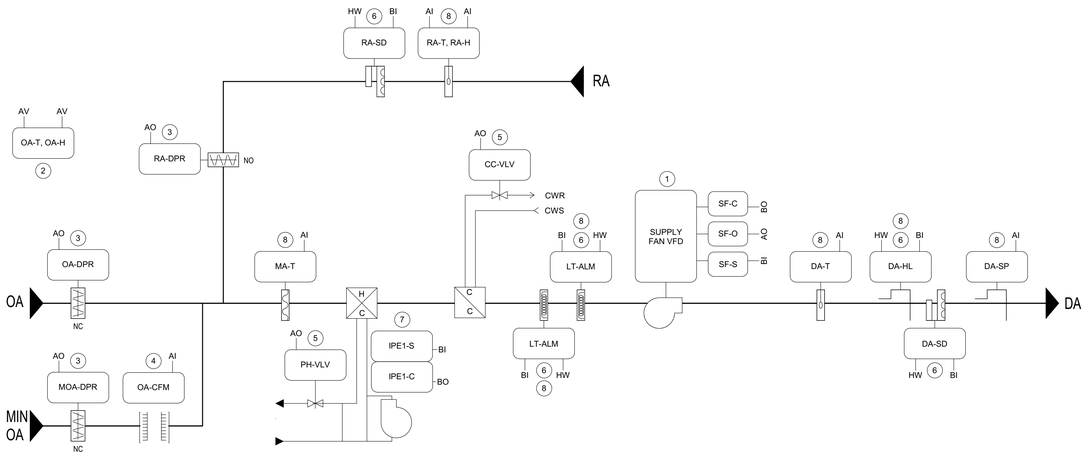
KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-705.3



SCHEMATIC NOTES:

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NOT TO SCALE

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SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

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70F	55F

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PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

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	Hardware Points				Software Points						Show On
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

	Hardware Points				Software Points						Show On
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPE1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPE1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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SARAH KATHLEEN HEMPSTEAD
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ARCHITECT

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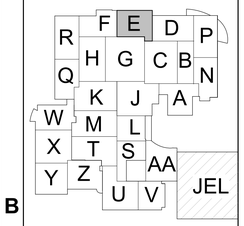

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-706.3

M-706_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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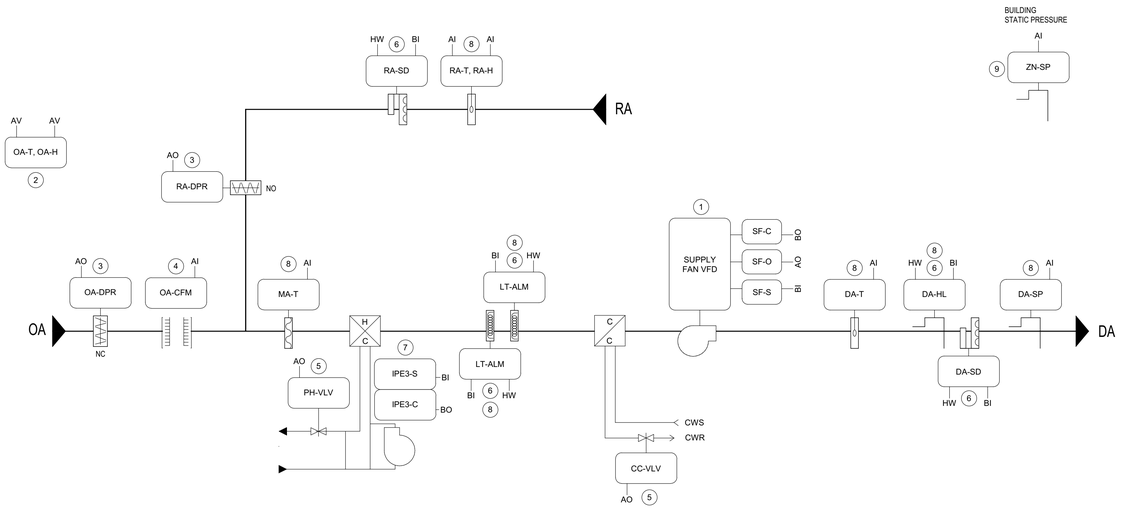

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NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

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OUTSIDE AIR TEMPERATURE OF	DISCHARGE TEMPERATURE OF
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

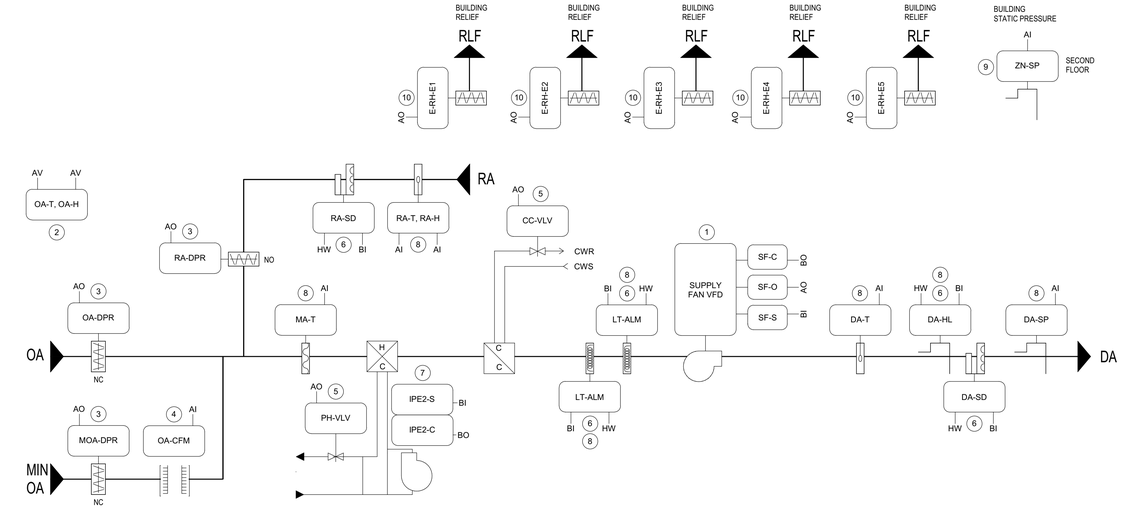
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPE3-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPE3-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x				x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCER. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE DAMPER ACTUATOR TO CIC FOR INSTALLATION AND WIRING.

1A AIR HANDLING UNIT E-AHU-E2
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (MINIMUM OF ZN-SP AND ZN-SP FROM E-AHU-E3) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFEn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE OF	DISCHARGE TEMPERATURE OF
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

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SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
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OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Zone Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Hood (RH-E1, RH-E2, RH-E3, RH-E4, RH-E5)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPE2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPE2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x				x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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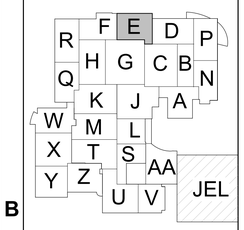
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-707.3

M-707.3 - TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M-S.D. of Washington Township, North Central High School Renovation_
Last Saved by sarah.hempstead@schmidt-arch.com on 4/4/2023 2:04:07 PM
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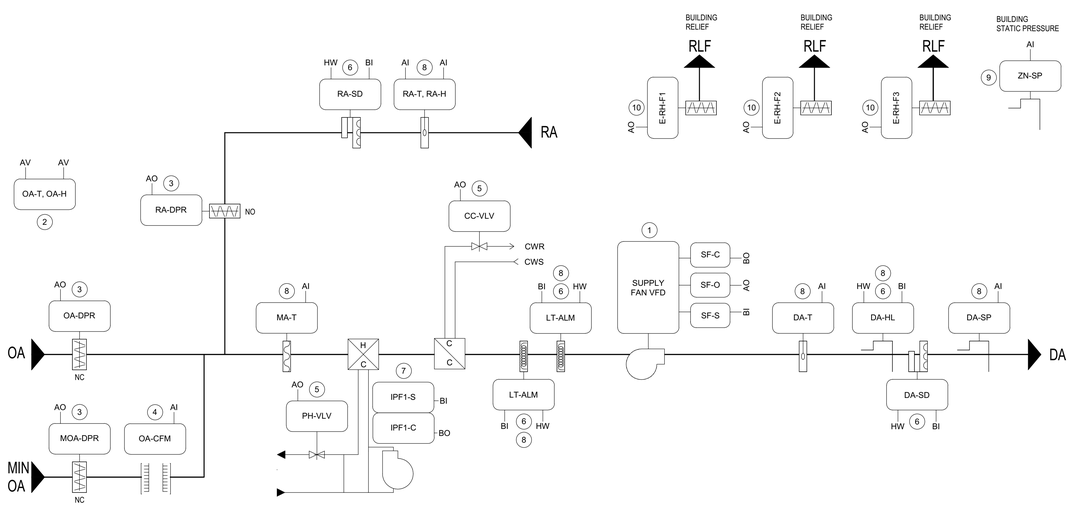
A3.3



SCHEMATIC NOTES:

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1A AIR HANDLING UNIT E-AHU-F1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

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OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
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SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
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OUTSIDE AIR DAMPER WILL CLOSE
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CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (E-RH-F1, E-RH-F2, E-RH-F3)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPF1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPF1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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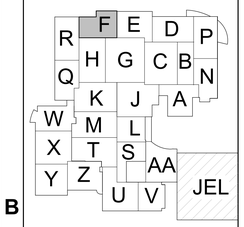
1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-708.3

M-708_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M-708.3 of Washington Township, North Central High School Renovation - Additions Phase 3.dwg
Plotted: 04/06/2023 - 2:08 PM by Brandon Nelson

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1A AIR HANDLING UNIT E-AHU-H1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFH>-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED. RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						Show On
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (RH-H1, RH-H4)		x							x		x

	Hardware Points				Software Points						Show On
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPH1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPH1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

SCHMIDT
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www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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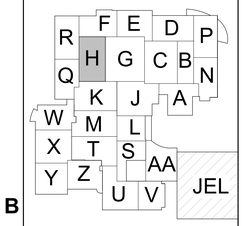
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-709.3

M-709.3 TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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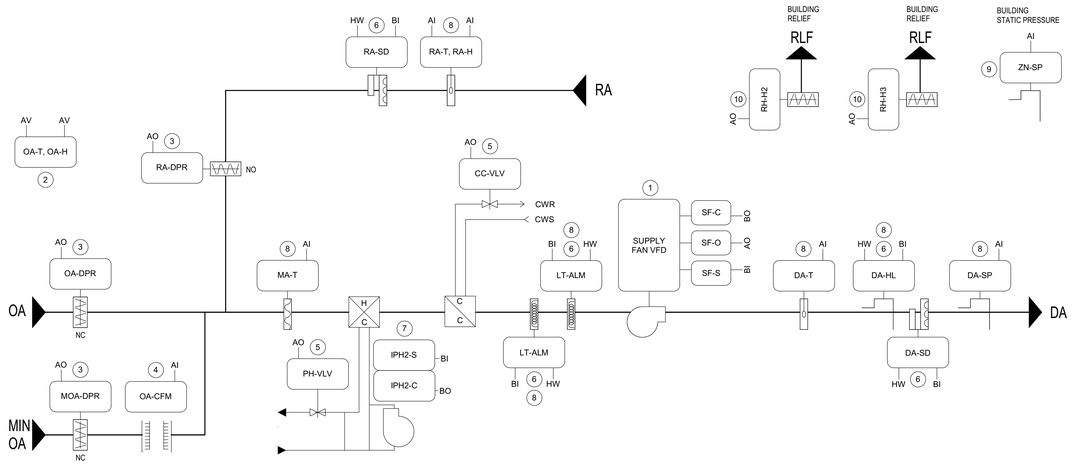

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CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (RH-H2, RH-H3)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPH2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPH2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
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www.schmidt-arch.com

Project No. 2019-067.NCH
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Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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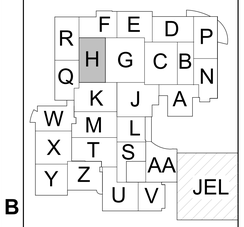

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M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

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M-710.3

M-710.1, TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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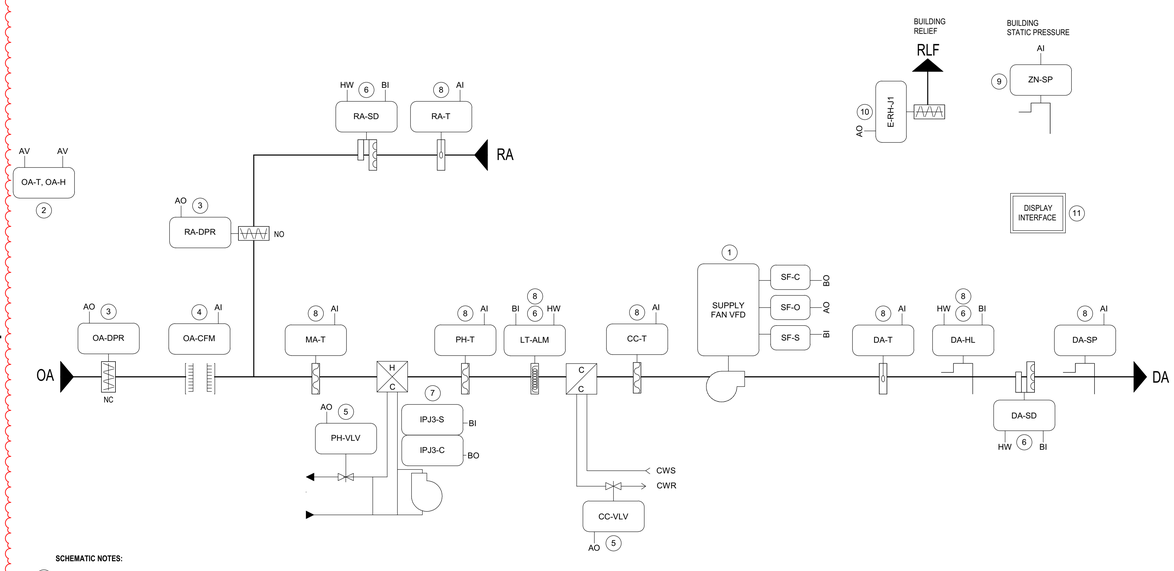

SCHEMATIC NOTES:

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5. TCC SHALL PROVIDE NEW CONTROL VALVE ASSEMBLY TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING. VALVE BODY CONFIGURATION PER M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
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10. TCC SHALL PROVIDE ACTUATOR. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SEE M-607.3 FOR REQUIREMENTS.
11. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW LOCAL CONTROLLER DISPLAY, RELOCATED CONTROL PANEL AND VARIABLE FREQUENCY DRIVE. SEE ELECTRICAL DRAWINGS FOR NEW LOCATION OF VARIABLE FREQUENCY DRIVE REQUIRED BECAUSE OF RENOVATION TO THE EXISTING SPACE LOCATION. CIC RESPONSIBLE FOR REMOTE DISCONNECT AUX CONTACT SAFETY WIRING BACK TO VFD SAFETY TERMINALS AND ALL CONTROL AND BACNET COMMUNICATION WIRING.

1C AIR HANDLING UNIT AHU-J3
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL PROVIDE NEW TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER. CIC IS RESPONSIBLE FOR INSTALLATION OF PANEL AND WIRING. DIVISION 26 CONTRACTOR TO BRING POWER TO THE PANEL ON A DEDICATED CIRCUIT.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

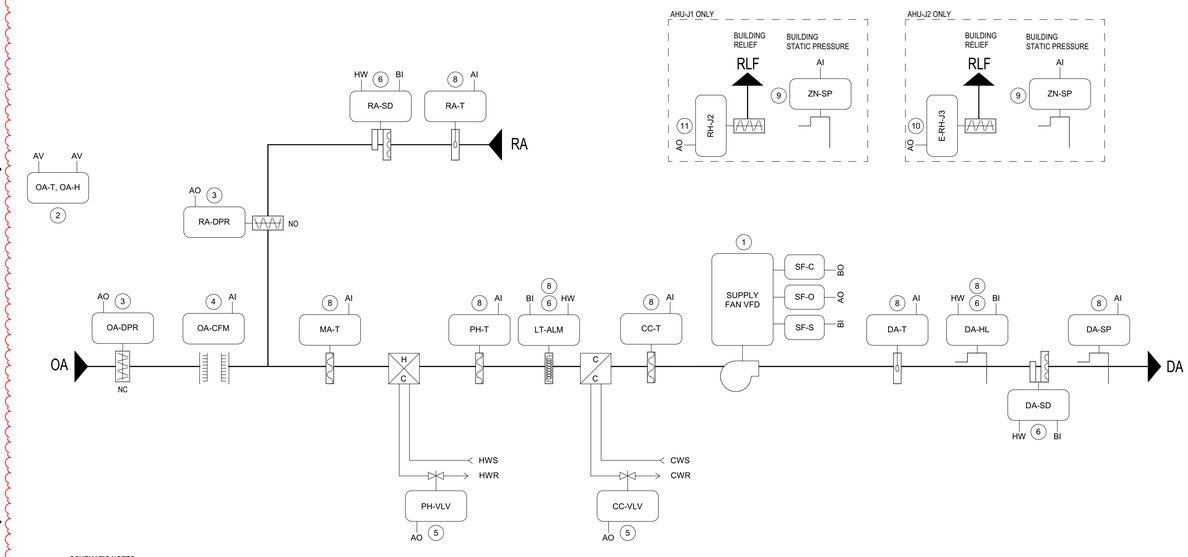
PREHEAT COIL CIRCULATING PUMP: PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (E-RH-J1)		x							x		x
Static Pressure High Limit (DA-HL)			x						x	x	x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPJ3-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPJ3-C)				x					x		x



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE NEW CONTROL VALVE ASSEMBLY TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING. VALVE BODY CONFIGURATION PER M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. NOT USED.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND INDOOR AND OUTDOOR STATIC REFERENCE POINTS TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. FOR NEW DAMPERS, SHEETMETAL CONTRACTOR SHALL INSTALL DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.
11. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1A AIR HANDLING UNIT AHU-J1, AHU-J2
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFJn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Discharge Air Static Pressure (DA-SP)	x								x		x
Space Static Pressure (ZN-SP) QTY 2	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (RH-J2, E-RH-J3)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Discharge Air High Limit Switch (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Zone Conditions (ZNn-T, ZNn-H, ZNn-CO2)					x				x		x

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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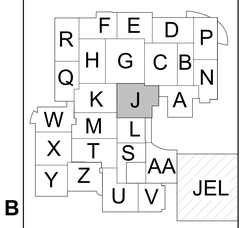
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-711.3

M-711.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_Stark County High School Renovation_
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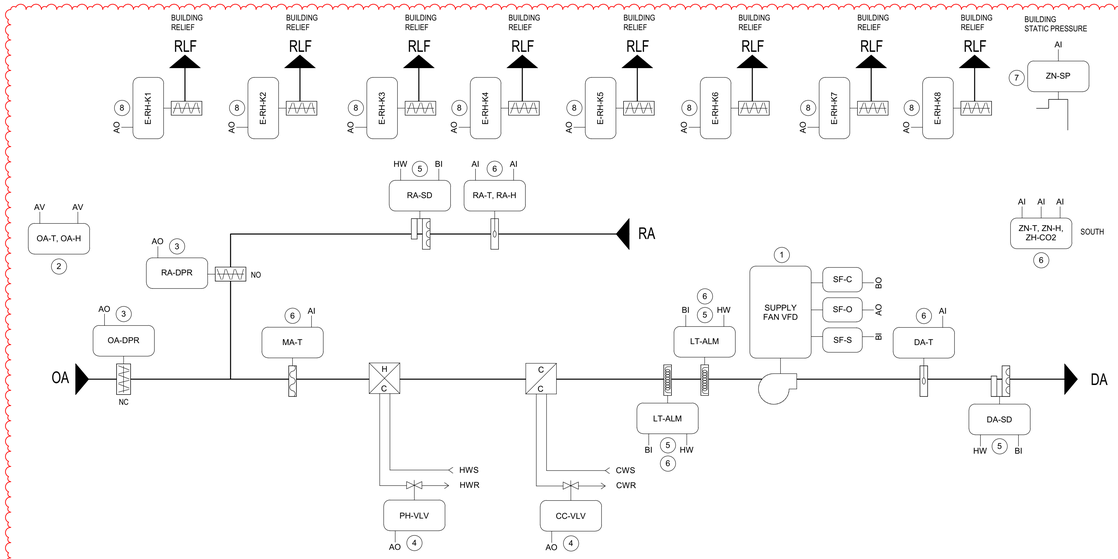


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE VALVE ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
5. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
6. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE. SPACE TEMPERATURE SENSOR SHALL COMMUNICATE VALUES TO AHU-K2 AND AHU-K3.
7. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
8. TCC SHALL PROVIDE DAMPER ACTUATOR TO CIC FOR INSTALLATION. CIC RESPONSIBLE FOR CONTROL AND POWER WIRING AND DEMOLITION OF EXISTING PNEUMATIC DEVICES. CIC TO DISCONNECT AND DELIVER COMPRESSOR TO OWNER AND REMOVE ALL PNEUMATIC TUBING.

1C AIR HANDLING UNIT E-AHU-K2
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

LEAD ROTATION: AHU-K2 (EAST), AHU-K3 (CENTER), AND AHU-K4 (WEST) SERVE THE MAIN GYM AND SHALL ROTATE LEAD WEEKLY. DURING OCCUPANCY, ONLY THE LEAD AIR HANDLING UNITS SHALL OPERATE UNLESS ADDITIONAL CAPACITY IS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT. ALL THREE AIR HANDLING UNITS SHALL BE ALLOWED TO OPERATE IF SPACE TEMPERATURE DEVIATES MORE THAN 1F (ADJ) FROM SETPOINT. LAG AIR HANDLING UNITS SHALL OPERATE ONLY WHEN REQUIRED AND TURN OFF OTHERWISE.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, IF IN LEAD, OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFKn-C, EXCEPT EF-K1 AND EF-K2 SERVING AHU-K6) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: WHEN ANY GYM AIR HANDLING UNIT (AHU-K1 TO AHU-K5) AND UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD DAMPERS (E-RH-K1 TO E-RH-K8) SHALL START AND MODULATE IN SEQUENCE, ONE AFTER ANOTHER, TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPERS SHALL CLOSE WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSOR) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

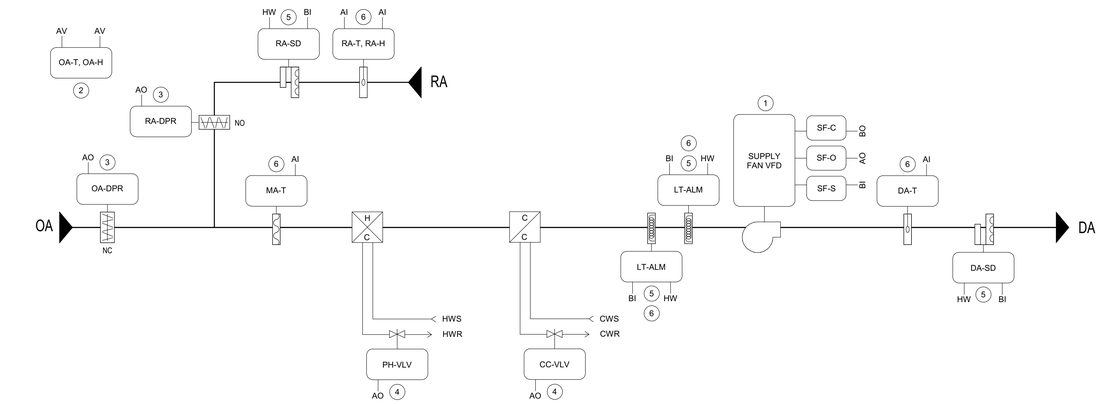
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE (WHEN ALL GYM AIR HANDLING UNITS (AHU-K1 TO AHU-K5) ARE NOT OPERATIONAL)
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Relief Hood Damper (E-RH-K1 TO K8) QTY 8		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



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1A AIR HANDLING UNIT E-AHU-K1
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

AHU-K1 SERVES THE EAST UPPER GYM

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

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CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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SARAH KATHLEEN HEMPSTEAD
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NO. AR10400134
STATE OF INDIANA
ARCHITECT

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A3.3	ADDENDUM 3.3	04.06.2023

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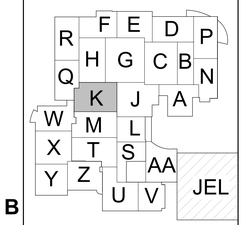

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-712.3

M-712.3 - TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_3-6-3 of Washington Township North Central High School Renovation_
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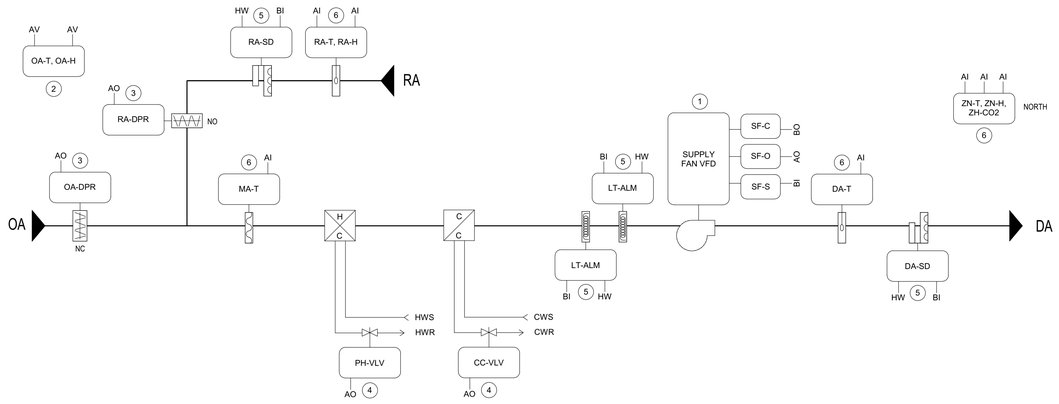

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6. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1C AIR HANDLING UNIT E-AHU-K4
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

LEAD ROTATION: AHU-K2 (EAST), AHU-K3 (CENTER), AND AHU-K4 (WEST) SERVE THE MAIN GYM AND SHALL ROTATE LEAD WEEKLY. DURING OCCUPANCY, ONLY THE LEAD AIR HANDLING UNITS SHALL OPERATE UNLESS ADDITIONAL CAPACITY IS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT. ALL THREE AIR HANDLING UNITS SHALL BE ALLOWED TO OPERATE IF SPACE TEMPERATURE DEVIATES MORE THAN 1F (ADJ) FROM SETPOINT. LAG AIR HANDLING UNITS SHALL OPERATE ONLY WHEN REQUIRED AND TURN OFF OTHERWISE.

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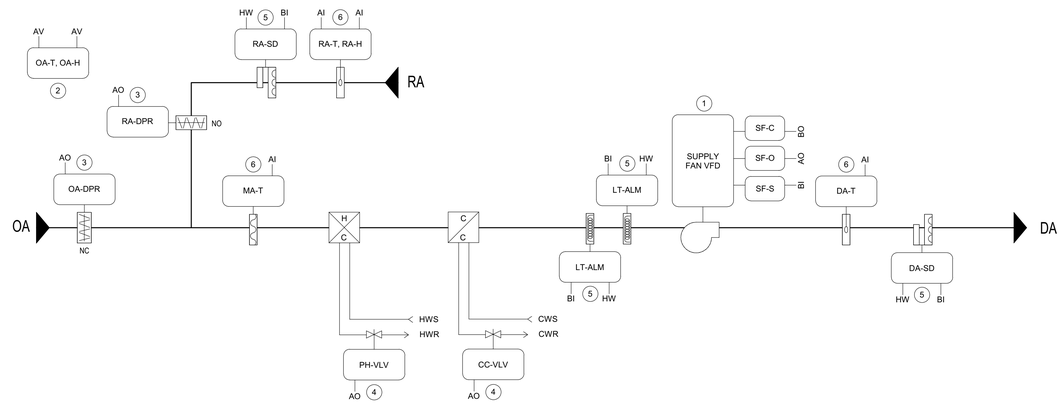
	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



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Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

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Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
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Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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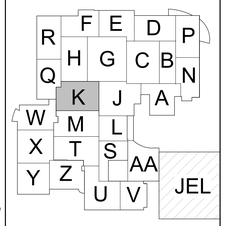

KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-713.3

M-713.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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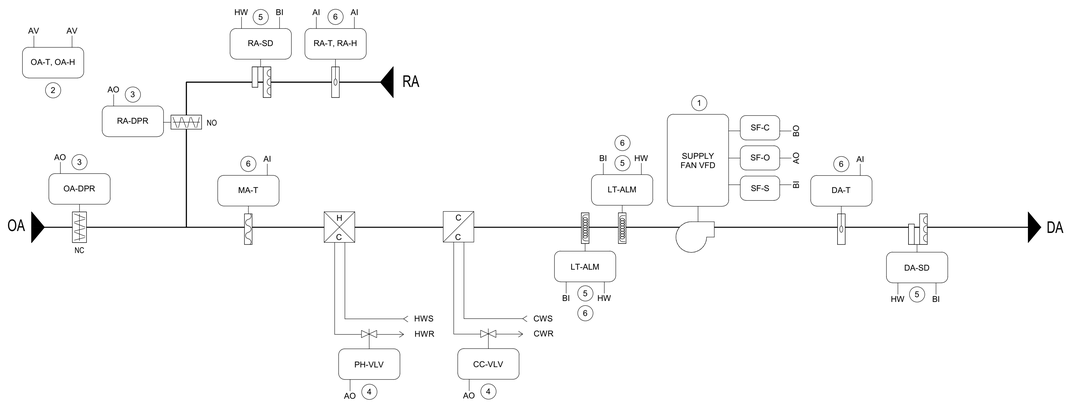

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
5. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
6. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1A AIR HANDLING UNIT E-AHU-K5
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

AHU-K5 SERVES THE WEST UPPER GYM

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 65 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZNn-C02 FROM MAIN GYM SENSORS) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ), UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ), UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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415 Massachusetts Avenue
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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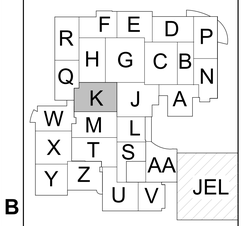

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-714.3

M-714.3 - TEMPERATURE CONTROLS SCHEMATICS
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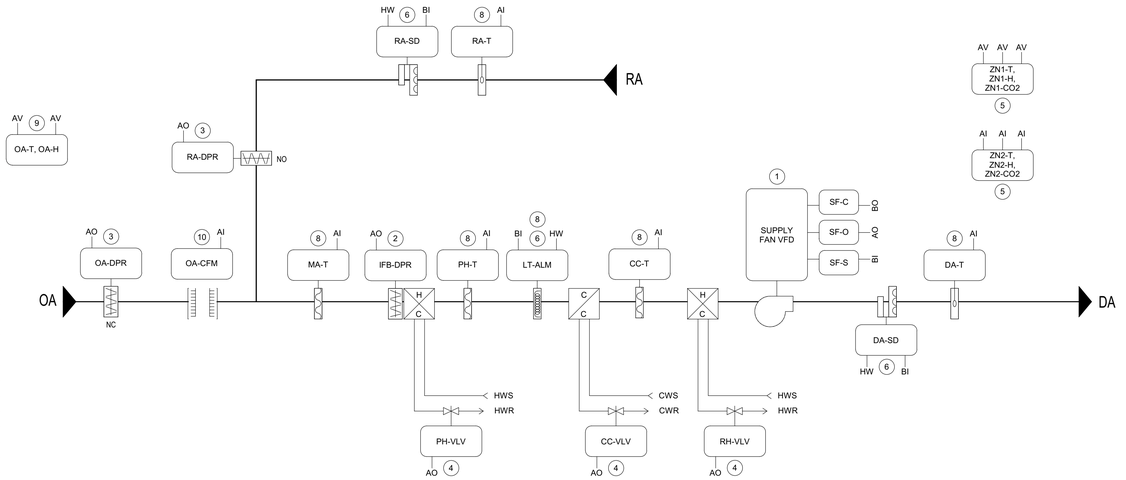

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS AND NUMBER OF FANS REQUIRED. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER ACTUATOR INCLUDING INTEGRAL END-SWITCH PROVIDED BY TCC. CIC TO INSTALL ACTUATOR INCLUDING CONTROL AND POWER WIRING AND INTERLOCK END-SWITCH WITH VARIABLE FREQUENCY DRIVE TO PREVENT OPERATION UNTIL PROVEN OPEN.
3. CONTROL DAMPER AND ACTUATOR PROVIDED BY TCC. SHEETMETAL CONTRACTOR TO INSTALL DAMPER ASSEMBLY. CIC TO INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE COMPLETE VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS TO MECHANICAL CONTRACTOR FOR INSTALLATION. SEE MECHANICAL SCHEDULE FOR TWO AND THREE WAY REQUIREMENTS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE AND CIC SHALL INSTALL ZONE SENSOR WITH TEMPERATURE, HUMIDITY, AND CO2 SENSING.
6. CIC SHALL PROVIDE AND WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
7. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
8. TCC TO PROVIDE NEW DEVICE AND CIC TO INSTALL DEVICE INCLUDING CONTROL WIRING.
9. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
10. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.

1A AIR HANDLING UNIT AHU-K6
NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL PROVIDE A NEW TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER. CIC IS RESPONSIBLE FOR INSTALLATION OF PANEL AND WIRING. DIVISION 26 CONTRACTOR TO BRING POWER TO THE PANEL ON A DEDICATED CIRCUIT.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL START AND RAMP TO BALANCER DETERMINED SPEED TO DELIVER THE SCHEDULED SUPPLY CFM.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFK1-C, EFK2-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO SUPPLY FAN OPERATION OF AHU-K6.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY. THE TWO SPACE TEMPERATURE SENSORS SHALL BE AVERAGED TO CONTROL THE AIR HANDLING UNIT. THE TWO SPACE HUMIDITY SENSORS SHALL UTILIZE THE MAXIMUM TO CONTROL HUMIDITY.

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND DISCHARGE TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL BE OPENED TO THE MINIMUM POSITION TO DELIVER THE SCHEDULED OUTSIDE AIRFLOW.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT AND REHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Discharge Air Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Heating Valve (RH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Integral Face and Bypass Damper (IFB-DPR)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Discharge Air High Limit Switch (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Exhaust Fan Status (EFn-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Exhaust Fan Start/Stop (EFn-C)				x					x		x
Zone Conditions (ZNn-T, ZNn-H, ZNn-CO2)					x				x		x

SCHMIDT
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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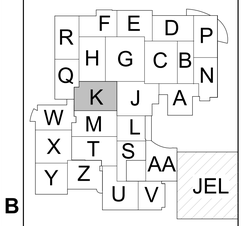

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-715.3

M-715.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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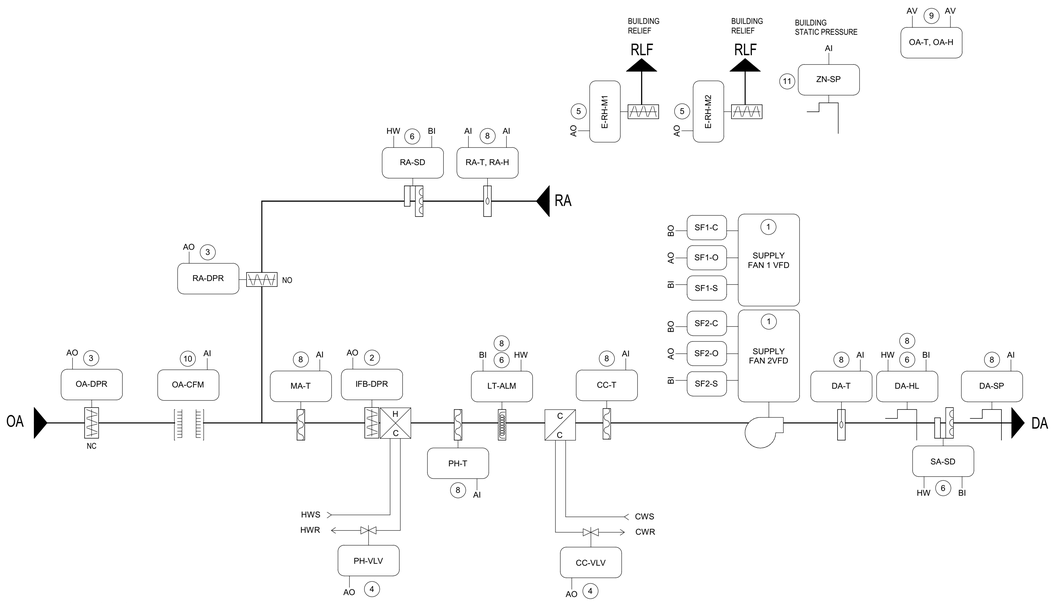

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS AND NUMBER OF FANS REQUIRED. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER ACTUATOR PROVIDED BY TCC. CIC TO INSTALL ACTUATOR INCLUDING CONTROL AND POWER WIRING.
3. CONTROL DAMPER AND ACTUATOR PROVIDED BY TCC. SHEETMETAL CONTRACTOR TO INSTALL DAMPER ASSEMBLY. CIC TO INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE COMPLETE VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS TO MECHANICAL CONTRACTOR FOR INSTALLATION. SEE MECHANICAL SCHEDULE FOR TWO AND THREE WAY REQUIREMENTS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE NEW DAMPER ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.
6. CIC SHALL PROVIDE AND WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
7. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT.
8. TCC TO PROVIDE NEW DEVICE AND CIC TO INSTALL DEVICE INCLUDING CONTROL WIRING.
9. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
10. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL IN DUCTWORK PER MANUFACTURER RECOMMENDATIONS. CIC TO PROVIDE AND INSTALL NEW CONTROL AND POWER WIRING.
11. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.

1A AIR HANDLING UNIT AHU-M1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFMn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND DISCHARGE TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SFn-O) QTY 2		x							x		x
Integral Face and Bypass Damper (IFB-DPR)		x							x		x
Mechanical Ventilation Damper (MV-DPR)		x							x		x
Relief Damper (E-RH-M1, E-RH-M2)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD, SA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SFn-S) QTY 2			x						x		x
Occupancy Sensor (OCC-S)			x						x		x
Supply Fan Start/Stop (SFn-C) QTY 2				x					x		x

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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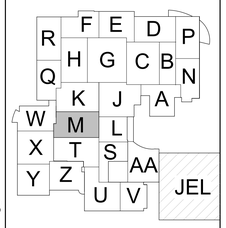
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-716.3

M-716.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
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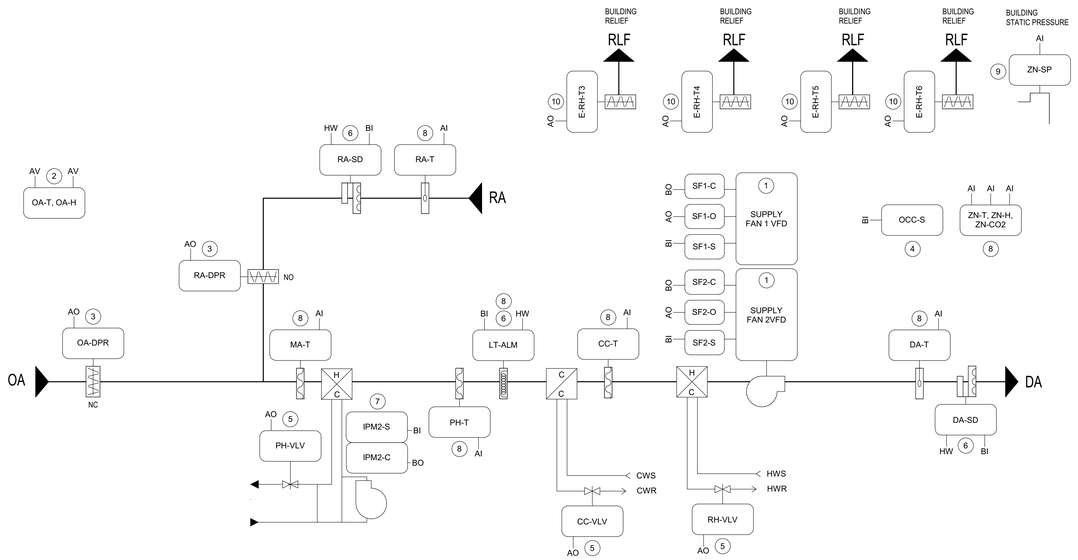

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVES PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING TO BOTH VFDs.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO INSTALL CONTROL AND POWER WIRING.
4. CIC SHALL WIRE TO LIGHTING OCCUPANCY SENSOR AUX CONTACT. MULTIPLE SENSORS TO BE WIRED IN PARALLEL TO SINGLE MONITORING CONTACT.
5. TCC SHALL PROVIDE VALVE ASSEMBLY WITH ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO INSTALL NEW CONTROL AND POWER WIRING. VALVE BODY CONFIGURATIONS PER M-601.3 AIR HANDLING UNIT SCHEDULE NOTES.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE DAMPER ACTUATOR TO CIC FOR INSTALLATION. CIC RESPONSIBLE FOR CONTROL AND POWER WIRING.

1A AIR HANDLING UNIT AHU-M2

NOT TO SCALE

AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY. THE OUTSIDE AIRFLOW MEASURING STATION (OA-CFM) SHALL ENSURE THE OUTSIDE AIR DAMPER (OA-DPR) PROVIDES A MINIMUM SCHEDULED AIRFLOW SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSORS) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Zone Conditions (ZN-T, ZN-H, ZN-CO2)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Heating Valve (RH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SFn-0) QTY 2		x							x		x
Inline Pump Status (IPM2-S)		x							x		x
Relief Dampers (E-RH-T3 TO E-RH-T6)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Supply Fan Status (SFn-S) QTY 2			x						x		x
Occupancy Sensor (OCC-S)			x						x		x
Supply Fan Start/Stop (SFn-C) QTY 2				x					x		x
Inline Pump Start/Stop (IPM2-C)				x					x		x

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STATE OF INDIANA
ARCHITECT

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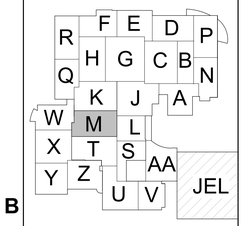
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-717.3

M-717.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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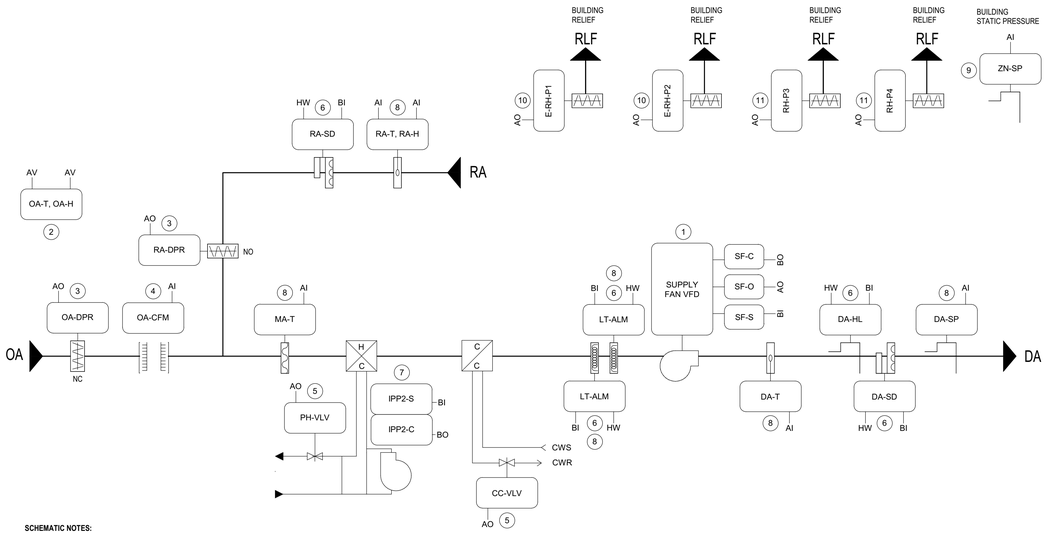


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE 24VAC AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE ACTUATOR TO CIC FOR INSTALLATION AND WIRING.
11. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1C AIR HANDLING UNIT E-AHU-P2
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFPn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

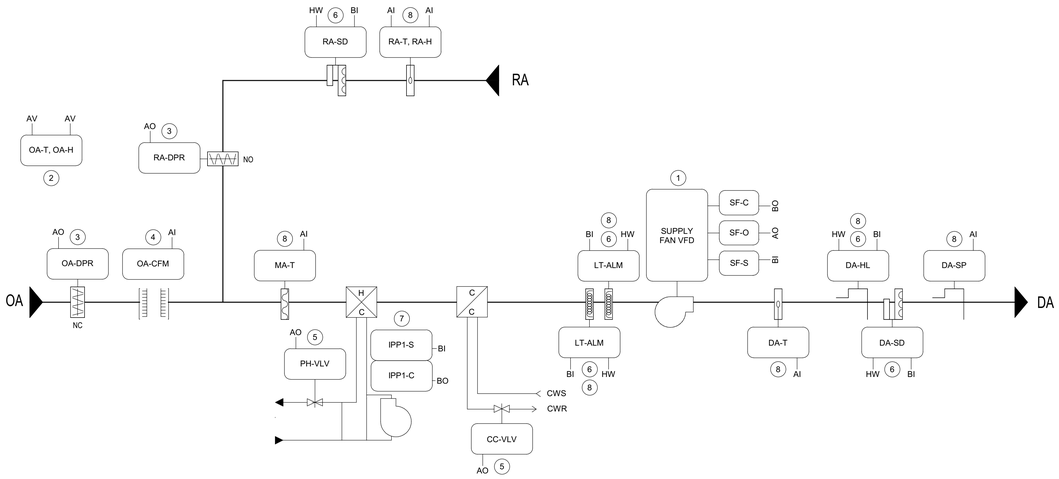
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Hood (E-RH-P1, E-RH-P2, RH-P3, RH-P4)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPP2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPP2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1A AIR HANDLING UNIT E-AHU-P1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOODS SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPP1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPP1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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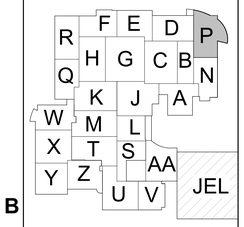
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-719.3

M-719.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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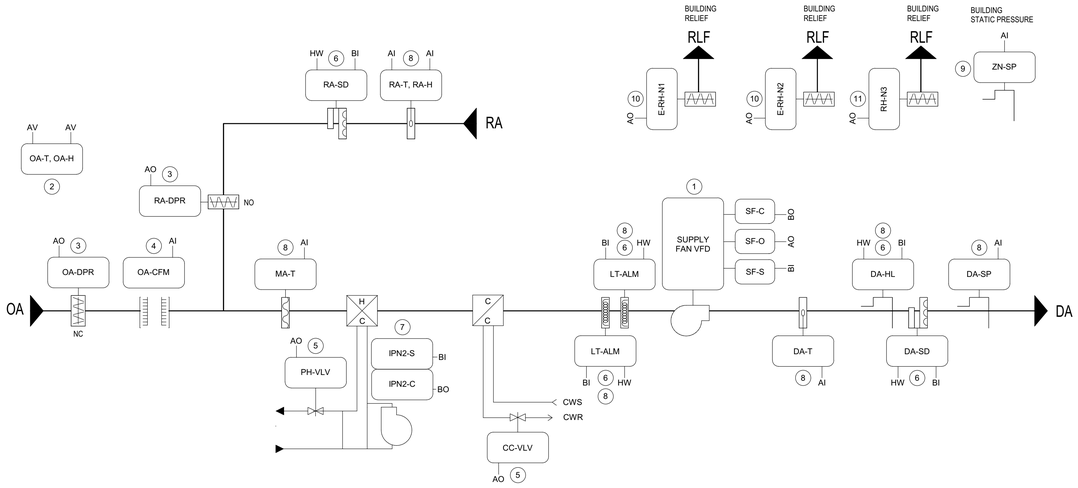


SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE DAMPER ACTUATOR TO CIC FOR INSTALLATION. CIC RESPONSIBLE FOR CONTROL AND POWER WIRING AND DEMOLITION OF EXISTING PNEUMATIC DEVICES. CIC TO DISCONNECT AND DELIVER COMPRESSOR TO OWNER AND REMOVE ALL PNEUMATIC TUBING.
11. TCC SHALL PROVIDE DAMPER ASSEMBLY WITH ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC RESPONSIBLE FOR CONTROL AND POWER WIRING.

1C AIR HANDLING UNIT E-AHU-N2

NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFN#-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

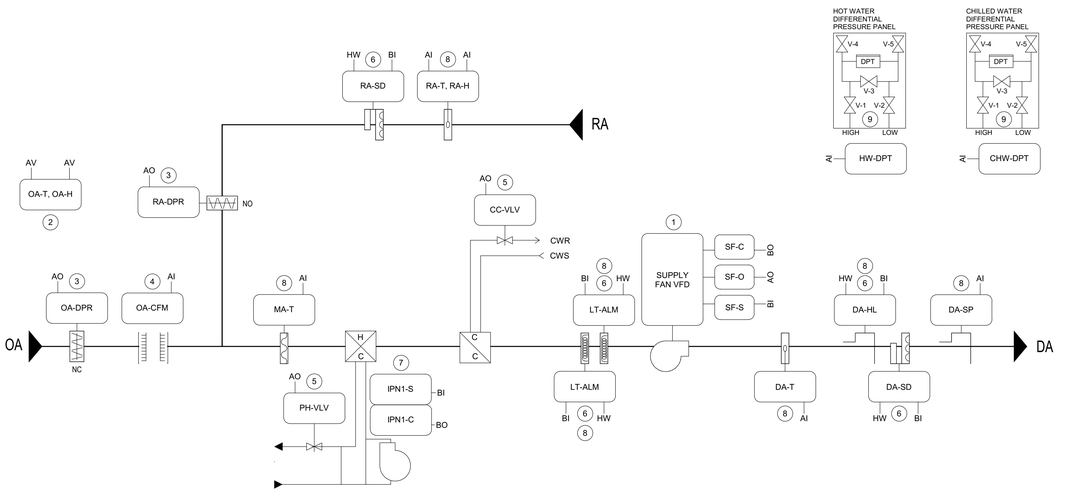
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED.
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (E-RH-N1, E-RH-N2, RH-N3)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPN2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPN2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

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6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL DIFFERENTIAL PRESSURE PANEL PER MECHANICAL PIPING PLANS AND TCC DRAWINGS. MECHANICAL CONTRACTOR RESPONSIBLE FOR 1/4" TUBING FROM THE PANEL TO THE TAPS AT THE MAIN PIPING.

1A AIR HANDLING UNIT E-AHU-N1

NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
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OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM.
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Hot Water Differential Pressure (HW-DPT)	x								x		x
Chilled Water Differential Pressure (CHW-DPT)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPN1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPN1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
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Bid Set 03
Produced BNW / DLM

KATHLEEN HENSTEN SARAH REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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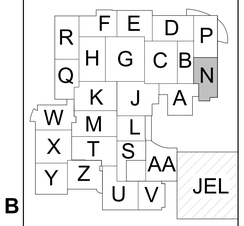
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

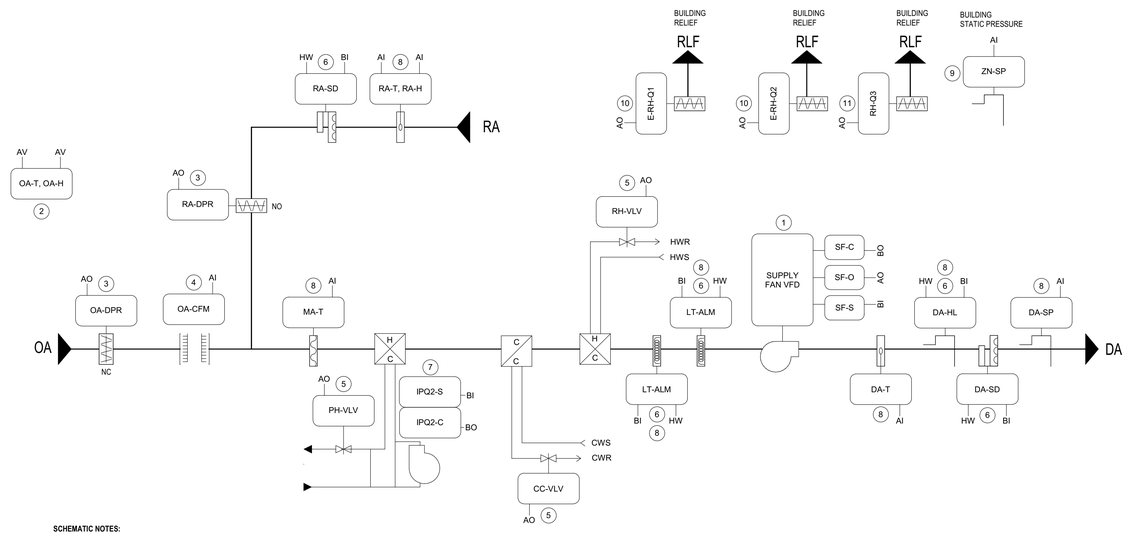
M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-718.3

M-718.3 TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
Plotted: 3/3/2023 2:59:07 PM CDT by Sarah Hempstead



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE 24VAC AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW BUILDING STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE ACTUATOR TO CIC FOR INSTALLATION AND WIRING.
11. TCC SHALL PROVIDE NEW DAMPER ASSEMBLY WITH ACTUATOR AND CONTROL DAMPER AS REQUIRED. CIC TO INSTALL DAMPER ACTUATOR AND WIRING. SHEETMETAL CONTRACTOR SHALL INSTALL NEW DAMPER AS SCHEDULED. SEE M-607.3 FOR REQUIREMENTS.

1C AIR HANDLING UNIT E-AHU-Q2
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFQn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

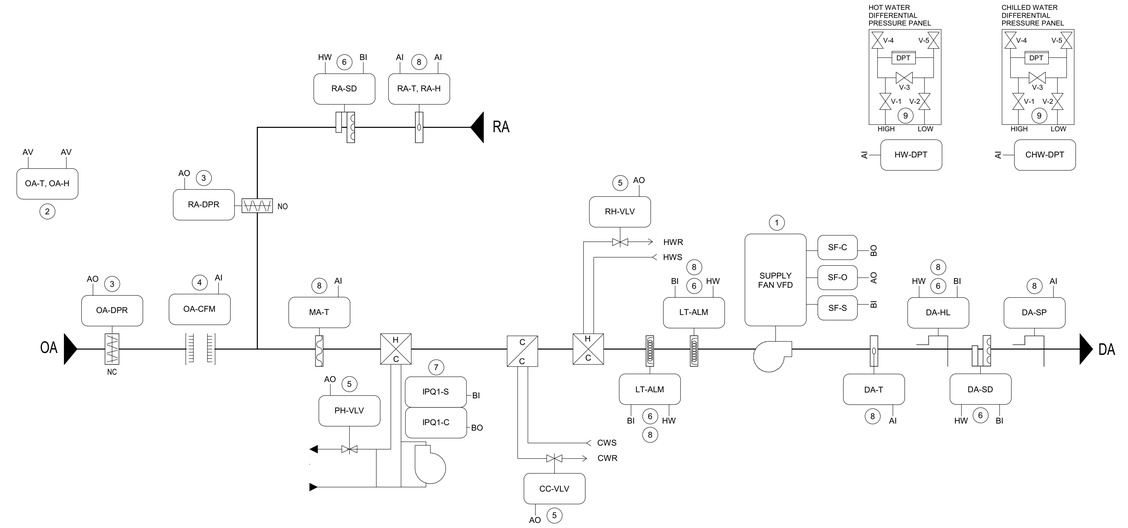
MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Damper (E-RH-Q1, E-RH-Q2, RH-Q3)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPQ2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPQ2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL DIFFERENTIAL PRESSURE PANEL PER MECHANICAL PIPING PLANS AND TCC DRAWINGS. MECHANICAL CONTRACTOR RESPONSIBLE FOR 1/4" TUBING FROM THE PANEL TO THE TAPS AT THE MAIN PIPING.

1A AIR HANDLING UNIT E-AHU-Q1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
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-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
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SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Hot Water Differential Pressure (HW-DPT)	x								x		x
Chilled Water Differential Pressure (CHW-DPT)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPQ1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPQ1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Bid Set 03
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REGISTERED
NO. AR10400134
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INDIANA
ARCHITECT

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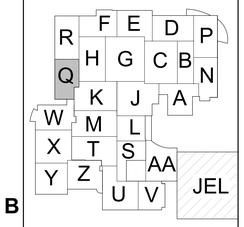
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-720.3

M-720.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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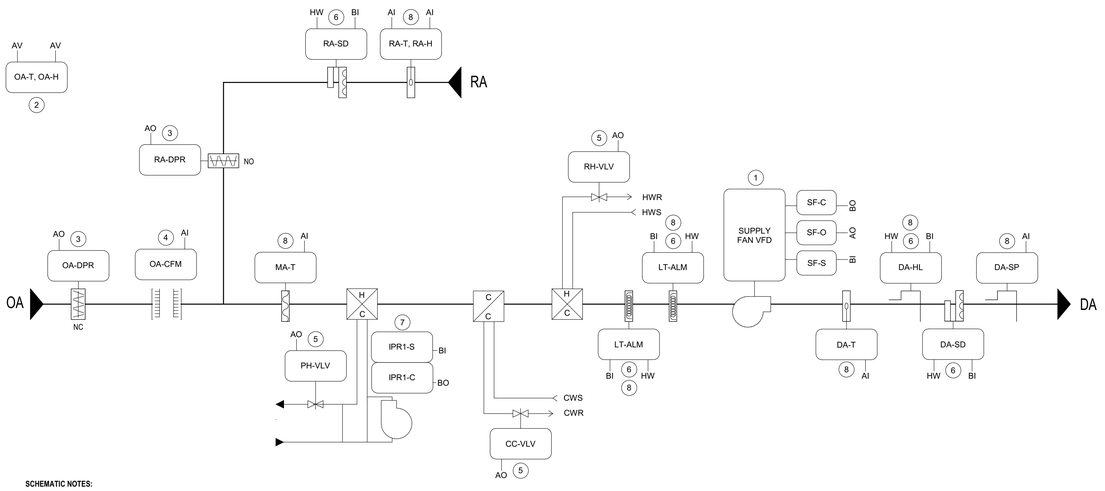

SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.

1A AIR HANDLING UNIT E-AHU-R1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Freezestat (LT-ALM)			x						x	x	x

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPR1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPR1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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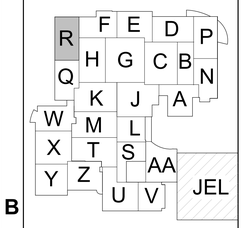

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-721.3

M-721.1, TEMPERATURE CONTROLS SCHEMATICS
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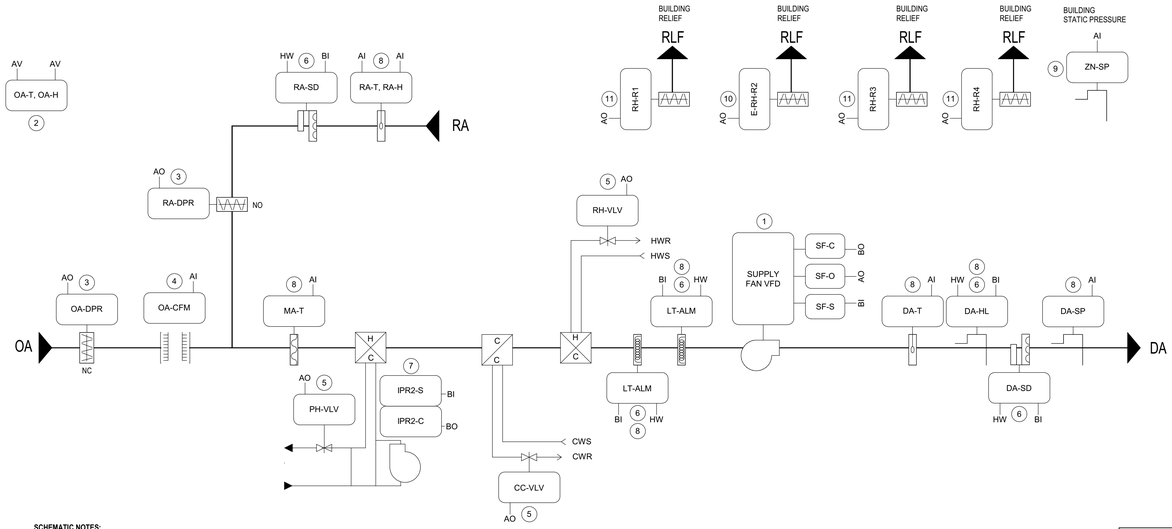

SCHEMATIC NOTES:

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NOT TO SCALE

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EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFRn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

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OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Hood (RH-R1, E-RH-R2, RH-R3, RH-R4)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x		x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPR2-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPR2-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO.
AR10400134
STATE OF
INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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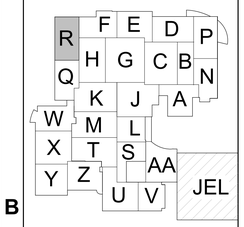

KEY PLAN

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M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-722.3

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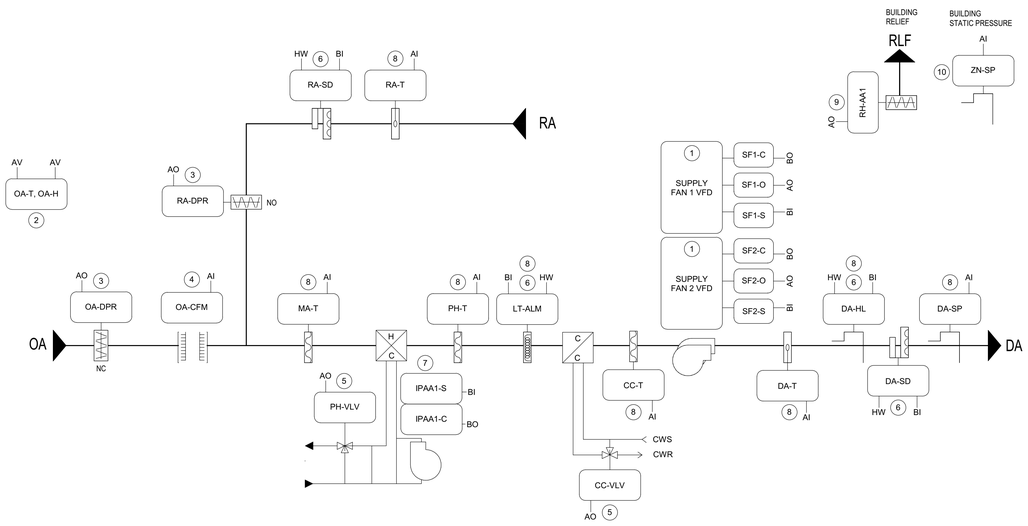

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NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

TCC SHALL SHALL PROVIDE A NEW TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER. CIC IS RESPONSIBLE FOR INSTALLATION OF PANEL AND WIRING. DIVISION 26 CONTRACTOR TO BRING POWER TO THE PANEL ON A DEDICATED CIRCUIT.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFAAn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

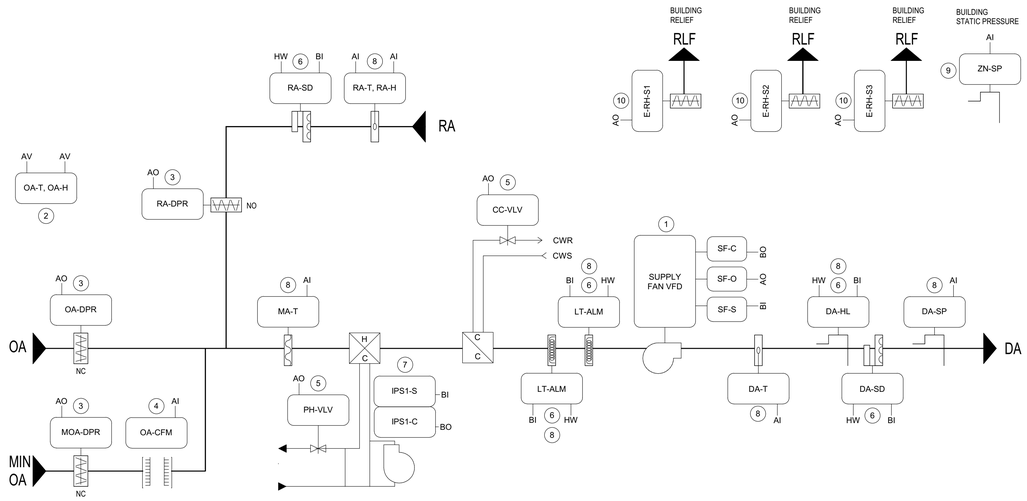
PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Mixed Air Temperature (MA-T)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Supply Air Temperature (DA-T)	x								x		x
Preheat Discharge Air Temperature (PH-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Outside Air Damper (OA-DPR)		x							x		x
Return Air Damper (RA-DPR)		x							x		x
Supply Fan VFD Speed (SFn-O)		x							x		x
Relief Hood Damper (RH-AA1)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Return Air Smoke Detector (RA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SFn-S)			x						x		x
Inline Circulation Pump Status (IPAA1-S)			x						x		x
Supply Fan Start/Stop (SFn-C)				x					x		x
Inline Circulation Pump Start/Stop (IPAA1-C)				x					x		x



SCHEMATIC NOTES:

1. VARIABLE FREQUENCY DRIVE PROVIDED BY TCC TO ELECTRICAL CONTRACTOR FOR INSTALLATION AND POWER. SEE MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR CONTROL AND BACnet COMMUNICATION WIRING.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.
3. CONTROL DAMPER ACTUATOR PROVIDED BY TCC TO CIC FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE AIRFLOW MEASURING STATION. MECHANICAL CONTRACTOR SHALL INSTALL. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE VALVE ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC TO REUSE CONTROL AND POWER WIRING. VALVE BODY TO REMAIN UNLESS NOTED ON M-601.3 EXISTING AIR HANDLING UNIT SCHEDULE NOTE 11.
6. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED. CIC SHALL INTERLOCK WITH EXISTING SMOKE DETECTOR SHUTDOWN CONTACT.
7. REFERENCE MECHANICAL SCHEDULE FOR PUMP DETAILS ON M-603.3.
8. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW CONTROL DEVICE.
9. TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW DUCT STATIC PRESSURE TRANSDUCERS. TCC SHALL FURNISH NEW POLY TUBING AND ALL REQUIRED ACCESSORIES TO MEASURE BUILDING STATIC PRESSURE. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
10. TCC SHALL PROVIDE ACTUATOR TO CIC FOR INSTALLATION AND WIRING.

1A AIR HANDLING UNIT E-AHU-S1
NOT TO SCALE

VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

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RELIEF HOOD DAMPER SHALL CLOSE
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	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE					x				x		x
Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Minimum Outside Air Damper (MOA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Relief Dampers (E-RH-S1, E-RH-S2, E-RH-S3)		x							x		x

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPS1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPS1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

KATHLEEN HEMPSTEAD SARAH REGISTERED STATE OF INDIANA ARCHITECT NO. AR10400134

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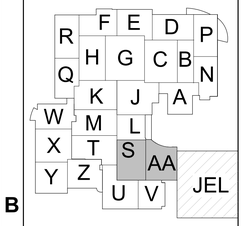
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-723.3

M-723.3 - TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_
Autodesk Docs://2019-067.NCH - North Central High School/2019-067.NCH_BIM360_CA_2022_Central.rvt
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SCHEMATIC NOTES:

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10. TCC SHALL PROVIDE ACTUATOR TO CIC FOR INSTALLATION AND WIRING.
11. TCC SHALL PROVIDE AND CIC SHALL INSTALL DIFFERENTIAL PRESSURE PANEL PER TCC DRAWINGS. MECHANICAL CONTRACTOR RESPONSIBLE FOR 1/4" TUBING FROM THE PANEL TO THE TAPS AT THE MAIN PIPING.

1A AIR HANDLING UNIT E-AHU-T1
NOT TO SCALE

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SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

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DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

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Outside Air Humidity (OA-H) NETWORK SHARE					x				x		x
Supply Air Temperature (DA-T)	x								x		x
Mixed Air Temperature (MA-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Duct Static Pressure (DA-SP)	x								x		x
Building Static Pressure (ZN-SP)	x								x		x
Outside Airflow (OA-CFM)	x								x		x
Hot Water Differential Pressure (HW-DPT)	x								x		x
Chilled Water Differential Pressure (CHW-DPT)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (PH-VLV)		x							x		x
Reheat Valve (RH-VLV)		x							x		x
Mixed Air Damper (MA-DPR)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x

	Hardware Points				Software Points						Show On
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Graphic
Relief Dampers (E-RH-T1, E-RH-T2)		x							x		x
Freezestat (LT-ALM)			x						x	x	x
Smoke Detector (RA-SD, DA-SD)			x						x	x	x
Static Pressure High Limit (DA-HL)			x						x	x	x
Supply Fan Status (SF-S)			x						x		x
Inline Circulation Pump Status (IPT1-S)			x						x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Inline Circulation Pump Start/Stop (IPT1-C)				x					x		x
Supply Air Temperature Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
High Supply Air Temperature						x				x	
Low Supply Air Temperature						x				x	
Supply Fan Failure						x				x	
Supply Fan in Hand						x				x	
Supply Fan Runtime Exceeded						x				x	

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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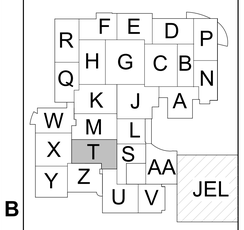
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-724.3

M-724.3 TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M-724.3 of Washington Township, North Central High School Renovation - Additions Phase 3
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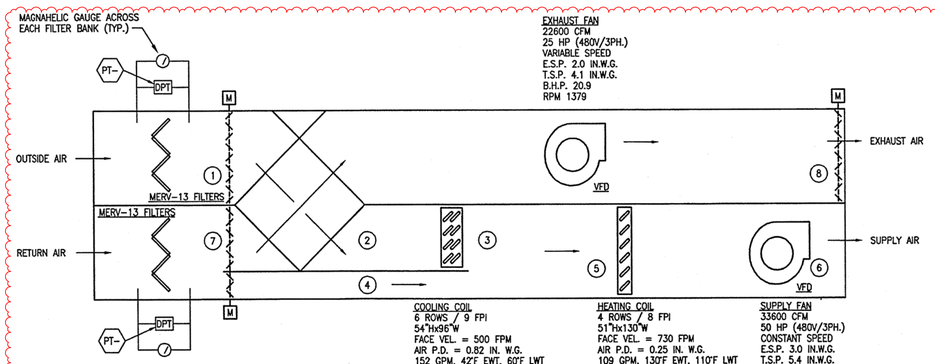
Plotted By: Brian Wilson

A3.3



BASIS OF DESIGN: INNOVENT MODEL NDHU

AHU-1 & AHU-2 OPERATING CONDITIONS

LOCATION	DESCRIPTION	SUMMER CONDITIONS	WINTER CONDITIONS
1	OUTSIDE AIR ENTERING HEAT EXCHANGER	95.8°F DB / 80.5°F WB 18000 CFM (MAX OA) 44.0 BTU/LB	4.1°F DB / 3.2°F WB 11450 CFM (MIN OA) 1.7 BTU/LB
2	OUTSIDE AIR LEAVING HEAT EXCHANGER	88.8°F DB / 78.9°F WB 18000 CFM 42.2 BTU/LB	41.7°F DB / 29.7°F WB 11450 CFM 10.7 BTU/LB
3	OUTSIDE AIR LEAVING COOLING COIL	58.8°F DB / 58.7°F WB 18000 CFM 25.5 BTU/LB	41.7°F DB / 29.7°F WB 11450 CFM 10.7 BTU/LB
4	RETURN AIR BYPASSING COOLING COIL	84.0°F DB / 72.6°F WB 15600 CFM 36.1 BTU/LB	84.0°F DB / 66.7°F WB 22150 CFM 31.1 BTU/LB
5	MIXED AIR ENTERING HEATING COIL	70.2°F DB / 65.6°F WB 33600 CFM 30.3 BTU/LB	68.8°F DB / 56.1°F WB 33600 CFM 23.7 BTU/LB
6	SUPPLY AIR LEAVING HEATING COIL	100.0°F DB / 74.6°F WB 33600 CFM 37.7 BTU/LB	98.8°F DB / 66.8°F WB 33600 CFM 31.1 BTU/LB
7	EXHAUST AIR ENTERING HEAT EXCHANGER	84.0°F DB / 72.6°F WB 22600 CFM 36.1 BTU/LB	84.0°F DB / 66.7°F WB 16050 CFM 31.1 BTU/LB
8	EXHAUST AIR LEAVING HEAT EXCHANGER	89.7°F DB / 74.2°F WB 22600 CFM 37.5 BTU/LB	57.1°F DB / 57.1°F WB 16050 CFM 24.5 BTU/LB

AIR HANDLING UNIT NOTES:

1. ALL DAMPERS AT ALL THREE AHU'S SHALL BE PROVIDED BY THE UNIT MANUFACTURER AND SHALL BE INTEGRAL TO THE UNITS. THE DAMPER MOTORS SHALL BE PROVIDED AND WIRED BY SECTION 15900.
2. SECTION 15900 SHALL PROVIDE FREEZE STATS ON THE LEAVING AIR SIDE OF THE COOLING COIL IN ALL THREE AHU'S. FREEZE STAT SET POINT SHALL BE 39°F.
3. SECTION 15900 SHALL PROVIDE LEAVING WATER TEMPERATURE TRANSMITTERS AT ALL COILS 1-1/2" AND LARGER.
4. SECTION 15900 SHALL PROVIDE VFD'S FOR AHU-1 & 2 EXHAUST FANS AND AHU-3 SUPPLY FAN.

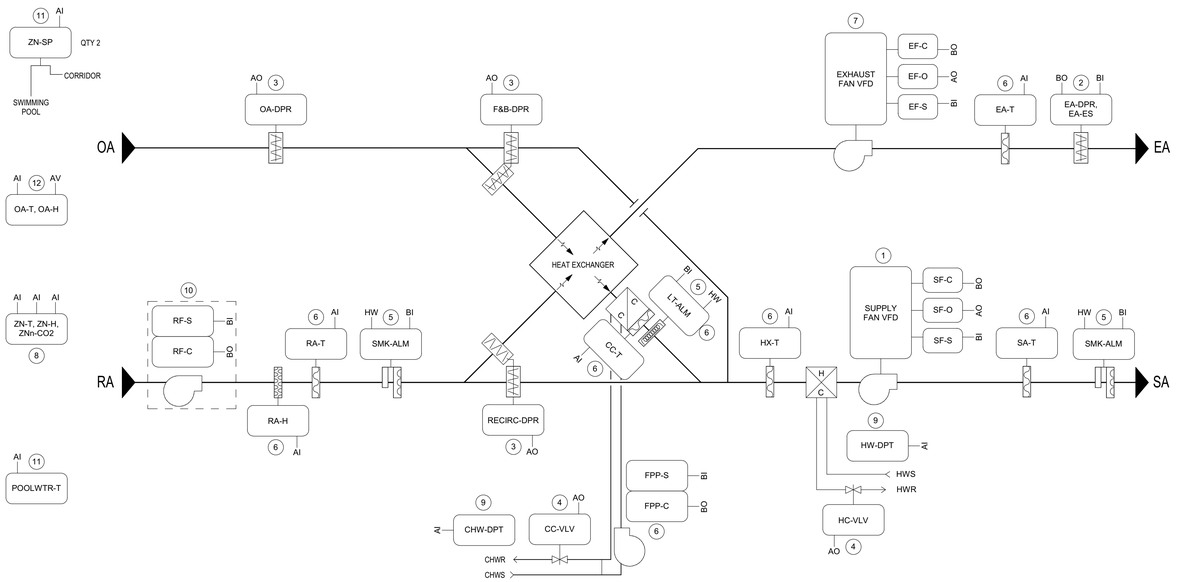
AHU-1 & AHU-2 SCHEMATIC

NO SCALE

AIR BALANCE NOTES:

1. THE SUPPLY AND EXHAUST FANS AT EACH AHU SHALL BE BALANCED BY SHEAVE CHANGE ONLY. DO NOT BALANCE WITH DAMPERS.

OWNER PROVIDED AS-BUILT DRAWINGS. FOR REFERENCE PURPOSES ONLY.



SCHEMATIC NOTES:

1. AHU-1 AND AHU-2 SUPPLY FANS SHALL BE CONVERTED FROM THE EXISTING MOTOR STARTER SOLUTION TO VARIABLE FREQUENCY DRIVES. TCC SHALL PROVIDE DRIVES TO THE DIVISION 26 CONTRACTOR FOR MOUNTING AND RECONNECTION TO EXISTING POWER. CIC RESPONSIBLE FOR CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING.
2. CONTROL DAMPER EXISTING. TCC SHALL PROVIDE REPLACEMENT ACTUATOR WITH END-SWITCH TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
3. CONTROL DAMPER EXISTING. TCC SHALL PROVIDE REPLACEMENT ACTUATOR TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE REPLACEMENT VALVE ACTUATORS TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
6. TCC SHALL PROVIDE REPLACEMENT SENSOR/DEVICE TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
7. EXISTING VARIABLE FREQUENCY DRIVE CONTROL AND MONITORING SHALL BE REWIRED TO NEW CONTROLLER BY THE CONTROLS INSTALLATION CONTRACTOR PER TCS DRAWINGS.
8. PROVIDE TEMPERATURE, HUMIDITY, AND CO2 SENSOR FOR NATATORIUM IN EXISTING LOCATION. CIC TO INSTALL AND WIRE NEW DEVICE.
9. TCC SHALL PROVIDE REPLACEMENT DIFFERENTIAL PRESSURE TRANSMITTERS AND 5-VALVE MANIFOLD ASSEMBLIES PRE-ASSEMBLED WITHIN PANEL FOR DIVISION 23 CONTRACTOR TO INSTALL IN ACCESSIBLE LOCATION ON THE WALL AND TUBING TO EXISTING PORTS ON PIPING MAINS. CIC RESPONSIBLE FOR INSTALLATION OF THE CONTROL WIRING BACK TO CONTROLLER. TCC SHALL TRANSFER VALUES FROM ONE HOT AND ONE CHILLED WATER TRANSMITTER TO THE CENTRAL PLANT FOR AVERAGING WITH OTHER SENSORS.
10. ONE RETURN FAN ASSOCIATED WITH BOTH AHU-1 AND AHU-2 SHALL RECEIVE NEW DEVICES BY TCC FOR INSTALLATION BY CONTROLS INSTALLATION CONTRACTOR.
11. TCC SHALL PROVIDE NEW SENSOR/DEVICE TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING. POOL WATER SENSOR SHALL BE INSTALLED IN POOL WATER PIPING TO SENSE POOL WATER TEMPERATURE.
12. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.

1A EXISTING TO REMAIN POOL AIR HANDLING UNITS AHU-1, AHU-2
NOT TO SCALE

NATATORIUM AIR HANDLING UNIT 1 AND 2 SEQUENCE OF OPERATION

TCC PROVIDED CONTROLLER SHALL BE INSTALLED, WIRED, AND CONNECTED TO EXISTING CONTROL CIRCUIT BY THE CONTROLS INSTALLATION CONTRACTOR. AHU-1 SHALL USE THE POOL SPACE (HIGH PRESSURE) AND CORRIDOR (NEGATIVE PRESSURE) AS THE REFERENCE STATIC PRESSURE POINTS FOR THE EXHAUST FAN TO MAINTAIN A NEGATIVE SPACE PRESSURE (ZN-SP) AS NOTED BELOW. TCC SHALL PROVIDE NEW PROGRAMMING AND CONTROL DEVICES TO MAINTAIN A FIXED DIFFERENTIAL BETWEEN POOL WATER TEMPERATURE AND SPECTATOR ADJUSTABLE ZONE TEMPERATURE. MINIMUM SPECTATOR TEMPERATURE SETPOINT SHALL BE 76 F AND MAXIMUM SHALL BE 80F (ADJ). TCC SHALL PROVIDE POOL WATER TEMPERATURE SENSOR FOR INSTALLATION BY THE CIC AND USE IN LOGIC WITHIN THE BUILDING AUTOMATION SYSTEM. CLASSROOM VAV CONTROLS SHALL BE REPLACED EXACTLY AS CURRENTLY IMPLEMENTED. SEE AS-BUILT TEMPERATURE CONTROL DRAWINGS FOR ADDITIONAL DETAILS. TCC SHALL REPLACE CONTROLS, VALVE ASSEMBLY, DAMPER ACTUATORS, AND VFDS. REFERENCE OWNER PROVIDED AS-BUILT DRAWINGS FOR ADDITIONAL DETAILS AND REQUIREMENTS. TCC SHALL ENABLE/DISABLE HIGH VOLUME LOW SPEED FANS ACCORDING TO SEQUENCE OF OPERATION PROVIDED ON M-708.3 DETAIL 1A.

DDC SHALL HAVE ONE DIGITAL OUTPUT FOR LOCAL INDICATION OF AN ALARM CONDITION. (I.E. BLOWER CURRENT/DIFFERENTIAL PRESSURE SWITCH, DAMPER END SWITCHES, FREEZE STAT, FIRE STAT, SMOKE, DIRTY FILTERS…).

1. AHU-1 AND AHU-2 SUPPLY FANS SHALL BE CONVERTED FROM THE EXISTING MOTOR STARTER SOLUTION TO VARIABLE FREQUENCY DRIVES. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES. AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
2. PROVIDE LOW LIMIT PROTECTION. NUMBER AS REQUIRED ON THE DISCHARGE OF AHU CHILLED WATER COILS TO SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. PROVIDE STRAP ON SENSOR TO OVERRIDE CONTROL VALVE UPON SENSING 39F AT THE CHILLED WATER RETURN LINE OF THE COOLING COIL. LOW LIMIT PROTECTION ON THE DISCHARGE OF AHU CHILLED WATER COILS SHALL SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. IMMERSION SENSOR SHALL OVERRIDE CONTROL VALVE LOGIC UPON SENSING 39F (ADJ) AT THE CHILLED RETURN LINE OF THE COOLING COIL.
3. DIVISION 26 CONTRACTOR SHALL PROVIDE AND MOUNT DUCT DETECTORS IN THE SUPPLY AIR (SA) AND RETURN AIR (RA) DUCTS. CIC SHALL WIRE DETECTORS TO STOP THE SUPPLY FAN (SA) AND GENERATE A BAS ALARM.
4. EITHER OF THE ABOVE SAFETIES SHALL STOP THE FAN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN THE HEATING CONTROL VALVE WHEN IN ALARM.
5. POOL WATER TEMPERATURE SENSOR SHALL BE UTILIZED TO CALCULATE SPACE TEMPERATURE VERSUS WATER TEMPERATURE DIFFERENTIAL. TCC SHALL INCLUDE SPACE AND WATER TEMPERATURE ON GRAPHIC. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES. AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
6. OUTSIDE AIR HEAT EXCHANGER FACE AND BYPASS DAMPER: (THE OUTSIDE AIR MAXIMUM AND MINIMUM SETTINGS SHALL BE SET AT ORIGINAL START-UP VALUES.)
   A. ENERGY RECOVERY MODE:
      1. UNIT SHALL OPERATE IN ENERGY RECOVERY MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS 38F AND ABOVE.
      2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE FULL OPEN TO FACE AND FULL CLOSED TO BYPASS TO PASS ALL OUTSIDE AIR THROUGH THE HEAT EXCHANGER.
   B. WINTER DEFROST MODE:
      1. UNIT SHALL OPERATE IN WINTER DEFROST MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS BELOW 39F.
      2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE OPEN TO BYPASS AND CLOSED TO THE FACE, BYPASSING SOME OF THE OUTSIDE AIR TO PREVENT FROST FORMATION ON THE EXHAUST SIDE OF THE HEAT EXCHANGER. UNIT SHALL OPERATE IN THIS MODE UNTIL THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS ABOVE 38F.
7. COOLING
   A. COOLING SHALL BE LOCKED OUT WHEN THE VALIDATED OUTSIDE AIR TEMPERATURE IS BELOW 55F.
   B. THE COOLING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE AIR TEMPERATURE AT SETPOINT. THIS SIGNAL SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.
8. HEATING
   A. THE HEATING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE TEMPERATURE AT SETPOINT. THIS SIGNAL SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.
9. SPACE PRESSURIZATION CONTROL
   A. THE EXHAUST FAN VFD SHALL MODULATE FAN SPEED AS REQUIRED TO MAINTAIN NEGATIVE POOL SPACE PRESSURE RELATIVE TO THE ADJACENT SPACES. DIFFERENTIAL PRESSURE SETPOINT SHALL BE 0.04" W.C. (ADJ).
10. SPACE HUMIDITY CONTROL
   A. RETURN AIR DEW POINT CONTROL: UNIT DEHUMIDIFICATION CONTROLS SHALL MAINTAIN RETURN AIR AT 86F AT 50% RH.
   B. OUTSIDE AIR AND RECIRCULATION AIR DAMPERS
      1. OA DAMPER AT MINIMUM POSITION; RECIRCULATION DAMPER AT MAXIMUM POSITION: THE EXHAUST FAN VFD OPERATES FAN AT MINIMUM EXHAUST SETTING.
      2. OA DAMPER AT MAXIMUM POSITION, RECIRCULATION DAMPER AT MINIMUM POSITION: COOLING COIL PI VALVE MODULATES AS REQUIRED FOR COIL DISCHARGE TEMPERATURE CONTROL OR RETURN AIR DEW POINT CONTROL.
11. SUPPLY AIR TEMPERATURE RESET
   A. THE SUPPLY AIR TEMPERATURE AT THE AHU DISCHARGE SHALL BE RESET WITHIN THE LIMITS BELOW TO MAINTAIN THE RETURN AIR TEMPERATURE AT SETPOINT OF 86F (ADJ).
      1. SUPPLY AIR MINIMUM SETPOINT OF 60F (ADJ).
      2. SUPPLY AIR MAXIMUM SETPOINT OF 120F (ADJ).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T)	x								x		x
Outside Air Humidity (OA-H)	x								x		x
Heat Exchanger Air Temperature (HX-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Supply Air Temperature (SA-T)	x								x		x
Exhaust Air Temperature (EA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Space Temperature (ZN-T)	x								x		x
Space Humidity (ZN-H)	x								x		x
Space CO2 Concentration Level (ZN-CO2)	x								x		x
Space Static Pressure (ZN-SP) QTY 2	x								x		x
Pool Water Temperature (POOLWTR-T)	x								x		x
Water Differential Pressure (HW-DPT, CHW-DPT)	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (HC-VLV)		x							x		x
Outside Air Dampers (OA-DPR)		x							x		x
HX Face and Bypass Damper (F&B-DPR)		x							x		x
Recirculation Air Damper (RECIRC-DPR)		x							x		x
Exhaust Air Damper (EA-DPR)		x							x		x
Exhaust Fan VFD Speed (EF-O)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Occupancy Sensor (OCC-S)		x							x		x
Freezestat (LT-ALM) QTY 2			x						x	x	x
Static Pressure High Limit (HL-ALM)			x						x	x	x
Return & Supply Air Smoke Detector (SMK-ALM) QTY 2			x						x	x	x
Exhaust Fan Status (EF-S)			x						x		x
Supply Fan Status (SF-S)			x						x		x
Freeze Protection Pump Status (FPP-S)			x						x		x
Return Fan Status (RF-S)			x						x		x
Damper Endswitch (OA-ES, EA-ES) QTY 2			x						x		x
Exhaust Fan Start/Stop (EF-C)				x					x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Freeze Protection Pump Start/Stop (FPP-C)				x					x		x
Return Fan Start/Stop (RF-C)				x					x		x

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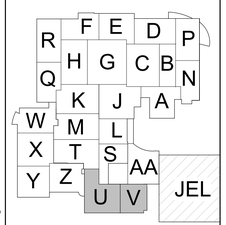

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-725.3

M-725.3_TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
Autodesk Docs://2019-067.NCH_North Central High School/2019-067.NCH_BNDWTP_M_ARCH_Detached.rvt
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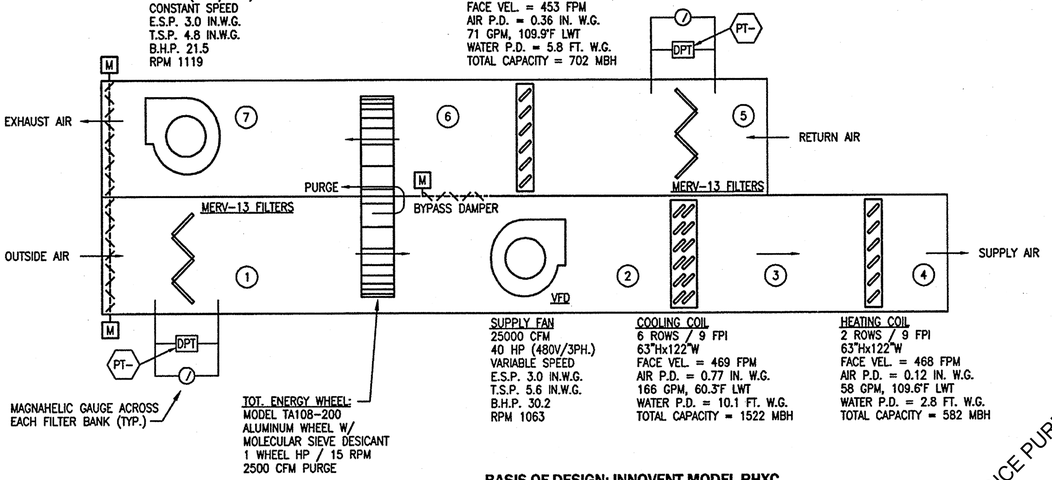
OWNER PROVIDED AS-BUILT DRAWINGS. FOR REFERENCE PURPOSES ONLY.
CONTROLS INSTALLATION CONTRACTOR ONLY SCOPE OF WORK.



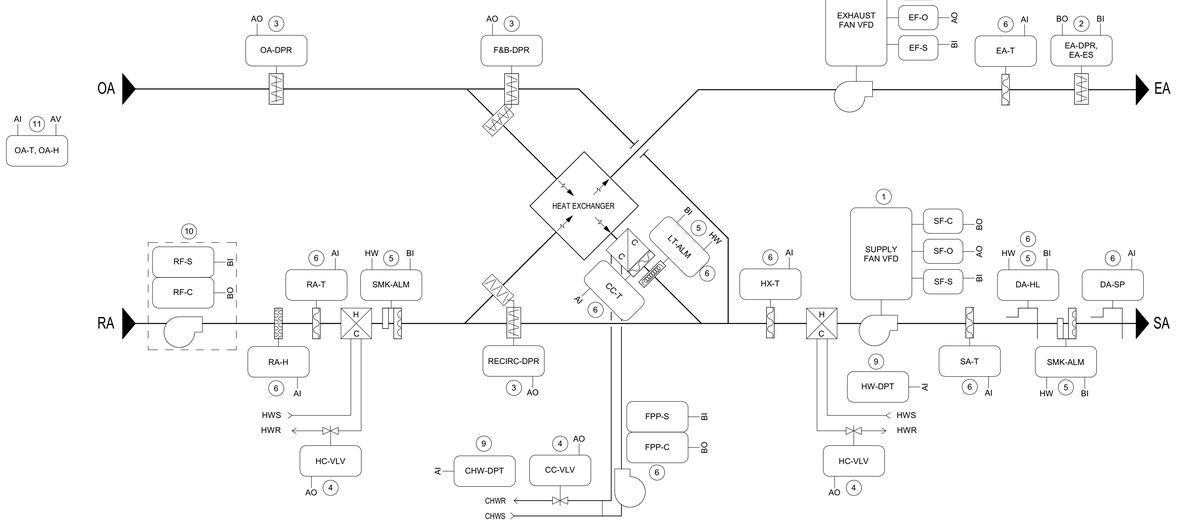
BASIS OF DESIGN: INNOVENT MODEL RHXC

AHU-3 SCHEMATIC
NO SCALE

FOR REFERENCE PURPOSES ONLY

AHU-3 OPERATING CONDITIONS

LOCATION	DESCRIPTION	SUMMER CONDITIONS	WINTER CONDITIONS
1	OUTSIDE AIR ENTERING ENERGY WHEEL	95.8°F DB / 80.5°F WB 44.0 BTU/LB	4.1°F DB / 3.2°F WB 1.7 BTU/LB
2	OUTSIDE AIR LEAVING ENERGY WHEEL	85.8°F DB / 72.9°F WB 36.4 BTU/LB	66.4°F DB / 43.5°F WB 16.7 BTU/LB
3	OUTSIDE AIR LEAVING COOLING COIL	54.9°F DB / 54.7°F WB 23.0 BTU/LB	66.4°F DB / 43.5°F WB 16.7 BTU/LB
4	OUTSIDE AIR LEAVING HEATING COIL	54.9°F DB / 54.7°F WB 23.0 BTU/LB	81.5°F DB / 50.6°F WB 20.4 BTU/LB
5	EXHAUST AIR ENTERING HEATING COIL	80.0°F DB / 66.8°F WB 31.2 BTU/LB	80.0°F DB / 63.7°F WB 28.8 BTU/LB
6	EXHAUST AIR ENTERING ENERGY WHEEL	80.0°F DB / 66.8°F WB 31.2 BTU/LB	115.2°F DB / 74.4°F WB 37.4 BTU/LB
7	EXHAUST AIR LEAVING ENERGY WHEEL	93.4°F DB / 75.5°F WB 38.8 BTU/LB	81.3°F DB / 64.2°F WB 29.1 BTU/LB



SCHEMATIC NOTES:

1. AHU-3 SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL BE REUSED BY THE TCC. THE CONTROLS INSTALLATION CONTRACTOR RESPONSIBLE FOR CONNECTION TO CONTROL, SAFETY, AND BACnet COMMUNICATION WIRING OF NEW CONTROLLERS.
2. CONTROL DAMPER EXISTING. TCC SHALL PROVIDE REPLACEMENT ACTUATOR WITH END-SWITCH TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
3. CONTROL DAMPER EXISTING. TCC SHALL PROVIDE REPLACEMENT ACTUATOR TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
4. TCC SHALL PROVIDE REPLACEMENT VALVE ACTUATORS TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED VARIABLE FREQUENCY DRIVE TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS ACTIVATED.
6. TCC SHALL PROVIDE REPLACEMENT SENSOR/DEVICE TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
7. EXISTING VARIABLE FREQUENCY DRIVE CONTROL AND MONITORING SHALL BE REWIRED TO NEW CONTROLLER BY THE CONTROLS INSTALLATION CONTRACTOR PER TCS DRAWINGS.
8. CIC RESPONSIBLE TO INTERLOCK SMOKE DETECTORS AND LOW LIMIT THERMOSTAT TO SAFETY CIRCUIT TO STOP AIR HANDLING UNIT OPERATION WHEN ACTIVATED.
9. TCC SHALL PROVIDE REPLACEMENT DIFFERENTIAL PRESSURE TRANSMITTERS AND 5-VALVE MANIFOLD ASSEMBLIES PRE-ASSEMBLED WITHIN PANEL FOR DIVISION 23 CONTRACTOR TO INSTALL IN ACCESSIBLE LOCATION ON THE WALL AND TUBING TO EXISTING PORTS ON PIPING MAINS. CIC RESPONSIBLE FOR INSTALLATION OF THE CONTROL WIRING BACK TO CONTROLLER. TCC SHALL TRANSFER VALUES FROM ONE HOT AND ONE CHILLED WATER TRANSMITTER TO THE CENTRAL PLANT FOR AVERAGING WITH OTHER SENSORS.
10. TCC SHALL PROVIDE NEW SENSOR/DEVICE TO CONTROLS INSTALLATION CONTRACTOR FOR INSTALLATION. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.
11. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE AND HUMIDITY VALUES.

EXISTING TO REMAIN POOL AIR HANDLING UNIT AHU-3
1A **NOT TO SCALE**

NATATORIUM AIR HANDLING UNIT 3 SEQUENCE OF OPERATION

TCC PROVIDED CONTROLLER SHALL BE INSTALLED, WIRED, AND CONNECTED TO EXISTING CONTROL CIRCUIT BY THE CONTROLS INSTALLATION CONTRACTOR. AHU-1 SHALL USE THE POOL SPACE (HIGH PRESSURE) AND CORRIDOR (NEGATIVE PRESSURE) AS THE REFERENCE STATIC PRESSURE POINTS FOR THE EXHAUST FAN TO MAINTAIN A NEGATIVE SPACE PRESSURE (ZN-SP) AS NOTED BELOW. TCC SHALL PROVIDE NEW PROGRAMMING AND CONTROL DEVICES TO MAINTAIN A FIXED DIFFERENTIAL BETWEEN POOL WATER TEMPERATURE AND SPECTATOR ADJUSTABLE ZONE TEMPERATURE. MINIMUM SPECTATOR TEMPERATURE SETPOINT SHALL BE 76 F AND MAXIMUM SHALL BE 80F (ADJ). TCC SHALL PROVIDE POOL WATER TEMPERATURE SENSOR FOR INSTALLATION BY THE CIC AND USE IN LOGIC WITHIN THE BUILDING AUTOMATION SYSTEM. CLASSROOM VAV CONTROLS SHALL BE REPLACED EXACTLY AS CURRENTLY IMPLEMENTED. SEE AS-BUILT TEMPERATURE CONTROL DRAWINGS FOR ADDITIONAL DETAILS. TCC SHALL REPLACE CONTROLS, VALVE ACTUATORS, DAMPER ACTUATORS, AND VFDS. REFERENCE OWNER PROVIDED AS-BUILT DRAWINGS FOR ADDITIONAL DETAILS AND REQUIREMENTS.

DDC SHALL HAVE ONE DIGITAL OUTPUT FOR LOCAL INDICATION OF AN ALARM CONDITION. (I.E. BLOWER CURRENT/DIFFERENTIAL PRESSURE SWITCH, DAMPER END SWITCHES, FREEZE STAT, FIRE STAT, SMOKE, DIRTY FILTERS…).

1. AIR HANDLING UNIT AHU-3 SHALL BE VARIABLE VOLUME SUPPLY AND CONSTANT AIR VOLUME EXHAUST.
2. PROVIDE LOW LIMIT PROTECTION. NUMBER AS REQUIRED ON THE DISCHARGE OF AHU CHILLED WATER COILS TO SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. PROVIDE STRAP ON SENSOR TO OVERRIDE CONTROL VALVE UPON SENSING 39F AT THE CHILLED WATER RETURN LINE OF THE COOLING COIL. LOW LIMIT PROTECTION ON THE DISCHARGE OF AHU CHILLED WATER COILS SHALL SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. IMMERSION SENSOR SHALL OVERRIDE CONTROL VALVE LOGIC UPON SENSING 39F (ADJ) AT THE CHILLED RETURN LINE OF THE COOLING COIL.
3. DIVISION 26 CONTRACTOR SHALL PROVIDE AND MOUNT DUCT DETECTORS IN THE SUPPLY AIR (SA) AND RETURN AIR (RA) DUCTS. CIC SHALL WIRE DETECTORS TO STOP THE SUPPLY FAN (SA) AND GENERATE A BAS ALARM.
4. EITHER OF THE ABOVE SAFETIES SHALL STOP THE FAN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN THE HEATING CONTROL VALVE WHEN IN ALARM.
5. FAN SHALL HAVE A DUCT STATIC PRESSURE HIGH LIMIT, LOCATED CLOSE TO THE FAN DISCHARGE TO PREVENT OVER-PRESSURIZING THE DUCT SYSTEM.
6. DAY MODE
   A. SA COOLING:
      1. COOLING SHALL BE LOCKED OUT WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 55F.
      2. THE COOLING COIL PRESSURE INDEPENDENT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN 55F AIR TEMPERATURE LEAVING THE COOLING COIL.
   B. SA HEATING:
      1. THE HEATING COIL PRESSURE INDEPENDENT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE TEMPERATURE PER THE CRITICAL ZONE RESET SEQUENCE BELOW. THIS SIGNAL SHALL BE OVER-RIDDEN AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING WATER TEMPERATURE MINIMUM OF 55F, AS MEASURED BY THE TEMPERATURE TRANSMITTER.
   C. DEFROST MODE (EA HEATING):
      1. THE HEATING COIL CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN EXHAUST AIR TEMPERATURE ABOVE THE DEFROST SETPOINT OF 35F (ADJ).
   D. BYPASS DAMPERS SHALL REMAIN FULLY CLOSED.
7. THE OUTSIDE AIR MAXIMUM AND MINIMUM SETTINGS SHALL BE SET PER ORIGINAL SYSTEM START-UP BY BALANCER.
8. DIRTY FILTER ALARM: EACH FILTER SECTION AT THE AIR HANDLING UNIT SHALL BE FITTED WITH A DIFFERENTIAL PRESSURE SENSOR AND TRANSMITTER WITH OUTPUTS MONITORED BY THE BUILDING AUTOMATION SYSTEM. UPON SENSING A HIGH LIMIT OF 0.5" WATER DIFFERENTIAL, THE CONTROLLER SHALL SIGNAL A DIRTY FILTER ALARM.
9. CRITICAL ZONE RESET
   A. THE AHU DISCHARGE AIR TEMPERATURE SHALL BE RESET FROM 55F TO 68F (MAX), AS REQUIRED TO KEEP THE VAV TERMINAL UNIT PRIMARY AIR VALVE IN THE 100% OPEN POSITION AT THE MOST CRITICAL ZONE. THE MOST CRITICAL ZONE IS THAT ZONE WITH THE GREATEST CALL FOR COOLING.
   B. WHEN THE CRITICAL ZONE SPACE TEMPERATURE RISES MORE THAN 2F ABOVE THE COOLING SETPOINT, THE AHU DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET DOWNWARD AS REQUIRED TO MAINTAIN THE CRITICAL ZONE SPACE TEMPERATURE AT SETPOINT.
   C. CRITICAL ZONE RESET SHALL BE ALLOWED WHEN THE OUTSIDE AIR TEMPERATURE IS 50F (ADJ) AND BELOW.
10. NIGHT MODE:
    A. THE OUTSIDE AIR DAMPER SHALL BE CLOSED. THE SUPPLY FAN, EXHAUST FAN, AND ENERGY WHEEL SHALL ALL BE OFF.
    B. AVERAGE OF SPACE TEMPERATURES SHALL BE CALCULATED BY TCC AND SHALL START THE AHU IF THE AVERAGE TEMPERATURE FALL BELOW THE NOMINAL NIGHT SETBACK TEMPERATURE OF 60F (ADJ). THE AHU SHALL OPERATE AS DESCRIBED BELOW IN THE MORNING WARM-UP SECTION AND SHALL SHUT OFF WHEN THE NOMINAL OCCUPIED SETPOINT IS REACHED.
    C. THE AHU SHALL OPERATE AS DESCRIBED ABOVE IN THE DAY MODE SECTION WHEN SPACE OVERRIDE BUTTONS ARE PUSHED AT THE SPACE THERMOSTATS. THE AHU SHALL RETURN TO NIGHT MODE 10 MINUTES (ADJ) AFTER SPACE OVERRIDE PERIOD ENDS.
11. MORNING WARM-UP:
    A. THE SYSTEM SHALL ENTER MORNING WARM-UP MODE WHEN THE SYSTEM IS GOING FROM NIGHT UNOCCUPIED MODE TO DAY MODE AND THE OUTSIDE AIR TEMPERATURE IS BELOW 60F (ADJ).
    B. THE AHU OUTSIDE AIR DAMPER SHALL REMAIN CLOSED THROUGHOUT THIS MODE OF OPERATION AND THE BYPASS DAMPER SHALL OPEN. THE EXHAUST FAN AND THE ENERGY WHEEL SHALL REMAIN OFF THROUGHOUT THIS MODE OF OPERATION.
    C. THE AHU SUPPLY FAN SHALL INITIATE AND THE SUPPLY AIR HEATING COIL CONTROL VALVE SHALL FULLY OPEN.
    D. THE EXHAUST AIR HEATING COIL CONTROL VALVE SHALL MODULATE AS REQUIRED TO PREVENT FROST FORMATION ON THE ENERGY WHEEL.
    E. THE TERMINAL UNIT BOXES SHALL OPERATE AS DESCRIBED IN THE MORNING WARM-UP SECTION OF THE TERMINAL UNIT SEQUENCE OF OPERATION.
    F. THE SYSTEM SHALL OPERATE IN THIS MODE UNTIL ALL SPACES ARE AT THE OCCUPIED TEMPERATURE SETPOINT. THE SYSTEM SHALL THEN ENTER DAY MODE OF OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.

	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T)	x								x		x
Outside Air Humidity (OA-H)	x								x		x
Heat Exchanger Air Temperature (HX-T)	x								x		x
Return Air Temperature (RA-T)	x								x		x
Return Air Humidity (RA-H)	x								x		x
Supply Air Temperature (SA-T)	x								x		x
Exhaust Air Temperature (EA-T)	x								x		x
Cooling Discharge Air Temperature (CC-T)	x								x		x
Space Temperature (ZN-T)	x								x		x
Space Humidity (ZN-H)	x								x		x
Space CO2 Concentration Level (ZN-CO2)	x								x		x
Space Static Pressure (ZN-SP) QTY 2	x								x		x
Cooling Valve (CC-VLV)		x							x		x
Heating Valve (HC-VLV)		x							x		x
Outside Air Dampers (OA-DPR)		x							x		x
HX Face and Bypass Damper (F&B-DPR)		x							x		x
Recirculation Air Damper (RECIRC-DPR)		x							x		x
Exhaust Air Damper (EA-DPR)		x							x		x
Exhaust Fan VFD Speed (EF-O)		x							x		x
Supply Fan VFD Speed (SF-O)		x							x		x
Occupancy Sensor (OCC-S)		x							x		x
Freezestat (LT-ALM) QTY 2			x						x	x	x
Static Pressure High Limit (HL-ALM)			x						x	x	x
Return & Supply Air Smoke Detector (SMK-ALM) QTY 2			x						x	x	x
Exhaust Fan Status (EF-S)			x						x		x
Supply Fan Status (SF-S)			x						x		x
Freeze Protection Pump Status (FPP-S)			x						x		x
Return Fan Status (RF-S)			x						x		x
Damper Endswitch (OA-ES, EA-ES) QTY 2			x						x		x
Exhaust Fan Start/Stop (EF-C)				x					x		x
Supply Fan Start/Stop (SF-C)				x					x		x
Freeze Protection Pump Start/Stop (FPP-C)				x					x		x
Return Fan Start/Stop (RF-C)				x					x		x

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEUSTIS REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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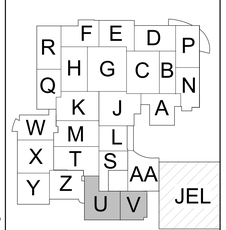
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-726.3

M:\PLS_TEMP\REVIT\MEP CONTROLS DRAWINGS.RVT2
2019-067 HCHS @ M.S.D. of Washington Township, North Central High School Renovation,
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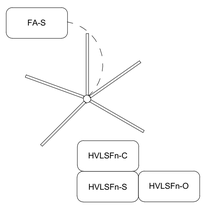


HIGH VOLUME LOW SPEED (HVLS) FANS SEQUENCE OF OPERATION

THE HVLS FANS SHALL BE FURNISHED WITH A SINGLE CONTROLLER WITH BACnet MSTP INTERFACE AND 50 FEET OF CAT-5E CONTROL CABLE FOR INTERLOCKING ALL FAN OPERATION. THE CIC CONTRACTOR SHALL INSTALL THE 50-FT OF CAT-5E CONTROL CABLE, THE CONTROLLER, AND ALSO FURNISH AND INSTALL ANY ADDITIONAL CAT-5E CABLE REQUIRED TO INTERLOCK THE OPERATION OF ALL FANS. THE CIC CONTRACTOR SHALL PROVIDE AND INSTALL A LOCKABLE PANEL TO INSTALL THE CEILING FAN CONTROLLER IN AND 24VDC/24VAC POWER (AS REQUIRED) PER MECHANICAL DRAWINGS.

OCCUPIED MODE: THE FANS (HVLSFn-C) SHALL BE COMMANDED TO RUN BASED MANUAL OPERATION AT THE LOCAL INTERFACE. THE BACnet MSTP INTERFACE SHALL NOT BE CONNECTED AT THIS TIME. A MAXIMUM SPEED OF 50 FT/MIN AT 4' A.F.F. SHALL BE MAINTAINED WHEN THE FANS ARE OPERATING. ALL FANS SHALL RUN CONCURRENTLY WHEN ENABLED AT THE SAME SPEED.

FIRE SAFETY MODE: THE FANS SHALL BE FURNISHED WITH A N.C. FIRE ALARM RELAY FOR INTERLOCK WITH THE FIRE ALARM SYSTEM. THE CIC CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR TO PROVIDE A FIRE ALARM OUTPUT FROM WHICH THE CONTROLLER CAN UTILIZE. THE CIC CONTRACTOR SHALL FURNISH AND INSTALL WIRING TO THE FIRE ALARM PANEL. THE FIRE ALARM CONTRACTOR SHALL BE RESPONSIBLE FOR TERMINATION OF THE WIRING. UPON SENSING AN ALARM, THE HVLS FAN SHALL BE HARDWIRED TO PREVENT OPERATION UNTIL THE ALARM IS CLEARED.

4A NATATORIUM HVLS FANS CF-n
NOT TO SCALE

SCHEMATIC NOTES:

1. CIC SHALL RESUSE 24 VOLT POWER TO VAV BOXES. SEE TEMPERATURE CONTROL AS-BUILT DRAWINGS.
2. VAV CONTROLLER/ACTUATOR FURNISHED BY TCC TO CIC FOR INSTALLATION AND WIRING. SEE M-731.3 FOR VAV LOCATIONS.
3. EXISTING TO REMAIN VALVES SHALL BE CONTROLLED BY THE NEW TCC CONTROLLER. CIC TO REUSE EXISTING WIRE AND TERMINATE TO NEW CONTROLLER.
4. CIC SHALL PULL NEW WIRING AND INSTALL NEW SENSOR PROVIDED BY TCC.
5. CIC SHALL INSTALL DISCHARGE TEMPERATURE SENSOR AND UTILIZE EXISTING WIRE.

VAV BOX WITH REHEAT SEQUENCE OF OPERATION (TYPICAL FOR 19 VAV BOXES AS SHOWN IN TEMPERATURE CONTROL AS-BUILT DRAWINGS)

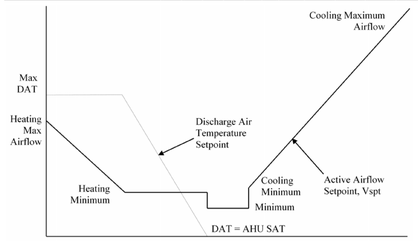
DISCHARGE AIR TEMPERATURE SENSOR: TCC SHALL PROVIDE A SUPPLY AIR TEMPERATURE SENSOR (DA-T) FOR MONITORING PURPOSES AND TO LIMIT THE DISCHARGE AT 95F (ADJ).

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-CFM) AND THE REHEAT VALVE (HTG-VLV) SHALL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT OF 72F (ADJ) PLUS THE DEAD BAND, THE PRIMARY AIR DAMPER SHALL INCREASE THE CFM AND THE REHEAT VALVE SHALL REMAIN FULLY CLOSED. ON A DROP IN TEMPERATURE BELOW THE HEATING SETPOINT OF 70F (ADJ), THE REHEAT VALVE SHALL MODULATE OPEN AFTER LOOP SIGNAL INCREASE AND THE PRIMARY AIR DAMPER SHALL MAINTAIN MINIMUM CFM UP TO THE HEATING MAX AIRFLOW. REFERENCE DIAGRAM AND SETPOINT MATRIX FOR FURTHER DETAILS.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN IN THE UNOCCUPIED MODE, THE VAV BOX SEQUENCE SHALL BE THE SAME AS THE ABOVE OCCUPIED SEQUENCE. UNOCCUPIED HEATING SETPOINT SHALL BE 65F (ADJ) AND THE COOLING SETPOINT SHALL BE 82F (ADJ). WHEN ANY TWO VAV BOXES REACH EITHER THEIR HEATING OR COOLING SETPOINT, THE AIR HANDLING UNIT SHALL START AND RUN TO MAINTAIN THE UNOCCUPIED SETPOINT. PROVIDE DIFFERENTIAL TO PREVENT SHORT CYCLING OF AHU.

1A EXISTING TO REMAIN NATATORIUM VAV BOXES (TYPICAL OF 19)
NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Flag	Sched	Trend	Alarm	Show On Graphic
Airflow (SA-CFM)	x								x		x
Discharge Air Temp (DA-T)	x								x		x
Zone Setpoint Adjust	x										x
Zone Combo (ZN-T, ZN-H, ZN-CO2)	x								x		x
Reheating Valve (HTG-VLV)		x							x		x
Zone Damper (DPR-O)		x							x		x
Airflow Setpoint					x				x		x
Cooling Setpoint					x				x		x
DAT Heating Stpt Limit					x						
Heating Setpoint					x				x		x
Heating Mode						x			x		x
Unoccupied Heating Stpt					x						x
Unoccupied Cooling Stpt					x						x
Unoccupied Low Limit					x		x				
High Discharge Air Temp						x				x	
High Zone Temp						x				x	
Low Discharge Air Temp						x				x	
Low Zone Temp						x				x	
Local Override Allowed						x			x		x
Occupied						x		x	x		x



Set Point	Occupied	Cooldown	Setup	Warm-Up	Setback	Unoccupied
Cooling maximum	Vcool-max	Vcool-max	Vcool-max	0	0	0
Cooling minimum	Vmin*	0	0	0	0	0
Minimum	Vmin*	0	0	0	0	0
Heating minimum	Max. (Vheat-min, Vmin*)	Vheat-min	0	Vheat-max	Vheat-max	0
Heating maximum	Max. (Vheat-max, Vmin*)	Vheat-max	0	Vcool-max	Vcool-max	0

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
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SARAH KATHLEEN HEMPSTEAD
REGISTERED
NO. AR10400134
STATE OF INDIANA
ARCHITECT

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

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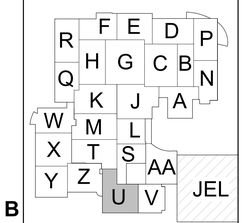

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-727.3

M:\31.1_TEMP\REVIT\MEP_CONTROLS CONTENTS\
2019-067.NCH_M-731.3 of Washington Township Public Schools\ High School Renovation_
Phase 3 - Additions\2019-067.NCH_North Central High School(2019-067.NCH_ENG)(BIM)_M_CRD_Cloud.rvt
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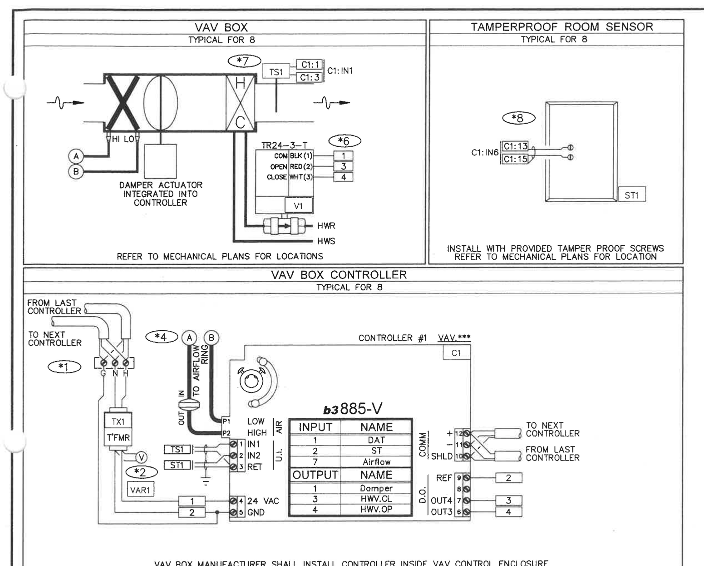
FOR REFERENCE PURPOSES ONLY



CONTROLLER NAME	TYPE	ROOM SERVED	LOCATION (ON SHEET M101)	TAG ID	MAX CFM	MIN CFM	PRICE ITEM #
101a	b3 885-V	101	102	VAV-7	2500	2500	2
112	b3 885-V	112	112	VAV-4	700	700	9
116	b3 885-V	116	116	VAV-7	1800	1800	12
117	b3 885-V	117	116	VAV-7	2500	2500	13
122	b3 885-V	122	122	VAV-5	900	400	14
127	b3 885-V	127	127	VAV-7	2500	1000	15
132	b3 885-V	132	127	VAV-7	1700	1700	16
133	b3 885-V	133	134	VAV-7	2500	2500	17

Tag	Part	Qty	Description	Vendor
C1	b3885-V	8	BACnet VAV CONTROLLER	TAC
ST1	01-0100-296	8	WALL PLATE, 10K-3, TAMPER PROOF	TAC
TS1	VER-TFBHR00	8	4" TEMP. PROBE, 10K-3	TAC
TX1	TR20VA003	8	24V/24V T'FMR, 20VA	FDI
V1	VALVE	8	SEE VALVE SCHEDULE FOR DETAILS	BELIMO
VAR1	01-2020-095	8	39V VARISTOR	TAC

GENERAL NOTES:

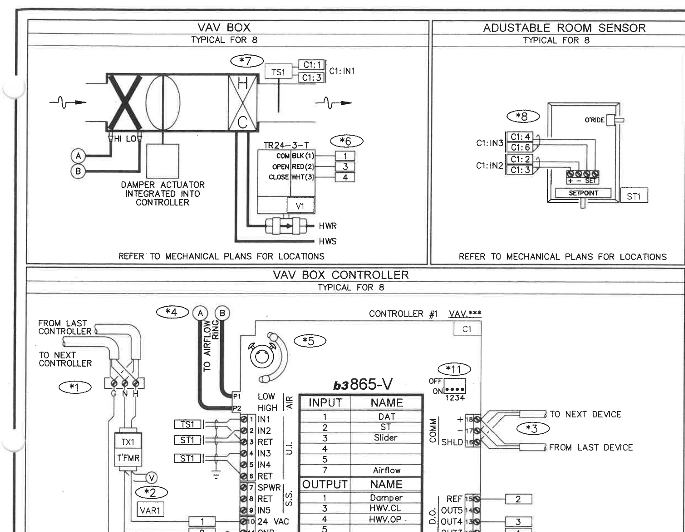
- REFER TO "INSTALLATION STANDARDS" SHEET FOR WIRING SPECIFICATIONS, ACCEPTABLE INSTALLATION GUIDELINES, AND LABELING REQUIREMENTS.
- ALL CONTROL DEVICES & WIRING SHALL BE INSTALLED IN ACCORDANCE WITH:
  ~ MANUFACTURER'S INSTALLATION INSTRUCTIONS
  ~ INSTALLATION STANDARDS PROVIDED ON THE "INSTALLATION STANDARDS" SHEET
- THESE DRAWINGS PROVIDE SCHEMATIC REPRESENTATIONS OF EQUIPMENT & FIELD DEVICES. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION.
- REFER TO THIS SHEET FOR ALL WIRING TERMINATIONS (UNLESS NOTED OTHERWISE).
- REFER TO TABLE FOR COMPLETE LIST OF VAV BOXES CONFIGURED AS SHOWN ON THIS SHEET.
- AIRFLOW RINGS SHALL BE FURNISHED & INSTALLED BY VAV BOX MANUFACTURER.
- CONTROLLERS, TRANSFORMERS, & VARISTORS SHALL BE FURNISHED BY TCC AND INSTALLED BY VAV BOX MANUFACTURER.
- REFER TO "VALVE SCHEDULE..." SHEETS FOR SPECIFIC VALVE INFORMATION.

NOTES:

*1 – GROUND CIRCUIT MUST BE COMPLETE PATH BACK TO BREAKER PANEL.
*2 – INSTALL 39 VOLT VARISTOR AS SHOWN.
*3 – SHIELD FOR COMM BUS MUST BE KEPT SEPARATE FROM OTHER SHIELDS AND FROM GROUND TERMINATIONS. REFER TO "COMM BUS" DRAWING FOR COMM BUS ROUTING CHARTS.
*4 – TUBING SHALL BE FURNISHED & INSTALLED BY VAV BOX MANUFACTURER. FLOW CROSS TUBING MUST BE PROPERLY ORIENTED WITH RESPECT TO FLOW DIRECTION (REFER TO INSTALLATION INSTRUCTIONS).
*5 – BEFORE INSTALLING DAMPER ACTUATOR, ROTATE DAMPER SHAFT COUNTER-CLOCKWISE UNTIL DAMPER IS FULLY CLOSED. MOVE THE GEAR DISENGAGEMENT LEVER & ROTATE ACTUATOR FULLY COUNTER-CLOCKWISE. INSTALL DAMPER ACTUATOR AND TIGHTEN ONTO DAMPER SHAFT.
*6 – CONNECT 24 VAC TERMINAL ON VALVE TO POWER AT CONTROLLER. DO NOT CONNECT TO POWER TERMINATION BLOCK (BEFORE TRANSFORMER).
*7 – INSTALL TEMPERATURE PROBE ALONG CENTERLINE OF DUCT.
*8 – SENSOR MUST BE INSULATED FROM AIR INFILTRATION THROUGH WALL CAVITY.

Havel An EMCOR Company t.a.c. — INDIANAPOLIS – FORT WAYNE – SOUTH BEND – KALAMAZOO
DATE / REMARKS: 5/29/08 SUBMIT; 3/28/09 AS-BUILT
REVISIONS: DATE / REMARKS
JOB NAME: NORTH CENTRAL HIGH SCHOOL; LOCATION: INDIANAPOLIS, INDIANA; ENGINEER: V.P.D.S.; CONTRACTOR: LEHMAN'S, INC.; DATE: 5/29/08; CHK. BY: ____; DRAWN BY: DPH
DWG. NUMBER 642435-039; SHEET 39; JOB NUMBER 09-4-435
TYPICAL NATATORIUM AREA VAV WITH TAMPERPROFF WALL SENSOR

FOR REFERENCE PURPOSES ONLY



CONTROLLER NAME	TYPE	ROOM SERVED	LOCATION (PROJECT PLAN SHEET M101)	TAG ID	SIZE	MAX CFM	MIN CFM	RH CFM	PRICE ITEM #
102	b3 865-V	102	102	VAV-2	8	350	100	350	1
103	b3 865-V	103	103	VAV-1	6	200	50	200	3
104	b3 865-V	104	104	VAV-1	6	200	50	200	4
105	b3 865-V	105	105	VAV-2	8	350	0	350	5
106	b3 865-V	106	106	VAV-2	8	350	0	350	6
113	b3 865-V	113	114	VAV-1	6	200	0	200	10
114	b3 865-V	114	114	VAV-7	24x16	2200	500	2200	11
135	b3 865-V	135	135	VAV-1	6	200	50	200	19

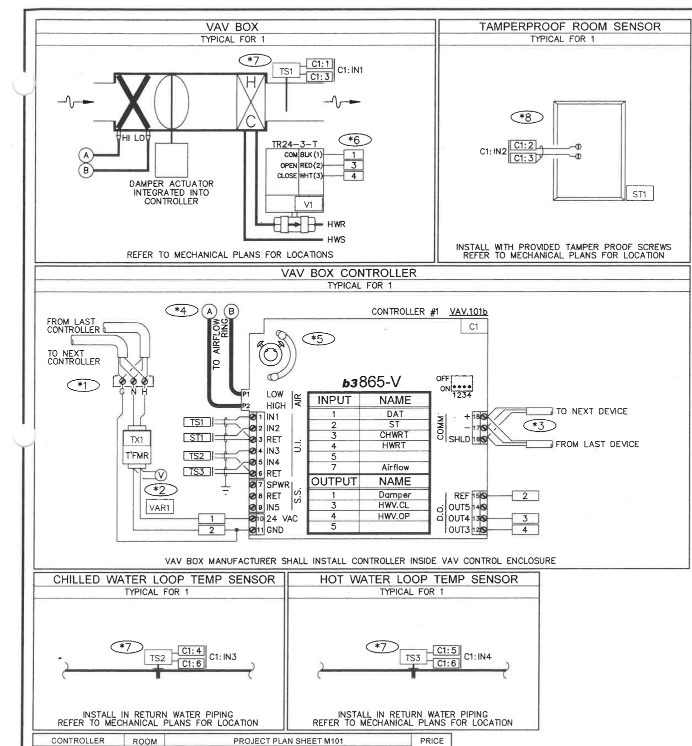
Tag	Part	Qty	Description	Vendor
C1	b3865-V	8	BACnet VAV CONTROLLER	TAC
ST1	ETR503	8	WALL SENSOR + STPT+ O'RIDE	TAC
TS1	VER-TFBHR00	8	4" TEMP. PROBE, 10K-3	TAC
TX1	TR20VA003	8	24V/24V T'FMR, 20VA	FDI
V1	VALVE	8	SEE VALVE SCHEDULE FOR DETAILS	BELIMO
VAR1	01-2020-095	8	39V VARISTOR	TAC

GENERAL NOTES: (same as sheet 39)

NOTES: *1 through *8 as listed for sheet 39.

DWG. NUMBER 642435-040; SHEET 40; JOB NUMBER 09-4-435; DATE 5/29/08 SUBMIT; 3/28/09 AS-BUILT
TYPICAL NATATORIUM AREA VAV WITH ADJUSTABLE WALL SENSOR

FOR REFERENCE PURPOSES ONLY



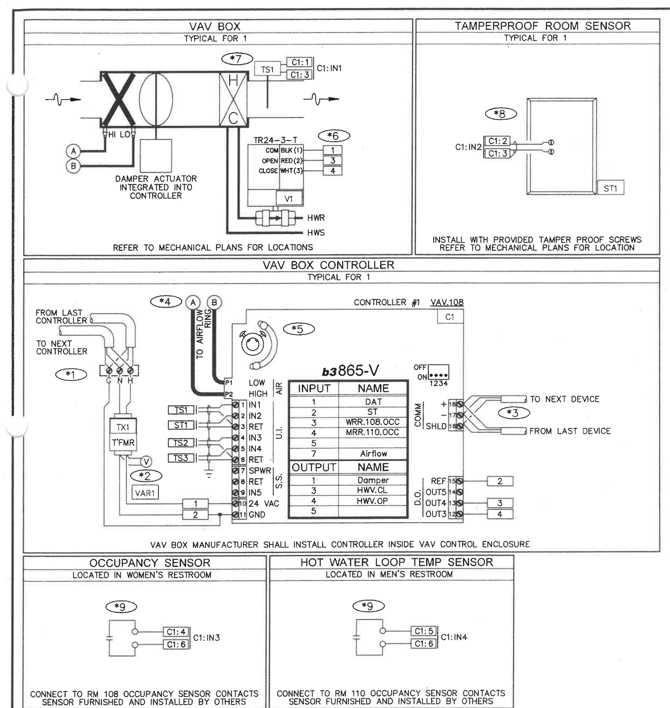
CONTROLLER NAME	TYPE	ROOM SERVED	LOCATION	TAG ID	SIZE	MAX CFM	MIN CFM	RH CFM	PRICE ITEM #
101b	b3 865-V	101	107	VAV-7	8	2500	100	350	1

Tag	Part	Qty	Description	Vendor
C1	b3865-V	1	BACnet VAV CONTROLLER	TAC
ST1	01-0100-296	1	WALL PLATE, 10K-3, TAMPER PROOF	TAC
TS1	VER-TFBHR00	1	4" TEMP. PROBE, 10K-3	TAC
TS2-3	VER-TIDB1H0	2	4" IMMERSION PROBE + WELL	TAC
TX1	TR20VA003	1	24V/24V T'FMR, 20VA	FDI
V1	VALVE	1	SEE VALVE SCHEDULE FOR DETAILS	BELIMO
VAR1	01-2020-095	1	39V VARISTOR	TAC

NOTES: *1 through *8 as listed for sheet 39.
*9 – SENSORS ARE SHOWN AS NEW DEVICES. IF SENSORS ALREADY EXIST AT THIS LOCAITON, CONSULT HAVEL PROJECT MANAGER FOR GUIDANCE.

DWG. NUMBER 642435-041; SHEET 41; JOB NUMBER 09-4-435
NATATORIUM AREA VAV BOX 101b

FOR REFERENCE PURPOSES ONLY



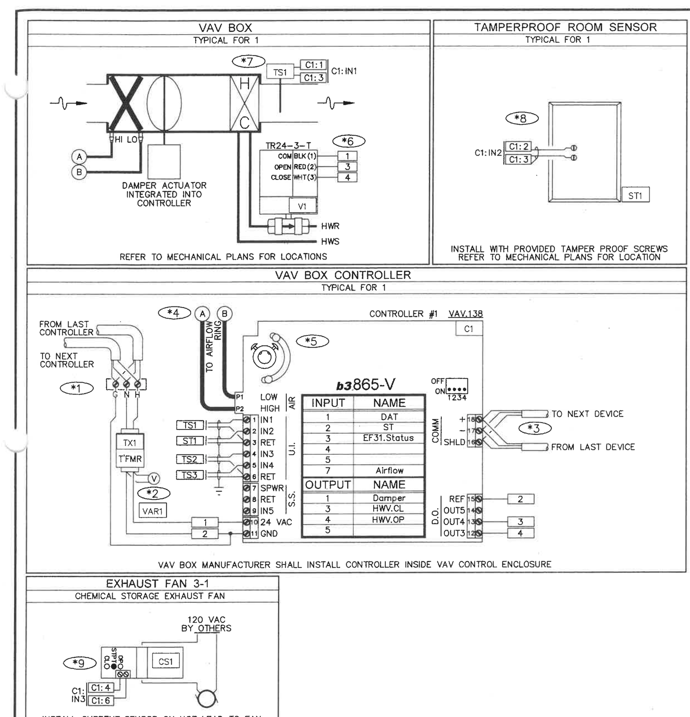
CONTROLLER NAME	TYPE	ROOM SERVED	LOCATION	TAG ID	SIZE	MAX CFM	MIN CFM	RH CFM
108	b3 865-V	108	106	VAV-6	16	1300	700	1300

Tag	Part	Qty	Description	Vendor
C1	b3865-V	1	BACnet VAV CONTROLLER	TAC
ST1	01-0100-296	1	WALL PLATE, 10K-3, TAMPER PROOF	TAC
TS1	VER-TFBHR00	1	4" TEMP. PROBE, 10K-3	TAC
TX1	TR20VA003	1	24V/24V T'FMR, 20VA	FDI
V1	VALVE	1	SEE VALVE SCHEDULE FOR DETAILS	BELIMO
VAR1	01-2020-095	1	39V VARISTOR	TAC

NOTES: *1 through *8 as listed for sheet 39.
*9 – CONNECT TO NORMALLY OPEN CONTACTS ON OCCUPANCY SENSORS. VERIFY THAT ON DETECTION OF OCCUPANCY, THE CONTACTS CLOSE.

DWG. NUMBER 642435-042; SHEET 42; JOB NUMBER 09-4-435
NATATORIUM AREA VAV BOX 108

FOR REFERENCE PURPOSES ONLY



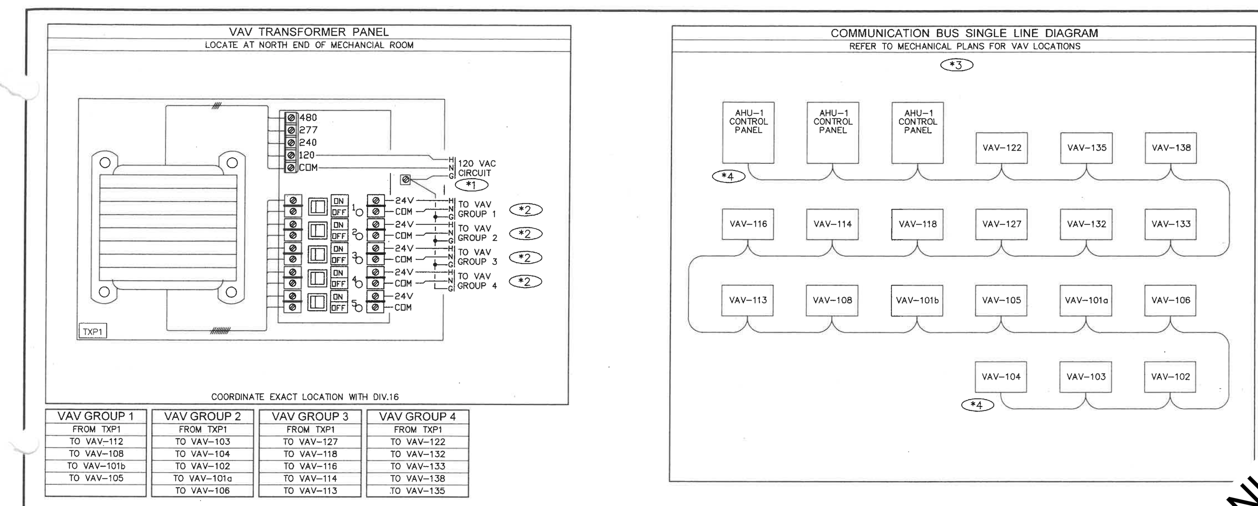
CONTROLLER NAME	TYPE	ROOM SERVED	LOCATION	TAG ID	SIZE	MAX CFM	MIN CFM	RH CFM
138	b3 865-V	138	133	VAV-7	24X16	2150	600	2150

Tag	Part	Qty	Description	Vendor
C1	b3865-V	1	BACnet VAV CONTROLLER	TAC
CS1	FUN-RIBXGTA	1	CURRENT SWITCH, .75-150A, N.O.	TAC
ST1	01-0100-296	1	WALL PLATE, 10K-3, TAMPER PROOF	TAC
TS1	VER-TFBHR00	1	4" TEMP. PROBE, 10K-3	TAC
TX1	TR20VA003	1	24V/24V T'FMR, 20VA	FDI
V1	VALVE	1	SEE VALVE SCHEDULE FOR DETAILS	BELIMO
VAR1	01-2020-095	1	39V VARISTOR	TAC

NOTES: *1 through *8 as listed for sheet 39.
*9 – INSTALL CURRENT SENSOR AND ADJUST ACCORDING TO MANUFACTURER'S INSTRUCTIONS. LOOP POWER CONDUCTOR THROUGH SENSOR MULITPLE TIMES IF REQUIRED TO DETECT CURRENT.

DWG. NUMBER 642435-043; SHEET 43; JOB NUMBER 09-4-435
NATATORIUM AREA VAV BOX 138

FOR REFERENCE PURPOSES ONLY



VAV GROUP 1	VAV GROUP 2	VAV GROUP 3	VAV GROUP 4
FROM TXP1	FROM TXP1	FROM TXP1	FROM TXP1
TO VAV-112	TO VAV-103	TO VAV-127	TO VAV-122
TO VAV-108	TO VAV-104	TO VAV-118	TO VAV-132
TO VAV-101b	TO VAV-102	TO VAV-116	TO VAV-133
TO VAV-105	TO VAV-101a	TO VAV-114	TO VAV-138
	TO VAV-106	TO VAV-113	TO VAV-135

GENERAL NOTES:

- REFER TO "INSTALLATION STANDARDS" DRAWING FOR WIRING SPECIFICATIONS, ACCEPTABLE INSTALLATION GUIDELINES, AND LABELING REQUIREMENTS.
- ALL CONTROL DEVICES & WIRING SHALL BE INSTALLED IN ACCORDANCE WITH:
  ~ MANUFACTURER'S INSTALLATION INSTRUCTIONS
  ~ INSTALLATION STANDARDS PROVIDED ON THE "INSTALLATION STANDARDS" DRAWING
- THIS DRAWING PROVIDES SCHEMATIC REPRESENTATIONS OF CONTROL DEVICES. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION.
- DAISY-CHAIN 3-CONDUCTOR, 16 GAUGE, UNSHIELDED 24 VAC WIRING FROM EACH TRANSFORMER TO VAV BOXES LISTED IN EACH GROUP. POWER WIRING TO VAV BOXES TO BE ROUTED IN THE ORDER THAT THE BOXES ARE LISTED TO MAINTAIN CALCULATED VOLTAGE DROP TOLERANCES.

NOTES:

*1 – GROUND CIRCUIT MUST BE COMPLETE PATH BACK TO BREAKER PANEL. PROVIDE AND INSTALL GROUND LUG INSIDE ENCLOSURE AS INDICATED.
*2 – ROUTE LOW VOLTAGE POWER CABLES THROUGH FLOOR OF MECHANICAL ROOM NEAR AHU-3 RETURN AIR DUCT, TO VAV BOXES AS LISTED. 16 GAUGE / 3 CONDUCTOR (HOT, NEUTRAL, GROUND) CABLE IS REQUIRED.
*3 – BUS ROUTING INDICATED IS A SUGGESTED ROUTE BASED ON REVIEW OF THE MECHANICAL DRAWINGS. COMM BUS MAY BE ADJUSTED FOR FIELD CONDITIONS AND NOTED ON REDLINES FOR AS-BUILT DRAWINGS. DAISY CHAIN TOPOLOGY MUST BE MAINTAINED FOR THE ENTIRE BUS.
*4 – INSTALL 120-OHM RESISTOR ACROSS + AND – COMM TERMINALS OF THE EACH END OF DAISY CHAIN COMM BUS.

Tag	Part	Qty	Description	Vendor
TXP1	FUN-PSH500A	1	ENCL 500VA PWR CNTR, 5 OUT	TAC

DWG. NUMBER 642435-044; SHEET 44; JOB NUMBER 09-4-435
VAV POWER AND COMM ROUTING AND DETAILS

FOR REFERENCE PURPOSES ONLY

642398 NATATORIUM VALVE SCHEDULE

VALVE TAG	FLOW (GPM)	PIPE SIZE (IN)	VALVE SIZE (IN)	TARGET Cv	VALVE Cv	ACTUAL PRESSURE DROP (PSI)	REQUIRED CLOSE-OFF (PSI)	ACTUAL CLOSE-OFF (PSI)	BALL	GLOBE	BUTTERFLY	24 VAC	120 VAC	ON-OFF	FLOATING	MODULATING	SPRING RETURN	FEEDBACK	2-WAY 2V OPEN	2-WAY 2V CLOSED	2-WAY FAIL N.O.	2-WAY FAIL N.C.	3-WAY 2V B TO AB OPEN	3-WAY 2V A TO AB OPEN	3-WAY FAIL B TO AB OPEN	3-WAY FAIL A TO AB OPEN	VALVE ASSEMBLY NUMBER	QUANTITY
VAV-101a	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-101b	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-102	2.7	0.75	0.50	1.6	1.9	2.0	???	200.0	X			X			X				X								B211B + TR24-3-T + NO	1
VAV-103	1.2	0.75	0.50	0.7	0.8	2.3	???	200.0	X			X			X				X								B209B + TR24-3-T + NO	1
VAV-104	1.2	0.75	0.50	0.7	0.8	2.3	???	200.0	X			X			X				X								B209B + TR24-3-T + NO	1
VAV-105	2.7	0.75	0.50	1.6	1.9	2.0	???	200.0	X			X			X				X								B211B + TR24-3-T + NO	1
VAV-106	2.7	0.75	0.50	1.6	1.9	2.0	???	200.0	X			X			X				X								B211B + TR24-3-T + NO	1
VAV-108	8.1	1.00	0.50	4.7	4.7	3.0	???	200.0	X			X			X				X								B213B + TR24-3-T + NO	1
VAV-112	3.3	1.00	0.50	1.9	1.9	3.0	???	200.0	X			X			X				X								B211B + TR24-3-T + NO	1
VAV-113	1.2	0.75	0.50	0.7	0.8	2.3	???	200.0	X			X			X				X								B209B + TR24-3-T + NO	1
VAV-114	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-116	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-118	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-122	5.4	1.00	0.50	3.1	4.7	1.3	???	200.0	X			X			X				X								B213B + TR24-3-T + NO	1
VAV-127	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-132	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-133	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
VAV-135	1.2	0.75	0.50	0.7	0.8	2.3	???	200.0	X			X			X				X								B209B + TR24-3-T + NO	1
VAV-138	12.2	1.50	0.75	7.0	7.4	2.7	???	200.0	X			X			X				X								B218B + TR24-3-T + NO	1
AHU-1 CHW	152.0	4.00	3.00			5 - 70	???	150.0				X				X				X							3"-HDP-200-05-L GMB24-MFTX1 US + NC / FC P-10001	1
AHU-1 HW	109.0	3.00	3.00			5 - 70	???	150.0				X				X			X								3"-HDP-160-05-L GMB24-MFTX1 US + NO / FO P-10001	1
AHU-2 CHW	152.0	4.00	3.00			5 - 70	???	150.0				X				X				X							3"-HDP-200-05-L GMB24-MFTX1 US + NC / FC P-10001	1
AHU-2 HW	109.0	3.00	3.00			5 - 70	???	150.0				X				X			X								3"-HDP-160-05-L GMB24-MFTX1 US + NO / FO P-10001	1
AHU-3 CHW	166.0	4.00	4.00			5 - 70	???	150.0				X				X				X							4"-EDP-210-05-L SY3-24P-150 + NC / FC P-10001	1
AHU-3 HW SUPPLY	58.0	2.50	2.00			5 - 70	???	150.0				X				X	X		X		X						2"-HDP-125-05-L AF24-MFT + NO / FO P-10001	1
AHU-3 HW RETURN	71.0	2.50	2.00			5 - 70	???	150.0				X				X	X		X		X						2"-HDP-125-05-L VALVE AF24-MFT + NO / FO P-10001	1
V-1 PHWS	???	10.00	10.00	1750.0	2047.0	???	???	50.0			X	X				X											F7250HSU + SY4-24SR CONFIG. CODE X13	1

Havel An EMCOR Company t.a.c.
DATE / REMARKS: 5/29/08 SUBMIT; 3/28/09 AS-BUILT
JOB NAME: NORTH CENTRAL HIGH SCHOOL; LOCATION: INDIANAPOLIS, INDIANA; ENGINEER: V.P.D.S.; CONTRACTOR: LEHMAN'S, INC.; DATE: 5/29/08; CHK. BY: ____; DRAWN BY: DPH
DWG. NUMBER 642435-045; SHEET 45; JOB NUMBER 09-4-435
VALVE SCHEDULE

FOR REFERENCE PURPOSES ONLY

VALVE TAG	FLOW (GPM)	PIPE SIZE (IN)	VALVE SIZE (IN)	TARGET Cv	VALVE Cv	ACTUAL PRESSURE DROP (PSI)	REQUIRED CLOSE-OFF (PSI)	ACTUAL CLOSE-OFF (PSI)	BALL	GLOBE	BUTTERFLY	24 VAC	120 VAC	ON-OFF	FLOATING	MODULATING	SPRING RETURN	FEEDBACK	2-WAY 2V OPEN	2-WAY 2V CLOSED	2-WAY FAIL N.O.	2-WAY FAIL N.C.	3-WAY 2V B TO AB OPEN	3-WAY 2V A TO AB OPEN	3-WAY FAIL B TO AB OPEN	3-WAY FAIL A TO AB OPEN	VALVE ASSEMBLY NUMBER	QUANTITY
A1-CHW	182.0	4.0	3.0	81.4	85.0	4.6		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
B1-CHW	199.0	4.0	3.0	89.0	85.0	5.5		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
C1-CHW	25.0	2.0	1.0	11.2	14.0	3.2		90.0		X		X				X	X			X		X					VS-7223-804-4-08	1
C3-CHW	104.0	3.0	2.5	46.5	56.0	3.4		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
C4-CHW	197.0	4.0	3.0	88.1	85.0	5.4		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
C5-CHW	144.0	5.0	3.0	64.4	85.0	2.9		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
D1-CHW	150.0		3.0	67.1	85.0	3.1		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
D2-CHW	125.0		2.5	55.9	56.0	5.0		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
E1-CHW	95.0	3.0	2.5	42.5	56.0	2.9		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
E2-CHW	139.0	4.0	3.0	62.2	85.0	2.7		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
E3-CHW	64.0	3.0	1.5	28.6	28.0	5.2		100.0		X		X				X	X			X		X					VS-7223-593-4-10	1
F1-CHW	153.0	4.0	3.0	68.4	85.0	3.2		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
G1-CHW	179.0	4.0	3.0	80.1	85.0	4.4		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
G2-CHW	188.0	4.0	3.0	84.1	85.0	4.9		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
G3-CHW	113.0	4.0	2.5	50.5	56.0	4.1		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
G4-CHW	123.0	4.0	2.5	55.0	56.0	4.8		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
G5-CHW	77.0	3.0	2.0	34.4	40.0	3.7		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
G6-CHW	99.0	3.0	2.5	44.3	56.0	3.1		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
H1-CHW	173.0		3.0	77.4	85.0	4.1		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
H2-CHW	121.0		2.5	54.1	56.0	4.7		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
J1-CHW	93.3	3.0	2.5	41.7	56.0	2.8		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
J2-CHW	103.0		2.5	46.1	56.0	3.4		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
J3-CHW	70.0	3.0	2.0	31.3	40.0	3.1		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
K1-CHW	89.0		2.0	39.8	40.0	5.0		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
K2-CHW	89.0		2.0	39.8	40.0	5.0		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
K3-CHW	89.0		2.0	39.8	40.0	5.0		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
K4-CHW	89.0		2.0	39.8	40.0	5.0		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
K5-CHW	89.0		2.0	39.8	40.0	5.0		65.0		X		X				X	X			X		X					VS-7223-593-4-11	1
M5-CHW	174.0	4.0	3.0	77.8	85.0	4.2		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
N1-CHW	114.0	3.0	2.5	51.0	56.0	4.1		125.0		X		X				X	X			X		X					VS-8223-596-5-12	1
N2-CHW	160.0	3.0	3.0	71.6	85.0	3.5		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
P1-CHW	171.5	4.0	3.0	76.7	85.0	4.1		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
P2-CHW	214.0	4.0	4.0	95.7	145.0	2.2		125.0		X		X				X	X			X		X					VS-8223-596-5-14	1
Q1-CHW	232.0	4.0	4.0	103.8	145.0	2.6		125.0		X		X				X	X			X		X					VS-8223-596-5-14	1
Q2-CHW	255.0	4.0	4.0	114.0	145.0	3.1		125.0		X		X				X	X			X		X					VS-8223-596-5-14	1
R1-CHW	232.0	4.0	4.0	103.8	145.0	2.6		125.0		X		X				X	X			X		X					VS-8223-596-5-14	1
R2-CHW	219.0	4.0	4.0	97.9	145.0	2.3		125.0		X		X				X	X			X		X					VS-8223-596-5-14	1
S1-CHW	154.0		3.0	68.9	85.0	3.3		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
T1-CHW	179.0	4.0	3.0	80.1	85.0	4.4		125.0		X		X				X	X			X		X					VS-8223-596-5-13	1
A1-HW	72.0	3.0	2.0	32.2	40.0	3.2		65.0		X		X				X	X		X		X						VS-7213-593-4-11	1
A2-HW	8.0	2.0	0.5	3.6	4.4	3.3		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
B1-HW	33.0	2.0	1.3	14.8	20.0	2.7		150.0		X		X				X	X		X		X						VS-7213-593-4-09	1
C1-HW	7.0	1.3	0.5	3.1	4.4	2.5		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
C2-HW	55.0	2.5	1.5	24.6	28.0	3.9		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
C3-HW	29.0	2.0	1.0	13.0	14.0	4.3		150.0		X		X				X	X		X		X						VS-7213-804-4-08	1
C4-HW	40.0	2.0	1.3	17.9	20.0	4.0		150.0		X		X				X	X		X		X						VS-7213-593-4-09	1
C5-HW	48.0	2.5	1.5	21.5	28.0	2.9		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
D1-HW	25.0		1.0	11.2	14.0	3.2		150.0		X		X				X	X		X		X						VS-7213-804-4-08	1
D2-HW	19.0		1.0	8.5	10.0	3.6		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
E1-HW	13.0	1.3	0.8	5.8	7.5	3.0		200.0		X		X				X	X		X		X						VS-7213-804-4-06	1
E2-HW	19.0	1.3	1.0	8.5	10.0	3.6		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
E3-HW	6.0	1.3	0.5	2.7	4.4	1.9		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
F1-HW	14.0	1.5	0.8	6.3	7.5	3.5		200.0		X		X				X	X		X		X						VS-7213-804-4-06	1
G1-HW	63.0	3.0	2.0	28.2	40.0	2.5		65.0		X		X				X	X		X		X						VS-7213-593-4-11	1
G2-HW	65.0	3.0	2.0	29.1	40.0	2.6		65.0		X		X				X	X		X		X						VS-7213-593-4-11	1
G3-HW	42.0	2.5	1.5	18.8	28.0	2.3		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
G4-HW	16.0	2.0	0.8	7.2	7.5	4.6		200.0		X		X				X	X		X		X						VS-7213-804-4-06	1
G5-HW	22.0	1.5	1.0	9.8	10.0	4.8		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
G6-HW	28.0		1.0	12.5	14.0	4.0		150.0		X		X				X	X		X		X						VS-7213-804-4-08	1
H1-HW	26.0		1.0	11.6	14.0	3.4		150.0		X		X				X	X		X		X						VS-7213-804-4-08	1
H2-HW	18.0		1.0	8.0	10.0	3.2		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
J1-HW	11.0	1.3	0.8	4.9	5.5	4.0		200.0		X		X				X	X		X		X						VS-7213-804-4-05	1
J2-HW	12.0	1.3	0.8	5.4	5.5	4.8		200.0		X		X				X	X		X		X						VS-7213-804-4-05	1
J3-HW	8.0	1.3	0.5	3.6	4.4	3.3		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1

VALVE TAG	FLOW (GPM)	PIPE SIZE (IN)	VALVE SIZE (IN)	TARGET Cv	VALVE Cv	ACTUAL PRESSURE DROP (PSI)	REQUIRED CLOSE-OFF (PSI)	ACTUAL CLOSE-OFF (PSI)	BALL	GLOBE	BUTTERFLY	24 VAC	120 VAC	ON-OFF	FLOATING	MODULATING	SPRING RETURN	FEEDBACK	2-WAY 2V OPEN	2-WAY 2V CLOSED	2-WAY FAIL N.O.	2-WAY FAIL N.C.	3-WAY 2V B TO AB OPEN	3-WAY 2V A TO AB OPEN	3-WAY FAIL B TO AB OPEN	3-WAY FAIL A TO AB OPEN	VALVE ASSEMBLY NUMBER	QUANTITY
K1-HW	43.0		1.5	19.2	28.0	2.4		60.0		X		X				X	X		X		X						VS-7213-804-4-10	1
K2-HW	43.0		1.5	19.2	28.0	2.4		60.0		X		X				X	X		X		X						VS-7213-804-4-10	1
K3-HW	43.0		1.5	19.2	28.0	2.4		60.0		X		X				X	X		X		X						VS-7213-804-4-10	1
K4-HW	43.0		1.5	19.2	28.0	2.4		60.0		X		X				X	X		X		X						VS-7213-804-4-10	1
K5-HW	43.0		1.5	19.2	28.0	2.4		60.0		X		X				X	X		X		X						VS-7213-804-4-10	1
K6-HW	15.0		0.8	6.7	7.5	4.0		200.0		X		X				X	X		X		X						VS-7213-804-4-06	1
M1-HW	7.0	1.3	0.5		4.4	2.5		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
M2-HW	7.0	1.3	0.5		4.4	2.5		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
M3-HW	7.0	1.3	0.5		4.4	2.5		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
M4-HW	7.0	1.3	0.5		4.4	2.5		250.0		X		X				X	X		X		X						VS-7213-804-4-04	1
M5-HW			1.5		28.0	0.0		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
N1-HW	25.0	2.0	1.0	11.2	14.0	3.2		150.0		X		X				X	X		X		X						VS-7213-804-4-08	1
N2-HW	35.0	2.0	1.3	15.7	20.0	3.1		150.0		X		X				X	X		X		X						VS-7213-593-4-09	1
P1-HW	37.0	2.5	1.3	16.5	20.0	3.4		100.0		X		X				X	X		X		X						VS-7213-593-4-09	1
P2-HW	45.0	2.5	1.5	20.1	28.0	2.6		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
Q1-HW	19.0	2.0	1.0	8.5	10.0	3.6		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
Q2-HW	22.0	2.0	1.0	9.8	10.0	4.8		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
R1-HW	19.0	2.0	1.0	8.5	10.0	3.6		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
R2-HW	18.0	2.0	1.0	8.0	10.0	3.2		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
S1-HW	57.0		1.5	25.5	28.0	4.1		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
T1-HW	11.0	1.3	0.8	4.9	5.5	4.0		200.0		X		X				X	X		X		X						VS-7213-804-4-05	1
A1-PHW	62.0	3.0	1.5	27.7	28.0	4.9		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
A2-PHW	22.0	1.0	1.0	9.8	10.0	4.8		150.0		X		X				X	X		X		X						VS-7213-804-4-07	1
C2-PHW	80.0	3.0	2.0	35.8	40.0	4.0		65.0		X		X				X	X		X		X						VS-7213-593-4-11	1
C3-PHW	35.0	2.0	1.3	15.7	20.0	3.1		100.0		X		X				X	X		X		X						VS-7213-593-4-09	1
C4-PHW	50.0	2.5	1.5	22.4	28.0	3.2		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
Q1-PHW	50.0	2.5	1.5	22.4	28.0	3.2		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
Q2-PHW	57.0	2.5	1.5	25.5	28.0	4.1		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
R1-PHW	50.0	2.5	1.5	22.4	28.0	3.2		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
R2-PHW	47.0	2.5	1.5	21.0	28.0	2.8		100.0		X		X				X	X		X		X						VS-7213-593-4-10	1
T1-PHW	40.0	2.5	1.3	17.9	20.0	4.0		100.0		X		X				X	X		X		X						VS-7213-593-4-09	1

Havel An EMCOR Company t.a.c. — INDIANAPOLIS – FORT WAYNE – SOUTH BEND – KALAMAZOO
DATE / REMARKS: 6/24/09 SUBMIT; 1/13/09 AS-BUILT
JOB NAME: NORTH CENTRAL HIGH SCHOOL; LOCATION: INDIANAPOLIS, INDIANA; ENGINEER: HAVEL – AN EMCOR COMPANY; CONTRACTOR: HAVEL – AN EMCOR COMPANY; DATE: 6/24/09; CHK. BY: ____; DRAWN BY: DPH
DWG. NUMBER 642435-149; SHEET 149; JOB NUMBER 09-4-435
AHU VALVE SCHEDULE

FOR REFERENCE PURPOSES ONLY

OWNER PROVIDED AS-BUILT DRAWINGS. FOR REFERENCE PURPOSES ONLY.
CONTROLS INSTALLATION CONTRACTOR ONLY SCOPE OF WORK.

A3.3

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

Sarah K Hempstead

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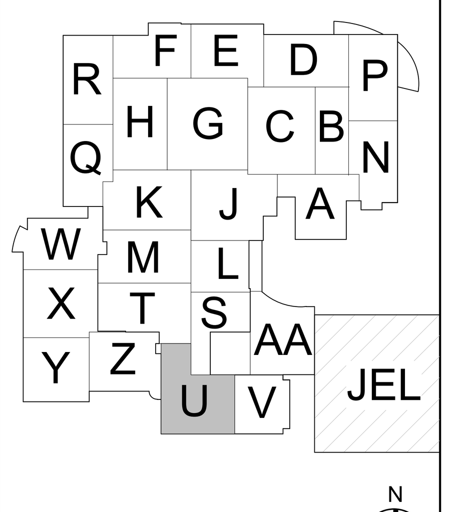
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-728.3

M-728.3_ TEMPERATURE CONTROLS SCHEMATICS
2019-067 NCH_M.S.D. of Washington Township_North Central High School Renovation_
Autodesk Docs://2019-067.NCH - North Central High School/2019-067.NCH_Bldg001_M_2022_Cloud.rvt
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CONTROLS INSTALLATION CONTRACTOR (CIC) MISCELLANEOUS SEQUENCES AND INFORMATION:

IT IS THE INTENTION OF THIS PROJECT TO PROVIDE DELTA CONTROLS DEVICES FOR ALL NEW EQUIPMENT EXCEPT NOTED PACKAGED EQUIPMENT AND CAPABLE OF ACHIEVING THE SEQUENCE OF OPERATION UTILIZING BACnet IP AND MSTP COMMUNICATION. TEMPERATURE CONTROLS SERVICES (TCS) SHALL PROVIDE ALL REQUIRED CONTROLS EQUIPMENT PER THE DRAWINGS AND SPECIFICATIONS AND WILL FUNCTION AS THE TCC. THE MECHANICAL CONTRACTOR SHALL PERFORM THE CIC SCOPE OF WORK AS QUALIFIED OR SUBCONTRACT THE WORK AS NEEDED. TCS AS THE TCC SHALL IDENTIFY AND COMMUNICATE TO THE CONTROLS INSTALLATION CONTRACTOR (CIC) ANY INSTALLATION DISCREPANCIES OR ISSUES FOR RESOLUTION BY THE CIC. ALL COORDINATION AND COMMUNICATION WITH TCS SHALL INCLUDE BRIAN SHEPPERD - BRIAN@TCSBAS.COM

TCS SHALL PROVIDE A COMPREHENSIVE GRAPHIC PACKAGE TO INCLUDE ALL NEW EQUIPMENT CONTROLLED OR MONITORED BY THE BUILDING AUTOMATION SYSTEM AND SHALL PROVIDE EQUIPMENT POINT DATABASE, LICENSING, SCHEDULES, TRENDING, AND REPORTS.

TCS SHALL COORDINATE WITH THE CLIENT FOR: EMAIL ALARM INFORMATION, 1-YEAR TRENDING AND REPORTS, OCCUPIED AND HOLIDAY SCHEDULES, AND SPECIALTY EQUIPMENT PARAMETERS AND ALARMING.

IDF/MDF AND ELECTRICAL HVAC SPLIT SYSTEM MONITORING SS-n: TCC SHALL REFERENCE THE MECHANICAL SCHEDULE AND CIC SHALL INSTALL AND WIRE BAS FLAT PLATE SPACE TEMPERATURE SENSORS FOR MONITOR OF IDF/MDF SPACES AND ALARM CONDITIONS. ALL STAND-ALONE HVAC SYSTEMS WILL HAVE BAS SPACE TEMPERATURE MONITORING IN ADDITION TO THE CONTROLS FROM THE MANUFACTURER. AN ALARM WILL BE GENERATED IF THE SPACE RISES ABOVE 81F (ADJ) OR DROPS BELOW 59F (ADJ). THESE SPACES ALSO REQUIRE A SEPARATE THERMOSTAT FOR LOCAL EQUIPMENT CONTROL THAT CIC WILL ENSURE IS CONFIGURED AND OPERATING PROPERLY. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.

CONTROL PANELS: TCC SHALL PROVIDE AND CIC SHALL INSTALL TEMPERATURE CONTROL PANEL BACKPLATES THAT ARE HOFFMAN STYLE FOR ALL AIR HANDLING UNITS EXCEPT AHU-AA1, AHU-J3, AND AHU-K6. THE TECHNOLOGY CONTRACTOR WILL PROVIDE ETHERNET DROPS FOR ALL PANELS THAT DO NOT ALREADY HAVE BUILDING NETWORK CONNECTIVITY AND THE DIVISION 26 CONTRACTOR SHALL PROVIDE 120 VAC CIRCUITS FOR ALL NEW PANELS DEDICATED TO PANEL AND VAV POWER. CIC IS RESPONSIBLE TO DEMOLISH EXISTING CONTROL PANEL CONTENTS BY REMOVING THE BACKPLATE AND ALL CONTENTS FROM THE EXISTING TO REMAIN PANELS WITH THE EXCEPTION TO FIELD CONTROL WIRING AND CONDUIT. CIC IS RESPONSIBLE TO INSTALL THE REPLACEMENT BACKPLATE WITH NEW CONTROLS PRE-MOUNTED AND PROVIDED BY TCC AND TERMINATE PER TCC DRAWINGS. ADDITIONAL CABLING SHALL ALSO BE INSTALLED BY THE CIC IN CONDUIT WITHIN MECHANICAL ROOMS. CLEARLY LABEL PANELS AS TO THE EQUIPMENT CONTROLLED AND INCLUDE A COPY OF THE CONTROL DRAWINGS IN A PROTECTIVE COVER AFFIXED ON THE INSIDE PANEL DOOR. SEPARATE CIRCUIT PROVIDED BY DIVISION 26 FOR VAV POWER PANELS.

BUILDING NETWORK ETHERNET INTERFACE: ONE (1) DATA DROP SHALL BE PROVIDED BY THE TELECOMMUNICATIONS CONTRACTOR FOR USE BY TCC IN EACH MECHANICAL ROOM TO EACH TEMPERATURE CONTROL PANEL. SEE TELECOMMUNICATIONS DRAWINGS.

ELECTRICAL UTILITY POWER MONITORING: TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS. EXISTING TO REMAIN EQUIPMENT INCLUDE:

1. CENTRAL PLANT MDPC - GE POWERLOGIX
2. MAIN ELECTRICAL ROOM MDPA-LEFT - HAWKEYE 8100
3. MAIN ELECTRICAL ROOM MDPA-RIGHT - HAWKEYE 8100
4. MAIN ELECTRICAL ROOM MDPB-LEFT A - HAWKEYE 8100
5. MAIN ELECTRICAL ROOM MDPB-LEFT B - HAWKEYE 8100
6. MAIN ELECTRICAL ROOM MDPB-RIGHT A - HAWKEYE 8100
7. MAIN ELECTRICAL ROOM MDPB-RIGHT A - HAWKEYE 8100
8. NATATORIUM - FIELD DETERMINED
9. WEST GYM - FIELD DETERMINED
10. SOUTH LOCKER ROOM - FIELD DETERMINED
11. TRANSPORTATION BUILDING - FIELD DETERMINED

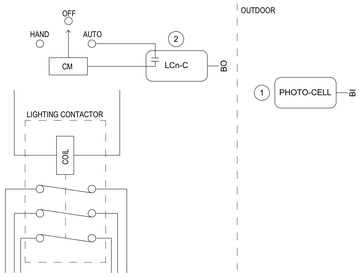
EXISTING TO REMAIN HVAC EQUIPMENT: TCC SHALL PROVIDE AND CIC SHALL INSTALL REPLACEMENT CONTROLS FOR THE EQUIPMENT SHOWN ON THE OWNER PROVIDED AS-BUILT DRAWINGS SHOWN ON M-701.3 TO M-731.3. CIC SHALL REFERENCE TCC (TEMPERATURE CONTROL SERVICES) DRAWINGS ISSUED BY ADDENDUM FOR DETAILED REQUIREMENTS.

BUILDING ANNUNCIATOR PANEL: UPON BRINGING AN AIR HANDLING UNIT ONLINE TCS SHALL BE RESPONSIBLE TO COMMUNICATE CRITICAL ALARMS TO THE EXISTING TO REMAIN ANNUNCIATOR PANEL CONTROLLER.

SPACE HUMIDIFIERS HAA-1, HAA-2, H-AA3: TCC SHALL CONNECT TO SPACE HUMIDIFIERS VIA BACNET MSTP FOR MONITORING OF THE UNITS.

3C CIC MISCELLANEOUS SCOPE OF WORK
NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Photocell (PHOTO-CELL)			x						x		x
Lighting Contactor (LCn-C) SEE BELOW FOR QUANTITY	x								x		x



SCHEMATIC NOTES:

1. TCC SHALL PROVIDE AND CIC SHALL INSTALL ONE EXTERIOR PHOTOCELL.
2. TCC SHALL PROVIDE AND CIC SHALL INSTALL INTERPOSING RELAYS WITH CONTACTS RATED FOR CONTINUOUS DUTY AT 277 VAC TO ENERGIZE LIGHTING CONTACTOR COILS. SEE E-622.3 DETAIL 2A.

EXISTING BAS LIGHTING CONTACTOR INFORMATION TO BE CONTROLLED BY THE BUILDING AUTOMATION SYSTEM AS PART OF THIS SCOPE OF WORK:

1. NORTH SECURITY LIGHTING	**AREA F**
A. NORTH SECURITY	CONTACTOR RF-1 IN B112B PANEL L12 L13
B. NORTH PARKING SECURITY	CONTACTOR RF-2 IN B112B PANEL L12 L14
C. NORTH PARKING	CONTACTOR RF-3 IN B112B PANEL L15 L16
D. NORTH WALK	CONTACTOR RF-4 IN B112B PANEL L15 L17
2. WEST EXTERIOR LIGHTING	**AREA K**
A. WEST LIGHTS	CONTACTOR RT-1 PANEL L17 L18
3. EAST EXTERIOR LIGHTING	**AREA N**
A. SECURITY LIGHTS EAST	CONTACTOR RN-1 IN H179 PANEL L14 L15
B. EAST LIGHTS	CONTACTOR RN-2 IN H179 PANEL L14 L16
C. EAST SECURITY LIGHTS	CONTACTOR RN-3 IN H179 PANEL L17 L18
D. EAST LIGHTS	CONTACTOR RN-4 IN H179 PANEL L17 L19
4. ZONE LIGHTING	**AREA Q**
A. ZONE4	CONTACTOR RR-3 IN N293A PANEL L14 L15
B. ZONE8	CONTACTOR RR-4 IN N293A PANEL L14 L16
C. ZONE12	CONTACTOR RR-5 IN N293A PANEL L17 L18
D. ZONE12	CONTACTOR RR-6 IN N293A PANEL L17 L18
E. ZONE12	CONTACTOR RR-7 IN N293A PANEL L17 L18
5. SOUTH EXTERIOR LIGHTING	**AREA S**
A. SOUTH SECURITY	CONTACTOR RS-4 IN L232 PANEL L14 L15
B. SOUTH PARKING	CONTACTOR RS-6 IN L232 PANEL L14 L16
C. SOUTH BUILDING	CONTACTOR RS-5 IN L232 PANEL L17 L18
D. SOUTH PARKING	CONTACTOR RS-7 IN L232 PANEL L17 L19
E. SOUTH WALK	CONTACTOR RS-8 IN L232 PANEL L20 L21
6. LIGHTING RELAY	**AREA J**
A. LIGHTING RELAY	CONTACTOR RJ-1 IN D147C

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELL LOCATED IN AREA T

NEW LIGHTING CONTACTOR INFORMATION TO BE CONTROLLED BY THE BUILDING AUTOMATION SYSTEM AS PART OF THIS SCOPE OF WORK:

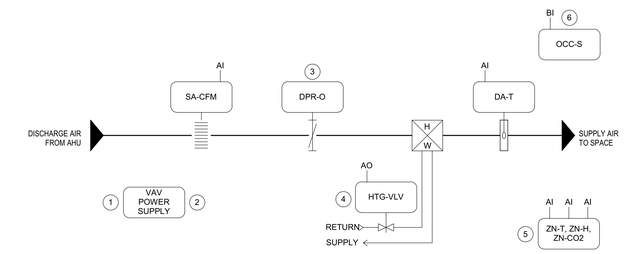
1. NORTHEAST LIGHTING	**AREA P**
A. NORTHEAST PARKING	CONTACTOR RPx PANEL 1H17- CIRCUITS 3,4,5,6,7
B. EXTERIOR WALL LIGHTING	CONTACTOR RPy PANEL 1XLSH3 CIRC. 2 & 1XLSH4 - CIRC. 5

PHASE 2B LIGHTING CONTACTOR INFORMATION TO BE CONTROLLED BY THE BUILDING AUTOMATION SYSTEM AS PART OF THIS SCOPE OF WORK:

1. NORTH & WEST EXTERIOR	**AREA R**
A. NORTH AND WEST EXT	CONTACTOR RR-1 IN P112 PANEL 1H16- CIRCUITS 17, 19, 21, 23, 25
2. SOUTH PARKING LOT	AREA U
A. SOUTH PARKING	CONTACTOR RU-1 PANEL HA - CIRCUITS 61,63,65,67,69,71
3. EXTERIOR AND PARKING LIGHTS	AREA Z
A. SOUTH EXTERIOR/WRESTLING	CONTACTOR RZ-1 PANEL 1HZ1 - CIRC. 13,16,18,20,22,24 1HLSZ1-14
B. WEST EXTERIOR/GYM	CONTACTOR RZ-2 PANEL 1HZ1 - CIRC. 15,17,19,21,23,25,27,29,31,1HLSZ1-12
C. SOUTH PARKING	CONTACTOR RZ-3 PANEL 1HZ1 - CIRC. 26,28,30,32,34,36

DDC INTERFACE TO EXTERIOR LIGHTING: ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

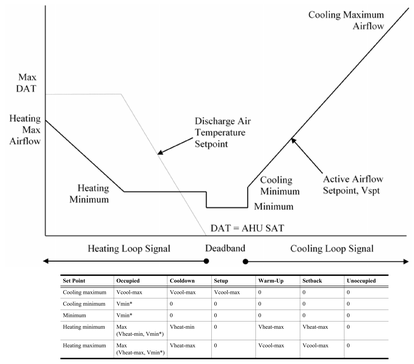
1D EXTERIOR LIGHTING CONTROL
NOT TO SCALE



SCHEMATIC NOTES:

1. 24 VOLT POWER TO VAV BOXES PROVIDED BY TCC AND INSTALLED BY CONTROLS INSTALLATION CONTRACTOR. USE POWER SUPPLY EQUAL TO FUNCTIONAL DEVICES PSH500A OR PSH300A AS APPLICABLE. 120 VOLT POWER TO POWER SUPPLIES BY DIV. 26. DIVISION 26 TO PROVIDE DEDICATED CIRCUIT FOR VAV POWER PANELS NEAR AIR HANDLING UNIT TEMPERATURE CONTROL PANELS SERVING VAV BOXES. SEE ELECTRICAL DRAWINGS.
2. TCC SHALL LOAD POWER SUPPLIES AS REQUIRED TO PROPERLY SERVE CONTROLS ON VAV BOXES. PROVIDE NUMBER REQUIRED. TCC SHALL PROVIDE FUSE PROTECTION AS REQUIRED FOR CONTROLS.
3. VAV CONTROLLER/ACTUATOR FURNISHED BY TCC TO VAV BOX MANUFACTURER FOR FACTORY INSTALLATION AND WIRING.
4. FURNISHED BY TCC, INSTALLED BY THE DIV. 23 CONTRACTOR. CIC SHALL PROVIDE AND INSTALL CONTROL AND POWER WIRING.
5. TCC SHALL PROVIDE AND CIC SHALL INSTALL AND WIRE BACK TO CONTROLLER AS SHOWN ON MECHANICAL PIPING DRAWINGS.
6. CIC SHALL INSTALL AND WIRE FROM TCC CONTROLLER TO AUX CONTACT INCLUDED WITH LIGHTING OCCUPANCY SENSOR.

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Flag	Sched	Trend	Alarm	Show On Graphic
Airflow (SA-CFM)	x								x		x
Discharge Air Temp (DA-T)	x								x		x
Zone Setpoint Adjust	x										x
Zone Combo (ZN-T, ZN-H, ZN-CO2)	x								x		x
Reheating Valve (HTG-O)		x							x		x
Zone Damper (DPR-O)		x							x		x
Occupancy Status (OCC-S)			x						x		x
Finned Tube (FTR-O)				x					x		x
Airflow Setpoint					x				x		x
Cooling Setpoint					x				x		x
DAT Heating Stpt Limit					x						
Heating Setpoint					x				x		x
Heating Mode						x			x		x
Unoccupied Heating Stpt					x						x
Unoccupied Cooling Stpt					x						x
Unoccupied Low Limit					x		x				
High Discharge Air Temp						x				x	
High Zone Temp						x				x	
Low Discharge Air Temp						x				x	
Low Zone Temp						x				x	



Set Point	Occupied	Cooldown	Setup	Warm-Up	Setback	Unoccupied
Cooling maximum	Vcool-max	Vcool-max	Vcool-max	0	0	0
Cooling minimum	Vmin*	0	0	0	0	0
Minimum	Vmin*	0	0	0	0	0
Heating minimum	Max (Vheat-min, Vmin*)	Vheat-min	0	Vheat-max	Vheat-max	0
Heating maximum	Max (Vheat-max, Vmin*)	Vheat-max	0	Vcool-max	Vcool-max	0

VAV BOX WITH REHEAT SEQUENCE OF OPERATION

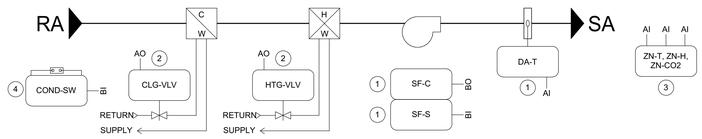
DISCHARGE AIR TEMPERATURE SENSOR: TCC SHALL PROVIDE A SUPPLY AIR TEMPERATURE SENSOR (DA-T) FOR MONITORING PURPOSES AND TO LIMIT THE DISCHARGE AT 95F (ADJ).

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-CFM) AND THE REHEAT VALVE (HTG-VLV) SHALL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT OF 72F (ADJ) PLUS THE DEAD BAND, THE PRIMARY AIR DAMPER SHALL INCREASE THE CFM AND THE REHEAT VALVE SHALL REMAIN FULLY CLOSED. ON A DROP IN TEMPERATURE BELOW THE HEATING SETPOINT OF 70F (ADJ), THE REHEAT VALVE SHALL MODULATE OPEN AFTER LOOP SIGNAL INCREASE AND THE PRIMARY AIR DAMPER SHALL MAINTAIN MINIMUM CFM UP TO THE HEATING MAX AIRFLOW. REFERENCE DIAGRAM AND SETPOINT MATRIX FOR FURTHER DETAILS.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN IN THE UNOCCUPIED MODE, THE VAV BOX SEQUENCE SHALL BE THE SAME AS THE ABOVE OCCUPIED SEQUENCE. UNOCCUPIED HEATING SETPOINT SHALL BE 65F (ADJ) AND THE COOLING SETPOINT SHALL BE 82F (ADJ). WHEN ANY TWO VAV BOXES REACH EITHER THEIR HEATING OR COOLING SETPOINT, THE AIR HANDLING UNIT SHALL START AND RUN TO MAINTAIN THE UNOCCUPIED SETPOINT. PROVIDE DIFFERENTIAL TO PREVENT SHORT CYCLING OF AHU.

3A VAV BOX WITH REHEAT VAV-n
NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE	x								x		x
Discharge Air Temperature (DA-T)	x								x		x
Space Temperature Humidity and CO2 (ZN-T, ZN-H, ZN-CO2)	x								x		x
Hot Water Valve (HTG-VLV)		x							x		x
Chilled Water Valve (CLG-VLV)		x							x		x
Supply Fan Status (SF-S)			x						x		x
Condensate Switch (COND-SW)			x						x	x	x
Supply Fan Start/Stop (SF-C)				x					x		x
Minimum Discharge Air Temperature					x						x
Fan Failure						x			x	x	
Low Discharge Air Temperature (<45F)						x			x	x	
High Discharge Air Temperature (>120F)						x			x	x	
Hot Water Available						x			x		x
Chilled Water Available						x			x		x
Occupied								x	x		x



SCHEMATIC NOTES:

1. TCC SHALL PROVIDE CONTROL DEVICE TO THE CIC FOR FIELD INSTALLATION AND WIRING.
2. TCC SHALL PROVIDE AND MECHANICAL CONTRACTOR SHALL INSTALL. CIC RESPONSIBLE FOR CONTROL AND POWER WIRING.
3. TCC SHALL PROVIDE AND CIC SHALL INSTALL PER MECHANICAL PIPING DRAWINGS.
4. MANUFACTURER INSTALLED DEVICE. CIC RESPONSIBLE TO WIRE TO TCC CONTROLLER PER TCC DRAWINGS.

FAN COIL UNIT WITH REHEAT SEQUENCE OF OPERATION

TCC SHALL PROVIDE CONTROLS AND DEVICES SPECIFIED AND CIC SHALL INSTALL AND PROVIDE ALL CONTROL AND POWER WIRING NOT SPECIFIED OTHERWISE.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM WILL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

ZONE CONTROL: THE COOLING VALVE (CLG-VLV) AND HEATING VALVE (HTG-VLV) WILL MODULATE IN SEQUENCE TO MAINTAIN THE ZONE TEMPERATURE (ZN-T) AT SETPOINT OF 74F (ADJ) COOLING AND 70F (ADJ) HEATING.

ZONE HUMIDITY CONTROL: IF THE SPACE HUMIDITY (ZN-H) RISES ABOVE 60% RH (ADJ) AND IF CHILLED AND HOT WATER IS AVAILABLE, THE COOLING VALVE (CLG-VLV) SHALL FULLY OPEN AND HEATING VALVE (HTG-VLV) WILL MODULATE IN SEQUENCE TO MAINTAIN THE ZONE SPACE TEMPERATURE AT SETPOINT. WHEN THE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE HOT AND CHILLED WATER CONTROL VALVES SHALL RETURN TO NORMAL OPERATION.

NIGHT SETBACK/NIGHT SETUP: WHEN IN "UNOCCUPIED" MODE, THE UNIT WILL CYCLE AS NECESSARY TO MAINTAIN THE NIGHT SETBACK ZONE TEMPERATURE AT SETPOINT WITHIN 60F AND 85F(ADJ). A DIFFERENTIAL PREVENTS THE UNIT FROM CYCLING EXCESSIVELY.

SHUTDOWN:
GENERATE AN ALARM AND SHUTDOWN OPERATION OF THE UNIT IN THE EVENT OF CONDENSATE SWITCH ALARM (COND-SW).
WHEN THE UNIT IS SHUTDOWN BY EITHER A STOP COMMAND OR SYSTEM SAFETY THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
COOLING VALVE WILL CLOSE
HEATING VALVE WILL MODULATE TO MAINTAIN THE DISCHARGE SENSOR AT 60F (ADJ)

POINTS LIST: THE POINTS LIST REPRESENTS THE MINIMUM POINTS TO BE PROVIDED AND DISPLAYED IN THE SYSTEM GRAPHICS. POINTS REQUIRED TO MEET THE SEQUENCE SHALL BE PROVIDED AND ALSO SHOWN.

1A FAN COIL UNITS FCU-A1, A2, C1, C2, G1
NOT TO SCALE

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT
Sarah K Hempstead

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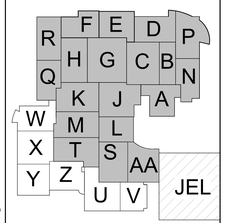
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-729.3

M:\701.1_TEMPERATURE CONTROLS SHEMATICS
2019-067.NCH_3-8.5 of Washington Township North Central High School Renovation_
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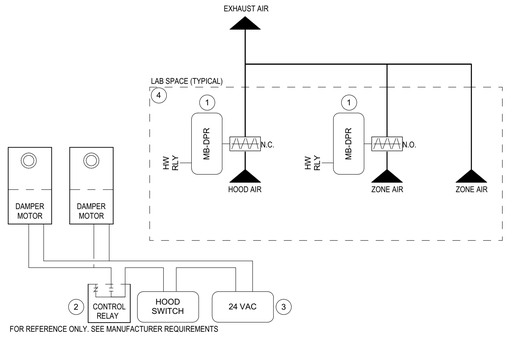
A3.3



FOR REFERENCE ONLY. SEE MANUFACTURER REQUIREMENTS

SCHEMATIC NOTES:

1. TCC SHALL PROVIDE DAMPER ACTUATOR TO CIC FOR INSTALLATION INCLUDING POWER AND CONTROL WIRING.
2. TCC SHALL PROVIDE AND CIC SHALL INSTALL ONE CONTROL RELAY FOR EACH LAB HOOD SWITCH. SEE MECHANICAL PLANS FOR QUANTITY.
3. TCC SHALL PROVIDE NEW CONTROL TRANSFORMER TO CIC FOR INSTALLATION AND REUSE OF EXISTING 120 VAC CIRCUIT.
4. SEE MECHANICAL DUCT PLANS FOR LOCATIONS.

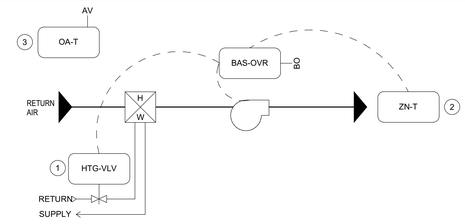
SCIENCE ROOM LAB HOOD SEQUENCE OF OPERATION

LAB HOOD OPERATION: THE LAB HOOD SWITCH SHALL BE CONTROLLED MANUALLY BY THE OPERATOR. WHEN THE SWITCH IS TURNED ON, THE BAS CONTROL RELAY SHALL DRIVE THE NORMALLY CLOSED HOOD AND NORMALLY OPEN ZONE DAMPER ACTUATORS. WHEN THE OPERATOR TURNS THE HOOD SWITCH OFF, BOTH DAMPERS SHALL SPRING TO NORMAL POSITION.

5C STANDALONE LAB HOOD CONTROL AREAS Q AND R

NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
BAS Override (BAS-OVR)				x					x		x
Outside Air Temperature (OA-T)					x				x		x



SCHEMATIC NOTES:

1. TCC SHALL PROVIDE CONTROL VALVES TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC SHALL INSTALL POWER AND CONTROL WIRING TO TCC PROVIDED CONTROL TRANSFORMER AND BAS OVERRIDE CONTACTS.
2. TCC SHALL PROVIDE AND CIC INSTALL LINE VOLTAGE THERMOSTAT IN LOCATIONS PER THE MECHANICAL PIPING DRAWINGS.
3. OUTSIDE AIR TEMPERATURE SHALL BE CENTRALIZED NETWORK SHARED BUILDING VALUE.

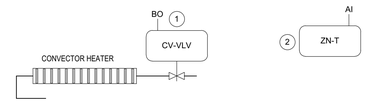
PROPELLER HEATER SEQUENCE OF OPERATION

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

3D HYDRONIC PROPELLER UNIT HEATER PUH-n AND E-PUH-n

NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Space Temperature (ZN-T)	x								x		x
Convector Valve (CV-VLV)				x					x		x
Outside Air Temperature					x						x



SCHEMATIC NOTES:

1. TCC SHALL PROVIDE VALVE ASSEMBLY WITH ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC RESPONSIBLE TO INSTALL 24 VOLT POWER AND CONTROL SIGNAL. SEE MECHANICAL PLANS FOR QUANTITIES.
2. TCC SHALL PROVIDE AND CIC SHALL INSTALL AND WIRE WALL MOUNTED SPACE TEMPERATURE SENSOR.

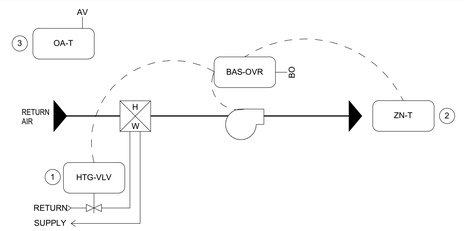
CONVECTOR SEQUENCE OF OPERATION.

RADIANT HEATING: WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), THE HOT WATER VALVE SHALL REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES SHALL CYCLE OPEN AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT OF 68F (ADJ).

3C CONVECTOR E-CV-n AND CV-n

NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
BAS Override (BAS-OVR)				x					x		x
Outside Air Temperature (OA-T)					x				x		x



SCHEMATIC NOTES:

1. TCC SHALL PROVIDE CONTROL VALVES TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC SHALL INSTALL POWER AND CONTROL WIRING TO TCC PROVIDED CONTROL TRANSFORMER AND BAS OVERRIDE CONTACTS.
2. MANUFACTURER SHALL PROVIDE THERMOSTAT.
3. LOGIC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE VALUE.

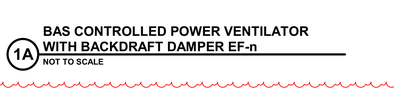
CABINET UNIT HEATER SEQUENCE OF OPERATION:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

1D HYDRONIC CABINET UNIT HEATER CH-n AND E-CH-n

NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Outside Air Temperature (OA-T) NETWORK SHARE	x										x
Radiant Ceiling Panel Control Valve (RAD-VLV)				x					x		x
Occupied									x		x



SCHEMATIC NOTES:

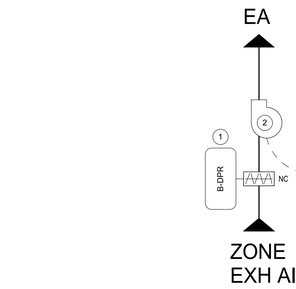
1. TCC SHALL PROVIDE VALVE ASSEMBLY WITH ACTUATOR TO MECHANICAL CONTRACTOR FOR INSTALLATION. CIC RESPONSIBLE TO INSTALL 24 VOLT POWER AND CONTROL SIGNAL. SEE MECHANICAL PLANS FOR QUANTITIES.
2. TCC SHALL UTILIZE SHARED OUTSIDE AIR TEMPERATURE VALUE.

RADIANT CEILING PANEL SEQUENCE OF OPERATION.

RADIANT CEILING PANELS: WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), HOT WATER VALVES FOR RADIANT HEATING ARE TO REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES ARE TO OPEN AS A FIRST STAGE OF HEATING FOR THE SPACES INDICATED IN THE MECHANICAL DRAWINGS.

1C RADIANT CEILING PANEL RCP-n

NOT TO SCALE



SCHEMATIC NOTES:

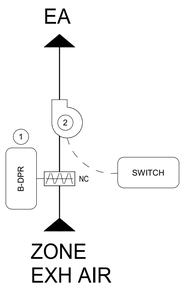
1. BACKDRAFT DAMPER REQUIRES NO TEMPERATURE CONTROLS.
2. REFERENCE MECHANICAL SCHEDULES ON M-602.3 FOR THERMOSTAT CONTROLLED EXHAUST FANS AND ADDITIONAL REQUIREMENTS.

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO WALL MOUNTED THERMOSTAT. CONTRACTOR SHALL SET ADJUSTABLE THERMOSTAT TO CONTROL SPACE TEMPERATURE TO 75F. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

4A THERMOSTAT CONTROLLED POWERED VENTILATOR WITH BACKDRAFT DAMPER EF-n

NOT TO SCALE



SCHEMATIC NOTES:

1. BACKDRAFT DAMPER REQUIRES NO TEMPERATURE CONTROLS.
2. REFERENCE MECHANICAL SCHEDULES ON M-602.3 FOR TOGGLE SWITCH CONTROLLED EXHAUST FANS AND ADDITIONAL REQUIREMENTS.

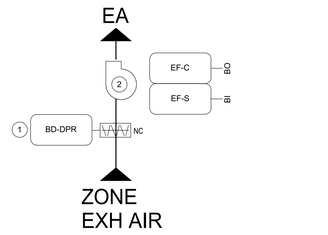
EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO WALL MOUNTED TOGGLE SWITCH. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

3A TOGGLE SWITCH CONTROLLED POWERED VENTILATOR WITH BACKDRAFT DAMPER EF-n

NOT TO SCALE

Point Name	Hardware Points AI	AO	BI	BO	Software Points AV	BV	Loop	Sched	Trend	Alarm	Show On Graphic
Exhaust Fan Status (EF-S)			x						x		x
Exhaust Fan Start/Stop (EF-C)				x					x		x
Fan Failure					x				x	x	
Occupied								x	x		x



SCHEMATIC NOTES:

1. BACKDRAFT DAMPER REQUIRES NO TEMPERATURE CONTROLS.
2. REFERENCE MECHANICAL SCHEDULES ON M-602.3 FOR BAS CONTROLLED EXHAUST FANS AND ADDITIONAL REQUIREMENTS.

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

1A BAS CONTROLLED POWER VENTILATOR WITH BACKDRAFT DAMPER EF-n

NOT TO SCALE

SCHMIDT
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415 Massachusetts Avenue
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www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced BNW / DLM

SARAH KATHLEEN HEMPSTEAD REGISTERED NO. AR10400134 STATE OF INDIANA ARCHITECT

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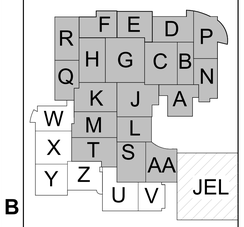
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-730.3

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2019-067.NCH_A3.3_of Washington Township_North Central High School Renovation_
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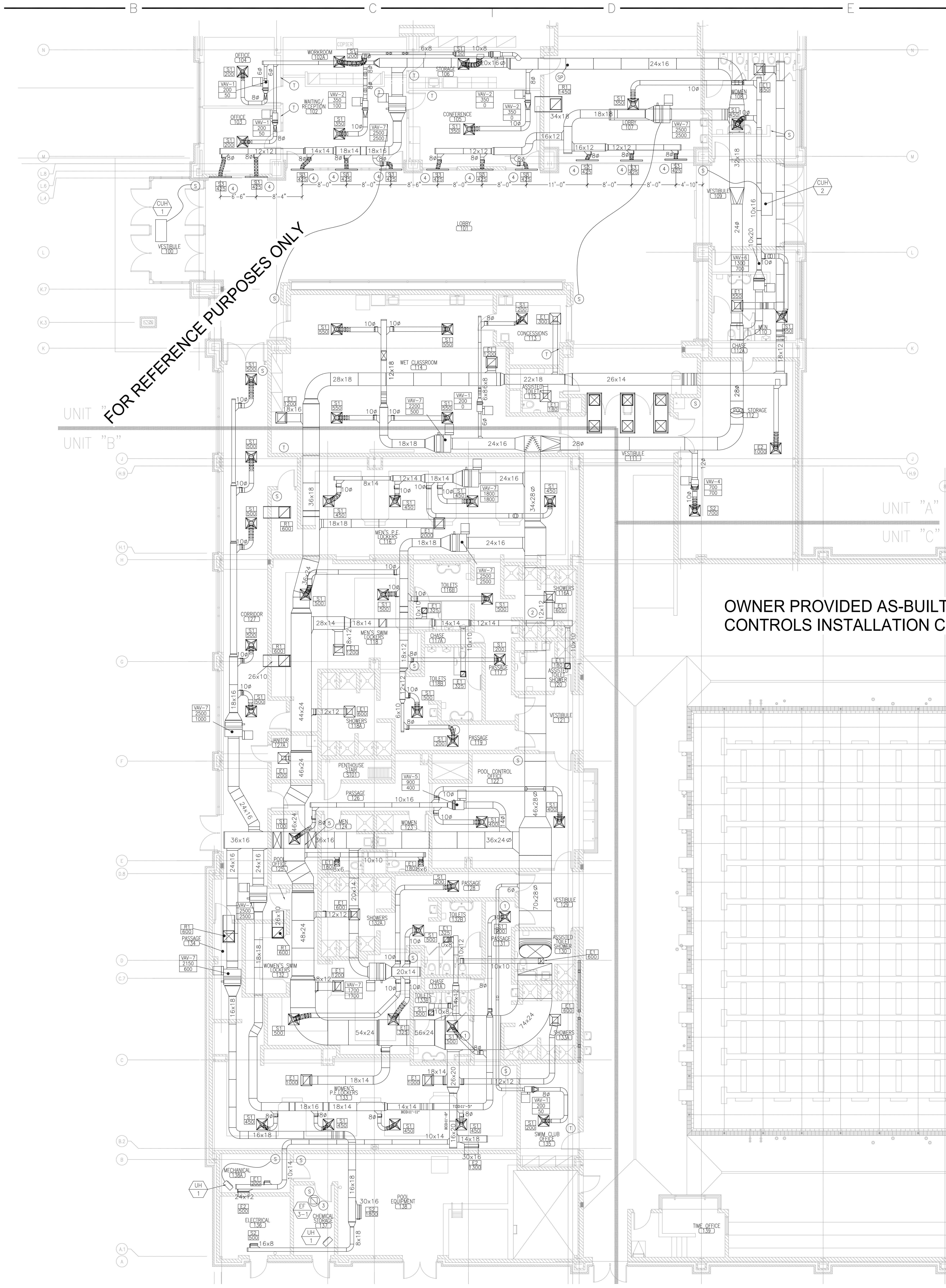

MECHANICAL REFERENCE NOTES:

1. PROVIDE BALANCE DAMPER AT DIFFUSER PLENUM FOR TEST AND BALANCE.
2. OFFSET EA DUCTWORK AS REQUIRED TO ROUTE IN JOIST SPACE ABOVE SA DUCTWORK.
3. EXTEND EXHAUST DUCTWORK 12" BELOW ROOF DECK. COVER OPENING WITH 1/2" MESH SCREEN.
4. BOTTOM OF LINEAR SLOT SUPPLY DIFFUSERS SHALL BE 10'-8" AFF.
5. OFFSET SA DUCTWORK AS REQUIRED TO ROUTE IN JOIST SPACE ABOVE EA DUCTWORK.

OWNER PROVIDED AS-BUILT DRAWINGS. FOR REFERENCE PURPOSES ONLY.
CONTROLS INSTALLATION CONTRACTOR ONLY SCOPE OF WORK.

NORTH

HVAC DUCTWORK PLAN - UNITS "A & B"

1/8"=1'-0"

AS BUILT DRAWING

AS BUILT DRAWING

Lehman's Inc.
Mechanical Contractor
1023 West 38 th Street
Anderson, IN 46013
765-644-4700

CERTIFIED BY

HVAC DUCTWORK PLAN UNITS "A & B"

NORTH CENTRAL HIGH SCHOOL NATATORIUM ADDITION
1801 EAST 82nd STREET
INDIANAPOLIS INDIANA

DATE:	10/10/2007
DRAWN BY:	C. MCCREARY
CHK'D BY:	
JOB NO.	5959

REVISIONS	
J. Holbrook	11-18-08

SHEET NO. M101

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Project No. 2019-067.NCH
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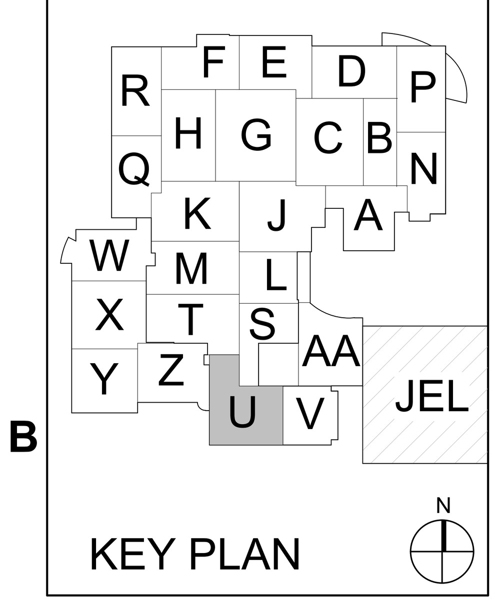
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

TEMPERATURE CONTROLS SCHEMATICS

M-731.3

M-731.3_ TEMPERATURE CONTROLS SCHEMATICS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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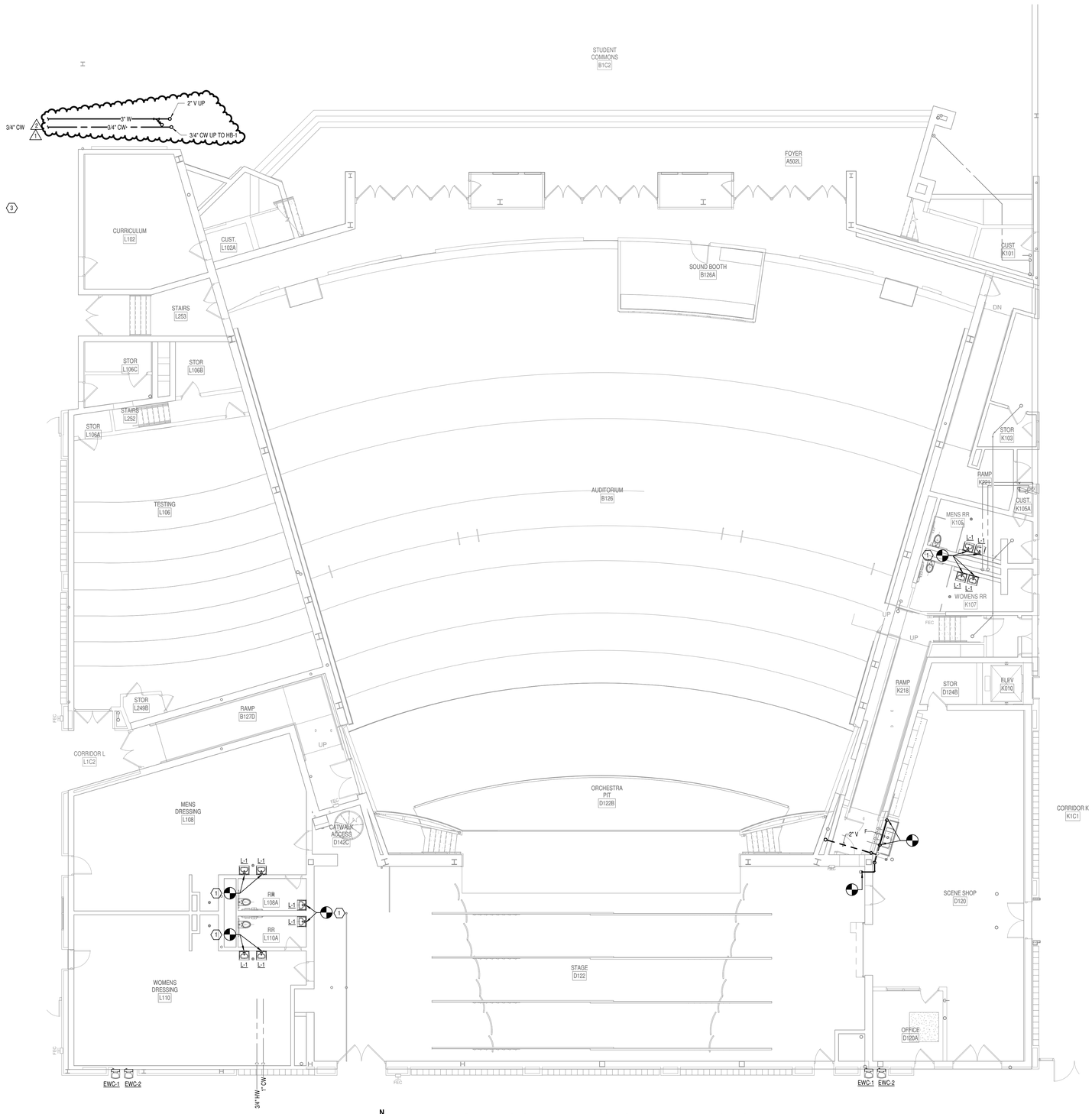

N

1 FIRST FLOOR PLUMBING PLAN - UNIT G

1/8" = 1'-0"

GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
B REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING FLOORS.
C REFER TO SPECIFICATIONS FOR PIPE SLEEVE REQUIREMENTS.
D REFER TO ARCHITECTURAL DRAWINGS FOR INSTRUCTIONS FOR REMOVING/REPLACING WALLS, CEILINGS, ETC.
E FOR ALL ELECTRIC WATER COOLER REPLACEMENTS, VERIFY EXISTING ELECTRIC WATER COOLER HAS NOT PREVIOUSLY BEEN REPLACED BY OWNER.
F FOR ALL WATER CLOSETS AND URINALS; VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 PROVIDE NEW LAVATORY, L-1. RECONNECT TO EXISTING CW, HW, AND WASTE PIPING.

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415 Massachusetts Avenue
Indianapolis, IN 46204
www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced KC TCC

KBSO #20060 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 3/3/2023

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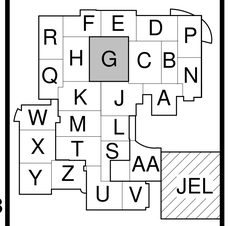
#	Revision	Date
A2.3	ADDENDUM 2.3	03.22.2023
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLUMBING PLAN - UNIT G

PF1G1.3

PF1G1.3_FIRST FLOOR PLUMBING PLAN - UNIT G
2019-067.NCH_M.S.D. of Washington Township North Central High School Renovation...
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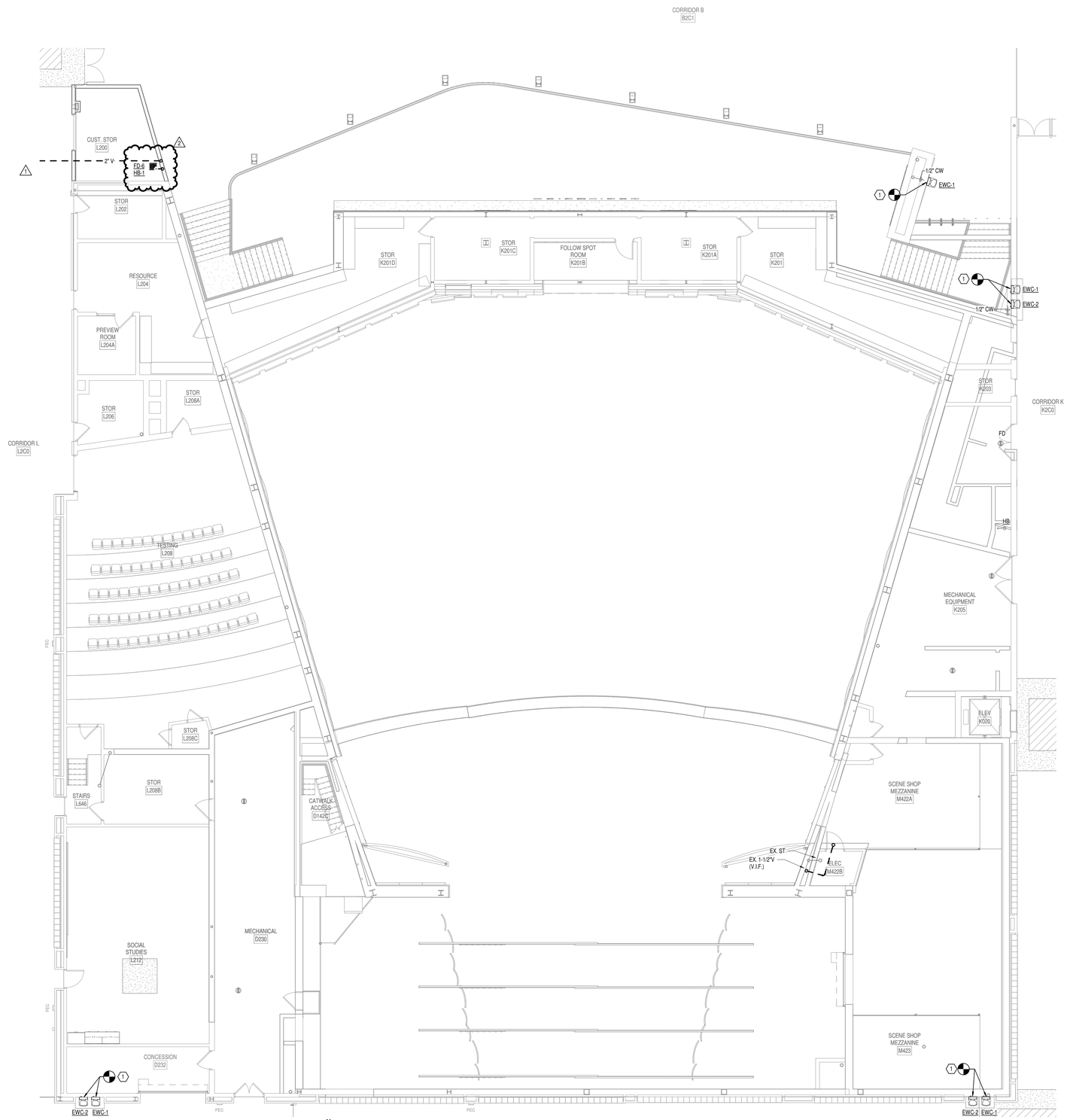

N

1 SECOND FLOOR PLUMBING PLAN - UNIT G

1/8" = 1'-0"

GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
B REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING FLOORS.
C REFER TO SPECIFICATIONS FOR PIPE SLEEVE REQUIREMENTS.
D REFER TO ARCHITECTURAL DRAWINGS FOR INSTRUCTIONS FOR REMOVING/REPLACING WALLS, CEILINGS, ETC.
E FOR ALL ELECTRIC WATER COOLER REPLACEMENTS, VERIFY EXISTING ELECTRIC WATER COOLER HAS NOT PREVIOUSLY BEEN REPLACED BY OWNER.
F FOR ALL WATER CLOSETS AND URINALS: VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 PROVIDE NEW WATER COOLERS, EWC-1 & EWC-2. RECONNECT TO EXISTING CW AND WASTE PIPING.

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
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www.schmidt-arch.com

Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced KC TCC

KBSO #20060 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 3/3/2023

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A3.3	ADDENDUM 3.3	04.06.2023

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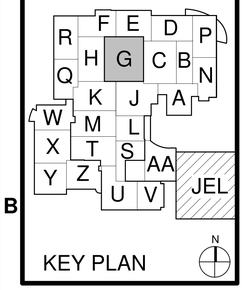

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PLUMBING PLAN - UNIT G

PF1G2.3

PF1G2.3_SECOND FLOOR PLUMBING PLAN - UNIT G
2019.067.NCH M.S.D of Washington Township_North Central High School Renovation_
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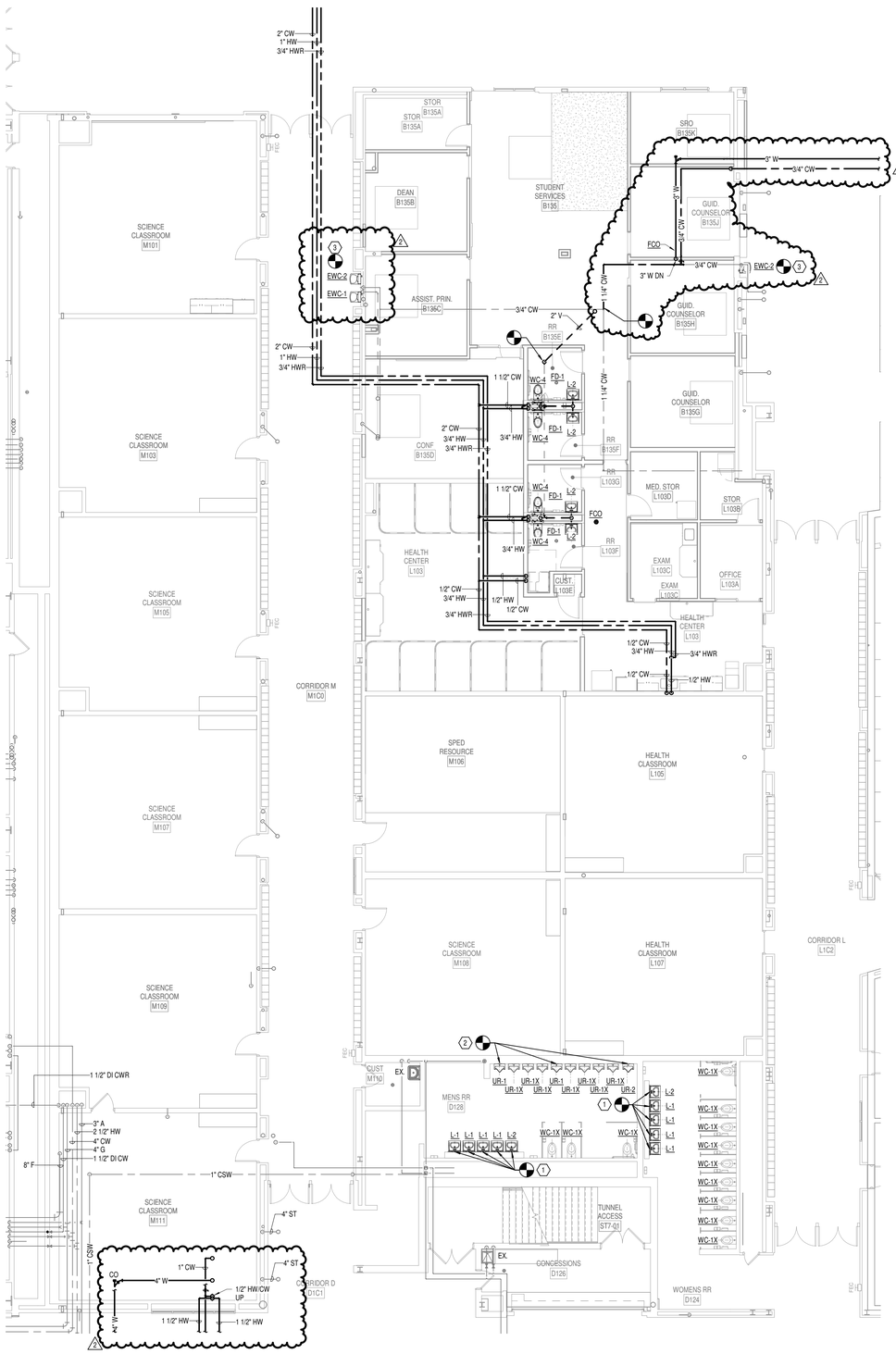

N

1 FIRST FLOOR PLUMBING PLAN - UNIT H

1/8" = 1'-0"

GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
B REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING FLOORS.
C REFER TO SPECIFICATIONS FOR PIPE SLEEVE REQUIREMENTS.
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F FOR ALL WATER CLOSETS AND URINALS; VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 PROVIDE NEW LAVATORIES, L-1 AND L-2. RECONNECT TO EXISTING CW, HW, AND WASTE PIPING.
2 PROVIDE NEW URINALS, UR-1 AND UR-2. RECONNECT TO EXISTING CW AND WASTE PIPING.
3 PROVIDE NEW WATER COOLER(S), EWC-1 AND/OR EWC-2. RECONNECT TO EXISTING CW AND WASTE PIPING.

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Project No. 2019-067.NCH
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KBSO #20060 OLUWASEUN OLUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 3/3/2023

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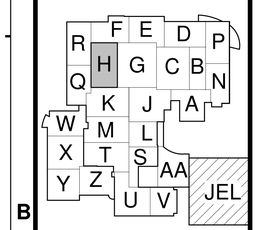

KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLUMBING PLAN - UNIT H

PF1H1.3

PF1H1.3 - FIRST FLOOR PLUMBING PLAN - UNIT H
2019-067.NCH M.S.D. of Washington Township, North Central High School Renovation - Additions Phase 3
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N

1 SECOND FLOOR PLUMBING PLAN - UNIT H

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3 PROVIDE NEW URINALS, UR-1 AND UR-2. RECONNECT TO EXISTING CW AND WASTE PIPING.

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A3.3	ADDENDUM 3.3	04.06.2023

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KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

SECOND FLOOR PLUMBING PLAN - UNIT H

PF1H2.3

PF1H2.3 - SECOND FLOOR PLUMBING PLAN - UNIT H
2019-067.NCH_R3.3.0 #Washington Township, North Central High School Renovation...
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GENERAL NOTES

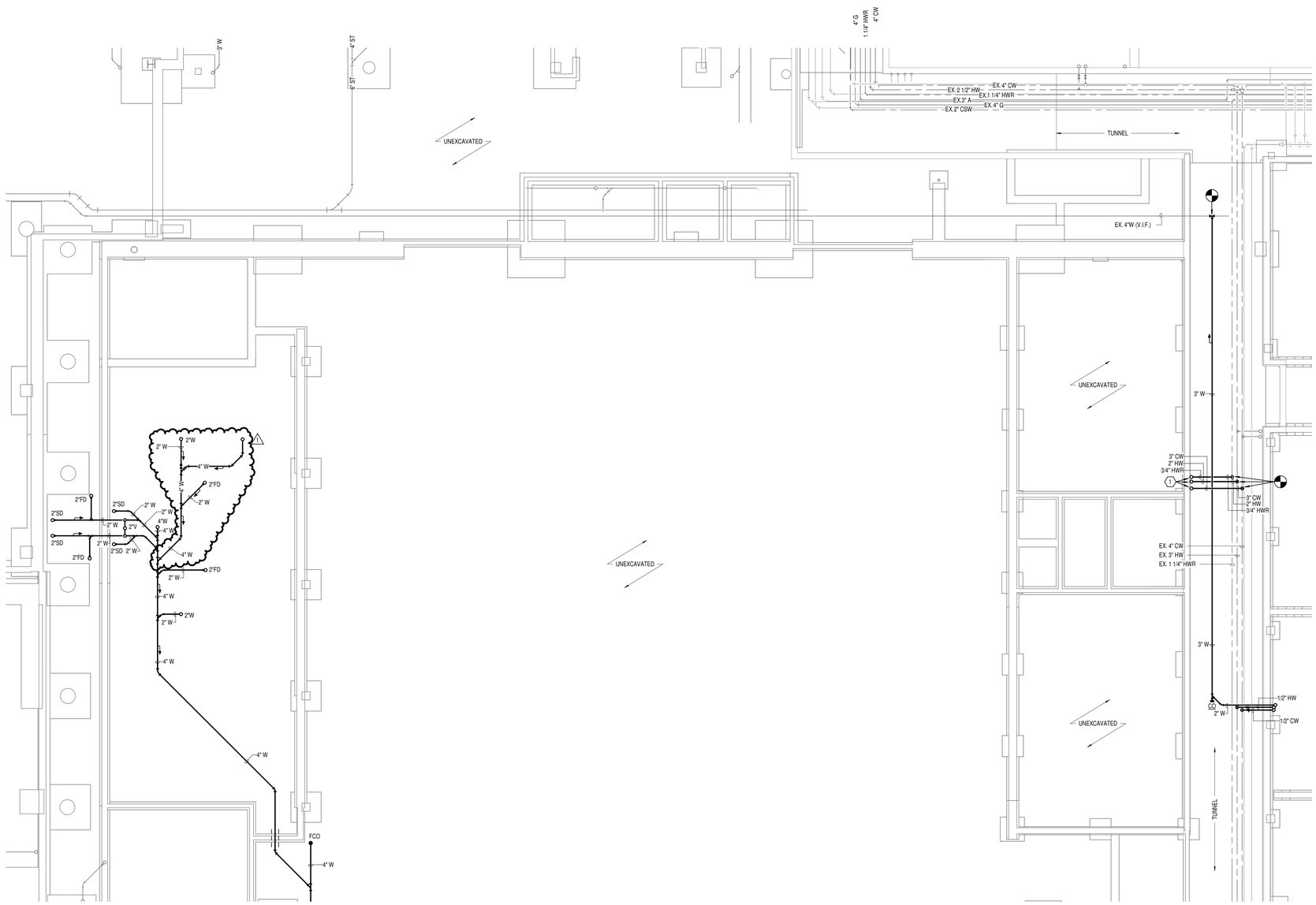
A SAWCUT FLOOR AND EXCAVATE TO INSTALL NEW PIPE. BACKFILL AND PATCH FLOOR.

B REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING FLOORS.

C REFER TO SPECIFICATIONS FOR PIPE SLEEVE REQUIREMENTS.

SHEET KEYNOTES

1 3"CW, 2"HW, 3/4"HWR UP IN CHASE ABOVE.



1 FOUNDATION PLUMBING PLAN - UNIT K
1/8" = 1'-0"

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced KC TCC

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No. 11300632
STATE OF INDIANA
PROFESSIONAL ENGINEER
KBSO #20060
3/3/2023

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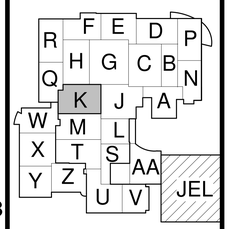

KEY PLAN

M.S.D. of Washington Township

North Central High School
Renovation - Additions
Phase 3

FOUNDATION PLUMBING PLAN - UNIT K

PF1K0.3

PF1K0_FOUNDATION PLUMBING PLAN - UNIT K
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GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
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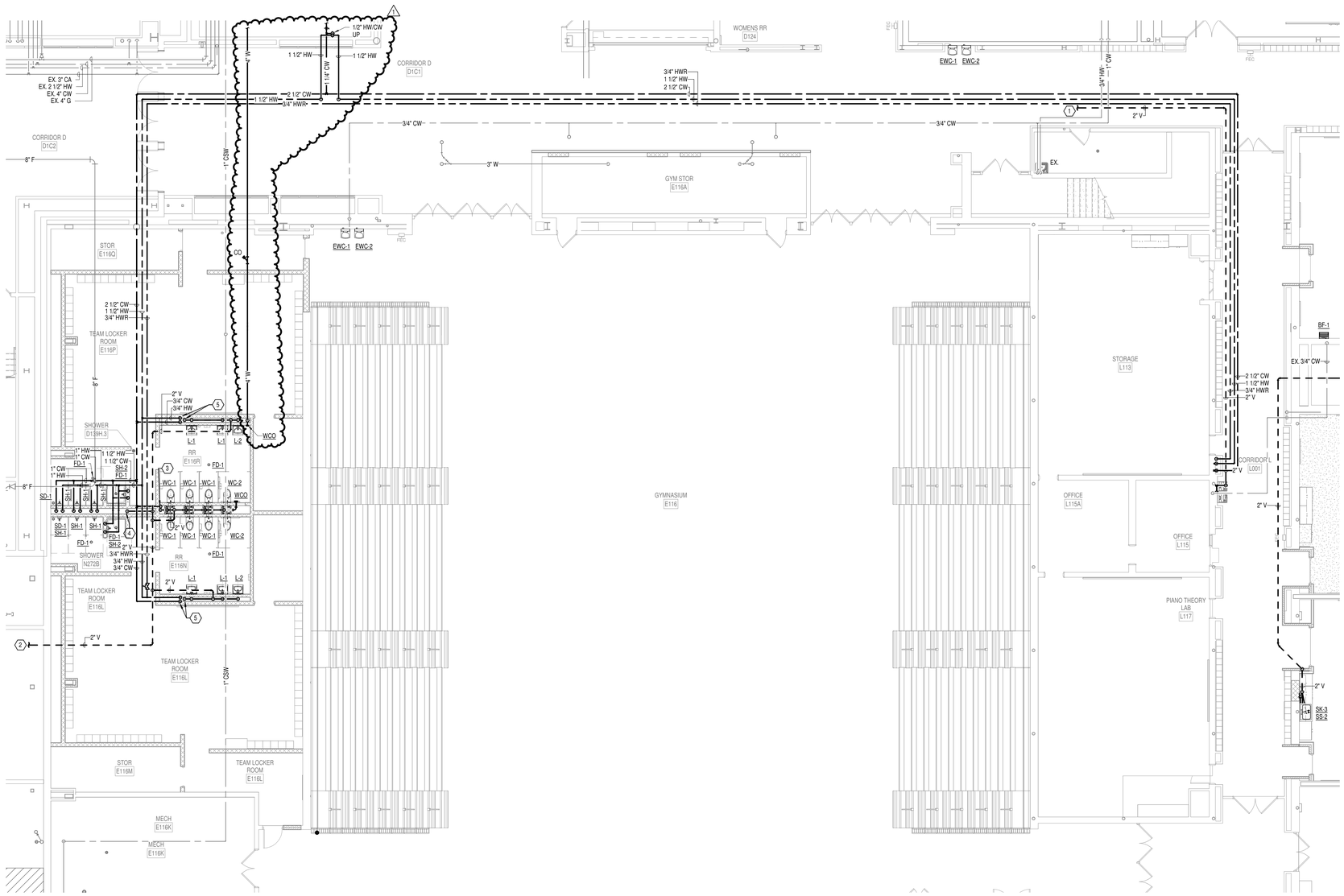
F FOR ALL WATER CLOSETS AND URINALS; VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 CONNECT 2"V INTO EXISTING VENT IN THIS AREA. VERIFY EXACT SIZE AND LOCATION OF EXISTING VENT IN FIELD.
2 EXTEND 2"V AND CONNECT INTO EXISTING VENT LOCATED IN 'UNIT W'. VERIFY EXACT SIZE AND LOCATION OF EXISTING VENT IN FIELD.
3 2 1/2" CW DOWN IN CHASE. ROUTE FULL SIZE HEADER IN CHASE TO FIXTURES, PROVIDE WATER HAMMER ARRESTOR (WHA-D) PRIOR TO LAST FLUSH VALVE. 4" W DOWN.
4 2" V FROM BELOW.
5 3/4" CW AND 3/4" HW DOWN IN CHASE - ROUTE FULL SIZE HEADERS TO FIXUTRES. 2" W DOWN.



N

1 FIRST FLOOR PLUMBING PLAN - UNIT K
1/8" = 1'-0"

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ASSOCIATES
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Indianapolis, IN 46204
www.schmidt-arch.com

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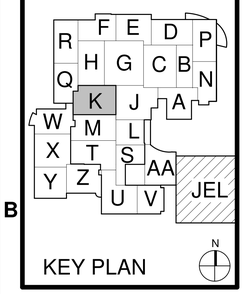

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLUMBING PLAN - UNIT K

PF1K1.3

PF1K1_FIRST FLOOR PLUMBING PLAN - UNIT K
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_
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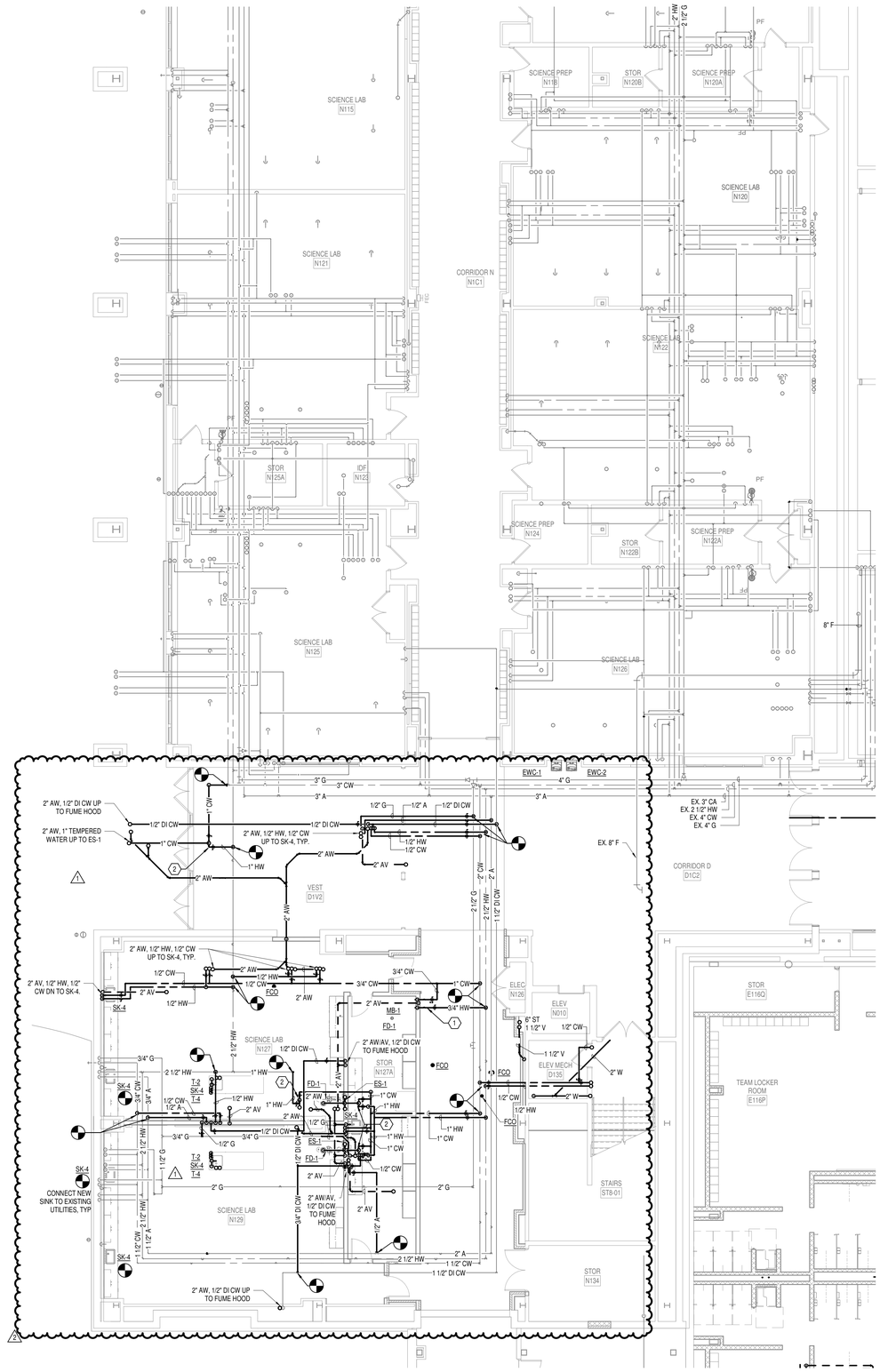

N

1 FIRST FLOOR PLUMBING PLAN - UNIT Q

1/8" = 1'-0"

GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
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F FOR ALL WATER CLOSETS AND URINALS, VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 PROVIDE SHUT-OFF VALVES AND CHECK VALVES ON HW AND CW SUPPLY TO MOP BASIN.
2 THERMOSTATIC MIXING VALVE PROVIDED WITH EMERGENCY SHOWER MOUNTED ABOVE CEILING.

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Project Date 03.03.2023
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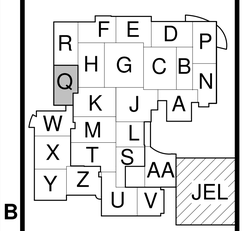

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLUMBING PLAN - UNIT Q

PF1Q1.3

PF1Q1.3_FIRST FLOOR PLUMBING PLAN - UNIT Q
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation...
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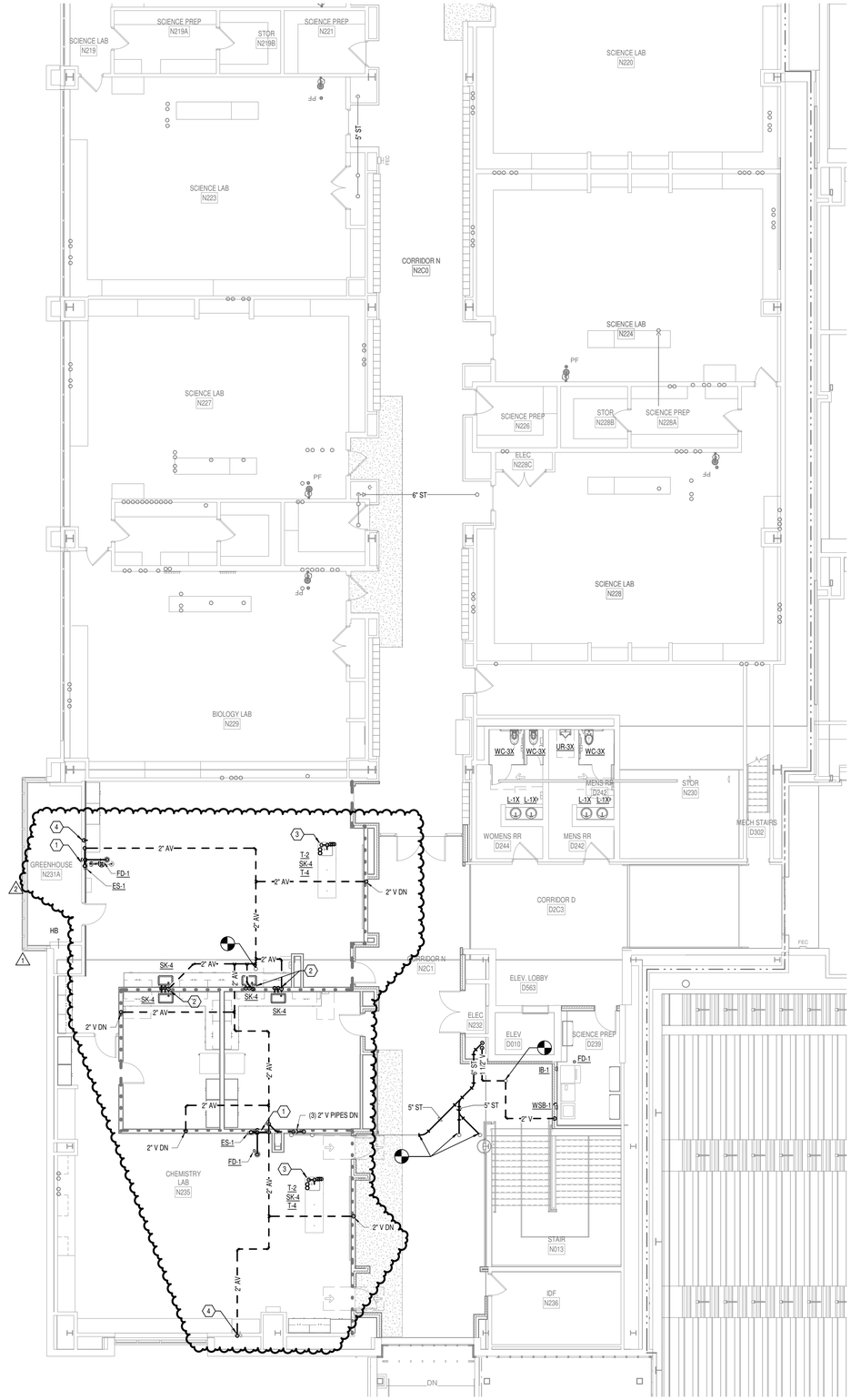
5/3/2023 3:48:38 PM
kcarter



N

1 SECOND FLOOR PLUMBING PLAN - UNIT Q

1/8" = 1'-0"

GENERAL NOTES

A SAWCUT AND/OR CORE DRILL FLOORS, WALLS, ETC. TO INSTALL NEW PIPE.
B REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING FLOORS.
C REFER TO SPECIFICATIONS FOR PIPE SLEEVE REQUIREMENTS.
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F FOR ALL WATER CLOSETS AND URINALS, VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 1" HW, 1" CW, 2" AW DN. 2" AV UP.
2 1/2" CW AND 1/2" HW FROM BELOW. 2" W DOWN AND 2" V UP, TYPICAL.
3 ALL SERVICES FEED FROM BELOW. COORDINATE LOCATIONS WITH STRUCTURAL AND CASEWORK LOCATIONS, TYPICAL.
4 1/2" DI CW & 2" AW FROM BELOW TO FUME HOOD. 2" AV DN.

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KBSO #20060
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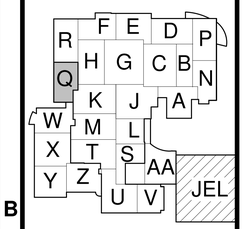
KEY PLAN



M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SECOND FLOOR PLUMBING PLAN - UNIT Q

PF1Q2.3

PF1Q2.3 - SECOND FLOOR PLUMBING PLAN - UNIT Q
2019-067.NCH A3.3 of Washington Township North Central High School Renovation...
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GENERAL NOTES

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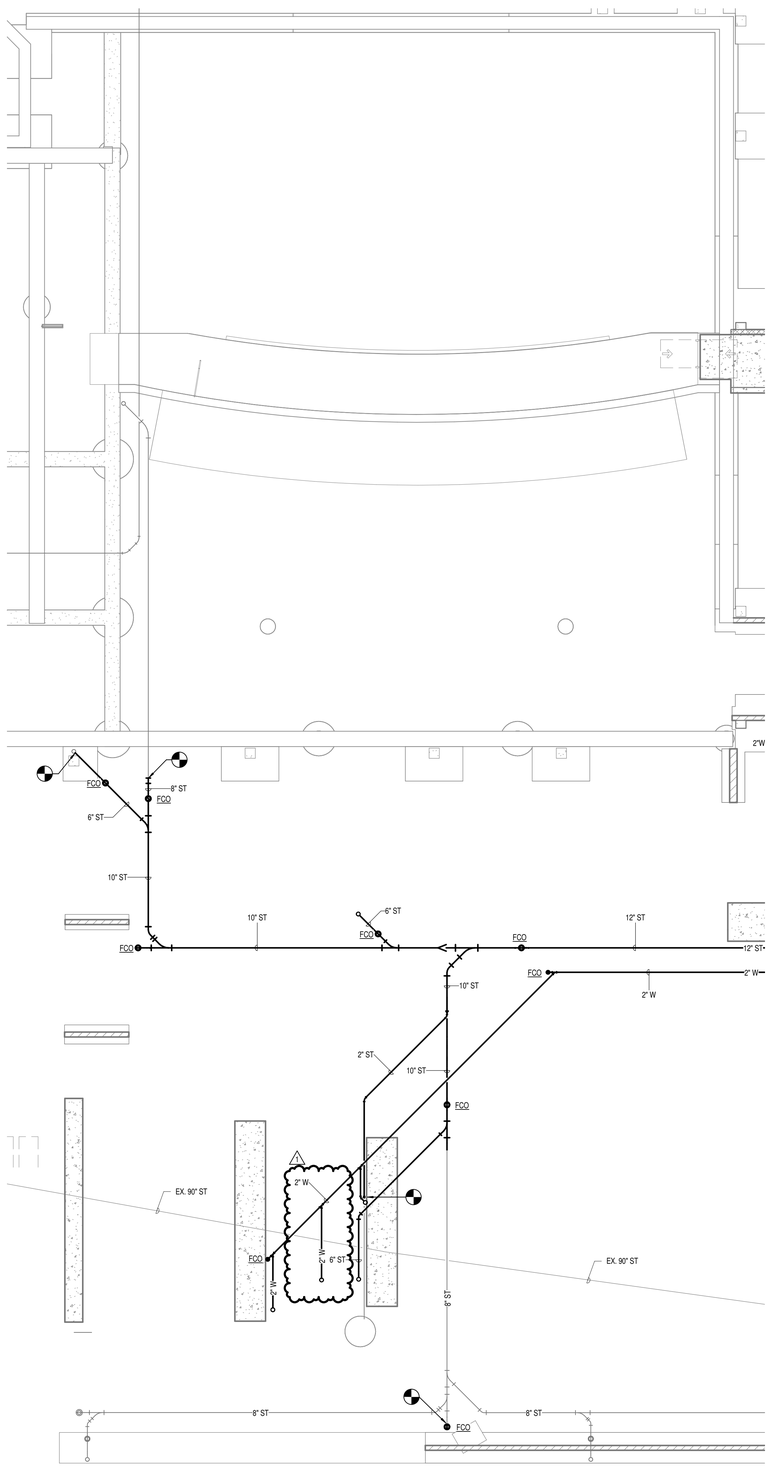

N

1 FOUNDATION PLUMBING PLAN - UNIT S
1/8" = 1'-0"

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Project No. 2019-067.NCH
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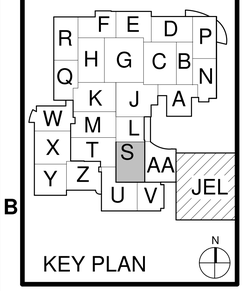

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FOUNDATION PLUMBING PLAN - UNIT S

PF1S0.3

PF1S0.3 - FOUNDATION PLUMBING PLAN - UNIT S
2019-067.NCH M.S.D. of Washington Township North Central High School Renovation - Additions Phase 3
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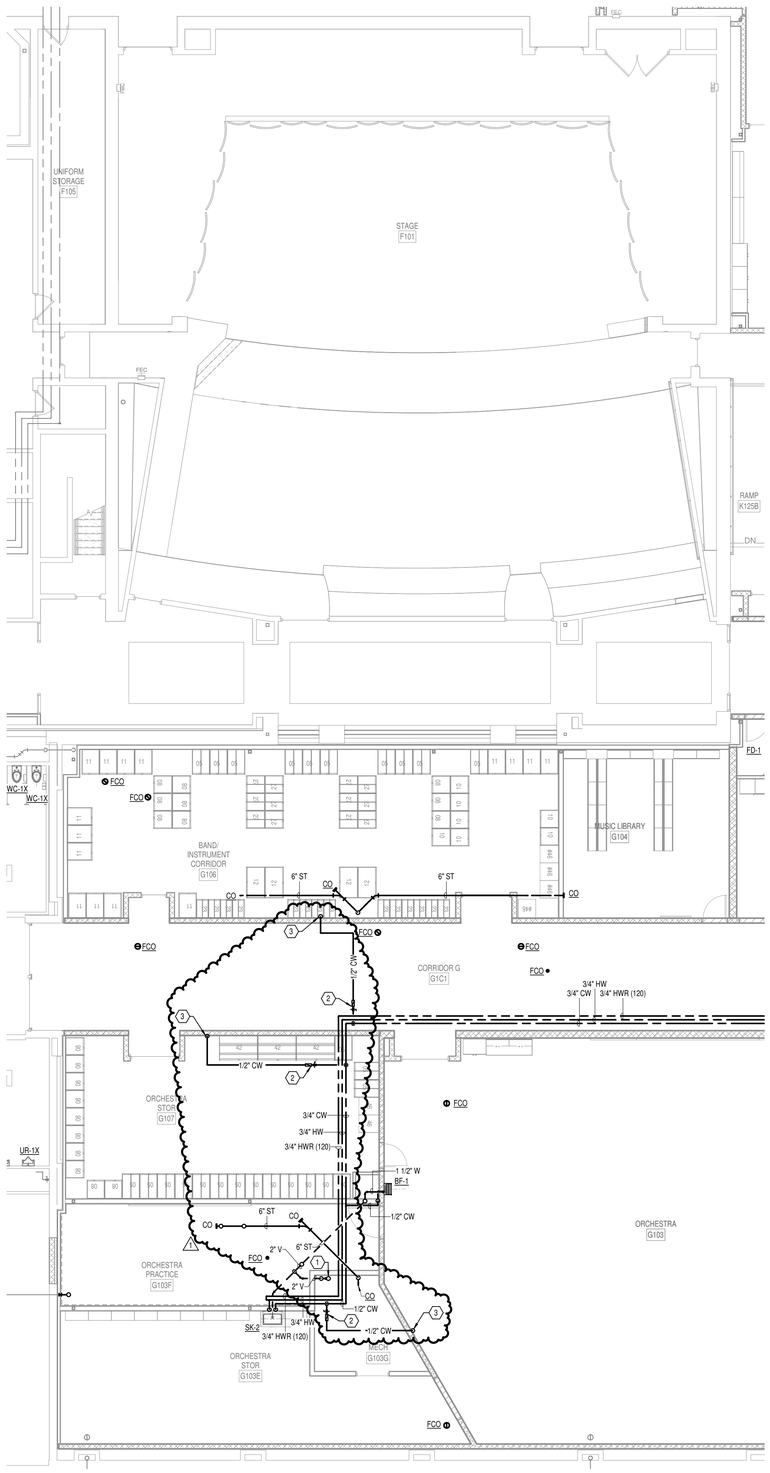
Central Model



N

1 FIRST FLOOR PLUMBING PLAN - UNIT S

1/8" = 1'-0"

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F FOR ALL WATER CLOSETS AND URINALS; VERIFY CONDITION AND OPERATION OF EXISTING FLUSH VALVE AND REPLACE AS NEEDED. REPLACE ALL WATER CLOSET SEATS.

SHEET KEYNOTES

1 2"x6" FITTING USED AS HUB DRAIN/STANDPIPE FOR MECHANICAL HUMIDIFICATION UNIT CONDENSATE. PROVIDE P-TRAP, 2" W DN, 2" V UP.
2 1/2" SHUT OFF VALVE AND BACKFLOW PREVENTER, BFP TO BE WATTS 007 OR EQUIVALENT.
3 1/2" CW DN TO HUMIDIFICATION UNIT. VERIFY EXACT LOCATION AND CONNECTION POINT WITH MECHANICAL DRAWINGS.

SCHMIDT
ASSOCIATES
415 Massachusetts Avenue
Indianapolis, IN 46204
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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced KC TCC

KBSO #20060 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 3/3/2023

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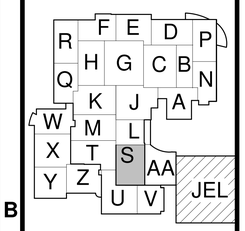
#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

FIRST FLOOR PLUMBING PLAN - UNIT S

PF1S1.3

PF1S1.3 - FIRST FLOOR PLUMBING PLAN - UNIT S
2019-067.NCH, M.S.D. of Washington Township, North Central High School Renovation - Additions Phase 3, 415 Massachusetts Avenue, Indianapolis, IN 46204
Plotted: 3/3/2023 8:46:08 AM By: Bridget.O'Connor.local

PLUMBING FIXTURE SCHEDULE

TAG	FIXTURE DESCRIPTION	FIXTURE	TRIM & ACCESSORIES
WC-1, 2	WATER CLOSET: WALL HUNG, VITREOUS CHINA, 1.6 GPF, 1,000 GRAMS MaP SCORE, ELONGATED BOWL, 1-1/2" TOP SPUD, 10" X 12" WATER SURFACE AREA, 1,000 LBS STATIC WEIGHT LOAD, SLOAN TEC GLAZE, DIRECT-FED SIPHON JET ACTION. FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 1" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 1-1/2" TOP SPUD COUPLING, NON-HOLD-OPEN HANDLE, ADA COMPLIANT. SEAT: OPEN FRONT LESS COVER, ELONGATED, HEAVY DUTY, INJECTION MOLDED SOLID PLASTIC, MOLDED IN BUMPERS, SELF-SUSTAINING CHECK HINGES, STAINLESS STEEL POSTS AND PINTLES, STA-TITE COMMERCIAL FASTENING SYSTEM. CARRIER: HEAVY DUTY, HORIZONTAL WATER CLOSET CARRIER WITH FLOOR MOUNTED FOOT SUPPORT, REAR ANCHOR, 7" ABS COUPLING, WITH O-RING SEAL, TEST CAP, THREADED ZINC PLATED SUPPORT STUDS AND HARDWARE, STUD PROTECTORS, NEOPRENE BOWL GASKET, CHROME PLATED CAP NUTS, AND ADJUSTABLE FACEPLATE.	WATER CLOSET: SLOAN ST-2459-STG	FLUSH VALVE: SLOAN ROYAL 111-1.6 SEAT: BEMIS 1955SSCT CARRIER: WADE 311XB / 330XB
WC-1X	FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 1" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 1-1/2" TOP SPUD COUPLING, NON-HOLD-OPEN HANDLE, ADA COMPLIANT.	EXISTING	FLUSH VALVE: SLOAN ROYAL 111-1.6
WC-3, 4	WATER CLOSET: WALL HUNG, VITREOUS CHINA, 1.6 GPF, 1,000 GRAMS MaP SCORE, ELONGATED BOWL, 1-1/2" TOP SPUD, 10" X 12" WATER SURFACE AREA, 1,000 LBS STATIC WEIGHT LOAD, SLOAN TEC GLAZE, DIRECT-FED SIPHON JET ACTION. FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 1" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 1-1/2" TOP SPUD COUPLING, HARD WIRED, INFRARED SENSOR, TRUE MECHANICAL OVERRIDE, ADA COMPLIANT. SEAT: OPEN FRONT LESS COVER, ELONGATED, HEAVY DUTY, INJECTION MOLDED SOLID PLASTIC, MOLDED IN BUMPERS, SELF-SUSTAINING CHECK HINGES, STAINLESS STEEL POSTS AND PINTLES, STA-TITE COMMERCIAL FASTENING SYSTEM. CARRIER: HEAVY DUTY, HORIZONTAL WATER CLOSET CARRIER WITH FLOOR MOUNTED FOOT SUPPORT, REAR ANCHOR, 7" ABS COUPLING, WITH O-RING SEAL, TEST CAP, THREADED ZINC PLATED SUPPORT STUDS AND HARDWARE, STUD PROTECTORS, NEOPRENE BOWL GASKET, CHROME PLATED CAP NUTS, AND ADJUSTABLE FACEPLATE.	WATER CLOSET: SLOAN ST-2459-STG NOTE: ALL WIRING, J-BOXES, ETC. FROM TRANSFORMER TO FLUSH VALVE TO BE PROVIDED BY THE PLUMBING CONTRACTOR. INSTALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS.	FLUSH VALVE: SLOAN ROYAL 111 ESS-1.6-TMO TRANSFORMER: SLOAN EL-451 (UP TO 6 FLUSHOMETERS) SLOAN EL-386 (UP TO 1 FLUSHOMETER) SEAT: BEMIS 1955SSCT CARRIER: WADE 311XB / 330XB
WC-3X	FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 1" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 1-1/2" TOP SPUD COUPLING, BATTERY POWERED, INFRARED SENSOR, TRUE MECHANICAL OVERRIDE, ADA COMPLIANT.	EXISTING	FLUSH VALVE: SLOAN ROYAL 8111-1.6
UR-1, 2	URINAL: WALL HUNG, VITREOUS CHINA, 1.0 GPF, FLUSHING RIM, WASHDOWN FLUSHING ACTION, 3/4" INLET, 2" OUTLET CONNECTION, STRAINER, SLOAN TEC GLAZE, ADA COMPLIANT. FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 3/4" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 3/4" TOP SPUD COUPLING, NON-HOLD-OPEN HANDLE, ADA COMPLIANT. CARRIER: PLATE TYPE URINAL CARRIER WITH ROUND, STEEL UPRIGHTS, UPPER AND LOWER BEARING PLATES, RECTANGULAR BASE, CONFORMS TO ASME A112.6.1M TYPE II URINAL CARRIER - MAX LOAD TEST 200 LBS.	URINAL: SLOAN ST-7409-STG	FLUSH VALVE: SLOAN ROYAL 186-1.0 CARRIER: WADE 402
UR-1X	FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 3/4" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, SEMI-RED BRASS VALVE BODY, 3/4" TOP SPUD COUPLING, NON-HOLD-OPEN HANDLE, ADA COMPLIANT.	EXISTING	FLUSH VALVE: SLOAN ROYAL 186-1.0
UR-3, 4	URINAL: WALL HUNG, VITREOUS CHINA, 1.0 GPF, FLUSHING RIM, WASHDOWN FLUSHING ACTION, 3/4" INLET, 2" OUTLET CONNECTION, STRAINER, SLOAN TEC GLAZE, ADA COMPLIANT. FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 3/4" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, 3/4" TOP SPUD COUPLING, HARD WIRED, INFRARED SENSOR, TRUE MECHANICAL OVERRIDE, ADA COMPLIANT. CARRIER: PLATE TYPE URINAL CARRIER WITH ROUND, STEEL UPRIGHTS, UPPER AND LOWER BEARING PLATES, RECTANGULAR BASE, CONFORMS TO ASME A112.6.1M TYPE II URINAL CARRIER - MAX LOAD TEST 200 LBS.	URINAL: SLOAN ST-7409-STG	FLUSH VALVE: SLOAN ROYAL 186 ESS-1.0-TMO CARRIER: WADE 402
UR-3X	FLUSH VALVE: QUIET, EXPOSED, DIAPHRAGM TYPE, CHROME PLATED, HIGH CHLORAMINE RESISTANT PERMEX SYNTHETIC RUBBER DIAPHRAGM WITH DUAL FILTERED BYPASS, 3/4" IPS SCREWDRIVER BAK-CHECK ANGLE STOP WITH VANDAL RESISTANT STOP COVER, VACUUM BREAKER WITH FLUSH CONNECTION, 3/4" TOP SPUD COUPLING, BATTERY POWERED, INFRARED SENSOR, TRUE MECHANICAL OVERRIDE, ADA COMPLIANT.	EXISTING	FLUSH VALVE: SLOAN ROYAL 8186-1.0
L-1, 2	LAVATORY: WALL HUNG, VITREOUS CHINA, FRONT OVERFLOW, D-SHAPED BOWL, SELF-DRAINING DECK WITH CONTOURED BACK AND SIDE SPLASH SHIELDS, FAUCET LEDGE, SLOAN TEC GLAZE, ADA COMPLIANT. FAUCET: HARD WIRED, DECK MOUNTED, PLUG ADAPTER POWER SUPPLY, INFRARED SENSOR, 0.5 GPM MULTI-LAMINAR, POLISHED CHROME, THERMOSTATIC MIXING VALVE, ADA COMPLIANT. DRAIN / TAILPIECE: HEAVY CAST BRASS, 1-1/4" DIA., 17 GAUGE, SEAMLESS BRASS, BRASS LOCKNUT, HEAVY RUBBER BASIN WASHER, FIBER FRICTION WASHER, CHROME PLATED. P-TRAP: HEAVY CAST BRASS, 1-1/4" X 1-1/2", ADJUSTABLE, CLEANOUT PLUG, SLIP NUTS, 17 GAUGE TUBULAR WALL BEND, STEEL SHALLOW FLANGE, CHROME PLATED. SUPPLIES: SOLID BRASS BODY, SLOW COMPRESSION CARTRIDGE, INTEGRAL CHECK, VANDAL PROOF LOOSE TEE HANDLE, SUPPLY RISER AND WALL FLANGE. PROTECTIVE COVERING: OPENS AT 180° FOR EASY INSTALLATION AND SECURE FIT, FORM FITTING, EVA FOAM MATERIAL, FADE RESISTANT, CERTIFIED ANTI-MICROBIAL PER ISO 846 METHOD C, ASTM E-84, ADA COMPLIANT, WHITE, COVERS FOR DRAIN, P-TRAP, WALL BEND, SUPPLY STOPS AND SUPPLY LINES. CARRIER: LAVATORY SUPPORT WITH CONCEALED ADJUSTABLE ARMS AND SURE-SET MECHANICAL LOCKING DEVICE, AND ROUND STEEL UPRIGHTS WITH WELDED BASES.	LAVATORY: SLOAN SS-3003-STG	FAUCET: SLOAN EBF-650-BDT-CP DRAIN / TAILPIECE: McGUIRE 155A P-TRAP: McGUIRE 8902C SUPPLIES: CHICAGO 1017-CABCP PROTECTIVE COVERING: DEARBORN ADA101 CARRIER: WADE 520
L-1X	FAUCET: HARD WIRED, DECK MOUNTED, PLUG ADAPTER POWER SUPPLY, INFRARED SENSOR, 0.5 GPM MULTI-LAMINAR, POLISHED CHROME, THERMOSTATIC MIXING VALVE, ADA COMPLIANT. DRAIN / TAILPIECE: HEAVY CAST BRASS, 1-1/4" DIA., 17 GAUGE, SEAMLESS BRASS, BRASS LOCKNUT, HEAVY RUBBER BASIN WASHER, FIBER FRICTION WASHER, CHROME PLATED. P-TRAP: HEAVY CAST BRASS, 1-1/4" X 1-1/2", ADJUSTABLE, CLEANOUT PLUG, SLIP NUTS, 17 GAUGE TUBULAR WALL BEND, STEEL SHALLOW FLANGE, CHROME PLATED. SUPPLIES: SOLID BRASS BODY, SLOW COMPRESSION CARTRIDGE, INTEGRAL CHECK, VANDAL PROOF LOOSE TEE HANDLE, SUPPLY RISER AND WALL FLANGE. PROTECTIVE COVERING: OPENS AT 180° FOR EASY INSTALLATION AND SECURE FIT, FORM FITTING, EVA FOAM MATERIAL, FADE RESISTANT, CERTIFIED ANTI-MICROBIAL PER ISO 846 METHOD C, ASTM E-84, ADA COMPLIANT, WHITE, COVERS FOR DRAIN, P-TRAP, WALL BEND, SUPPLY STOPS AND SUPPLY LINES.	EXISTING	FAUCET: SLOAN EBF-650-BDT-CP DRAIN / TAILPIECE: McGUIRE 155A P-TRAP: McGUIRE 8902C SUPPLIES: CHICAGO 1017-CABCP PROTECTIVE COVERING: DEARBORN ADA101
SH-1	SHOWER: BASE AND SURROUND BY G.C. SHOWER VALVE & HEAD ASSEMBLY: 18 GAUGE 300 SERIES STAINLESS STEEL SHOWER PANEL, STAINLESS STEEL BARREL HINGES, THERMOSTATIC MIXING VALVE, 1.5 GPM SHOWER HEAD, SUPPLY STOPS, SLOPED TOP, VERTICAL SHROUD TO CEILING, VANDAL RESISTANT.		SHOWER VALVE & HEAD ASSEMBLY: BRADLEY WS-1X-TMV-S15-ST-SL-SHV-VS
SH-2H	SHOWER (ADA): BASE AND SURROUND BY G.C. SHOWER VALVE & HEAD ASSEMBLY: 18 GAUGE 300 SERIES STAINLESS STEEL SHOWER PANEL, STAINLESS STEEL BARREL HINGES, THERMOSTATIC MIXING VALVE, 1.5 GPM SHOWER HEAD, HAND SHOWER WITH ON/OFF CONTROL, 60" STAINLESS STEEL FLEXIBLE HOSE AND POST STYLE MOUNTING BRACKET, ELEVATED IN-LINE BACKFLOW PREVENTER WITH QUICK DISCONNECT, LEVER HANDLE OPERATION DIVERTER VALVE TO DIVERT BETWEEN FIXED AND HAND SHOWER, SUPPLY STOPS, 24" SLIDE BAR, SLOPED TOP, VERTICAL SHROUD TO CEILING, VANDAL RESISTANT, ADA COMPLIANT.		SHOWER VALVE & HEAD ASSEMBLY: BRADLEY WS-1X-HN-TMV-S15-ST-SB-SHV-VS
HT-1	HYDROTHERAPY TUB: HYDROTHERAPY TUB PROVIDED BY OWNER. TUB FILL VALVE: THERMOSTATIC MIXING VALVE - LIQUID FILLED THERMOSTAT, INTEGRAL STRAINER CHECKSTOPS ON INLETS, ADJUSTABLE SET POINT WITHIN TEMPERATURE RANGE, ACCURATE TEMPERATURE CONTROL, POSITIVE SHUTOFF OF HOT SUPPLY WHEN COLD SUPPLY IS LOST, CHROME PLATED, DIAL THERMOMETER, PIPED ASSEMBLY WITH INLET AND OUTLET SHUT-OFFS. CABINET - 18 GAUGE BODY AND DOOR, LEFT HAND HINGE, CYLINDER LOCK, INLET/OUTLET KNOCK-OUT HOLES FOR MOUNTING FLEXIBILITY, STAINLESS STEEL FINISH, SURFACE MOUNTED, PLEXI-GLASS WINDOW IN DOOR. VACUUM BREAKER: ASSE 1001, ATMOSPHERIC, CHROME PLATED FINISH, 3/4" NPT FEMALE INLET AND OUTLET.		TUB FILL VALVE: BRADLEY S59-2025-C-S-T-P-SS-W VACUUM BREAKER: T&S #001301-45

TAG	FIXTURE DESCRIPTION	FIXTURE	TRIM & ACCESSORIES
SK-1	SINK: 14 GAUGE TYPE 304 STAINLESS STEEL, 12" HIGH BACKSPLASH WITH 2" ANGLED RETURN, POLISHED HAND-BLENDED INTERIOR SURFACES, (4) 1-5/8" OD 16 GAUGE STAINLESS STEEL TUBULAR LEGS WITH FULLY ENCLOSED GUSSETS AND ADJUSTABLE FEET. THREE COMPARTMENTS, CENTER DRAIN COMPARTMENT, DRILLED FOR TWO BACKSPLASH FAUCETS CENTERED OVER PARTIONS, NSF CERTIFIED FOR FOOD SERVICE. FAUCET: HOT AND COLD WATER, WALL-MOUNTED WITH ADJUSTABLE ARMS FOR 7-1/2" TO 8-3/4" CENTERS, CHROME PLATED, L-TYPE SWING SPOUT 9-1/2" CENTER TO CENTER, FULL FLOW QUIXTOP OUTLET WITH SINGLE SCREEN, 2-3/8" METAL VANDAL PROOF LEVEL HANDLES WITH 16-POINT TAPERED BROACH AND SECURE BLUE AND RED INDEX BUTTONS, QUATURN REBUILDABLE COMPRESSION CARTRIDGE (OPENS AND CLOSES AT 90°), CLOSES WITH WATER PRESSURE, SQUARE TAPERED STEM, 3/8" OFFSET INLET SUPPLY ARM WITH 1/2" NPT FEMALE THREAD INLET, 2-5/16" DIA SLIP FLANGE, ECAST CONSTRUCTION WITH LESS THAN 0.25% LEAD CONTENT BY WEIGHTED AVERAGE, ADA COMPLIANT, NSF 61 CERTIFIED. DRAIN / TAILPIECE: TYPE 304 STAINLESS STEEL BODY, TYPE 304 STAINLESS STEEL FLAT STRAINER, TWIST HANDLE, DIE-CAST ZINC LOCKING NUT, CHROME PLATED BRASS 1-1/2" TAILPIECE, BRASS COUPLING NUTS. CONTINUOUS WASTE: CHROME PLATED BRASS DRAIN TUBE AND TEE FITTINGS, DIE CAST COUPLING NUTS.	SINK: JUST NSFB-345-24RL-12/12	FAUCET: CHICAGO 540-LDL9E1ABCP DRAIN / TAILPIECE: JUST CONTINUOUS WASTE:
SK-2	SINK: SEAMLESS DIE-DRAWN TYPE 304 18-8 STAINLESS STEEL, INTERIOR AND TOP SURFACES POLISHED TO A NON-POROUS HAND-BLENDED FINISH WITH HIGHLIGHTED BOWL RIM, FULLY UNDERSIDE INSULATED FOR SOUND AND CONDENSATE REDUCTION, STRAIGHT SIDED COMPARTMENT WITH RADIUS CORNERS, SELF-RIMMING TOP MOUNT WITH STAINLESS STEEL MOUNTING CHANNELS, 3-1/2" CENTER DRAIN, ADA COMPLIANT. FAUCET: 8" FIXED CENTERS, 8" L-TYPE SWING SPOUT, PRESSURE COMPENSATING AERATOR 1.5 GPM, VANDAL PROOF 2-3/8" LEVER HANDLES, QUATURN COMPRESSION OPERATING CARTRIDGES. DRAIN / TAILPIECE: TYPE 304 STAINLESS STEEL BODY & FLAT STRAINER, CHROME PLATED 1-1/2" TAILPIECE. P-TRAP: HEAVY CAST BRASS, 1-1/2" X 1-1/2", ADJUSTABLE, CLEANOUT PLUG, SLIP NUTS, 17 GAUGE TUBULAR WALL BEND, STEEL SHALLOW FLANGE, CHROME PLATED. P-TRAP: QUARTER TURN BALL VALVES, 1/2" IPS X 3/8" OD, COPPER FLEXIBLE RISERS, STEEL SHALLOW FLANGES, CHROME PLATED.	SINK: JUST SL-ADA-1921-A-GR	FAUCET: CHICAGO 1100-E35-369ABCP DRAIN / TAILPIECE: JUST J-35-FS P-TRAP: McGUIRE 8912C SUPPLIES: McGUIRE LFBV2165
SK-3 SS-2	SINK: EPOXY COATED SINK WITH DRAIN BY G.C. FAUCET: DECK MOUNTED, 8" CENTERS, HOT & COLD WATER, 2.2 GPM AERATOR, VANDAL PROOF WRISTBLADE HANDLES, 1/2" NPSM SUPPLY INLETS AND COUPLING NUT FOR 3/8" OR 1/2" FLEXIBLE RISER, ECAST DESIGN, CHROME PLATED, L-TYPE SWING SPOUT, 9-1/2" CENTER-TO-CENTER, CERAMIC QUARTER-TURN CARTRIDGE, ADA COMPLIANT. SOLIDS INTERCEPTOR: SS-2 INJECTION MOLDED PVC HOUSING AND POLYCARBONATE PERFORATED BASKET; BASKET CAPACITY 0.17 GALLONS, TAMPER PROOF BRACKET MAX. FLOW RATE 23 GPM, MAXIMUM OPERATING TEMPERATURE 140 DEG. F, TOP INLET AND 3 OUTLET OPTIONS. SUPPLIES: QUARTER TURN BALL VALVES, 1/2" IPS X 3/8" OD, COPPER FLEXIBLE RISERS, STEEL SHALLOW FLANGES, CHROME PLATED.		FAUCET: CHICAGO 786-GN8AE29VPXKABCP SOLIDS INTERCEPTOR: SS-2 STRIEM SIDEKICK-TP SUPPLIES: McGUIRE LFBV2165
SK-4	SINK: EPOXY COATED SINK WITH DRAIN BY G.C. FAUCET: SINGLE HOLE DECK MOUNTED, CHROME PLATED, RIGID GOOSENECK SPOUT WITH ATMOSPHERIC VACUUM BREAKER, 6" CENTER-TO-CENTER, SERRATED, FULL FLOW LABORATORY NOZZLE, 2-1/2" METAL VANDAL PROOF CROSS HANDLES WITH 8-POINT TAPERED BROACH AND BUTTONS INDEXED "CW" AND "HW", SLOW COMPRESSION REBUILDABLE CARTRIDGE OPENS AND CLOSES 360° FOR FINE ADJUSTMENT, CLOSES WITH WATER PRESSURE, FEATURES SQUARE TAPERED STEM, FLEXIBLE STAINLESS STEEL SUPPLY HOSES WITH 3/8" COMPRESSION FITTING.		FAUCET: CHICAGO 930-CP
SK-5	SINK: EPOXY COATED SINK WITH DRAIN BY G.C. FAUCET: SINGLE HOLE DECK MOUNTED, CHROME PLATED, RIGID GOOSENECK SPOUT WITH ATMOSPHERIC VACUUM BREAKER, 6" CENTER-TO-CENTER, SERRATED, FULL FLOW LABORATORY NOZZLE, 4" METAL VANDAL PROOF WRISTBLADE HANDLES WITH 16-POINT TAPERED BROACH AND BUTTONS INDEXED "CW" AND "HW", SLOW COMPRESSION REBUILDABLE CARTRIDGE OPENS AND CLOSES 360° FOR FINE ADJUSTMENT, CLOSES WITH WATER PRESSURE, FEATURES SQUARE TAPERED STEM, FLEXIBLE STAINLESS STEEL SUPPLY HOSES WITH 3/8" COMPRESSION FITTING, ADA COMPLIANT.		FAUCET: CHICAGO 930-GN8BVBE7-317XK
EWC-1, 2	ELECTRIC WATER COOLER: ADA, HIGH EFFICIENCY FILTERED, CHILLING CAPACITY OF 8 GPH OF 50°F DRINKING WATER BASED ON 80°F INLET WATER AND 90°F AMBIENT PER ASHRAE 18 TESTING, WALL MOUNTED, UL 399, LEAD-FREE, NSF 61 & 372, MECHANICAL FRONT PUSHBUTTON ACTIVATION, CABINET AND TOP BASIN SHALL BE 14 GAUGE STAINLESS STEEL, HEAVY DUTY FRAME, VANDAL RESISTANT, CHROME PLATED BRASS BUBBLER. SPORTS BOTTLE FILLER: ADA COMPLIANT, INDEPENDENT MANUAL ACTIVATION, ANTIMICROBIAL COPPER ACTIVATION BUTTON, SINGLE PIECE POLYMER CABINET, LEAD REDUCTION FILTER (3,000 GALLON). P-TRAP: HEAVY CAST BRASS, 1-1/4" X 1-1/2", ADJUSTABLE, CLEANOUT PLUG, SLIP NUTS, 17 GAUGE TUBULAR WALL BEND, STEEL SHALLOW FLANGE, CHROME PLATED. SUPPLY: SOLID BRASS BODY, SLOW COMPRESSION CARTRIDGE, INTEGRAL CHECK, VANDAL PROOF LOOSE TEE HANDLE, SUPPLY RISER AND WALL FLANGE.	ELECTRIC WATER COOLER: OASIS PGVBAC-14G SPORTS BOTTLE FILLER: OASIS PWFSBF-K12	P-TRAP: McGUIRE 8902C SUPPLY: CHICAGO 1017-CABCP
T-1, 3	TURRET: SINGLE BALL VALVE WITH TURRET AND CHECK, DECK MOUNTED, CHROME PLATED, SERRATED FULL FLOW LABORATORY NOZZLE, ALL THREADED CONNECTIONS FACTORY ASSEMBLED, ANTI-ROTATIONAL DECK PIN IN FAUCET BODY PREVENTS TURNING, CERTIFIED FOR SERVICE, ADA COMPLIANT.		TURRET: CHICAGO 980-VR909CAGCP
T-2, 4	TURRET: TWO BALL VALVES WITH TURRET AND CHECK, DECK MOUNTED, CHROME PLATED, SERRATED FULL FLOW LABORATORY NOZZLES, ALL THREADED CONNECTIONS FACTORY ASSEMBLED, ANTI-ROTATIONAL DECK PIN IN FAUCET BODY PREVENTS TURNING, CERTIFIED FOR SERVICE, ADA COMPLIANT.		TURRET: CHICAGO 981-VR909CAGCP
ES-1	EMERGENCY SHOWER AND EYE WASH: RECESSED BARRIER-FREE EYE / FACE WASH AND SHOWER SAFETY STATION WITH CEILING MOUNTED EXPOSED SHOWER HEAD. EYE / FACE WASH RECESSED IN WALL WITH STAINLESS STEEL COVER, COVER SWINGS DOWN AND WORKS AS DRAIN PAN. RECESSED WALL BOX HAS WATER AND DRAIN CONNECTIONS, ADA COMPLIANT. "PANIC BAR" STYLE HANDLE FOR EYE / FACE WASH ACTIVATION, PULL-DOWN HANDLE ON WALL FOR SHOWER ACTIVATION. TWO HEAD SPRAY HEAD ASSEMBLY WITH INDIVIDUALLY ADJUSTABLE FLOW CONTROL AND FILTER. 1" NPT WATER SUPPLY 2" NPT WASTE OUTLET. 20 GPM SHOWER FLOW RATE. EMERGENCY THERMOSTATIC MIXING VALVE: ANSI Z358.1 COMPLIANT, ASSE 1071 CERTIFIED, LIQUID FILLED THERMOSTAT, CHECKSTOP INLETS, ADJUSTABLE SET POINT, ACCURATE TEMPERATURE CONTROL, BUILT-IN COLD WATER BY-PASS, POSITIVE SHUTOFF OF HOT WATER WHEN COLD WATER SUPPLY IS LOST, DIAL THERMOMETER, FACTORY ASSEMBLED AND TESTED, UNIVERSAL MOUNTING CAPABILITY.	EMERGENCY SHOWER AND EYE WASH: GUARDIAN GBF2150	EMERGENCY THERMOSTATIC MIXING VALVE: GUARDIAN G6040
EEW-1	EMERGENCY EYE WASH: RECESSED BARRIER-FREE SWING-DOWN EYE / FACE WASH WITH DRAIN PAN, STAINLESS STEEL COVER SWINGS DOWN AND WORKS AS DRAIN PAN, ADA COMPLIANT, TWO HEAD SPRAY HEAD ASSEMBLY WITH INDIVIDUALLY ADJUSTABLE FLOW CONTROL AND FILTER. "PANIC BAR" STYLE HANDLE. 1/2" NPT WATER INLET, 2" NPT WASTE OUTLET. EMERGENCY THERMOSTATIC MIXING VALVE: ANSI Z358.1 COMPLIANT, ASSE 1071 CERTIFIED, LIQUID FILLED THERMOSTAT, CHECKSTOP INLETS, ADJUSTABLE SET POINT, ACCURATE TEMPERATURE CONTROL, BUILT-IN COLD WATER BY-PASS, POSITIVE SHUTOFF OF HOT WATER WHEN COLD WATER SUPPLY IS LOST, DIAL THERMOMETER, FACTORY ASSEMBLED AND TESTED, UNIVERSAL MOUNTING CAPABILITY.	EMERGENCY EYE WASH: GUARDIAN GBF1735DP	EMERGENCY THERMOSTATIC MIXING VALVE: GUARDIAN G6020
MB-1	MOP BASIN: 24" X 24" X 10", MOLDED STONE, STAINLESS STEEL DRAIN BODY, 3" DRAIN PIPE SIZE, DOME STRAINER. FAUCET: 8" BODY, ADJUSTABLE CENTERS, VACUUM BREAKER SPOUT WITH PAIL HOOK AND WALL BRACE, VANDAL PROOF 2-3/4" LEVER HANDLES, 16-PT TAPERED BROACH, 1/4-TURN OPERATING CARTRIDGES, 1/2" NPT ADJUSTABLE FEMALE UNION NUT SUPPLY ARMS, 3/4" MALE HOSE THREAD OUTLET, INTEGRAL STOP VALVES, ROUGH CHROME PLATED FINISH, ADA COMPLIANT. ACCESSORIES: MOP HOLDER, STAINLESS STEEL WALL GUARD	MOP BASIN: FIAT MSB2424	FAUCET: CHICAGO 897-RCF ACCESSORIES: MOP HOLDER - FIAT 889-CC WALL GUARD - FIAT MSG2424
IB-1	WATER SUPPLY BOX: RECESSED STAINLESS STEEL WATER SUPPLY BOX WITH 1/2" QUARTER TURN VALVE, STAINLESS STEEL FRAME PLATE.	WATER SUPPLY BOX: GUY GRAY / IPS SSIB1AB	
WSB-1	WASHER BOX: RECESSED STAINLESS STEEL WASHING MACHINE BOX WITH 2" CENTER DRAIN OUTLET, 1/2" QUARTER TURN VALVES, STAINLESS STEEL FRAME PLATE.	WASHER BOX: GUY GRAY / IPS SSWB1	
HB-1	HOSE BIBB: ANTI-SIPHON, BACKFLOW PROTECTED, ASSE 1052 APPROVED, 3/4" MALE HOSE THREAD, EPDM PACKING, ADJUSTABLE BRASS NUT WITH DEEL STEM GUARD, STANDARD "O" SIZE WASHER VALVE SEAT, METAL WHEEL HANDLE, CHROME PLATED FINISH.	HOSE BIBB: WOODFORD 26CP	
HYD-1	WALL HYDRANT: AUTOMATIC DRAINING WITH BACKFLOW PREVENTER, ASSE 1052 APPROVED, 3/4" INLET AND OUTLET, HARDENED STAINLESS STEEL OPERATING STEM AND ONE-PIECE VALVE PLUNGER TO CONTROL BOTH FLOW AND DRAIN FUNCTIONS, EXTERIOR FINISH TO BE CHROME PLATED, RECESSED WALL BOX WITH LOCKABLE DOOR, LOOSE TEE KEY (FURNISHED WITH EACH HYDRANT).	WALL HYDRANT: WOODFORD B67	
BF-1	BOTTLE FILLER: REFRIGERATED SURFACE MOUNT BOTTLE FILLING STATION, CHILLING CAPACTIY OF 8 GPH AT 50 DEG. F BASED ON 80 DEG. F INLET AND 90 DEG. F AMBIENT PER ASHRAE 18 TESTING, ANTI-MICROBIAL, FILTERED, HANDS FREE, LAMINAR FLOW, REAL DRAIN, VISUAL FILTER MONITOR, ELECTRONIC BOTTLE FILLER SENSOR, UL 399 CERTIFIED.	BOTTLE FILLER: OASIS PGN8EBF	

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#	Revision	Date
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
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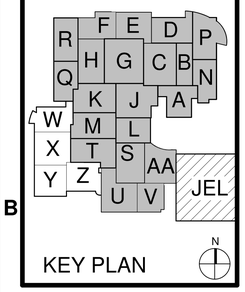

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

PLUMBING SCHEDULES

P-601.3

P-601.3_PLUMBING SCHEDULES
2019-067.NCH_M.S.D. of Washington Township, North Central High School Renovation_
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ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AF	AMPERES FRAME (BREAKER RATING)
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
AT	AMPERES TRIP (BREAKER SETTING)
ATS	AUTOMATIC TRANSFER SETTING
AUX	AUXILIARY
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
DISC	DISCONNECT
DL	DOUBLE LUGS
DP	POWER DISTRIBUTION PANEL
DWG	DRAWING
EF	EXHAUST FAN
EG	EQUIPMENT GROUND
ELEC	ELECTRIC/ELECTRICAL
EM/EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EO	ELECTRICALLY OPERATED
F	FUSE
FA	FIRE ALARM
FB	FLOOR BOX
FDR	FEEDER
FL	FLOOR
FLEX	FLEXIBLE
FTL	FEED THRU LUGS
G	GROUND
GRND	GROUND
HP	HORSEPOWER
HOA	HAND-OFF-AUTOMATIC
JB	JUNCTION BOX
KV	KILOVOLTS
KVA	KILOVOLTS-AMPERES
KVAR	KILOVOLTS-AMPERES-REACTIVE
KW	KILOWATTS
KWH	KILOWATT-HOURS
LA	LIGHTNING ARRESTOR
LP	LIGHTING PANELBOARD
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTG	MOUNTING
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NF	NON-FUSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO.	NUMBER
N.T.S.	NOT TO SCALE
OC	ON CENTER
OL'S	OVERLOADS
P	POLE
PB	PUSH BUTTON
PH/Ø	PHASE
PT	POTENTIAL TRANSFORMER
RCLP	REMOTE CONTROL LIGHTING PANEL
RECEPT.	RECEPTACLE
RF	RETURN FAN
RP	RECEPTACLE PANELBOARD
RSC	RIGID STEEL CONDUIT
SCHED	SCHEDULE
SF	SUPPLY FAN
ST	SHUNT TRIP
STB	SHUNT TRIP BREAKER
SW	SWITCH
SWBD	SWITCHBOARD
TB	TERMINAL BLOCK
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WIRE

ELECTRICAL LEGEND & SYMBOLS

LIGHTING

SUBSCRIPTS FOR LIGHTING FIXTURES INDICATE THE FOLLOWING, U.O.N.
NL - NIGHT LIGHT, PANEL SWITCHED, U.O.N.

	LIGHTING FIXTURE - TYPE AS INDICATED
	WALL MOUNTED FIXTURE - TYPE AS INDICATED
	LIGHTING FIXTURE - TYPE AS INDICATED
	POLE MOUNTED LIGHTING FIXTURE - TYPE AS INDICATED
	TRACK LIGHTING FIXTURE
	EMERGENCY BATTERY WALL PACK LIGHTING FIXTURE - TYPE AS INDICATED
	SHADING INDICATES EMERGENCY FIXTURE CONNECTED TO BATTERY INVERTER OR GENERATOR. CONNECT TO UNSWITCHED SOURCE IN ADDITION TO SWITCHING INDICATED
	EXIT LIGHT - WALL/CEILING MOUNTED - DIRECTIONAL ARROWS AS INDICATED, SHADING INDICATES ILLUMINATED FACE. CONNECT TO UNSWITCHED BRANCH CIRCUIT INDICATED

POWER DISTRIBUTION

	POWER DISTRIBUTION PANELBOARD - 480Y/277V, 3Ø, 4W & GRD, U.O.N.
	POWER DISTRIBUTION PANELBOARD - 208Y/120V, 3Ø, 4W & GRD, U.O.N.
	BRANCH CIRCUIT PANELBOARD 208Y/120V OR 480Y/277V, 3Ø, 4W & GRD, U.O.N. (FLUSH/SURFACE)
	TERMINAL CABINET, TYPE AS NOTED ON DRAWINGS (FLUSH/SURFACE)
	TRANSFORMER - TYPE AND RATING AS INDICATED, NL INDICATES NON-LINEAR TYPE
MCB	SWITCHBOARD W/MAIN CIRCUIT BREAKER SECTION
ATS	AUTOMATIC TRANSFER SWITCH
	WORKING CLEARANCE ABOUT ELECTRICAL EQUIPMENT
UG	UNDERGROUND CONDUIT/DUCTBANK
FB	FEEDER BUSWAY
PB	PLUG-IN BUSWAY
G	GROUND CABLE, SIZE AS INDICATED
GB	GROUND BUS
	CONDUIT TURNED UP
	CONDUIT TURNED DOWN
MEMH	ELECTRIC MANHOLE
	HOMERUN TO PANEL WITH CIRCUIT NUMBER(S) AS INDICATED
	GROUND WIRE
	PHASE WIRE
	NEUTRAL WIRE
	GROUND ROD
M	MOTOR - "M" INDICATES HORSEPOWER
	HEAVY-DUTY DISCONNECT SWITCH, NON-FUSED, NUMBER OF POLES AS REQUIRED FOR APPLICATION, PROVIDE SWITCH AMPACITY AS INDICATED (DS-#)
	HEAVY-DUTY DISCONNECT SWITCH, FUSED, NUMBER OF POLES AS REQUIRED FOR APPLICATION, PROVIDE SWITCH AMPACITY AS INDICATED (DS-#)
	COMBINATION MOTOR STARTER (MS-#)
	VARIABLE FREQUENCY DRIVE (MS-#)
$_{MS}	MOTOR RATED SWITCH (120V, SINGLE PHASE, HORSEPOWER RATED TOGGLE SWITCH)
C$_{P}$	CAPACITOR - WHERE "P" INDICATES KVAR SIZE.
	EMERGENCY SHUTOFF PUSHBUTTON
	PUSH BUTTON CONTROL STATION

PANELBOARD NAMING

BRANCH PANELBOARDS

1 2 A 1
- SEQUENCIAL PANEL NUMBER
- FLOOR PLAN UNIT: A - UNIT A; B - UNIT B
- VOLTAGE: 2 - 208Y/120V; 4 - 480Y/277V
- FLOOR NUMBER: B - BASEMENT; 1 - 1ST FLOOR; 2 - 2ND FLOOR

DISTRIBUTION PANELBOARDS

1 2 DP A 1
- SEQUENCIAL PANEL NUMBER
- FLOOR PLAN UNIT: A - UNIT A; B - UNIT B
- "DISTRIBUTION PANEL"
- VOLTAGE: 2 - 208Y/120V; 4 - 480Y/277V
- FLOOR NUMBER: B - BASEMENT; 1 - 1ST FLOOR; 2 - 2ND FLOOR

WIRING DEVICES

SUBSCRIPTS FOR RECEPTACLES, JUNCTION BOXES AND OTHER DEVICES INDICATE THE FOLLOWING, U.O.N.
- F - FLUSH IN FLOOR
- GFCI - GROUND FAULT CIRCUIT INTERRUPTER
- H - HORIZONTALLY MOUNTED
- IG - ISOLATED GROUND
- L - LOCKING TYPE
- S1 - SINGLE CHANNEL SURFACE RACEWAY
- S2 - DUAL CHANNEL SURFACE RACEWAY
- U - INTEGRAL USB
- WP - WEATHERPROOF IN-USE
- X - MOUNTED IN EXISTING OUTLET BOX

	125V. 20A., (WALL/+2" ABOVE BACKSPLASH OR COUNTERTOP TO BOTTOM) SIMPLEX RECEPTACLE, 2 POLE, 3 WIRE (NEMA 5-20R)
GFCI GFCI	125V. 20A., (WALL/+2" ABOVE BACKSLPASH OR COUNTERTOP TO BOTTOM) DUPLEX RECEPTACLE, 2 POLE, 3 WIRE (NEMA 5-20R)
	125V. 20A., (WALL/+2" ABOVE BACKSPLASH OR COUNTERTOP TO BOTTOM) DOUBLE DUPLEX (QUADRAPLEX) RECEPTACLE, 2 POLE, 3 WIRE (NEMA 5-20R)
GFCI	125V. 20A., (CEILING, MOUNTED) DUPLEX RECEPTACLE, 2 POLE, 3 WIRE (NEMA 5-20R)
	125V. 20A., (WALL/+2" ABOVE BACKSPLASH OR COUNTERTOP TO BOTTOM) EMERGENCY DUPLEX RECEPTACLE, 2 POLE, 3 WIRE (NEMA 5-20R)
GFCI GFCI	125V. 20A., (WALL/+2" ABOVE BACKSPLASH OR COUNTERTOP TO BOTTOM) DOUBLE DUPLEX (QUADRAPLEX) RECEPTACLE, CONNECTED TO EMERGENCY POWER SYSTEM, 2 POLE, 3 WIRE (NEMA 5-20R)
	SPECIAL RECEPTACLE - NEMA CONFIGURATION AS INDICATED ON DRAWING
J	JUNCTION BOX (RECESSED/SURFACE)
	DIRECT CONNECTION TO EQUIPMENT
PB	PULLBOX. PROVIDE PULLBOXES INDICATED AS A MINIMUM. PROVIDE ADDITIONAL PULLBOXES, SIZED PER NEC, AS REQUIRED
J	FLUSH JUNCTION BOX WITH FURNITURE FEED ADAPTING CONNECTOR MOUNTED AT 6" A.F.F.
GFCI GFCI GFCI	SURFACE-MOUNTED RACEWAY WITH RECEPTACLES IN LOCATIONS INDICATED
	WIREWAY - WALL MOUNTED U.O.N.
FB	FLOOR BOX
$	SINGLE POLE SWITCH
$_{3}	THREE-WAY SWITCH
$_{4}	FOUR-WAY SWITCH
$_{P}	SINGLE POLE SWITCH W/ PILOT LIGHT
$_{3P}	THREE-WAY SWITCH WITH PILOT LIGHT
$_{K}	KEY OPERATED SINGLE POLE SWITCH
$_{3K}	KEY OPERATED THREE-WAY SWITCH

FIRE ALARM SYSTEM

SUBSCRIPTS FOR FIRE ALARM SYSTEM DEVICES INDICATE THE FOLLOWING, U.O.N:
- S - SURFACE MOUNTED
- WP - WEATHERPROOF
- X - MOUNTED IN EXISTING OUTLET BOX

FACP FACP	FIRE ALARM CONTROL PANEL (FLUSH/SURFACE)
RACP RACP	REMOTE FIRE ALARM CONTROL PANEL (FLUSH/SURFACE)
FAAP FAAP	FIRE ALARM ANNUNCIATOR PANEL (FLUSH/SURFACE)
M	MANUAL PULLSTATION
S	SPEAKER
S	SPEAKER/STROBE
H	HORN
H	HORN/STROBE
V	VISUAL STROBE
B	BELL WITH VISUAL INDICATOR
D$_{S}$	SMOKE DETECTOR
D$_{R}$	HEAT DETECTOR
D$_{S}$	DUCT DETECTOR - SUPPLY DUCT
D$_{R}$	DUCT DETECTOR - RETURN DUCT
R	DOOR HOLD RELEASE DEVICE
AR	ADDRESSABLE RELAY
TS	SPRINKLER SYSTEM TAMPER SWITCH
FS	SPRINKLER SYSTEM FLOW SWITCH
PS	SPRINKLER SYSTEM PRESSURE SWITCH
P	POST INDICATOR VALVE

LIGHTING CONTROL DEVICES

SYMBOL	MOUNTING	DIMMING TYPE	OCCUPANCY SENSOR TYPE	SWITCH/ BUTTONS	CONTROL DESCRIPTION
D	WALL	0-10V	N/A	(1)	- (1) MANUAL SWITCH ON (TO SELECTED LIGHT LEVEL)/OFF. - (1) MANUAL LIGHT LEVEL WITH SLIDER.
D$_{D2}$	WALL	0-10V	DUAL TECH.	(1)	- (1) MANUAL SWITCH ON (TO SELECTED LIGHT LEVEL)/OFF. - (1) MANUAL LIGHT LEVEL WITH SLIDER. - MANUAL ON / AUTO OFF.
D$_{D3}$	WALL	LINE VOLT.	N/A	(1)	- (1) MANUAL SWITCH ON (TO SELECTED LIGHT LEVEL)/OFF. - (1) MANUAL LIGHT LEVEL WITH SLIDER.
D$_{DMX}$	WALL	DMX	N/A	MULTI.	- DMX COLOR CHANGING CONTROLLER. - NICOLAUDIE STICK-CU4.
$_{OS1}	WALL	N/A	DUAL TECH.	(1)	- (1) MANUAL SWITCH ON/OFF. - MANUAL ON / AUTO OFF.
$_{OS2}	WALL	N/A	DUAL TECH.	(2)	- (2) MANUAL SWITCH ON/OFF. - MANUAL ON / AUTO OFF.
$_{OS3}	WALL	N/A	DUAL TECH.	(1)	- (1) MANUAL SWITCH ON/OFF. - AUTO ON / AUTO OFF.
(OT)	CEILING	N/A	DUAL TECH.	N/A	- AUTO-ON / AUTO-OFF - 1000 SQFT COVERAGE. - TWO RELAYS IN POWER PACK. - DISTRIBUTION COVERAGE AS REQUIRED FOR SPACE SIZE.
(O2)	CEILING	N/A	DUAL TECH.	N/A	- AUTO-ON / AUTO-OFF - 2000 SQFT COVERAGE. - TWO RELAYS IN POWER PACK. - DISTRIBUTION COVERAGE AS REQUIRED FOR SPACE SIZE.
(O3)	CEILING	N/A	DUAL TECH.	N/A	- AUTO-ON / AUTO-OFF - 2000 SQFT COVERAGE. - TWO RELAYS IN POWER PACK. - DISTRIBUTION COVERAGE AS REQUIRED FOR SPACE SIZE.
(HB)	CEILING	N/A	PIR	N/A	- MANUAL OR AUTO-ON / AUTO-OFF - HIGHBAY COVERAGE. - TWO RELAYS IN POWER PACK. - DISTRIBUTION COVERAGE AS REQUIRED FOR SPACE SIZE.

(NOTES APPLY TO ALL ELECTRICAL DRAWINGS)

GENERAL SYMBOLS & ABBREVIATIONS NOTES

#	NOTES
A	CONNECT ALL LIGHTING FIXTURES WITHIN ROOM TO INDICATED SWITCH AND BRANCH CIRCUIT, U.O.N.
B	WHERE MULTIPLE SWITCHES, RECEPTACLES, AND OTHER OUTLETS (EXCEPT PHONES) ARE INDICATED, PROVIDE MULTI-GANGEBACK OUTLET BOXES WITH GANG BARRIERS AND A COMMON FACEPLATE FOR SIMILIAR DEVICES.
C	WHERE EXIT SIGNS ARE INDICATED ABOVE DOOR, MOUNT AS FOLLOWS: IF THE DISTANCE BETWEEN THE TOP OF THE DOOR FRAME AND THE CEILING IS 24 INCHES OR LESS, CENTER THE EXIT SIGN BETWEEN TOP OF DOOR FRAME AND CEILING. OTHERWISE, MOUNT BOTTOM OF EXIT SIGN 6 INCHES ABOVE TOP OF DOOR FRAME. MOUNT OTHER WALL MOUNTED EXIT SIGNS LOCATED WITHIN THE SAME AREA AT THE SAME HEIGHT.
D	WHERE DIFFERENT RECESSED ELECTRICAL DEVICES WITH THE SAME MOUNTING HEIGHTS ARE INDICATED SIDE-BY-SIDE, MOUNT THE DEVICES SO THAT THERE IS FOUR INCHES BETWEEN ADJACENT VERTICAL EDGES.
E	WHERE ELECTRICAL DEVICES WITH DIFFERENT MOUNTING HEIGHTS ARE LOCATED IN THE SAME AREA ALIGN DEVICES VERTICALLY THROUGH THEIR CENTERLINES.
F	INSTALL SEPARATE INDEPENDENT NEUTRAL CONDUCTORS FOR ALL 120V AND 277V CIRCUITS. DO NOT SHARE NEUTRALS.
G	ALL EXIT FIXTURES AND FIXTURES INDICATED WITH "NL" SHALL BE UNSWITCHED.
H	INSTALL NO MORE THAN THREE PHASE CONDUCTORS (PLUS NEUTRALS AND GROUND) PER CONDUIT UNLESS T310-15 NEC IS FOLLOWED.
I	NUMBER OF WIRES INDICATED ON DRAWINGS, IN PANEL SCHEDULES AND CIRCUIT SIZING SCHEDULES APPLIES TO CURRENT CARRYING CONDUCTORS INCLUDING NEUTRALS. IN ADDITION TO THE NUMBER OF WIRES INDICATED, PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR SIZED AS SCHEDULED OR SIZED BY NEC 250.
J	UNLESS OTHERWISE NOTED, PROVIDE FEEDERS AND BRANCH CIRCUITS WHICH HAVE AN AMPACITY EQUAL TO OR GREATER THAN THE CIRCUIT OVERCURRENT PROTECTIVE DEVICE RATING SERVING THE CIRCUIT. REFER TO CIRCUIT SIZING SCHEDULE FOR SIZES OF FEEDERS AND BRANCH CIRCUITS.
K	COORDINATE LOCATION OF CEILING MOUNTED FIRE ALARM DEVICES WITH OTHER EQUIPMENT TO AVOID INTERFERENCE. LOCATE FIRE ALARM DEVICES AS NEAR TO LOCATION INDICATED WHILE AVOIDING INTERFERENCES.
L	MAKE FINAL CONNECTION BETWEEN DISCONNECT AND EQUIPMENT BEING SERVED BY FEEDER OR BRANCH CURRENT.
M	DIVISION 26 CONTRACTOR SHALL REFER TO LIFE SAFETY PLAN FOR FIRE-RATING REQUIREMENTS. DIVISION 26 CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING FIRE-RATED DEVICES/SEALS AS SHOWN ON ELECTRICAL DRAWINGS AND AS REQUIRED BASED ON LIFE SAFETY PLAN INFORMATION.
N	PER NEC ARTICLE 110.26(A) AND 110.26(F) THE DEDICATED ELECTRICAL SPACE INCLUDES THE SPACE DEFINED BY EXTENDING THE FOOTPRINT OF THE ELECTRICAL EQUIPMENT (INCLUDING BUT NOT LIMITED TO SWITCHBOARDS, PANELBOARDS, TRANSFORMERS, MOTOR CONTROLLERS) FROM THE FLOOR TO A HEIGHT OF 6'-0" ABOVE THE HEIGHT OF THE EQUIPMENT OR TO THE STRUCTURAL CEILING, WHICH EVER IS LOWER. THE DEDICATED ELECTRICAL SPACE MUST BE CLEAR OF ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS, OR EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION. PLUMBING, HEATING, VENTILATION, AND AIR-CONDITIONING PIPING, DUCTS, AND EQUIPMENT MUST BE INSTALLED OUTSIDE THE WIDTH AND DEPTH ZONE. CONTRACTOR SHALL MAKE SURE NO PIPING OR DUCT WORK IS INSTALLED ABOVE THE ELECTRICAL EQUIPMENT. COORDINATE THESE REQUIREMENTS WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
O	CONTRACT DOCUMENTS CONSISTS OF BOTH A PROJECT MANUAL AND DRAWINGS. BOTH ARE MEANT TO BE COMPLEMENTARY - ANYTHING APPEARING ON EITHER MUST BE EXECUTED THE SAME AS IF SHOWN ON BOTH.

VOLTAGE DROP NOTES:

A. VOLTAGE DROP ADJUSTMENTS FOR FEEDERS AND BRANCH CIRCUITS ARE NOT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL ADJUST BRANCH CIRCUIT WIRING TO LIMIT VOLAGE DROP TO 3%. CONTRACTOR SHALL ADJUST FEEDER WIRING TO LIMIT VOLTAGE DROP TO 2% BASED ON DEMAND LOAD INFORMATION.

DEVICE BOX INSTALLATION:

A. DEVICE BOXES ABANDONED IN WALLS THAT ARE NOT REUSED SHALL HAVE BLANK COVERPLATE INSTALLED.
B. NEW DEVICES SHOWN TO BE INSTALLED ON EXISTING BLOCK WALLS SHALL INSTALLED USING SURFACE MOUNTED RACEWAY (WIREMOLD).
C. NEW DEVICES SHOWN TO BE INSTALLED IN EXISTING DRYWALL WALLS SHALL BE INSTALLED FLUSH IN THE WALL WITH ALL WIRING CONCEALED. CUT AND PATCH WALLS AS REQUIRED.
D. FIRE ALARM DEVICES INSTALLED IN SURFACE BOXES SHALL UTILIZE FACTORY SURFACE BOXES TO MATCH FIRE ALARM DEVICE DIMENSIONS.

SURFACE MOUNTED RACEWAY INSTALLATION:

A. SURFACE RACEWAY (WIREMOLD) INSTALLATION SHALL BE COORDINATED AND APPROVDED IN ADVANCE WITH THE ARCHITECT.
B. VERTICAL DROPS SHALL BE MADE IN THE CORNERS OF THE ROOM AND THEN ROUTED HORIZONTALLY TO DEVICES. VERTICAL DROPS AWAY FROM THE CORNER OF THE ROOM SHALL NOT BE DONE WITHOUT APPROVAL FROM THE ARCHITECT. ALL SURFACE MOUNTED RACEWAY SHALL BE PAINTED TO MATCH THE WALL.

ADDEDNDUM #2.3

1. ALL RECEPTACLES SHOWN AT STANDARD HEIGHT IN WALLS TAGGED WITH NOTE 77 ON THE A-SERIES SHEETS SHALL BE LOWERED TO MISS WALL REVEALS.
2. THE FOLLOWING AIR HANDLING UNITS HAVE BEEN PROVIDED WITH (2) VFDS. CONNECT ADDITIONAL VFD AND PROVIDE ALL WIRING AND CONDUIT AS REQUIRED. VARIABLE FREQUENCY DRIVE PROVIDED BY DIV 23 AND INSTALLED BY DIV 26. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
   - AHU-C2
   - AHU-C3
   - AHU-M1
   - AHU-M2
3. PROVIDE SURFACE MOUNTED RECEPTACLE IN ALL LOW SCOPE CLASSROOMS FOR A/V EQUIPMENT. INSTALL RECEPTACLE INDICATED AT +46" A.F.F. TO C.L. DIRECTLY ABOVE ADJACENT TEACHERS DESK RECEPTACLE. REFER TO T-SERIES DRAWINGS FOR DATA AND POWER LAYOUT. CONNECT TO NEAREST EXISTING RECEPTACLE CIRCUIT SERVING CLASSROOM.

A3.3

ADDEDNDUM #3.3

1. ALL BRANCH CIRCUIT WIRING SHALL BE TYPE MC CABLE WITH THE FOLLOWING EXCEPTIONS:
   - ALL WIRING THAT IS INSTALLED UNDERGROUND OR IN AREAS THAT DO NOT HAVE CEILINGS OR WHERE WIRING WOULD BE EXPOSED SHALL BE INSTALLED IN CONDUIT COMPLETE.
2. THE FOLLOWING AIR HANDLING UNIT VAV CONTROL TRANSFORMER PANELS ARE NEW.
   - AHU-B1, AHU-C1, AHU-C4, AHU-D1, AHU-D2, AHU-E1, AHU-E2, AHU-E3, AHU-F1, AHU-G1, AHU-G2, AHU-G3, AHU-G4, AHU-G5, AHU-G6, AHU-H1, AHU-H2, AHU-J1, AHU-J2, AHU-J3, AHU-M1, AHU-N1, AHU-N2, AHU-P1, AHU-P2, AHU-Q1, AHU-Q2, AHU-R1, AHU-R2, AHU-S1, AHU-T1, & AHU-AA1
   - CONNECT EACH NEW OR RELOCATED PANEL TO A DEDICATED 120V-1P, 20A CIRCUIT FROM THE NEAREST PANEL. PROVIDE ALL WIRING AND CONDUIT AS REQUIRED. VAV CONTROL TRANSFORMER PANEL PROVIDED BY DIV 23 AND INSTALLED BY DIV 26. ALL OTHER AIR HANDLING UNIT VAV CONTROL TRANSFORMER PANELS ARE EXISTING TO REMAIN.

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Project No. 2019-067.NCH
Project Date 03.03.2023
Bid Set 03
Produced JAW

DAVID SAUCK REGISTERED No. 19700101 STATE OF INDIANA PROFESSIONAL ENGINEER

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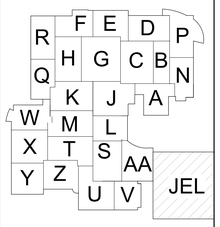
#	Revision	Date
A2.3	ADDENDUM 2.3	03.22.2023
A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240



KEY PLAN N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

SYMBOLS AND ABBREVIATIONS

E-001.3

E-001.3_SYMBOLS AND ABBREVIATIONS
2019-067.NCH_M.S.D. of Washington Township_North Central High School Renovation_ 03217.dwg
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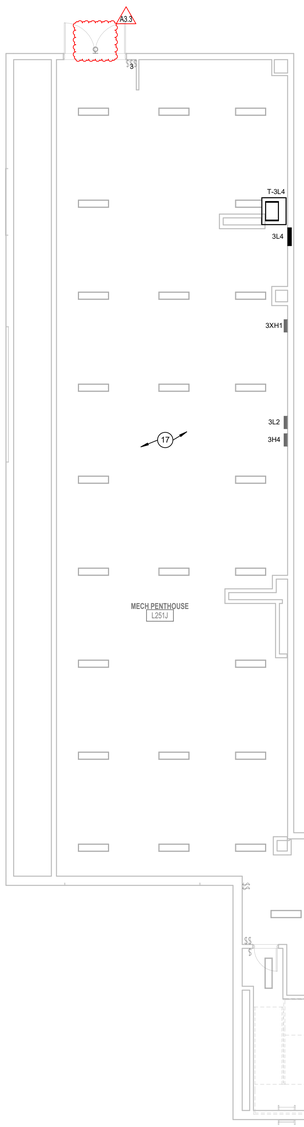
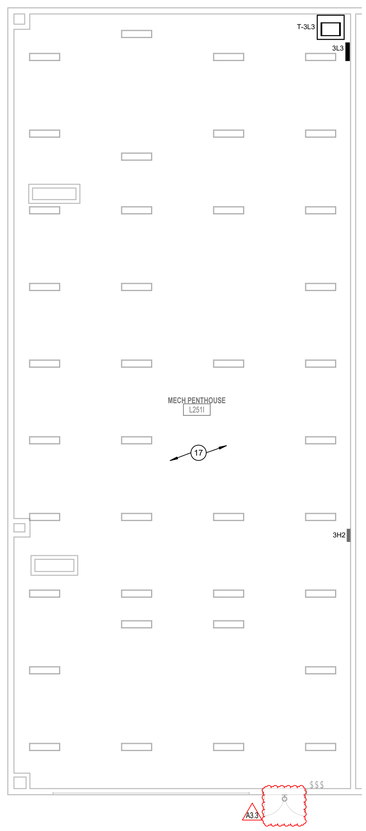
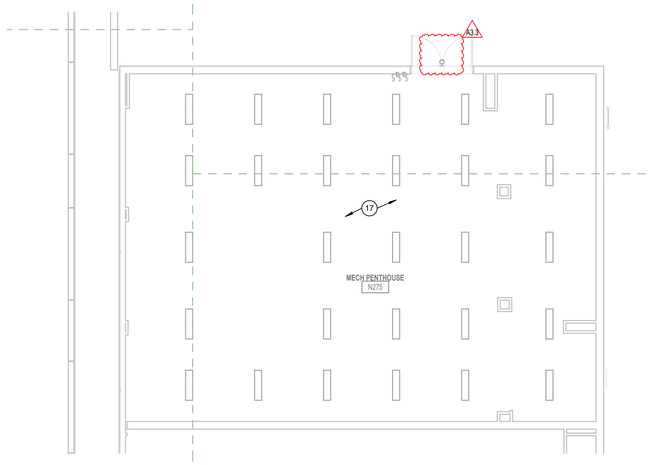
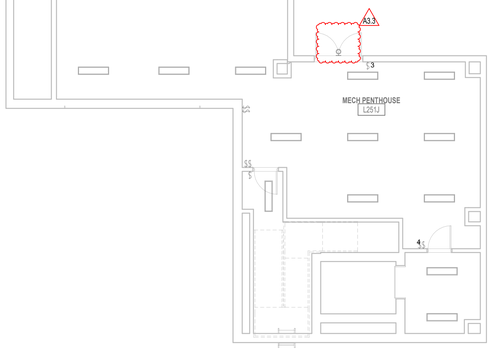




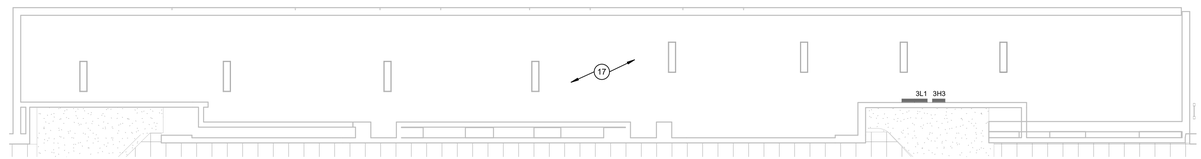
2 THIRD FLOOR LIGHTING PLAN - UNIT Q
1/8" = 1'-0"



1 THIRD FLOOR LIGHTING PLAN - UNIT T
1/8" = 1'-0"



3 THIRD FLOOR LIGHTING PLAN - UNIT N
1/8" = 1'-0"



4 THIRD FLOOR LIGHTING PLAN - UNIT K
1/8" = 1'-0"

GENERAL LIGHTING NOTES

#	NOTES
A	REFER TO SHEET E-001 FOR ADDITIONAL INFORMATION.
B	ALL LOWER LEVEL LIGHT FIXTURES ARE FED FROM PANELBOARD 'OXH1'.
C	NEW LIGHTING DEVICES / LIGHTING FIXTURES SHOWN TO BE INSTALLED ON EXISTING BLOCK WALLS / CEILINGS TIGHT TO STRUCTURE SHALL BE INSTALLED SURFACE MOUNTED AND IN SURFACE MOUNTED WIREMOLD PAINTED TO MATCH WALLS AND CEILINGS. WIREMOLD SHALL BE INSTALLED NEATLY AND AT RIGHT ANGLES TO STRUCTURE. WHEN POSSIBLE ROUTE VERTICAL WIREMOLD IN CORNERS THEN TO DEVICE / FIXTURE. WIREMOLD SHALL BE INSTALLED TO MINIMIZE LENGTH. REFER TO ARCHITECTURAL FLOOR PLANS AND REFLECTED CEILING PLANS FOR ADDITIONAL INFORMATION. CONFIRM EXACT WIREMOLD ROUTING WITH ARCHITECT PRIOR TO INSTALLATION.

LIGHTING PLAN NOTES

#	NOTES
1	CONNECT NEW LIGHT FIXTURES TO NORMAL AND/OR EMERGENCY CIRCUITS THAT WERE MAINTAINED DURING DEMOLITION.
2	ONE-FOR-ONE LIGHT FIXTURE REPLACEMENT. CONNECT NEW LIGHT FIXTURE TO CIRCUIT THAT WAS MAINTAINED DURING DEMOLITION.
3	CONNECT NEW DEVICES TO CIRCUIT THAT WAS MAINTAINED DURING DEMOLITION.
4	CONNECT NEW LIGHT FIXTURES TO CLOSEST LIGHTING CIRCUIT IN THIS AREA.
5	MOUNT FIXTURES INDICATED BELOW PIPING. REWORK WIRE AND CONDUIT AS REQUIRED.
6	PROVIDE UL 924 AUTOMATIC LOAD CONTROL RELAY IN OUTLET BOX FLUSH-MOUNTED IN CEILING TO ZONE CONTROL EMERGENCY LIGHTING IN THIS ROOM/SPACE. CONNECT UL 924 DEVICE TO NORMAL AND EMERGENCY CIRCUITS INDICATED AT DEVICE. CONTROL FIXTURE(S) BASED ON SWITCH LEG(S) WHERE REQUIRED.
7	COORDINATE FINAL LOCATION OF FIXTURES WITH ELEVATOR INSTALLATION CONTRACTOR.
8	CONNECT FIXTURE TO EXTERIOR LIGHTING CONTROLS.
9	REFER TO SECOND FLOOR LIGHTING PLAN FOR FIXTURE LAYOUT AND CONTROLS FOR THIS ROOM/AREA.
10	REFER TO FIRST FLOOR LIGHTING PLAN FOR FIXTURE LAYOUT AND CONTROLS FOR THIS ROOM/AREA.
11	ALL LIGHTING DEVICES AND FIXTURES IN THIS AREA ARE EXISTING TO REMAIN.
12	4 SCENE LOW VOLTAGE PUSHBUTTON WALL STATION, WITH DIMMING CAPABILITIES. PROVIDE PRESET LEVELS FOR NORMAL GYM ACTIVITIES AND FOR GAMES. PROVIDE UL 924 FOR CONTROL OF EMERGENCY LIGHTING INDICATED. PROVIDE ALL COMPONENTS, ROOM CONTROLLERS, WIRING, ETC. FOR COMPLETE OPERATIONAL SYSTEM.
13	LIGHTING IN THIS AREA SHALL BE PROVIDED BY EQUIPMENT PROVIDER. REFER TO POWER PLANS FOR CIRCUIT DESIGNATION.
14	RGB LED SYSTEM TO BE PROVIDED BY LIGHTBOX MANUFACTURER. WIRING AND INSTALLATION BY E.C. TO CIRCUIT INDICATED. CONNECT FIXTURE TO EXTERIOR LIGHTING CONTROLS.
16	LOWER LEVEL LIGHT FIXTURES ARE EXISTING TO REMAIN.
17	PENTHOUSE LIGHT FIXTURES ARE EXISTING TO REMAIN.
18	SOUTH CANOPY ALTERNATE: PROVIDE ALTERNATE BID FOR CANOPY AND LIGHT BOX LIGHTING AS SHOWN.
19	EAST PERFORMANCE ARTS ENTRANCE ALTERNATE: PROVIDE ALTERNATE BID FOR CANOPY LIGHTING AS SHOWN.

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A3.3	ADDENDUM 3.3	04.06.2023

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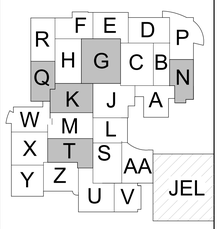

KEY PLAN
N

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

PENTHOUSE LIGHTING PLANS

EL101.3

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2019-067.NCH_A13.3 of Washington Township, North Central High School Renovation_1537.rvtdwf
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4/4/2023 2:04:32 PM

LOWER LEVEL & ROOF GENERAL NOTES

#	NOTES
A	REFER TO SHEET E-001 FOR ADDITIONAL INFORMATION.
B	DIV 26 TO PROVIDE 120V-1P, 20A EXHAUST FAN MOTOR STARTER DISCONNECT FOR EXHAUST FANS. DIV 23 PROVIDES CONTROL RELAY AND CURRENT TRANSFORMER SWITCH. VERIFY EXACT LOCATION PRIOR TO INSTALLATION. REFER TO SHEET M SERIES SHEETS FOR ADDITIONAL INFORMATION.

LOWER LEVEL & ROOF PLAN NOTES

#	NOTES
1	PROVIDE INFRARED SCAN FOR EQUIPMENT INDICATED. CLEAN ALL DUST OFF EQUIPMENT, EXERCISE AND LUBRICATE ALL FUSIBLE SWITCHES.
2	CONNECT NEW AIR HANDLING UNIT BUILDING AUTOMATION CONTROLLER TO CIRCUIT SERVING EXISTING BUILDING AUTOMATION CONTROLLER COMPLETE. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
3	CONNECT AIR HANDLING UNIT AND ASSOCIATED VARIABLE FREQUENCY DRIVE COMPLETE TO CIRCUIT INDICATED. VARIABLE FREQUENCY DRIVE PROVIDED BY DIV 23 AND INSTALLED BY DIV 26. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
4	CONNECT NEW CIRCULATION PUMP COMPLETE TO CIRCUIT INDICATED. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
5	CONNECT NEW CIRCULATION PUMP TO EXISTING CIRCUIT MAINTAINED DURING DEMOLITION. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
6	DISCONNECT EXISTING AIR HANDLING UNIT MOTOR CONTROL AND CONNECT NEW VARIABLE FREQUENCY DRIVE TO EXISTING CIRCUIT MAINTAINED DURING DEMOLITION. VARIABLE FREQUENCY DRIVE PROVIDED BY DIV 23 AND INSTALLED BY DIV 26. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
7	DISCONNECT EXISTING AIR HANDLING UNIT MOTOR AND CONNECT NEW MOTOR COMPLETE. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
8	PROVIDE 208V-1P, 30A, NEMA 3R, FUSIBLE DISCONNECT SWITCH FUSED PER UNIT MANUFACTURERS RECOMMENDATIONS. PROVIDE ADDITIONAL SUPPORT STRUCTURE AS REQUIRED.
9	REFER TO FIRST FLOOR KITCHEN PLANS FOR ADDITIONAL INFORMATION.
10	K HALL ELEVATOR ALTERNATE. PROVIDE ALTERNATE BID FOR 480V-3P, 60A FUSIBLE DISCONNECT. PROVIDE 480V-3P, 60A CONTACTOR FOR ELEVATOR SHUT DOWN PRIOR TO SPRINKLER SYSTEM RELEASE. INTERLOCK CONTACTOR WITH FIRE ALARM SYSTEM AS REQUIRED. ROUTE POWER FOR ELEVATOR THRU CONTACTOR FOR CONTROL. PROVIDE RESET SWITCH IN COVER. PROVIDE 2P-30A, 208V, FUSIBLE DISCONNECT FOR ELEVATOR LIGHTING AND CONTROL. PROVIDE CONNECTIONS TO ELEVATOR EQUIPMENT AS REQUIRED. COORDINATE ALL EQUIPMENT LOCATIONS WITH ELEVATOR SUPPLIER. FUSES PER EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
11	DISCONNECT SWITCH PROVIDED BY MANUFACTURER.
12	PROVIDE NEMA SIZE 1, FVNR MOTOR CONTROLLER. PROVIDE CONTROL POWER TRANSFORMER, H-O-A SWITCH, ON PILOT LIGHT, 2 NO, 2 NC AUX CONTACT SWITCHES, SOLID STATE OVERLOADS.
13	PROVIDE 120V-1P, 20A TOGGLE SWITCH DISCONNECT SWITCH.
A3.3 14	CONNECT EXHAUST FAN TO VARIABLE FREQUENCY DRIVE COMPLETE TO CIRCUIT INDICATED. VARIABLE FREQUENCY DRIVE PROVIDED BY DIV 23 AND INSTALLED BY DIV 26. REFER TO M SERIES DRAWINGS FOR ADDITIONAL INFORMATION.

CIRCUIT CONNECTIONS FOR HEAT TRACE ON GREASE WASTE PIPING. PROVIDE ALL EQUIPMENT AND CONNECTIONS AS REQUIRED BY MANUFACTURER. REFER TP P SERIES DRAWINGS FOR ADDITIONAL INFORMATION.

1 **LOWER LEVEL PARTIAL OVERALL POWER PLAN**
3/64" = 1'-0"

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A3.3	ADDENDUM 3.3	04.06.2023

1801 East 86th Street
Indianapolis, IN 46240

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

LOWER LEVEL POWER PLAN

EP100.3

EP100_L_LOWER LEVEL POWER PLAN
2019-067.NCH M.S.D. of Washington Township_North Central High School Renovation_ 10217.rvt
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LOWER LEVEL & ROOF GENERAL NOTES

#	NOTES
A	REFER TO SHEET E-001 FOR ADDITIONAL INFORMATION.
B	DIV 26 TO PROVIDE 120V-1P, 20A EXHAUST FAN MOTOR STARTER DISCONNECT FOR EXHAUST FANS. DIV 23 PROVIDES CONTROL RELAY AND CURRENT TRANSFORMER SWITCH. VERIFY EXACT LOCATION PRIOR TO INSTALLATION. REFER TO SHEET M SERIES SHEETS FOR ADDITIONAL INFORMATION.

LOWER LEVEL & ROOF PLAN NOTES

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9	REFER TO FIRST FLOOR KITCHEN PLANS FOR ADDITIONAL INFORMATION.
10	K HALL ELEVATOR ALTERNATE. PROVIDE ALTERNATE BID FOR 480V-3P, 60A FUSIBLE DISCONNECT. PROVIDE 480V-3P, 60A CONTACTOR FOR ELEVATOR SHUT DOWN PRIOR TO SPRINKLER SYSTEM RELEASE. INTERLOCK CONTACTOR WITH FIRE ALARM SYSTEM AS REQUIRED. ROUTE POWER FOR ELEVATOR THRU CONTACTOR FOR CONTROL. PROVIDE RESET SWITCH IN COVER. PROVIDE 2P-30A, 208V, FUSIBLE DISCONNECT FOR ELEVATOR LIGHTING AND CONTROL. PROVIDE CONNECTIONS TO ELEVATOR EQUIPMENT AS REQUIRED. COORDINATE ALL EQUIPMENT LOCATIONS WITH ELEVATOR SUPPLIER. FUSES PER EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
11	DISCONNECT SWITCH PROVIDED BY MANUFACTURER.
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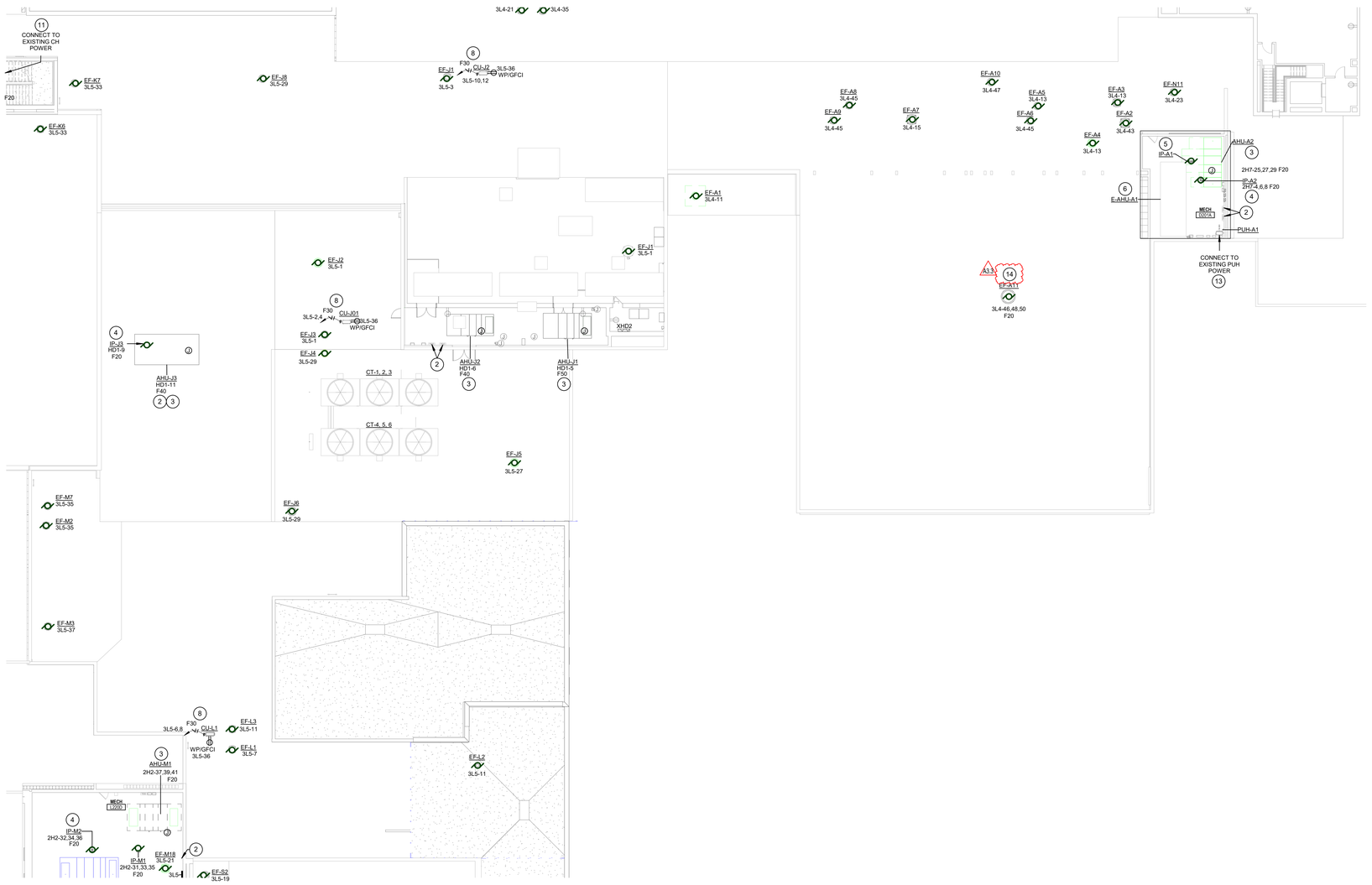

2A **ROOF POWER PLAN - UNIT A, J, L**
1/16" = 1'-0"

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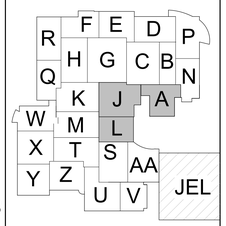

KEY PLAN

M.S.D. of Washington Township

North Central High School Renovation - Additions Phase 3

ROOF POWER PLAN - UNIT A, J, L

EP101.3

EP101.3 - ROOF POWER PLAN - UNIT A, J, L
2019-067.NCH_A3.3 of Washington Township, North Central High School Renovation_ 03/27/2023
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4/4/2023 7:51:17 PM

MSD Washington Township
North Central High School - Phase 3

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
TITLE-03	Title Page - Phase 3 (1 of 4)	3	New	Design Review DR.0
TITLE-04	Title Page - Phase 3 (2 of 4)	3	New	Design Review DR.0
TITLE-05	Title Page - Phase 3 (3 of 4)	3	New	Design Review DR.0
TITLE-06	Title Page - Phase 3 (4 of 4)	3	New	Design Review DR.0
GEN-01	Installation Standards - Legend	All	New	Design Review DR.0
GEN-02	Installation Standards - Electrical	All	New	Design Review DR.0
GEN-03	Installation Standards - Network	All	New	Design Review DR.0
GEN-04	Installation Standards - Mechanical	All	New	Design Review DR.0
RISER-05	BAS Ethernet & RS-485 Network Risers, Phase 3, Areas A & B	3	New	Design Review DR.0
RISER-06	BAS Ethernet & RS-485 Network Risers, Phase 3, Area C	3	New	Design Review DR.0
RISER-07	BAS Ethernet & RS-485 Network Risers, Phase 3, Area D	3	New	Design Review DR.0
RISER-08	BAS Ethernet & RS-485 Network Risers, Phase 3, Area E	3	New	Design Review DR.0
RISER-09	BAS Ethernet & RS-485 Network Risers, Phase 3, Areas F & G	3	New	Design Review DR.0
RISER-10	BAS Ethernet & RS-485 Network Risers, Phase 3, Area H	3	New	Design Review DR.0
RISER-11	BAS Ethernet & RS-485 Network Risers, Phase 3, Area J	3	New	Design Review DR.0
RISER-12	BAS Ethernet & RS-485 Network Risers, Phase 3, Area K	3	New	Design Review DR.0
RISER-13	BAS Ethernet & RS-485 Network Risers, Phase 3, Area M	3	New	Design Review DR.0
RISER-14	BAS Ethernet & RS-485 Network Risers, Phase 3, Area N	3	New	Design Review DR.0
RISER-15	BAS Ethernet & RS-485 Network Risers, Phase 3, Area P	3	New	Design Review DR.0
RISER-16	BAS Ethernet & RS-485 Network Risers, Phase 3, Area Q	3	New	Design Review DR.0
RISER-17	BAS Ethernet & RS-485 Network Risers, Phase 3, Area R	3	New	Design Review DR.0
RISER-18	BAS Ethernet & RS-485 Network Risers, Phase 3, Areas S & T	3	New	Design Review DR.0
RISER-19	BAS Ethernet & RS-485 Network Risers, Phase 3, Area AA1	3	New	Design Review DR.0
RISER-20	BAS Ethernet & RS-485 Network Risers, Phase 3, Area Natatorium	3	New	Design Review DR.0
NCHS-99	AHU-A2 Field Devices	3	New	Design Review DR.0
NCHS-100	Area A Exhaust & Relief Field Devices	3	New	Design Review DR.0
NCHS-101	AHU-A2 & Area A Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-102	AHU-A2 Sequences of Operation	3	New	Design Review DR.0
NCHS-103	AHU-A2 System 15 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-104	AHU-A2 System 15 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-105	AHU-A2 System 15 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-106	AHU-A2 System 15 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-107	AHU-C1 Field Devices	3	New	Design Review DR.0
NCHS-108	Area C Exhaust Field Devices	3	New	Design Review DR.0
NCHS-109	AHU-C1 & Area C Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-110	AHU-C1 Sequences of Operation	3	New	Design Review DR.0
NCHS-111	AHU-C1 System 16 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-112	AHU-C1 System 16 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-113	AHU-C1 System 16 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-114	AHU-C1 System 16 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-115	AHU-C2 Field Devices	3	New	Design Review DR.0
NCHS-116	Area C Exhaust Field Devices	3	New	Design Review DR.0
NCHS-117	AHU-C2 & Area C Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-118	AHU-C2 Sequences of Operation	3	New	Design Review DR.0
NCHS-119	AHU-C2 System 17 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-120	AHU-C2 System 17 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-121	AHU-C2 System 17 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-122	AHU-C2 System 17 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-123	AHU-C3 Field Devices	3	New	Design Review DR.0
NCHS-124	AHU-C3 Point Tables	3	New	Design Review DR.0
NCHS-125	AHU-C3 Sequences of Operation	3	New	Design Review DR.0
NCHS-126	AHU-C3 System 18 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-127	AHU-C3 System 18 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-128	AHU-C3 System 18 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-129	AHU-C3 System 18 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-130	AHU-C5 Field Devices	3	New	Design Review DR.0
NCHS-131	AHU-C5 Exhaust, Relief, & Temp Monitoring Field Devices	3	New	Design Review DR.0
NCHS-132	AHU-C5 & Area C Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-133	AHU-C5 Sequences of Operation	3	New	Design Review DR.0

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-134	AHU-C5 System 19 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-135	AHU-C5 System 19 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-136	AHU-C5 System 19 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-137	AHU-C5 System 19 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-138	AHU-J1 Field Devices	3	New	Design Review DR.0
NCHS-139	Area J Exhaust & Relief Field Devices	3	New	Design Review DR.0
NCHS-140	Area J Lighting & Phase Loss Monitoring Field Devices	3	New	Design Review DR.0
NCHS-141	AHU-J1 & Area J Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-142	AHU-J1 Sequences of Operation	3	New	Design Review DR.0
NCHS-143	AHU-J1 System 20 Panel - I/O Wiring (1 of 3)	3	New	Design Review DR.0
NCHS-144	AHU-J1 System 20 Panel - I/O Wiring (2 of 3)	3	New	Design Review DR.0
NCHS-145	AHU-J1 System 20 Panel - I/O Wiring (3 of 3)	3	New	Design Review DR.0
NCHS-146	AHU-J1 System 20 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-147	AHU-J1 System 20 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-148	AHU-J2 Field Devices	3	New	Design Review DR.0
NCHS-149	Area J Relief Field Devices	3	New	Design Review DR.0
NCHS-150	AHU-J2 & Area J Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-151	AHU-J2 Sequences of Operation	3	New	Design Review DR.0
NCHS-152	AHU-J2 System 21 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-153	AHU-J2 System 21 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-154	AHU-J2 System 21 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-155	AHU-J2 System 21 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-156	AHU-J3 & Relief Field Devices	3	New	Design Review DR.0
NCHS-157	AHU-J3 Touchscreen, Photocell, & Area J Relief Field Devices	3	New	Design Review DR.0
NCHS-158	AHU-J3 & Area J Misc Devices Point Tables	3	New	Design Review DR.0
NCHS-159	AHU-J3 Sequences of Operation	3	New	Design Review DR.0
NCHS-160	AHU-J3 System 22 Panel - I/O Wiring (1 of 2)	3	New	Design Review DR.0
NCHS-161	AHU-J3 System 22 Panel - I/O Wiring (2 of 2)	3	New	Design Review DR.0
NCHS-162	AHU-J3 System 22 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-163	AHU-J3 System 22 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-164	AHU-K6 Field Devices	3	New	Design Review DR.0
NCHS-165	Area K Exhaust Field Devices (1 of 2)	3	New	Design Review DR.0
NCHS-166	Area K Exhaust, Relief, & Temp Monitoring Field Devices (2 of 2)	3	New	Design Review DR.0
NCHS-167	Area K Radiant Panel & Convector Field Devices	3	New	Design Review DR.0
NCHS-168	Area K Cabinet & Propeller Unit Heater Field Devices	3	New	Design Review DR.0
NCHS-169	Area K Lighting & Phase Loss Monitoring Field Devices	3	New	Design Review DR.0
NCHS-170	AHU-K6 & Area K Misc Field Devices Point Tables	3	New	Design Review DR.0
NCHS-171	AHU-K6 Sequences of Operation	3	New	Design Review DR.0
NCHS-172	AHU-K6 System 23 Panel - I/O Wiring (1 of 5)	3	New	Design Review DR.0
NCHS-173	AHU-K6 System 23 Panel - I/O Wiring (2 of 5)	3	New	Design Review DR.0
NCHS-174	AHU-K6 System 23 Panel - I/O Wiring (3 of 5)	3	New	Design Review DR.0
NCHS-175	AHU-K6 System 23 Panel - I/O Wiring (4 of 5)	3	New	Design Review DR.0
NCHS-176	AHU-K6 System 23 Panel - I/O Wiring (5 of 5)	3	New	Design Review DR.0
NCHS-177	AHU-K6 System 23 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-178	AHU-K6 System 23 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-179	AHU-K6 Companion Panel - Power Wiring	3	New	Design Review DR.0
NCHS-180	AHU-K6 Companion Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-181	AHU-M1 Field Devices	3	New	Design Review DR.0
NCHS-182	Area M Exhaust, Relief, & Radiant Panel Field Devices (1 of 3)	3	New	Design Review DR.0
NCHS-183	Area M Radiant Panel Field Devices (2 of 3)	3	New	Design Review DR.0
NCHS-184	Area M Radiant Panel Field Devices (3 of 3)	3	New	Design Review DR.0
NCHS-185	AHU-M1 & Area M Misc Field Devices Point Tables	3	New	Design Review DR.0
NCHS-186	AHU-M1 Sequences of Operation	3	New	Design Review DR.0
NCHS-187	AHU-M1 System 24 Panel - I/O Wiring (1 of 3)	3	New	Design Review DR.0
NCHS-188	AHU-M1 System 24 Panel - I/O Wiring (2 of 3)	3	New	Design Review DR.0
NCHS-189	AHU-M1 System 24 Panel - I/O Wiring (3 of 3)	3	New	Design Review DR.0
NCHS-190	AHU-M1 System 24 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-191	AHU-M1 System 24 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-192	AHU-M1 Companion Panel - Power Wiring	3	New	Design Review DR.0

Delta Controls

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
TITLE-03
JOB NUMBER:
J-2304001

MSD Washington Township
North Central High School - Phase 3

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-193	AHU-M1 Companion Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-194	AHU-M2 Field Devices	3	New	Design Review DR.0
NCHS-195	Area M Relief & Propeller Unit Heater Field Devices	3	New	Design Review DR.0
NCHS-196	AHU-M2 & Area M Misc Field Devices Point Tables	3	New	Design Review DR.0
NCHS-197	AHU-M2 Sequences of Operation	3	New	Design Review DR.0
NCHS-198	AHU-M2 System 25 Panel - I/O Wiring (1 of 3)	3	New	Design Review DR.0
NCHS-199	AHU-M2 System 25 Panel - I/O Wiring (2 of 3)	3	New	Design Review DR.0
NCHS-200	AHU-M2 System 25 Panel - I/O Wiring (3 of 3)	3	New	Design Review DR.0
NCHS-201	AHU-M2 System 25 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-202	AHU-M2 System 25 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-203	AHU-AA1 Field Devices	3	New	Design Review DR.0
NCHS-204	Area AA Exhaust, Relief, & Propeller Unit Heater Field Devices	3	New	Design Review DR.0
NCHS-205	AHU-AA1 & Area AA Misc Field Devices Point Tables	3	New	Design Review DR.0
NCHS-206	AHU-AA1 Sequences of Operation	3	New	Design Review DR.0
NCHS-207	AHU-AA1 System 26 Panel - I/O Wiring (1 of 3)	3	New	Design Review DR.0
NCHS-208	AHU-AA1 System 26 Panel - I/O Wiring (2 of 3)	3	New	Design Review DR.0
NCHS-209	AHU-AA1 System 26 Panel - I/O Wiring (2 of 3)	3	New	Design Review DR.0
NCHS-210	AHU-AA1 System 26 Panel - Power & Network Wiring	3	New	Design Review DR.0
NCHS-211	AHU-AA1 System 26 Panel - Dimensions & BOM	3	New	Design Review DR.0
NCHS-212	AHU-A1 Field Devices	3	Existing	Design Review DR.0
NCHS-213	Area A1 Exhaust, Prop Unit Heater, & IDF Temp Monitoring Field Devices	3	Existing	Design Review DR.0
NCHS-214	Area A1 Cabinet Unit Heater Field Devices	3	Existing	Design Review DR.0
NCHS-215	AHU-A1 & Area 1 Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-216	AHU-A1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-217	AHU-A1 System 27 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-218	AHU-A1 System 27 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-219	AHU-A1 System 27 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-220	AHU-A1 System 27 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-221	AHU-A1 System 27 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-222	[PAGE NUMBER NOT USED]	3	Existing	Design Review DR.0
NCHS-223	[PAGE NUMBER NOT USED]	3	Existing	Design Review DR.0
NCHS-224	AHU-B1 Field Devices	3	Existing	Design Review DR.0
NCHS-225	Area B Exhaust Field Devices	3	Existing	Design Review DR.0
NCHS-226	Area B Relief & Leak Detection Field Devices	3	Existing	Design Review DR.0
NCHS-227	AHU-B1 & Area B Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-228	AHU-B1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-229	AHU-B1 System 28 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-230	AHU-B1 System 28 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-231	AHU-B1 System 28 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-232	AHU-B1 System 28 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-233	AHU-B1 System 28 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-234	AHU-C4 Field Devices	3	Existing	Design Review DR.0
NCHS-235	Area C Relief Air & Leak Detection Field Devices	3	Existing	Design Review DR.0
NCHS-236	AHU-C4 & Area C Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-237	AHU-C4 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-238	AHU-C4 System 29 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-239	AHU-C4 System 29 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-240	AHU-C4 System 29 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-241	AHU-C4 System 29 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-242	AHU-D1 Field Devices	3	Existing	Design Review DR.0
NCHS-243	Area D Exhaust, Relief, & Leak Detection Field Devices	3	Existing	Design Review DR.0
NCHS-244	AHU-D1 & Area D Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-245	AHU-D1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-246	AHU-D1 System 30 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-247	AHU-D1 System 30 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-248	AHU-D1 System 30 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-249	AHU-D1 System 30 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-250	AHU-D2 Field Devices	3	Existing	Design Review DR.0
NCHS-251	Area D Relief Air & Leak Detection Field Devices	3	Existing	Design Review DR.0

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-252	AHU-D2 & Area D Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-253	AHU-D2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-254	AHU-D2 System 31 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-255	AHU-D2 System 31 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-256	AHU-D2 System 31 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-257	AHU-D2 System 31 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-258	AHU-D2 System 31 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-259	AHU-E1 Field Devices	3	Existing	Design Review DR.0
NCHS-260	Area E Exhaust Air & Temp Monitoring Field Devices	3	Existing	Design Review DR.0
NCHS-261	AHU-E1 & Area E Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-262	AHU-E1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-263	AHU-E1 System 32 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-264	AHU-E1 System 32 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-265	AHU-E1 System 32 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-266	AHU-E1 System 32 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-267	AHU-E1 System 32 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-268	AHU-E2 Field Devices	3	Existing	Design Review DR.0
NCHS-269	AHU-E2 Relief Air & Temp Monitoring Field Devices	3	Existing	Design Review DR.0
NCHS-270	AHU-E2 Point Tables	3	Existing	Design Review DR.0
NCHS-271	AHU-E2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-272	AHU-E2 System 33 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-273	AHU-E2 System 33 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-274	AHU-E2 System 33 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-275	AHU-E2 System 33 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-276	AHU-E2 System 33 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-277	AHU-E3 Field Devices	3	Existing	Design Review DR.0
NCHS-278	AHU-E3 Point Tables	3	Existing	Design Review DR.0
NCHS-279	AHU-E3 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-280	AHU-E3 System 34 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-281	AHU-E3 System 34 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-282	AHU-E3 System 34 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-283	AHU-E3 System 34 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-284	AHU-F1 Field Devices	3	Existing	Design Review DR.0
NCHS-285	Area F Relief Air, Lighting, & Temp Monitoring Field Devices	3	Existing	Design Review DR.0
NCHS-286	AHU-F1 & Area F Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-287	AHU-F1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-288	AHU-F1 System 35 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-289	AHU-F1 System 35 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-290	AHU-F1 System 35 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-291	AHU-F1 System 35 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-292	AHU-F1 System 35 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-293	AHU-H1 Field Devices	3	Existing	Design Review DR.0
NCHS-294	Area H Exhaust, Relief, & Leak Detection Field Devices	3	Existing	Design Review DR.0
NCHS-295	AHU-H1 & Area H Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-296	AHU-H1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-297	AHU-H1 System 36 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-298	AHU-H1 System 36 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-299	AHU-H1 System 36 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-300	AHU-H1 System 36 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-301	AHU-H1 System 36 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-302	AHU-H2 Field Devices	3	Existing	Design Review DR.0
NCHS-303	Area H Relief & Leak Detection Field Devices	3	Existing	Design Review DR.0
NCHS-304	AHU-H2 & Area H Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-305	AHU-H2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-306	AHU-H2 System 37 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-307	AHU-H2 System 37 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-308	AHU-H2 System 37 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-309	AHU-H2 System 37 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-310	AHU-K1 & Area K Exhaust Field Devices	3	Existing	Design Review DR.0

Delta Controls

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
TITLE-04
JOB NUMBER:
J-2304001

MSD Washington Township
North Central High School - Phase 3

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-311	AHU-K1 & Area K Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-312	AHU-K1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-313	AHU-K1 System 38 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-314	AHU-K1 System 38 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-315	AHU-K1 System 38 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-316	AHU-K1 System 38 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-317	AHU-K2 Field Devices	3	Existing	Design Review DR.0
NCHS-318	Area K Relief & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-319	AHU-K2 & Area K Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-320	AHU-K2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-321	AHU-K2 System 39 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-322	AHU-K2 System 39 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-323	AHU-K2 System 39 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-324	AHU-K2 System 39 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-325	AHU-K2 System 39 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-326	AHU-K3 & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-327	AHU-K3 & Area K Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-328	AHU-K3 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-329	AHU-K3 System 40 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-330	AHU-K3 System 40 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-331	AHU-K3 System 40 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-332	AHU-K3 System 40 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-333	AHU-K4 Field Devices	3	Existing	Design Review DR.0
NCHS-334	AHU-K4 Point Tables	3	Existing	Design Review DR.0
NCHS-335	AHU-K4 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-336	AHU-K4 System 41 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-337	AHU-K4 System 41 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-338	AHU-K4 System 41 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-339	AHU-K4 System 41 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-340	AHU-K5 Field Devices	3	Existing	Design Review DR.0
NCHS-341	AHU-K5 Point Tables	3	Existing	Design Review DR.0
NCHS-342	AHU-K5 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-343	AHU-K5 System 42 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-344	AHU-K5 System 42 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-345	AHU-K5 System 42 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-346	AHU-K5 System 42 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-347	AHU-N1 Field Devices	3	Existing	Design Review DR.0
NCHS-348	AHU-N1 Exhaust & Lighting Field Devices	3	Existing	Design Review DR.0
NCHS-349	Area N East Building EOL Pressure Control & Lighting Field Devices	3	Existing	Design Review DR.0
NCHS-350	AHU-N1 & Area N Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-351	AHU-N1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-352	AHU-N1 System 43 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-353	AHU-N1 System 43 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-354	AHU-N1 System 43 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-355	AHU-N1 System 43 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-356	AHU-N1 System 43 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-357	AHU-N2 Field Devices	3	Existing	Design Review DR.0
NCHS-358	Area N Relief & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-359	AHU-N2 & Area N Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-360	AHU-N2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-361	AHU-N2 System 44 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-362	AHU-N2 System 44 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-363	AHU-N2 System 44 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-364	AHU-N2 System 44 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-365	AHU-P1 & Area P Lighting Field Devices	3	Existing	Design Review DR.0
NCHS-366	AHU-P1 & Area A Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-367	AHU-P1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-368	AHU-P1 System 45 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-369	AHU-P1 System 45 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-370	AHU-P1 System 45 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-371	AHU-P1 System 45 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-372	AHU-P2 Field Devices	3	Existing	Design Review DR.0
NCHS-373	Area P Exhaust & Relief Field Devices	3	Existing	Design Review DR.0
NCHS-374	AHU-P2 & Area P Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-375	AHU-P2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-376	AHU-P2 System 46 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-377	AHU-P2 System 46 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-378	AHU-P2 System 46 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-379	AHU-P2 System 46 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-380	AHU-Q1 Field Devices	3	Existing	Design Review DR.0
NCHS-381	Area Q Exhaust Field Devices (1 of 2)	3	Existing	Design Review DR.0
NCHS-382	Area Q Exhaust Fans & Lighting Field Devices (2 of 2)	3	Existing	Design Review DR.0
NCHS-383	Area Q West Building EOL Pressure Control & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-384	AHU-Q1 & Area Q Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-385	AHU-Q1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-386	AHU-Q1 System 47 Panel - I/O Wiring (1 of 4)	3	Existing	Design Review DR.0
NCHS-387	AHU-Q1 System 47 Panel - I/O Wiring (2 of 4)	3	Existing	Design Review DR.0
NCHS-388	AHU-Q1 System 47 Panel - I/O Wiring (3 of 4)	3	Existing	Design Review DR.0
NCHS-389	AHU-Q1 System 47 Panel - I/O Wiring (4 of 4)	3	Existing	Design Review DR.0
NCHS-390	AHU-Q1 System 47 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-391	AHU-Q1 System 47 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-392	AHU-Q2 Field Devices	3	Existing	Design Review DR.0
NCHS-393	Area Q Exhaust & Relief Field Devices	3	Existing	Design Review DR.0
NCHS-394	AHU-Q2 & Area Q Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-395	AHU-Q2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-396	AHU-Q2 System 48 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-397	AHU-Q2 System 48 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-398	AHU-Q2 System 48 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-399	AHU-Q2 System 48 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-400	AHU-Q2 System 48 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-401	AHU-R1 Field Devices	3	Existing	Design Review DR.0
NCHS-402	Area R Lighting Field Devices	3	Existing	Design Review DR.0
NCHS-403	AHU-R1 & Area R Lighting Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-404	AHU-R1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-405	AHU-R1 System 49 Panel - I/O Wiring (1 of 2)	3	Existing	Design Review DR.0
NCHS-406	AHU-R1 System 49 Panel - I/O Wiring (2 of 2)	3	Existing	Design Review DR.0
NCHS-407	AHU-R1 System 49 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-408	AHU-R1 System 49 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-409	AHU-R2 Field Devices	3	Existing	Design Review DR.0
NCHS-410	AHU-R2 Exhaust Field Devices (1 of 2)	3	Existing	Design Review DR.0
NCHS-411	AHU-R2 Exhaust & Relief Field Devices (2 of 2)	3	Existing	Design Review DR.0
NCHS-412	AHU-R2 & Area R Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-413	AHU-R2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-414	AHU-R2 System 50 Panel - I/O Wiring (1 of 4)	3	Existing	Design Review DR.0
NCHS-415	AHU-R2 System 50 Panel - I/O Wiring (2 of 4)	3	Existing	Design Review DR.0
NCHS-416	AHU-R2 System 50 Panel - I/O Wiring (3 of 4)	3	Existing	Design Review DR.0
NCHS-417	AHU-R2 System 50 Panel - I/O Wiring (4 of 4)	3	Existing	Design Review DR.0
NCHS-418	AHU-R2 System 50 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-419	AHU-R2 System 50 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-420	AHU-R2 Companion Panel - Power Wiring	3	Existing	Design Review DR.0
NCHS-421	AHU-R2 Companion Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-422	AHU-S1 Field Devices	3	Existing	Design Review DR.0
NCHS-423	Area S Exhaust & Relief Field Devices	3	Existing	Design Review DR.0
NCHS-424	Area S Lighting & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-425	AHU-S1 & Area S Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-426	AHU-S1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-427	AHU-S1 System 51 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-428	AHU-S1 System 51 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0

Delta Controls

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
TITLE-05
JOB NUMBER:
J-2304001

MSD Washington Township
North Central High School - Phase 3

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-429	AHU-S1 System 51 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-430	AHU-S1 System 51 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-431	AHU-S1 System 51 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-432	AHU-T1 Field Devices	3	Existing	Design Review DR.0
NCHS-433	Area T Exhaust, Relief, & PUH Field Devices	3	Existing	Design Review DR.0
NCHS-434	Area T JELCC EOL Pressure Control & Phase Loss Monitoring Field Devices	3	Existing	Design Review DR.0
NCHS-435	AHU-T1 & Area T Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-436	AHU-T1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-437	AHU-T1 System 52 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-438	AHU-T1 System 52 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-439	AHU-T1 System 52 Panel - I/O Wiring (3 of 3)	3	Existing	Design Review DR.0
NCHS-440	AHU-T1 System 52 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-441	AHU-T1 System 52 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-442	NAT AHU-1 Field Devices	3	Existing	Design Review DR.0
NCHS-443	NAT-AHU-1 Misc Field Devices	3	Existing	Design Review DR.0
NCHS-444	NAT-AHU-1 & Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-445	NAT-AHU-1 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-446	NAT-AHU-1 System 53 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-447	NAT-AHU-1 System 53 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-448	NAT-AHU-1 System 53 Panel - I/O Wiring (2 of 3)			
NCHS-449	NAT-AHU-1 System 53 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-450	NAT-AHU-1 System 53 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-451	NAT AHU-2 Field Devices	3	Existing	Design Review DR.0
NCHS-452	NAT-AHU-2 Misc Field Devices	3	Existing	Design Review DR.0
NCHS-453	NAT-AHU-2 Point Tables	3	Existing	Design Review DR.0
NCHS-454	NAT-AHU-2 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-455	NAT-AHU-2 System 54 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-456	NAT-AHU-2 System 54 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-457	NAT-AHU-2 System 54 Panel - I/O Wiring (3 of 3)			
NCHS-458	NAT-AHU-2 System 54 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-459	NAT-AHU-2 System 54 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-460	NAT AHU-3 Field Devices	3	Existing	Design Review DR.0
NCHS-461	Area Natatorium Phase Loss Monitoring Field Devices			
NCHS-462	NAT-AHU-3 & Natatorium Misc Field Devices Point Tables	3	Existing	Design Review DR.0
NCHS-463	NAT-AHU-3 Sequences of Operation	3	Existing	Design Review DR.0
NCHS-464	NAT-AHU-3 System 55 Panel - I/O Wiring (1 of 3)	3	Existing	Design Review DR.0
NCHS-465	NAT-AHU-3 System 55 Panel - I/O Wiring (2 of 3)	3	Existing	Design Review DR.0
NCHS-466	NAT-AHU-3 System 55 Panel - I/O Wiring (3 of 3)			
NCHS-467	NAT-AHU-3 System 55 Panel - Power & Network Wiring	3	Existing	Design Review DR.0
NCHS-468	NAT-AHU-3 System 55 Panel - Dimensions & BOM	3	Existing	Design Review DR.0
NCHS-469	Fan Coil Unit (FCU) Field Devices	3	New	Design Review DR.0
NCHS-470	FCU Point Tables & Sequence of Operation	3	New	Design Review DR.0
NCHS-471	FCU - I/O Wiring	3	New	Design Review DR.0
NCHS-472	FCU - Power & Network Wiring	3	New	Design Review DR.0
NCHS-473	FCU - Dimensions & BOM	3	New	Design Review DR.0
NCHS-474	VAV Detail 'A' Field Devices & Controls	3	New	Design Review DR.0
NCHS-475	VAV Detail 'B' Field Devices & Controls	3	New	Design Review DR.0
NCHS-476	VAV Detail 'C' Field Devices & Controls	3	New	Design Review DR.0
NCHS-477	VAV Detail 'D' Field Devices & Controls	3	Existing	Design Review DR.0
NCHS-478	VAV Detail 'E' Field Devices & Controls	3	Existing	Design Review DR.0
NCHS-479	VAV Detail 'F' Field Devices & Controls	3	Existing	Design Review DR.0
NCHS-480	VAV Detail 'G' Field Devices & Controls	3	Existing	Design Review DR.0
NCHS-481	VAV Schedule (1 of 10)	3	New	Design Review DR.0
NCHS-482	VAV Schedule (2 of 10)	3	New	Design Review DR.0
NCHS-483	VAV Schedule (3 of 10)	3	New	Design Review DR.0
NCHS-484	VAV Schedule (4 of 10)	3	New	Design Review DR.0
NCHS-485	VAV Schedule (5 of 10)	3	New	Design Review DR.0
NCHS-486	VAV Schedule (6 of 10)	3	New	Design Review DR.0
NCHS-487	VAV Schedule (7 of 10)	3	New	Design Review DR.0

Drawing Number:	Title:	Phase	New / Revised Work	Current Revision:
NCHS-488	VAV Schedule (8 of 10)	3	New	Design Review DR.0
NCHS-489	VAV Schedule (9 of 10)	3	New	Design Review DR.0
NCHS-490	VAV Schedule (10 of 10)	3	New	Design Review DR.0
NCHS-491	VAV Sequences of Operation	3	New	Design Review DR.0
NCHS-492	VAV Power Panel Schedule	3	New	Design Review DR.0
NCHS-493	EF - Standalone with Toggle Switch Controls	3	New	Design Review DR.0
NCHS-494	EF - Standalone with Thermostat Controls (1 of 3)	3	New	Design Review DR.0
NCHS-495	EF - Standalone with Thermostat Controls (2 of 3)	3	New	Design Review DR.0
NCHS-496	EF - Standalone with Thermostat Controls (3 of 3)	3	New	Design Review DR.0
NCHS-497	Standalone Lab Hood Controls - Areas Q & R	3	New	Design Review DR.0
NCHS-498	HVLS Fans & Space Humidifiers Field Devices & Controls	3	New	Design Review DR.0
NCHS-499	Phase Loss Monitoring - Transportation Bldg Field Devices	3	New	Design Review DR.0
NCHS-500	AHU-G1 PUH Field Devices	3	New	Design Review DR.0
NCHS-501	AHU-G4 Panel Device Adds Under Phase 3 Project	3	New	Design Review DR.0
NCHS-502	Misc Requirements & Sequences of Operation for Phase 3 Equipment	3	New	Design Review DR.0
SCH-11	Valve Schedule - Phase 3 (1 of 16)	3	New	Design Review DR.0
SCH-12	Valve Schedule - Phase 3 (2 of 16)	3	New	Design Review DR.0
SCH-13	Valve Schedule - Phase 3 (3 of 16)	3	New	Design Review DR.0
SCH-14	Valve Schedule - Phase 3 (4 of 16)	3	New	Design Review DR.0
SCH-15	Valve Schedule - Phase 3 (5 of 16)	3	New	Design Review DR.0
SCH-16	Valve Schedule - Phase 3 (6 of 16)	3	New	Design Review DR.0
SCH-17	Valve Schedule - Phase 3 (7 of 16)	3	New	Design Review DR.0
SCH-18	Valve Schedule - Phase 3 (8 of 16)	3	New	Design Review DR.0
SCH-19	Valve Schedule - Phase 3 (9 of 16)	3	New	Design Review DR.0
SCH-20	Valve Schedule - Phase 3 (10 of 16)	3	New	Design Review DR.0
SCH-21	Valve Schedule - Phase 3 (11 of 16)	3	New	Design Review DR.0
SCH-22	Valve Schedule - Phase 3 (12 of 16)	3	New	Design Review DR.0
SCH-23	Valve Schedule - Phase 3 (13 of 16)	3	New	Design Review DR.0
SCH-24	Valve Schedule - Phase 3 (14 of 16)	3	New	Design Review DR.0
SCH-25	Valve Schedule - Phase 3 (15 of 16)	3	New	Design Review DR.0
SCH-26	Valve Schedule - Phase 3 (16 of 16)	3	New	Design Review DR.0
SCH-27	Damper Schedule - Phase 3 (1 of 5)	3	New	Design Review DR.0
SCH-28	Damper Schedule - Phase 3 (2 of 5)	3	New	Design Review DR.0
SCH-29	Damper Schedule - Phase 3 (3 of 5)	3	New	Design Review DR.0
SCH-30	Damper Schedule - Phase 3 (4 of 5)	3	New	Design Review DR.0
SCH-31	Damper Schedule - Phase 3 (5 of 5)	3	New	Design Review DR.0
SCH-32	Air Handling Unit Schedule - Phase 3 (New and Existing)	3	New	Design Review DR.0
SCH-33	Convector, Pump, & Split System Schedules - Phase 3	3	New	Design Review DR.0
SCH-34	VFD & Radiant Panel Schedules - Phase 3	3	New	Design Review DR.0
SCH-35	Air Flow Measuring Station Schedule - Phase 3	3	New	Design Review DR.0
SCH-36	Exhaust Fan Schedule - Phase 3 (1 of 4)	3	New	Design Review DR.0
SCH-37	Exhaust Fan Schedule - Phase 3 (2 of 4)	3	New	Design Review DR.0
SCH-38	Exhaust Fan Schedule - Phase 3 (3 of 4)	3	New	Design Review DR.0
SCH-39	Exhaust Fan Schedule - Phase 3 (4 of 4)	3	New	Design Review DR.0
SCH-40	Intake & Relief Hood Schedule - Phase 3	3	New	Design Review DR.0
SCH-41	Cabinet Unit Heater & Propeller Unit Heater Schedules - Phase 3	3	New	Design Review DR.0
SCH-42	Consolidated Bill of Material	3	New	Design Review DR.0
SCH-43	Label List	3	New	Design Review DR.0
INST-01	Installation Standards - Inputs (1 of 3)	All	New	Design Review DR.0
INST-02	Installation Standards - Inputs (2 of 3)	All	New	Design Review DR.0
INST-03	Installation Standards - Inputs (3 of 3)	All	New	Design Review DR.0
INST-04	Installation Standards - Outputs (1 of 3)	All	New	Design Review DR.0
INST-05	Installation Standards - Outputs (2 of 3)	All	New	Design Review DR.0
INST-06	Installation Standards - Outputs (3 of 3)	All	New	Design Review DR.0
INST-07	Installation Standards - Typical Third-Party Connections	All	New	Design Review DR.0

Delta Controls

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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
TITLE-06
JOB NUMBER:
J-2304001

TAG	TAG DESCRIPTION
AC	DX COOLING-ONLY UNIT
ACF	ACTIVATED CARBON FILTER SYSTEM
ACK	ACKNOWLEDGE
ACP	AIR COMPRESSOR
ACU	AIR COOLED CONDENSING UNIT
ACU	AIR CONDITIONING SYSTEM
AF	AIR FILTER
AFS	AIR FLOW MEASURING STATION
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
ALM	ALARM
AO	ANALOG OUTPUT
AVG	AVERAGE(ING)
BAS	BUILDING AUTOMATION SYSTEM
BC	BOILER CONTROLLER
BI	BINARY (DIGITAL) INPUT
BLR	BOILER
BO	BINARY (DIGITAL) OUTPUT
BYP	BYPASS
BZR	BUZZER
CBL	CABLE
CB	CIRCUIT BREAKER
CC	COOLING COIL
CCDAT	COOLING COIL DISCHARGE AIR TEMPERATURE
CF	CARTRIDGE FILTER SYSTEM
CH	CHILLER
CHW	CHILL WATER
CHWR	CHILL WATER RETURN TEMPERATURE
CHWS	CHILL WATER SUPPLY TEMPERATURE
CI	CHLORINE
CND	CONDENSING UNIT
CO	CARBON MONOXIDE SENSOR
CO2	CARBON DIOXIDE SENSOR
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
C1A	CONTROLLER - DAC-1600 APPLICATION
C2E	CONTROLLER - DSC-1212E SYSTEM
C3A	CONTROLLER - DAC-633 APPLICATION
C3S	CONTROLLER - DSC-633 SYSTEM
C4A	CONTROLLER - DAC-1146 APPLICATION
C4F	CONTROLLER - DFM-440 FIELD MODULE
C4S	CONTROLLER - DSC-1146 SYSTEM
C4X	CONTROLLER - eBX-04 EXPANDER BACKPLANE
C6A	CONTROLLER - DAC-606 APPLICATION
C6E	CONTROLLER - DSC-1616E SYSTEM
C7E	CONTROLLER - eTCH-7E TOUCH SCREEN
C8U	CONTROLLER - eBM-800 UI MODULE
C8X	CONTROLLER - eBX-08 EXPANDER BACKPLANE
CCU	CONTROLLER - COPPERCUBE ARCHIVER
CDF	CONTROLLER - DFC-304R3-240 FCU
CDV	CONTROLLER - DVC-V322A-B VAV
CDX	CONTROLLER - DMUX-8-J MULTIPLEXER
CDZ	CONTROLLER - DZNR-768 REPEATER
CEB	CONTROLLER - eBMGR-2
CEC	CONTROLLER - EBCON-2 SYSTEM
CET	CONTROLLER - eBMGR-TCH-2
CFP	CONTROLLER - DMF-400P PWM FIELD MODULE
CFU	CONTROLLER - DFM-400 FIELD MODULE
CJA	CONTROLLER - JACE 8000 NETWORK ENGINE
CMA	CONTROLLER - eBM-440-M AO MODULE
CMD	CONTROLLER - eBM-D400R4 DO MODULE
CMH	CONTROLLER - eBM-D400R4-H DO MODULE

TAG	TAG DESCRIPTION
CMI	CONTROLLER - eBM-440-I MODULE
CZF	CONTROLLER - eZFCP-424r4-24 FCU
CZV	CONTROLLER - enteliZONE VAV
CS	CURRENT SENSOR
CT	CURRENT TRANSDUCER
CTR	COOLING TOWER
CTS	CHEMICAL TREATMENT SYSTEM
CTW	CITY WATER (RAW)
CW	CONDENSER WATER
CWF	CONDENSER WATER FILTER
CWR	CONDENSER WATER RETURN TEMPERATURE
CWS	CONDENSER WATER SUPPLY TEMPERATURE
CWV	CHILL WATER VALVE
DAH	DISCHARGE AIR HUMIDITY
DAT	DISCHARGE AIR TEMPERATURE
DDC	DIRECT DIGITAL CONTROL
DEM	DEMAND
DET	DETECTION
DI	DIGITAL (BINARY) INPUT
DO	DIGITAL (BINARY) OUTPUT
DP	DEW POINT TRANSMITTER
DPA	DIFFERENTIAL PRESSURE TRANSDUCER - AIRFLOW
DPB	DIFFERENTIAL PRESSRUE BLDG TRANSDUCER
DPD	DIFFERENTIAL PRESSURE DUCT TRANSDUCER
DPF	DIFFERENTIAL PRESSURE FILTER
DPR	DAMPER
DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSDUCER
DPW	DIFFERENTIAL PRESSURE WATER TRANSDUCER
DR	DIN RAIL
DRA	DIN RAIL ADAPTER
DWH	DOMESTIC WATER HEATER
DWM	DOMESTIC WATER METER
DWP	DOMESTIC WATER PRESSURE
DWR	DISHWASHER
EAD	EXHAUST AIR DAMPER
EBO	EQUIPMENT BY OTHERS
ELE	ELEVATOR
ENA	ENABLE
ENC	ENCLOSURE
EOA	EMERGENCY OUTSIDE AIR
EOL	END OF LINE RESISTOR
EPM	ELECTRICAL POWER MONITORING
ES	END SWITCH
ESC	ELECTRONIC SPEED CONTROL
ET	EXPANSION TANK
ETR	EXISTING TO REMAIN
ETS	ETHERNET SWITCH
EWH	ELECTRIC WATER HEATER
FA	FIRE ALARM SYSTEM POINT
FAA	FIRE ALARM ANNUNCIATION
FACP	FIRE ALARM CONTROL PANEL
FAS	FIRE ALARM SYSTEM
FB	FUSE BLOCK
FBK	FEEDBACK
FBD	FACE AND BYPASS DAMPER
FBP	FACE AND BYPASS
FC	FIBER CONVERTER, (TO ETHERNET)
FCU	FAN COIL UNIT
FDT	FUEL DAY TANK
FE	FRONT END

TAG	TAG DESCRIPTION
FLT	FILTER DIFFERENTIAL PRESSURE
FM	FLOW METER
FP	FIRE PUMP
FR	FIELD RELAY
FS	FLOW SWITCH
FSC	FCU FAN SPEED CONTROL SWITCH
FT	FAULT
FWC	FIRE WATER CHEMICAL TREATMENT SYSTEM
FWC	FIRE WTR CORR CHEM TREAT INJECT SYSTEM
G	GAUGE
GD	GAS DETECTOR
GEN	GENERATOR
GFS	GAS FLOW SWITCH
GM	GAS METER
H2S	HYDROGEN SENSOR
HC	HEATING COIL
HL	HIGH LIMIT, DUCT PRESSURE
HR	HEAT RECOVERY
HRC	HEAT RECOVERY COIL
HRU	HEAT RECOVERY UNIT
HS	HUMIDISTAT
HTD	HUMIDITY / TEMPERATURE SENSOR - DUCT
HTR	HUMIDITY / TEMPERATURE SENSOR - ROOM
HTS	HEAT SENSOR
HU	HUMIDIFIER
HUM	HUMIDITY SENSOR
HW	HOT WATER
HWR	HOT WATER RETURN TEMPERATURE
HWS	HOT WATER SUPPLY TEMPERATURE
HWV	HOT WATER VALVE
IL	INTERLOCK
ION	IONIZATION UNIT
ISO	ISOLATION
JA	JACE (CONTROLLER, ACCESSORIES, EXP. PACKS)
KWM	KILOWATT METER
LAN	LOCAL ACCESS NETWORK
LBL	LABEL
LC	LIGHTING CONTACTOR
LD	LEAK DETECTOR
LFH	LAB FUME HOOD
LL	LOW LIMIT TEMPERATURE SWITCH
LLS	LIQUID LEVEL SWITCH
LLT	LIQUID LEVEL TRANSMITTER
LN*	LINKNET NETWORK POINT
LRB	LIGHTING RELAY BRACKET
LS(S)	LOAD SHEDDING (SIGNAL)
LT	LIGHT
LVL	LEVEL
LWC	LOW WATER CUT-OFF
M	ACTUATOR
MAD	MIXED AIR DAMPER
MAG	MAGNEHELIC PRESSURE GAUGE
MAT	MIXED AIR TEMPERATURE
MAX	MAXIMUM
MB	MOUNTING BRACKET
MF	MULTIMEDIA FILTER SYSTEM
MIN	MINIMUM
MS	MOTOR STARTER
MTR	METER
N*	NETWORK (SOFTWARE) POINT NUMBER
OA	OUTSIDE AIR

TAG	TAG DESCRIPTION
OAD	OUTSIDE AIR DAMPER
OAH	OUTSIDE AIR HUMIDITY
OAT	OUTSIDE AIR TEMPERATURE
OATH	OUTSIDE AIR TEMPERATURE / HUMIDITY
OBS	OBSOLETE
OCC	OCCUPANCY
OS	OCCUPANCY SENSOR
PAN	PANDUIT / WIRE MOLD
PB(C)	PANEL BUILD (COMPONENT)
PF	PANEL FUSE
Ph	POTENTIAL HYDROGEN
PHV	PRE-HEAT VALVE
PLG	PANEL LIGHT - GREEN
PLR	PANEL LIGHT - RED
PLY	PANEL LIGHT - YELLOW
PM	POWER MONITOR
PMP	PUMP
PNL	PANEL
PLM	PHASE LOSS MONITOR
PP	PRESSURE PICKUP, SPACE - LOW PROFILE
PpH	POTABLE WATER POTENTIAL HYDROGEN (Ph) LEVEL
PR	RELAY, PANEL, TRACK MOUNT
PS	POWER SUPPLY
PRES	PRESSURE
PRN	PRINTER
PSR	PHOTOCELL RELAY
PT	PNEUMATIC TUBING - POLY
PTS	PNEUMATIC PRESSURE PICKUP - STATIC PRESSURE
PTT	PNEUMATIC PRESSURE PICKUP - TOTAL PRESSURE
PTV	PNEUMATIC PRESSURE PICKUPS - STATIC & TOTAL
PWC	POTABLE WATER CHLORINATION SYSTEM
PWM	PULSE WIDTH MODULATION
PWT	POTABLE WATER TANK
R	PANEL RELAY
RA	RETURN AIR
RAD	RETURN AIR DAMPER
RAH	RETURN AIR HUMIDITY
RAT	RETURN AIR TEMPERATURE
RB	RELAY, PANEL, ICE CUBE, SOCKET BASE
RBP	CITY RAW WATER BOOSTER PUMP
RD	RADON DETECTOR
REL(D)	RELIEF (DAMPER)
RM	REFRIGERANT MONITOR
RPC	RAW WATER BOOSTER PUMP CONTROLLER
RTS	ROTARY TIMER SWITCH
RTU	ROOFTOP UNIT
RWB	RAW WATER BAG FILTER SYSTEM
RWP	RAW WATER TREATMENT SYSTEM PUMP PKG
RWPC	RAW WATER PUMP CONTROL SYSTEM
RWR	RAW WATER RECIRCULATION & CHLORINATION SYS
RWT	RAW WATER TANK
SA	SUPPLY AIR
SAT	SUPPLY AIR TEMPERATURE
SCR	SILICONE-CONTROLLED RECTIFIER (REHEAT TYP.)
SD	SMOKE DETECTOR
SEF	SMOKE EXHAUST FAN
SEP	SEWAGE EJECTION PUMP
SF	SUPPLY FAN
SGD	SURGE DAMPER - AIR
SI + []	SAFETY INTERLOCK + Source (i.e. Term L6 & L7)
SMP	SUMP PUMP

TAG	TAG DESCRIPTION
SP	SWITCH PLATE
SPD	SPEED SIGNAL (VFD INPUT SPEED FROM BAS)
SPS	SPRAY WATER SYSTEM
SR	SAFETY RELAY
SS	START / STOP
SSG	SPACE SENSOR GUARD
SSP	SECURITY SYSTEM PANEL
ST	SPACE TEMPERATURE
STAT	STATUS
STPT	SETPOINT
SW	SWITCH - ELECTRIC
TB	TERMINAL BLOCK
TBP	TRIPLEX DOMESTIC WATER BOOSTER PUMP PKG
TH	THERMOSTAT, ROOM TEMPERATURE
TL	TOWER LIGHT (ALARM INDICATION)
TS	TEMPERATURE SENSOR
TW	THERMOWELL, TEMPERATURE
TX	TRANSFORMER
V	VALVE / ACTUATOR COMBINATION
VAV	VARIABLE AIR VOLUME BOX
VFD	VARIABLE FREQUENCY DRIVE
VFDR	VARIABLE FREQUENCY DRIVE, RETURN FAN
VFDS	VARIABLE FREQUENCY DRIVE, SUPPLY FAN
WA	WATER ALARM
WD	WATER DETECTOR
WLP	WATER LEVEL TRANSDUCER, PRESSURE TYPE
WLU	WATER LEVEL TRANSDUCER, ULTRASONIC
WM	WATER METER
WP	WATER PRESSURE
WSHP	WATER SOURCE HEAT PUMP
WTR	WATER
WWT	WASTE WATER TREATMENT
XFMR	TRANSFORMER

Delta Controls
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UPDATES	
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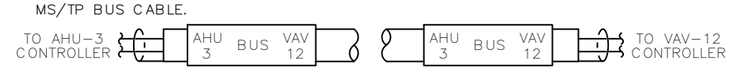
CONTRACT NO:

SHEET
GEN-01
JOB NUMBER:
J-2304001

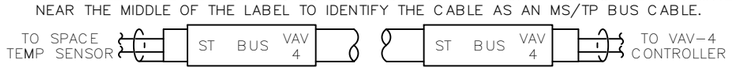
INSTALLATION STANDARDS – LEGEND

MS/TP BUS CABLE LABELING

1. THE LABELING SHOWN BELOW SHALL BE PROVIDED ON ALL MS/TP BUS CABLES RUNNING FROM ONE CONTROL PANEL TO ANOTHER, OR FROM A CONTROLLER TO A SPACE TEMPERATURE SENSOR. MS/TP BUS CABLES CONNECTING CONTROLLERS WITHIN A SINGLE CONTROL PANEL SHALL NOT BE LABELED.
   - ON CABLES RUNNING BETWEEN CONTROL PANELS: EACH LABEL SHALL INDICATE THE NAMES OF THE CONTROLLERS CONNECTED AT EACH END OF THE CABLE. THE NAME PRINTED ON THE LEFT SIDE OF THE LABEL SHALL BE THE NAME OF THE CONTROLLER CONNECTED TO THE LEFT END OF THE CABLE & VICE-VERSA (SEE EXAMPLE BELOW). THE WORD "BUS" SHALL BE PRINTED NEAR THE MIDDLE OF THE LABEL TO IDENTIFY THE CABLE AS AN MS/TP BUS CABLE.



   - ON CABLES RUNNING TO SPACE TEMPERATURE SENSORS: EACH LABEL SHALL INDICATE THE NAME OF THE CONTROLLER ON THE RIGHT SIDE AND THE LETTERS "ST" ON THE LEFT SIDE. THE CABLE SHALL BE INSTALLED AS SHOWN BELOW. THE WORD "BUS" SHALL BE PRINTED NEAR THE MIDDLE OF THE LABEL TO IDENTIFY THE CABLE AS AN MS/TP BUS CABLE.



2. EACH LABEL SHALL BE MADE OF TRANSPARENT VINYL FILM BACKED WITH AN ACRYLIC, PRESSURE-SENSITIVE ADHESIVE. THE LABEL MATERIAL SHALL BE OIL & SOLVENT RESISTANT WITH GOOD CONFORMABILITY & FLEXIBILITY. THE MEANS OF PRINTING ON THE LABEL SHALL RESULT IN A CLEARLY LEGIBLE, PERMANENT MARKING. LABELS SHALL REMAIN INTACT & CLEARLY LEGIBLE WHEN SUBJECTED TO ULTRAVIOLET LIGHT, EXTREME HUMIDITY & SURFACE TEMPERATURES FROM -40° F TO 150° F (-40° C TO 66° C).
3. EACH CABLE SHALL BE IDENTIFIED WITH (2) LABELS. A LABEL SHALL BE LOCATED WITHIN 18" OF EACH END OF THE CABLE & SHALL BE VISIBLE WITHIN THE CONTROL ENCLOSURE. THE SAME NOTATION THAT APPEARS ON THE LABEL SHALL BE MARKED ON THE COVER OF EACH JUNCTION BOX THAT THE CABLE PASSES THROUGH.

WIRING TERMINATION LEGEND - PANEL

[#] = VDC TERMINATION AT CONTROL PANEL

[L##] = VAC TERMINATION AT CONTROL PANEL

1## = 120-460VAC INTRA-PANEL TERMINATION

2##, 4## = 24VAC INTRA-PANEL TERMINATION

3##, 5## = 24VDC INTRA-PANEL TERMINATION

WIRING TERMINATION LEGEND - BACNet ID

XX ## (NOTE: LEADING ZEROS NOT USED)

INSTANCE NUMBER: FROM PANEL I/O = PHYSICAL CONNECTION NUMBER
N* INSTANCE NUMBER INDICATES A NETWORK (SOFTWARE) POINT

I/O TYPE: AI=ANALOG INPUT, BI=BINARY INPUT, MI=MULTISTATE INPUT
AO=ANALOG OUTPUT, BO=BINARY OUTPUT

DEVICE BASIC ADDRESS FROM SWITCH
DEVICE BACNET ADDRESS = DEVICE SWITCH ADDRESS * DEVICE TYPE FACTOR

DEVICE TYPE: = AREA (FACTOR = 10000)
= SYSTEM (FACTOR = 100)
= SUBLAN (FACTOR = 1)
= LINKNET DEVICE (BACNET ADDRESS USES HOSTPANEL_ID)

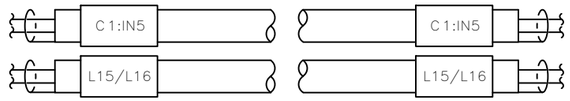
EXAMPLES:
AREA DEVICE # 3, BINARY INPUT NUMBER 4: [BACNET ADDRESS = 30000.BI4]
LINKNET DEVICE # 2, BINARY INPUT NUMBER 3: [BACNET ADDRESS = HOSTPANEL_ID.BI203]

INPUT / OUTPUT WIRING STANDARDS

1. ALL I/O CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:
   - STRANDED 18 GAUGE, TWISTED/SHIELDED-PAIR COPPER WIRE WITH 300 VOLT INSULATION
2. PLENUM-RATED CABLE SHALL BE USED WHERE REQUIRED BY LOCAL OR NATIONAL CODES.
3. I/O WIRING SHALL NOT BE RUN IN THE SAME CONDUIT AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
4. WITHIN ANY CONTROL PANEL:
   - I/O WIRING SHALL NOT CROSS OVER A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
   - I/O WIRING SHALL NOT BE RUN IN THE SAME CABLE GROUP AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
5. ONLY SHIELDED 24 VAC POWER WIRING SHALL BE ALLOWED TO CROSS OVER, RUN IN THE SAME CONDUIT, OR RUN IN THE SAME CABLE GROUP AS I/O WIRING.
6. WHERE UNAVOIDABLE, I/O WIRING MAY BE LOCATED NO CLOSER THAN 6" AND SHOULD BE LOCATED AS FAR APART AS POSSIBLE FROM POWER WIRING CARRYING MORE THAN 24 VOLTS. AVOID RUNNING PARALLEL TO POWER WIRING ANY FURTHER THAN NECESSARY, CROSS POWER WIRING AT 90 DEGREE ANGLES ONLY IF REQUIRED.
7. SHIELDS ON INPUT AND OUTPUT WIRING TO BE GROUNDED AT PANEL (OR CONTROLLER) LOCATION ONLY. THEY SHOULD BE TIED TO A TRUE EARTH GROUND.
8. STRIP ONLY ENOUGH CABLE BACK TO ALLOW TERMINATION OF SHIELD AND WIRE.

INPUT / OUTPUT CABLE LABELING

1. THE LABELING SHOWN BELOW SHALL BE PROVIDED ON ALL I/O WIRING TO & FROM CONTROLLERS AND FIELD DEVICES. I/O WIRING CONTAINED WITHIN A CONTROL PANEL SHALL NOT BE LABELED. EACH LABEL SHALL INDICATE THE I/O WIRING TERMINATION AS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS (SEE EXAMPLES BELOW).



2. EACH LABEL SHALL BE MADE OF TRANSPARENT VINYL FILM BACKED WITH AN ACRYLIC, PRESSURE-SENSITIVE ADHESIVE. THE LABEL MATERIAL SHALL BE OIL & SOLVENT RESISTANT WITH GOOD CONFORMABILITY & FLEXIBILITY. THE MEANS OF PRINTING ON THE LABEL SHALL RESULT IN A CLEARLY LEGIBLE, PERMANENT MARKING. LABELS SHALL REMAIN INTACT & CLEARLY LEGIBLE WHEN SUBJECTED TO ULTRAVIOLET LIGHT, EXTREME HUMIDITY & SURFACE TEMPERATURES FROM -40° F TO 150° F (-40° C TO 66° C).
3. EACH CABLE SHALL BE IDENTIFIED WITH (2) LABELS. A LABEL SHALL BE LOCATED WITHIN 18" OF EACH END OF THE CABLE & SHALL BE VISIBLE AT THE CONTROL PANEL OR FIELD DEVICE. THE SAME NOTATION THAT APPEARS ON THE LABEL SHALL BE MARKED ON THE COVER OF EACH JUNCTION BOX THAT THE CABLE PASSES THROUGH.

GENERAL ELECTRICAL STANDARDS

1. ALL CURRENT SENSING DEVICES SHALL HAVE THE POWER WIRE LOOPED THROUGH THE SENSOR MULTIPLE TIMES, IF NECESSARY, TO PROVIDE AN AMPERAGE THAT IS WELL WITHIN THE RANGE OF THE SENSOR (REFER TO MANUFACTURER'S LITERATURE FOR AMPERAGE RANGE).
2. ALL FIELD WIRING TO TERMINAL STRIPS IN CONTROL PANELS SHALL BE TERMINATED AT THE OUTERMOST TERMINALS. INNER TERMINALS OF TERMINAL STRIPS ARE RESERVED FOR INTERNAL WIRING TERMINATIONS.
3. 120 VAC POWER WIRING SHALL ENTER ANY CONTROL PANEL AT THE UPPER RIGHT CORNER UNLESS OTHERWISE INDICATED.
4. 240 VAC POWER WIRING SHALL ENTER ANY CONTROL PANEL AT THE LOWER LEFT CORNER UNLESS OTHERWISE INDICATED.
5. THE GROUND WIRE CONNECTED TO ANY CONTROL PANEL MUST BE A CONTINUOUS CONDUCTOR BACK TO THE GROUND CONNECTION AT THE BREAKER PANEL. GROUNDING TO BUILDING STEEL IS NOT ACCEPTABLE.
6. ALL JUMPER & DIP SWITCH CONFIGURATIONS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS SHALL BE SET BY THE INSTALLER. IF NO SPECIFIC CONFIGURATION IS SHOWN FOR A DEVICE, NO CHANGE SHALL BE MADE TO THE DEFAULT SETTINGS.
7. ALL FIELD WIRING THAT DIFFERS FROM THE WIRING SHOWN ON THE TEMPERATURE CONTROL DRAWINGS SHALL BE NOTED ON THE DRAWINGS (BY THE INSTALLER) WITH RED INK OR PENCIL. THE COMPLETE SET OF NOTED DRAWINGS SHALL BE PROVIDED TO THE PROJECT MANAGER UPON COMPLETION OF THE PROJECT OR SOONER UPON REQUEST.

ELECTRICAL NOTES

- ALL CONTROL DEVICES & WIRING SHALL BE INSTALLED IN ACCORDANCE WITH: MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND INSTALLATION STANDARDS PROVIDED ON THE "INSTALLATION STANDARDS" SHEET.
- THESE DRAWINGS PROVIDE SCHEMATIC REPRESENTATIONS OF EQUIPMENT & FIELD DEVICES BASED ON THE BID PROPOSAL. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION.
- FIELD VERIFICATION OF WIRING TERMINATIONS REQUIRED.

- GROUND CIRCUIT MUST BE A CONTINUOUS PATH BACK TO THE BREAKER PANEL.
- ELECTRICAL NOTE: CONTROLLER GROUND CONNECTION MUST BE A COMPLETE PATH BACK TO BREAKER PANEL.

- REMOVE SHUNT JUMPER IF SHIELD IS GROUNDED DIRECTLY AT ANY OTHER POINT OR SHUNT IS INSTALLED AT OTHER END OF NETWORK.
- ADP-45-MSTP-TB-Y AND ADP-45-MSTP-Y BOARDS MAY BE FLUSH MOUNTED ONTO METAL PANELBOARDS WITHOUT AN INSULATOR BETWEEN THE TWO.
- FIELD DEVICES SHOULD ONLY BE GROUNDED IN THE CONTROL PANEL. DO NOT GROUND I/O WIRING IN BOTH THE FIELD AND THE PANEL.
- THESE DRAWINGS PROVIDE SCHEMATIC REPRESENTATIONS OF EQUIPMENT & FIELD DEVICES BASED ON THE CHILDREN'S EDUCATION ADDITION PROPOSAL. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION.
- SEE FIELD DEVICE TERMINATION DETAIL SHEET(S) FOR POINT WIRING REQUIREMENTS.

FROM BAPI:

- BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes.
Do NOT run this device's wiring in the same conduit as AC power wiring of NEC class 1, NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. If you are experiencing any of these difficulties, please contact your BAPI representative.

Cable Requirements:

	Cable Type	Equal to	Max Cable Length	Wiring Precautions
RS-485 Network	22-24 AWG twisted pair, shielded, jacketed communication cable	Belden 9841, 82841	4000 ft (1220 m)	- Braided or Aluminum foil shield, Impedence 100-200 Ω, Capacitance 17 pF/ft or less. - Use for BACnet MS/TP, LINKNet, V2 Subnet, MODBUS-RTU
Ethernet	10/100 Base T, Cat5e, Cat6		no limit (w/ switches)	Follow IEEE 802.3 standards
Fiber Optic	Grade 3 (62.5/125μ) / Grade 4 (50/125µ), min 2 fiber, Multimode, SC connector	Belden FDxM006P0	1000 ft (550 m) for Gigabit Ethernet	Suggest 4 or more fibers for redundancy in case of damage
10k Ω / Dry Contact Input	2 conductor 18 AWG	Belden 8461NH	3900 ft (1200 m)	Ground only at controller input GND terminal
	2 conductor 22 AWG	Belden 88442	1500 ft (450 m)	Ground only at controller input GND terminal
5 V Input	2 conductor 22 AWG shielded	Belden 83552	100 ft (30 m)	Keep Cable Short Use dedicated shielded cable
	2 conductor 20 AWG shielded	Belden 83602	330 ft (100m) w 20 kΩ load resistor	
	3 conductor 20 AWG shielded	Belden 8772		

Cable Requirements:

	Cable Type	Equal to	Max Cable Length	Wiring Precautions
10 V Input	3 conductor 18 AWG unshielded	Belden 88870	330 ft (100 m)	
4-20 mA Input	2 conductor 18 AWG unshielded	Belden 8461NH	3300 ft (1000 m)	
	4 conductor 18 AWG unshielded	Belden 88489		
Digital Input	2 conductor 18 AWG	Belden 8461NH	3900 ft (1200 m)	
	2 conductor 22 AWG	Belden 88442	1500 ft (450 m)	
RTD Input	2 conductor 18 AWG	Belden 8461NH	No practical limit	Ground only at controller input GND terminal
	2 conductor 22 AWG	Belden 88442		
Analog 0-10 VDC Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	
Analog 4-20 mA Output	2 conductor 18 AWG unshielded	Belden 8461NH	Depends upon impedence	ft = 1000 (500 - end dev imp) / 12.8 m = 1000 (500 - end dev imp) / 42
Binary Triac Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	min turn-on current = 25 mA
Binary SS Relay Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	No min turn-on current, Max External Voltages: 28 VAC, 28 VDC
Binary Relay Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	Max External Voltages: 28 VAC, 28 VDC

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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
GEN-02
JOB NUMBER:
J-2304001

BACNET MS/TP (RS-485) BUS STANDARDS

1. THE MS/TP BUS SHIELD MUST BE KEPT SEPARATE FROM OTHER SHIELDS & MUST NOT BE GROUNDED. THE MS/TP BUS SHIELD SHALL BE PROTECTED FROM CONTACTING ANY SURFACE OTHER THAN THE TERMINATION BLOCK.
2. SPLICES IN MS/TP BUS WIRING ARE NOT ACCEPTABLE. MS/TP BUS WIRING SHALL BE TERMINATED ONLY AT A CONTROLLER, REPEATER, OR TRM-768: RS-485 LAN TERMINATOR.
3. THE BLACK WIRE IN AN MS/TP BUS CABLE SHALL ALWAYS BE CONNECTED TO THE (-) BUS TERMINAL ON THE DEVICE AT EACH END OF THE CABLE.
4. ALL 2-CONDUCTOR MS/TP BUS CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:
   - 22-24 GAUGE, SINGLE TWISTED-PAIR, TINNED, SHIELDED COPPER WIRE WITH GREEN JACKET
   - NOMINAL IMPEDANCE = 100-120 OHMS BETWEEN CONDUCTORS
   - CAPACITANCE < OR = TO 17 pF/FT BETWEEN GROUNDED CONDUCTOR & NEXT CONDUCTOR
   - ACCEPTABLE CABLE = BELDEN 9841, 82841 OR WINDY CITY WIRE 42002-S. (PLENUM-RATED)

   APPROVAL OF EQUIVALENT CABLE IS REQUIRED PRIOR TO INSTALLATION
5. PLENUM-RATED CABLE SHALL BE USED WHERE REQUIRED BY LOCAL OR NATIONAL CODES.
6. MS/TP BUS WIRING SHALL NOT BE RUN IN THE SAME CONDUIT AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
7. WITHIN ANY CONTROL PANEL:
   - MS/TP BUS WIRING SHALL NOT CROSS OVER A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
   - MS/TP BUS WIRING SHALL NOT BE RUN IN THE SAME CABLE GROUP AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
8. ONLY SHIELDED 24 VAC POWER WIRING SHALL BE ALLOWED TO CROSS OVER, RUN IN THE SAME CONDUIT, OR RUN IN THE SAME CABLE GROUP AS MS/TP BUS WIRING.

BACNET MS/TP (RS-485) BUS NOTES

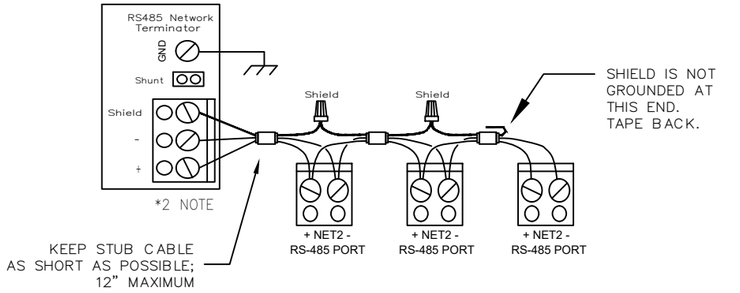
- EACH SEGMENT OF THE DZNT COMMUNICATION BUS CAN HAVE UP TO 50 DEVICES AND 2,000' TOTAL CAT5 CABLE LENGTH (COMBINED DISTANCE BETWEEN TERMINATION BOARDS AND FROM TERMINATION BOARD TO DZNT-TO-VAV (THE WALL MOUNTED DEVICE)) TO A MAXIMUM OF 99 DEVICES TOTAL.
- TOTAL NETWORK LENGTH IS DETERMINED BY SUM OF CABLE LENGTHS BETWEEN TERMINATION BOARDS, PLUS THE SUM OF THE DROP CABLES BETWEEN TERMINATION BOARD AND THERMOSTAT.
- IF ONLY 1 SEGMENT IS REQUIRED, AN ADP45-MSTP-TB-Y MAY BE USED INSTEAD OF AN ADP45-MSTP-Y.
- THERE IS NO HARD LIMIT TO THE NUMBER OF BRANCHES CREATED BY ADP45-MSTP-Y CONNECTORS, PROVIDED TOTAL OF ALL BRANCHES IS WITHIN THE LENGTH AND DEVICE LIMIT FOR THE SEGMENT. DAISY CHAIN STRUCTURE IS MAINTAINED DUE TO THE DESIGN OF THE CABLING SYSTEM.
- AFTER SPLITTING A NETWORK INTO TWO (2) BRANCHES, DO NOT RECOMBINE TO A SINGLE BRANCH AT THE OPPOSITE END OR NETWORK PROBLEMS WILL OCCUR.
- LOOPBACK TERMINATION, ADP45-MSTP-ENDLOOP, MUST BE USED AT THE END OF EACH NETWORK BRANCH OR SEGMENT. NETWORK WILL CONTINUE TO FUNCTION IF ON LOOPBACK OR DEVICE IS REMOVED FROM THE NETWORK BUT DEVICES WILL DROP OFF THE NETWORK BETWEEN ANY TWO (2) REMOVED DZNT-TO-VAV OR ADP45-MSTP-LOOP.
- 12" LENGTH OF NETWORK CABLE ATTACHED TO THE ADP45-MSTP-TB-Y IS MAXIMUM ALLOWED. TERMINATE GROUND LEAD TO GND ON THE CONTROLLER TO MAINTAIN NETWORK INTEGRITY.
- CABLING IS DESIGNED TO USE STANDARD STRAIGHT-THROUGH UNSHIELDED TWISTED PAIR (UTP) CAT3 OR HIGHER CABLES (CAT5, CAT5e, CAT6) TO CONNECT BOXES TO BOXES, AND INDIVIDUAL BOXES TO THEIR THERMOSTATS.
- CABLING IS DESIGNED TO MAINTAIN THE REQUIRED DAISY-CHAIN CONFIGURATION EVEN WITH THE USE OF NETWORK Y's.

- DO NOT EXCEED (64) NODES ON A NETWORK SEGMENT. THERE IS A MAXIMUM OF 99 NOTES ALLOWED ON A SINGLE MS/TP NETWORK. ANY MORE THAN (64) NODES ON A NETWORK REQUIRES THE USE OF A REPEATER!
- DO NOT EXCEED 4,000 FEET (1,220 m) TOTAL LENGTH ON ANY SINGLE TWISTED PAIR RS-485 NETWORK SEGMENT.
- DO NOT EXCEED 2,000 FEET (610 m) TOTAL LENGTH ON ANY SINGLE CAT5 RS-485 NETWORK SEGMENT.
- DO NOT EXCEED (3) NODES ON A SINGLE LINKNET SEGMENT.
- DO NOT EXCEED 100 FEET (30 m) TOTAL LENGTH ON ANY SINGLE LINKNET NETWORK.
- SHIELD FOR MS/TP BUS MUST BE KEPT SEPARATE FROM OTHER SHIELDS AND FROM GROUND TERMINATIONS.
- MS/TP BUS SHIELD MUST BE TIED THROUGH EACH NODE TO MAKE A CONTINUOUS SHIELD THAT RUNS THE ENTIRE LENGTH OF THE RS-485 SEGMENT. DO NOT CONNECT THE SHIELD TO GROUND AT THE NODE.
- PROTECT FROM CONTACT WITH ANY SURFACE OTHER THAN THE TRM-768 TERMINAL BOARD OR DNZR-768 REPEATER.
- COMMUNICATION WIRING MUST NOT BE SPLICED. ALL TERMINATIONS MUST OCCUR AT CONTROLLERS UNLESS SPECIFICALLY NOTED OTHERWISE.
- BLACK COMMUNICATION WIRE SHALL ALWAYS BE CONNECTED TO (-) TERMINAL AT ALL CONTROLLERS.
- REFER TO "INSTALLATION STANDARDS" SHEET FOR ACCEPTABLE CABLE SPECIFICATIONS AND WIRING PRACTICES.
- ALL DEVICES CONNECTED TO THE MS/TP NETWORK MUST BE PROPERLY GROUNDED.
- ALL DEVICES ON THE NETWORK MUST RUN AT THE SAME BAUD RATE.

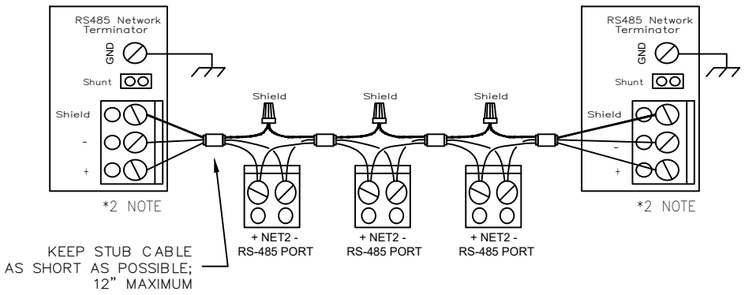
- THE LAYOUTS REPRESENTED ARE EXAMPLES OF HOW THE NETWORK MAY BE CONFIGURED. THERE IS NO REQUIREMENT TO FOLLOW THESE PROPOSED LAYOUTS, OTHER THAN MAINTAINING THE GROUPING UNDER EACH SYSTEM CONTROLLER.
- EACH APPLICATION CONTROLLER ON A GIVEN MS/TP BUS (UNDER EACH SYSTEM CONTROLLER) MUST HAVE UNIQUE ADDRESSING SET VIA THE DIP SWITCHES.

BACNET MS/TP (RS-485) BUS TERMINATIONS

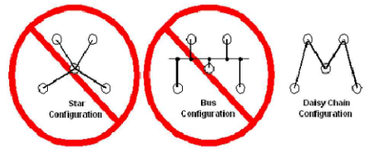
MS/TP TERMINATIONS USING ONE TRM-768 AND BUILT-IN TERMINATION



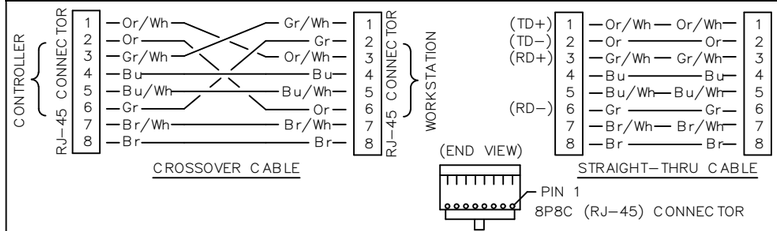
MS/TP TERMINATIONS USING TWO TRM-768s



ONLY A DAISY-CHAIN RS-485 MS/TP TOPOLOGY IS ALLOWED!



ETHERNET CABLE CONNECTIONS



- THE CONNECTIONS SHOWN ARE FOR CAT5 TWISTED-PAIR CABLE.

ETHERNET CABLE STANDARDS

1. ALL ETHERNET CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:
   - 10/100-BASE-T: 22 OR 24 AWG, (4) TWISTED-PAIR, SOLID COPPER WIRE (CAT-5 EQUIV.)
     MAX. SEGMENT LENGTH = 330 FT (100 m)
     MAX. NETWORK LENGTH = 2,000 FT (610 m)
   - 10/100-BASE-F: 62.5/125 MICRON CABLE
     MAX. SEGMENT LENGTH = 1,351 FT (412 m)
2. PLENUM-RATED CABLE SHALL BE USED WHERE REQUIRED BY LOCAL OR NATIONAL CODES.

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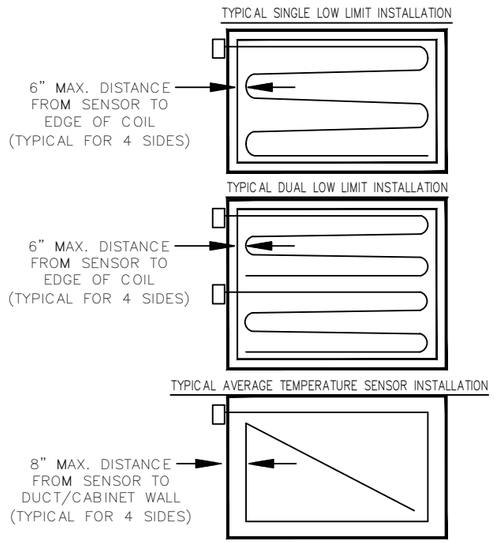
SHEET
GEN-03
JOB NUMBER:
J-2304001

GENERAL MECHANICAL STANDARDS

1. VALVE PORT DETAILS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS DO NOT NECESSARILY INDICATE THE ACTUAL VALVE CONFIGURATION. REFER TO MANUFACTURER'S LITERATURE FOR ACTUAL VALVE PORT CONFIGURATION.
2. ALL LIQUID PRESSURE SENSORS SHALL BE INSTALLED ON VERTICAL PIPING OR BELOW THE CENTERLINE OF HORIZONTAL PIPING TO PREVENT AIR ENTRAPMENT AT THE SENSOR.

DUCT / COIL TEMPERATURE SENSOR INSTALLATION



- ALL SENSORS SHALL BE PROTECTED FROM DAMAGE AT THE POINT OF ENTRY INTO THE DUCT/CABINET. EACH SENSOR SHALL BE PROTECTED BY A RUBBER GROMMET, BUSHING, PLASTIC TUBING OR ELECTRICAL TAPE AT THE POINT OF ENTRY.
- ALL SENSORS SHALL BE SECURELY ANCHORED ALONG THE FULL LENGTH TO PREVENT DAMAGE CAUSED BY VIBRATION.

PNEUMATIC TERMINATION LEGEND

- ◇ # = PNEUMATIC SIGNAL TERMINATION AT CONTROL PANEL
- △ # = INTRA-PANEL PNEUMATIC SIGNAL TERMINATION
- (S ##) = SUPPLY AIR TERMINATION AT CONTROL PANEL (## = PSI)
- △ S ## = INTRA-PANEL SUPPLY AIR TERMINATION (## = PSI)

RED-LINE REQUIREMENTS

ALL SUBCONTRACTORS ARE REQUIRED TO SUBMIT DETAILED RED-LINE MODIFICATIONS TO THESE PRINTS FOR INCLUSION IN THE AS-BUILT SET. RED-LINES MUST INCLUDE BUT ARE NOT NECESSARILY LIMITED TO:

1. ACCURATE EQUIPMENT LOCATIONS INDICATED ON FLOOR PLANS, INCLUDING ROOF MOUNTED EQUIPMENT RELATIVE TO THE UPPERMOST FLOOR IF NO ROOF PLAN IS PROVIDED.
2. SENSOR LOCATIONS INDICATED ON FLOOR PLANS.
3. EXACT MS/TP AND ETHERNET BUS WIRING CONFIGURATION SHOWN ON FLOOR PLANS (WHEN PROVIDED) AS WELL AS IN TABLE FORMAT.
4. ALL WIRING AND EQUIPMENT CHANGES MADE ON ANY PORTION OF THE JOB.
5. FOR JOBS WITH NO FLOOR PLANS, ALL EQUIPMENT (INCLUDING SENSORS) WILL BE NOTED WITH ROOM NAME AND NUMBER.
6. ALL BACKUP BATTERY TABS ARE TO BE PULLED AT TIME OF CONTROLLER INSTALLATION.
7. ALL CONTROLLER SERIAL NUMBERS ARE TO BE RECORDED BY INSTALLING CONTRACTOR AT TIME OF INSTALLATION. THIS INFORMATION IS TO BE PASSED TO TEMPERATURE CONTROL SERVICES, LLC., AS THE JOB PROGRESSES.

MECHANICAL NOTES

- NOT ALL PANELS MAY CONTAIN THE TRM-768 END-OF-LINE TERMINATION BOARD. SEE CONTROLLER WIRING AND/OR SCHEDULE SHEETS FOR DETAILS.
- VAV CONTROLLERS MAY OPERATE IN A STAND-ALONE CONFIGURATION. HOWEVER, THIS PROJECT CALLS FOR BUS COMMUNICATION BETWEEN CONTROLLERS.
- FOR CLARITY, NOT ALL FACTORY PROVIDED ELECTRICAL WIRING AND COMPONENTS WHICH INTERFACE WITH THIRD-PARTY CONTROLLERS ARE SHOWN. FIELD VERIFICATION OF INSTALLED COMPONENTS AND WIRING CONNECTIONS REQUIRED!
- ZONE PRESSURE SENSOR LOCATED IN CONTROL PANEL.

*- DX UNITS WILL BE CONTROLLED BY FACTORY-PROVIDED ZONE SENSOR, WIRED TO FACTORY SUPPLIED CONTROLLERS. WIRING TO BE INSTALLED BY OTHERS.

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
GEN-04
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA A

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-A1
SYSTEM CONTROL PANEL 27

eBMGR-2 — MS/TP

LOCATED IN RM: _____

MS/TP

AHU-A1 - System Panel 27 MS/TP - Leg 01		
NODE	**CONTROLLER**	**ADR**
1	AHU-A1 SF VFD	90
2	FCU-A1	2
3	FCU-A2	3
4	EF-A11-VFD	91
5	EF-A12-VFD	92
EOL		

EOL1

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-A2
SYSTEM CONTROL PANEL 15

eBMGR-2 — MS/TP

LOCATED IN RM: _____

MS/TP

AHU-A2 - System Panel 15 MS/TP - Leg 01		
NODE	**CONTROLLER**	**ADR**
1	AHU-A2 SF VFD	90
2	EF-A12 VFD	91
EOL		

EOL2

AREA B

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-B1
SYSTEM CONTROL PANEL 28

eBMGR-2 — MS/TP — DZNR-768

SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-B1 - System Panel 28 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-B1 SF VFD	90
2	VAV B1-01	1
3	VAV B1-02	2
4	VAV B1-03	3
5	VAV B1-04	4
6	VAV B1-05	5
7	VAV B1-06	6
8	VAV B1-07	7
EOL		

EOL3

AHU-B1 - System Panel 28 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
9	VAV B1-08	8
10	VAV B1-09	9
11	VAV B1-10	10
12	VAV B1-11	11
13	VAV B1-12	12
14	VAV B1-13	13
15	VAV B1-14	14
EOL		

EOL4

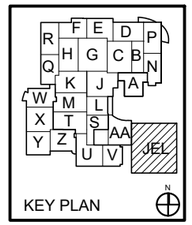
AHU-B1 - System Panel 28 MS/TP - Leg 04		
NODE	**CONTROLLER**	**ADR**
16	VAV B1-15	15
17	VAV B1-16	16
18	VAV B1-17	17
19	VAV B1-18	18
20	VAV B1-19	19
21	VAV B1-20	20
22	VAV B1-21	21
EOL		

EOL5

BILL OF MATERIALS

NOTES:
1. ALL SYSTEM CONTROL PANELS WILL HAVE A DEDICATED ETHERNET NETWORK DROP FROM THE SCHOOL'S NETWORK. INSTALL CAT 6a OR BETTER CABLE FROM PANEL TO DESIGNATED DROP.
2. REFER TO ELECTRICAL AND TECHNOLOGY DESIGN DRAWINGS FOR LOCATIONS OF ALL EXISTING OR NEW SYSTEM CONTROL ENCLOSURES. UPDATE RISERS WITH CONFIRMED INSTALLATION LOCATIONS FOR INCLUSION IN AS-BUILT PRINTS.
3. ALL VFD POWER PANELS SHALL BE LOCATED ADJACENT TO THEIR RESPECTIVE AIR HANDLER'S SYSTEM CONTROL PANEL. SEE VAV POWER PANELS SHEET FOR FURTHER DETAILS.

KEY PLAN



Delta Controls

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UPDATES	
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REVISIONS	
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

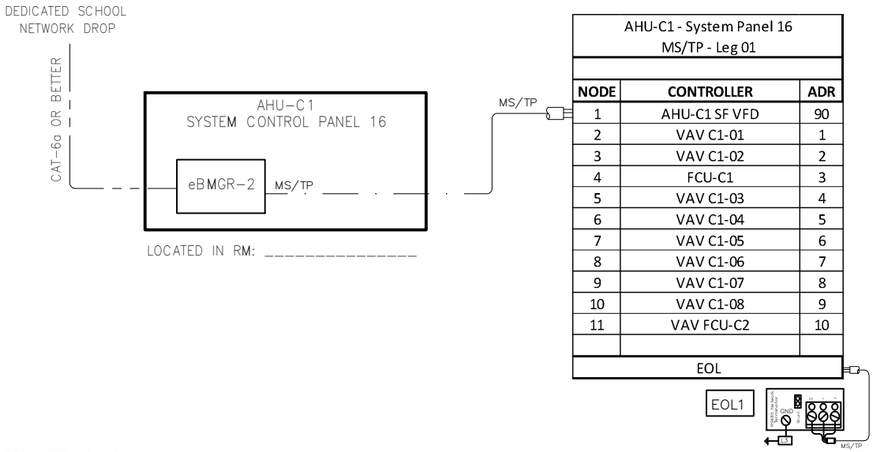
CONTRACT NO:

SHEET
RISER-05
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

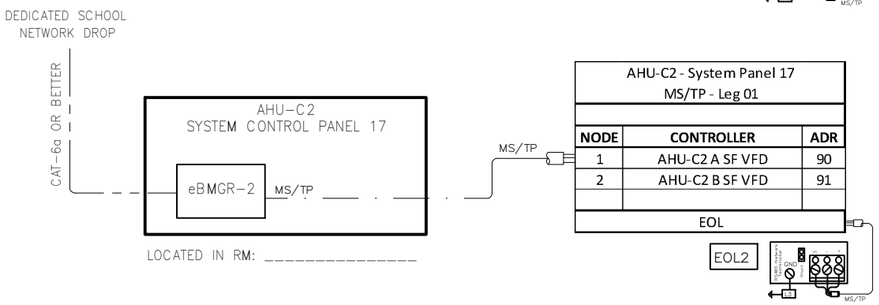
AREA C



AHU-C1 - System Panel 16
MS/TP - Leg 01

NODE	CONTROLLER	ADR
1	AHU-C1 SF VFD	90
2	VAV C1-01	1
3	VAV C1-02	2
4	FCU-C1	3
5	VAV C1-03	4
6	VAV C1-04	5
7	VAV C1-05	6
8	VAV C1-06	7
9	VAV C1-07	8
10	VAV C1-08	9
11	VAV FCU-C2	10
EOL		

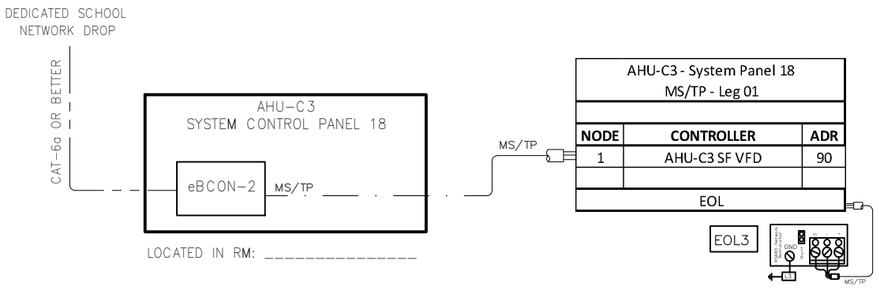
EOL1



AHU-C2 - System Panel 17
MS/TP - Leg 01

NODE	CONTROLLER	ADR
1	AHU-C2 A SF VFD	90
2	AHU-C2 B SF VFD	91
EOL		

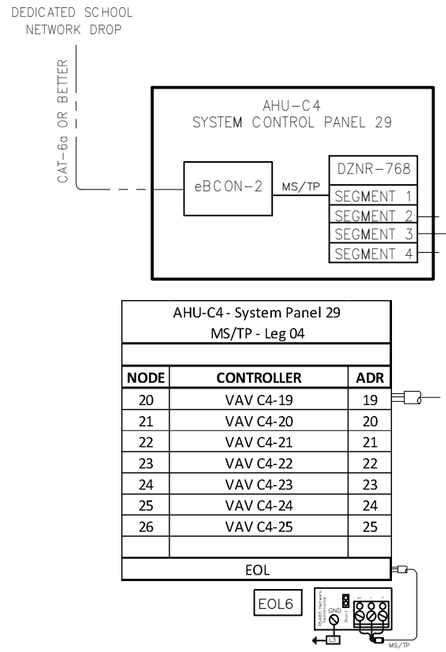
EOL2



AHU-C3 - System Panel 18
MS/TP - Leg 01

NODE	CONTROLLER	ADR
1	AHU-C3 SF VFD	90
EOL		

EOL3



AHU-C4 - System Panel 29
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-C4 SF VFD	90
2	VAV C4-01	1
3	VAV C4-02	2
4	VAV C4-03	3
5	VAV C4-04	4
6	VAV C4-05	5
7	VAV C4-06	6
8	VAV C4-07	7
9	VAV C4-08	8
10	VAV C4-09	9
EOL		

EOL4

AHU-C4 - System Panel 29
MS/TP - Leg 03

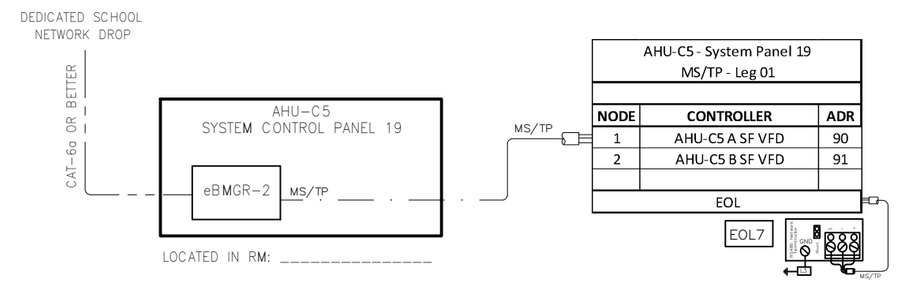
NODE	CONTROLLER	ADR
11	VAV C4-10	10
12	VAV C4-11	11
13	VAV C4-12	12
14	VAV C4-13	13
15	VAV C4-14	14
16	VAV C4-15	15
17	VAV C4-16	16
18	VAV C4-17	17
19	VAV C4-18	18
EOL		

EOL5

AHU-C4 - System Panel 29
MS/TP - Leg 04

NODE	CONTROLLER	ADR
20	VAV C4-19	19
21	VAV C4-20	20
22	VAV C4-21	21
23	VAV C4-22	22
24	VAV C4-23	23
25	VAV C4-24	24
26	VAV C4-25	25
EOL		

EOL6

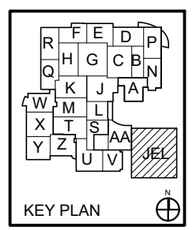


AHU-C5 - System Panel 19
MS/TP - Leg 01

NODE	CONTROLLER	ADR
1	AHU-C5 A SF VFD	90
2	AHU-C5 B SF VFD	91
EOL		

EOL7

BILL OF MATERIALS



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ETHERNET & RS-485 NETWORK RISER (PHASE 3) AREA C

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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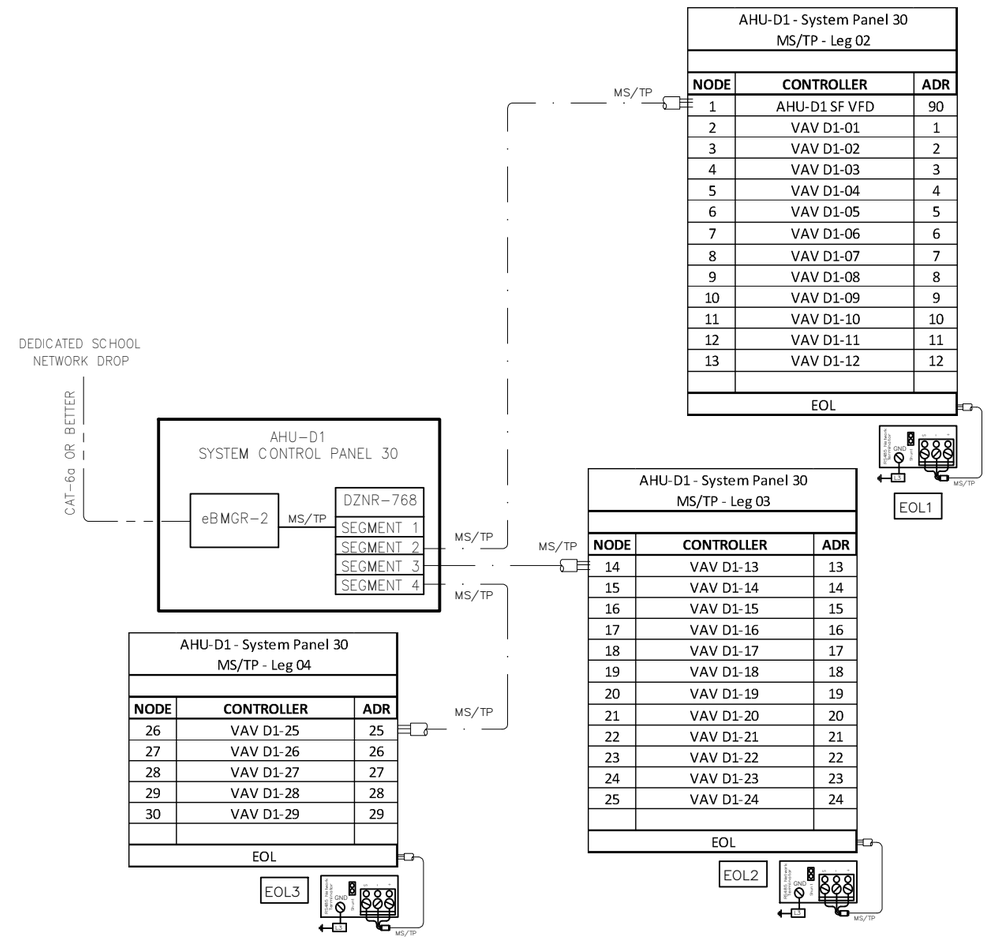
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
RISER-06
JOB NUMBER:
J-2304001

AREA D



AHU-D1 - System Panel 30
MS/TP - Leg 02

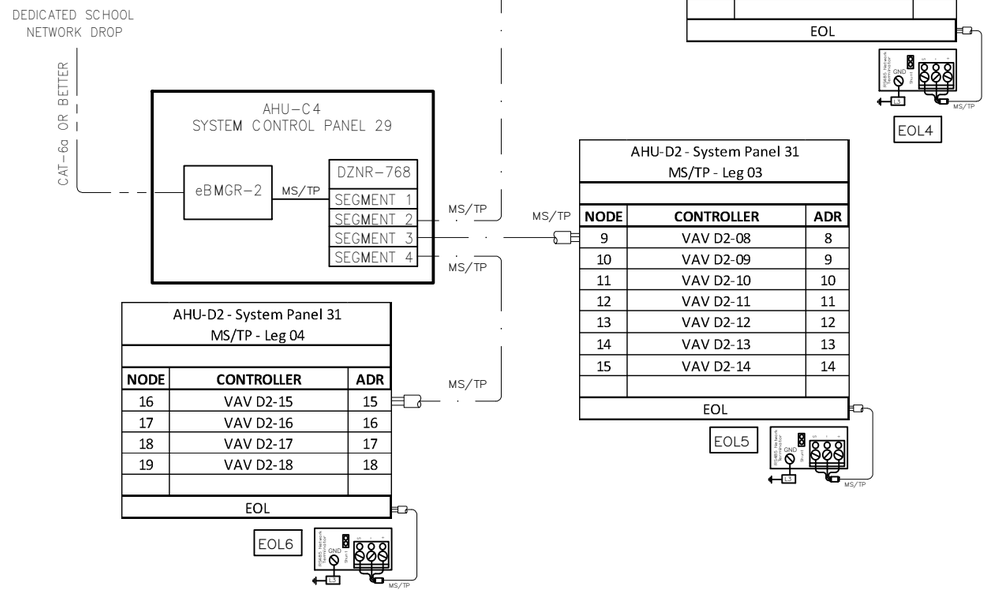
NODE	CONTROLLER	ADR
1	AHU-D1 SF VFD	90
2	VAV D1-01	1
3	VAV D1-02	2
4	VAV D1-03	3
5	VAV D1-04	4
6	VAV D1-05	5
7	VAV D1-06	6
8	VAV D1-07	7
9	VAV D1-08	8
10	VAV D1-09	9
11	VAV D1-10	10
12	VAV D1-11	11
13	VAV D1-12	12
EOL		

AHU-D1 - System Panel 30
MS/TP - Leg 03

NODE	CONTROLLER	ADR
14	VAV D1-13	13
15	VAV D1-14	14
16	VAV D1-15	15
17	VAV D1-16	16
18	VAV D1-17	17
19	VAV D1-18	18
20	VAV D1-19	19
21	VAV D1-20	20
22	VAV D1-21	21
23	VAV D1-22	22
24	VAV D1-23	23
25	VAV D1-24	24
EOL		

AHU-D1 - System Panel 30
MS/TP - Leg 04

NODE	CONTROLLER	ADR
26	VAV D1-25	25
27	VAV D1-26	26
28	VAV D1-27	27
29	VAV D1-28	28
30	VAV D1-29	29
EOL		



AHU-D2 - System Panel 31
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-D2 SF VFD	90
2	VAV D2-01	1
3	VAV D2-02	2
4	VAV D2-03	3
5	VAV D2-04	4
6	VAV D2-05	5
7	VAV D2-06	6
8	VAV D2-07	7
EOL		

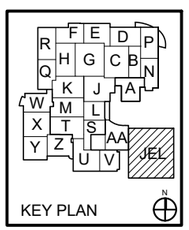
AHU-D2 - System Panel 31
MS/TP - Leg 03

NODE	CONTROLLER	ADR
9	VAV D2-08	8
10	VAV D2-09	9
11	VAV D2-10	10
12	VAV D2-11	11
13	VAV D2-12	12
14	VAV D2-13	13
15	VAV D2-14	14
EOL		

AHU-D2 - System Panel 31
MS/TP - Leg 04

NODE	CONTROLLER	ADR
16	VAV D2-15	15
17	VAV D2-16	16
18	VAV D2-17	17
19	VAV D2-18	18
EOL		

BILL OF MATERIALS



NOTES:
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UPDATES	
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04/06/2023	ADD 3.3
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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

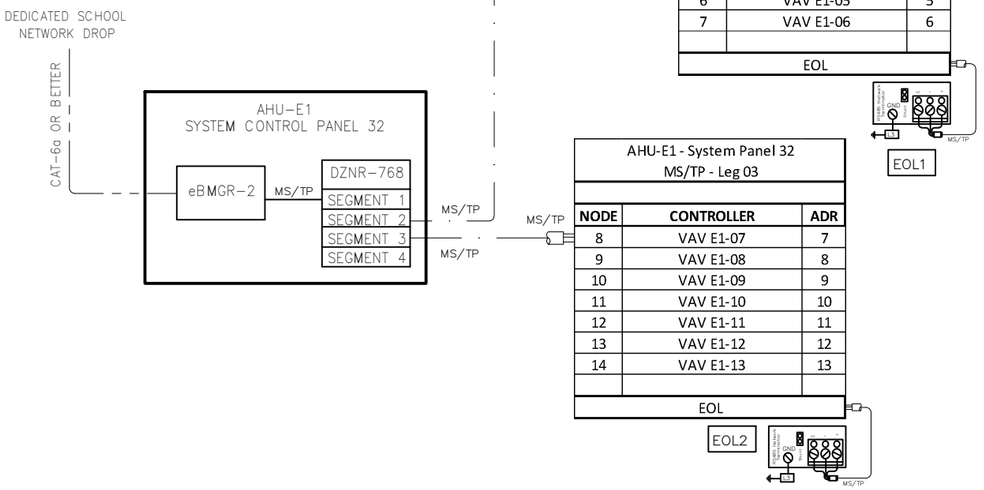
CONTRACT NO:

SHEET
RISER-07
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA E

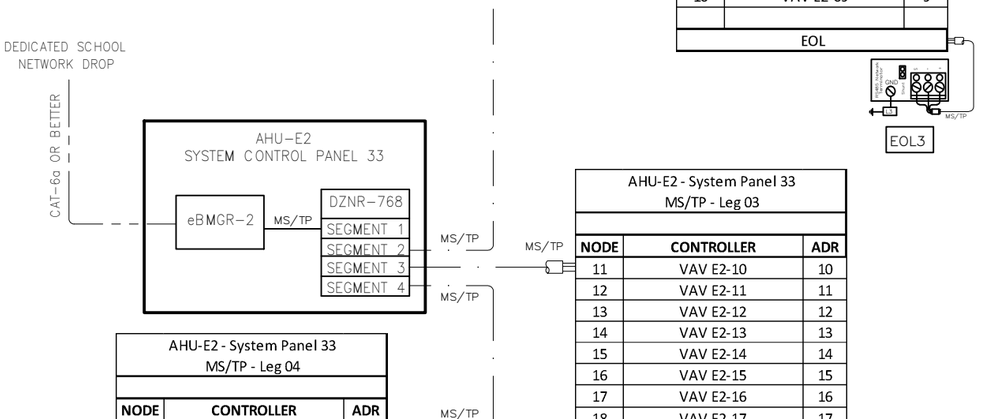


AHU-E1 - System Panel 32
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-E1 SF VFD	90
2	VAV E1-01	1
3	VAV E1-02	2
4	VAV E1-03	3
5	VAV E1-04	4
6	VAV E1-05	5
7	VAV E1-06	6
EOL		

AHU-E1 - System Panel 32
MS/TP - Leg 03

NODE	CONTROLLER	ADR
8	VAV E1-07	7
9	VAV E1-08	8
10	VAV E1-09	9
11	VAV E1-10	10
12	VAV E1-11	11
13	VAV E1-12	12
14	VAV E1-13	13
EOL		



AHU-E2 - System Panel 33
MS/TP - Leg 02

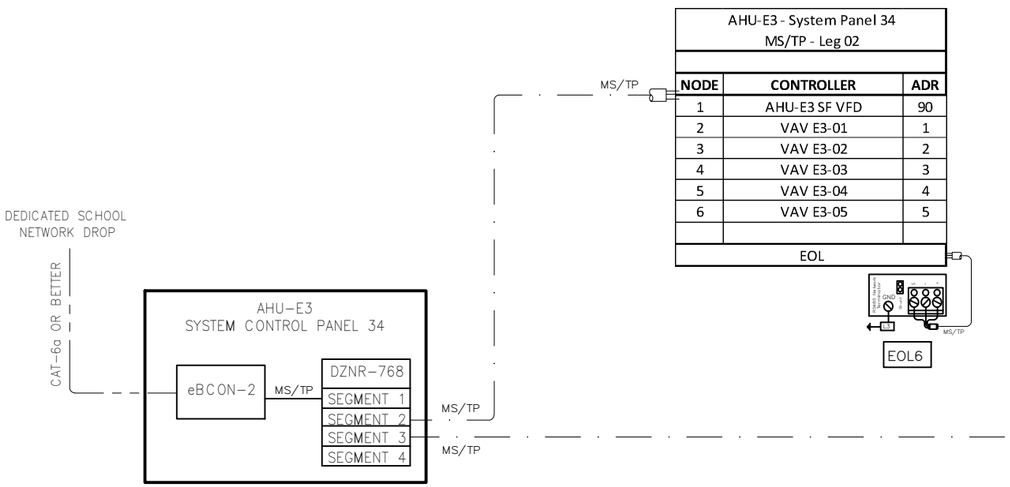
NODE	CONTROLLER	ADR
1	AHU-E2 SF VFD	90
2	VAV E2-01	1
3	VAV E2-02	2
4	VAV E2-03	3
5	VAV E2-04	4
6	VAV E2-05	5
7	VAV E2-06	6
8	VAV E2-07	7
9	VAV E2-08	8
10	VAV E2-09	9
EOL		

AHU-E2 - System Panel 33
MS/TP - Leg 03

NODE	CONTROLLER	ADR
11	VAV E2-10	10
12	VAV E2-11	11
13	VAV E2-12	12
14	VAV E2-13	13
15	VAV E2-14	14
16	VAV E2-15	15
17	VAV E2-16	16
18	VAV E2-17	17
19	VAV E2-18	18
EOL		

AHU-E2 - System Panel 33
MS/TP - Leg 04

NODE	CONTROLLER	ADR
20	VAV E2-19	19
21	VAV E2-20	20
22	VAV E2-21	21
23	VAV E2-22	22
24	VAV E2-23	23
25	VAV E2-24	24
EOL		



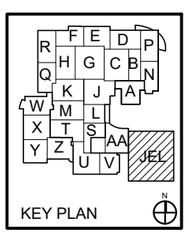
AHU-E3 - System Panel 34
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-E3 SF VFD	90
2	VAV E3-01	1
3	VAV E3-02	2
4	VAV E3-03	3
5	VAV E3-04	4
6	VAV E3-05	5
EOL		

AHU-E3 - System Panel 34
MS/TP - Leg 03

NODE	CONTROLLER	ADR
7	VAV E3-06	6
8	VAV E3-07	7
9	VAV E3-08	8
10	VAV E3-09	9
11	VAV E3-10	10
EOL		

BILL OF MATERIALS



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ETHERNET & RS-485 NETWORK RISER (PHASE 3) AREA E

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
RISER-08
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA F

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-F1
SYSTEM CONTROL PANEL 35

eBMGR-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-F1 - System Panel 35
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-F1 SF VFD	90
2	VAV F1-01	1
3	VAV F1-02	2
4	VAV F1-03	3
5	VAV F1-04	4
6	VAV F1-05	5
7	VAV F1-06	6
8	VAV F1-07	7
9	VAV F1-08	8
10	VAV F1-09	9
EOL		

EOL1

AHU-F1 - System Panel 35
MS/TP - Leg 03

NODE	CONTROLLER	ADR
11	VAV F1-10	10
12	VAV F1-11	11
13	VAV F1-12	12
14	VAV F1-13	13
15	VAV F1-14	14
16	VAV F1-15	15
17	VAV F1-16	16
18	VAV F1-17	17
19	VAV F1-18	18
EOL		

EOL2

AHU-F1 - System Panel 35
MS/TP - Leg 04

NODE	CONTROLLER	ADR
20	VAV F1-19	19
21	VAV F1-20	20
22	VAV F1-21	21
23	VAV F1-22	22
24	VAV F1-23	23
25	VAV F1-24	24
26	VAV F1-25	25
EOL		

EOL3

AREA G*

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-G4
SYSTEM CONTROL PANEL 06

DSC-1616e — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-G4 - System Panel 06
MS/TP - Leg 02
(AHU installed in Phase 1)

NODE	CONTROLLER	ADR
1	AHU-G4 SF VFD	90
2	VAV G4-01	2
3	VAV G4-02	3
4	VAV G4-03	4
5	VAV G4-04	5
6	VAV G4-05	6
7	VAV G4-06	7
EOL		

EOL4

AHU-G4 - System Panel 06
MS/TP - Leg 03
(AHU installed in Phase 1)

NODE	CONTROLLER	ADR
8	VAV G4-07	8
9	VAV G4-08	9
10	VAV G4-09	10
11	VAV G4-10	11
12	VAV E-G4-11	12
13	VAV E-G4-12	16
14	VAV E-G4-13	14
EOL		

EOL5

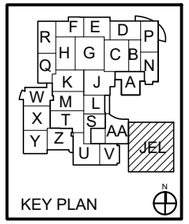
AHU-G4 - System Panel 06
MS/TP - Leg 04
(AHU installed in Phase 1)

NODE	CONTROLLER	ADR
15	AHU-G4 DMF-400	1
EOL		

EOL6

* AHU-G4 PANEL INSTALLED IN PHASE 2, NEW EQUIPMENT AND MS/TP SUB NETWORK BEING ADDED IN PHASE 3.
SEE AHU-G4 PANEL DEVICE ADDS UNDER PHASE 3 PROJECT SHEET FOR ADDITIONAL DETAILS.

KEY PLAN



NOTES:
1. ALL SYSTEM CONTROL PANELS WILL HAVE A DEDICATED ETHERNET NETWORK DROP FROM THE SCHOOL'S NETWORK. INSTALL CAT 6a OR BETTER CABLE FROM PANEL TO DESIGNATED DROP.
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3. ALL VFD POWER PANELS SHALL BE LOCATED ADJACENT TO THEIR RESPECTIVE AIR HANDLER'S SYSTEM CONTROL PANEL. SEE VAV POWER PANELS SHEET FOR FURTHER DETAILS.

ETHERNET & RS-485 NETWORK RISER (PHASE 3) AREAS F & G

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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REVISIONS	
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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
RISER-09
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS - PHASE 3

(SEE INSTALLATION STANDARDS - ELECTRICAL FOR CABLE REQUIREMENTS)

AREA H

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-H1
SYSTEM CONTROL PANEL 36

eBMGR-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-H1 - System Panel 36 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-H1 SF VFD	90
2	VAV H1-01	1
3	VAV H1-02	2
4	VAV H1-03	3
5	VAV H1-04	4
6	VAV H1-05	5
7	VAV H1-06	6
8	VAV H1-07	7
9	VAV H1-08	8
10	VAV H1-09	9
EOL		

EOL1

AHU-H1 - System Panel 36 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
11	VAV H1-10	10
12	VAV H1-11	11
13	VAV H1-12	12
14	VAV H1-13	13
15	VAV H1-14	14
16	VAV H1-15	15
17	VAV H1-16	16
18	VAV H1-17	17
19	VAV H1-18	18
EOL		

EOL2

AHU-H1 - System Panel 36 MS/TP - Leg 04		
NODE	**CONTROLLER**	**ADR**
20	VAV H1-19	19
21	VAV H1-20	20
22	VAV H1-21	21
23	VAV H1-22	22
24	VAV H1-23	23
25	VAV H1-24	24
26	VAV H1-25	25
27	VAV H1-26	26
EOL		

EOL3

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-H2
SYSTEM CONTROL PANEL 37

eBCON-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

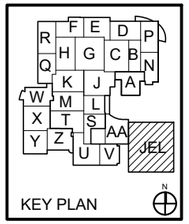
AHU-H2 - System Panel 37 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-H2 SF VFD	90
2	VAV H2-01	1
3	VAV H2-02	2
4	VAV H2-03	3
5	VAV H2-04	4
6	VAV H2-05	5
7	VAV H2-06	6
8	VAV H2-07	7
9	VAV H2-08	8
10	VAV H2-09	9
EOL		

EOL4

AHU-H2 - System Panel 37 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
11	VAV H2-10	10
12	VAV H2-11	11
13	VAV H2-12	12
14	VAV H2-13	13
15	VAV H2-14	14
16	VAV H2-15	15
EOL		

EOL5

KEY PLAN



NOTES:
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ETHERNET & RS-485 NETWORK RISER (PHASE 3) AREA H

Delta Controls

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4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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CONTRACT WITH: MSD Washington Township
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CONTRACT NO:

SHEET
RISER-10
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA J

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-J2
SYSTEM CONTROL PANEL 21

eBCON-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-J2 - System Panel 21 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-J2 SF VFD	90
2	VAV-J2-01	1
3	VAV-J2-03	2
4	FCU-G1	3
5	VAV-J2-02	4
EOL		

EOL1

AHU-J2 - System Panel 21 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
6	VAV J2-04	5
7	VAV J2-05	6
8	VAV J2-06	7
9	VAV J2-07	8
10	VAV J2-08	9
11	VAV J2-09	10
12	VAV J2-10	11
13	VAV J2-11	12
14	VAV J2-12	13
15	VAV J2-13	14
16	VAV J2-14	15
EOL		

EOL2

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-J3
SYSTEM CONTROL PANEL 22

eBCON-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-J3 - System Panel 22 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-J3 SF VFD	90
2	VAV J3-01	1
3	VAV J3-02	2
4	VAV J3-15	15
5	VAV J3-16	16
6	VAV J3-03	3
7	VAV J3-04	4
8	VAV J3-05	5
9	VAV J3-06	6
EOL		

EOL6

CAT-6a OR BETTER

AHU-J3 TOUCHSCREEN
SYSTEM CTRL 56

LOCATED IN AHU-J3
(CONDITIONED CONTROL ENCLOSURE
ON UNIT FOR LOCAL BAS ACCESS)

BILL OF MATERIALS

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-J1
SYSTEM CONTROL PANEL 20

eBMGR-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-J1 - System Panel 20 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-J1 SF VFD	90
2	VAV J1-01	1
3	VAV J1-02	2
4	VAV J1-03	3
5	VAV J1-04	4
6	VAV J1-05	5
7	VAV J1-06	6
8	VAV J1-07	7
9	VAV J1-08	8
10	VAV J1-09	9
11	VAV J1-10	10
EOL		

EOL3

AHU-J1 - System Panel 20 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
12	VAV J1-11	11
13	VAV J1-12	12
14	VAV J1-13	13
15	VAV J1-14	14
16	VAV J1-15	15
17	VAV J1-16	16
18	VAV J1-17	17
19	VAV J1-18	18
20	VAV J1-19	19
21	VAV J1-20	20
EOL		

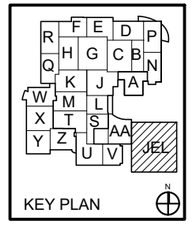
EOL4

AHU-J1 - System Panel 20 MS/TP - Leg 04		
NODE	**CONTROLLER**	**ADR**
22	Pwr Mtr Elec Rm MDPA Left	80
23	Pwr Mtr Elec Rm MDPA Rt	81
24	Pwr Mtr Elec Rm MDPB Left A	82
23	Pwr Mtr Elec Rm MDPB Left B	83
24	Pwr Mtr Elec Rm MDPB Rt A	84
25	Pwr Mtr Elec Rm MDBP Rt B	85
26	Pwr Mtr Cent Plant MDPC	86
EOL		

EOL5

AHU-J3 - System Panel 22 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
10	VAV J3-07	7
11	VAV J3-08	8
12	VAV J3-09	9
13	VAV J3-10	10
14	VAV J3-11	11
15	VAV J3-12	12
16	VAV J3-13	13
17	VAV J3-14	14
EOL		

EOL7



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ETHERNET & RS-485 NETWORK RISER (PHASE 3) AREA J

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
DATE	REMARKS

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LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

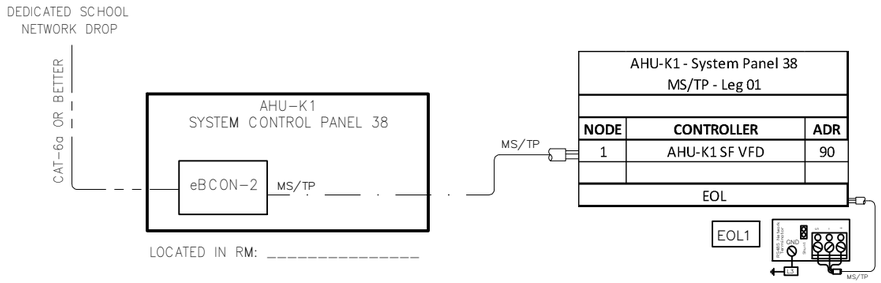
CONTRACT NO:

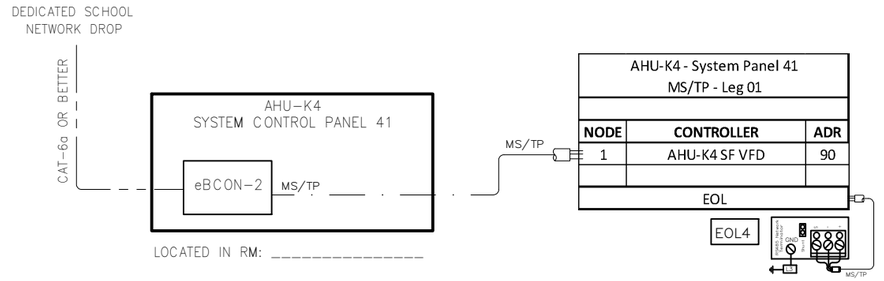
SHEET
RISER-11
JOB NUMBER:
J-2304001

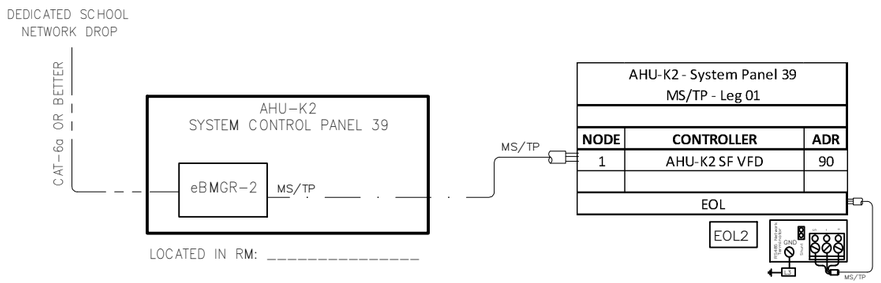
ETHERNET & RS-485 NETWORK RISERS – PHASE 3

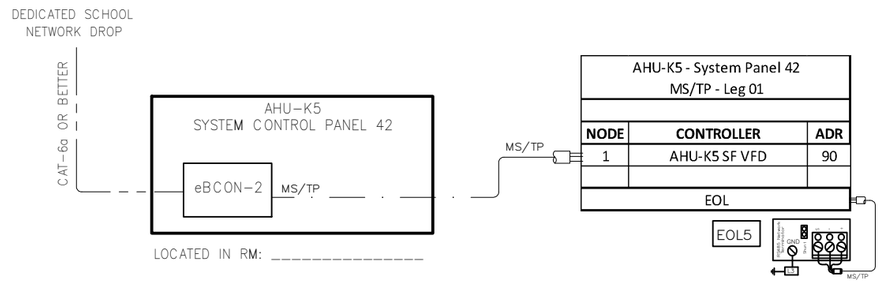
(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

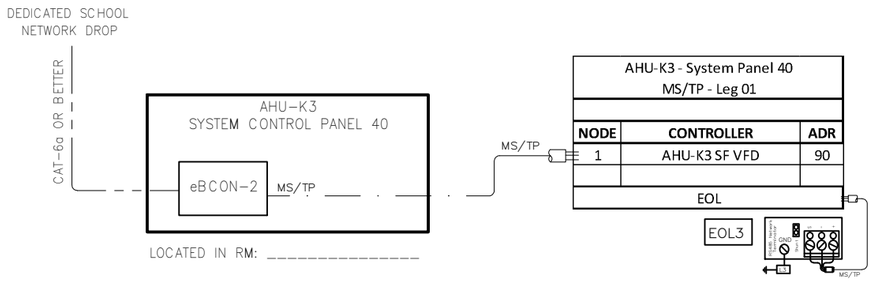
AREA K

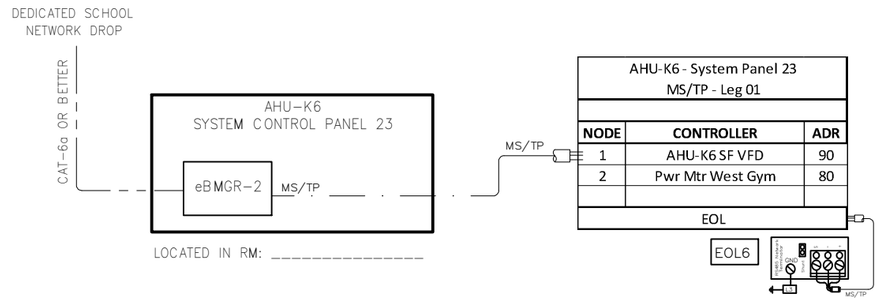




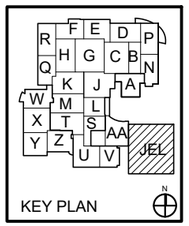








BILL OF MATERIALS



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Delta Controls
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4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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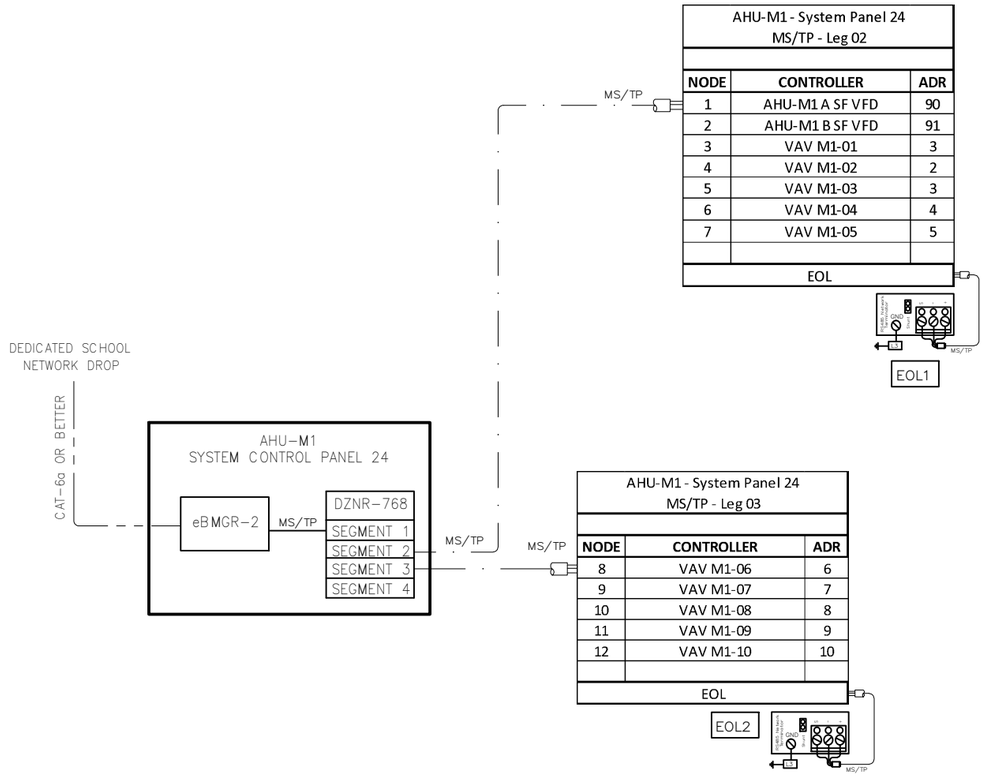
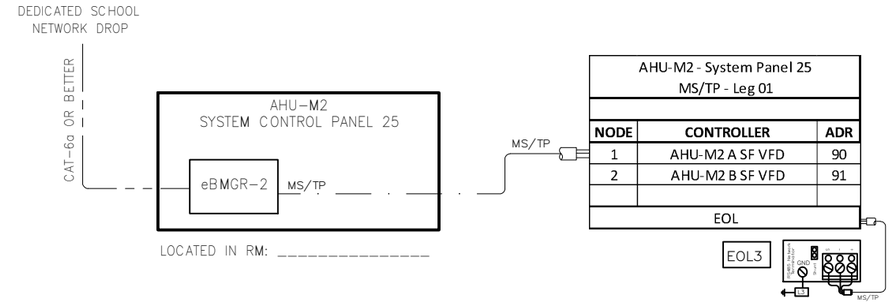
SHEET
RISER-12
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA M





BILL OF MATERIALS

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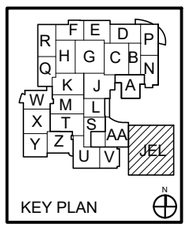

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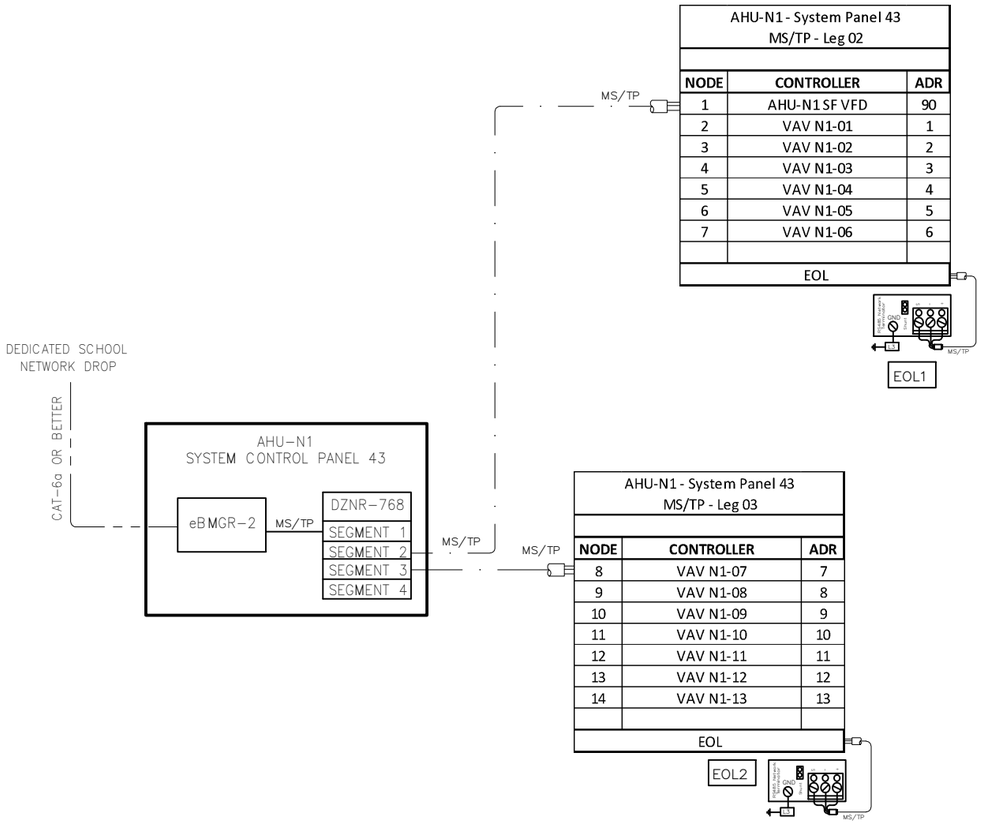
CONTRACT NO:

SHEET
RISER-13
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

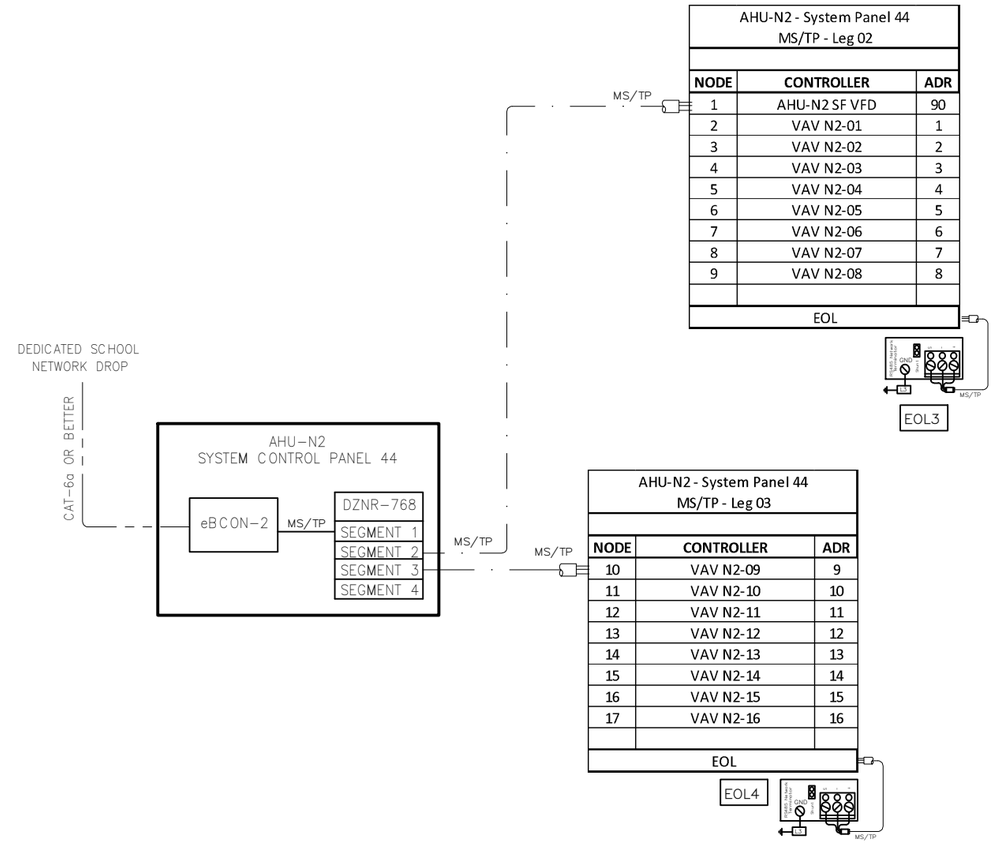
(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA N



AHU-N1 - System Panel 43 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-N1 SF VFD	90
2	VAV N1-01	1
3	VAV N1-02	2
4	VAV N1-03	3
5	VAV N1-04	4
6	VAV N1-05	5
7	VAV N1-06	6
EOL		

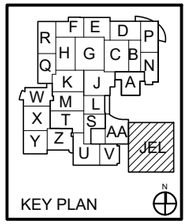
AHU-N1 - System Panel 43 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
8	VAV N1-07	7
9	VAV N1-08	8
10	VAV N1-09	9
11	VAV N1-10	10
12	VAV N1-11	11
13	VAV N1-12	12
14	VAV N1-13	13
EOL		



AHU-N2 - System Panel 44 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-N2 SF VFD	90
2	VAV N2-01	1
3	VAV N2-02	2
4	VAV N2-03	3
5	VAV N2-04	4
6	VAV N2-05	5
7	VAV N2-06	6
8	VAV N2-07	7
9	VAV N2-08	8
EOL		

AHU-N2 - System Panel 44 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
10	VAV N2-09	9
11	VAV N2-10	10
12	VAV N2-11	11
13	VAV N2-12	12
14	VAV N2-13	13
15	VAV N2-14	14
16	VAV N2-15	15
17	VAV N2-16	16
EOL		

BILL OF MATERIALS



NOTES:
1. ALL SYSTEM CONTROL PANELS WILL HAVE A DEDICATED ETHERNET NETWORK DROP FROM THE SCHOOL'S NETWORK. INSTALL CAT 6a OR BETTER CABLE FROM PANEL TO DESIGNATED DROP.
2. REFER TO ELECTRICAL AND TECHNOLOGY DESIGN DRAWINGS FOR LOCATIONS OF ALL EXISTING OR NEW SYSTEM CONTROL ENCLOSURES. UPDATE RISERS WITH CONFIRMED INSTALLATION LOCATIONS FOR INCLUSION IN AS-BUILT PRINTS.
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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
RISER-14
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA P

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-P1
SYSTEM CONTROL PANEL 45

eBCON-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-P1 - System Panel 45
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-P1 SF VFD	90
2	VAV P1-01	1
3	VAV P1-02	2
4	VAV P1-03	3
5	VAV P1-04	4
6	VAV P1-05	5
7	VAV P1-06	6
8	VAV P1-07	7
9	VAV P1-08	8
10	VAV P1-09	9
11	VAV P1-10	10
12	VAV P1-11	11
13	VAV P1-12	12
EOL		

EOL1

AHU-P1 - System Panel 45
MS/TP - Leg 03

NODE	CONTROLLER	ADR
14	VAV P1-13	13
15	VAV P1-14	14
16	VAV P1-15	15
17	VAV P1-16	16
18	VAV P1-17	17
19	VAV P1-18	18
20	VAV P1-19	19
21	VAV P1-20	20
22	VAV P1-21	21
23	VAV P1-22	22
24	VAV P1-23	23
25	VAV P1-24	24
EOL		

EOL2

AHU-P1 - System Panel 45
MS/TP - Leg 04

NODE	CONTROLLER	ADR
26	VAV P1-25	25
27	VAV P1-26	26
28	VAV P1-27	27
29	VAV P1-28	28
30	VAV P1-29	29
31	VAV P1-30	30
32	VAV P1-31	31
33	VAV P1-32	32
34	VAV P1-33	33
35	VAV P1-34	34
36	VAV P1-35	35
EOL		

EOL3

DEDICATED SCHOOL NETWORK DROP

CAT-6a OR BETTER

AHU-P2
SYSTEM CONTROL PANEL 46

eBMGR-2 — MS/TP — DZNR-768
SEGMENT 1
SEGMENT 2
SEGMENT 3
SEGMENT 4

MS/TP

AHU-P2 - System Panel 46
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-P2 SF VFD	90
2	VAV P2-01	1
3	VAV P2-02	2
4	VAV P2-03	3
5	VAV P2-04	4
6	VAV P2-05	5
7	VAV P2-06	6
8	VAV P2-07	7
9	VAV P2-08	8
10	VAV P2-09	9
EOL		

EOL4

AHU-P2 - System Panel 46
MS/TP - Leg 03

NODE	CONTROLLER	ADR
11	VAV P2-10	10
12	VAV P2-11	11
13	VAV P2-12	12
14	VAV P2-13	13
15	VAV P2-14	14
16	VAV P2-15	15
17	VAV P2-16	16
18	VAV P2-17	17
19	VAV P2-18	18
EOL		

EOL5

AHU-P2 - System Panel 46
MS/TP - Leg 04

NODE	CONTROLLER	ADR
20	VAV P2-19	19
21	VAV P2-20	20
22	VAV P2-21	21
23	VAV P2-22	22
24	VAV P2-23	23
25	VAV P2-24	24
26	VAV P2-25	25
EOL		

EOL6

BILL OF MATERIALS

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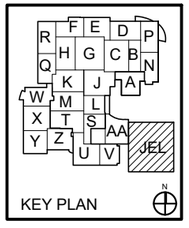
KEY PLAN



Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

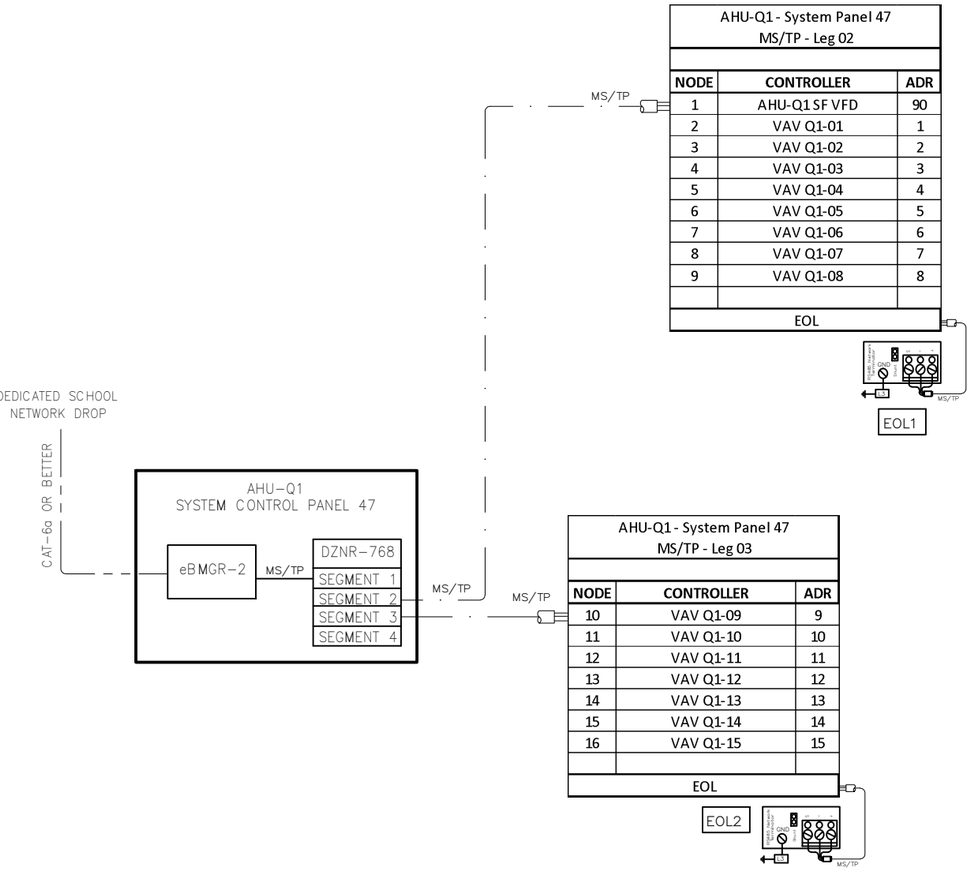
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
RISER-15
JOB NUMBER:
J-2304001

AREA Q

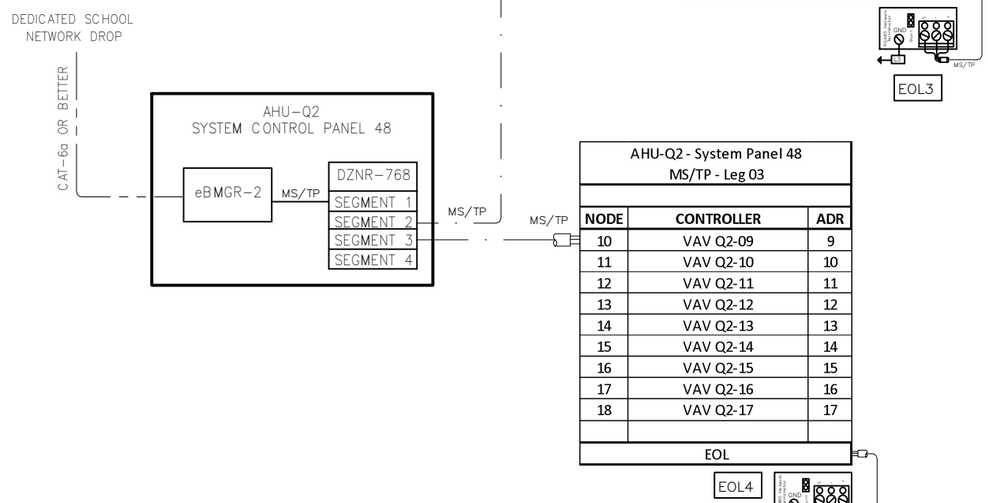


AHU-Q1 - System Panel 47
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-Q1 SF VFD	90
2	VAV Q1-01	1
3	VAV Q1-02	2
4	VAV Q1-03	3
5	VAV Q1-04	4
6	VAV Q1-05	5
7	VAV Q1-06	6
8	VAV Q1-07	7
9	VAV Q1-08	8
EOL		

AHU-Q1 - System Panel 47
MS/TP - Leg 03

NODE	CONTROLLER	ADR
10	VAV Q1-09	9
11	VAV Q1-10	10
12	VAV Q1-11	11
13	VAV Q1-12	12
14	VAV Q1-13	13
15	VAV Q1-14	14
16	VAV Q1-15	15
EOL		



AHU-Q2 - System Panel 48
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	AHU-Q2 SF VFD	90
2	VAV Q2-01	1
3	VAV Q2-02	2
4	VAV Q2-03	3
5	VAV Q2-04	4
6	VAV Q2-05	5
7	VAV Q2-06	6
8	VAV Q2-07	7
9	VAV Q2-08	8
EOL		

AHU-Q2 - System Panel 48
MS/TP - Leg 03

NODE	CONTROLLER	ADR
10	VAV Q2-09	9
11	VAV Q2-10	10
12	VAV Q2-11	11
13	VAV Q2-12	12
14	VAV Q2-13	13
15	VAV Q2-14	14
16	VAV Q2-15	15
17	VAV Q2-16	16
18	VAV Q2-17	17
EOL		

BILL OF MATERIALS

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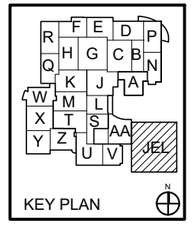


Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

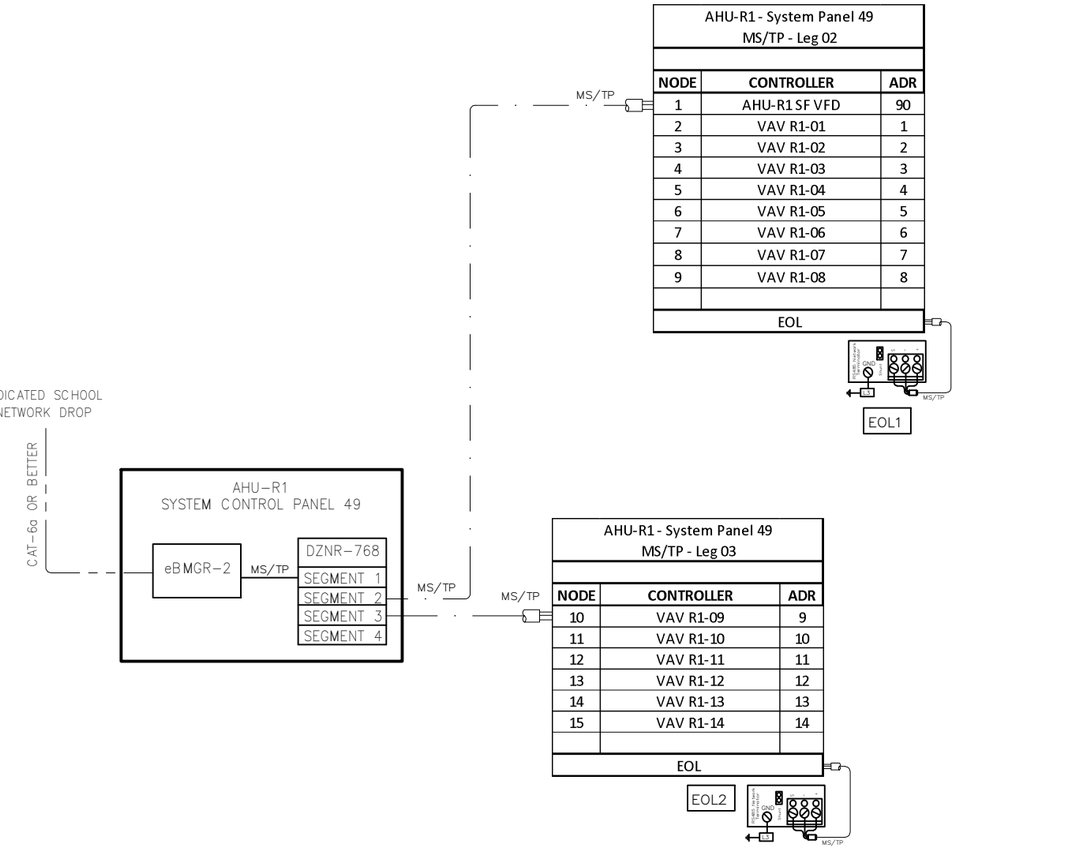
CONTRACT NO:

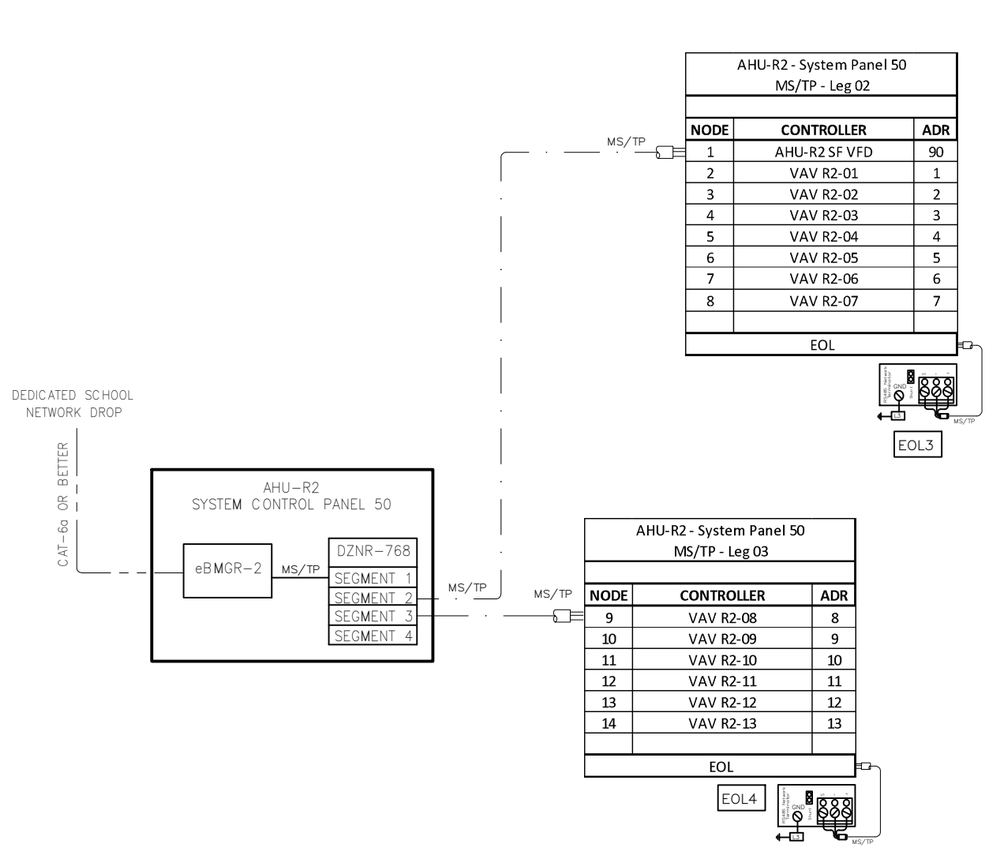
SHEET
RISER-16
JOB NUMBER:
J-2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA R





BILL OF MATERIALS

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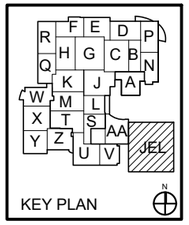

Delta Controls
Temperature Control Services
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LEBANON, INDIANA 46052
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E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

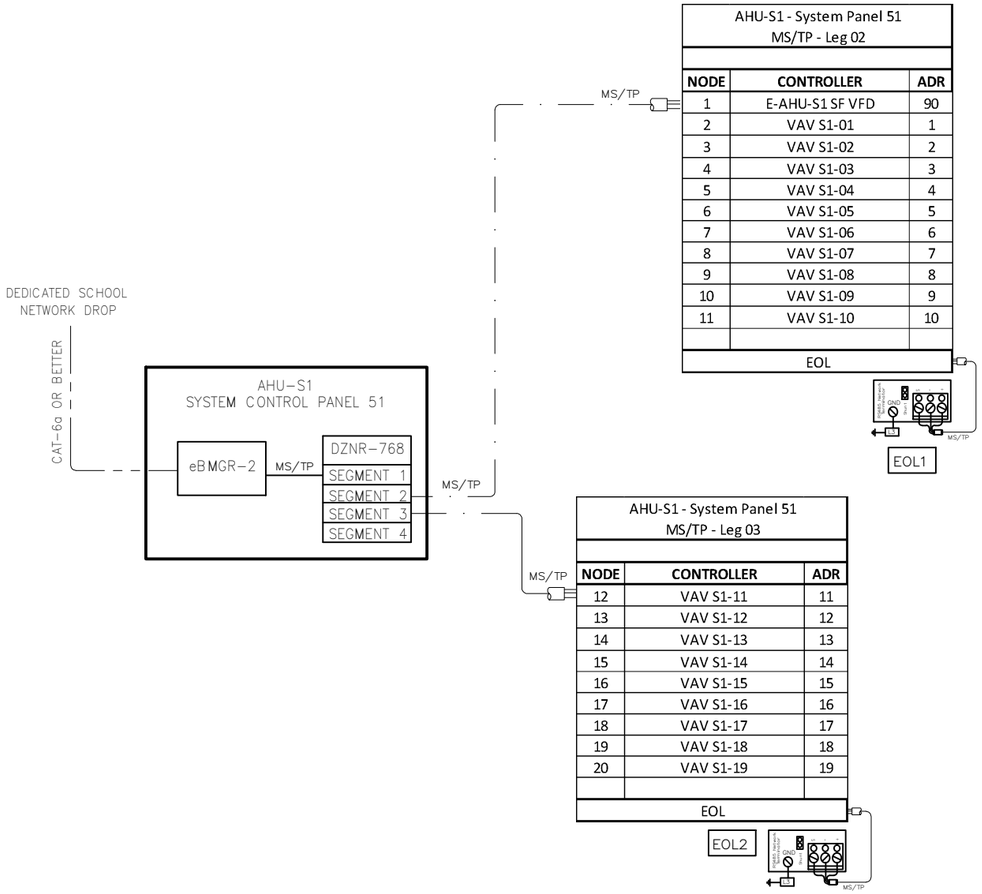
CONTRACT NO:

SHEET
RISER-17
JOB NUMBER:
J-2304001

ETHERNET & RS–485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA S



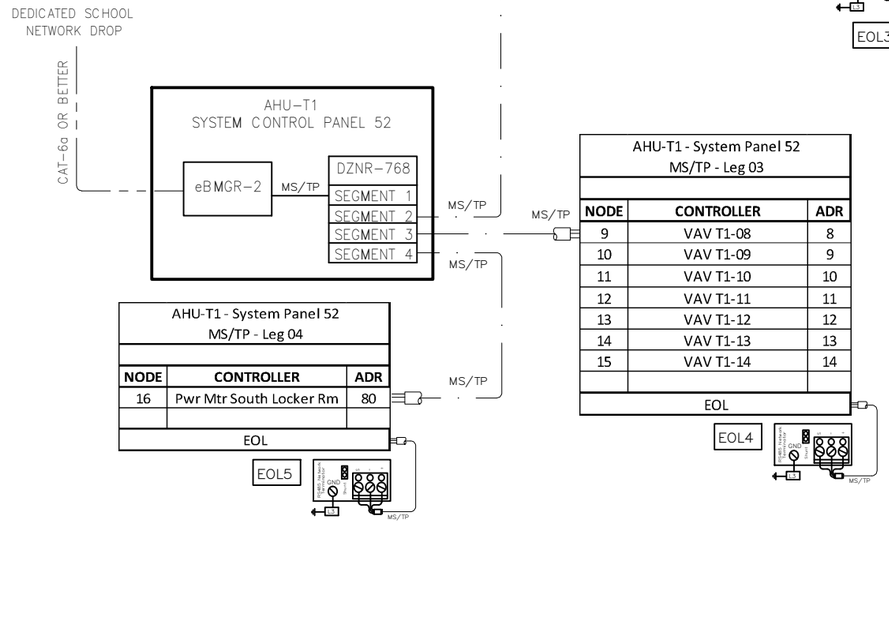
AHU-S1 - System Panel 51
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	E-AHU-S1 SF VFD	90
2	VAV S1-01	1
3	VAV S1-02	2
4	VAV S1-03	3
5	VAV S1-04	4
6	VAV S1-05	5
7	VAV S1-06	6
8	VAV S1-07	7
9	VAV S1-08	8
10	VAV S1-09	9
11	VAV S1-10	10
EOL		

AHU-S1 - System Panel 51
MS/TP - Leg 03

NODE	CONTROLLER	ADR
12	VAV S1-11	11
13	VAV S1-12	12
14	VAV S1-13	13
15	VAV S1-14	14
16	VAV S1-15	15
17	VAV S1-16	16
18	VAV S1-17	17
19	VAV S1-18	18
20	VAV S1-19	19
EOL		

AREA T



AHU-T1 - System Panel 52
MS/TP - Leg 02

NODE	CONTROLLER	ADR
1	E-AHU-T1 SF VFD	90
2	VAV E-T1-01	1
3	VAV E-T1-02	2
4	VAV E-T1-03	3
5	VAV E-T1-04	4
6	VAV E-T1-05	5
7	VAV E-T1-06	6
8	VAV E-T1-07	7
EOL		

AHU-T1 - System Panel 52
MS/TP - Leg 03

NODE	CONTROLLER	ADR
9	VAV T1-08	8
10	VAV T1-09	9
11	VAV T1-10	10
12	VAV T1-11	11
13	VAV T1-12	12
14	VAV T1-13	13
15	VAV T1-14	14
EOL		

AHU-T1 - System Panel 52
MS/TP - Leg 04

NODE	CONTROLLER	ADR
16	Pwr Mtr South Locker Rm	80
EOL		

BILL OF MATERIALS

NOTES:
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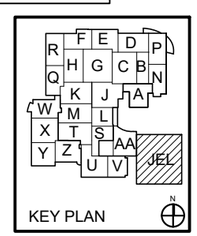

Delta Controls
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LEBANON, INDIANA 46052
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
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DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

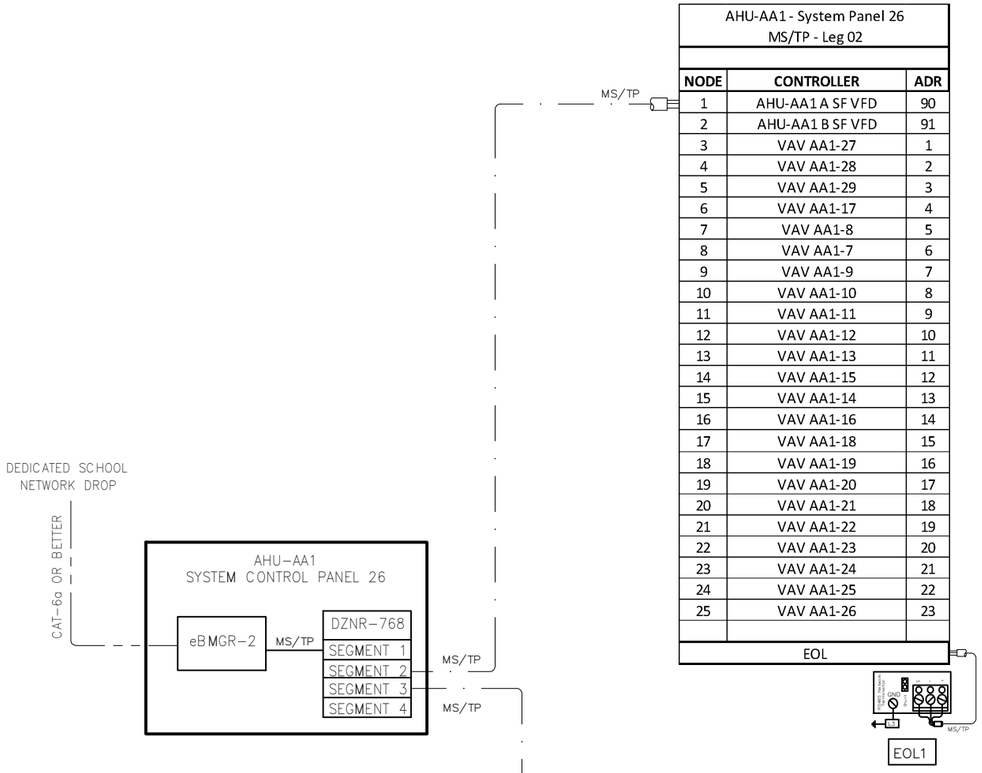
CONTRACT NO:

SHEET
RISER–18
JOB NUMBER:
J–2304001

ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA AA1



AHU-AA1 - System Panel 26 MS/TP - Leg 02		
NODE	**CONTROLLER**	**ADR**
1	AHU-AA1 A SF VFD	90
2	AHU-AA1 B SF VFD	91
3	VAV AA1-27	1
4	VAV AA1-28	2
5	VAV AA1-29	3
6	VAV AA1-17	4
7	VAV AA1-8	5
8	VAV AA1-7	6
9	VAV AA1-9	7
10	VAV AA1-10	8
11	VAV AA1-11	9
12	VAV AA1-12	10
13	VAV AA1-13	11
14	VAV AA1-15	12
15	VAV AA1-14	13
16	VAV AA1-16	14
17	VAV AA1-18	15
18	VAV AA1-19	16
19	VAV AA1-20	17
20	VAV AA1-21	18
21	VAV AA1-22	19
22	VAV AA1-23	20
23	VAV AA1-24	21
24	VAV AA1-25	22
25	VAV AA1-26	23
EOL		

AHU-AA1 - System Panel 26 MS/TP - Leg 03		
NODE	**CONTROLLER**	**ADR**
26	VAV AA1-2	24
27	VAV AA1-6	25
28	VAV AA1-1	26
29	H-AA3-B	80
30	H-AA3-D	81
31	H-AA2-B	82
32	H-AA2-D	83
33	VAV AA1-3	27
34	VAV AA1-4	28
35	VAV AA1-5	29
36	H-AA1-B	84
37	H-AA1-D	85
38	HVLS CF-1	86
39	HVLS CF-2	87
40	HVLS CF-3	88
EOL		

EOL2

BILL OF MATERIALS

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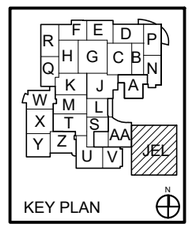

Delta Controls
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LEBANON, INDIANA 46052
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UPDATES	
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REVISIONS	
DATE	REMARKS

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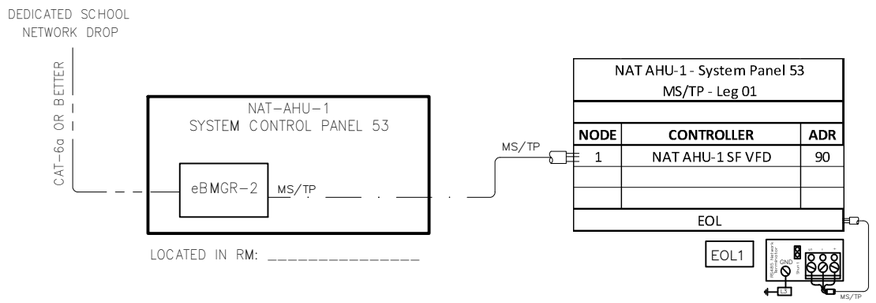
CONTRACT NO:

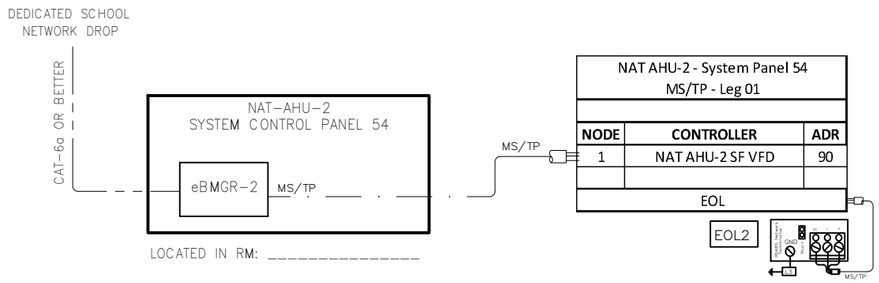
SHEET
RISER-19
JOB NUMBER:
J-2304001

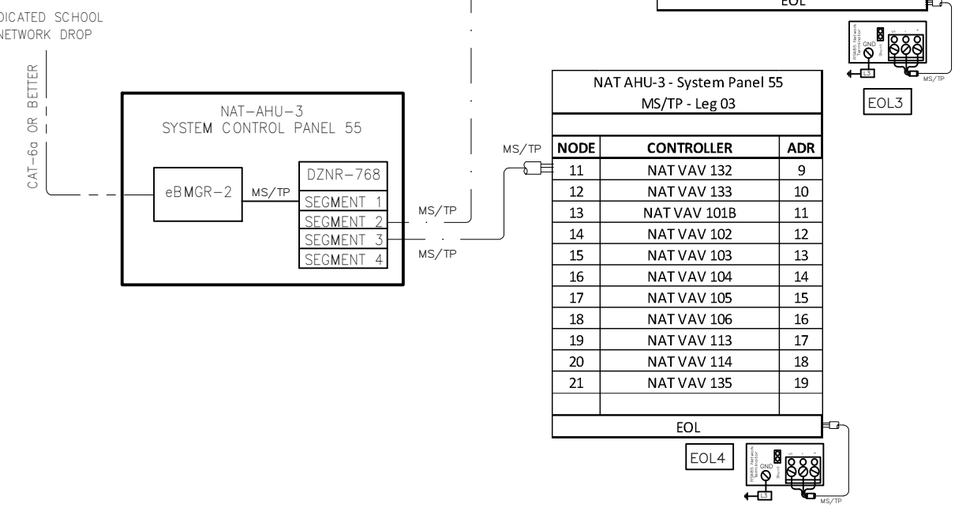
ETHERNET & RS-485 NETWORK RISERS – PHASE 3

(SEE INSTALLATION STANDARDS – ELECTRICAL FOR CABLE REQUIREMENTS)

AREA NATATORIUM

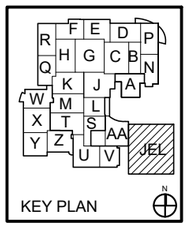






BILL OF MATERIALS

NOTES:
1. ALL SYSTEM CONTROL PANELS WILL HAVE A DEDICATED ETHERNET NETWORK DROP FROM THE SCHOOL'S NETWORK. INSTALL CAT 6a OR BETTER CABLE FROM PANEL TO DESIGNATED DROP.
2. REFER TO ELECTRICAL AND TECHNOLOGY DESIGN DRAWINGS FOR LOCATIONS OF ALL EXISTING OR NEW SYSTEM CONTROL ENCLOSURES. UPDATE RISERS WITH CONFIRMED INSTALLATION LOCATIONS FOR INCLUSION IN AS-BUILT PRINTS.
3. ALL VFD POWER PANELS SHALL BE LOCATED ADJACENT TO THEIR RESPECTIVE AIR HANDLER'S SYSTEM CONTROL PANEL. SEE VAV POWER PANELS SHEET FOR FURTHER DETAILS.



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

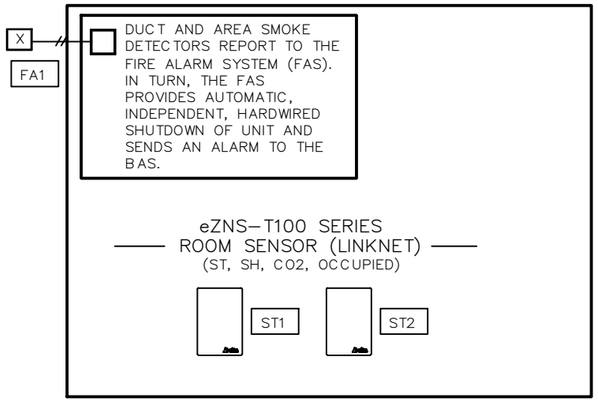
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

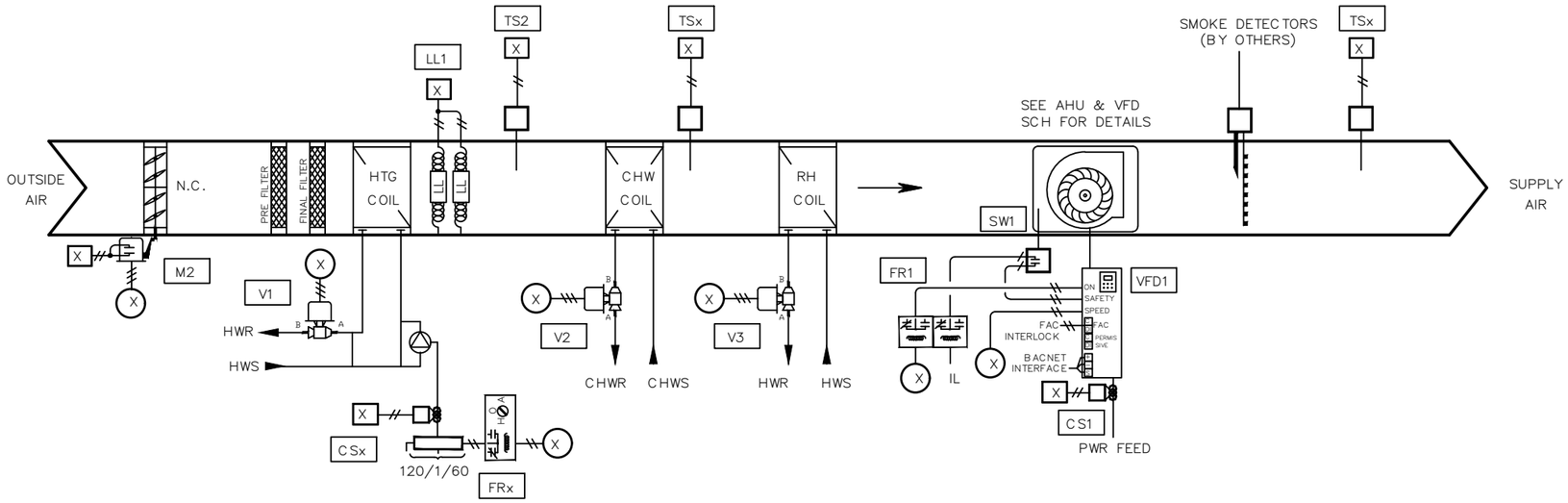
SHEET
RISER-20
JOB NUMBER:
J-2304001

AHU–A2 FIELD DEVICES



BILL OF MATERIAL (PNEUMATIC INSTALLATION MATERIAL USED THROUGHOUT PROJECT)

TAG	ITEM NAME	VENDOR P/N	DESCRIPTION	QTY	MANUF	LOC
PN1	T-101	499329	T-101 1/4IN OD POLY TUBING 250FT SPOOL	82	Kele	Field
PN2	B-263	499650	B-263 ¼" x ¼" Coupling (50 Pack)	8	Kele	Field
PN3	B-376	499651	B-376 ¼" x1/4" x1/4" Barb Tees (100 Pack)	3	Kele	Field
PN4	B-391	499652	B-391 5/32" and ¼" Plug (50 Pack)	1	Kele	Field
PN5	C-133	499703	C-133 1/4X1/8 MPT COMP FTG PKG50	4	Kele	Field



BILL OF MATERIAL

TAG	ITEM NAME	VENDOR P/N	DESCRIPTION	QTY	MANUF	LOC
CS1-2	RIBXKTA	403501	RIBXKTA Solid Core, Adjustable Current Switch, 0.50-150 Amp, Terminal	1	Functional Devices	Field
FR1	RIBU2C	403464	RIBU2C Enclosed Pilot Relays 10 Amp 2 SPDT with 10-30 Vac/dc/120 Vac Coil	1	Functional Devices	Field
FR2	RIB2401SBC	403273	RIB2401SBC Enclosed Relay 20 Amp SPDT + Override with 24 Vac/dc/120 Vac Coil	1	Functional Devices	Field
LL1	TSA-DOP	499777	TSA-DOP LOW LIMIT,MANUAL RESET, SPDT	1	Kele	Field
M2	OA Damper	See Schedule	See Damper Sch for Details	2	Belimo	Field
ST1-2	eZNS-T100CHM-ND-SC-000-WWG	337370	eZNS-T100CHM-ND-SC-000-WWG enteliZONE Network Sensor (No Display, Temp, CO2, Hum, Motion, Surface C	1	Delta Controls	Field
SW1	Door Switch (EBO)	N/A	AHU Door Safety Interlock (EBO)	1	Others	Field
TS1-2	BA/10K-3-D-8"	400100	BA/10K-3-D-8" Duct Temp Sensor, 8" Stainless Steel Probe, Steel J-Box Enclosure	1	BAPI	Field
V1, 3	HW Valve	See Schedule	See Valve Sch for Details	1	Belimo	Field
V2	CW Valve	See Schedule	See Valve Sch for Details	1	Belimo	Field
VFD1	VFD Drive	See Schedule	VFD Drive (see schedule)	2	ABB	Field

NETWORK POINTS
N1 THROUGH Nx

AHU–A2 FIELD DEVICES

Delta Controls
Temperature Control Services
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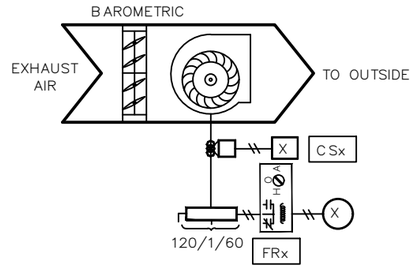
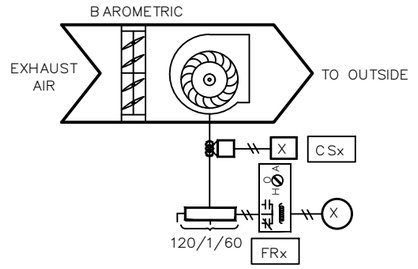
NCHS–99
JOB NUMBER:
J–2304001

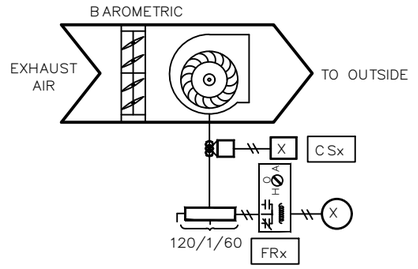
EXHAUST FAN – BAS CONTROLLED
EF–A1



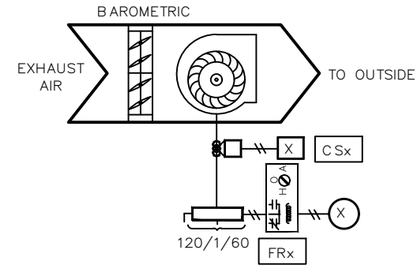
EXHAUST FAN – BAS CONTROLLED
EF–A2



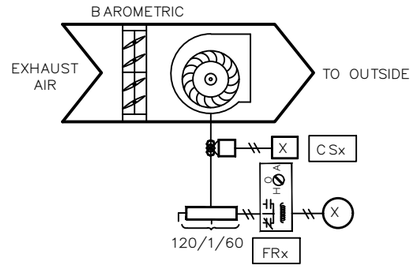
EXHAUST FAN – BAS CONTROLLED
EF–A3



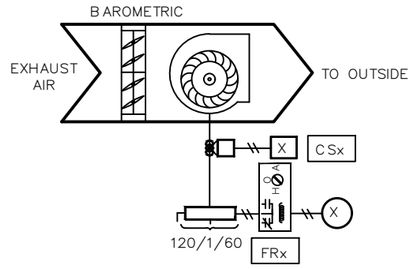
EXHAUST FAN – BAS CONTROLLED
EF–A4



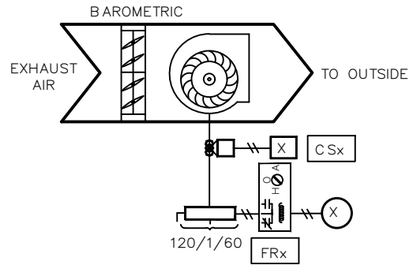
EXHAUST FAN – BAS CONTROLLED
EF–A5



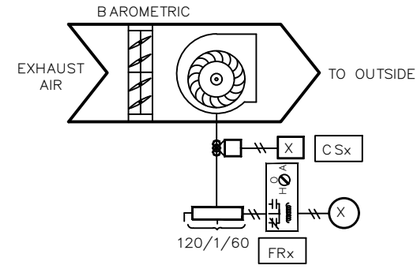
EXHAUST FAN – BAS CONTROLLED
EF–A6



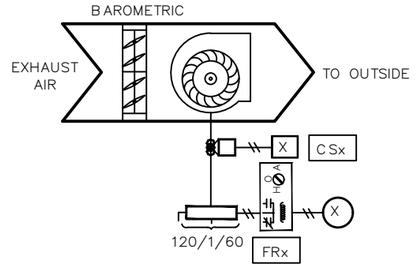
EXHAUST FAN – BAS CONTROLLED
EF–A7



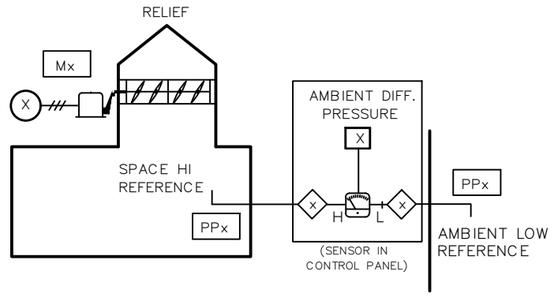
EXHAUST FAN – BAS CONTROLLED
EF–A8



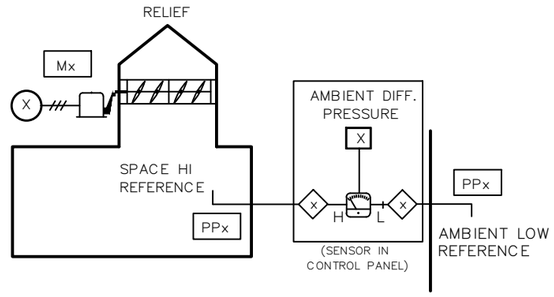
EXHAUST FAN – BAS CONTROLLED
EF–A9



BUILDING PRESSURE CONTROL
E–IH–A1



BUILDING PRESSURE CONTROL
E–IH–A2



NETWORK POINTS

N1 THROUGH Nx

BILL OF MATERIAL

TAG	ITEM NAME	VENDOR P/N	DESCRIPTION	QTY	MANUF	LOC
CS1-9	RIBXKTA	403501	RIBXKTA Solid Core, Adjustable Current Switch, 0.50-150 Amp, Terminal	9	Functional Devices	Field
FR1-9	RIB2401SBC	403273	RIB2401SBC Enclosed Relay 20 Amp SPDT + Override with 24 Vac/dc/120 Vac Coil	9	Functional Devices	Field
M1-2	REL Damper	See Schedule	See Damper Sch for Details	2	Belimo	Field
PP1-2	ZPS-ACC10	400083	ZPS-ACC10 Outside Air Pressure Pickup Port, Wall or Roof Top Mount	2	BAPI	Field
PP3-4	ZPS-ACC20	400429	ZPS-ACC20- Low Profile Pick-up Port	2	BAPI	Field

AREA A MISC FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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CONTRACT NO:

SHEET
NCHS–100
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

Point Name	Point Description	Hardware Points				
		AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
PHT	Preheat Discharge Air Temp	X				
EF-A1 STAT	Exhaust Fan A1 Status		X			
EF-A2 STAT	Exhaust Fan A2 Status		X			
EF-A3 STAT	Exhaust Fan A3 Status		X			
EF-A4 STAT	Exhaust Fan A4 Status		X			
EF-A5 STAT	Exhaust Fan A5 Status		X			
EF-A6 STAT	Exhaust Fan A6 Status		X			
EF-A7 STAT	Exhaust Fan A7 Status		X			
EF-A8 STAT	Exhaust Fan A8 Status		X			
EF-A9 STAT	Exhaust Fan A9 Status		X			
LL	Low Limit (Freezestat)		X			
OAD ES	Outside Air Damper Status		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-IH-A1 DPR	Relief Air Damper			X		
E-IH-A2 DPR	Relief Air Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
SF VFD	Supply Fan VFD Speed			X		
EF-A1 SS	Exhaust Fan A1 Start / Stop				X	
EF-A2 SS	Exhaust Fan A2 Start / Stop				X	
EF-A3 SS	Exhaust Fan A3 Start / Stop				X	
EF-A4 SS	Exhaust Fan A4 Start / Stop				X	
EF-A5 SS	Exhaust Fan A5 Start / Stop				X	
EF-A6 SS	Exhaust Fan A6 Start / Stop				X	
EF-A7 SS	Exhaust Fan A7 Start / Stop				X	
EF-A8 SS	Exhaust Fan A8 Start / Stop				X	
EF-A9 SS	Exhaust Fan A9 Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
ST2	Space Temp					X
SH3	Space Humidity					X
S CO22	Space CO2					X
OCC2	Occupied Flag					X
	POINT TOTALS:	**5**	**14**	**7**	**11**	**8**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-A2 & AREA A MISC FIELD DEVICES POINT TABLE

Delta Controls
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SHEET
NCHS-101
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-A2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFAn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATING THE PREHEAT VALVE AS NECESSARY. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FAN SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

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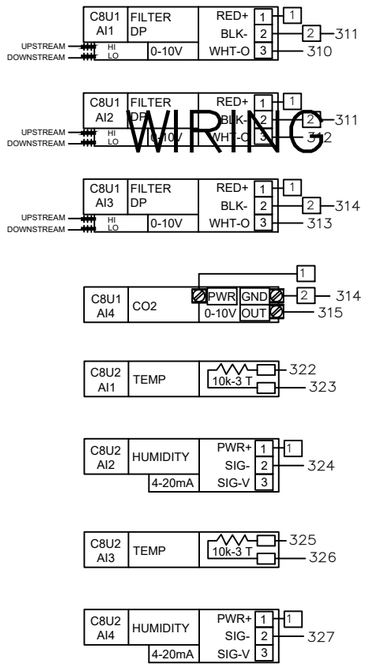
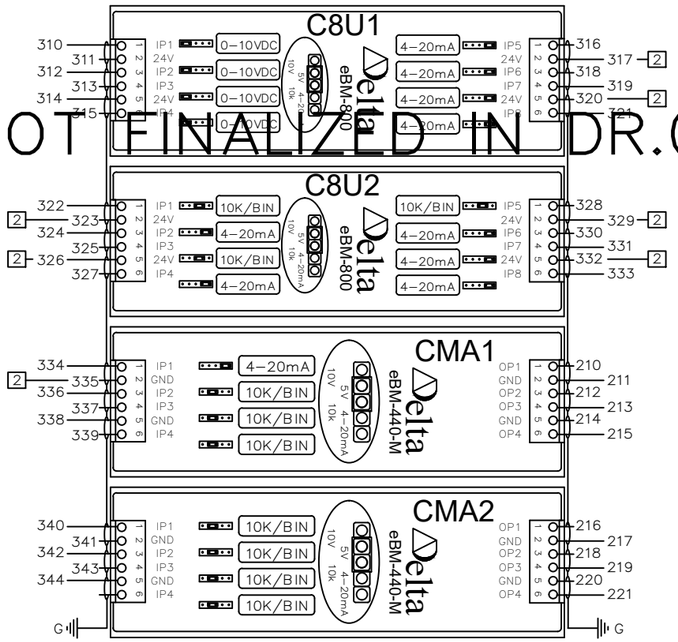
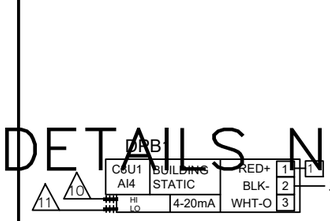
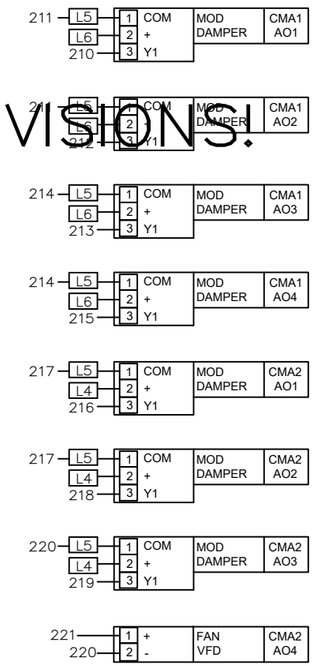
SHEET
NCHS-102
JOB NUMBER:
J-2304001

SYSTEM 15 CONTROL PANEL









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

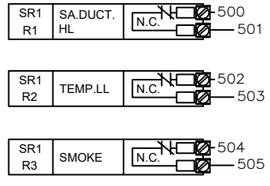
CONTRACT NO:

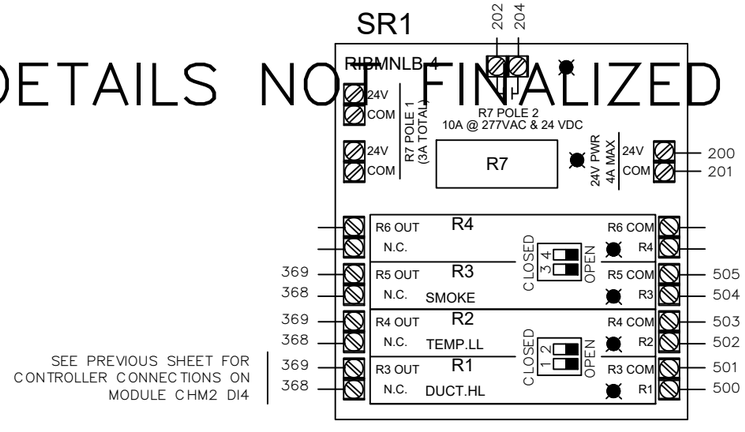
SHEET
NCHS-103
JOB NUMBER:
J-2304001

AHU-2 SYSTEM 15 PANEL – I/O WIRING (1 OF 2)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!





SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
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SHEET
NCHS-104
JOB NUMBER:
J-2304001

SYSTEM 15 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1 — ETHERNET SWITCH — V1- 301, V1+ 300, L3, ports 1 2 3 4 5

CAT5e

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

EOL 4

ST1 — NET, PWR

ST2 — NET, PWR

24 VAC

LINKNET (RS-485)

SR1 — RIBMNLB-4 — 202 204 — 200 201 24V COM POWER 24 MAX — R7 POLE 3 10A @ 277VAC & 24 VDC — R7 POLE 1 5A @ 30VDC RESISTIVE — R4 R3 R2 R1 — R4 OUT N.C. — R3 OUT N.C. — R2 OUT N.C. — R1 OUT N.C. — CLOSED LOOP OPEN

CEB1 — PWR 24~ GND — USB2 — USB1 — (NOT USED) — NET1 RS-485 — NET2 RS-485 — LAN 1 — LAN 2 — LAN 3

C8X1 — 201 200 — PWR 24~ GND — eBX — eBUS Address — eBUS

eBMGR-2

eBM-800 — eBM-440-M — eBM-440-M — eBM-D400R4-H — eBM-440-M — eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG — L3

MS/TP

LINKNET (RS-485)

EOL3

SEE RISER DIAGRAMS FOR LOCATION

TX1 — 24V CB — Power — 120 VAC LAPTOP PWR — 75VA 24VAC 24VAC — 100 H C G L2 L3 — 200 201 CONTROLLER PWR — 202 203 FIELD DEV POWER

24 VDC PWR — PWR SUPPLY — +V -V GND L N — 300 301 101 L3 L2 — PS1

TB1 — 1.0A 101 — 5.0A 100 — G — PANEL GND LUG — L1 L2 L3 — H N 120 VAC

TB2 — 202 L4 L4 L4 — 203 L5 L5 L5 — 204 L6 L6 L6 — 205 L7 L7 L7 — 24 VAC TO FIELD

TB3 — 300 1 1 1 — 301 2 2 2 — 24 VDC TO FIELD

DPB1 — 1 — Power + GND / 4-20mA out - Voltage out 0 — HIGH LOW — 2 3 — PNEUMATIC

DPB2 — 1 — Power + GND / 4-20mA out - Voltage out 0 — HIGH LOW — 4 5 — PNEUMATIC

5 4 3 2

AHU-2 SYSTEM 15 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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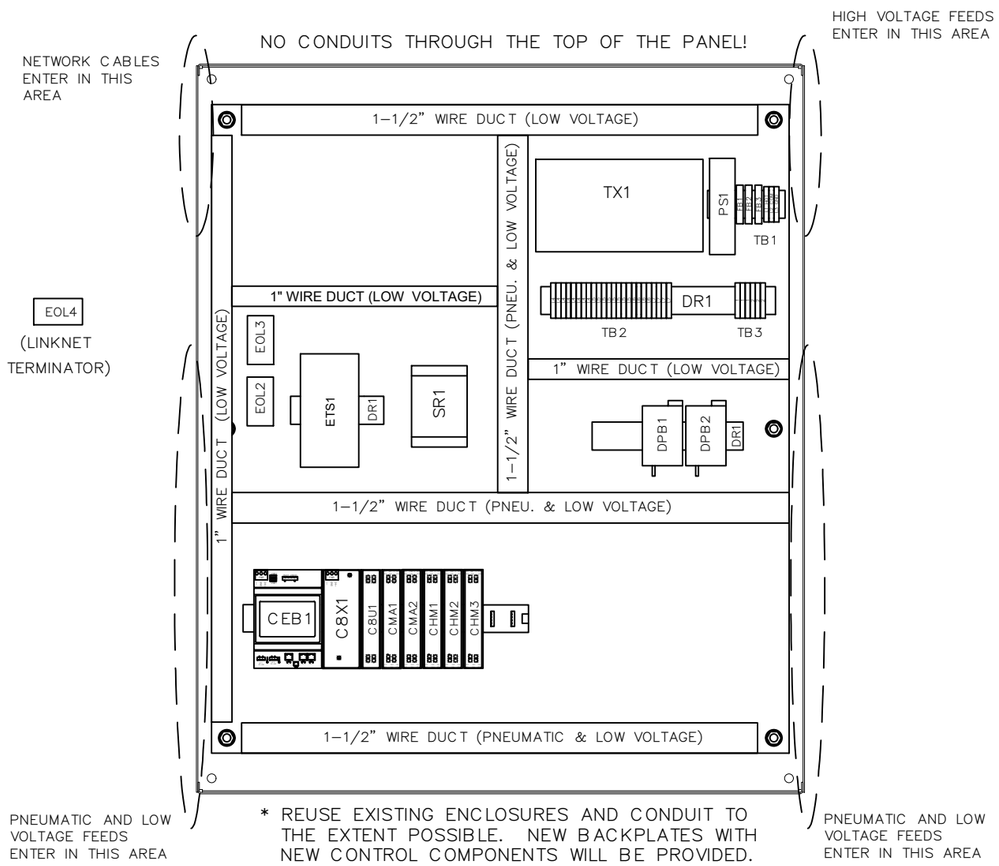
SHEET
NCHS-105
JOB NUMBER:
J-2304001

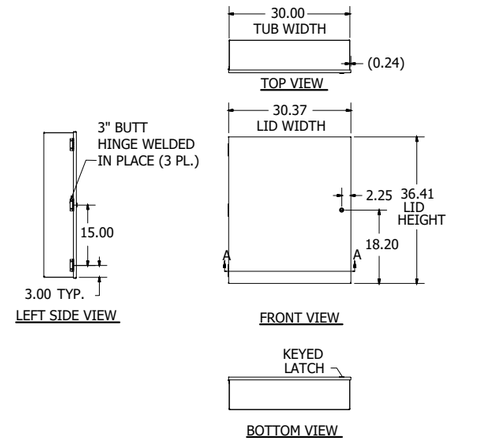
SYSTEM CONTROL PANEL 15 LAYOUT

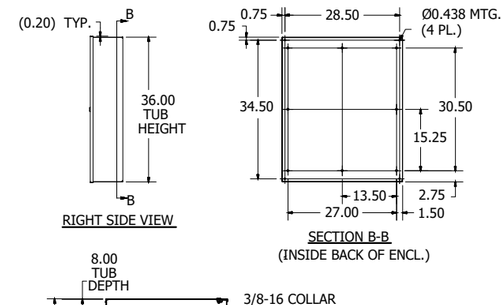


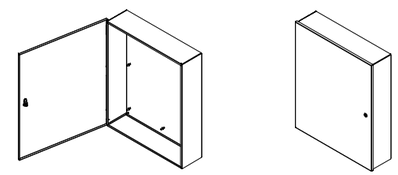
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

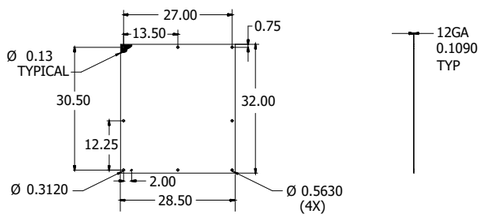
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



BILL OF MATERIALS

TAG	ITEM NAME	VENDOR P/N	DESCRIPTION	QTY	MANUF	LOC
C8U1	eBM-800	375606	eBM-800 enteliBUS Module (8 UIs)	1	Delta Controls	Panel
C8X1	eBX-08	311602	eBX-08 enteliBUS Expander Backplane (8 slot)	1	Delta Controls	Panel
CBL1	eBB-CABLE	272600	eBB-CABLE Cable Kit for enteliBUS (CAN)	1	Delta Controls	Panel
CEB1	eBMGR-2	301604	eBMGR-2 enteliBUS System Controller w/Etherr	1	Delta Controls	Panel
CMA1-2	eBM-440-M	375601	eBM-440-M enteliBUS Module (4 UIs,4 AOs with	2	Delta Controls	Panel
CMH1-3	eBM-D400R4-H	375609	eBM-D400R4-H enteliBUS Module (4 BIs,4 Relay	3	Delta Controls	Panel
DPB1-2	ZPS-LR-EZ-NT-IN	400399	ZPS-LR-EZ-NT-IN EZ Low Pressure Sensor, 0.1 to	2	BAPI	Panel
DR1	DIN-3F	499991	DIN-3F - STEEL DIN RAIL - 1 METER	1	Kele	Panel
EBP1	36 x 30 Perf Plate	N1P3036PP	Perf Backplate for 36"x30" Enc	1	Hubbell W.	Panel
ENC1	36 x 30 Enc (ETR)	N/A	36"x30"x8.63" Enc (ETR)	1	ETR	Panel
EOL2-4	TRM768	151924	TRM768 Network Terminator (MS/TP)	3	Delta Controls	Panel
EPC1	630128	630128	3' CAT 5e Patch Cable, Blue	2	Belkin	Panel
ETS1	DVS-005I00	507500	DVS-005I00 Unmanaged Industrial 5-Port Ethern	1	Delta Electronic	Panel
FB1	M4/8SF	499975	M4/8SF - 8MM K-235 FUSEHOLDER	4	Kele	Panel
FBE1	FEM8S	499803	FEM8S END PLATE FOR M4/8SF GRAY	2	Kele	Panel
PAN1	Wire Duct 1.5 x 3	TY15X3WPW6C	1.5"x3"x6.5' Wire Duct, White	1	Kele	Panel

BILL OF MATERIALS

TAG	ITEM NAME	VENDOR P/N	DESCRIPTION	QTY	MANUF	LOC
PAN2	Wire Duct 1 x 1.5	TY1X15WPW6C	1"x1.5"x6.5' Wire Duct, White	1	Kele	Panel
PB1	M4/6	499994	M4/6 - 6MM (.238IN) TERMINAL BLOCK	32	Kele	Panel
PB2	M4/6.P	499974	M4/6.P -GROUNDING LUG GREEN YELLOW	1	Kele	Panel
PB3	BAM4	499352	BAM4 END STOP GRAY FOR M4/6	9	Kele	Panel
PB4	FEM6	499921	FEM6 - END PLATE FOR M4/6	3	Kele	Panel
PB5	SCF6	499333	SCF6 CIRCUIT SEPARATOR	2	Kele	Panel
PB6	BJS6-10	499313	BJS6-10 JUMPER BAR 10 POLES PER BAR	4	Kele	Panel
PB7	EV6	499726	EV6 JUMPER BAR SUB-ASY PKG20	40	Kele	Panel
PF1	K235-1	499340	K235-1 FUSE 5X20MM FAST 1 AMP 250V PKG5	1	Kele	Panel
PF2	K235-5	499341	K235-5 FUSE 5X20MM FAST 5 AMP 125V PKG5	1	Kele	Panel
PLK1	Keyed Lock	N1C14TKL	Cylinder Lock Kit	1	Hubbell W.	Panel
PNL1	PNL-eBM	PNL-eBM	TCS Panel Build - eBMGR Style	1	TCS	Panel
PS1	DRP024V060W1AA	506000	DRP024V060W1AA - Line Voltage DC Power Supp	1	Delta Electronic	Panel
SR1	RIBMNLB-4	403386	RIBMNLB-4 2.75" Track Mount AHU Fan Safety Al	1	Functional Devi	Panel
TRM1	eBB-TERM	272601	eBB-TERM Network Terminator for enteliBUS (C	1	Delta Controls	Panel
TX1	PSH75A75A	403205	PSH75A75A Enclosed Dual 75VA, Multi-tap 480/2	1	Functional Devi	Panel

AHU–A2 SYSTEM 15 PANEL – DIMENSIONS & BOM

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

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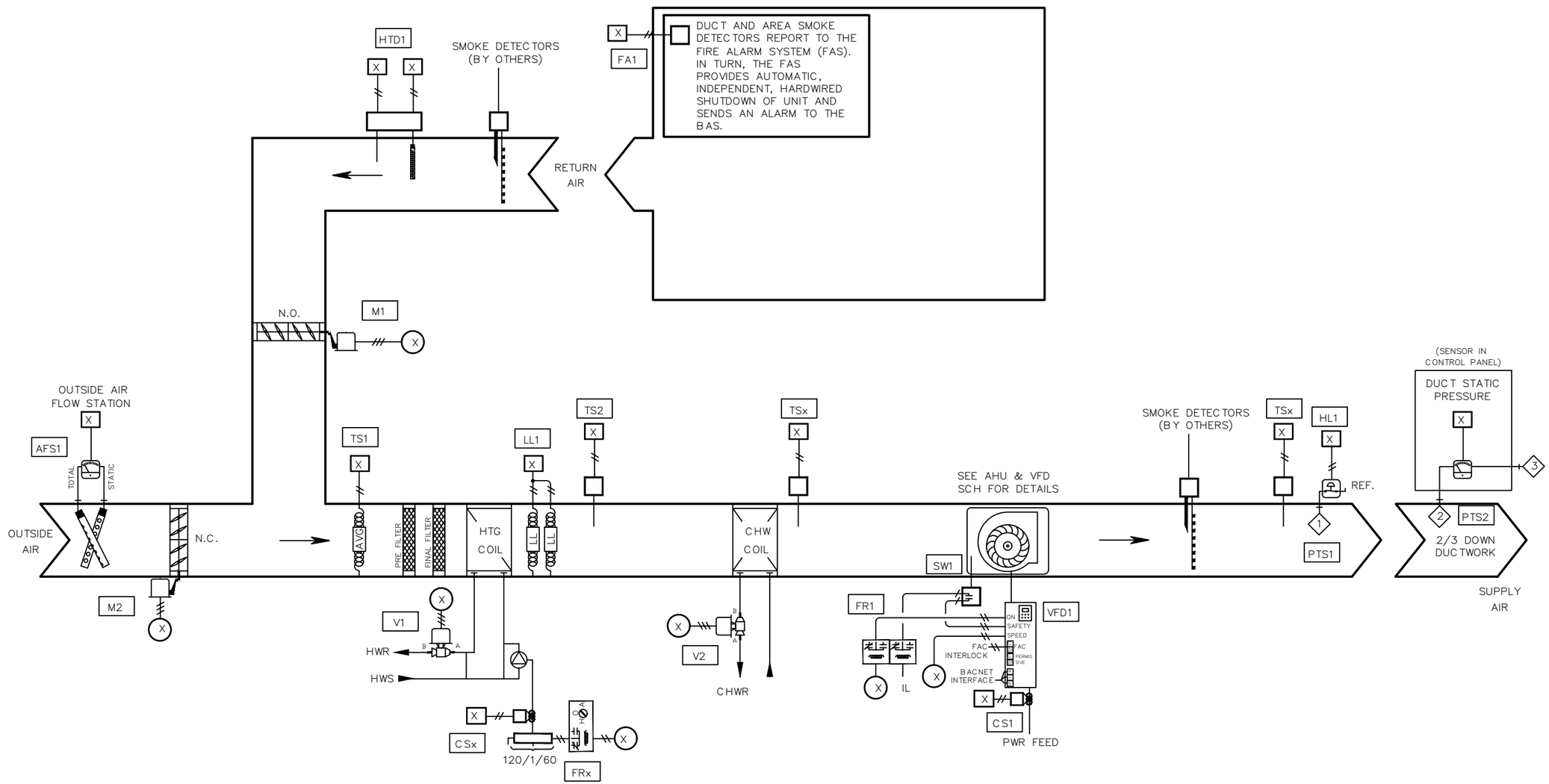
CONTRACT NO:

SHEET
NCHS–106
JOB NUMBER:
J–2304001

AHU–C1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–C1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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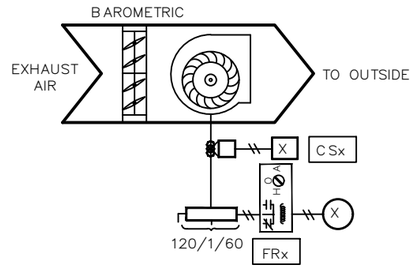
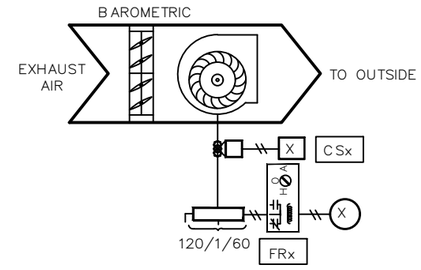
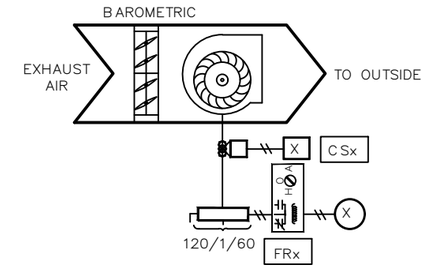
EXHAUST FAN – BAS CONTROLLED
EF–C1



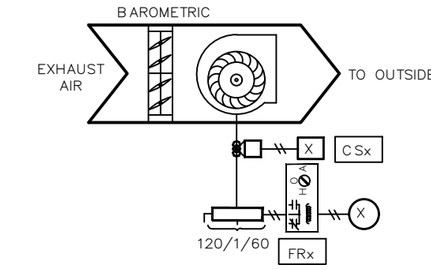
EXHAUST FAN – BAS CONTROLLED
EF–C2



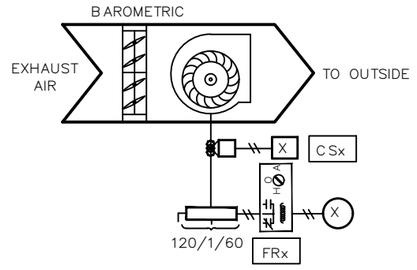
EXHAUST FAN – BAS CONTROLLED
EF–C3



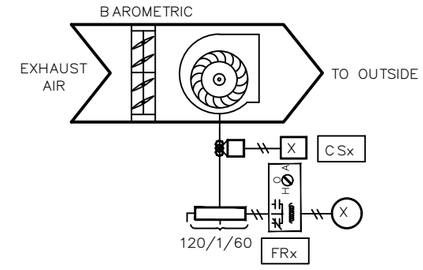
EXHAUST FAN – BAS CONTROLLED
EF–C4



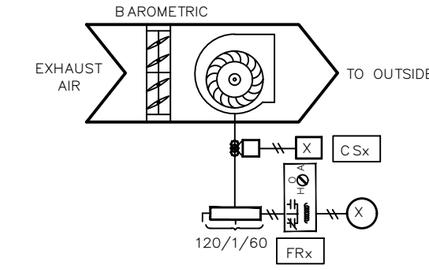
EXHAUST FAN – BAS CONTROLLED
EF–C5



EXHAUST FAN – BAS CONTROLLED
EF–C7



EXHAUST FAN – BAS CONTROLLED
EF–C8



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA C MISC FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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04/06/2023	ADD 3.3
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REVISIONS	
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SHEET
NCHS–108
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

Point Name	Point Description	Hardware Points				
		AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-C1 STAT	Exhaust Fan C1 Status		X			
EF-C2 STAT	Exhaust Fan C2 Status		X			
EF-C3 STAT	Exhaust Fan C3 Status		X			
EF-C4 STAT	Exhaust Fan C4 Status		X			
EF-C5 STAT	Exhaust Fan C5 Status		X			
EF-C7 STAT	Exhaust Fan C7 Status		X			
EF-C8 STAT	Exhaust Fan C8 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-C1 SS	Exhaust Fan C1 Start / Stop				X	
EF-C2 SS	Exhaust Fan C2 Start / Stop				X	
EF-C3 SS	Exhaust Fan C3 Start / Stop				X	
EF-C4 SS	Exhaust Fan C4 Start / Stop				X	
EF-C5 SS	Exhaust Fan C5 Start / Stop				X	
EF-C7 SS	Exhaust Fan C7 Start / Stop				X	
EF-C8 SS	Exhaust Fan C8 Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**7**	**12**	**5**	**9**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
Temperature Control Services
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VAV AIR HANDLING UNIT AHU-C1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFCn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE OUTSIDE AIR DAMPER (OA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

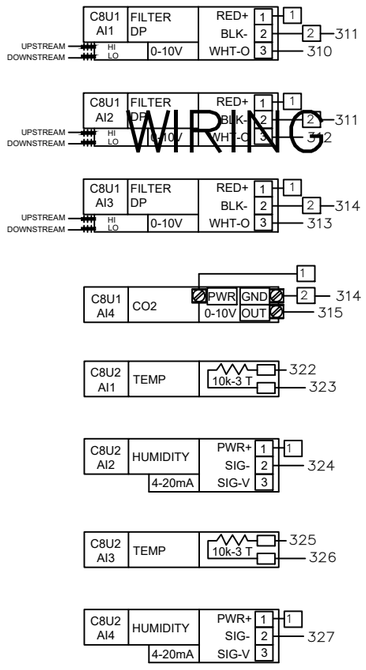
REVISIONS	
DATE	REMARKS

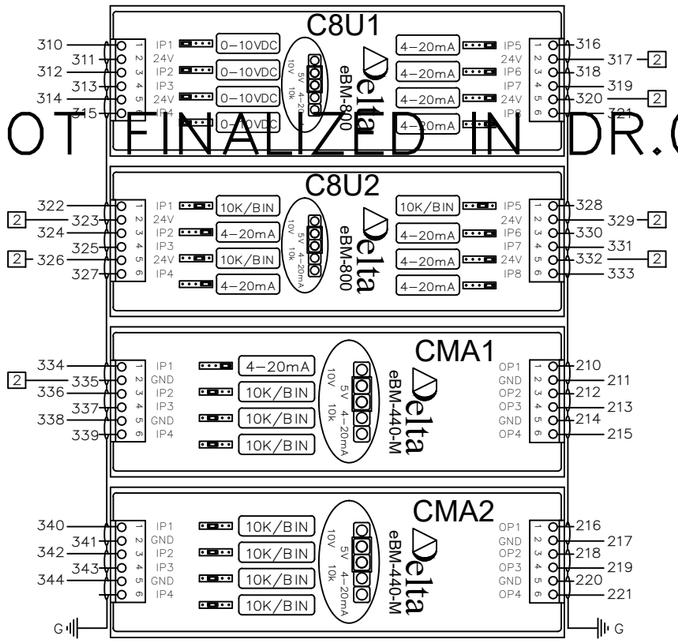
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

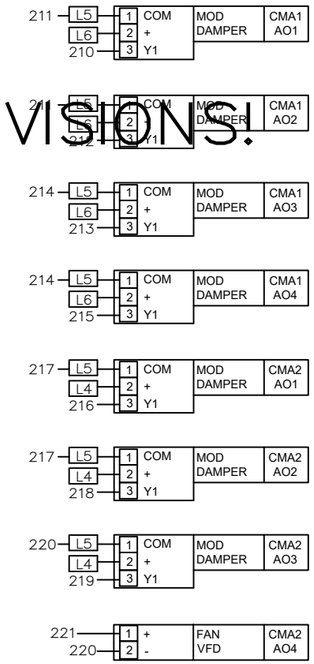
CONTRACT NO:

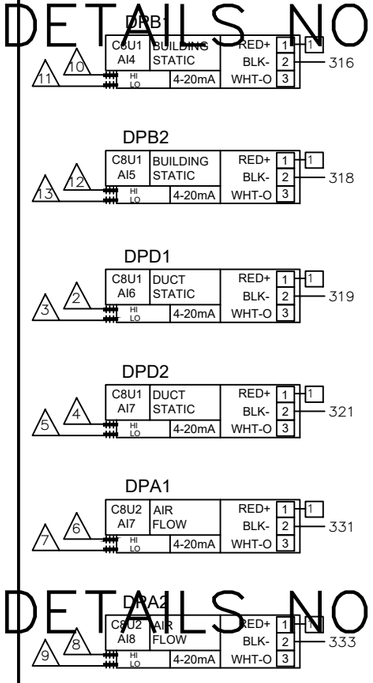
SHEET
NCHS–110
JOB NUMBER:
J–2304001

SYSTEM 16 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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REVISIONS	
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SHEET
NCHS-111
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WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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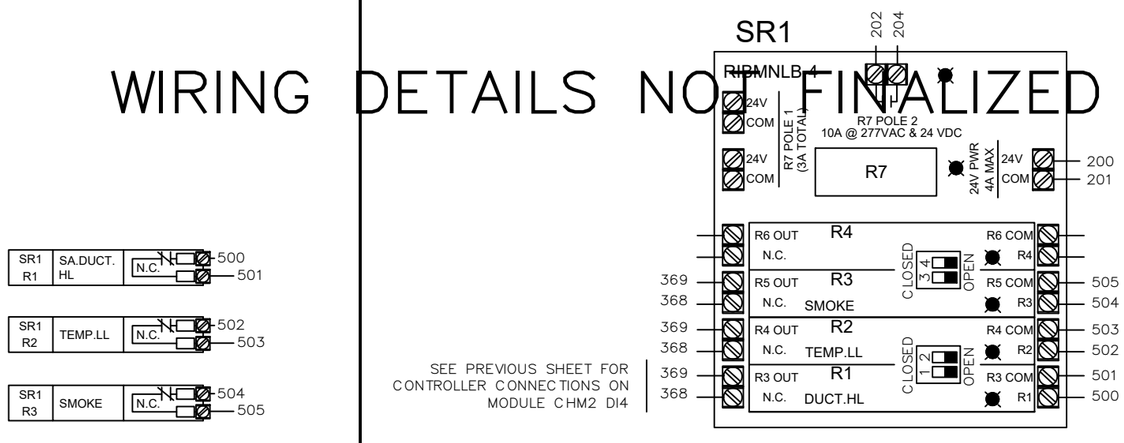

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

AHU-C1 SYSTEM 16 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS-112
JOB NUMBER:
J-2304001

SYSTEM 16 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

GND

ETS1

300
301
L3
V1-
V1+
ETHERNET SWITCH
1
3
5
2
4
CAT5e

SR1
RIBMNLB-4
202
204
200
201
24V
COM
POWER
4A MAX
R7
R7 POLE 2
10A @ 277VAC & 24 VDC
R7 POLE 1
(N.O. ONLY)
R4
R3
R2
R1
R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.
R4 COM
R3 COM
R2 COM
R1 COM
CLOSED
OPEN
LOOP

TX1
24V CB
Power
100
L2
L3
H
C
G
120 VAC LAPTOP PWR
75VA
24VAC
200
201
202
203
CONTROLLER PWR
FIELD DEV POWER

24 VDC PWR
PWR SUPPLY
+V
-V
GND
L
N
300
301
101
L3
L2
PS1

1.0A
5.0A
101
100
G
PANEL GND LUG
TB1
L1
L2
L3
H
N
120 VAC

TB2
202
203
204
205
L4
L5
L6
L7
24 VAC TO FIELD

TB3
300
301
1
2
24 VDC TO FIELD

DPD1
Power + GND / 4-20mA out - Voltage out O
HIGH
LOW
PNEUMATIC
2
3

CEB1
C8X1
201
200
PWR
GND
24V~
USB2
USB1
(NOT USED)
eBMGR-2
eBX
eBUS Address
eBUS
NET1 RS-485
NET2 RS-485
LAN 1
LAN 2
eBM-800
eBM-440-M
eBM-D400R4-H
I/O SHIELD DRAIN
TO PANEL GND LUG
L3
MS/TP

SEE RISER DIAGRAMS FOR LOCATION

AHU-C1 SYSTEM 16 PANEL – POWER & NETWORK WIRING

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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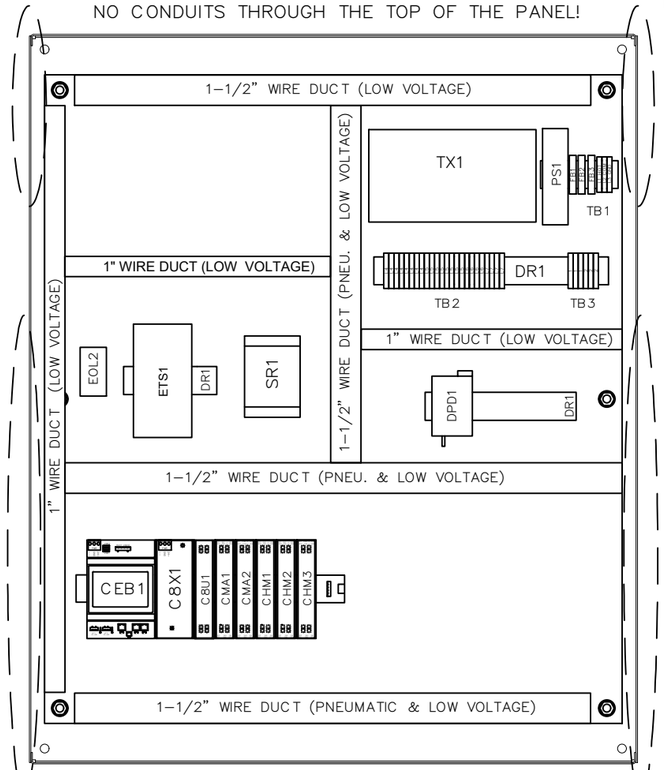
SHEET
NCHS-113
JOB NUMBER:
J-2304001

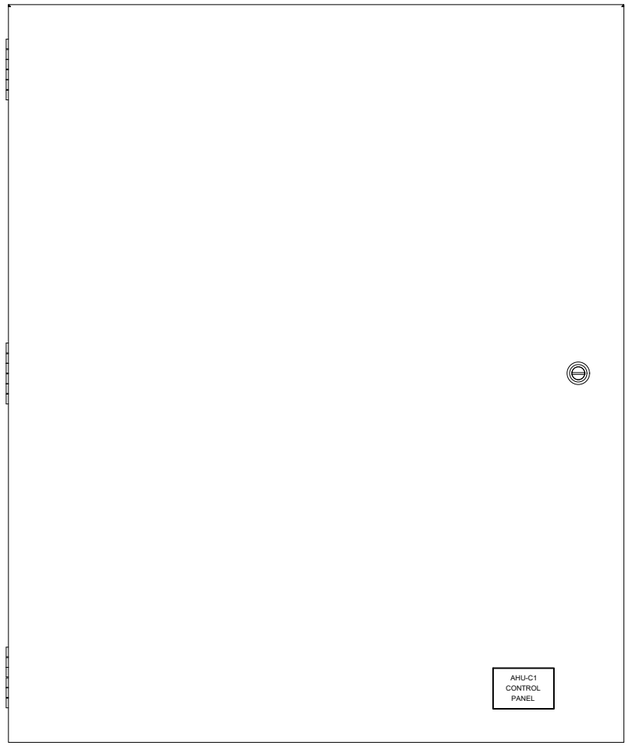
SYSTEM CONTROL PANEL 16 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

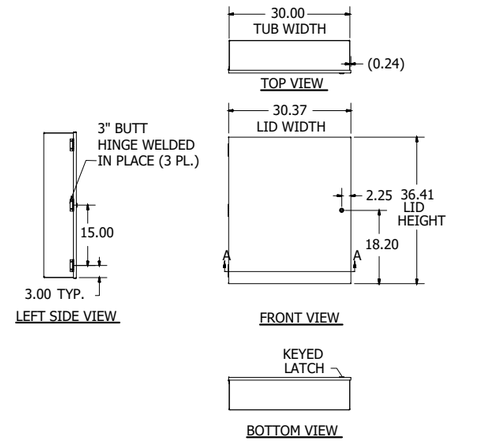
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

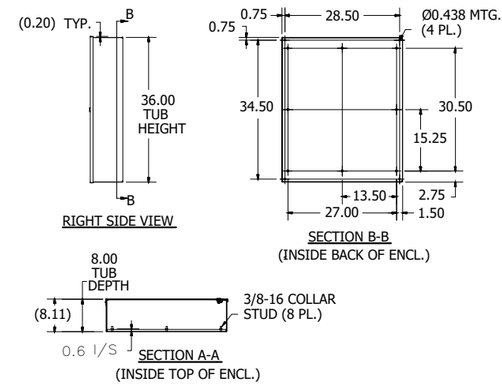
BILL OF MATERIALS

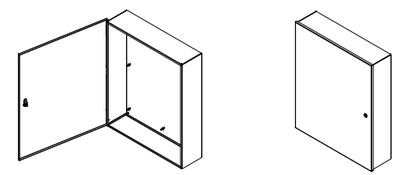
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

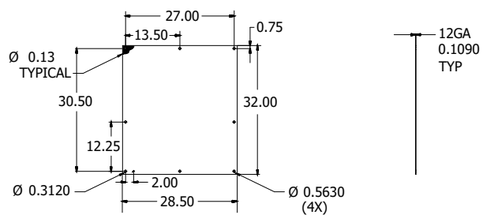
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



AHU-C1 SYSTEM 16 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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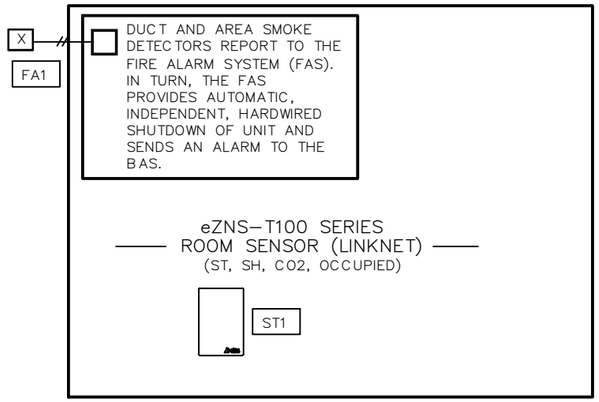
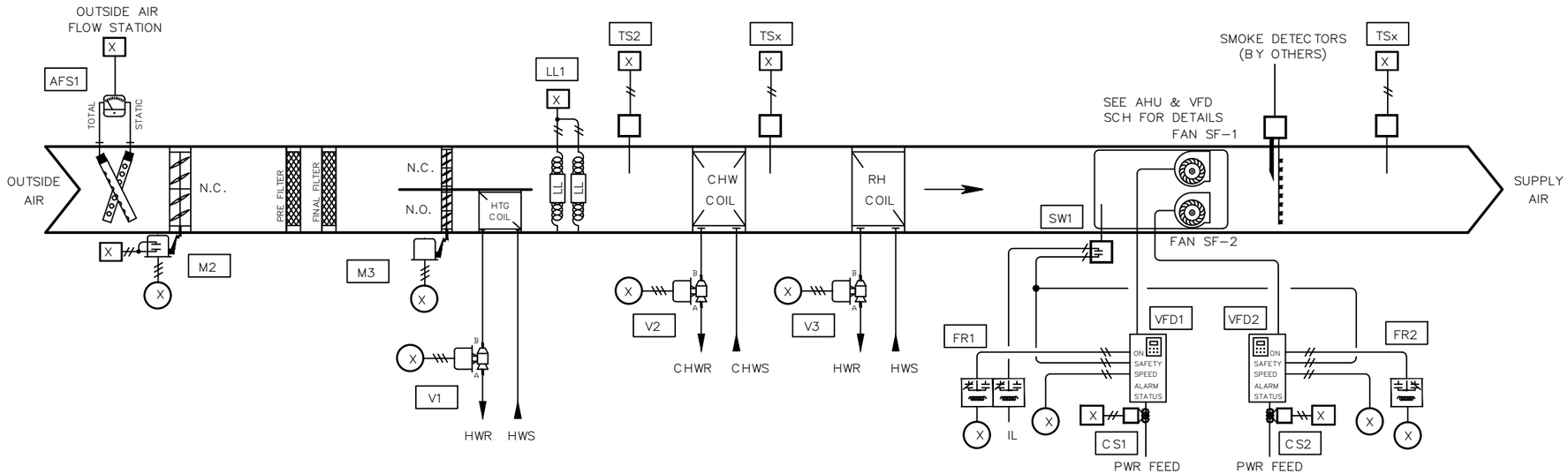
AHU-C2 FIELD DEVICES





BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AHU-C2 FIELD DEVICES

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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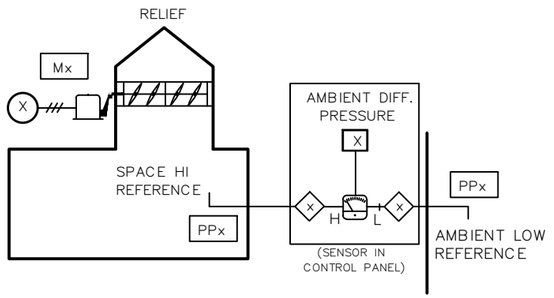
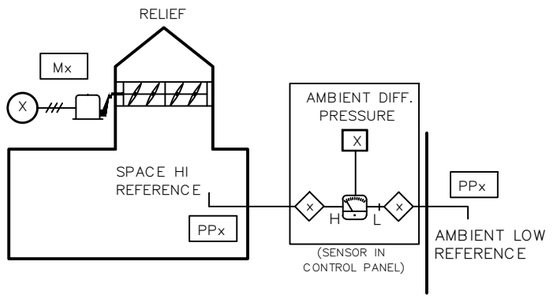
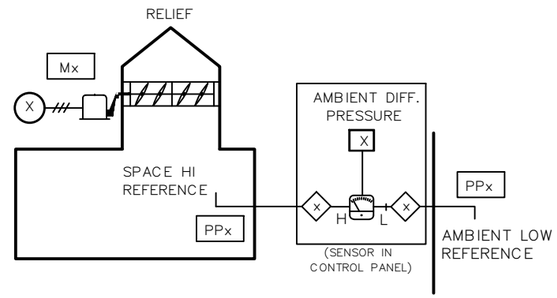
BUILDING PRESSURE CONTROL
E–RH–C1



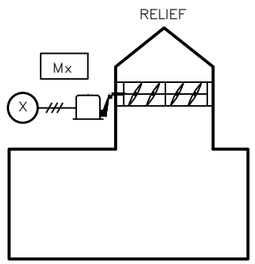
BUILDING PRESSURE CONTROL
RH–C2



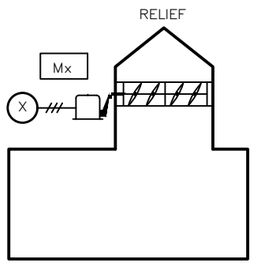
BUILDING PRESSURE CONTROL
E–RH–C3



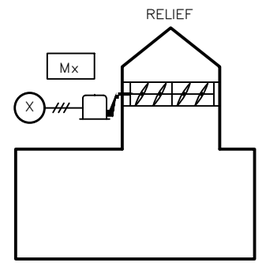
BUILDING PRESSURE CONTROL
E–RH–C4



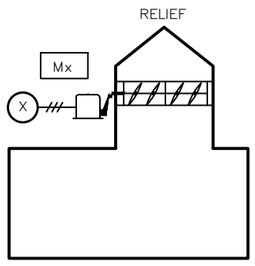
BUILDING PRESSURE CONTROL
E–RH–C5



BUILDING PRESSURE CONTROL
RH–C6



BUILDING PRESSURE CONTROL
RH–C7



BILL OF MATERIAL

NOTE:
THERE WILL BE THREE (3) BUILDING PRESSURE SENSOR INPUTS FOR CONTROL OF THESE SEVEN (7) RELIEF DAMPERS. SPECIFIC CONTROL CORRELATIONS SHALL BE DETERMINED DURING TIME OF INSTALLATION AND STARTUP.

NETWORK POINTS
N1 THROUGH Nx

AREA C MISC FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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CONTRACT NO:

SHEET
NCHS–116
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

Point Name	Point Description	Hardware Points				
		AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
LL	Low Limit (Freezestat)		X			
OAD ES	OAD Damper Status		X			
SF 1 STAT	Supply Fan 1 Status		X			
SF 2 STAT	Supply Fan 2 Status		X			
CWV	Chill Water Valve			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
E-RH-C1 DPR	Relief Air Damper			X		
RH-C2 DPR	Relief Air Damper			X		
E-RH-C3 DPR	Relief Air Damper			X		
E-RH-C4 DPR	Relief Air Damper			X		
E-RH-C5 DPR	Relief Air Damper			X		
RH-C6 DPR	Relief Air Damper			X		
RH-C7 DPR	Relief Air Damper			X		
SF 1 VFD	Supply Fan 1 VFD Speed			X		
SF 2 VFD	Supply Fan 2 VFD Speed			X		
SF 1 SS	Supply Fan 1 Start / Stop				X	
SF 2 SS	Supply Fan 2 Start / Stop				X	
ST	Space Temp					X
SH	Space Humidity					X
S CO2	Space CO2					X
OCC	Occupied Flag					X
	POINT TOTALS:	**7**	**4**	**14**	**2**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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OUTDOOR AIR HANDLING UNIT AHU-C2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE KITCHEN HOOD OPERATION OR AS MANUALLY SELECTED BY THE OPERATOR, OR BY OCCUPANCY SENSOR (OCC-S). MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

RELIEF DAMPER CONTROL: AS SPACE PRESSURE (ZN-SP) INCREASES, THE RELIEF DAMPER (RLFn-DPR) SHALL BE MODULATED TO MAINTAIN A SETPOINT OF +0.03" W.C. (ADJ) IN THE SERVING LINE AND CAFETERIA AS COMPARED TO THE KITCHEN. ALL DAMPERS SHALL BE FULLY CLOSED WHEN THE ASSOCIATED AHUs ARE NOT RUNNING. PNEUMATIC SENSING TUBE, TERMINATION DEVICES, AND PRESSURE TRANSDUCER FIELD INSTALLED BY CIC.

TCC SHALL GENERATE AN ALARM IF ANY HOOD IS OPERATING AND MAKEUP AIR HANDLING UNIT IS NOT. IF ANY HOOD IS IN OPERATION, VARIABLE FREQUENCY DRIVES SHALL MODULATE IN ORDER TO DELIVER THE QUANTITY OF OUTSIDE AIR EQUAL TO THE TOTAL HOOD AIRFLOW OF EXHAUST FANS C1, C2, AND C3. IF NOT HOOD EXHAUST FANS ARE RUNNING, THE VARIABLE FREQUENCY DRIVE SPEED SHALL MODULATE TO MAINTAIN THE COOLING DEMAND OF THE SPACE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT COIL CONTROL, FACE AND BYPASS DAMPER, AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND PREHEAT TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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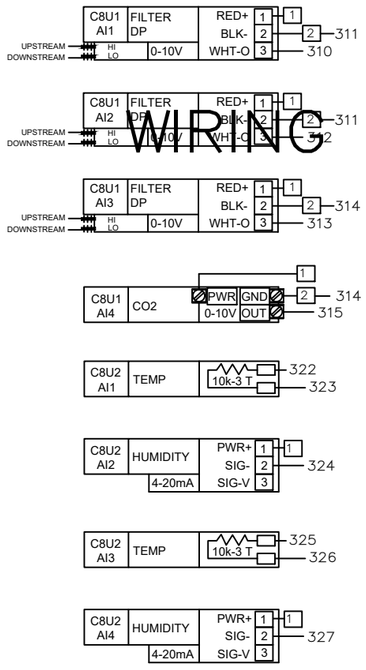
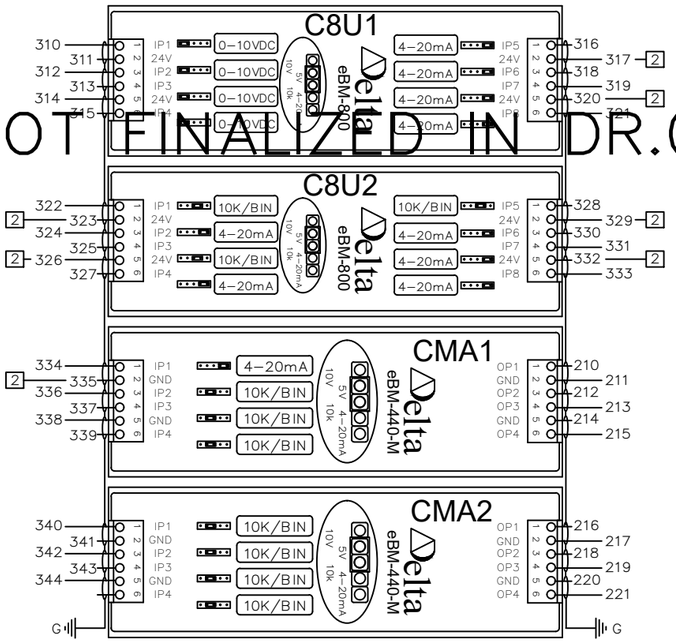
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

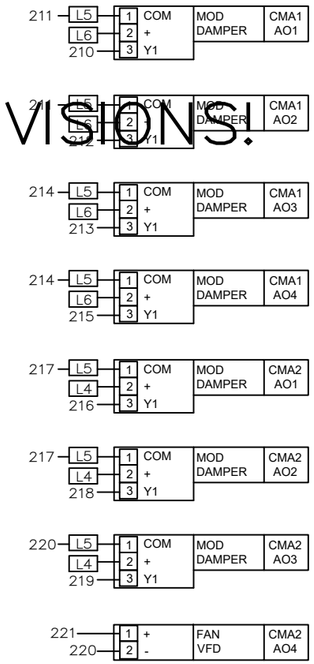
CONTRACT NO:

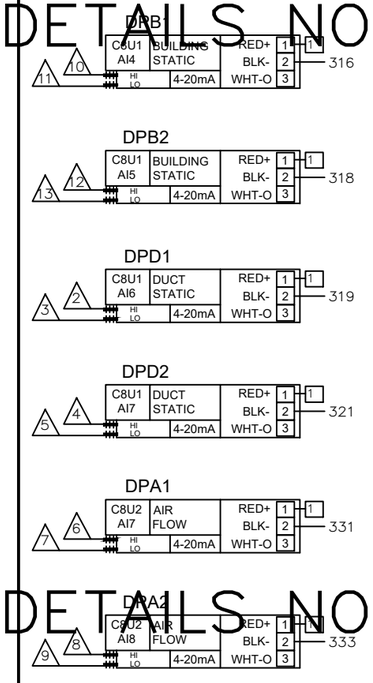
SHEET
NCHS-118
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS	C8U1 eBM-800
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO		
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO		
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510		
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201		
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201		
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200		
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	eBM-800 I/O MODULE	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS	C8U2 eBM-800
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101		
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101		
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101		
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101		
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101		
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201		
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	eBM-800 I/O MODULE	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS	CMA1 eBM-440-M
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001		
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002		
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301		
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS	
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206		
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206		
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	eBM-440-M I/O MODULE	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS	CMA2 eBM-440-M
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003		
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO		
CMA2	4	10100.1404					
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS	
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208		
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208		
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	eBM-440-M I/O MODULE	

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta CONTROLS
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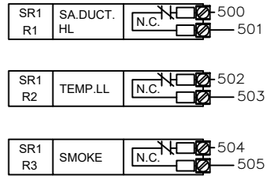

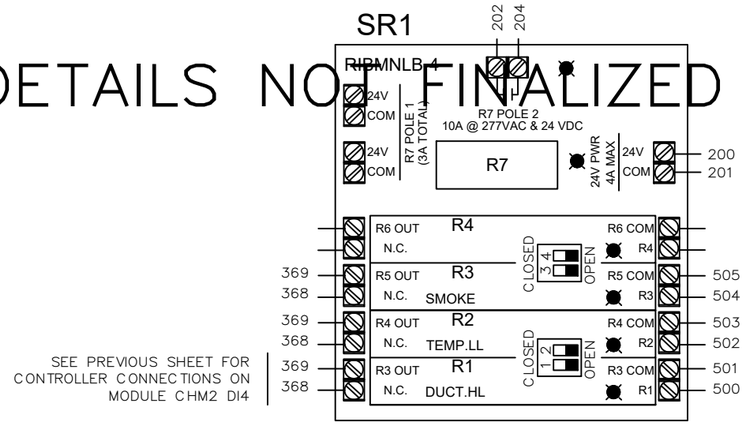

SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-C2 SYSTEM 117 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS-120
JOB NUMBER:
J-2304001

SYSTEM 17 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

SND

ETS1

ETHERNET SWITCH

V1-
V1+

300
301
L3

CAT5e

SR1

RIBMNLB-4

202
204
200
201

R7 POLE 3
10A @ 277VAC & 24 VDC

R7 POLE 1
(NO SHOWN)

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM
R3 COM
R2 COM
R1 COM

CLOSED
OPEN

TRANSFORMER

102
L2
206
207

TX1

24V CB
Power
120 VAC LAPTOP PWR
75VA
24VAC
100
L2
L3
H
C
G
200
201
202
203
CONTROLLER PWR
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY
+V
-V
GND
L
N
300
301
101
L3
L2
PS1

TB1

4.0A
1.0A
5.0A
102
101
100
G
L1
L2
L3
H
N
120 VAC
PANEL GND LUG

TB2

202
203
204
205
206
207
L4
L5
L6
L7
L8
L9
24 VAC TO FIELD

TB3

300
301
1
2
24 VDC TO FIELD

DPB1
DPB2
DPB3

1
Power + GND / 4-20mA out - Voltage out - 0
HIGH
LOW
4
5
6
7
8
9
PNEUMATIC

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1
NET
PWR
24 VAC
LINKNET (RS-485)

CEB1

PWR
USB2
USB1
(NOT USED)
NET1 RS-485
NET2 RS-485
LED 1
LED 2
LED 3

C8X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800
eBM-440-M
eBM-D400R4-H

I/O SHIELD DRAIN

L3
TO PANEL GND LUG

MS/TP
LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

AHU-C2 SYSTEM 17 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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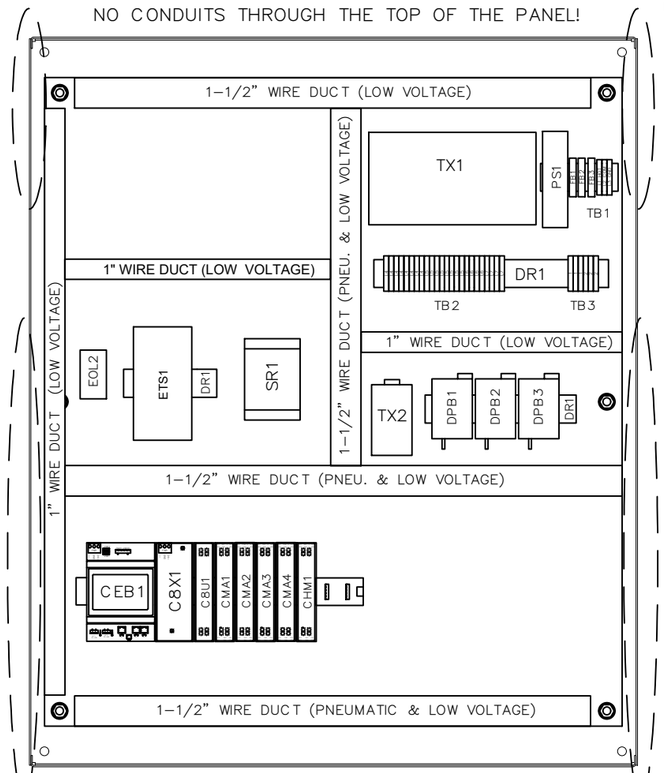
SHEET
NCHS-121
JOB NUMBER:
J-2304001

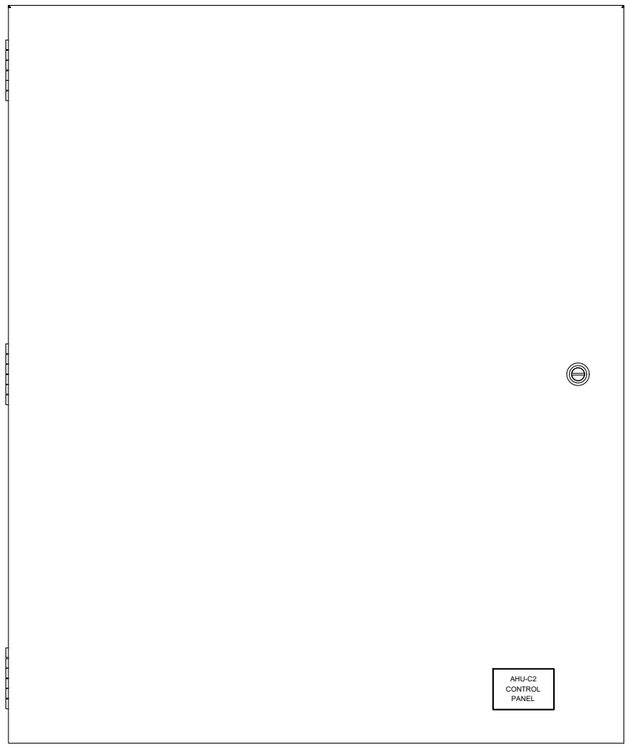
SYSTEM CONTROL PANEL 17 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

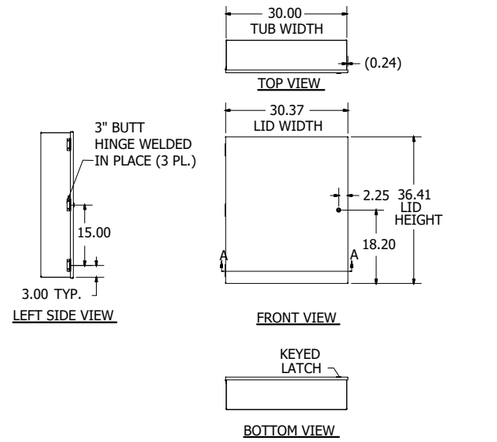
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

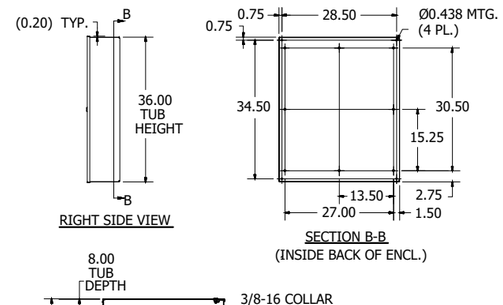
BILL OF MATERIALS

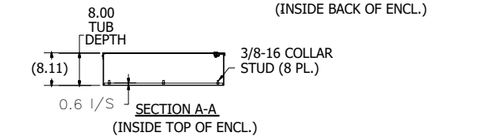
BILL OF MATERIALS

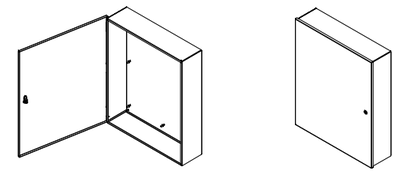
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

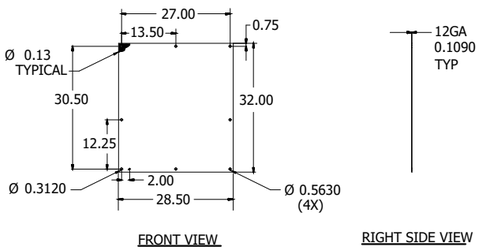








PANEL DIMENSIONS



Delta Controls
Temperature Control Services
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LEBANON, INDIANA 46052
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J–2304001

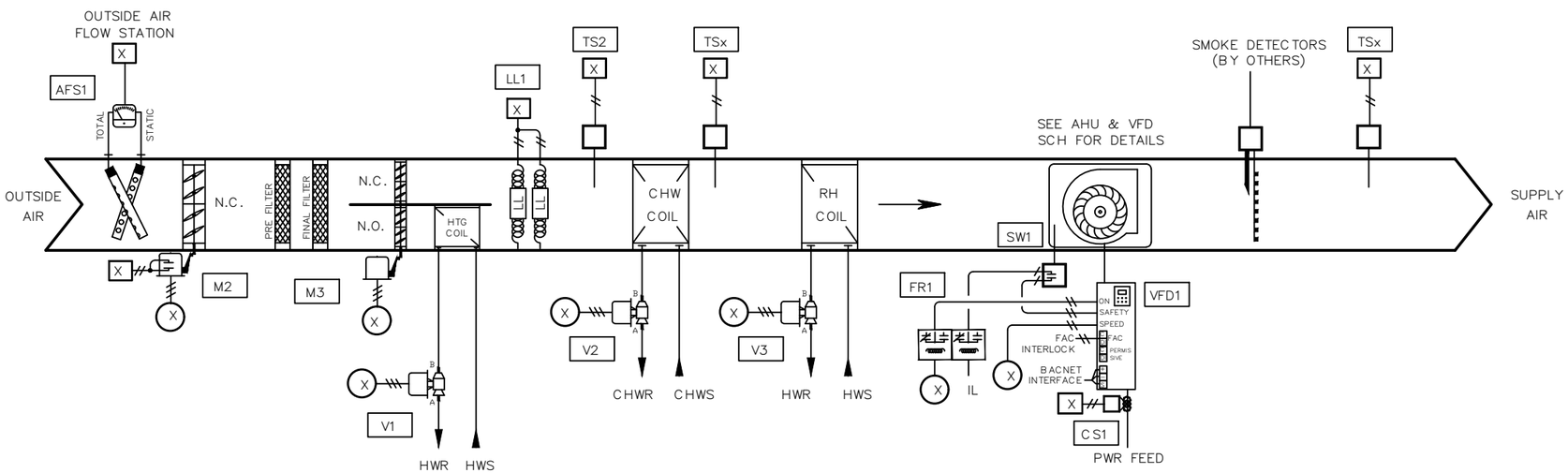
AHU-C3 FIELD DEVICES

X — FA1

DUCT AND AREA SMOKE DETECTORS REPORT TO THE FIRE ALARM SYSTEM (FAS). IN TURN, THE FAS PROVIDES AUTOMATIC, INDEPENDENT, HARDWIRED SHUTDOWN OF UNIT AND SENDS AN ALARM TO THE BAS.

eZNS-T100 SERIES
ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)

ST1



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AHU-C3 FIELD DEVICES

Temperature Control Services
4240 W 50 S
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SHEET
NCHS-123
JOB NUMBER:
J-2304001

INPUT / OUTPUT POINT TABLE

Point Name	Point Description	Hardware Points				
		AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
LL	Low Limit (Freezestat)		X			
OAD ES	OAD Damper Status		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
ST	Space Temp					X
SH	Space Humidity					X
S CO2	Space CO2					X
OCC	Occupied Flag					X
	POINT TOTALS:	**4**	**3**	**6**	**1**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-C3 POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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OUTDOOR AIR HANDLING UNIT AHU-C3 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT, FACE AND BYPASS DAMPER, AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND PREHEAT TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

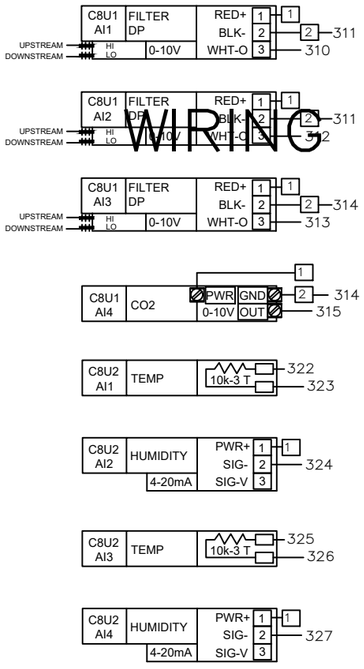
REVISIONS	
DATE	REMARKS

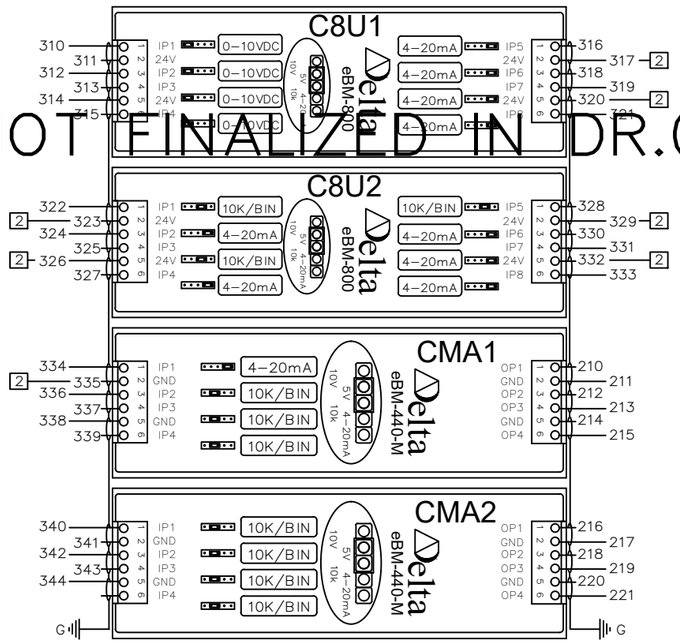
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

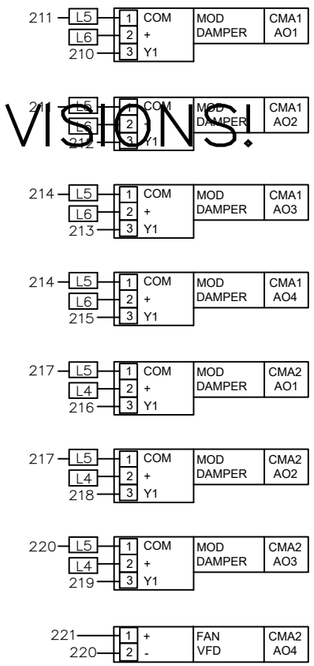
CONTRACT NO:

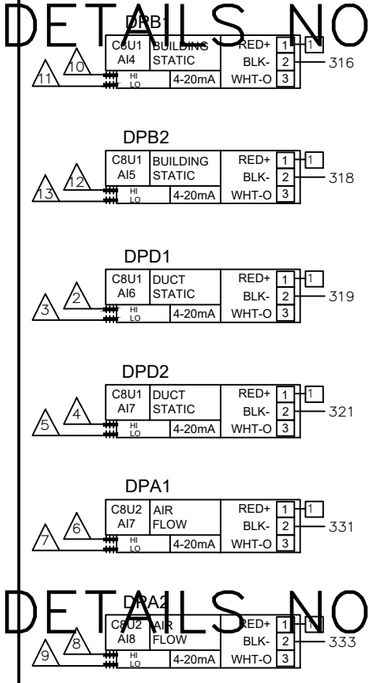
SHEET
NCHS-125
JOB NUMBER:
J-2304001

SYSTEM 18 CONTROL PANEL









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	INPUTS
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	INPUTS
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	INPUTS
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	INPUTS
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	INPUTS
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	INPUTS
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	INPUTS

C8U1 eBM-800 — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	INPUTS
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	INPUTS
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	INPUTS
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	INPUTS
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	INPUTS
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	INPUTS
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	INPUTS

C8U2 eBM-800 — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	INPUTS
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	INPUTS
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	INPUTS
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	OUTPUTS
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	OUTPUTS
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	OUTPUTS

CMA1 eBM-440-M — eBM-440-M I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	INPUTS
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	INPUTS
CMA2	4	10100.1404				INPUTS
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	OUTPUTS
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	OUTPUTS
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	OUTPUTS

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-C3 SYSTEM 18 PANEL – I/O WIRING (1 OF 2)

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
DATE	REMARKS

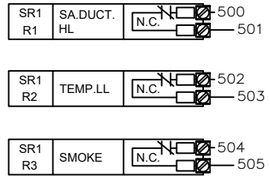
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

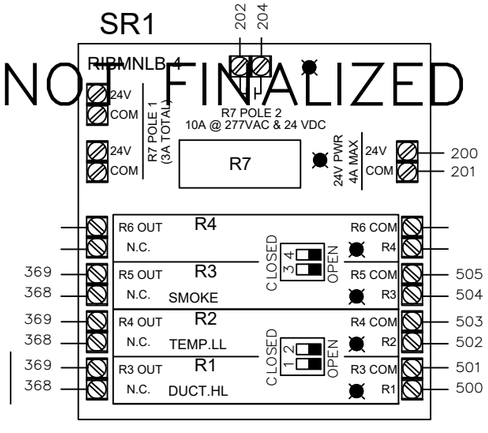
SHEET
NCHS-126
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!



SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4



INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-C3 SYSTEM 18 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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SHEET
NCHS-127
JOB NUMBER:
J-2304001

SYSTEM 18 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8 SW9 SW10
ON
SNS

ETS1

300 301 L3

V1+ V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202 204

200 201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 (N.O. CONTACT)

24V COM

R7

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED OPEN

TX1

24V CB 24V CB

Power Power

100 H C G L2 L3

120 VAC LAPTOP PWR

75VA 24VAC 24VAC 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L3 L2

PS1

101 1.0A

100 5.0A

G PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1

NET

PWR

24 VAC

LINKNET (RS-485)

201 200

CEB1

PWR

USB2

USB1

(NOT USED)

C8X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-440-M

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

AHU-C3 SYSTEM 18 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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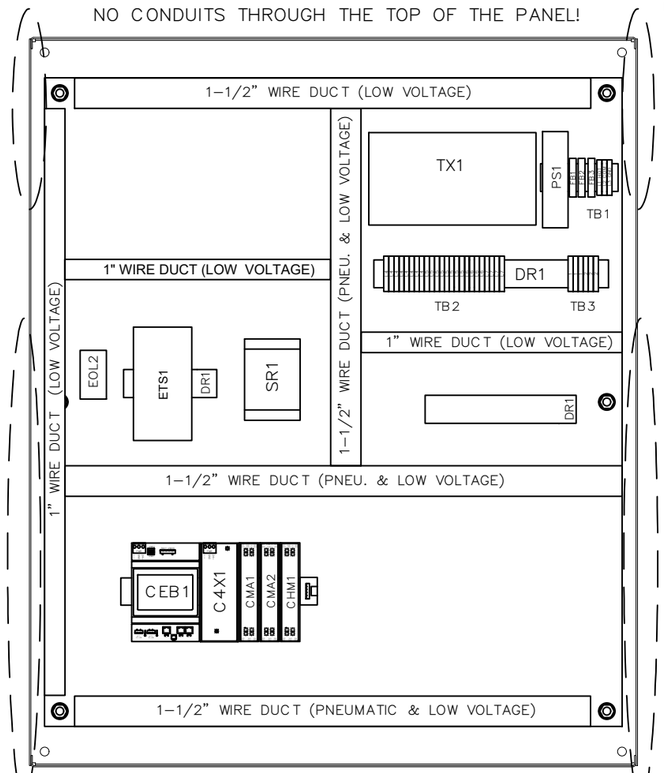
CONTRACT NO:

SHEET
NCHS-128
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 18 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

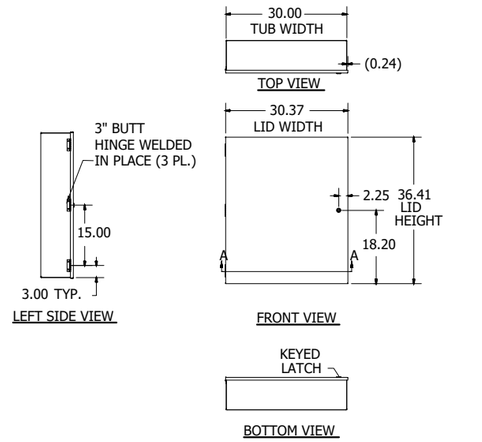
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

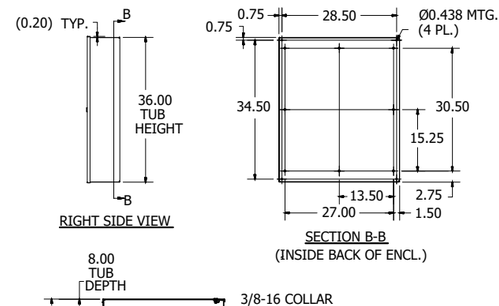
BILL OF MATERIALS

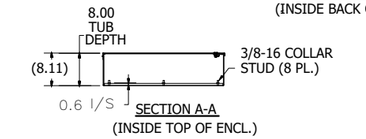
BILL OF MATERIALS

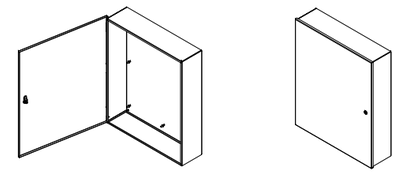
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

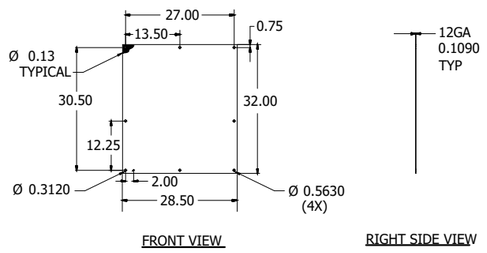








PANEL DIMENSIONS



AHU-C3 SYSTEM 18 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
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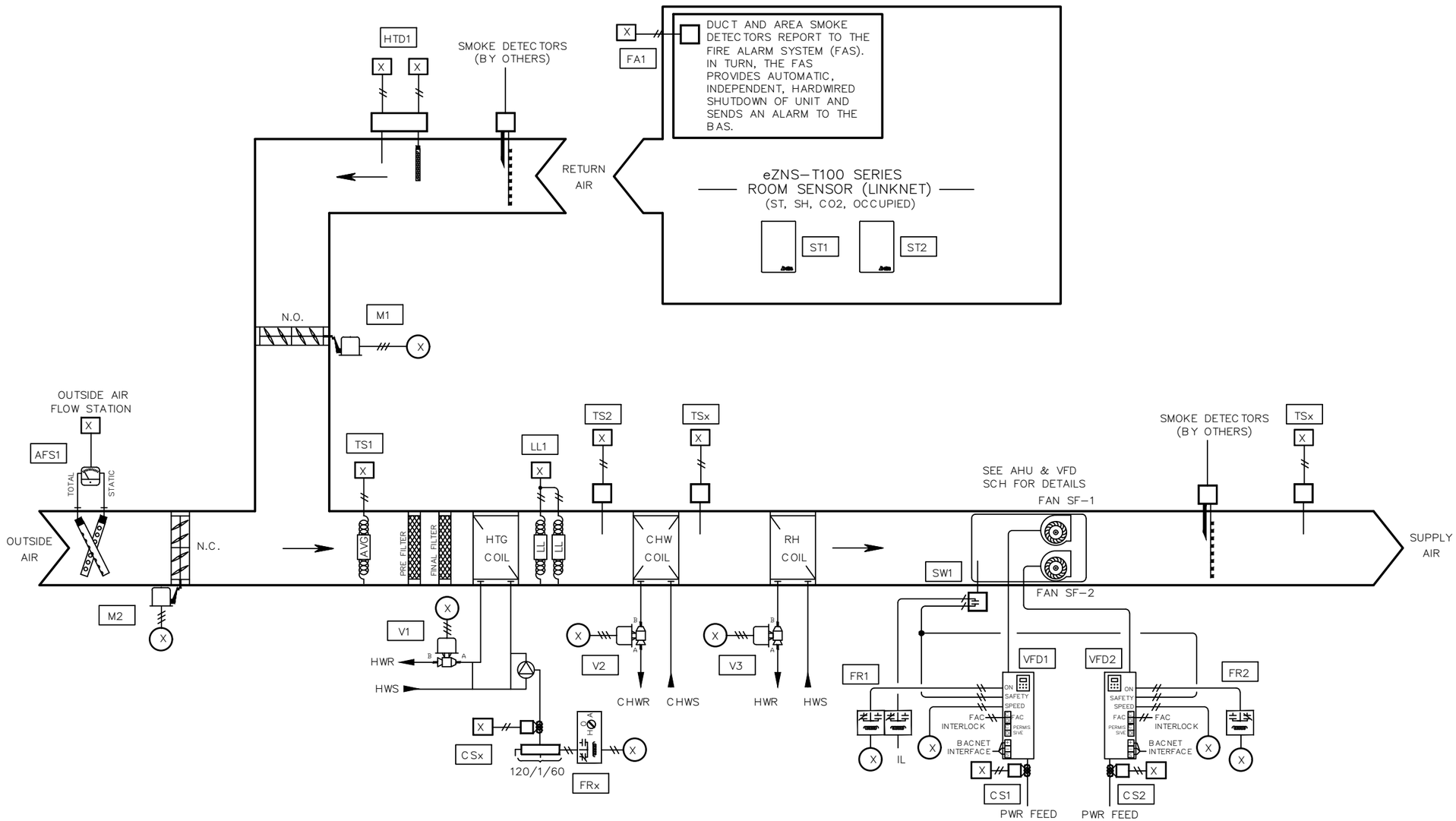
CONTRACT NO:

SHEET
NCHS–129
JOB NUMBER:
J–2304001

AHU-C5 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU-C5 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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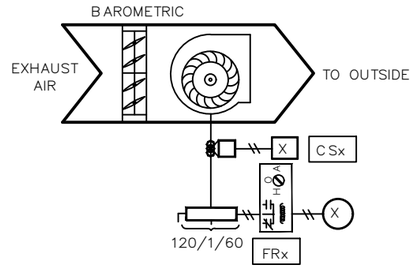
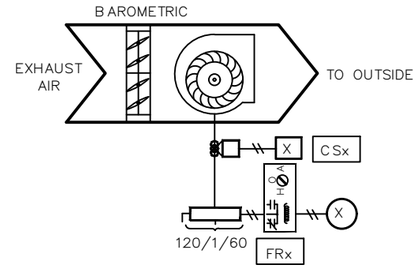
CONTRACT NO:

SHEET
NCHS-130
JOB NUMBER:
J-2304001

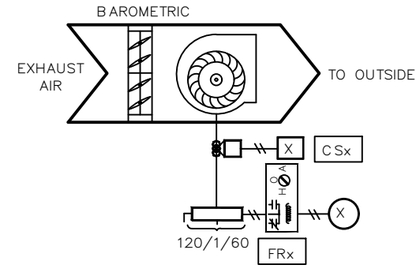
EXHAUST FAN – BAS CONTROLLED
EF–P1



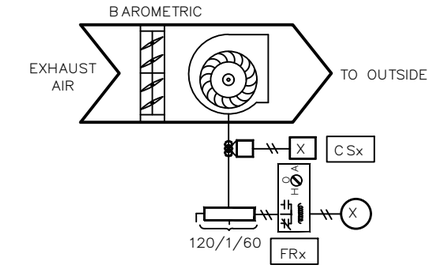
EXHAUST FAN – BAS CONTROLLED
EF–P2



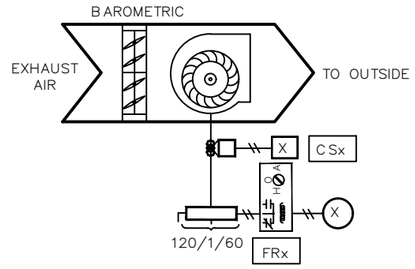
EXHAUST FAN – BAS CONTROLLED
EF–P3



EXHAUST FAN – BAS CONTROLLED
EF–P4



EXHAUST FAN – BAS CONTROLLED
EF–P5



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA C MISC FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
DATE	REMARKS

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DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–131
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

Point Name	Point Description	Hardware Points				
		AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-P1 STAT	Exhaust Fan P1 Status		X			
EF-P2 STAT	Exhaust Fan P2 Status		X			
EF-P3 STAT	Exhaust Fan P3 Status		X			
EF-P4 STAT	Exhaust Fan P4 Status		X			
EF-P5 STAT	Exhaust Fan P5 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF 1 STAT	Supply Fan 1 Status		X			
SF 2 STAT	Supply Fan 2 Status		X			
CWV	Chill Water Valve			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF 1 VFD	Supply Fan 1 VFD Speed			X		
SF 2 VFD	Supply Fan 2 VFD Speed			X		
EF-P1 SS	Exhaust Fan P1 Start / Stop				X	
EF-P2 SS	Exhaust Fan P2 Start / Stop				X	
EF-P3 SS	Exhaust Fan P3 Start / Stop				X	
EF-P4 SS	Exhaust Fan P4 Start / Stop				X	
EF-P5 SS	Exhaust Fan P5 Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF 1 SS	Supply Fan 1 Start / Stop				X	
SF 2 SS	Supply Fan 2 Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
ST2	Space Temp					X
SH3	Space Humidity					X
S CO22	Space CO2					X
OCC2	Occupied Flag					X
	POINT TOTALS:	**6**	**11**	**7**	**8**	**8**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-C5 & AREA C MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-132
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-C5 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFCn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN AVERAGE OF THE TWO ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

WHEN ECONOMIZER IS DISABLED, OUTSIDE AIR DAMPER SHALL BE CONTROLLED TO PROVIDE AT LEAST THE SCHEDULED MINIMUM OUTSIDE AIRFLOW AS MEASURED BY THE OUTSIDE AIRFLOW MEASURING STATION (OA-CFM) AT ALL TIMES.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2, ZN2-CO2) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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04/06/2023	ADD 3.3
	ISSUED FOR CONST
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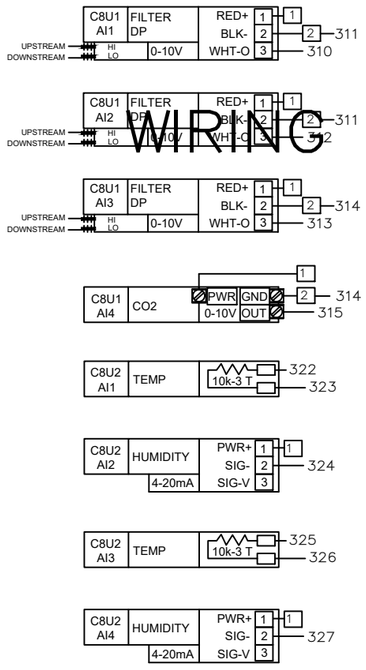
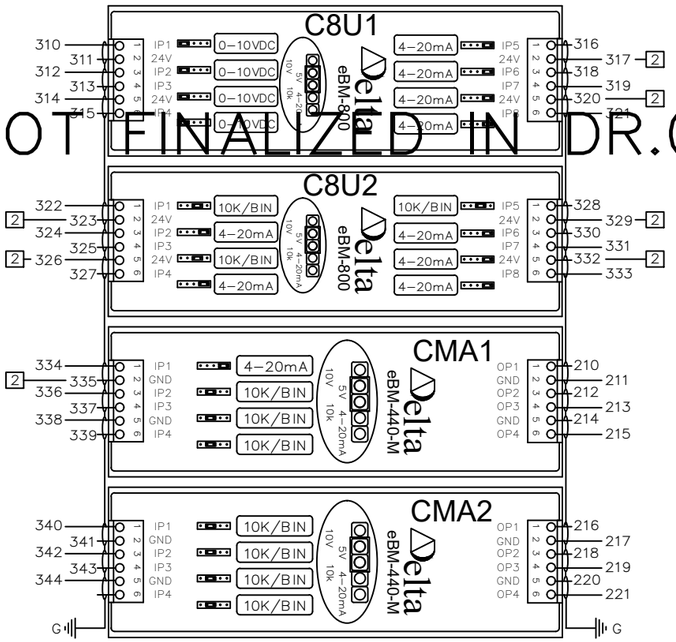
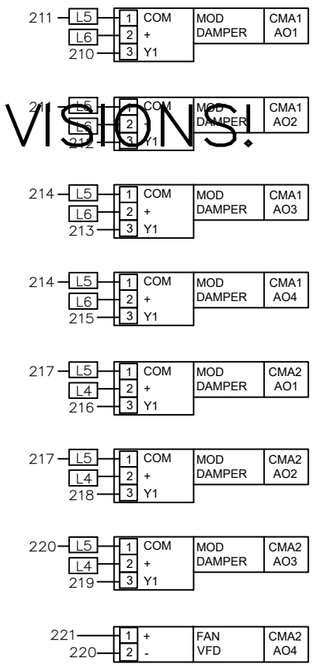
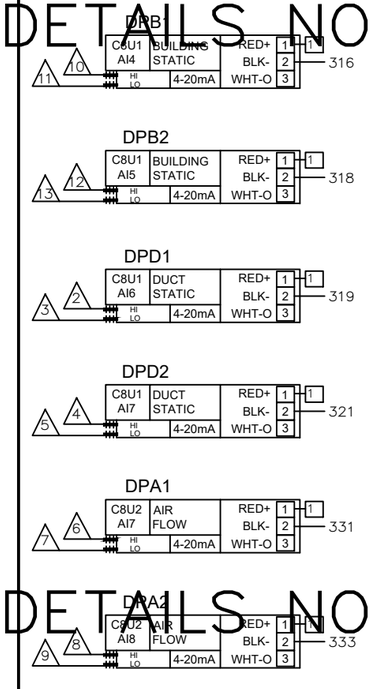
SYSTEM 19 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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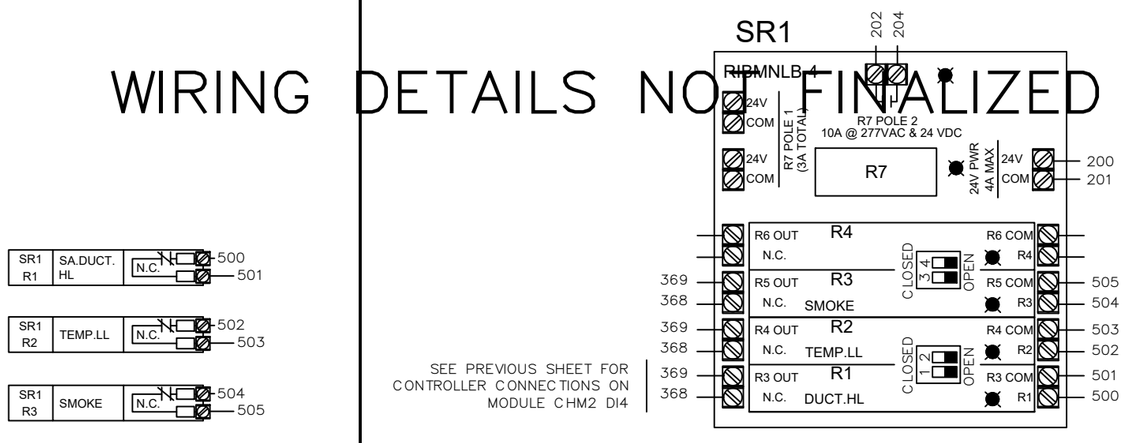

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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SYSTEM 19 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

GND

300
301
L3
ETS1
V1-
V1+
ETHERNET SWITCH
1
3
5
4
2
CAT5e

eZNS-T100 SERIES
ROOM SENSOR
POWER & NETWORK
WIRING

EOL 4

GND

ST1
NET
PWR

ST2
NET
PWR

24 VAC

LINKNET (RS-485)

SR1
RIBMNLB-4
202
204
200
201
24V COM
POWER 24 MAX
R7
R7 POLE 2 10A @ 277VAC & 24 VDC
R7 POLE 1 10A @ 277VAC & 24 VDC
R4 OUT N.C.
R4 COM
R4
R3 OUT N.C.
R3 COM
R3
CLOSED
OPEN
R2 OUT N.C.
R2 COM
R2
R1 OUT N.C.
R1 COM
R1

201
200
CEB1
C8X1
PWR
GND
24~
USB2
USB1
(NOT USED)
eBX
eBUS Address
eBUS
eBMGR-2
eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
I/O SHIELD DRAIN
L3
TO PANEL GND LUG

MS/TP
LINKNET (RS-485)
EOL3
GND

SEE RISER DIAGRAMS FOR LOCATION

TX1
24V CB
24V CB
Power
Power
100
L2
L3
H
C
G
75VA
24VAC
24VAC
120 VAC
LAPTOP PWR
200
201
CONTROLLER PWR
202
203
FIELD DEV POWER

24 VDC PWR
PWR
SUPPLY
+V
-V
GND
L
N
300
301
101
L2
L3
PS1

101
1.0A
100
5.0A
G
PANEL
GND LUG
TB1
L1
L2
L3
H
N
120 VAC

TB2
202
203
204
205
L4
L5
L6
L7
24 VAC TO FIELD

TB3
300
301
1
2
24 VDC TO FIELD

AHU-C5 SYSTEM 19 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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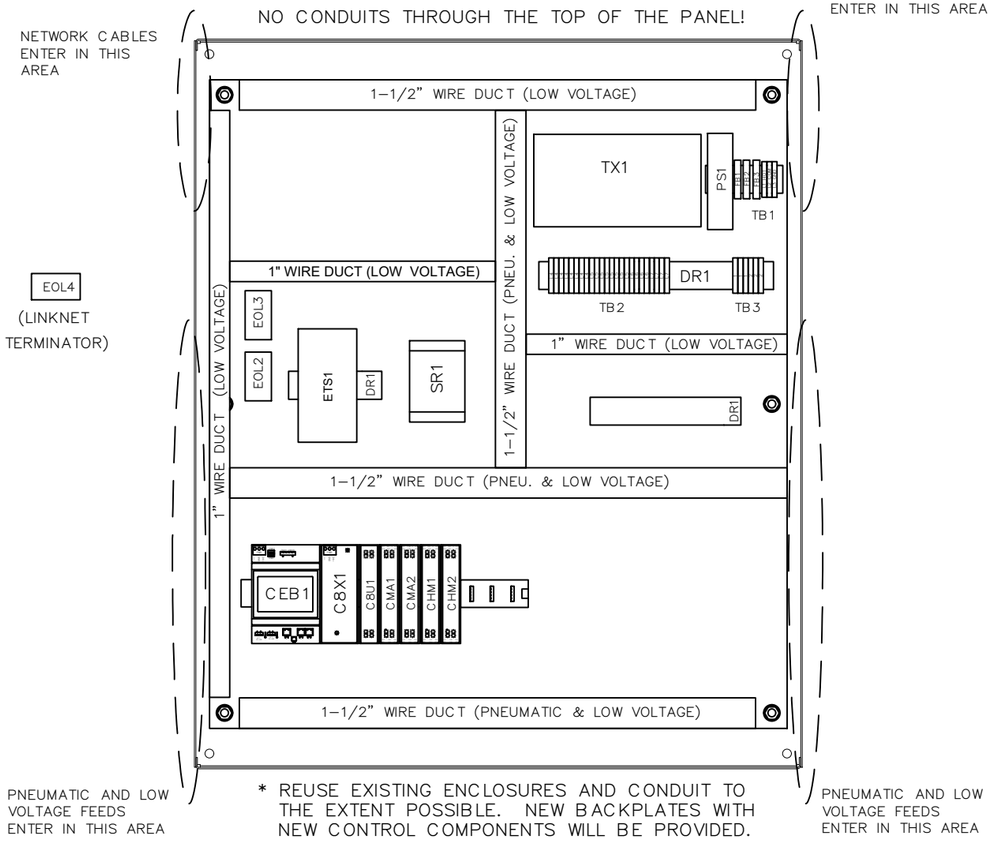
SYSTEM CONTROL PANEL 19 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

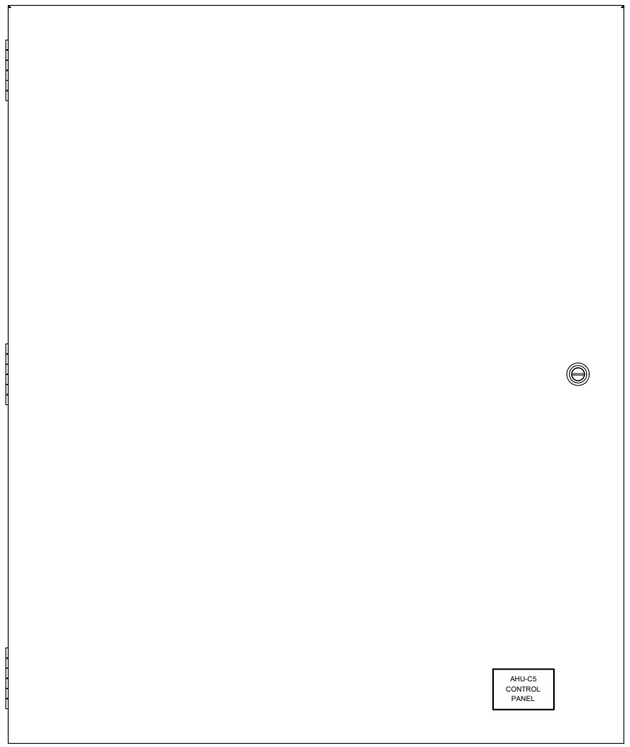


EOL4
(LINKNET TERMINATOR)

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

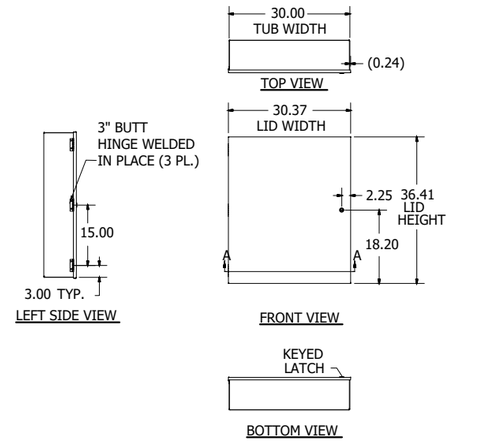


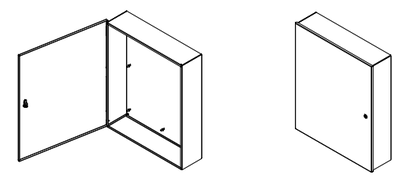
BILL OF MATERIALS

BILL OF MATERIALS

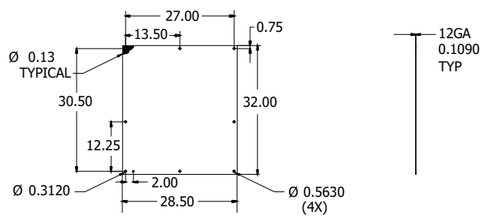
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)





PANEL DIMENSIONS



AHU-C5 SYSTEM 19 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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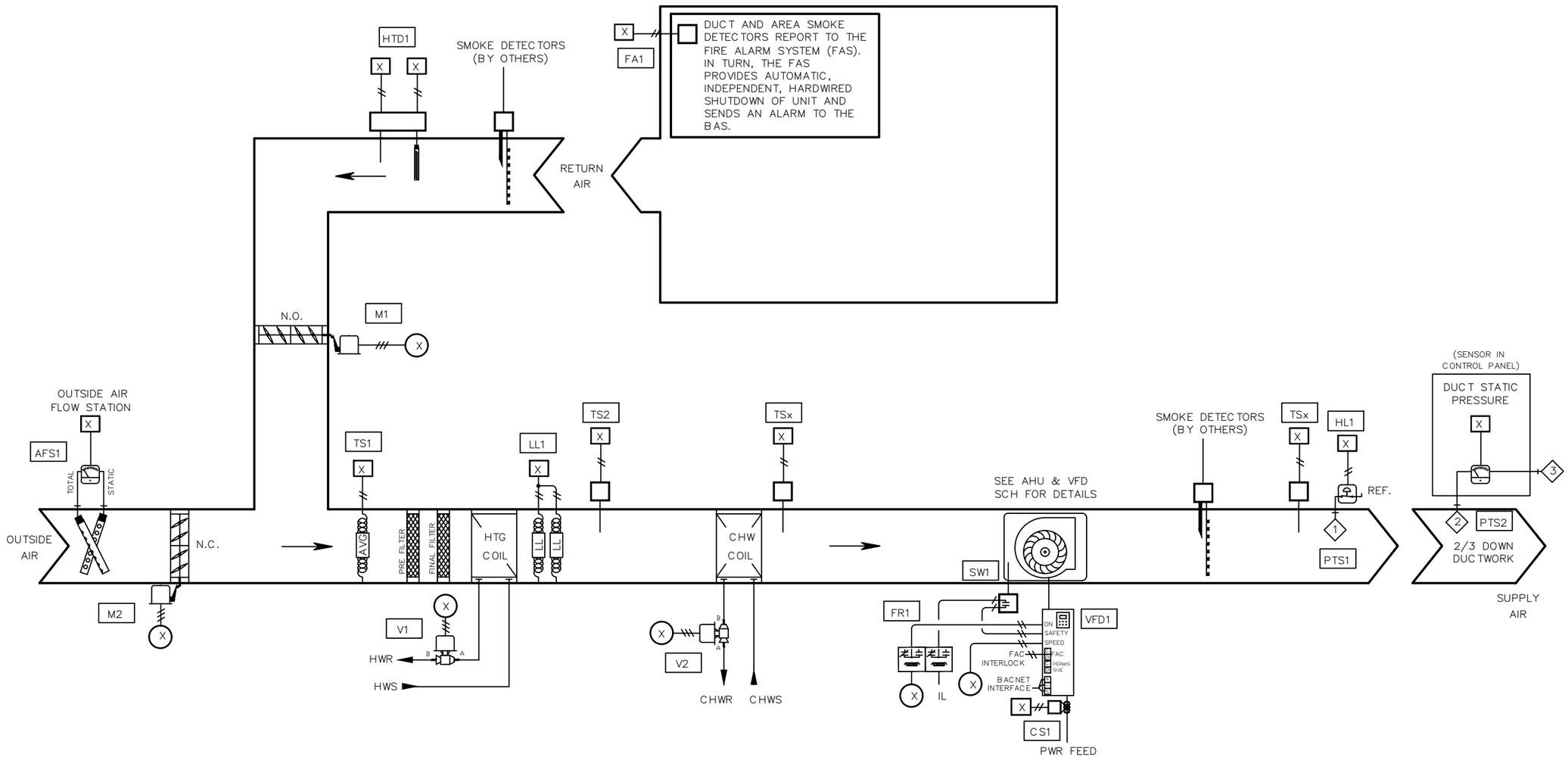
AHU–J1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–J1 FIELD DEVICES

Delta Controls

Temperature Control Services
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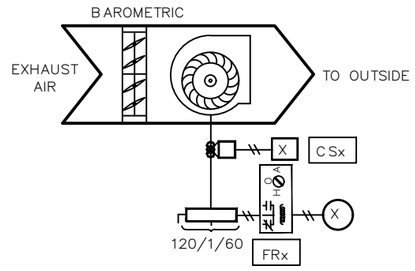
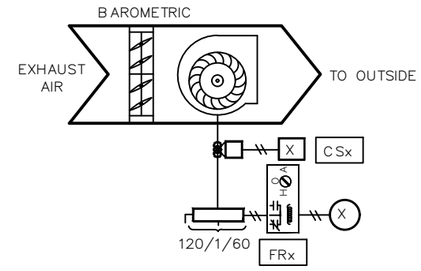
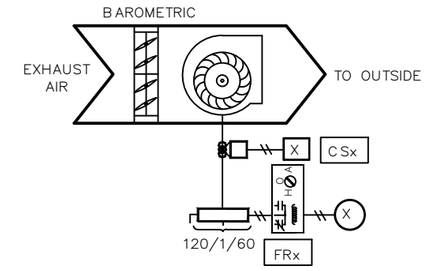
EXHAUST FAN – BAS CONTROLLED
EF–J1



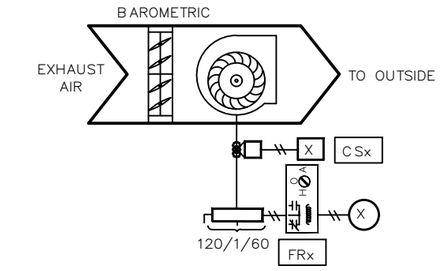
EXHAUST FAN – BAS CONTROLLED
EF–J2



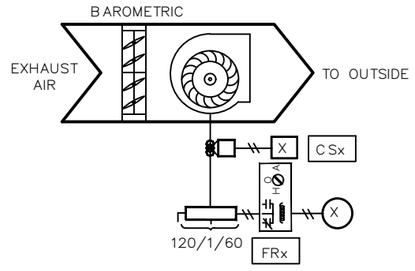
EXHAUST FAN – BAS CONTROLLED
EF–J3



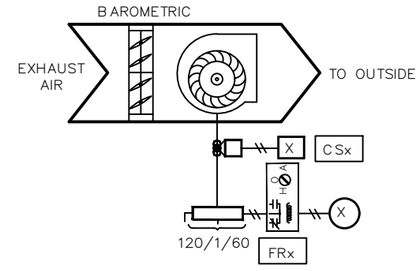
EXHAUST FAN – BAS CONTROLLED
EF–J4



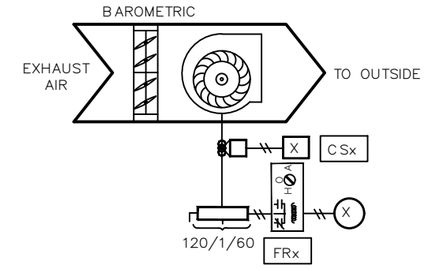
EXHAUST FAN – BAS CONTROLLED
EF–J5



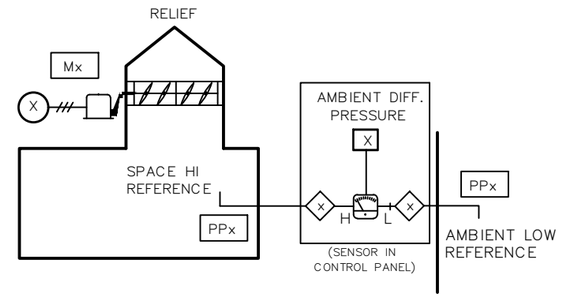
EXHAUST FAN – BAS CONTROLLED
EF–J6



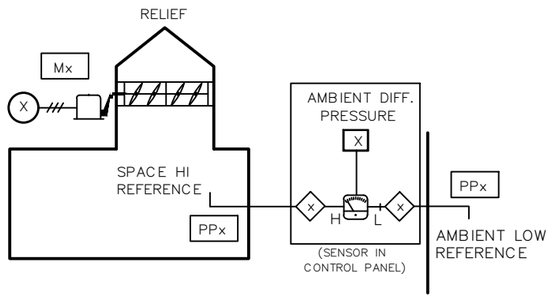
EXHAUST FAN – BAS CONTROLLED
EF–J7



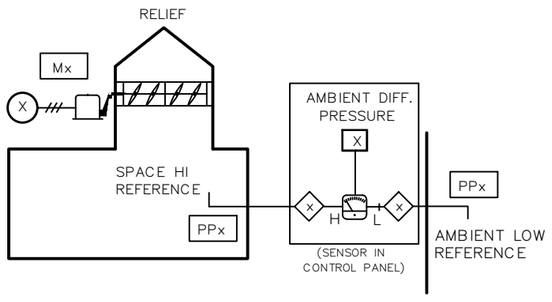
BUILDING PRESSURE CONTROL
E–IH–J1



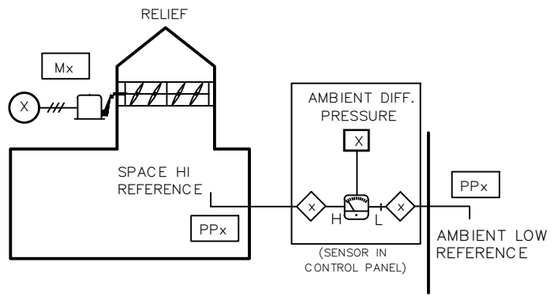
BUILDING PRESSURE CONTROL
E–RH–L1



BUILDING PRESSURE CONTROL
RH–J2



BUILDING PRESSURE CONTROL
RH–L2



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA J EXHAUST AND RELIEF FIELD DEVICES

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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REVISIONS	
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CONTRACT NO:

SHEET
NCHS–139
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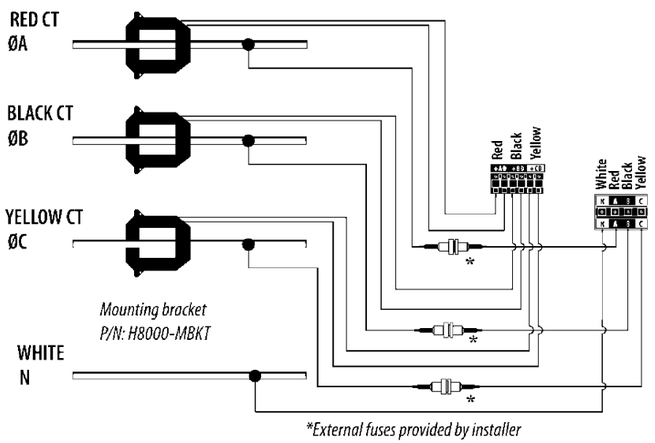
J–2304001

POWER METER HIGH VOLTAGE WIRING DETAIL

(FOR REFERENCE ONLY, NOT INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR SEVEN (7) METERS IN THIS AREA)

TYPICAL 208/480VAC, 4-WIRE, 3Ø INSTALLATION

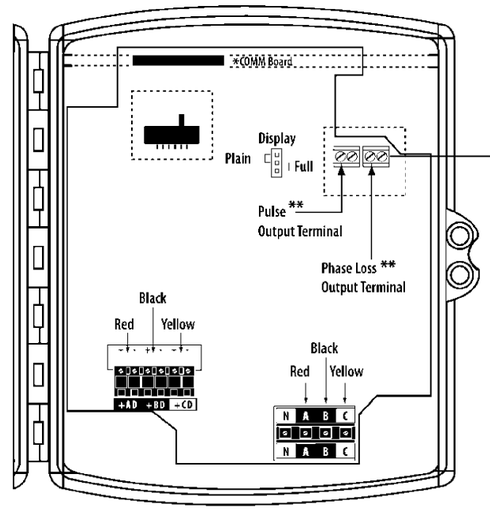


*External fuses provided by installer

(* PREVIOUS BAS DESIGN INDICATES VERIS AH04 TRIPLE FUSE KITS WERE INSTALLED)

POWER METER HIGH VOLTAGE WIRING DETAIL

(BACNET MS/TP COMMUNICATION AND PHASE LOSS MONITORING INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR SEVEN (7) METERS IN THIS AREA)



*COMM Board is Optional
**H8160 Series only

PHASE LOSS OUTPUT
(ONE CONNECTION PER METER)

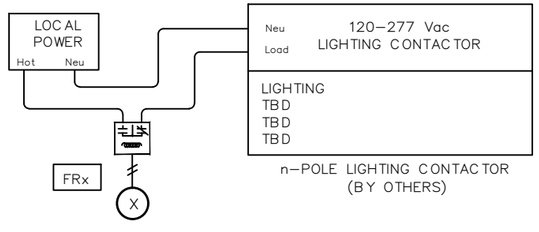
X	PL MTR3	(ELEC SWITCHGEAR RM)
X	PL MTR2	(ELEC SWITCHGEAR RM)
X	PL MTR1A	(ELEC SWITCHGEAR RM)
X	PL MTR1B	(ELEC SWITCHGEAR RM)
X	PL MTR4A	(ELEC SWITCHGEAR RM)
X	PL MTR4B	(ELEC SWITCHGEAR RM)
X	PL MTR MDPC	(CENT. PLANT)

COMMUNICATION
CARD
(IF INSTALLED)

+
–
S

BACNET
INTERFACE
(ONE CONNECTION PER METER)

LIGHTING CONTACTOR CONTROLS
RJ–1 – ROOM D147C



n–POLE LIGHTING CONTACTOR
(BY OTHERS)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA J LIGHTING AND PHASE LOSS MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
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NCHS–140
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB 1	Building Static Pressure 1	X				
DPB 2	Building Static Pressure 2	X				
DPB 3	Building Static Pressure 3	X				
DPB 4	Building Static Pressure 4	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-J1 STAT	Exhaust Fan J1 Status		X			
EF-J2 STAT	Exhaust Fan J2 Status		X			
EF-J3 STAT	Exhaust Fan J3 Status		X			
EF-J4 STAT	Exhaust Fan J4 Status		X			
EF-J5 STAT	Exhaust Fan J5 Status		X			
EF-J6 STAT	Exhaust Fan J6 Status		X			
EF-J7 STAT	Exhaust Fan J7 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PL MTR3	Phase Loss Elec Rm MDPA Left		X			
PL MTR2	Phase Loss Elec Rm MDPA Rt		X			
PL MTR1A	Phase Loss Elec Rm MDPB Left A		X			
PL MTR1B	Phase Loss Elec Rm MDPB Left B		X			
PL MTR4A	Phase Loss Elec Rm MDPB Rt A		X			
PL MTR4B	Phase Loss Elec Rm MDBP Rt B		X			
PL MTR MDPC	Phase Loss Cent Plant MDPC		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-IH-J1 DPR	Relief Air Damper			X		
E-RH-L1	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-J2	Relief Air Damper			X		
RH-L2	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-J1 SS	Exhaust Fan J1 Start / Stop				X	
EF-J2 SS	Exhaust Fan J2 Start / Stop				X	
EF-J3 SS	Exhaust Fan J3 Start / Stop				X	
EF-J4 SS	Exhaust Fan J4 Start / Stop				X	
EF-J5 SS	Exhaust Fan J5 Start / Stop				X	
EF-J6 SS	Exhaust Fan J6 Start / Stop				X	
EF-J7 SS	Exhaust Fan J7 Start / Stop				X	
LTG 1	Lighting Contactor - Rm D147C RJ-1				X	
SF SS	Supply Fan Start / Stop					
	POINT TOTALS:	**11**	**18**	**9**	**8**	**0**

SOFTWARE AND NETWORK (NON–PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-J1 AND AHU-J2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFJn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

ELECTRICAL UTILITY POWER MONITORING:

TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS.

Delta Controls
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4240 W 50 S
LEBANON, INDIANA 46052
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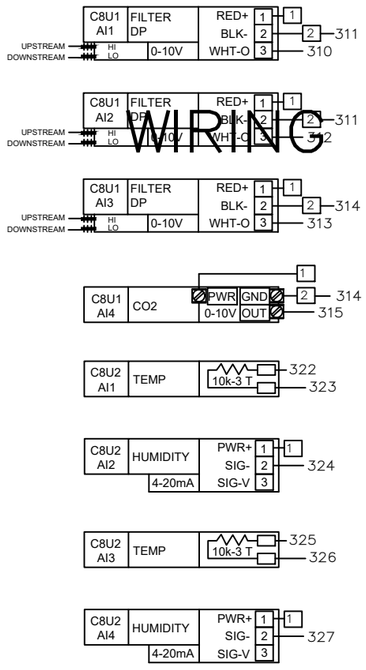
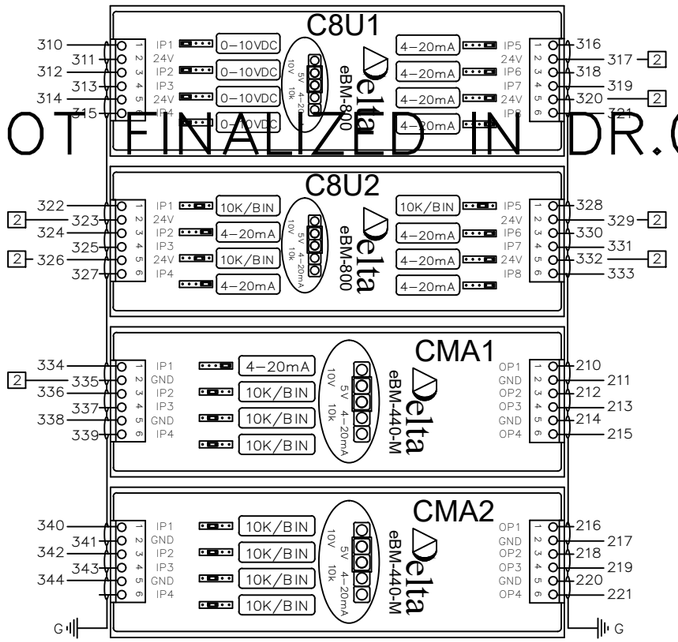
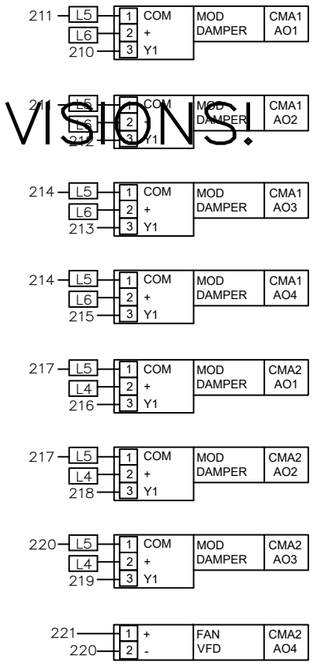
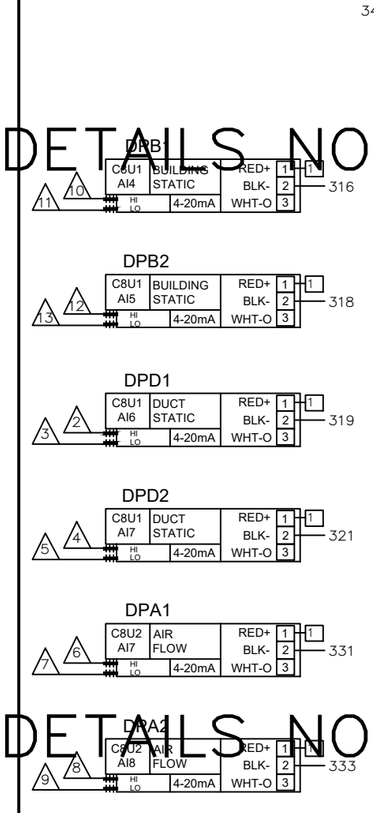
SYSTEM 20 CONTROL PANEL









WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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C8U1 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

eBM-800 I/O MODULE — C8U1 eBM-800

C8U2 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

eBM-800 I/O MODULE — C8U2 eBM-800

CMA1 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

eBM-440-M I/O MODULE — CMA1 eBM-440-M

CMA2 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

eBM-440-M I/O MODULE — CMA2 eBM-440-M

AHU-J1 SYSTEM 20 PANEL – I/O WIRING (1 OF 3)

Delta CONTROLS
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4240 W 50 S
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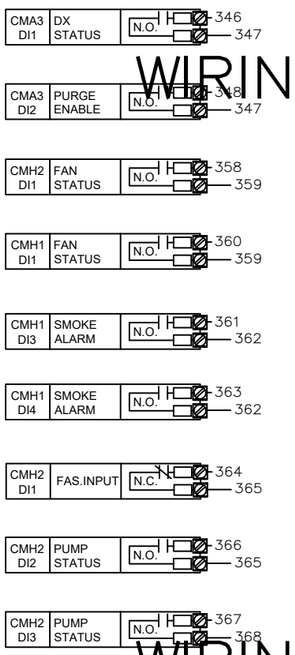
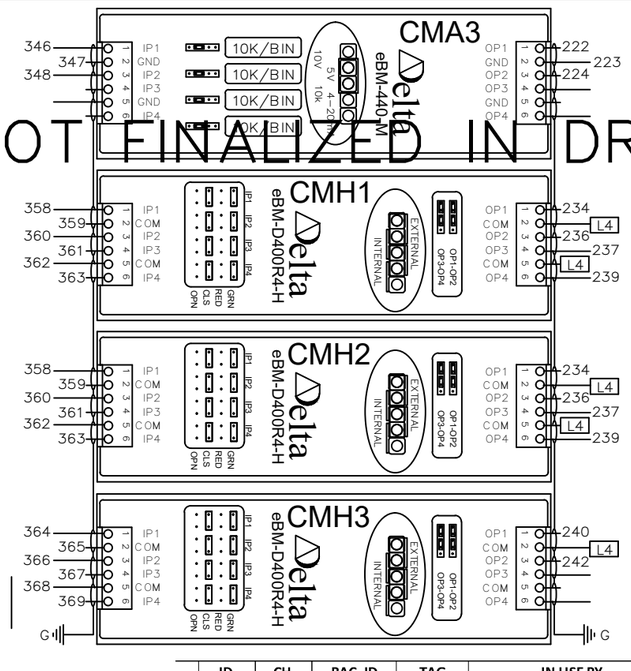
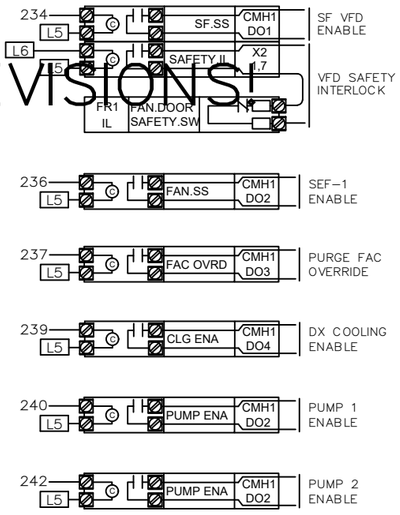




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	LOOP HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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JOB TITLE: North Central High School
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–144
JOB NUMBER:
J–2304001

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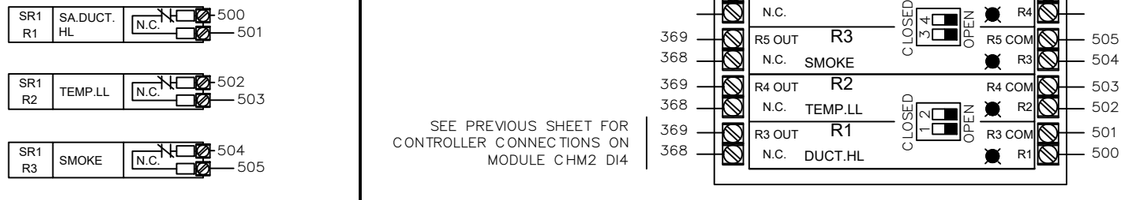

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

Delta Controls

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SYSTEM 20 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TRANSFORMER

102 L2

206 207

TX1

24V CB Power

24V CB Power

100 L2 L3 H C G

75VA 24VAC 24VAC

120 VAC LAPTOP PWR

75VA 24VAC 24VAC

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L2 L3

PS1

102 4.0A

101 1.0A

100 5.0A

G PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

206 L8 L8 L8

207 L9 L9 L9

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

ETS1

300 301 L3

V1− V1+

ETHERNET SWITCH

1 2 3 4 5

CAT5e

SR1

RIBMNLB-4

202 204

200 201

24V COM POWER 44 MAX

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 (NORMALLY OPEN)

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED OPEN

DPD1 DPB1 DPB2 DPB3 DPB4

1

Power + GND / 4-20mA out - Voltage out O

HIGH LOW

2 3 4 5 6 7 8 9 10 11

PNEUMATIC

CEB1

201 200

PWR

USB2 USB1

(NOT USED)

C8X1

201 200

PWR

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485 NET2 RS-485

eBM-800 eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H

OP1 OP2 OP3 OP4

I/O SHIELD DRAIN

TO PANEL GND LUG

L3

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

AHU-J1 SYSTEM 20 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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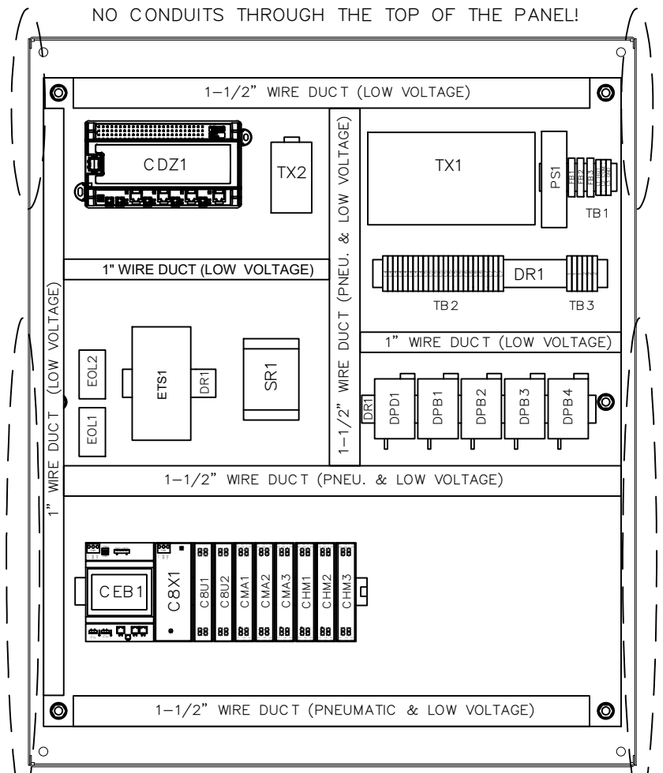
J-2304001

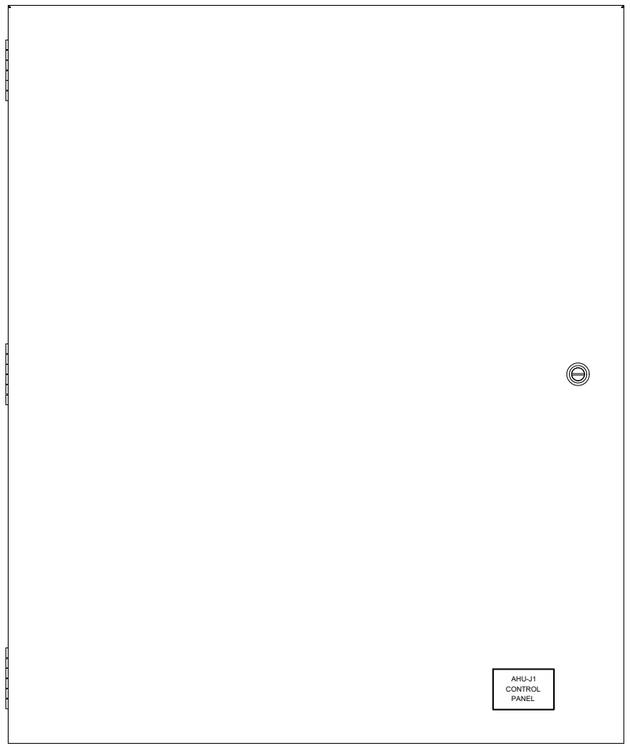
SYSTEM CONTROL PANEL 20 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

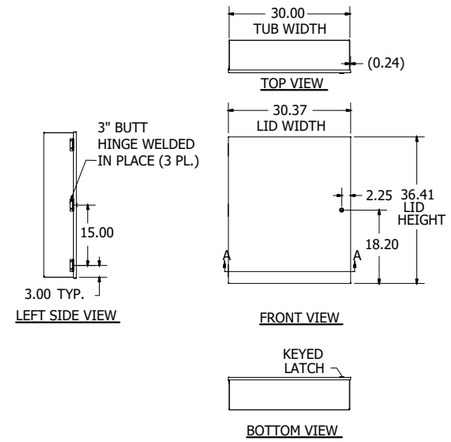
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

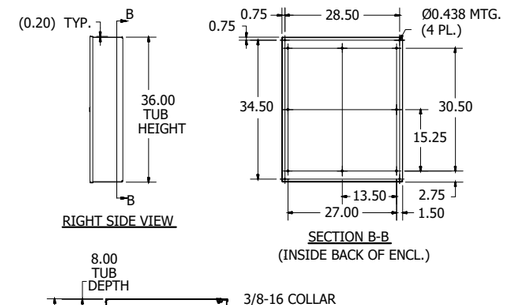
BILL OF MATERIALS

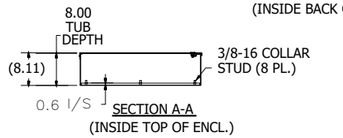
BILL OF MATERIALS

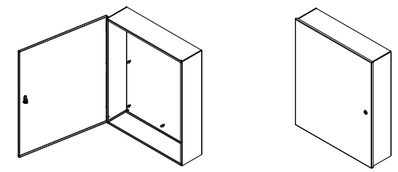
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

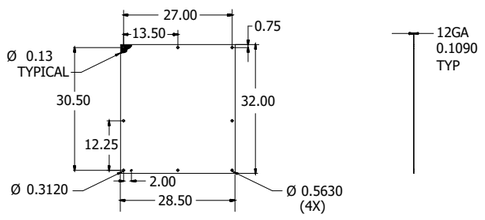








PANEL DIMENSIONS



AHU–J1 SYSTEM 20 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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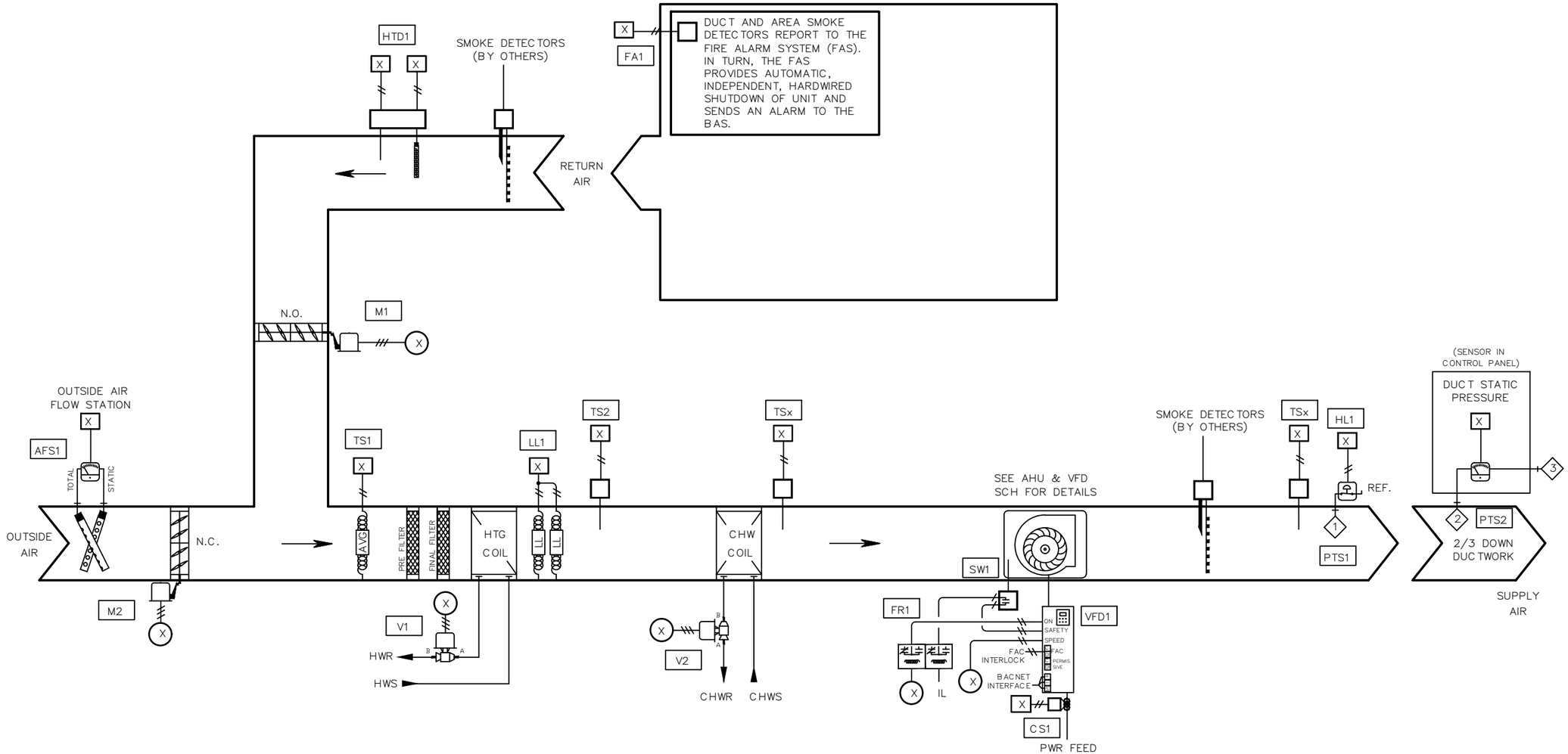
AHU–J2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–J2 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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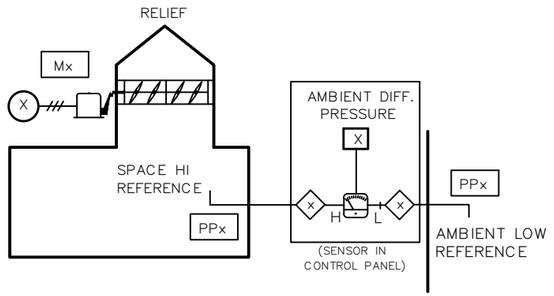
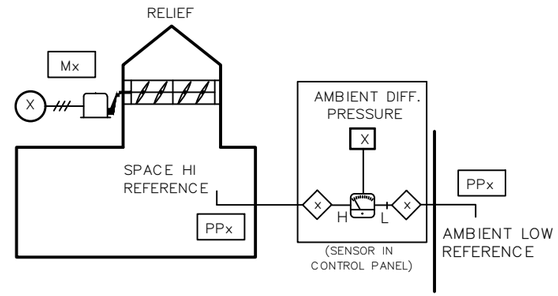
BUILDING PRESSURE CONTROL
E–IH–J2



BUILDING PRESSURE CONTROL
E–RH–J3



BILL OF MATERIAL

NETWORK POINTS

(N1) THROUGH (Nx)

AREA J RELIEF FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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NCHS–149
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB 1	Building Static Pressure 1	X				
DPB 2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-IH-J2 DPR	Relief Air Damper			X		
E-RH-J3 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**9**	**4**	**7**	**1**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-J2 & AREA J MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS-150
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-J1 AND AHU-J2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFJn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

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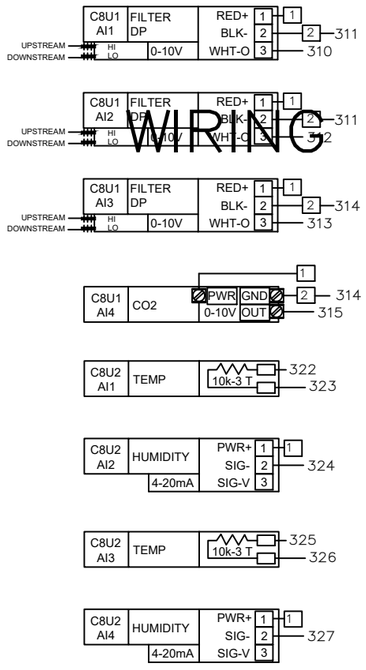
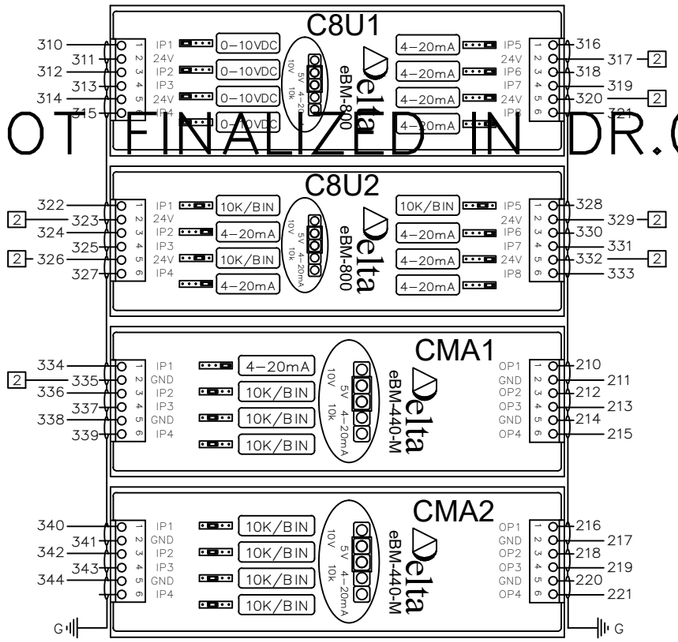
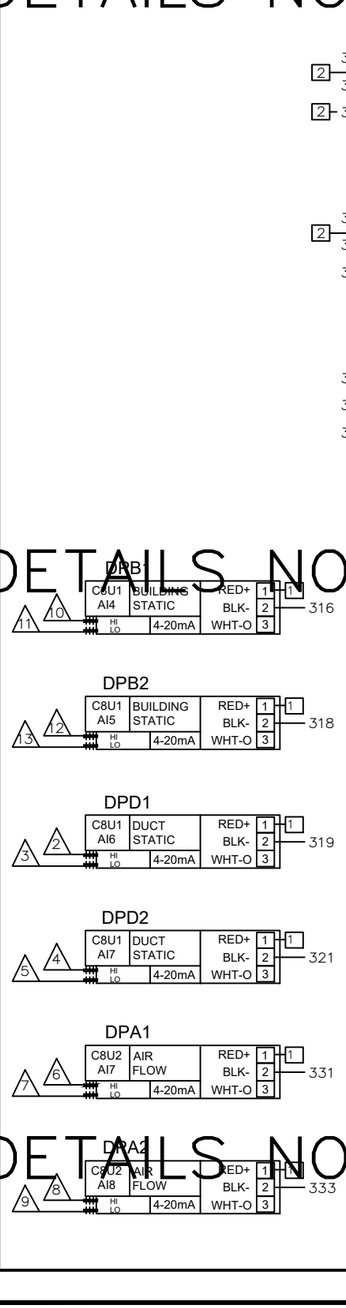
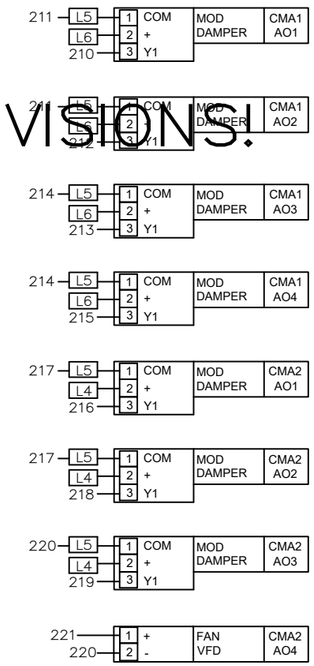
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-J2 SYSTEM 21 PANEL – I/O WIRING (1 OF 2)

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-152
JOB NUMBER:
J-2304001

SYSTEM 21 CONTROL PANEL

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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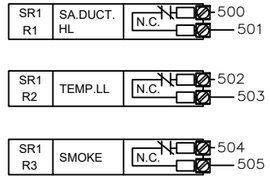
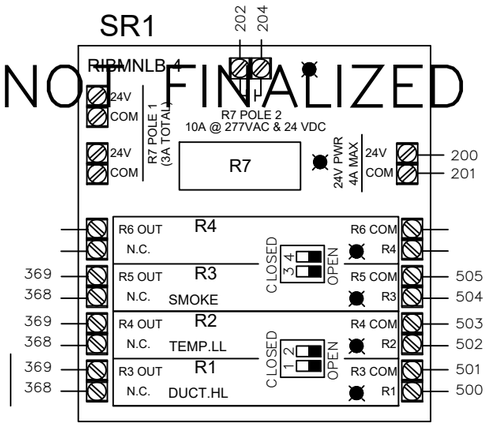


SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4



WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU-J2 SYSTEM 21 PANEL – I/O WIRING (2 OF 2)

Delta Controls
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PHONE: 765.481.8510
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UPDATES	
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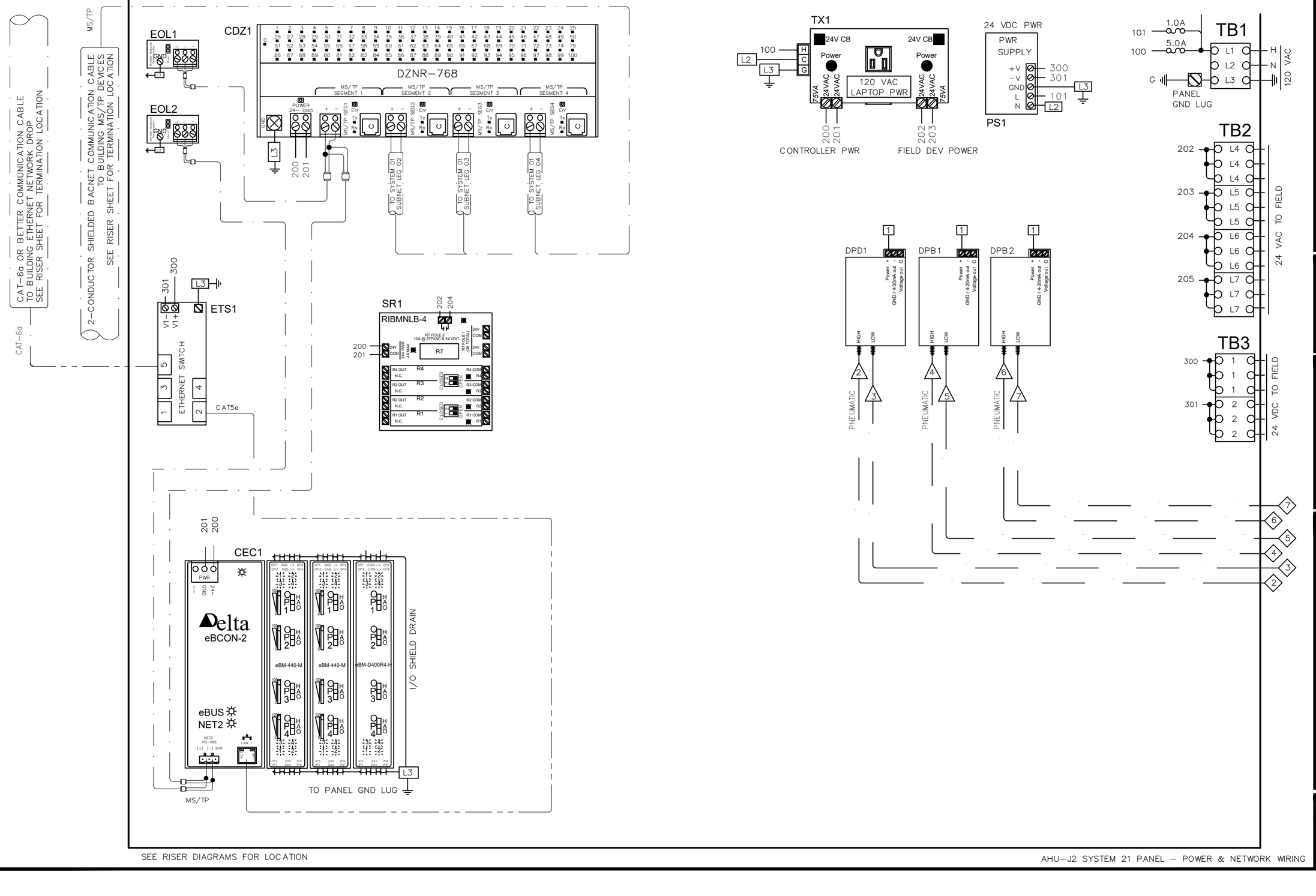
SHEET
NCHS-153
JOB NUMBER:
J-2304001

SYSTEM 21 CONTROL PANEL

PANEL _____
CIRCUIT _____



SEE RISER DIAGRAMS FOR LOCATION

AHU-J2 SYSTEM 21 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS-154
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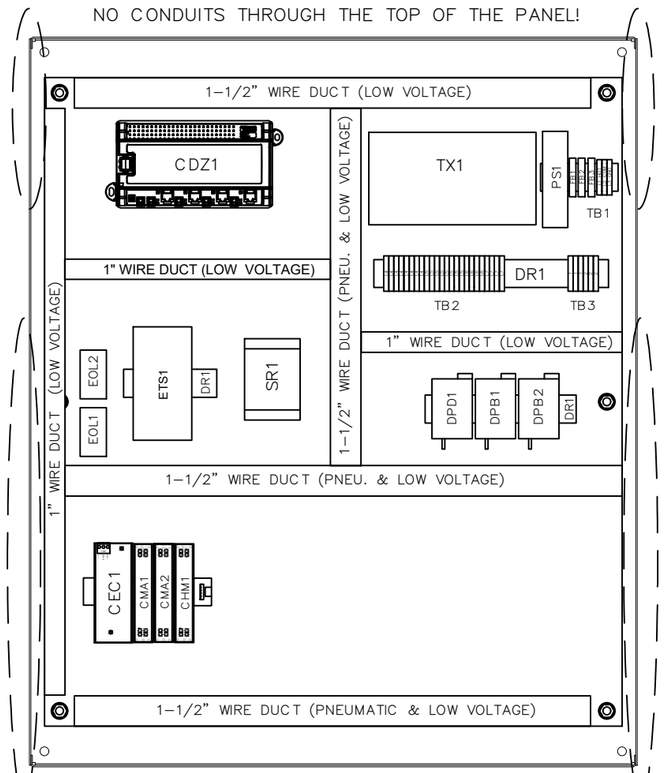
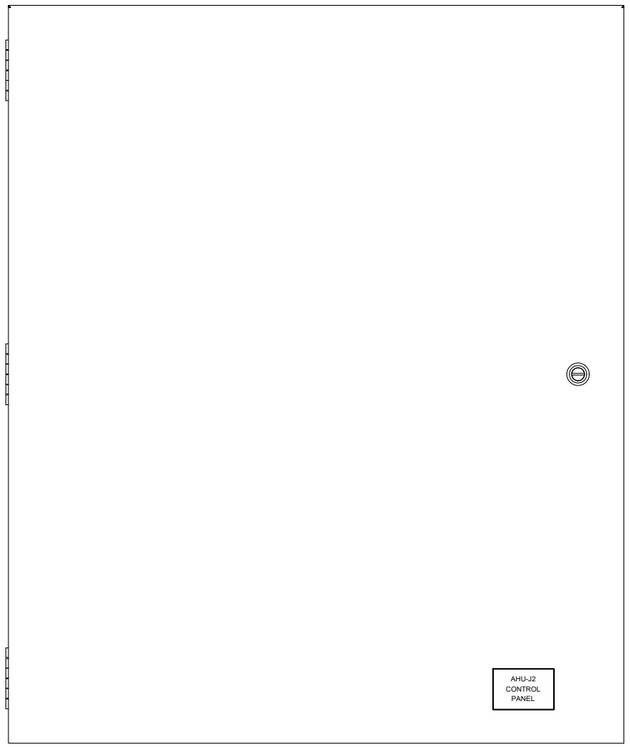
SYSTEM CONTROL PANEL 21 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

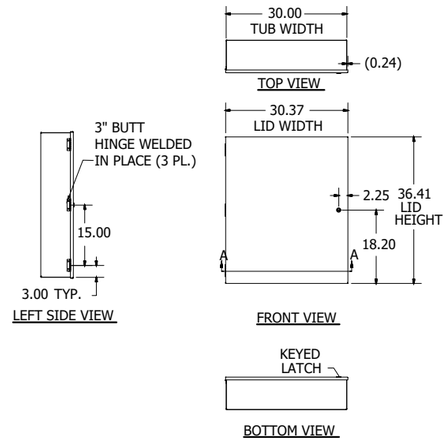
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

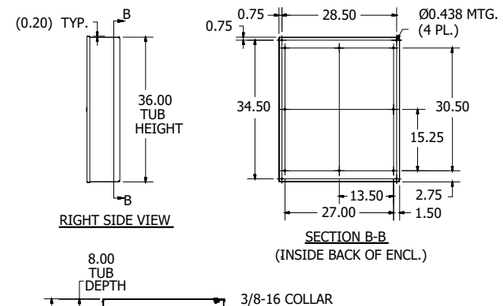
BILL OF MATERIALS

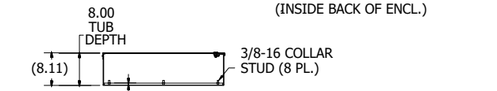
BILL OF MATERIALS

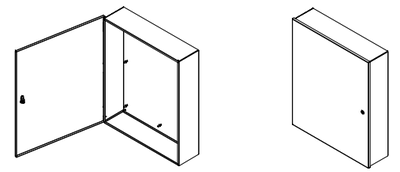
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

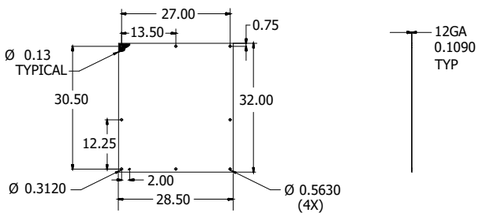








PANEL DIMENSIONS



Delta Controls
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UPDATES	
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REVISIONS	
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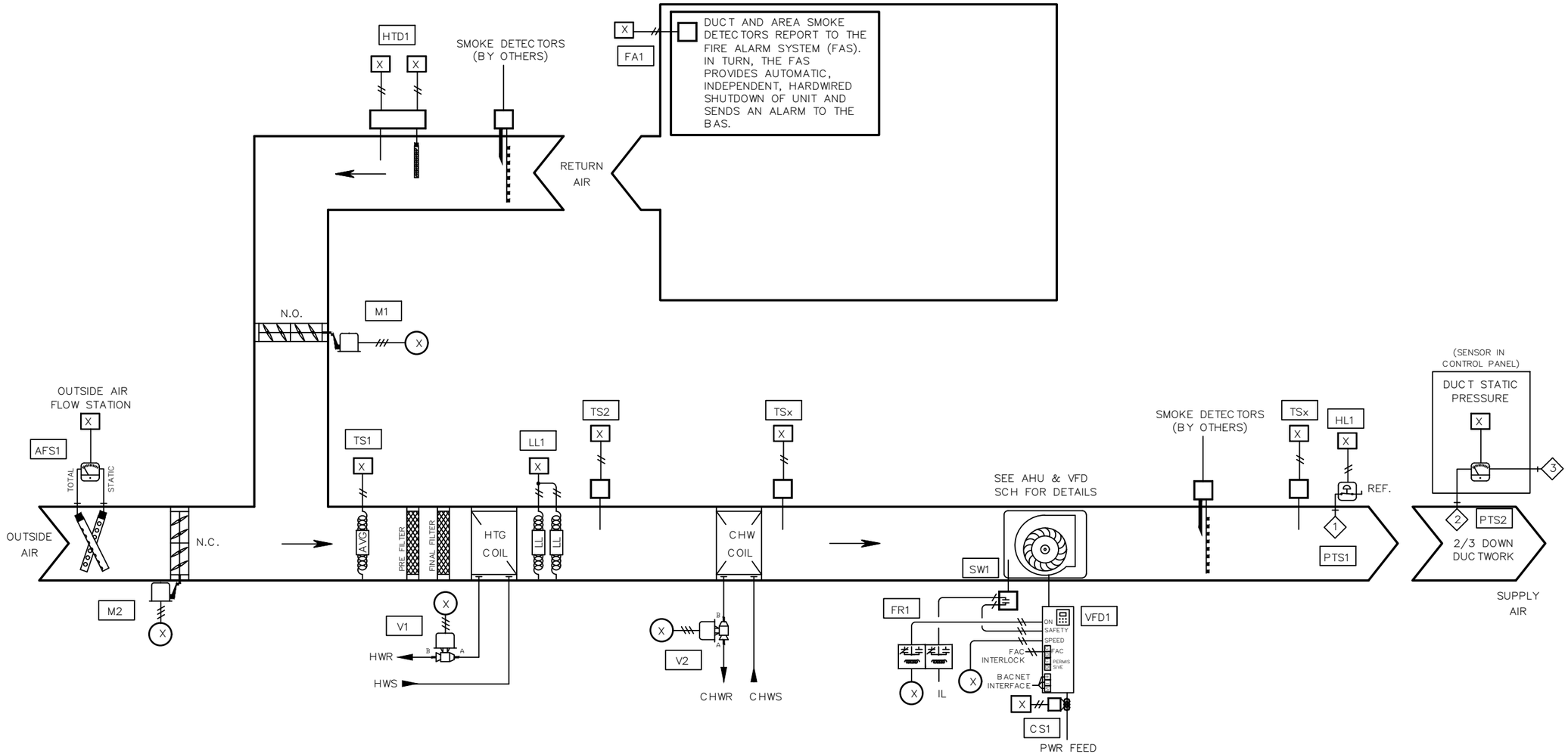
CONTRACT NO:

SHEET
NCHS–155
JOB NUMBER:
J–2304001

AHU–J3 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–J3 FIELD DEVICES

Delta Controls

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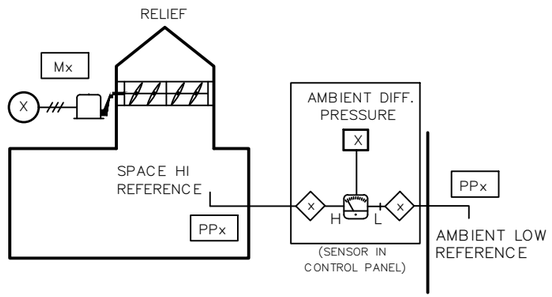
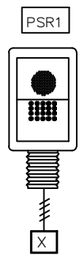
BUILDING PRESSURE CONTROL
E–RH–J1

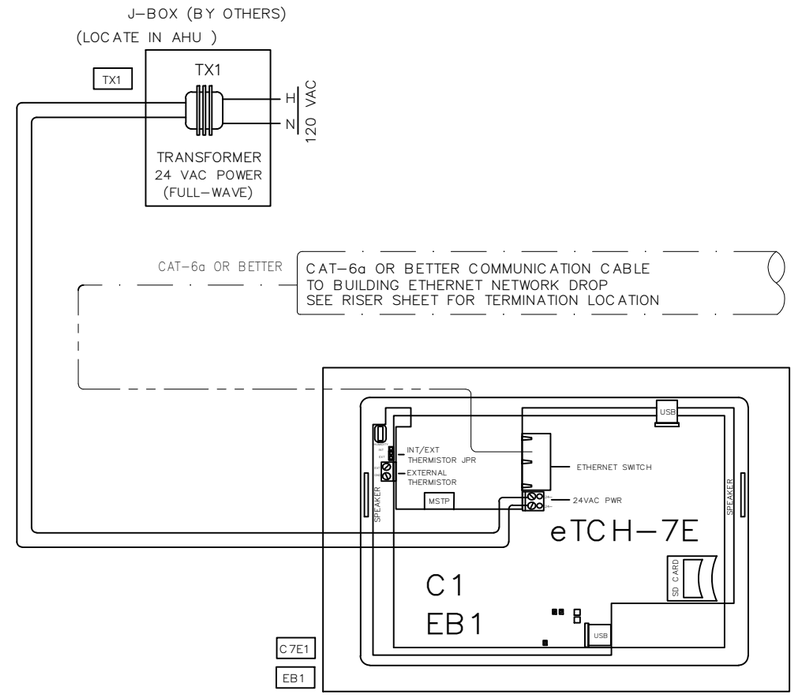


LIGHTING CONTACTOR CONTROLS

PHOTOCELL



TOUCHSCREEN LOCAL INTERFACE – AT AHU–J3
(LOCATE IN LOW–VOLTAGE CONTROLS ENCLOSURE AT THE UNIT.)



SEE RISER DIAGRAMS FOR TOUCHSCREEN CONTROLLER LOCATION

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AHU–J3 TOUCHSCREEN & AREA J RELIEF FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS–157
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB 1	Building Static Pressure 1	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PSR	Photocell		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-J1 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**8**	**5**	**6**	**1**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-J3 SEQUENCE OF OPERATION

TCC SHALL PROVIDE NEW TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER. CIC IS RESPONSIBLE FOR INSTALLATION OF PANEL AND WIRING. DIVISION 26 CONTRACTOR TO BRING POWER TO THE PANEL ON A DEDICATED CIRCUIT.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

LOCAL CONTROLLER DISPLAY:

TCC SHALL PROVIDE AND CIC SHALL INSTALL NEW LOCAL CONTROLLER DISPLAY AT THE AIR HANDLING UNIT TO SUPPORT LOCAL OPERATION AS CONTROL ENCLOSURE WILL BE LOCATED REMOTELY BELOW THE ROOF.

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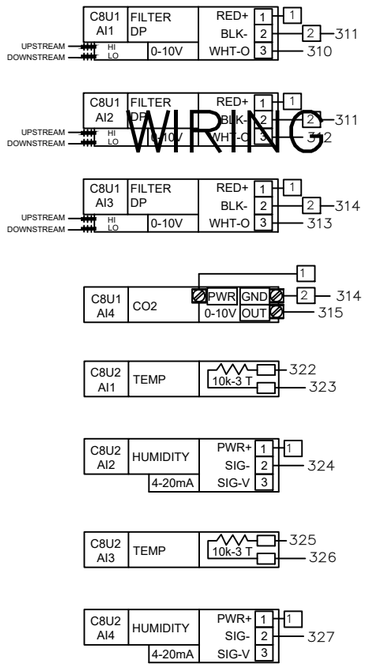
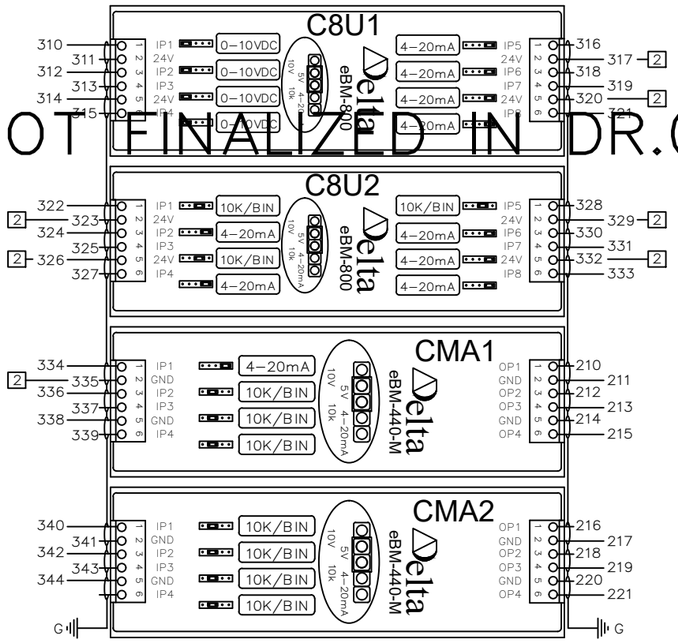
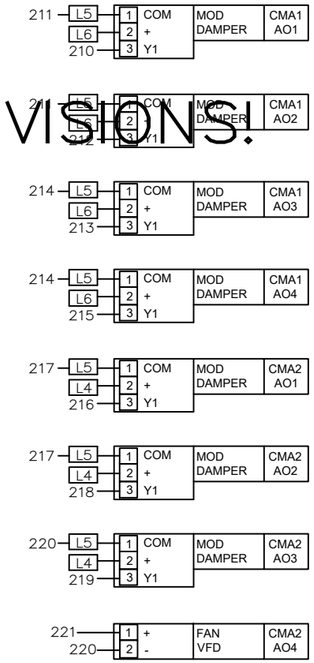
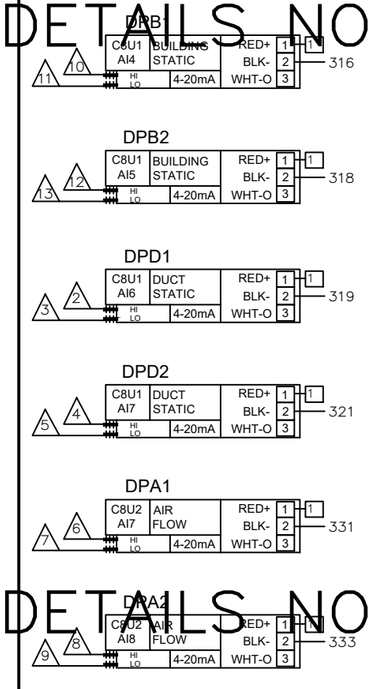
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-J3 SYSTEM 22 PANEL – I/O WIRING (1 OF 2)

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

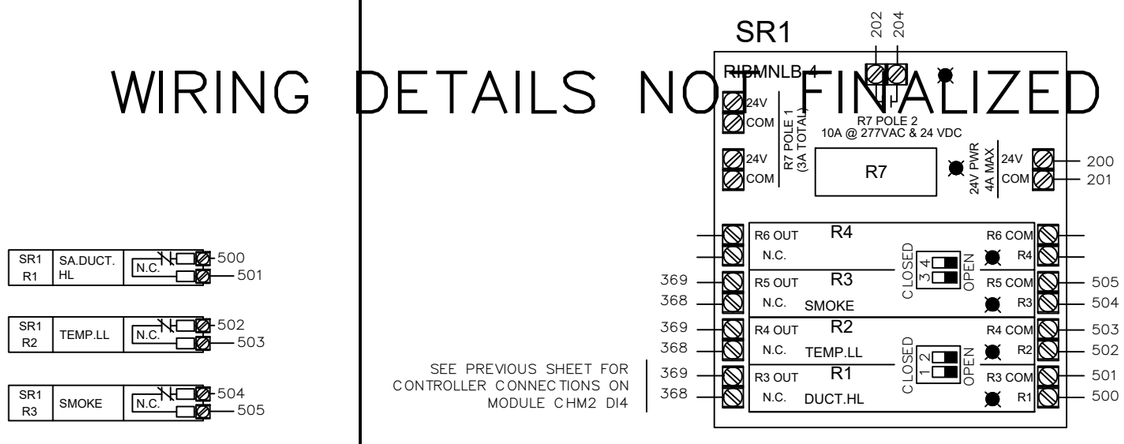
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-160
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!



WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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REVISIONS	
DATE	REMARKS

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DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-161
JOB NUMBER:
J-2304001

SYSTEM 22 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

CAT-6a

300
301

ETS1

V1-
V1+

ETHERNET SWITCH

1 2 3 4 5

CAT5e

CAT-6a

eTCH NETWORK DISPLAY

eTCH-7E

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 10A @ 277VAC

R7

R4 OUT N.C.
R4 COM
R4

R3 OUT N.C.
R3 COM
R3

R2 OUT N.C.
R2 COM
R2

R1 OUT N.C.
R1 COM
R1

CLOSED
OPEN

TX1

24V CB
24V CB

Power
Power

H
C
G

100
L2
L3

120 VAC LAPTOP PWR

24VAC
24VAC
75VA

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
5.0A
101
100
G

PANEL GND LUG

TB1

L1
L2
L3

H
N
120 VAC

TB2

202
203
204
205

L4
L4
L4
L5
L5
L5
L6
L6
L6
L7
L7
L7

24 VAC TO FIELD

TB3

300
301

1
1
1
2
2
2

24 VDC TO FIELD

DPD1

DPB1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2
3
4
5

CEC1

201
200

PWR
24~
GND

Delta
eBCON-2

eBUS
NET2

NET2 RS-485
[+] [-] SHD

LAN

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H

OP1 OP2 OP3 OP4

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

AHU-J3 SYSTEM 22 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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REVISIONS	
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DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

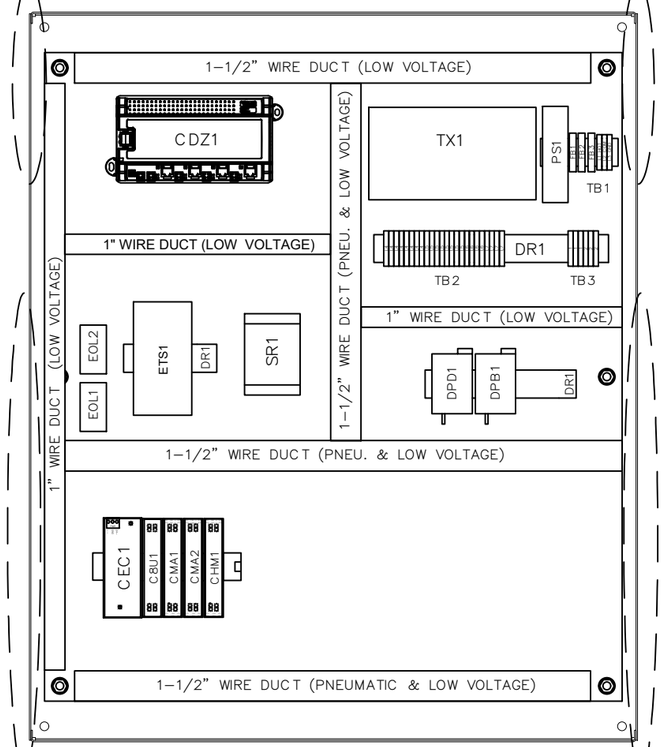
CONTRACT NO:

SHEET
NCHS-162
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 22 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

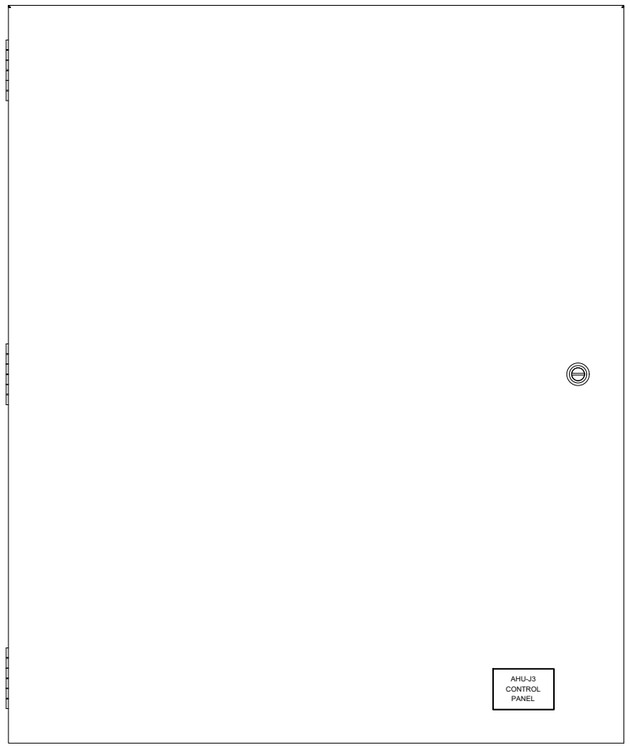


PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

*NEW ENCLOSURE PROVIDED FOR THIS AHU.

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

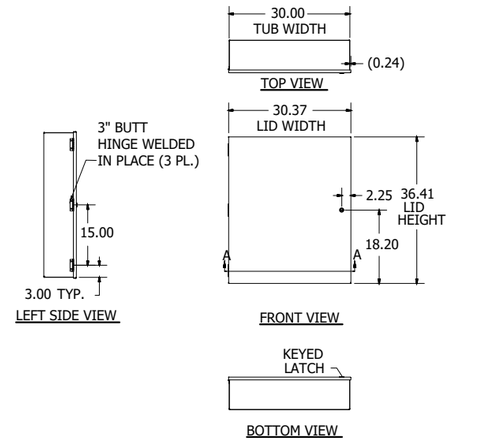


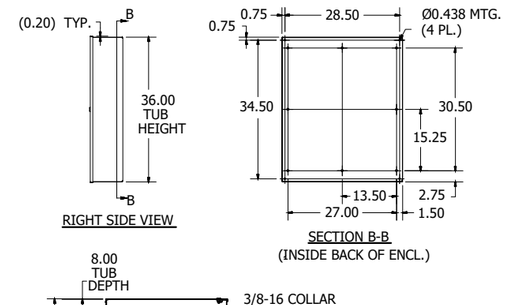
BILL OF MATERIALS

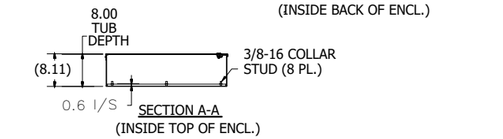
BILL OF MATERIALS

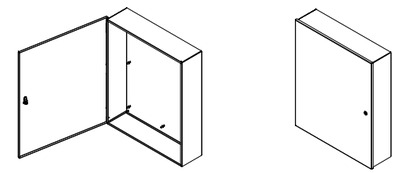
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

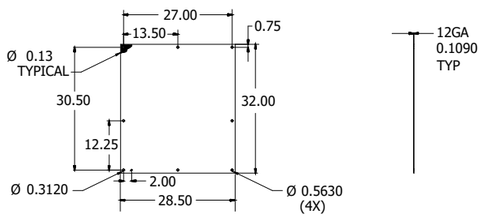








PANEL DIMENSIONS



Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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	AS–BUILT

REVISIONS	
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JOB TITLE: North Central High School
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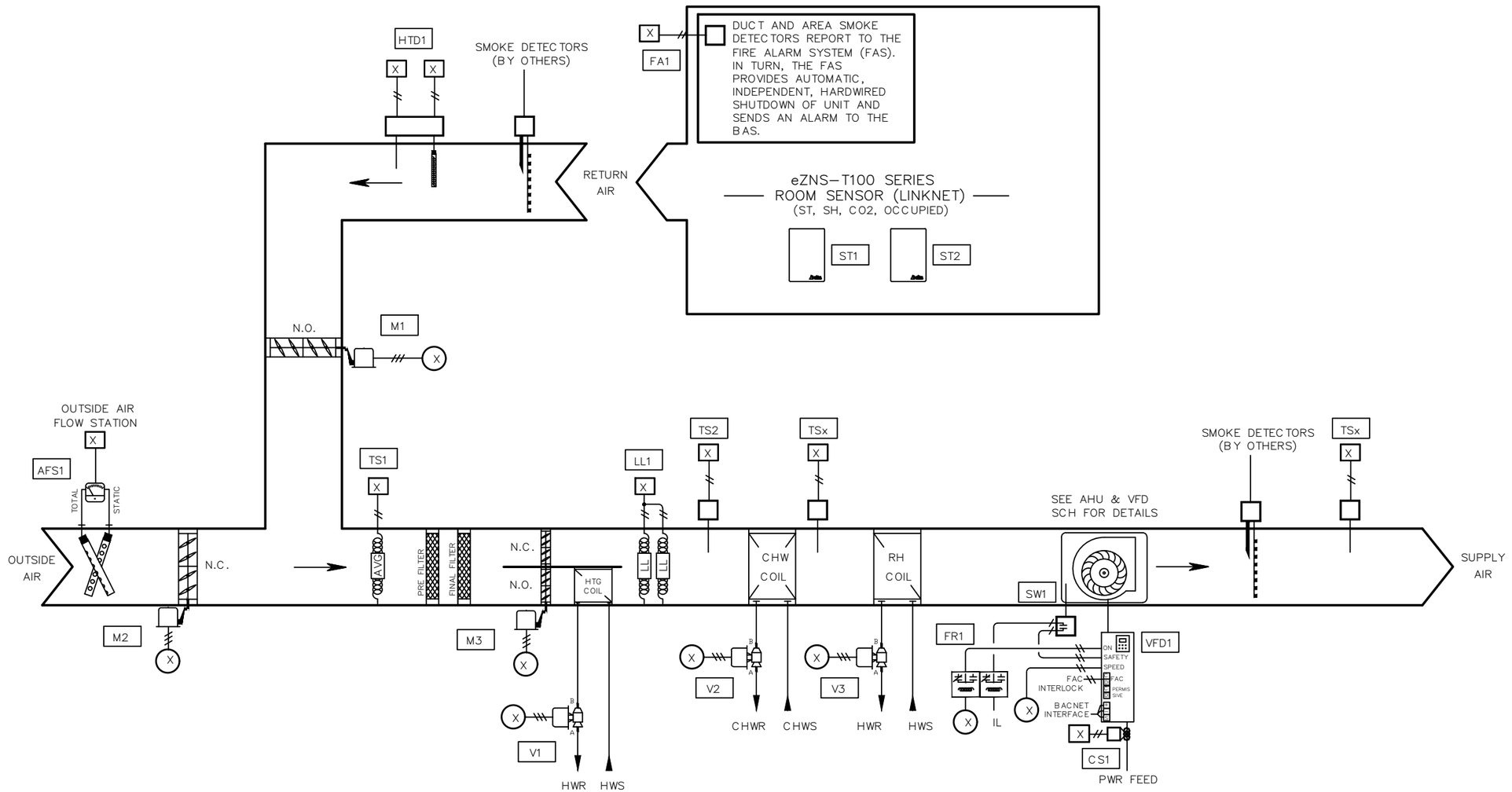
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–163
JOB NUMBER:
J–2304001

AHU-K6 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU-K6 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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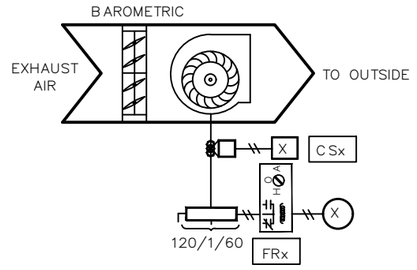
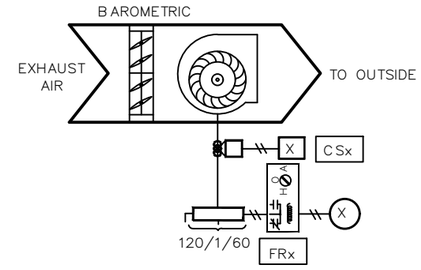
SHEET
NCHS-164
JOB NUMBER:
J-2304001

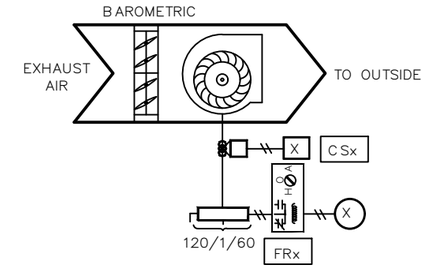
EXHAUST FAN – BAS CONTROLLED
EF–K2



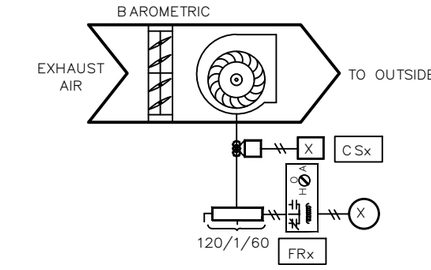
EXHAUST FAN – BAS CONTROLLED
EF–K3



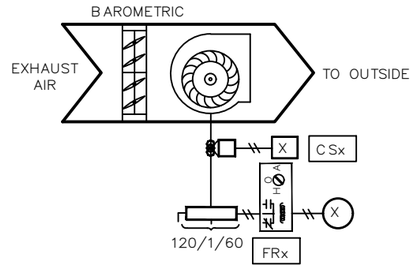
EXHAUST FAN – BAS CONTROLLED
EF–K6



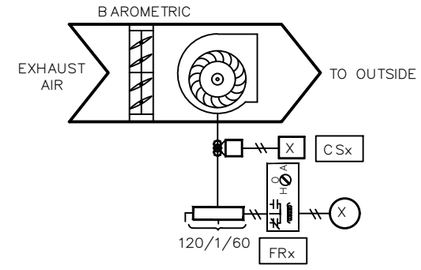
EXHAUST FAN – BAS CONTROLLED
E–EF–M1



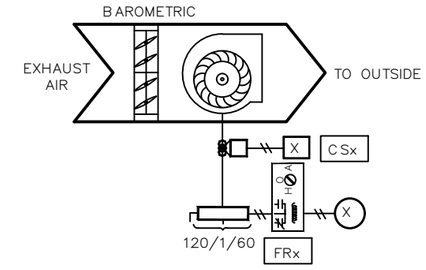
EXHAUST FAN – BAS CONTROLLED
EF–M2



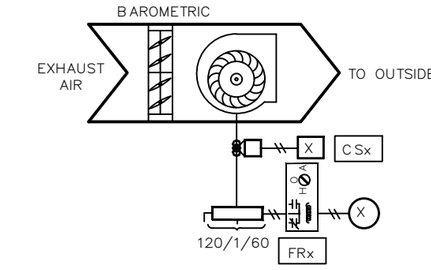
EXHAUST FAN – BAS CONTROLLED
EF–M4



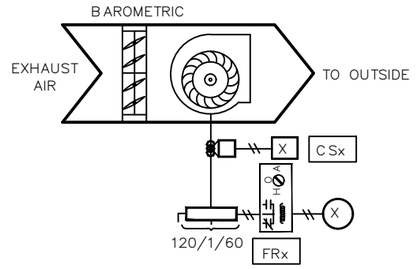
EXHAUST FAN – BAS CONTROLLED
EF–M5



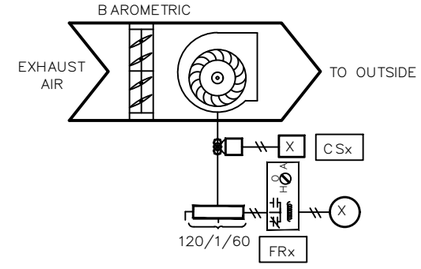
EXHAUST FAN – BAS CONTROLLED
EF–M6



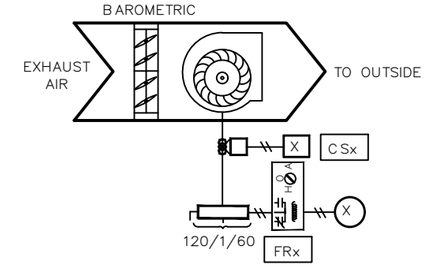
EXHAUST FAN – BAS CONTROLLED
EF–M8



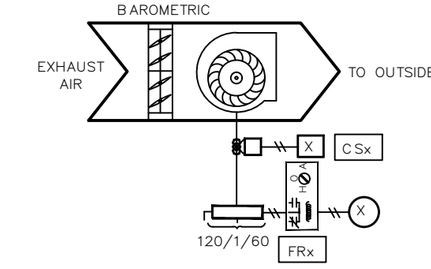
EXHAUST FAN – BAS CONTROLLED
EF–M9



EXHAUST FAN – BAS CONTROLLED
EF–M10



EXHAUST FAN – BAS CONTROLLED
EF–M11



BILL OF MATERIAL

NETWORK POINTS

(N1) THROUGH (Nx)

AREA K EXHAUST FIELD DEVICES (1 OF 2)

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
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REVISIONS	
DATE	REMARKS

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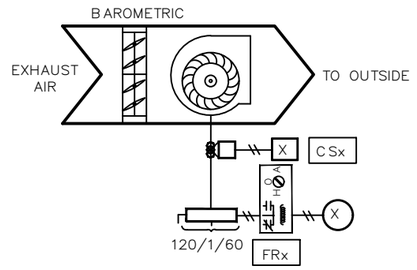
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

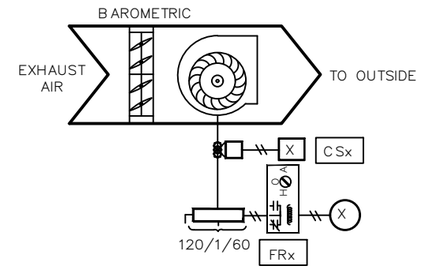
CONTRACT NO:

SHEET
NCHS–165
JOB NUMBER:
J–2304001

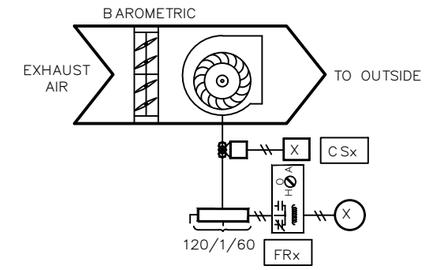
EXHAUST FAN – BAS CONTROLLED
EF–M12



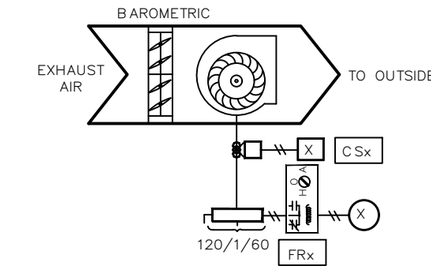
EXHAUST FAN – BAS CONTROLLED
EF–M13



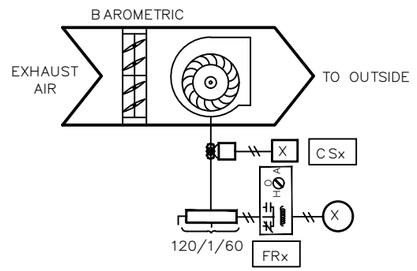
EXHAUST FAN – BAS CONTROLLED
EF–M14



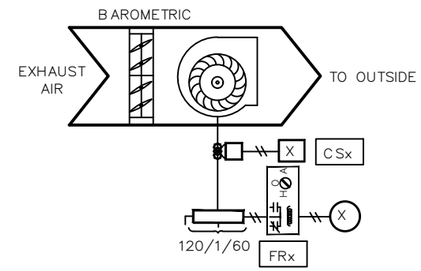
EXHAUST FAN – BAS CONTROLLED
EF–M15



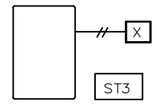
EXHAUST FAN – BAS CONTROLLED
EF–M16



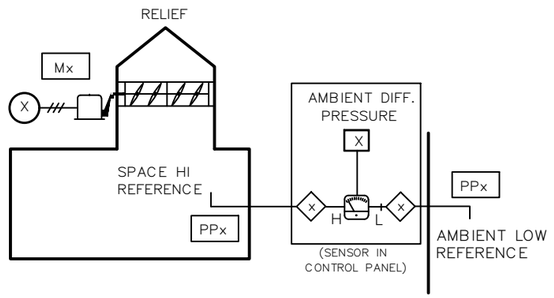
EXHAUST FAN – BAS CONTROLLED
EF–M17



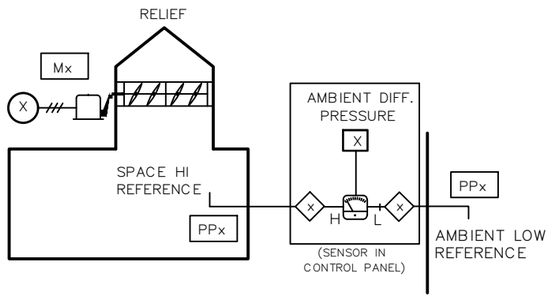
IDF / MDF / ELEC ROOM
SPACE TEMPERATURE
RM (TBD)



BUILDING PRESSURE CONTROL
IH–W1



BUILDING PRESSURE CONTROL
IH–W2



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA K EXHAUST, RELIEF, & IDF MONITORING FIELD DEVICES (2 OF 2)

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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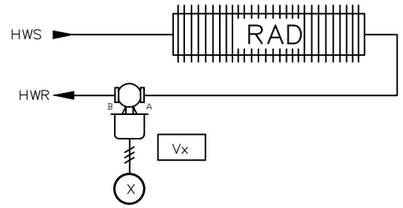
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

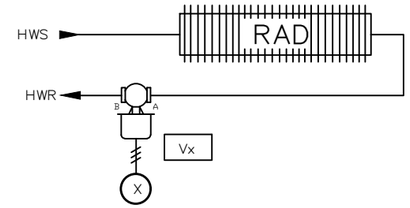
CONTRACT NO:

SHEET
NCHS–166
JOB NUMBER:
J–2304001

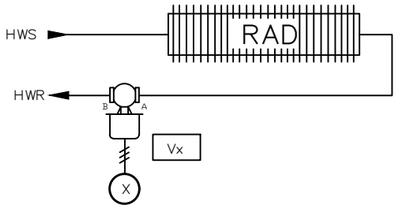
RADIANT CEILING PANEL
RCP–K1



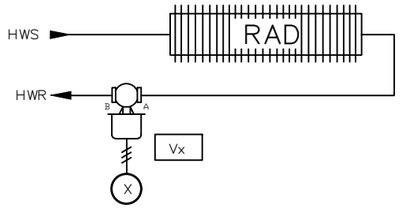
RADIANT CEILING PANEL
RCP–K2



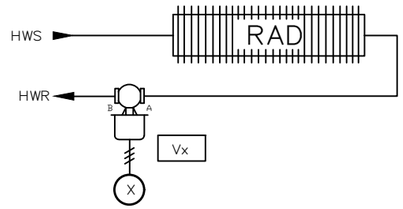
RADIANT CEILING PANEL
RCP–K3



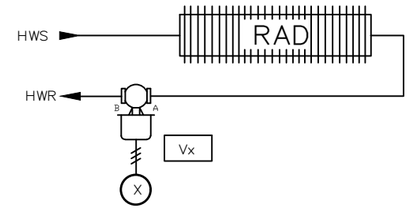
RADIANT CEILING PANEL
RCP–K4



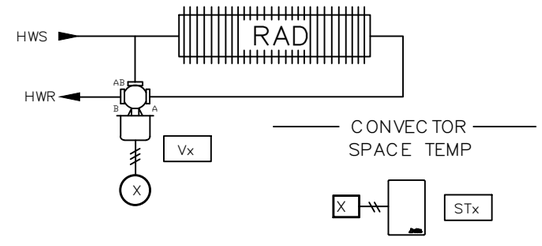
RADIANT CEILING PANEL
RCP–K5



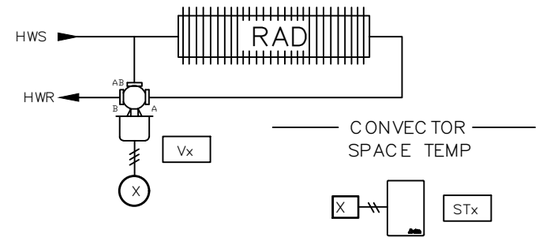
RADIANT CEILING PANEL
RCP–K6



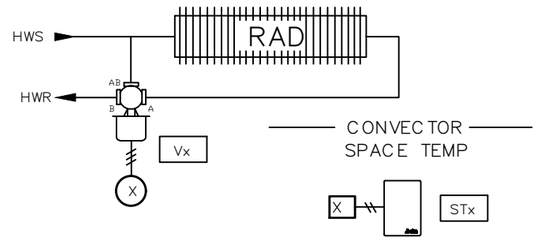
CONVECTOR
E–CV–M5



CONVECTOR
E–CV–M6



CONVECTOR
E–CV–M7



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA K RADIANT PANEL & CONVECTOR FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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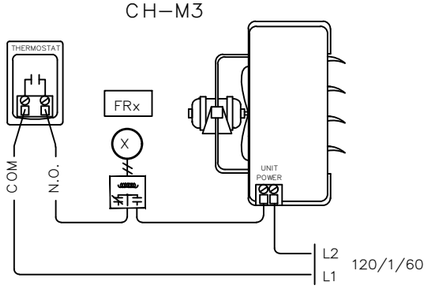
CONTRACT NO:

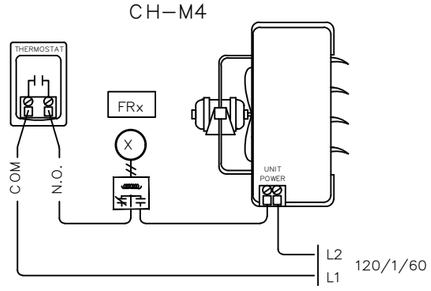
SHEET
NCHS–167
JOB NUMBER:
J–2304001

CABINET UNIT HEATER CH–M3



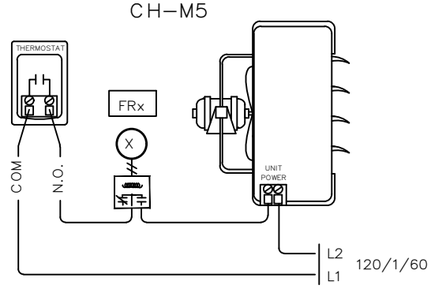
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER CH–M4



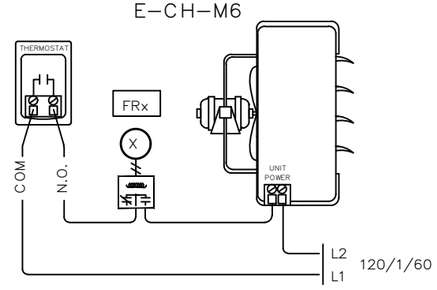
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER CH–M5



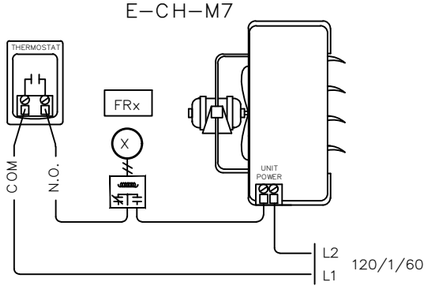
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M6



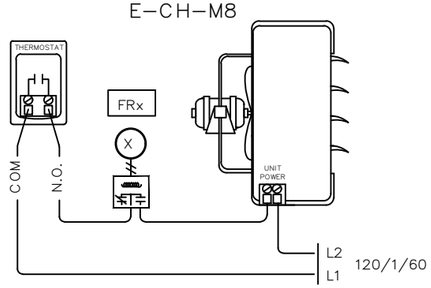
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M7



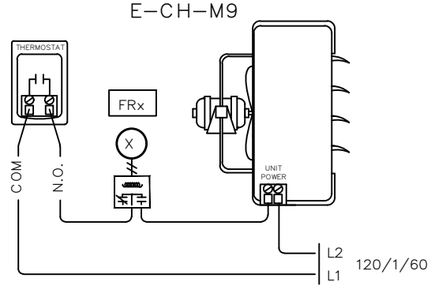
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M8



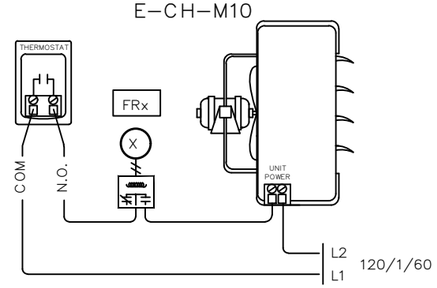
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M9



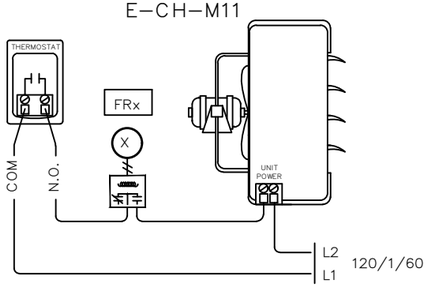
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M10



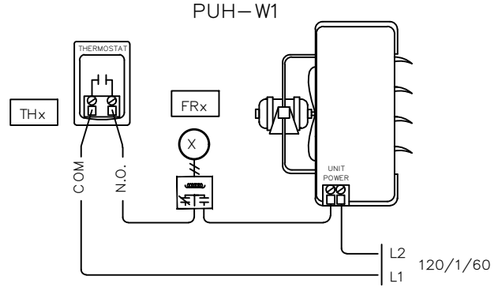
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER E–CH–M11



(THERMOSTAT BY MANUF.)

PROPELLER UNIT HEATER PUH–W1



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA K CABINET & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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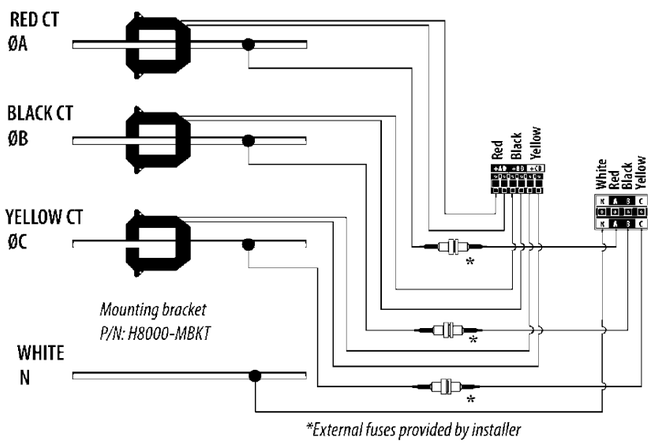
CONTRACT NO:

SHEET
NCHS–168
JOB NUMBER:
J–2304001

POWER METER HIGH VOLTAGE WIRING DETAIL

(FOR REFERENCE ONLY, NOT INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)

TYPICAL 208/480VAC, 4-WIRE, 3Ø INSTALLATION

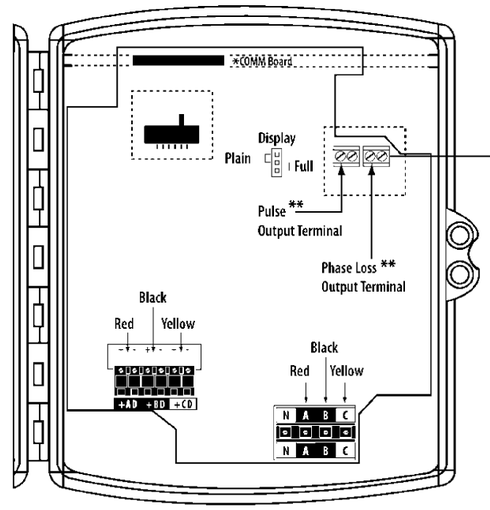


*External fuses provided by installer

(* PREVIOUS BAS DESIGN INDICATES VERIS AH04 TRIPLE FUSE KITS WERE INSTALLED)

POWER METER HIGH VOLTAGE WIRING DETAIL

(BACNET MS/TP COMMUNICATION AND PHASE LOSS MONITORING INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)



*COMM Board is Optional
**H8160 Series only

PHASE LOSS OUTPUT
(ONE CONNECTION PER METER)

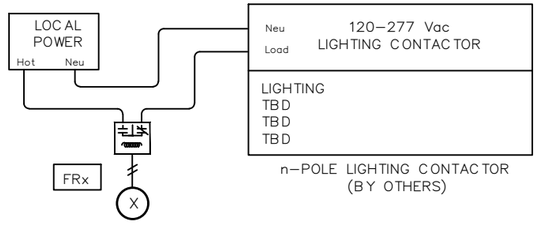
X PL MTR WGYM (WEST GYM)

COMMUNICATION
CARD
(IF INSTALLED)

\+
–
S

BACNET
INTERFACE
(ONE CONNECTION PER METER)

LIGHTING CONTACTOR CONTROLS
RT–1 – WEST LIGHTS



n–POLE LIGHTING CONTACTOR
(BY OTHERS)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA K LIGHTING AND PHASE LOSS MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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CONTRACT NO:

SHEET
NCHS–169
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
E-CV-M5 ST	Convector M5 Space Temp	X				
E-CV-M6 ST	Convector M6 Space Temp	X				
E-CV-M7 ST	Convector M7 Space Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
ST3	IDF Space Temp	X				
E-EF-M1 STAT	Exhaust Fan M1 Status		X			
EF-K2 STAT	Exhaust Fan K2 Status		X			
EF-K3 STAT	Exhaust Fan K3 Status		X			
EF-K6 STAT	Exhaust Fan K6 Status		X			
EF-M10 STAT	Exhaust Fan M10 Status		X			
EF-M11 STAT	Exhaust Fan M11 Status		X			
EF-M12 STAT	Exhaust Fan M12 Status		X			
EF-M13 STAT	Exhaust Fan M13 Status		X			
EF-M14 STAT	Exhaust Fan M14 Status		X			
EF-M15 STAT	Exhaust Fan M15 Status		X			
EF-M16 STAT	Exhaust Fan M16 Status		X			
EF-M17 STAT	Exhaust Fan M17 Status		X			
EF-M2 STAT	Exhaust Fan M2 Status		X			
EF-M4 STAT	Exhaust Fan M4 Status		X			
EF-M5 STAT	Exhaust Fan M5 Status		X			
EF-M6 STAT	Exhaust Fan M6 Status		X			
EF-M8 STAT	Exhaust Fan M8 Status		X			
EF-M9 STAT	Exhaust Fan M9 Status		X			
LL	Low Limit (Freezestat)		X			
PL MTR WGYM	Phase Loss Elec Meter West Gym		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
IH-W1 DPR	Relief Air Damper			X		
IH-W2 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CH-M3 EN	CUH M3 Enable				X	
CH-M4 EN	CUH M4 Enable				X	
CH-M5 EN	CUH M5 Enable				X	
E-CH-M6 EN	CUH M6 Enable				X	
E-CH-M7 EN	CUH M7 Enable				X	
E-CH-M8 EN	CUH M8 Enable				X	
E-CH-M9 EN	CUH M9 Enable				X	
E-CH-M10 EN	CUH M10 Enable				X	
E-CH-M11 EN	CUH M11 Enable				X	
E-CV-M5 HWV	Convector M5 Hot Water Valve				X	
E-CV-M6 HWV	Convector M6 Hot Water Valve				X	
E-CV-M7 HWV	Convector M7 Hot Water Valve				X	
E-EF-M1 SS	Exhaust Fan M1 Start / Stop				X	
EF-K2 SS	Exhaust Fan K2 Start / Stop				X	
EF-K3 SS	Exhaust Fan K3 Start / Stop				X	
EF-K6 SS	Exhaust Fan K6 Start / Stop				X	
EF-M10 SS	Exhaust Fan M10 Start / Stop				X	
EF-M11 SS	Exhaust Fan M11 Start / Stop				X	
EF-M12 SS	Exhaust Fan M12 Start / Stop				X	
EF-M13 SS	Exhaust Fan M13 Start / Stop				X	
EF-M14 SS	Exhaust Fan M14 Start / Stop				X	
EF-M15 SS	Exhaust Fan M15 Start / Stop				X	
EF-M16 SS	Exhaust Fan M16 Start / Stop				X	
EF-M17 SS	Exhaust Fan M17 Start / Stop				X	
EF-M2 SS	Exhaust Fan M2 Start / Stop				X	
EF-M4 SS	Exhaust Fan M4 Start / Stop				X	
EF-M5 SS	Exhaust Fan M5 Start / Stop				X	
EF-M6 SS	Exhaust Fan M6 Start / Stop				X	
EF-M8 SS	Exhaust Fan M8 Start / Stop				X	
EF-M9 SS	Exhaust Fan M9 Start / Stop				X	
LTG 1	Lighting Contactor - West Lights RT-1				X	
PUH-W1 EN	PUH W1 Enable				X	
RCP-K1 HWV	Radiant Panel K1 Hot Water Valve				X	
RCP-K2 HWV	Radiant Panel K2 Hot Water Valve				X	
RCP-K3 HWV	Radiant Panel K3 Hot Water Valve				X	
RCP-K4 HWV	Radiant Panel K4 Hot Water Valve				X	
RCP-K5 HWV	Radiant Panel K5 Hot Water Valve				X	
RCP-K6 HWV	Radiant Panel K6 Hot Water Valve				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
ST2	Space Temp					X
SH3	Space Humidity					X
S CO22	Space CO2					X
OCC2	Occupied Flag					X
	POINT TOTALS:	**12**	**22**	**9**	**39**	**8**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-K6 & AREA K MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-170
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-K6 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL START AND RAMP TO BALANCER DETERMINED SPEED TO DELIVER THE SCHEDULED SUPPLY CFM.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFK1-C, EFK2-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO SUPPLY FAN OPERATION OF AHU-K6.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY. THE TWO SPACE TEMPERATURE SENSORS SHALL BE AVERAGED TO CONTROL THE AIR HANDLING UNIT. THE TWO SPACE HUMIDITY SENSORS SHALL UTILIZE THE MAXIMUM TO CONTROL HUMIDITY.

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND DISCHARGE TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL BE OPENED TO THE MINIMUM POSITION TO DELIVER THE SCHEDULED OUTSIDE AIRFLOW.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT AND REHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ) WITH THE FACE AND BYPASS DAMPER CLOSED TO THE COIL.

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

ELECTRICAL UTILITY POWER MONITORING:

TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS.

RADIANT CEILING PANELS:

WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), HOT WATER VALVES FOR RADIANT HEATING ARE TO REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES ARE TO OPEN AS A FIRST STAGE OF HEATING FOR THE SPACES INDICATED IN THE MECHANICAL DRAWINGS.

CONVECTOR HEATING:

WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), THE HOT WATER VALVE SHALL REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES SHALL CYCLE OPEN AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT OF 68F (ADJ).

CABINET UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

IDF/MDF AND ELECTRICAL HVAC SPLIT SYSTEM MONITORING:

INSTALL AND WIRE BAS FLAT PLATE SPACE TEMPERATURE SENSORS FOR MONITOR OF IDF/MDF SPACES AND ALARM CONDITIONS. ALL STAND-ALONE HVAC SYSTEMS WILL HAVE BAS SPACE TEMPERATURE MONITORING IN ADDITION TO THE CONTROLS FROM THE MANUFACTURER. AN ALARM WILL BE GENERATED IF THE SPACE RISES ABOVE 81F (ADJ) OR DROPS BELOW 59F (ADJ). THESE SPACES ALSO REQUIRE A SEPARATE THERMOSTAT FOR LOCAL EQUIPMENT CONTROL.

Delta Controls
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DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

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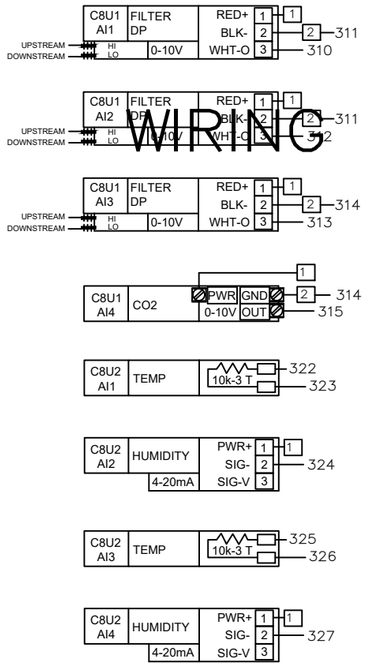
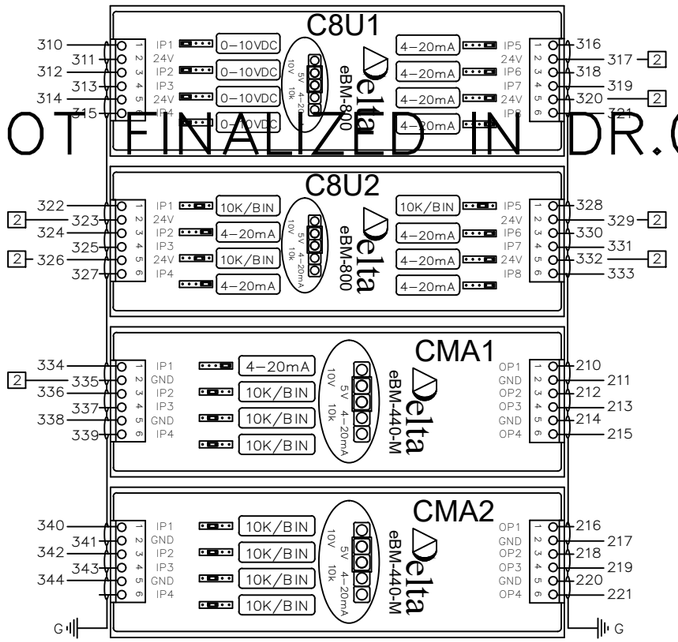
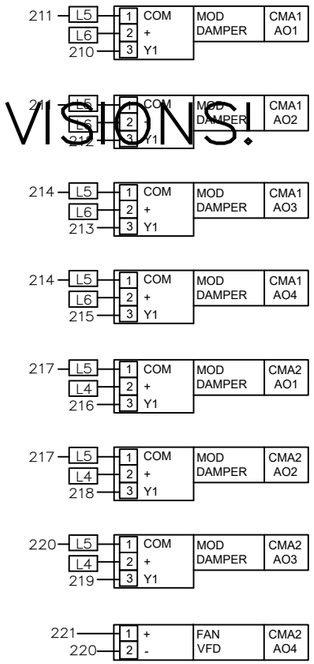
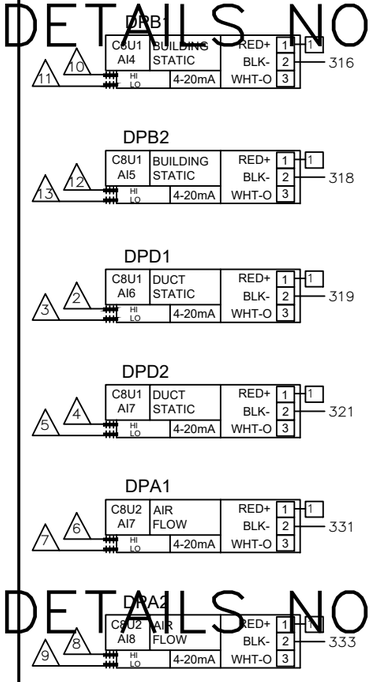
J–2304001

SYSTEM 23 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

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AHU-K6 SYSTEM 23 PANEL – I/O WIRING (1 OF 5)

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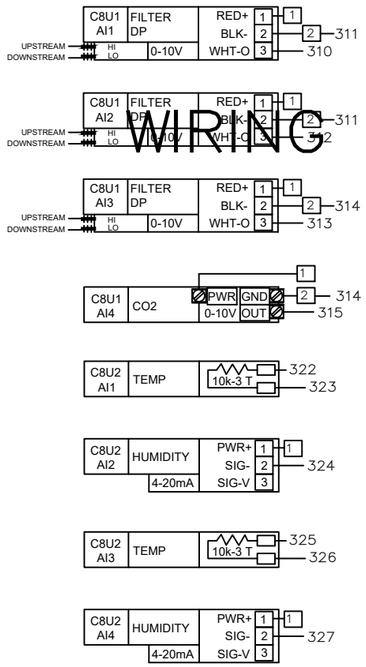
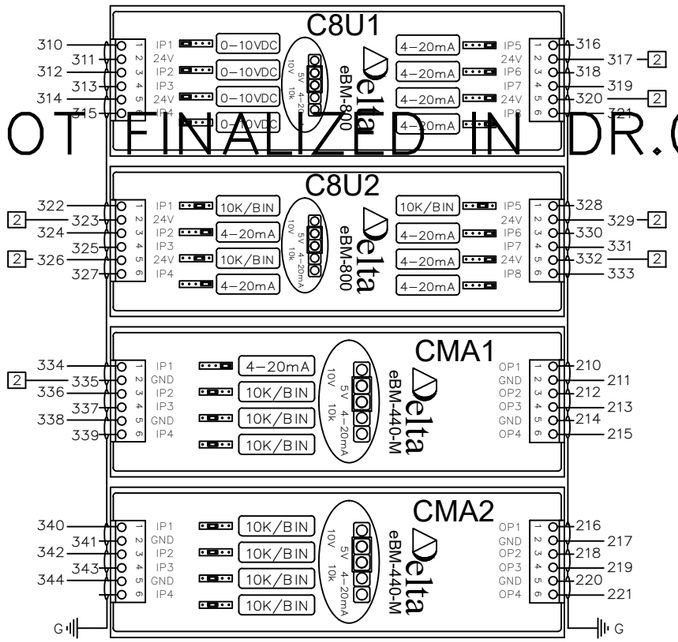




ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	INPUTS
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	INPUTS
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	INPUTS
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	INPUTS
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	INPUTS
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	INPUTS
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	INPUTS

C8U1 eBM-800 — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	INPUTS
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	INPUTS
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	INPUTS
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	INPUTS
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	INPUTS
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	INPUTS
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	INPUTS

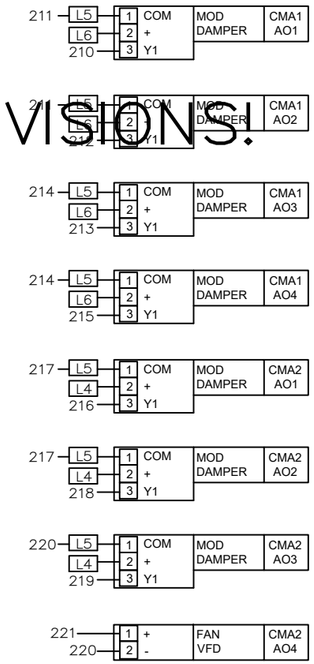
C8U2 eBM-800 — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	INPUTS
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	INPUTS
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	INPUTS
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	OUTPUTS
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	OUTPUTS
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	OUTPUTS

CMA1 eBM-440-M — eBM-440-M I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	INPUTS
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	INPUTS
CMA2	4	10100.1404				INPUTS
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	OUTPUTS
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	OUTPUTS
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	OUTPUTS

CMA2 eBM-440-M — eBM-440-M I/O MODULE



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4240 W 50 S
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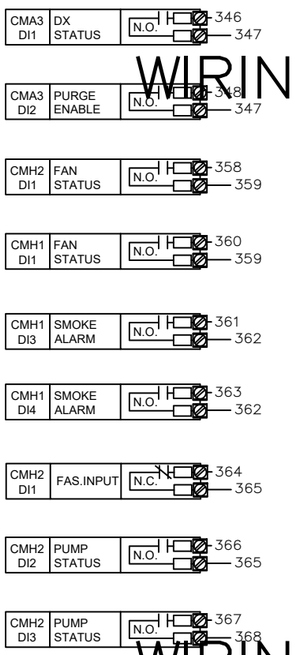
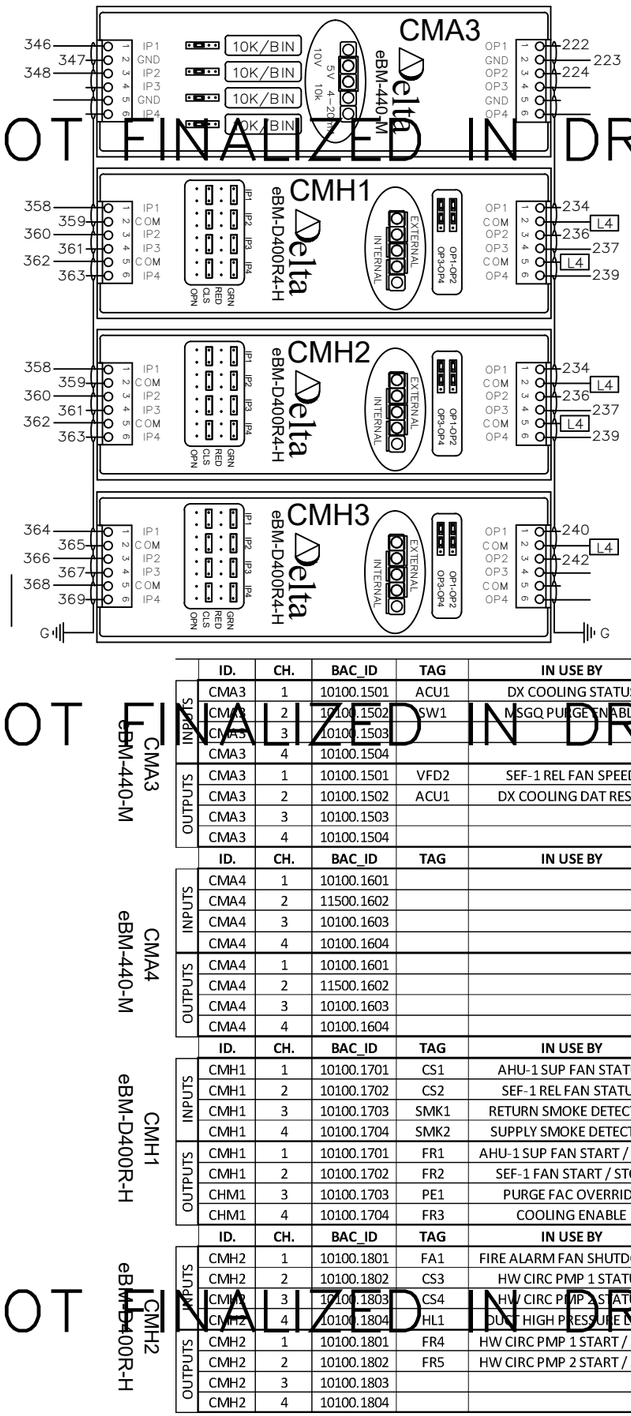
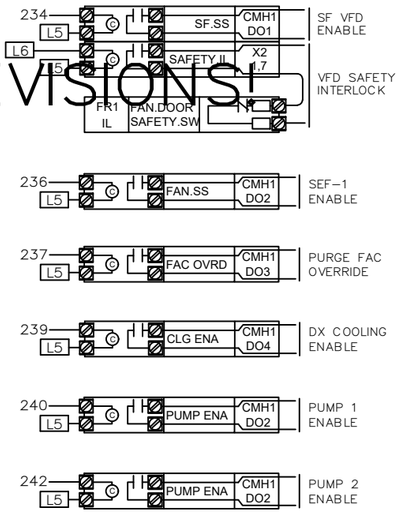




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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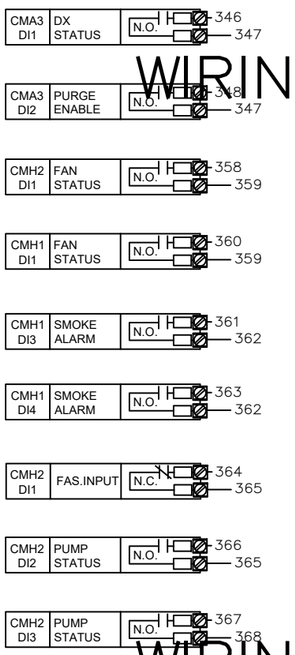
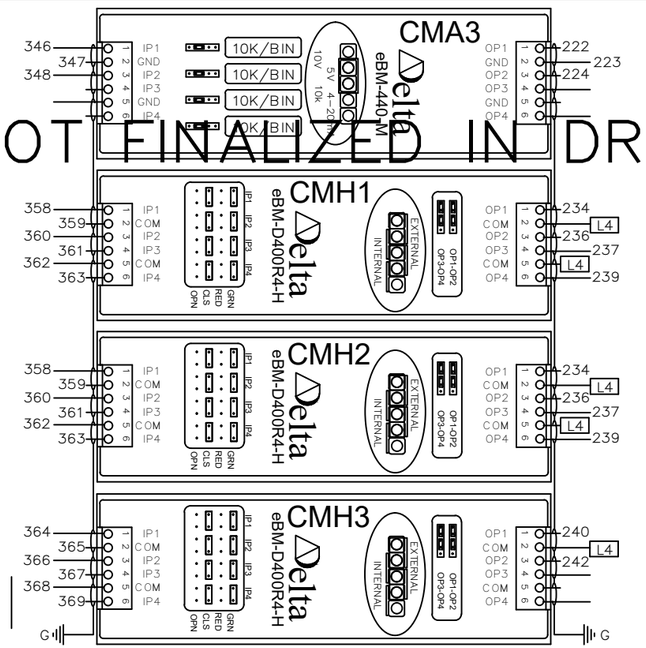
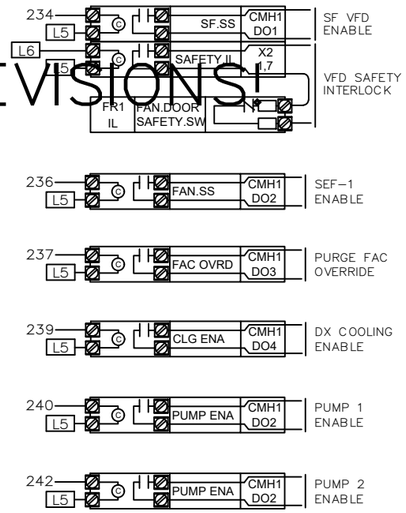




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–175
JOB NUMBER:
J–2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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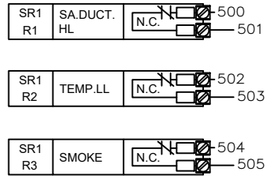

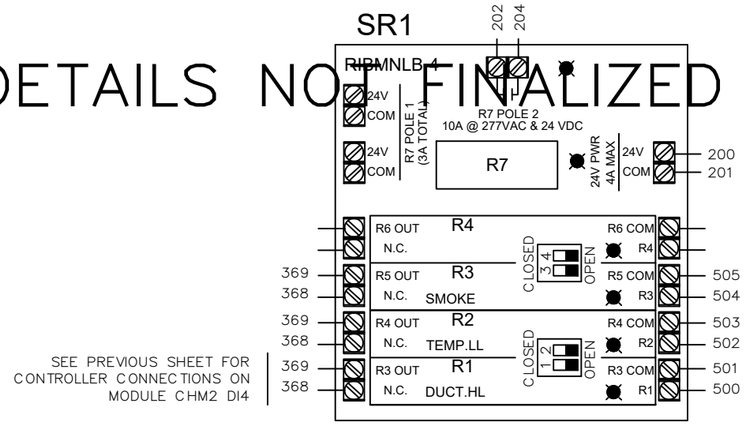

SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
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DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-176
JOB NUMBER:
J-2304001

SYSTEM 23 CONTROL PANEL

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

GND

300

301

L3

ETS1

V1-

V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202

204

200

201

24V COM

R7 POLE 2 10A @ 277VAC & 24 VDC

R7

R4 OUT N.C.

R4 COM

R4

R3 OUT N.C.

R3 COM

R3

CLOSED

R2 OUT N.C.

R2 COM

R2

R1 OUT N.C.

R1 COM

R1

eNET BUS

201

200

C8X2

PWR

GND

24~

eBX

eBUS Address

eBUS

eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

L3

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

EOL 4

GND

ST1

NET

PWR

ST2

NET

PWR

24 VAC

LINKNET (RS-485)

201

200

CEB1

C8X1

PWR

GND

24~

USB2

USB1

(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485

NET2 RS-485

+ - SHD

LAN 1

LAN 2

LAN 3

eBM-800

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

eNET BUS

TO PANEL GND LUG

L3

MS/TP

LINKNET (RS-485)

EOL3

GND

SEE RISER DIAGRAMS FOR LOCATION

AHU-K6 SYSTEM 23 PANEL – POWER & NETWORK WIRING

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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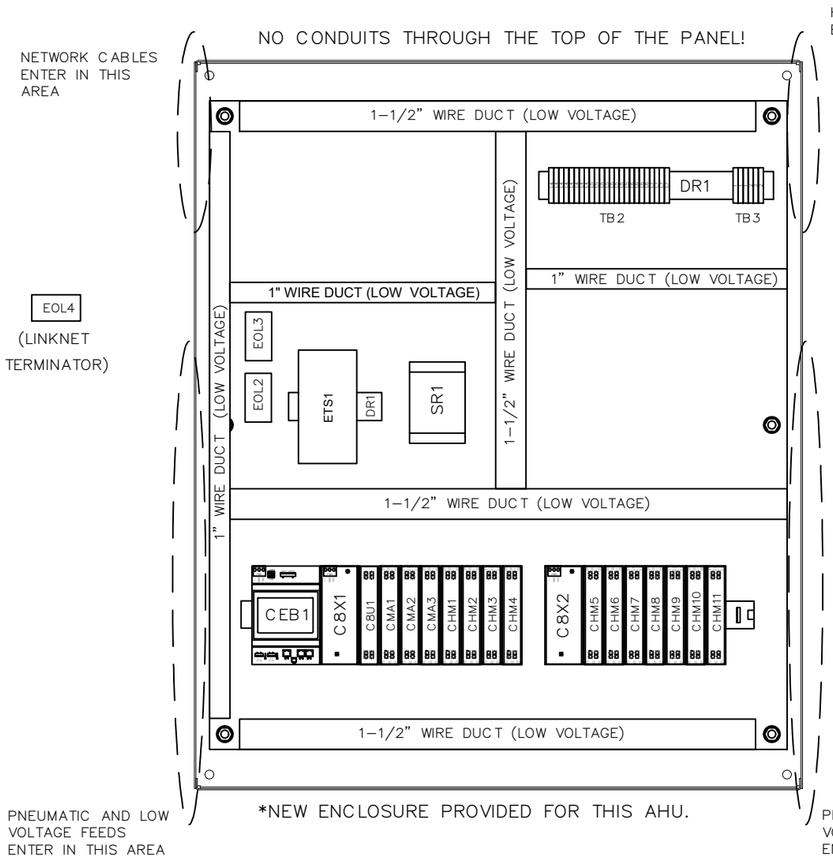
SHEET
NCHS-177
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 23 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

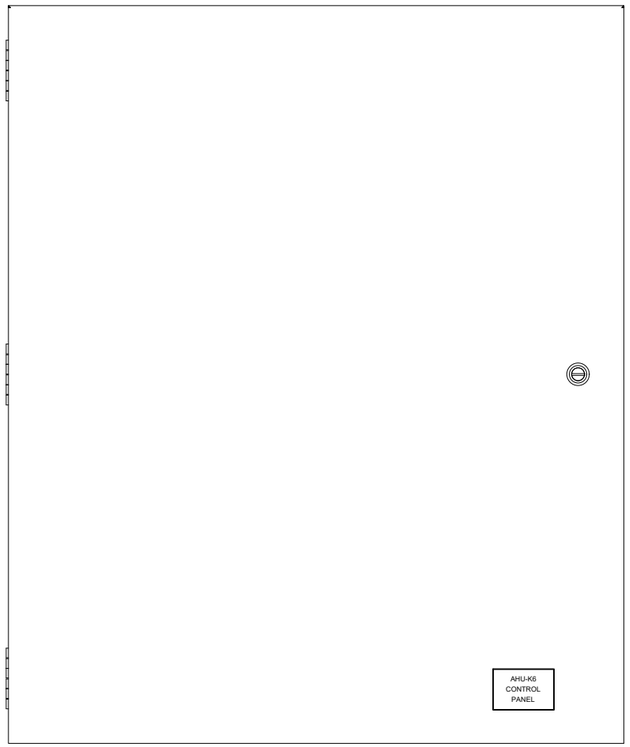


EOL4
(LINKNET TERMINATOR)

*NEW ENCLOSURE PROVIDED FOR THIS AHU.

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

HIGH VOLTAGE FEEDS ENTER IN THIS AREA



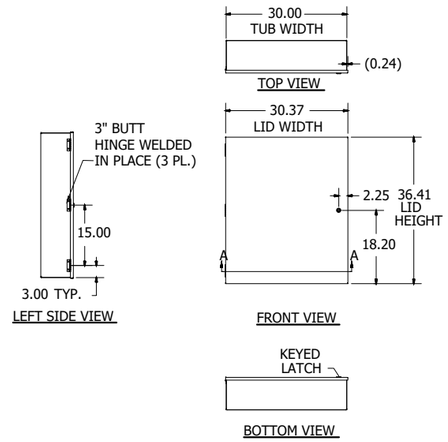
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

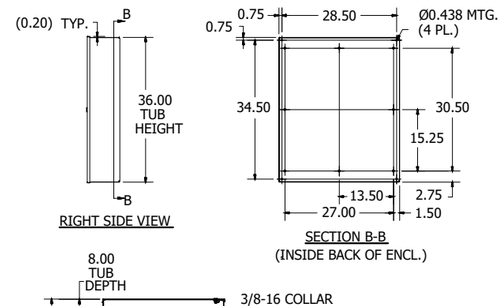
BILL OF MATERIALS

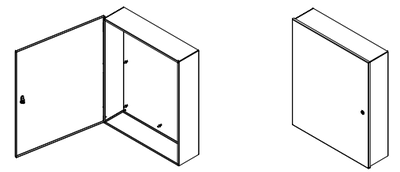
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

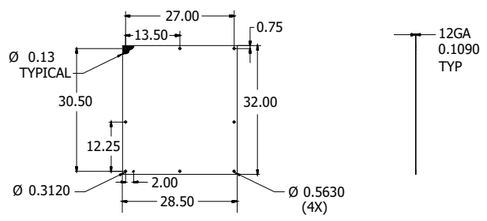
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



AHU-K6 SYSTEM 23 PANEL – DIMENSIONS & BOM

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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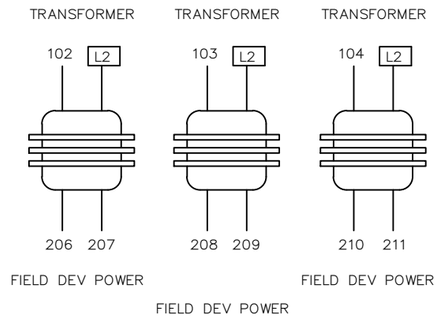
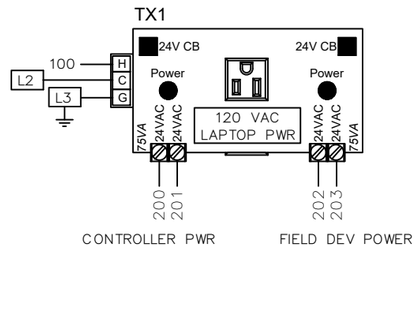
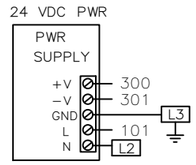
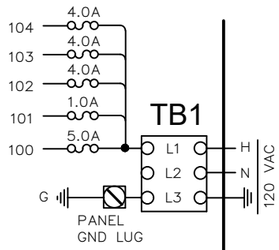
NCHS–178
JOB NUMBER:
J–2304001

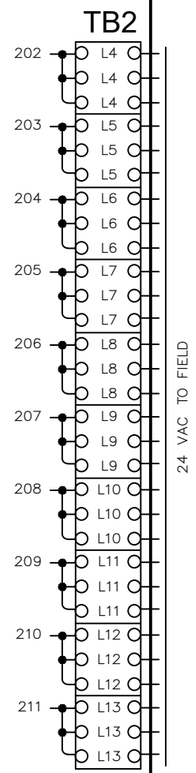
PANEL _____
CIRCUIT _____

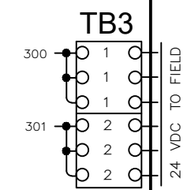


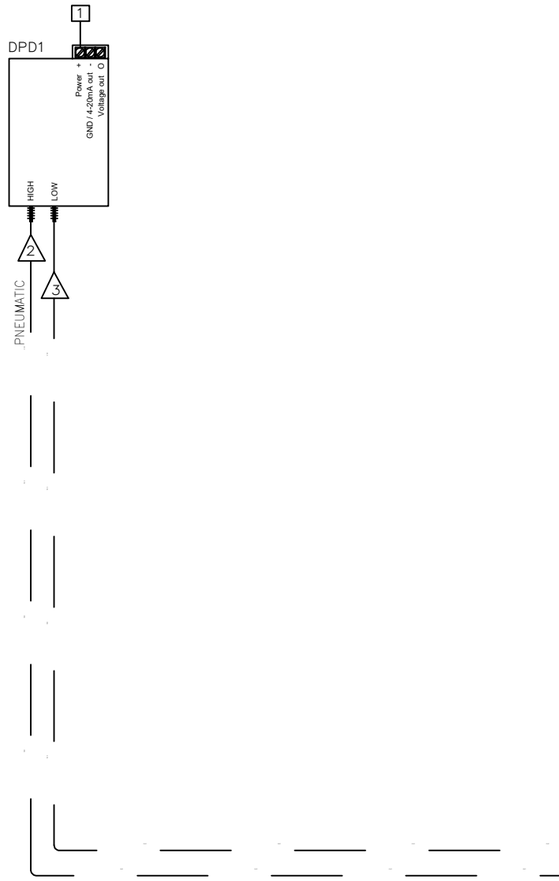












SEE RISER DIAGRAMS FOR LOCATION

AHU–K6 SYSTEM 23 COMPANION PANEL – POWER WIRING & PNEUMATIC CONNECTIONS

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

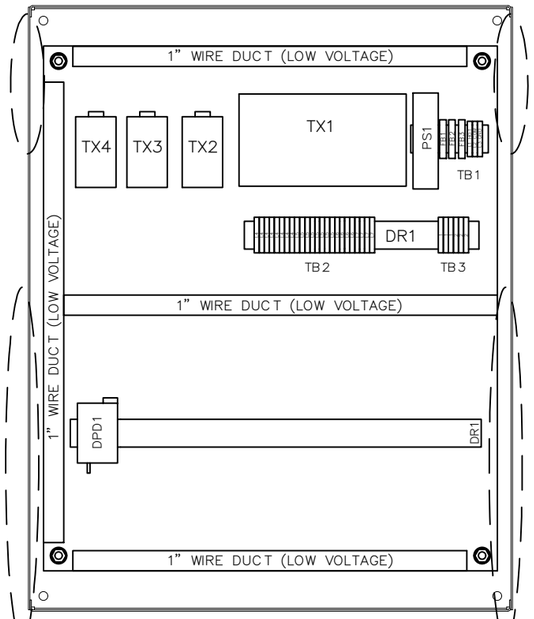
CONTRACT NO:

SHEET
NCHS–179
JOB NUMBER:
J–2304001

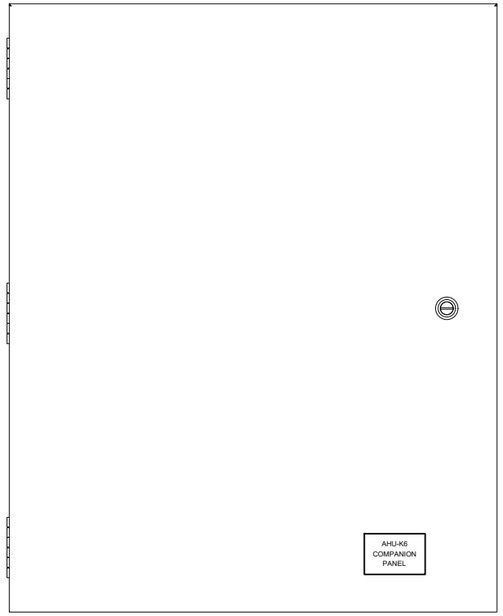
SYSTEM 23 COMPANION PANEL LAYOUT

NO CONDUITS THROUGH THE TOP OF THE PANEL!

NETWORK CABLES ENTER IN THIS AREA



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



*NEW ENCLOSURE PROVIDED

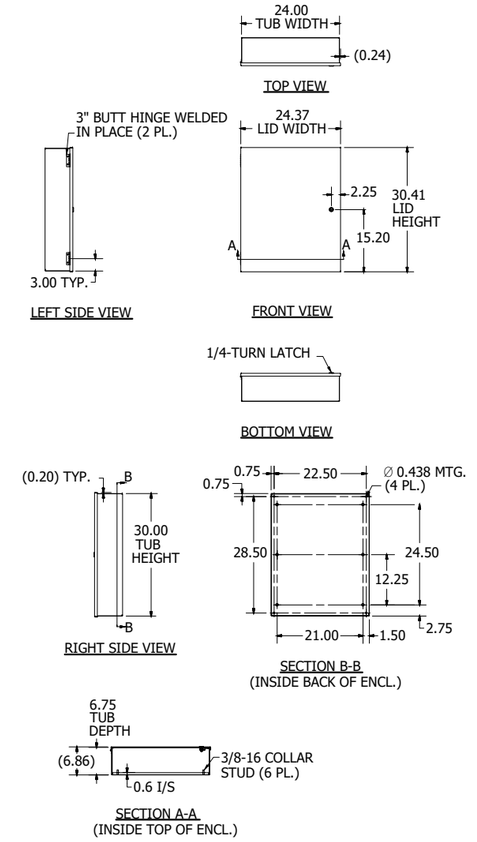
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

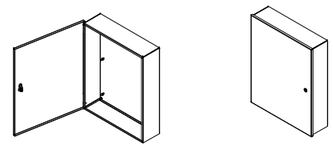
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

BILL OF MATERIALS

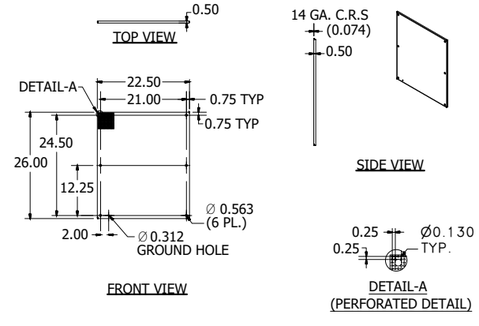
BILL OF MATERIALS

24" (W) x 30" (H) ENCLOSURE DIMENSIONS





PANEL DIMENSIONS



AHU-K6 SYSTEM 23 COMPANION PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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JOB TITLE: North Central High School
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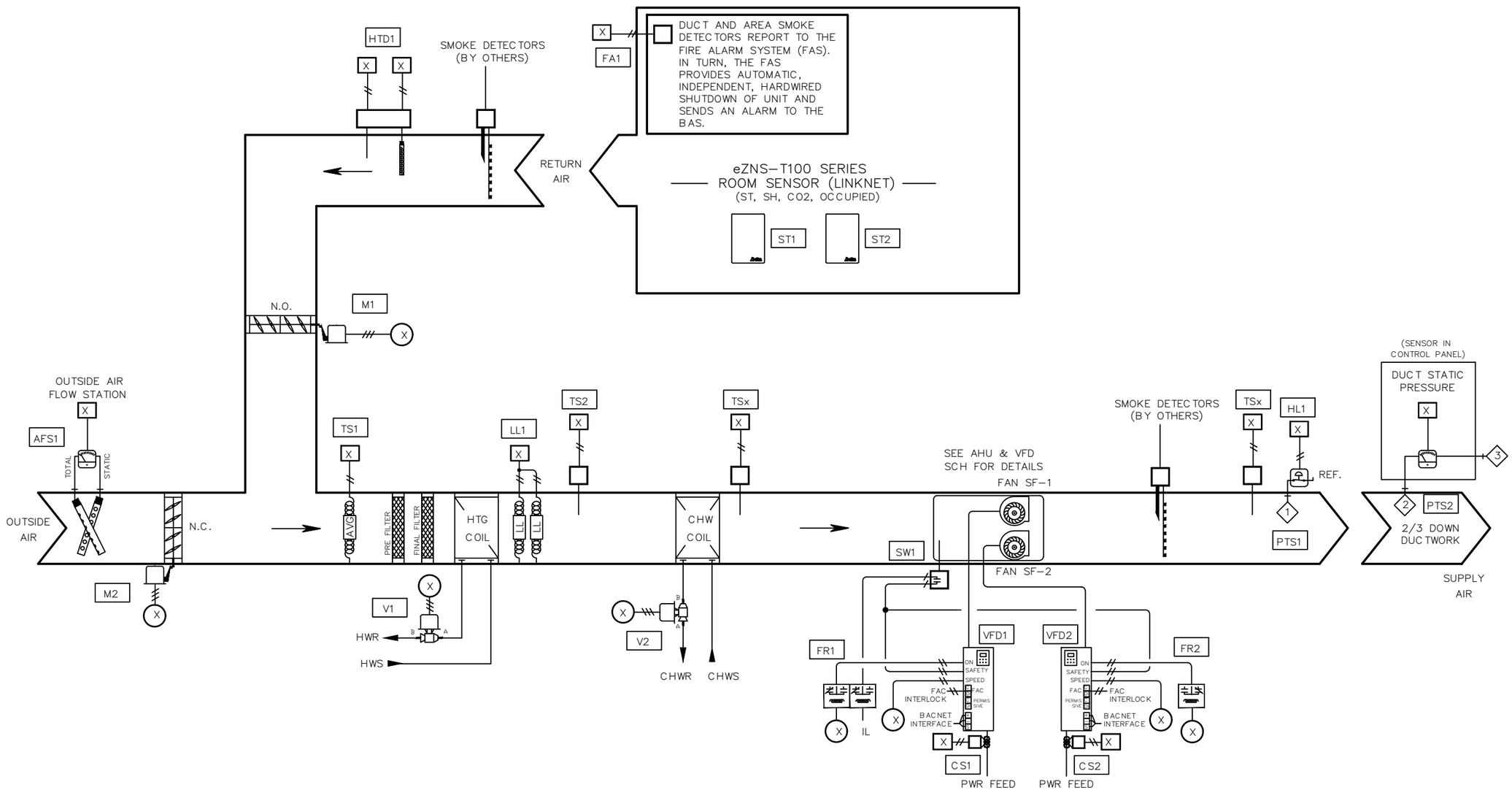
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-180
JOB NUMBER:
J-2304001

AHU–M1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–M1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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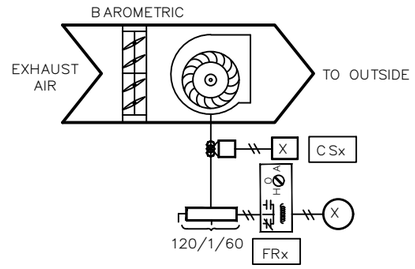
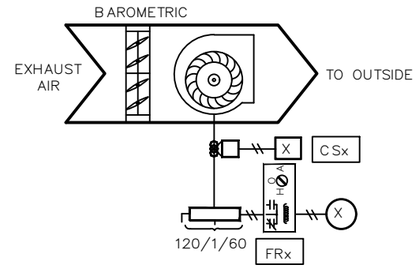
CONTRACT NO:

SHEET
NCHS–181
JOB NUMBER:
J–2304001

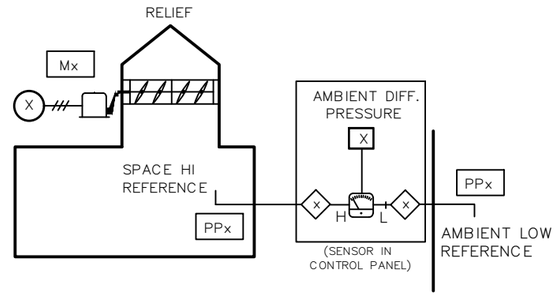
EXHAUST FAN – BAS CONTROLLED
EF–L1



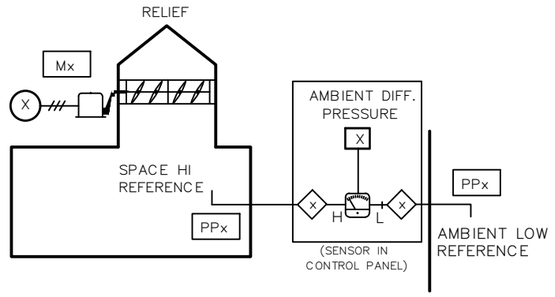
EXHAUST FAN – BAS CONTROLLED
EF–L2



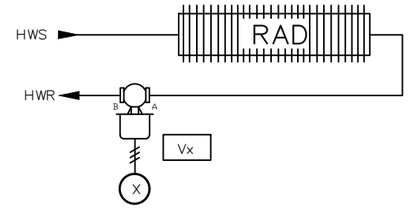
BUILDING PRESSURE CONTROL
E–RH–M1



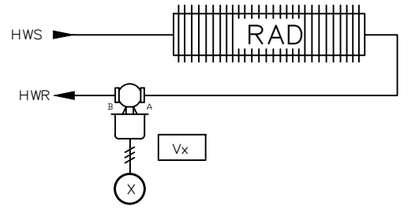
BUILDING PRESSURE CONTROL
E–RH–M2



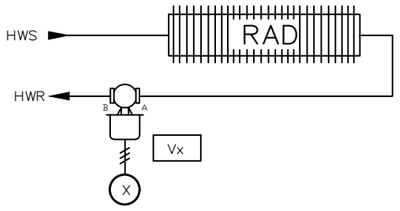
RADIANT CEILING PANEL
RCP–M1



RADIANT CEILING PANEL
RCP–M2



RADIANT CEILING PANEL
RCP–M3



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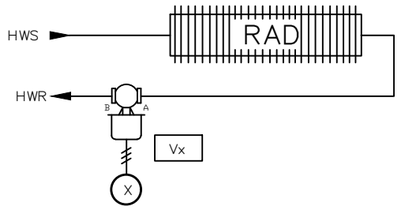

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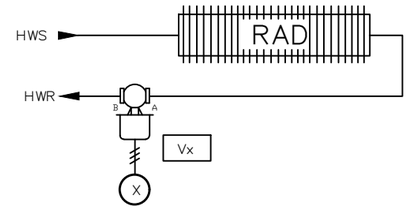

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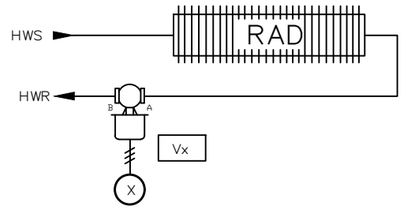
RCP–M6



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA M EXHAUST, RELIEF, & RADIANT PANEL FIELD DEVICES (1 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

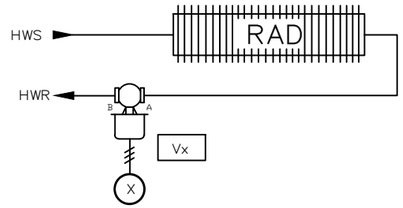
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

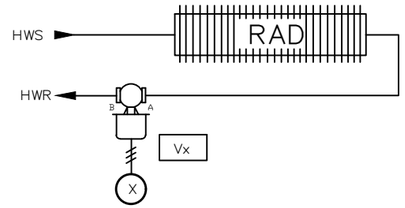
CONTRACT NO:

SHEET
NCHS–182
JOB NUMBER:
J–2304001

RADIANT CEILING PANEL
RCP–M7



RADIANT CEILING PANEL
RCP–M8



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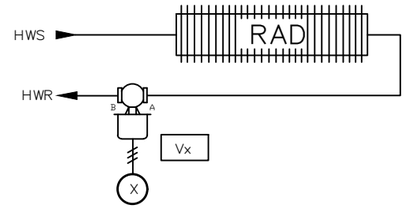
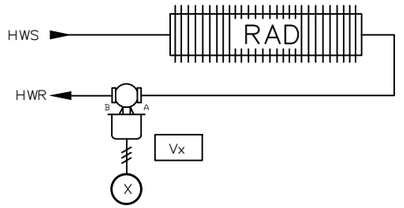
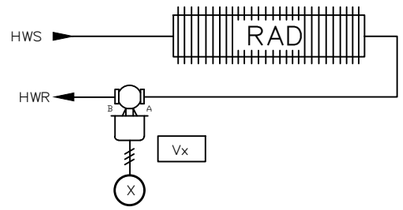
RCP–M9



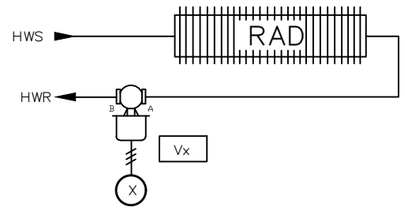
RADIANT CEILING PANEL
RCP–M10



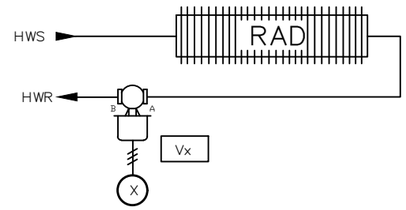
RADIANT CEILING PANEL
RCP–M11



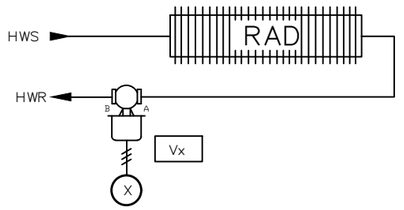
RADIANT CEILING PANEL
RCP–M12



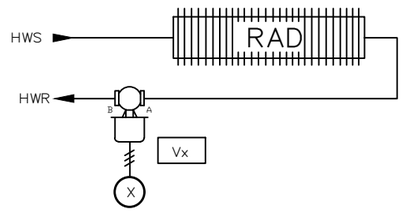
RADIANT CEILING PANEL
RCP–M13



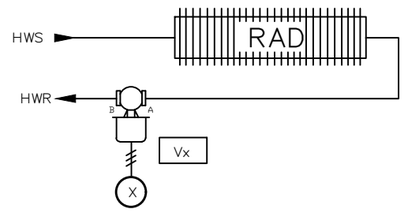
RADIANT CEILING PANEL
RCP–M14



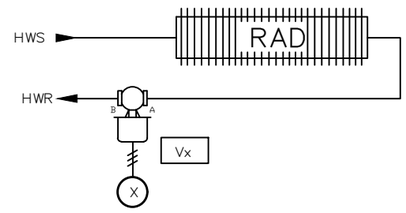
RADIANT CEILING PANEL
RCP–M15



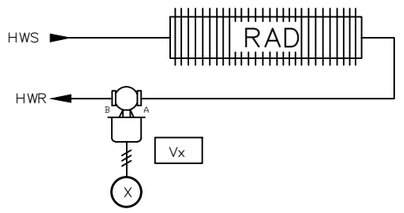
RADIANT CEILING PANEL
RCP–M16



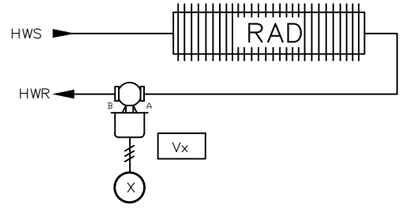
RADIANT CEILING PANEL
RCP–M17



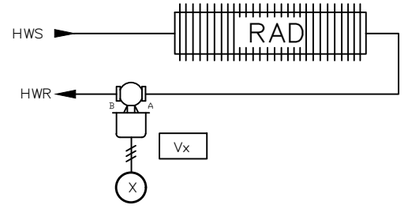
RADIANT CEILING PANEL
RCP–M18



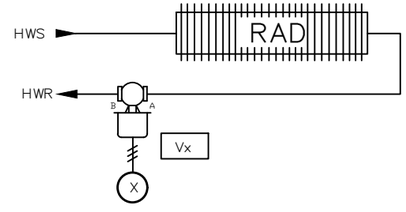
RADIANT CEILING PANEL
RCP–M19



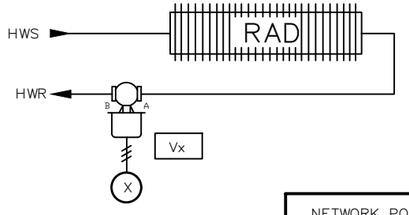
RADIANT CEILING PANEL
RCP–M20



RADIANT CEILING PANEL
RCP–M21



RADIANT CEILING PANEL
RCP–M22



NETWORK POINTS
N1 THROUGH Nx

BILL OF MATERIAL

AREA M RADIANT PANEL FIELD DEVICES (2 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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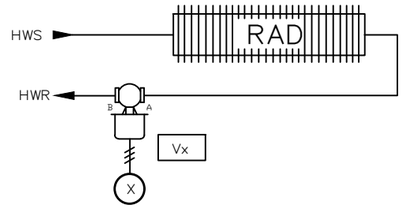
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

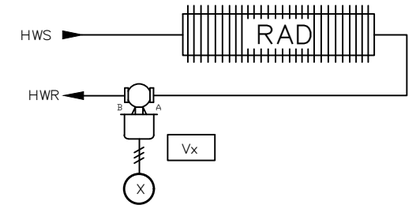
CONTRACT NO:

SHEET
NCHS–183
JOB NUMBER:
J–2304001

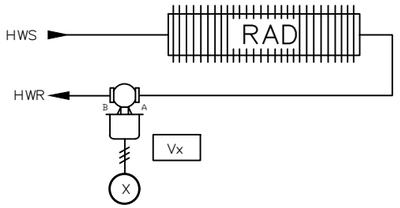
RADIANT CEILING PANEL
RCP–M23



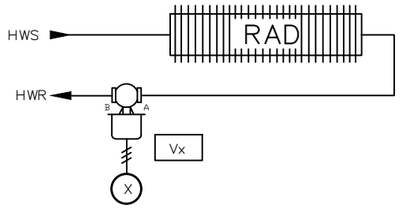
RADIANT CEILING PANEL
RCP–M24



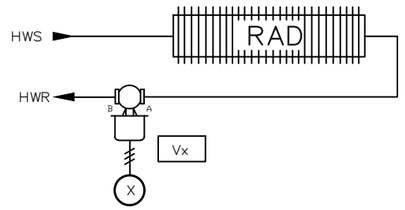
RADIANT CEILING PANEL
RCP–M25



RADIANT CEILING PANEL
RCP–M26



RADIANT CEILING PANEL
RCP–M27



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA M RADIANT PANEL FIELD DEVICES (3 OF 3)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–184
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-L1 STAT	Exhaust Fan L1 Status		X			
EF-L2 STAT	Exhaust Fan L2 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF 1 STAT	Supply Fan 1 Status		X			
SF 2 STAT	Supply Fan 2 Status		X			
CWV	Chill Water Valve			X		
E-RH-M1 DPR	Relief Air Damper			X		
E-RH-M2 DPR	Relief Air Damper			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF 1 VFD	Supply Fan 1 VFD Speed			X		
SF 2 VFD	Supply Fan 2 VFD Speed			X		

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
EF-L1 SS	Exhaust Fan L1 Start / Stop				X	
EF-L2 SS	Exhaust Fan L2 Start / Stop				X	
RCP-M1 HWV	Radiant Panel M1 Hot Water Valve				X	
RCP-M10 HWV	Radiant Panel M10 Hot Water Valve				X	
RCP-M11 HWV	Radiant Panel M11 Hot Water Valve				X	
RCP-M12 HWV	Radiant Panel M12 Hot Water Valve				X	
RCP-M13 HWV	Radiant Panel M13 Hot Water Valve				X	
RCP-M14 HWV	Radiant Panel M14 Hot Water Valve				X	
RCP-M15 HWV	Radiant Panel M15 Hot Water Valve				X	
RCP-M16 HWV	Radiant Panel M16 Hot Water Valve				X	
RCP-M17 HWV	Radiant Panel M17 Hot Water Valve				X	
RCP-M18 HWV	Radiant Panel M18 Hot Water Valve				X	
RCP-M19 HWV	Radiant Panel M19 Hot Water Valve				X	
RCP-M2 HWV	Radiant Panel M2 Hot Water Valve				X	
RCP-M20 HWV	Radiant Panel M20 Hot Water Valve				X	
RCP-M21 HWV	Radiant Panel M21 Hot Water Valve				X	
RCP-M22 HWV	Radiant Panel M22 Hot Water Valve				X	
RCP-M23 HWV	Radiant Panel M23 Hot Water Valve				X	
RCP-M24 HWV	Radiant Panel M24 Hot Water Valve				X	
RCP-M25 HWV	Radiant Panel M25 Hot Water Valve				X	
RCP-M26 HWV	Radiant Panel M26 Hot Water Valve				X	
RCP-M27 HWV	Radiant Panel M27 Hot Water Valve				X	
RCP-M3 HWV	Radiant Panel M3 Hot Water Valve				X	
RCP-M4 HWV	Radiant Panel M4 Hot Water Valve				X	
RCP-M5 HWV	Radiant Panel M5 Hot Water Valve				X	
RCP-M6 HWV	Radiant Panel M6 Hot Water Valve				X	
RCP-M7 HWV	Radiant Panel M7 Hot Water Valve				X	
RCP-M8 HWV	Radiant Panel M8 Hot Water Valve				X	
RCP-M9 HWV	Radiant Panel M9 Hot Water Valve				X	
SF 1 SS	Supply Fan 1 Start / Stop				X	
SF 2 SS	Supply Fan 2 Start / Stop				X	
	POINT TOTALS:	**9**	**7**	**10**	**31**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-M1 & AREA M MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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SHEET
NCHS-185
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-M1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFMn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

FACE AND BYPASS DAMPER CONTROL: ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 38F (ADJ), THE HEATING COIL (PH-VLV) SHALL BE FULLY OPEN AND DISCHARGE TEMPERATURE SHALL BE MAINTAINED BY MODULATING THE FACE AND BYPASS DAMPERS. WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 38F (ADJ), THE FACE AND BYPASS DAMPERS SHALL BE FULLY OPEN TO THE COIL AND THE HEATING COIL SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

RADIANT CEILING PANELS:

WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), HOT WATER VALVES FOR RADIANT HEATING ARE TO REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES ARE TO OPEN AS A FIRST STAGE OF HEATING FOR THE SPACES INDICATED IN THE MECHANICAL DRAWINGS.

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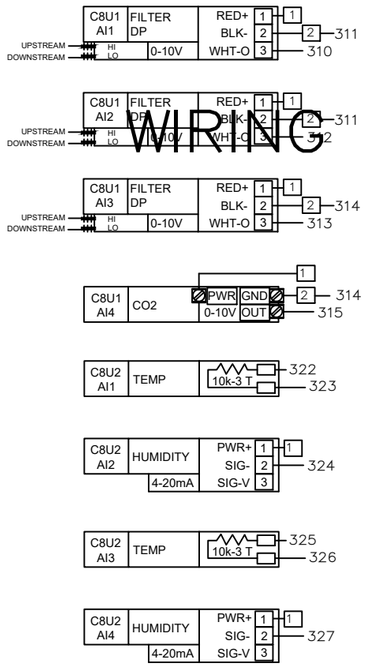
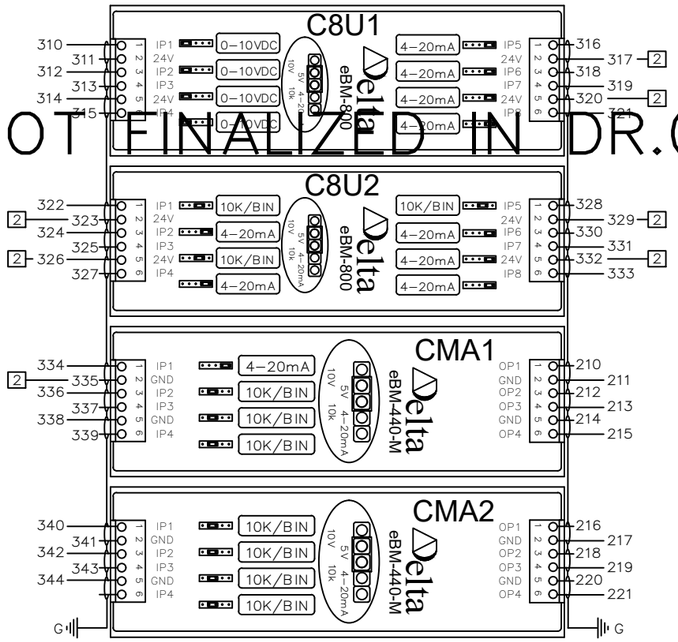
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

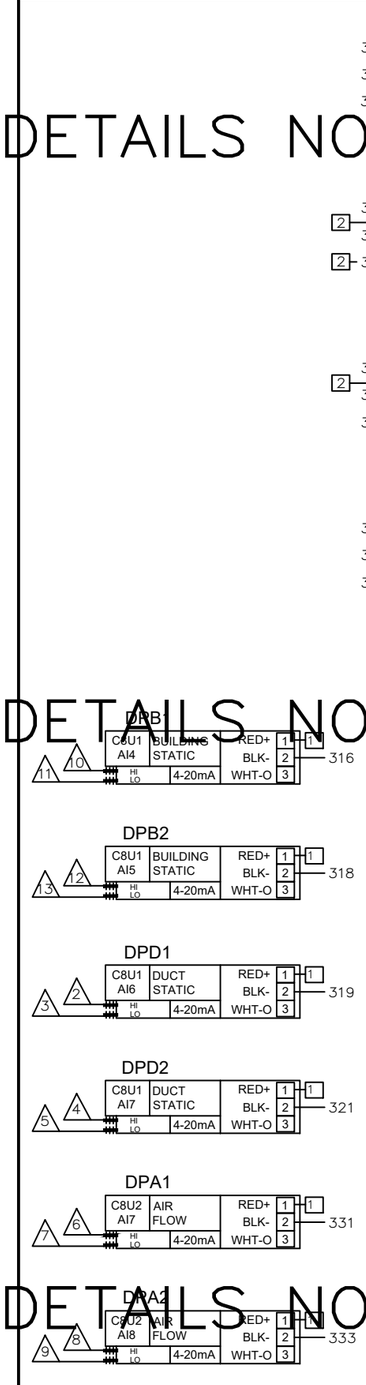
CONTRACT NO:

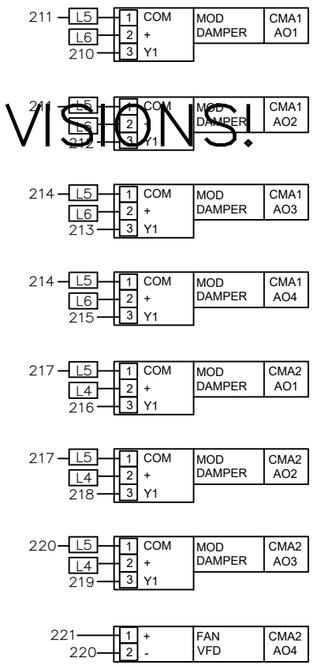
SHEET
NCHS-186
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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J–2304001

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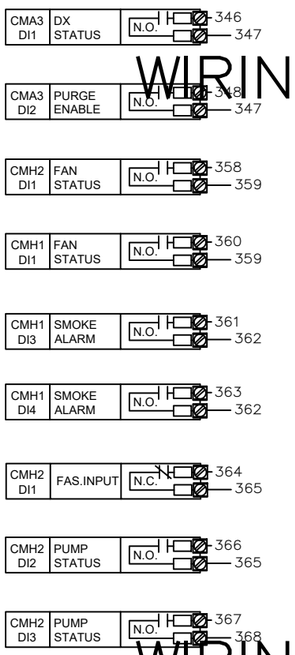
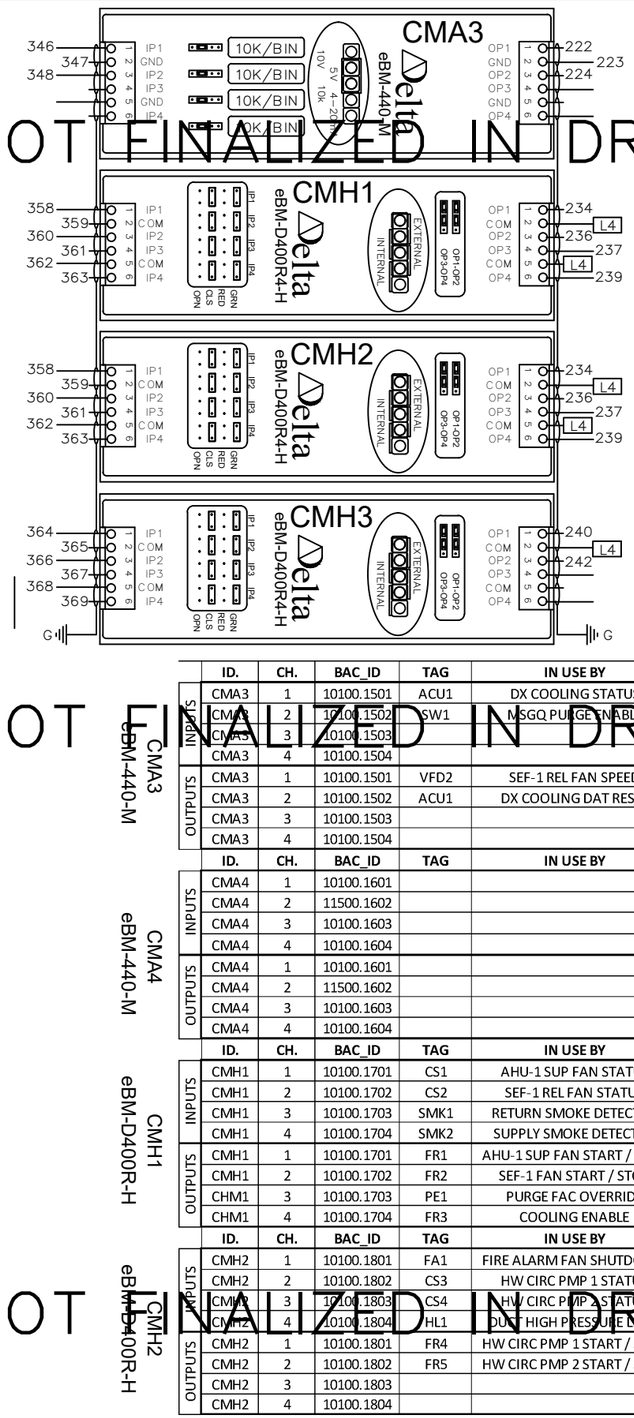
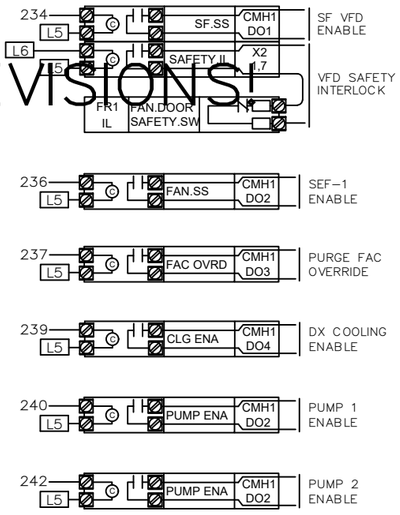




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–188
JOB NUMBER:
J–2304001

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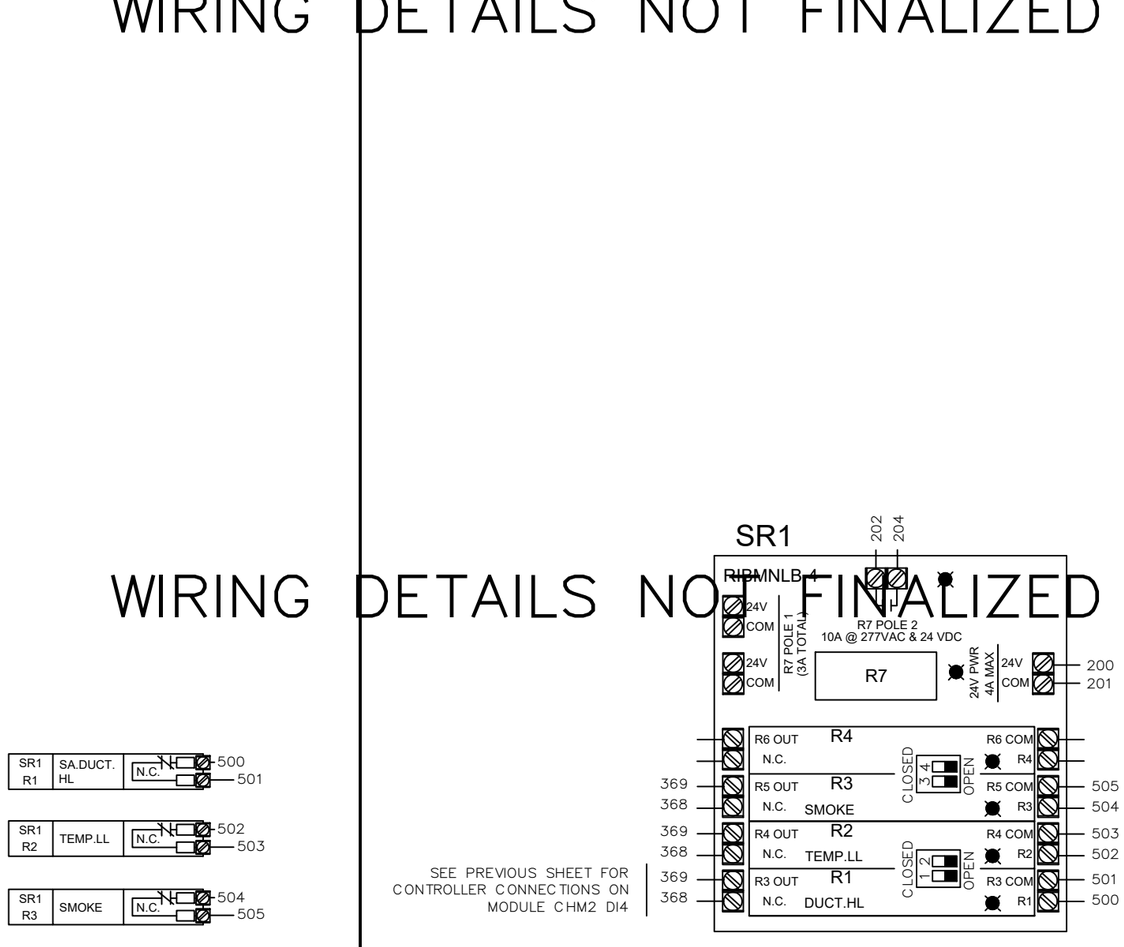

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-M1 SYSTEM 24 PANEL – I/O WIRING (3 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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NCHS-189
JOB NUMBER:
J-2304001

SYSTEM 24 CONTROL PANEL

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET LEG 02

TO SYSTEM 01 SUBNET LEG 03

TO SYSTEM 01 SUBNET LEG 04

300
301

ETS1

V1-
V1+

ETHERNET SWITCH

1 2 3 4 5

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2
10A @ 277VAC & 24 VDC

R7

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM
R3 COM
R2 COM
R1 COM

CLOSED

201
200

CEB1

PWR
GND
24~

USB2
USB1

(NOT USED)

eBMGR-2

C8X1

eBX

eBUS Address

eBUS

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

eNET BUS

C8X2

TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

AHU-M1 SYSTEM 24 PANEL – POWER & NETWORK WIRING

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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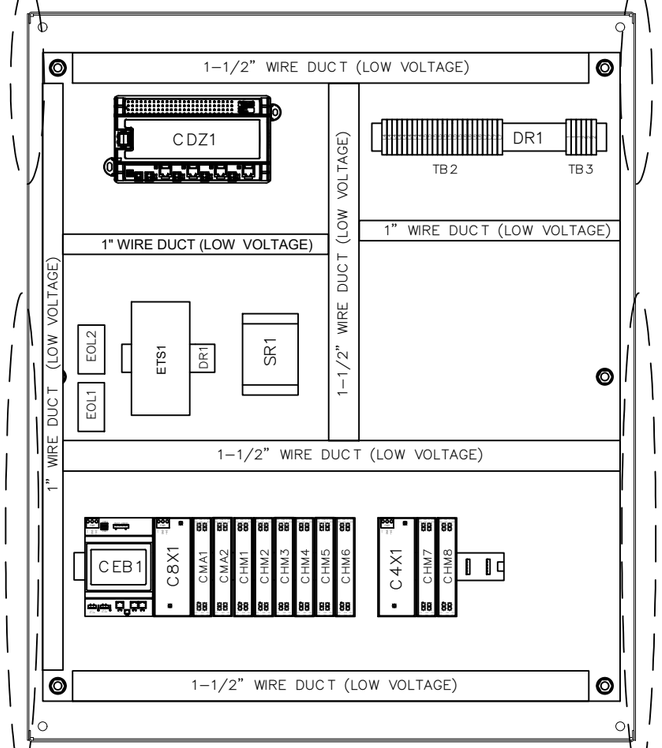
NCHS-190
JOB NUMBER:
J-2304001

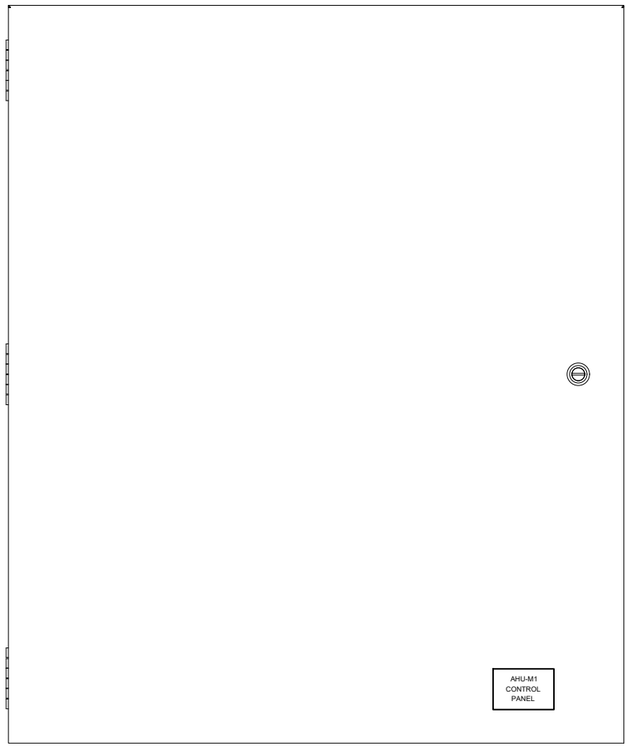
SYSTEM CONTROL PANEL 24 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

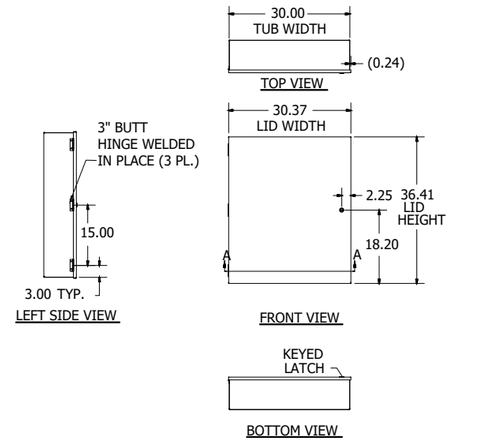
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

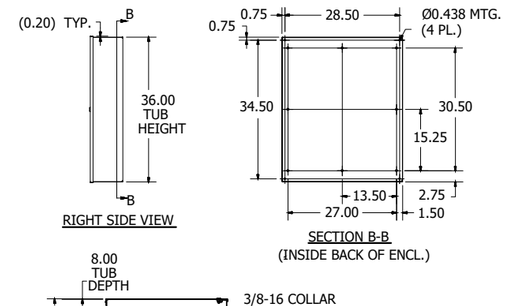
BILL OF MATERIALS

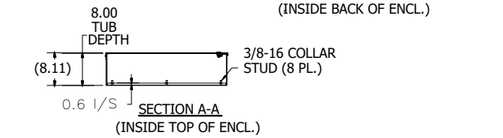
BILL OF MATERIALS

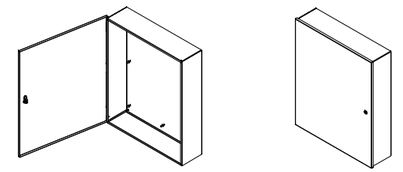
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

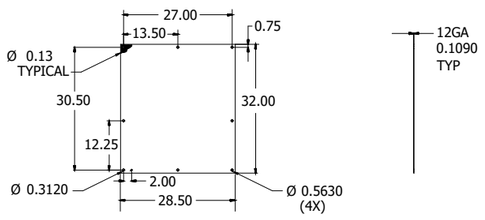








PANEL DIMENSIONS



AHU–M1 SYSTEM 24 PANEL – DIMENSIONS & BOM

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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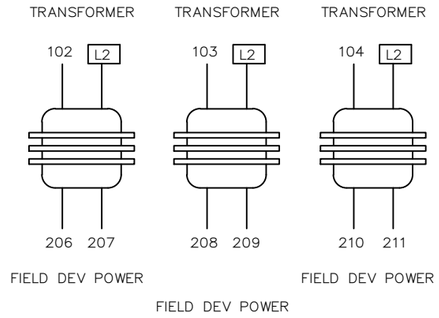
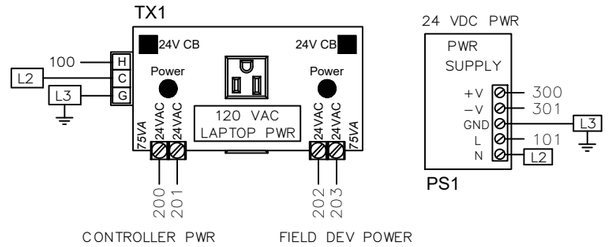
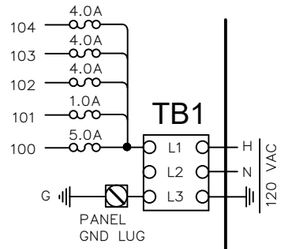
SHEET
NCHS–191
JOB NUMBER:
J–2304001

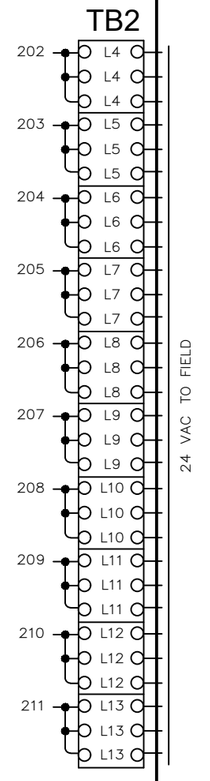
SYSTEM 24 COMPANION PANEL

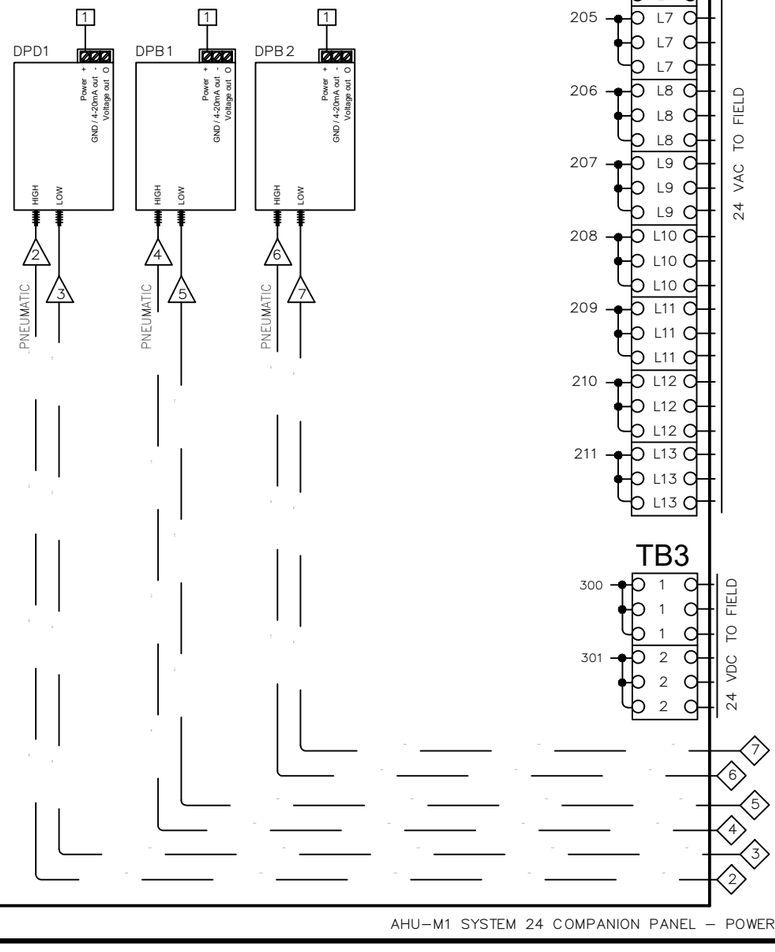
PANEL _____
CIRCUIT _____











SEE RISER DIAGRAMS FOR LOCATION

AHU–M1 SYSTEM 24 COMPANION PANEL – POWER WIRING & PNEUMATIC CONNECTIONS

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
DATE	REMARKS

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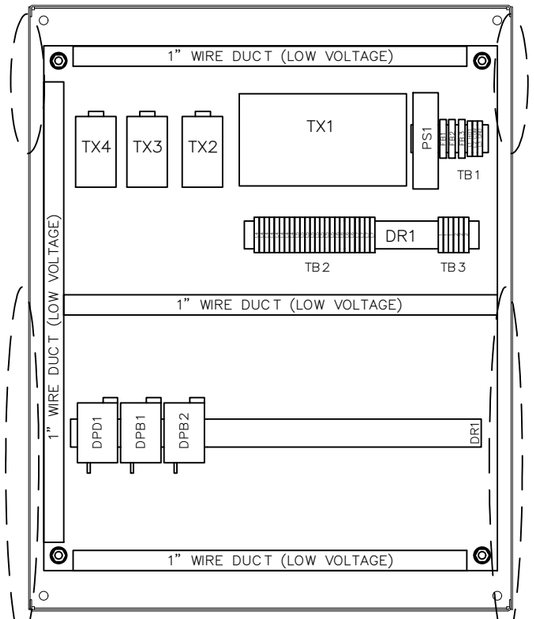
CONTRACT NO:

SHEET
NCHS–192
JOB NUMBER:
J–2304001

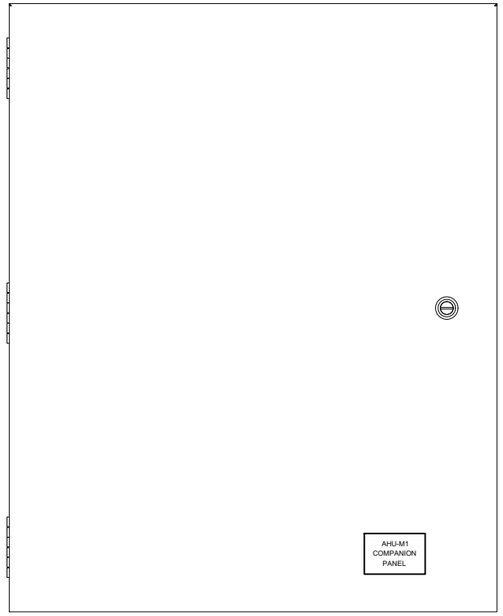
SYSTEM 24 COMPANION PANEL LAYOUT

NO CONDUITS THROUGH THE TOP OF THE PANEL!

NETWORK CABLES ENTER IN THIS AREA



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



*NEW ENCLOSURE PROVIDED

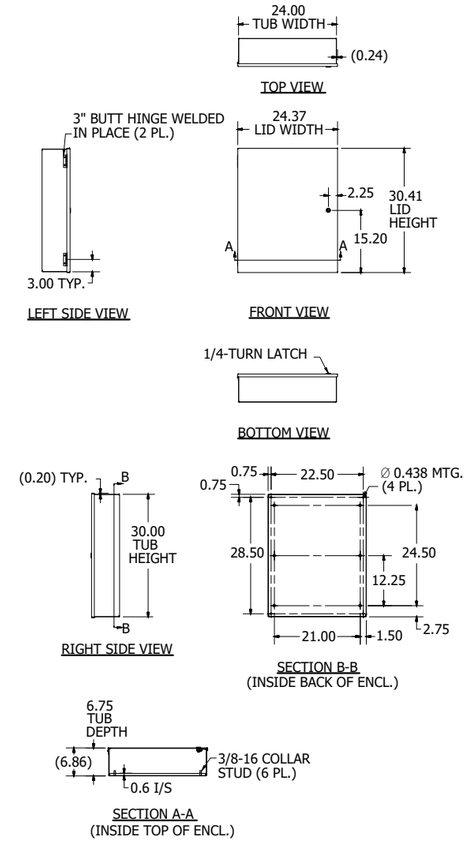
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

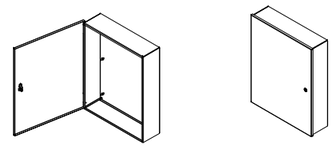
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

BILL OF MATERIALS

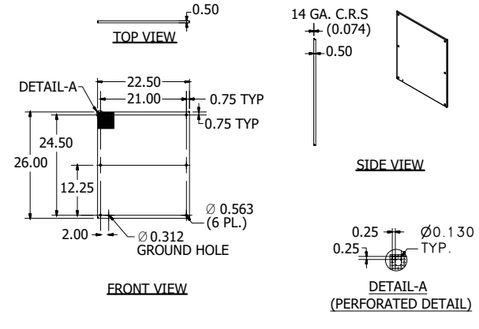
BILL OF MATERIALS

24" (W) x 30" (H) ENCLOSURE DIMENSIONS





PANEL DIMENSIONS



AHU-M1 SYSTEM 24 COMPANION PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

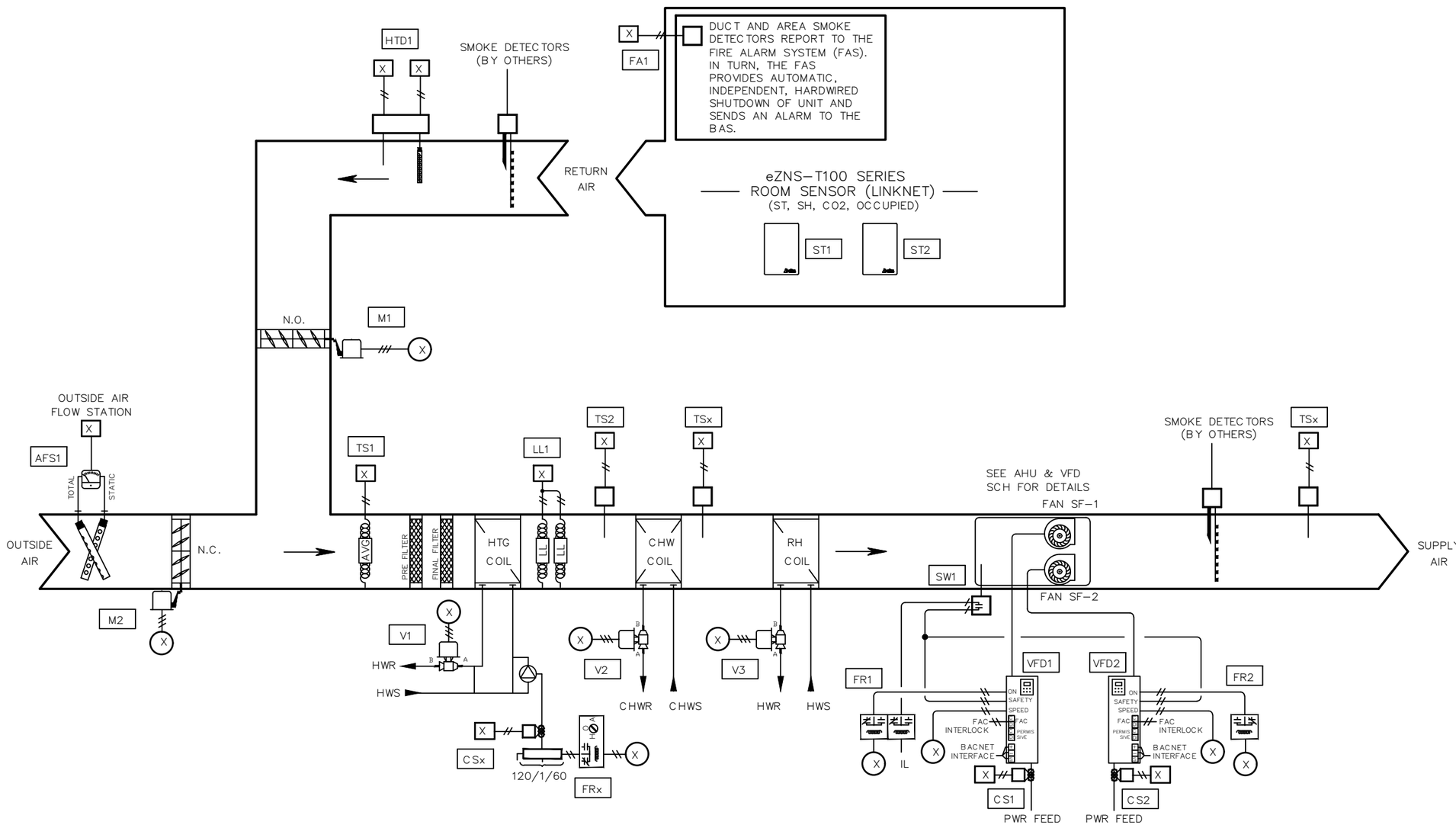
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-193
JOB NUMBER:
J-2304001

AHU–M2 FIELD DEVICES



NETWORK POINTS

N1 THROUGH Nx

BILL OF MATERIAL

AHU–M2 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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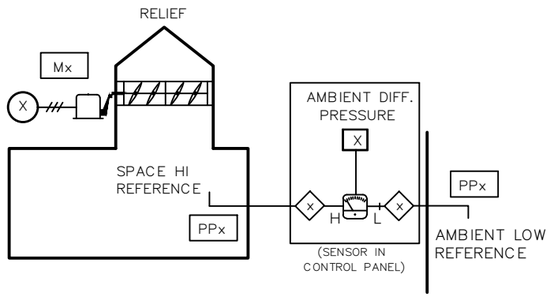
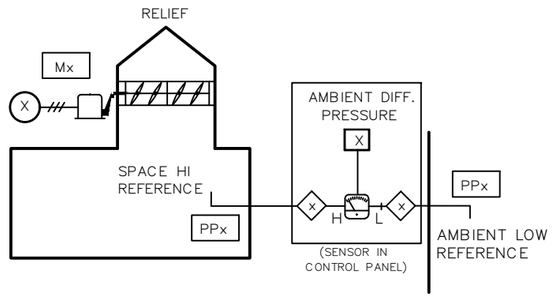
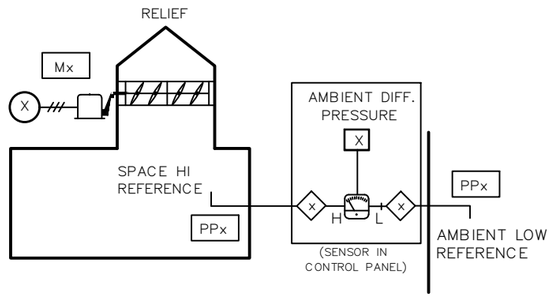
BUILDING PRESSURE CONTROL
E–IH–M2



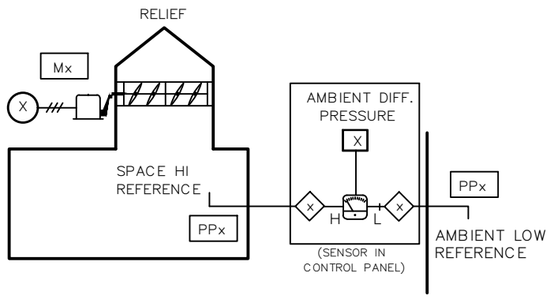
BUILDING PRESSURE CONTROL
E–IH–S1



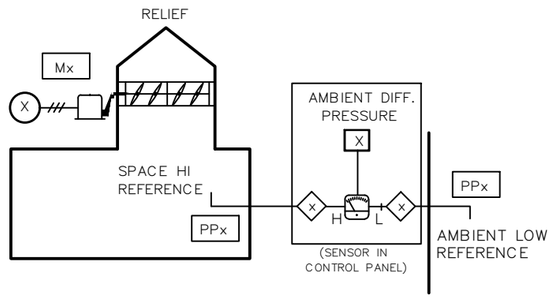
BUILDING PRESSURE CONTROL
E–RH–T3



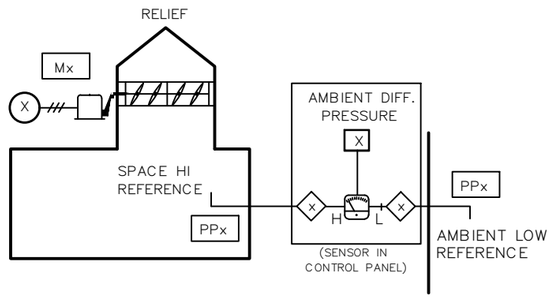
BUILDING PRESSURE CONTROL
E–RH–T4



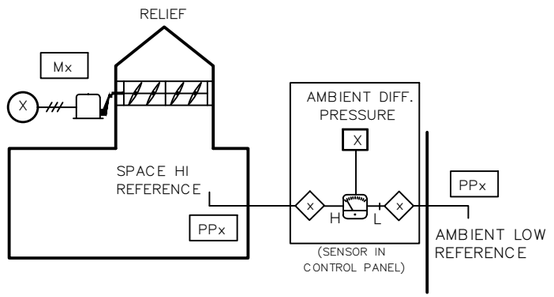
BUILDING PRESSURE CONTROL
E–RH–T5



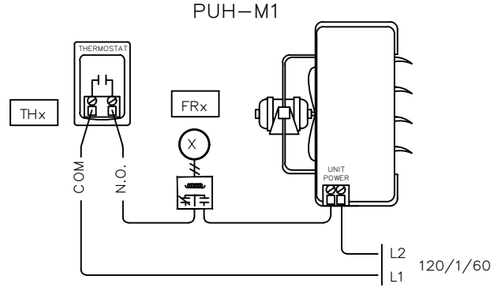
BUILDING PRESSURE CONTROL
E–RH–T6



BUILDING PRESSURE CONTROL
IH–M1



PROPELLER UNIT HEATER
PUH–M1



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA M RELIEF & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
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CONTRACT NO:

SHEET
NCHS–195
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPB5	Building Static Pressure 5	X				
DPB6	Building Static Pressure 6	X				
DPB7	Building Static Pressure 7	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF 1 STAT	Supply Fan 1 Status		X			
SF 2 STAT	Supply Fan 2 Status		X			
CWV	Chill Water Valve			X		
E-IH-M2 DPR	Relief Air Damper			X		
E-IH-S1 DPR	Relief Air Damper			X		
E-RH-T3 DPR	Relief Air Damper			X		
E-RH-T4 DPR	Relief Air Damper			X		
E-RH-T5 DPR	Relief Air Damper			X		
E-RH-T6 DPR	Relief Air Damper			X		
HWV	Hot Water Valve			X		
IH-M1 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF 1 VFD	Supply Fan 1 VFD Speed			X		
SF 2 VFD	Supply Fan 2 VFD Speed			X		
PUH-M1 EN	PUH M1 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF 1 SS	Supply Fan 1 Start / Stop				X	
SF 2 SS	Supply Fan 2 Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
ST2	Space Temp					X
SH3	Space Humidity					X
S CO22	Space CO2					X
OCC2	Occupied Flag					X
	POINT TOTALS:	**13**	**5**	**14**	**4**	**8**

SOFTWARE AND NETWORK (NON–PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU–M2 & AREA M MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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NCHS–196
JOB NUMBER:
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AIR HANDLING UNIT AHU-M2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY. THE OUTSIDE AIRFLOW MEASURING STATION (OA-CFM) SHALL ENSURE THE OUTSIDE AIR DAMPER (OA-DPR) PROVIDES A MINIMUM SCHEDULED AIRFLOW SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSORS) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

Delta Controls
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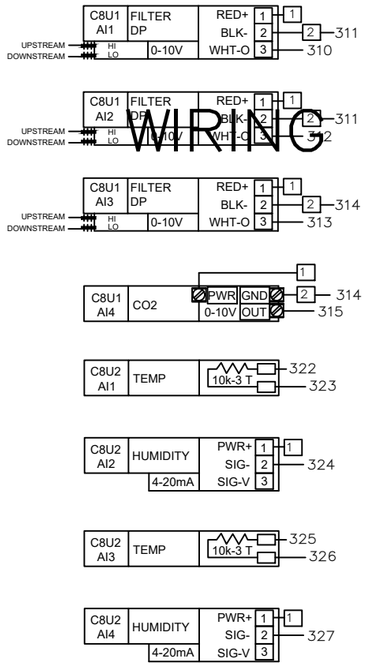
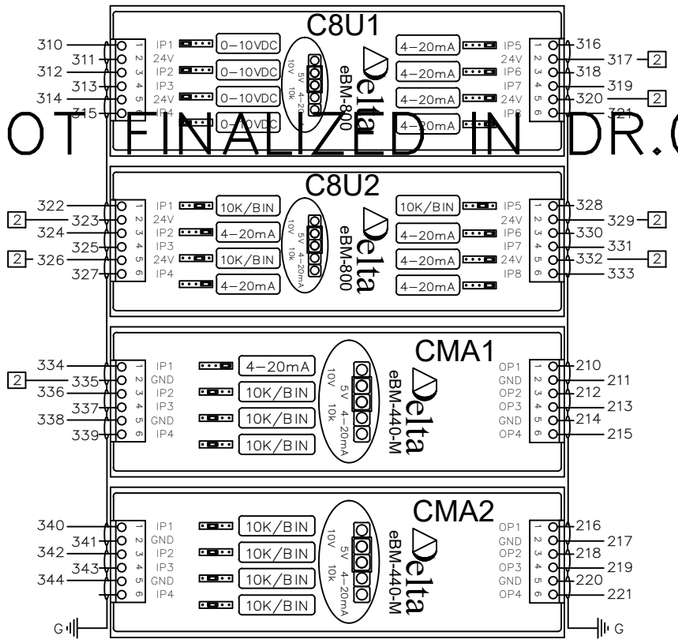
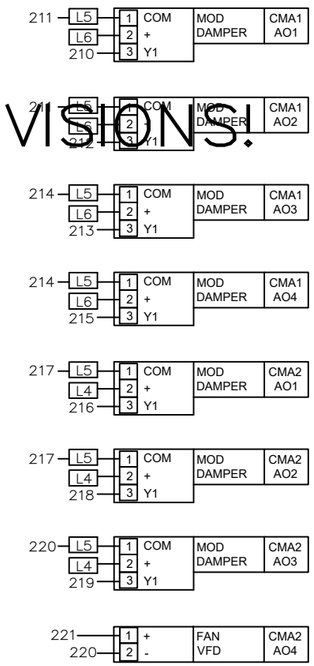
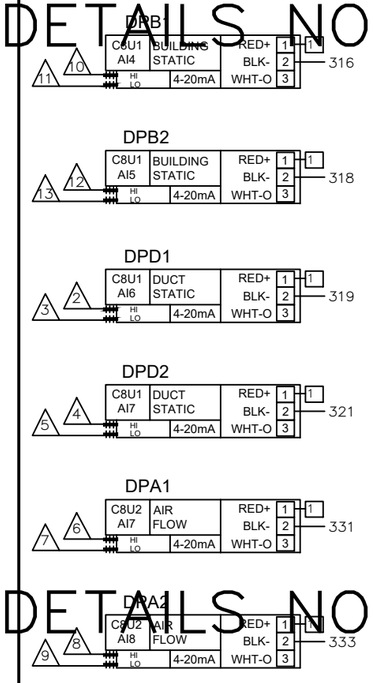
SYSTEM 25 CONTROL PANEL









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	INPUTS
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	INPUTS
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	INPUTS
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	INPUTS
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	INPUTS
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	INPUTS
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	INPUTS

C8U1 eBM-800 — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	INPUTS
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	INPUTS
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	INPUTS
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	INPUTS
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	INPUTS
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	INPUTS
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	INPUTS

C8U2 eBM-800 — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	INPUTS
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	INPUTS
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	INPUTS
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	OUTPUTS
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	OUTPUTS
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	OUTPUTS

CMA1 eBM-440-M — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	INPUTS
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	INPUTS
CMA2	4	10100.1404				INPUTS
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	OUTPUTS
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	OUTPUTS
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	OUTPUTS

CMA2 eBM-440-M — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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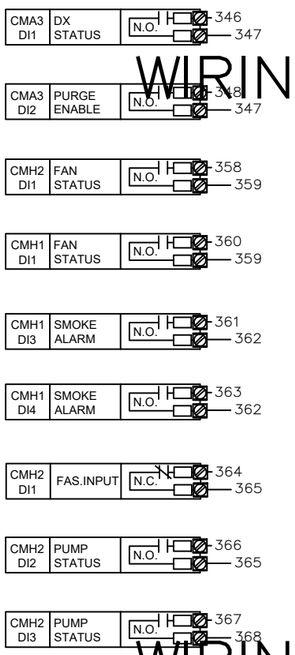
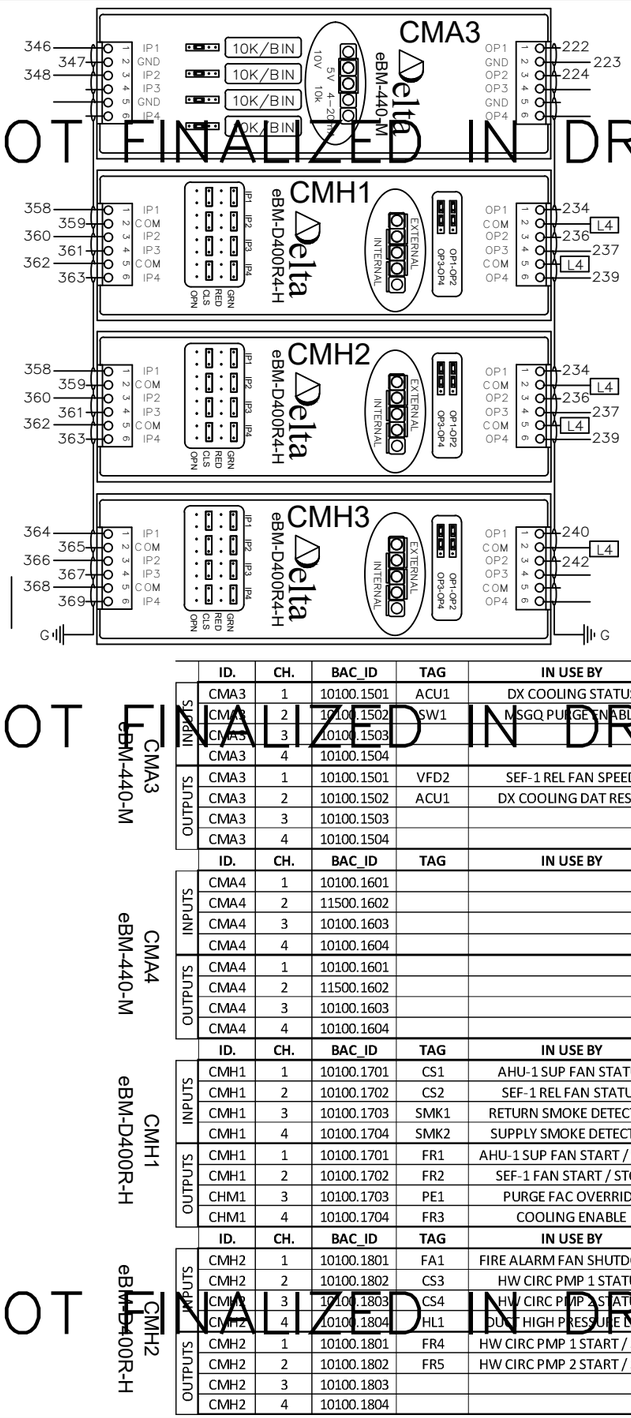
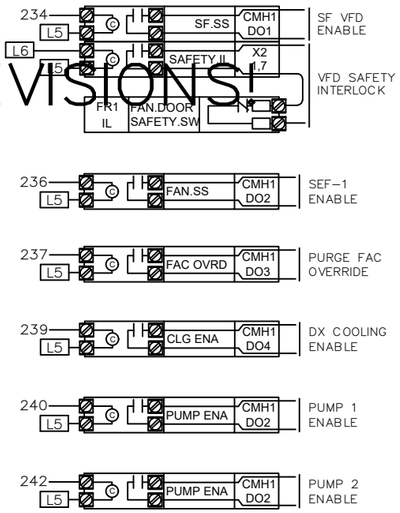
AHU-M2 SYSTEM 25 PANEL – I/O WIRING (1 OF 3)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!





SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
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DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–199
JOB NUMBER:
J–2304001

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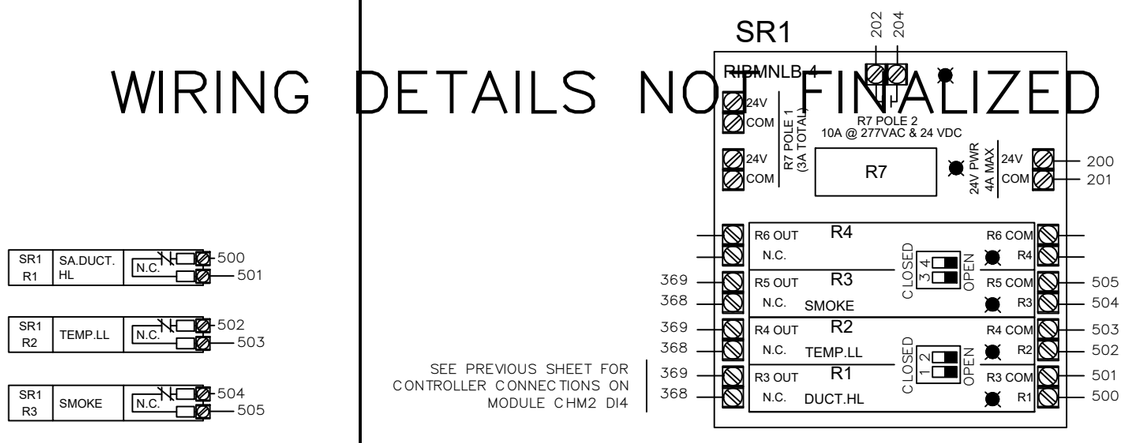

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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NCHS-200
JOB NUMBER:
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SYSTEM 25 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1

ETHERNET SWITCH

CAT5e

eZNS-T100 SERIES
ROOM SENSOR
POWER & NETWORK
WIRING

EOL 4

ST1

ST2

24 VAC

LINKNET (RS-485)

SR1
RIBMNLB-4

TRANSFORMER
102 L2
206 207

TX1
24V CB
Power
240 VAC LAPTOP PWR
CONTROLLER PWR
FIELD DEV POWER

24 VDC PWR
PWR SUPPLY
PS1

TB1
4.0A
1.0A
5.0A
PANEL GND LUG
120 VAC

TB2
24 VAC TO FIELD

TB3
24 VDC TO FIELD

DPB1 DPB2 DPB3 DPB4 DPB5 DPB6 DPB7
HIGH LOW
PNEUMATIC

CEB1
C8X1
eBMGR-2
eBX
eBUS Address
eBUS
eBM-800
eBM-440-M
eBM-D400R4-H
I/O SHIELD DRAIN
TO PANEL GND LUG

EOL3
MS/TP
LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

AHU-M2 SYSTEM 25 PANEL – POWER & NETWORK WIRING

Delta CONTROLS
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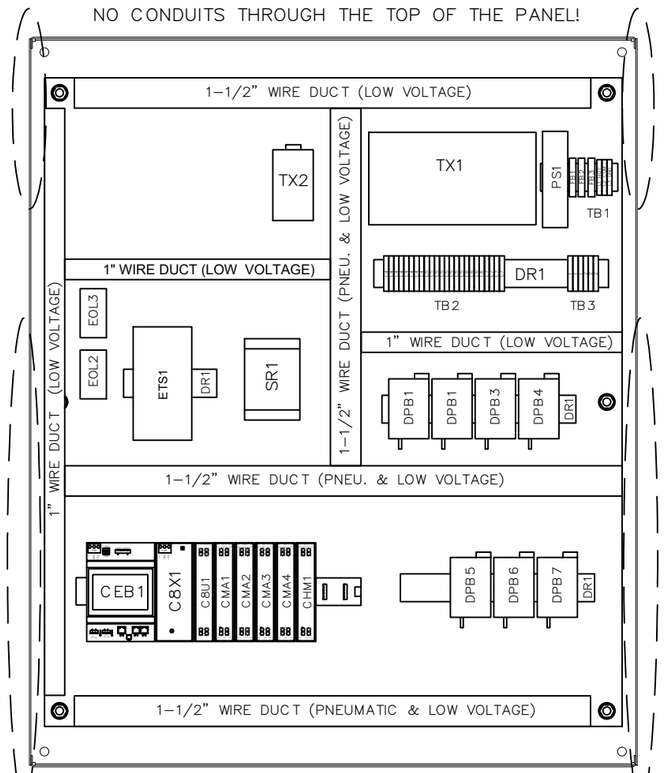
SYSTEM CONTROL PANEL 25 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

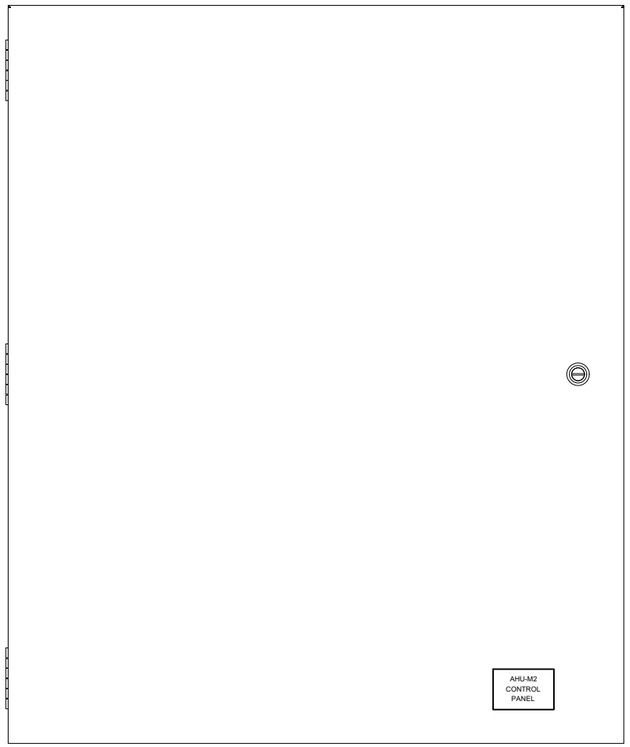


EOL4
(LINKNET TERMINATOR)

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

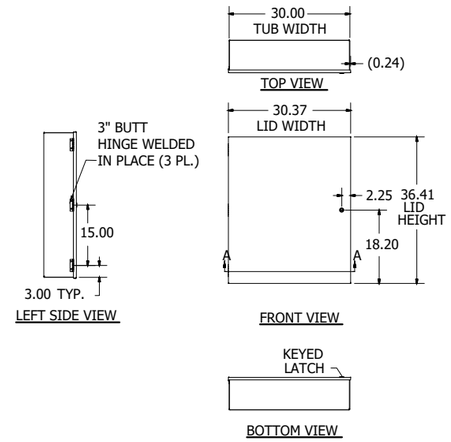


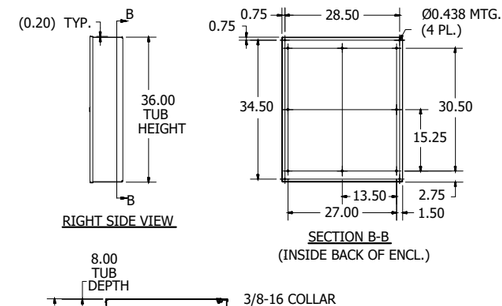
BILL OF MATERIALS

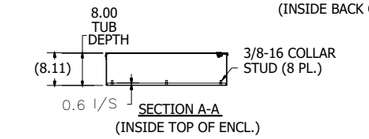
BILL OF MATERIALS

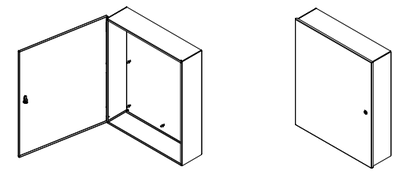
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

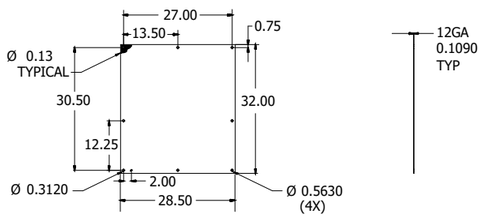








PANEL DIMENSIONS



Delta Controls
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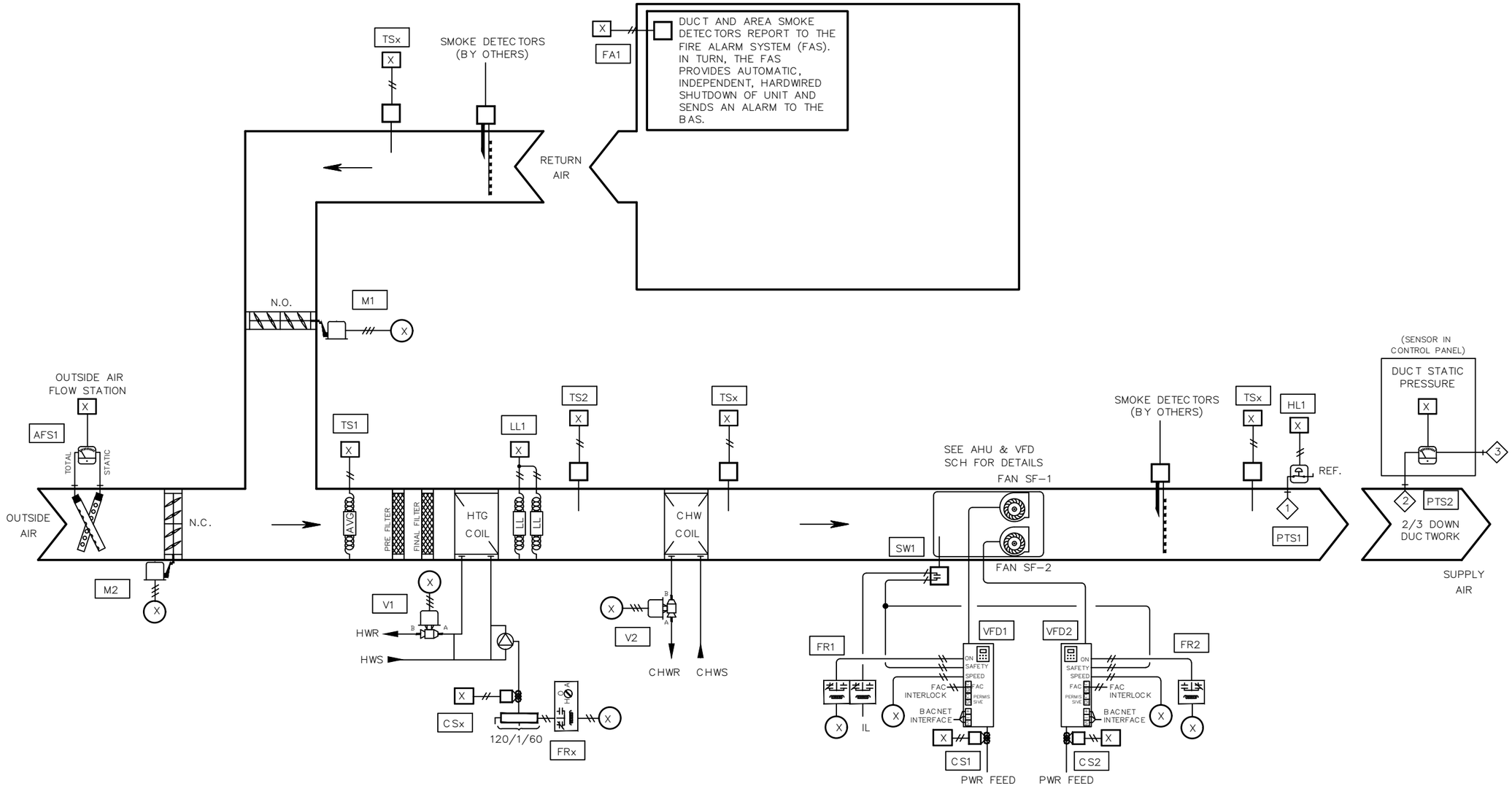
SHEET
NCHS–202
JOB NUMBER:
J–2304001

AHU–AA1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AHU–AA1 FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
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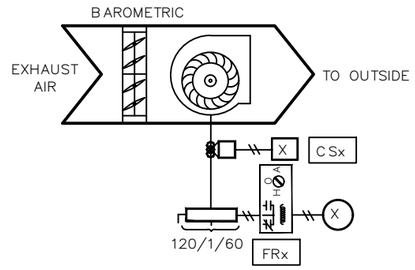
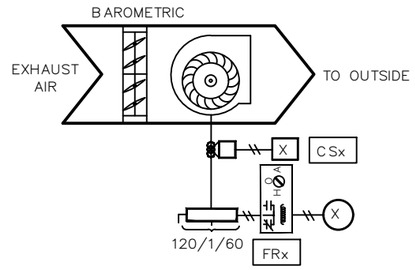
J–2304001

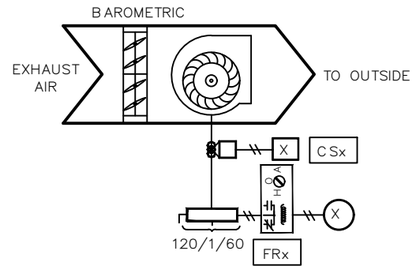
EXHAUST FAN – BAS CONTROLLED
EF–AA1



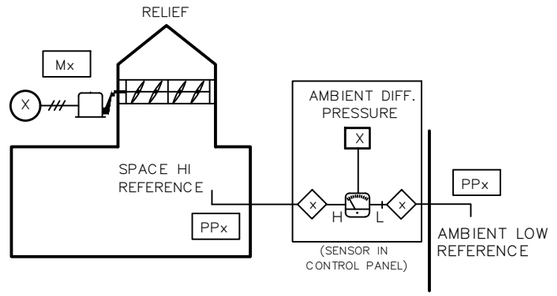
EXHAUST FAN – BAS CONTROLLED
EF–AA2



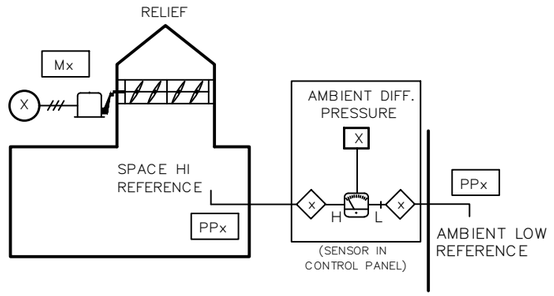
EXHAUST FAN – BAS CONTROLLED
EF–AA3



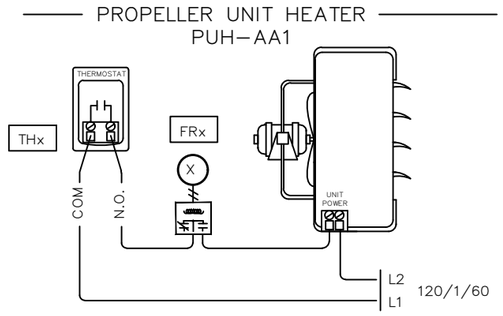
BUILDING PRESSURE CONTROL
IH–AA4



BUILDING PRESSURE CONTROL
RH–AA1



PROPELLER UNIT HEATER
PUH–AA1



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA AA EXHAUST, RELIEF, & PROPELLER UNIT HEATER FIELD DEVICES

Delta CONTROLS
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SHEET
NCHS–204
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-AA1 STAT	Exhaust Fan AA1 Status		X			
EF-AA2 STAT	Exhaust Fan AA2 Status		X			
EF-AA3 STAT	Exhaust Fan AA3 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF 1 STAT	Supply Fan 1 Status		X			
SF 2 STAT	Supply Fan 2 Status		X			
CWV	Chill Water Valve			X		
IH-AA4 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-AA1 DPR	Relief Air Damper			X		
SF 1 VFD	Supply Fan 1 VFD Speed			X		
SF 2 VFD	Supply Fan 2 VFD Speed			X		
EF-AA1 SS	Exhaust Fan AA1 Start / Stop				X	
EF-AA2 SS	Exhaust Fan AA2 Start / Stop				X	
EF-AA3 SS	Exhaust Fan AA3 Start / Stop				X	
PUH-AA1 EN	PUH AA1 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF 1 SS	Supply Fan 1 Start / Stop				X	
SF 2 SS	Supply Fan 2 Start / Stop				X	
	POINT TOTALS:	**9**	**9**	**8**	**7**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-AA1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF1-C, SF2-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF1-S, SF2-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFAAn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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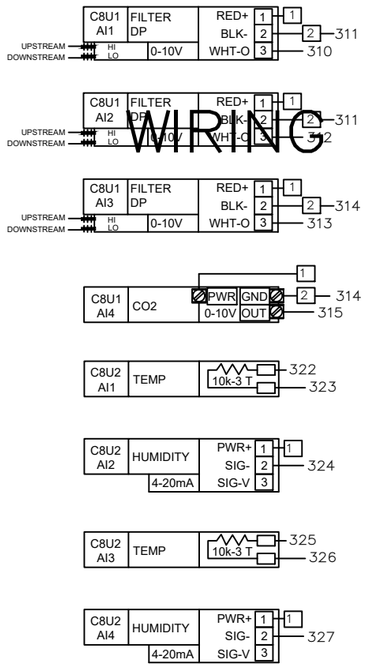
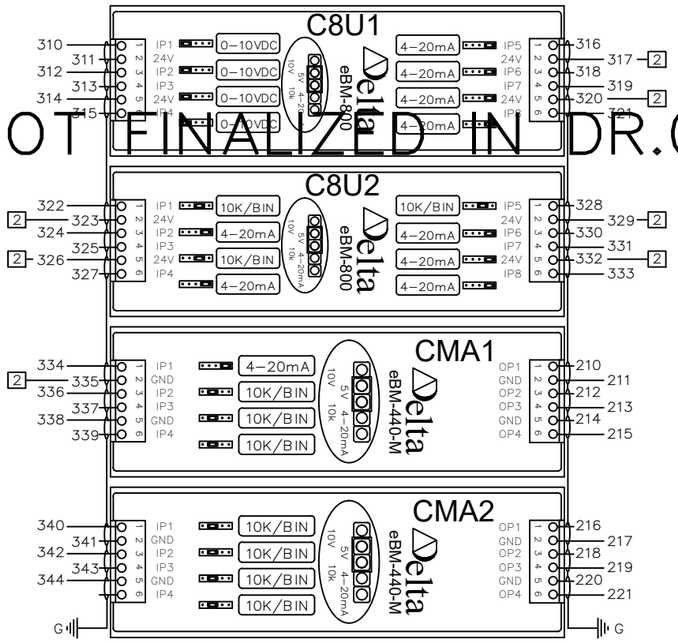
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

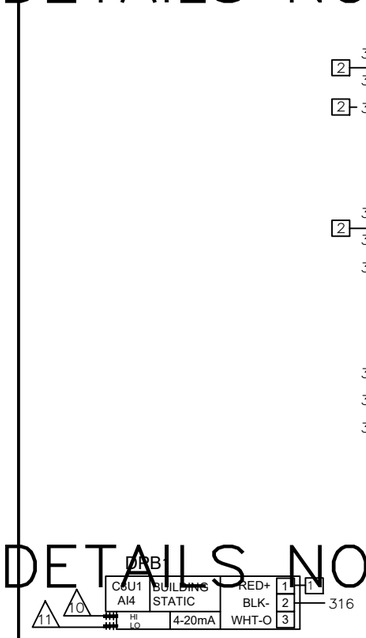
CONTRACT NO:

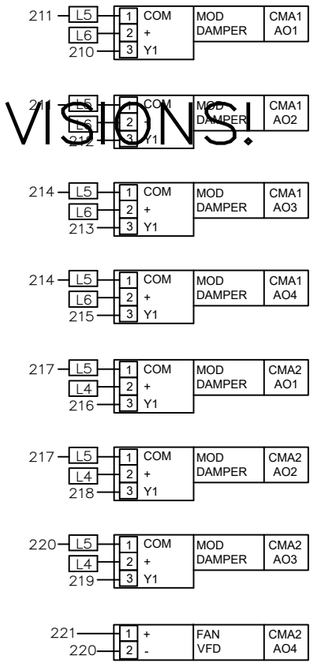
SHEET
NCHS-206
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU-AA1 SYSTEM 26 PANEL – I/O WIRING (1 OF 3)

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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CONTRACT NO:

SHEET
NCHS-207
JOB NUMBER:
J-2304001

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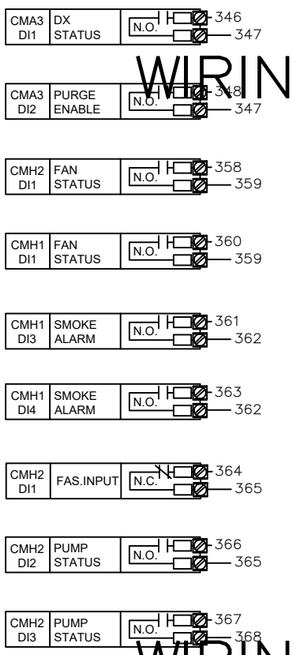
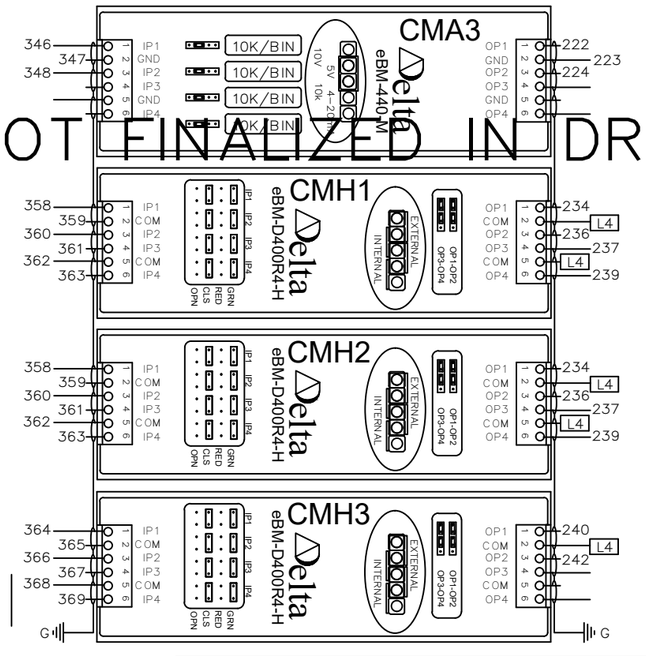
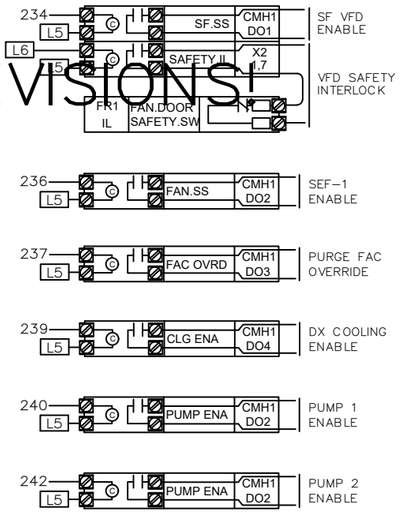




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–208
JOB NUMBER:
J–2304001

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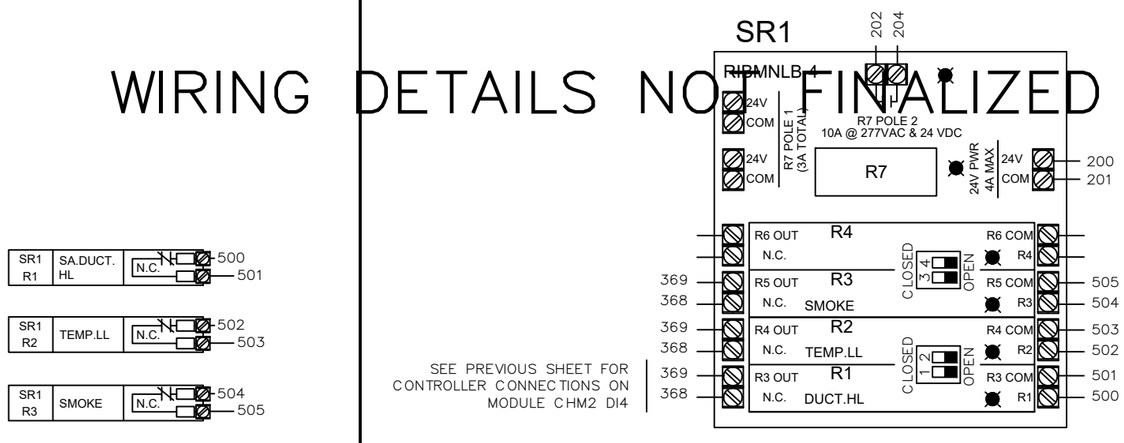

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS-209
JOB NUMBER:
J-2304001

SYSTEM 26 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

300
301

ETS1

V1-
V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4
R3 COM R3
R2 COM R2
R1 COM R1

CLOSED OPEN

TX1

24V CB
Power

100
L2
L3

H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
5.0A
101
100
G

PANEL GND LUG

TB1

L1 L2 L3

H N 120 VAC

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1 DPB1 DPB2

1

Power + GND / 4-20mA out - Voltage out 0

HIGH LOW

PNEUMATIC

2 3 4 5 6 7

CEB1

C8X1

201
200

PWR GND 24~

USB2 USB1

(NOT USED)

NET1 RS-485 NET2 RS-485

LAN 1 LAN 2 LAN 3

eBMGR-2

eBX

eBUS Address

eBUS

MS/TP

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

AHU-AA1 SYSTEM 26 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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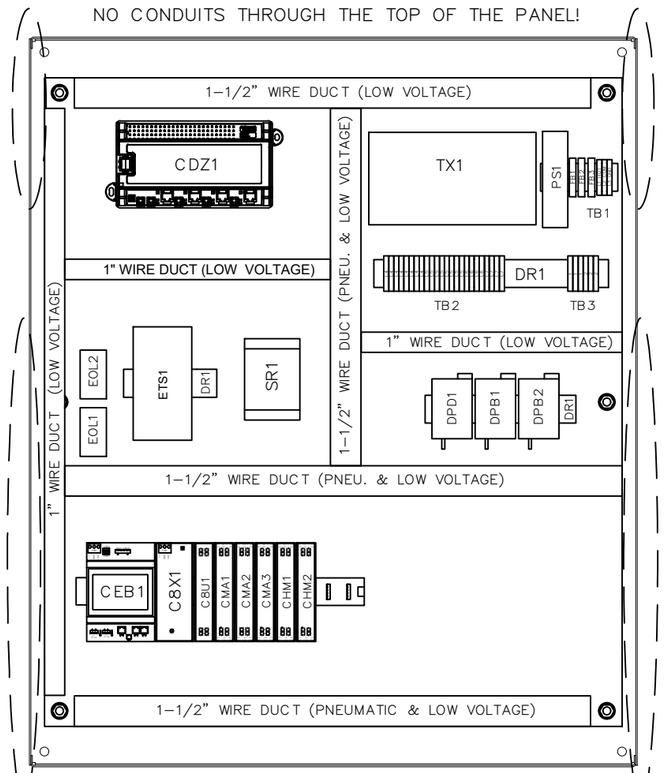
NCHS-210
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 26 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

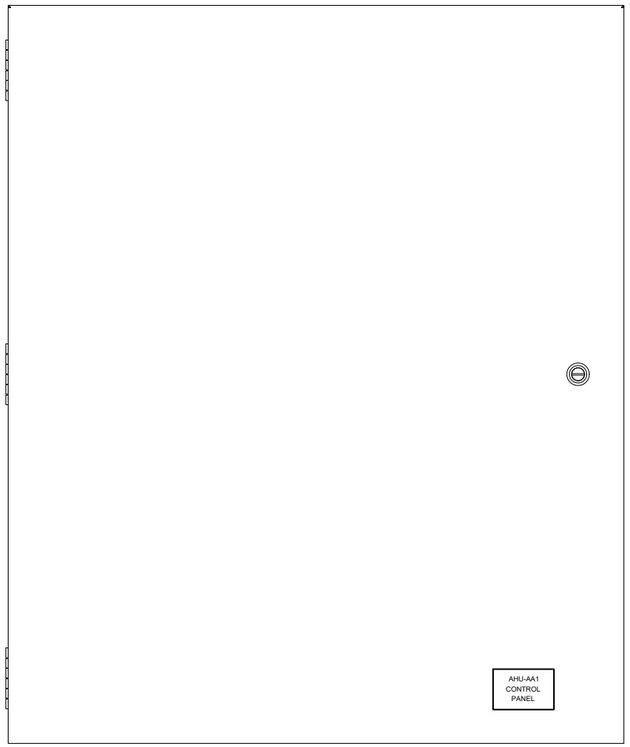
NO CONDUITS THROUGH THE TOP OF THE PANEL!



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

*NEW ENCLOSURE PROVIDED FOR THIS AHU.

HIGH VOLTAGE FEEDS ENTER IN THIS AREA



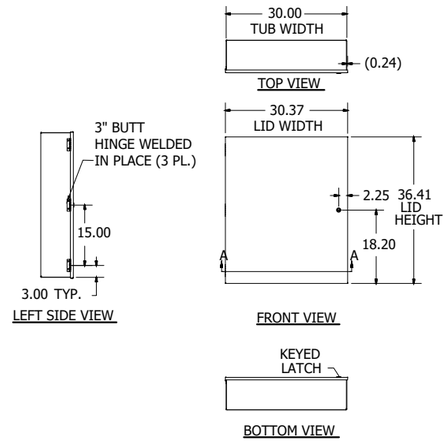
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

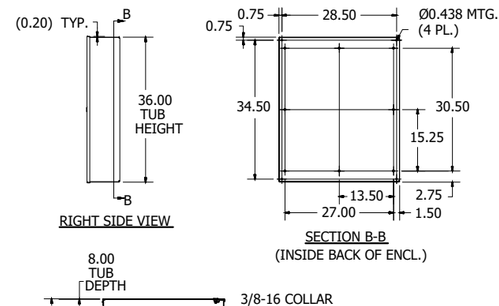
BILL OF MATERIALS

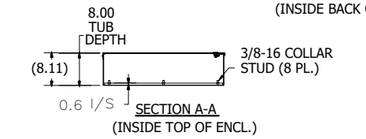
BILL OF MATERIALS

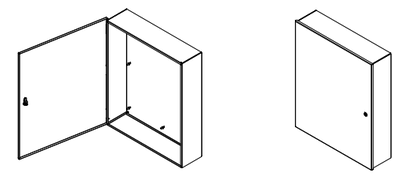
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

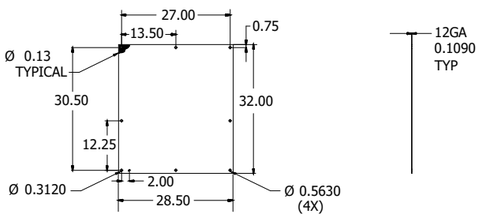








PANEL DIMENSIONS



AHU-AA1 SYSTEM 26 PANEL – DIMENSIONS & BOM

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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	AS–BUILT

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JOB NUMBER:
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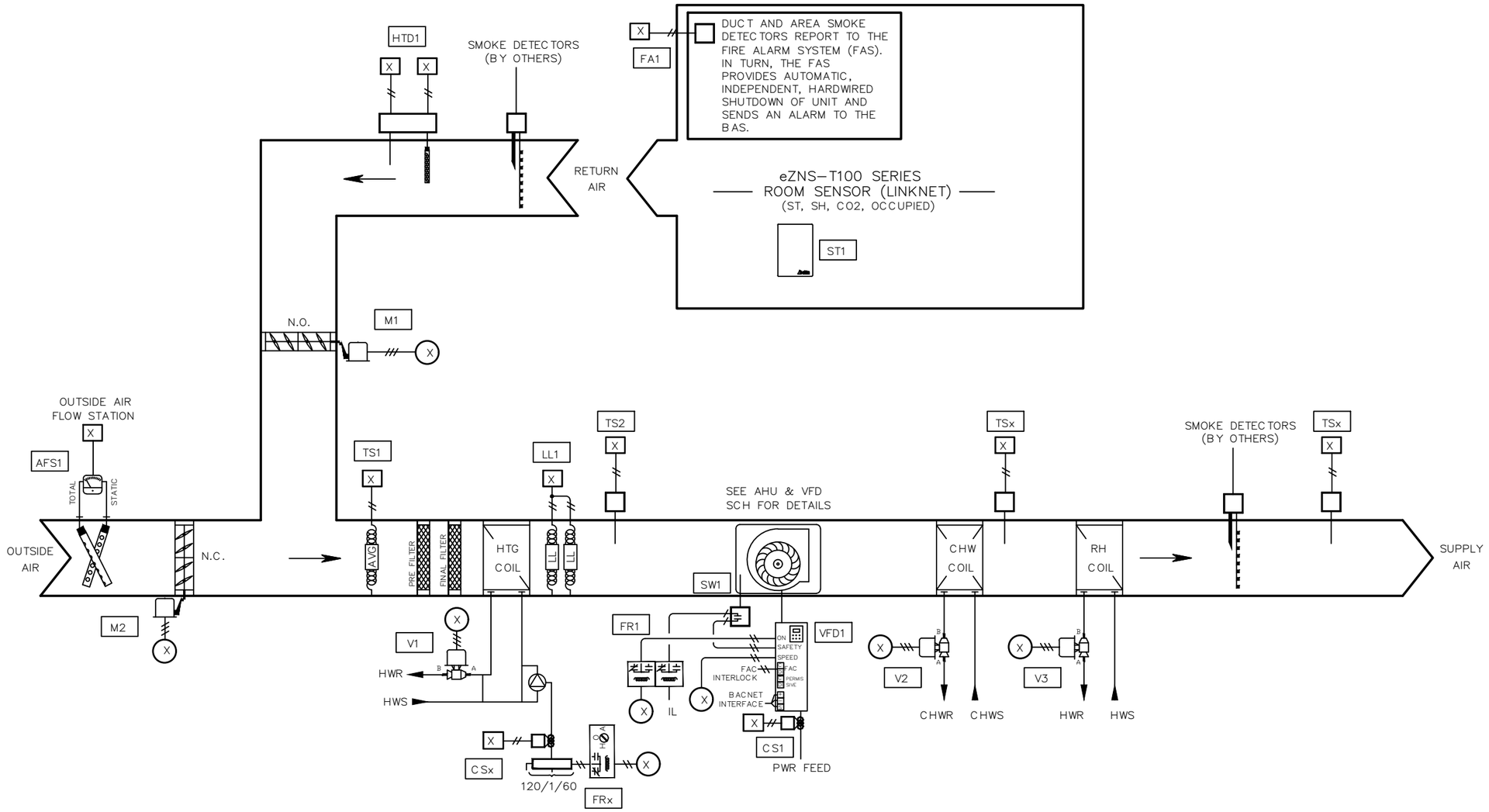
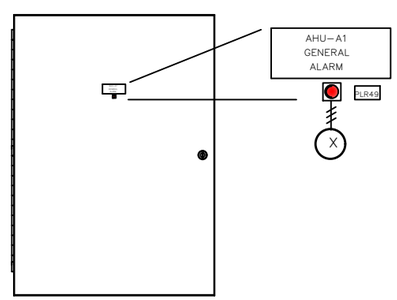
E–AHU–A1 FIELD DEVICES



E–AHU–A1 GENERAL ALARM LIGHT
(REUSE EXISTING LIGHT IN ENCLOSURE DOOR)



NETWORK POINTS
N1 THROUGH Nx

BILL OF MATERIAL

AHU–A1 FIELD DEVICES

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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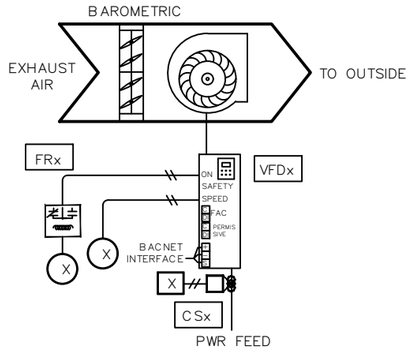
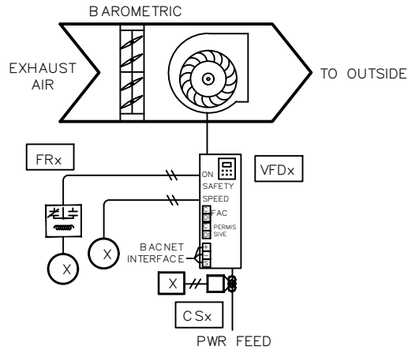
SHEET
NCHS–212
JOB NUMBER:
J–2304001

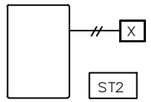
EXHAUST FAN – BAS CONTROLLED
EF–A11



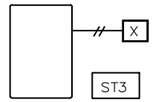
EXHAUST FAN – BAS CONTROLLED
EF–A12



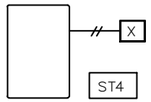
IDF / MDF / ELEC ROOM SPACE TEMPERATURE
RM (TBD)



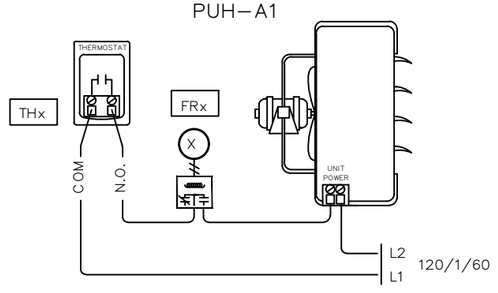
IDF / MDF / ELEC ROOM SPACE TEMPERATURE
RM (TBD)



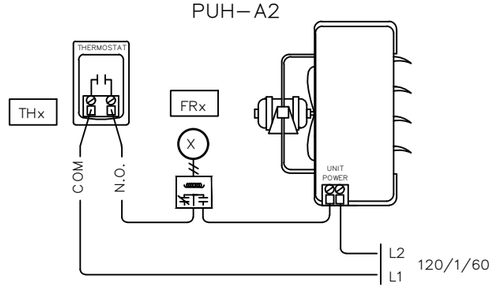
IDF / MDF / ELEC ROOM SPACE TEMPERATURE
RM (TBD)



PROPELLER UNIT HEATER
PUH–A1



PROPELLER UNIT HEATER
PUH–A2



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA A EXHAUST, IDF MONITORING, & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

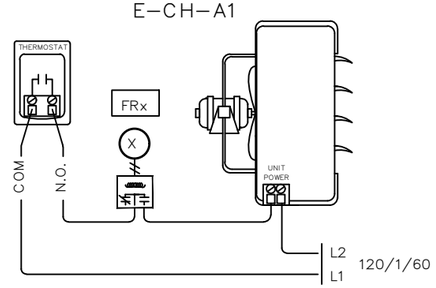
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

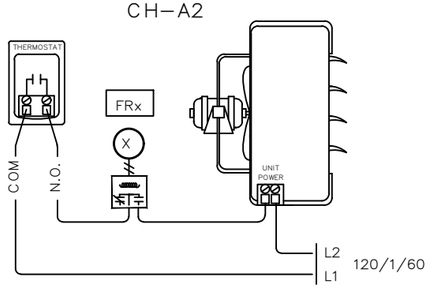
SHEET
NCHS–213
JOB NUMBER:
J–2304001

CABINET UNIT HEATER
E-CH-A1



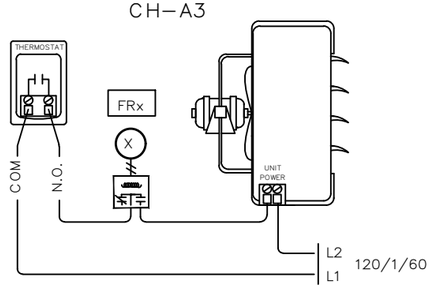
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A2



(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A3



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CABINET UNIT HEATER
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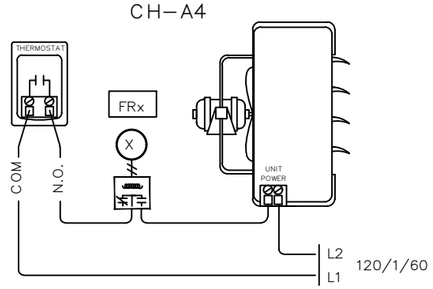

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CABINET UNIT HEATER
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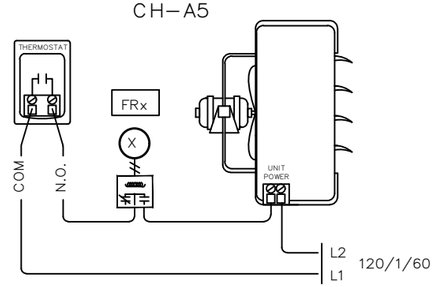
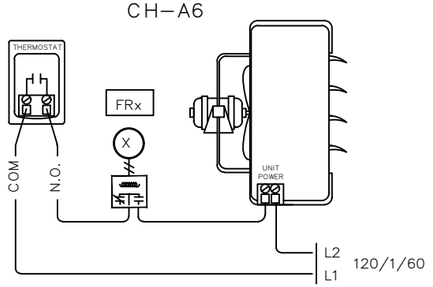


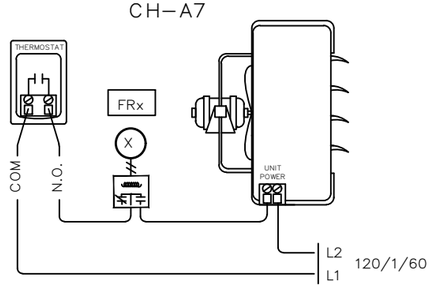
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A6



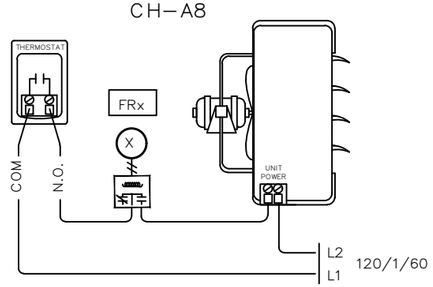
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A7



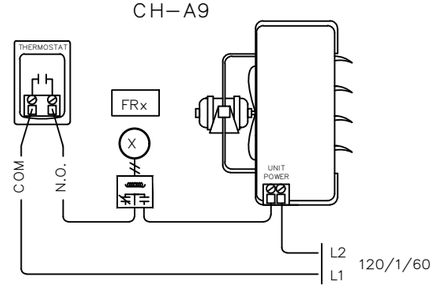
(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A8



(THERMOSTAT BY MANUF.)

CABINET UNIT HEATER
CH-A9



(THERMOSTAT BY MANUF.)

BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA A CABINET UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-214
JOB NUMBER:
J-2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
ST2	Space Temp	X				
ST3	Space Temp	X				
ST4	Space Temp	X				
EF-A11 STAT	Exhaust Fan A11 Status		X			
EF-A12 STAT	Exhaust Fan A12 Status		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
EF-A11 VFD	Exhaust Fan A11 VFD Speed			X		
EF-A12 VFD	Exhaust Fan A12 VFD Speed			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
ALARM LT	AHU-A1 General Alarm (in pnl face)				X	
E-CH-A1 EN	CUH A1 Enable				X	
EF-A11 SS	Exhaust Fan A11 Start / Stop				X	
EF-A12 SS	Exhaust Fan A12 Start / Stop				X	
CH-A2 EN	CUH A2 Enable				X	
CH-A3 EN	CUH A3 Enable				X	
CH-A4 EN	CUH A4 Enable				X	
CH-A5 EN	CUH A5 Enable				X	
CH-A6 EN	CUH A6 Enable				X	
CH-A7 EN	CUH A7 Enable				X	
CH-A8 EN	CUH A8 Enable				X	
CH-A9 EN	CUH A9 Enable				X	
PUH-A1 EN	PUH A1 Enable				X	
PUH-A2 EN	PUH A2 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**9**	**6**	**8**	**16**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-A1 & AREA A MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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CONTRACT NO:

SHEET
NCHS-215
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-A1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE. OCCUPANCY SENSOR AUX CONTACT (OCC-S), OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), EF-A11 AND EF-A12 FANS SHALL START AND MODULATE IN UNISON TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE FANS SHALL STOP WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

DEHUMIDIFICATION MODE: WHEN SPACE HUMIDITY RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN SPACE HUMIDITY FALLS BELOW 55 % RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZNn-CO2) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

CABINET UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

IDF/MDF AND ELECTRICAL HVAC SPLIT SYSTEM MONITORING:

INSTALL AND WIRE BAS FLAT PLATE SPACE TEMPERATURE SENSORS FOR MONITOR OF IDF/MDF SPACES AND ALARM CONDITIONS. ALL STAND-ALONE HVAC SYSTEMS WILL HAVE BAS SPACE TEMPERATURE MONITORING IN ADDITION TO THE CONTROLS FROM THE MANUFACTURER. AN ALARM WILL BE GENERATED IF THE SPACE RISES ABOVE 81F (ADJ) OR DROPS BELOW 59F (ADJ). THESE SPACES ALSO REQUIRE A SEPARATE THERMOSTAT FOR LOCAL EQUIPMENT CONTROL.

Delta Controls
Temperature Control Services
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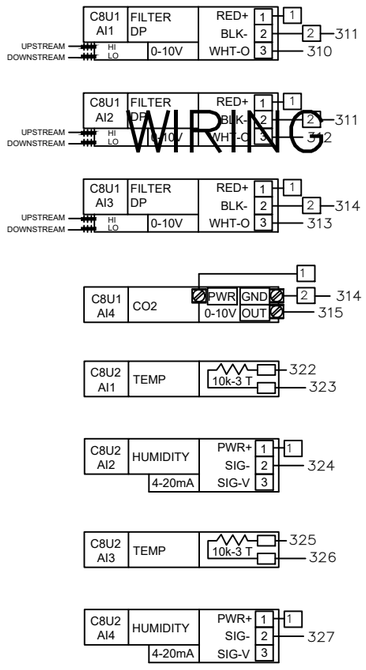
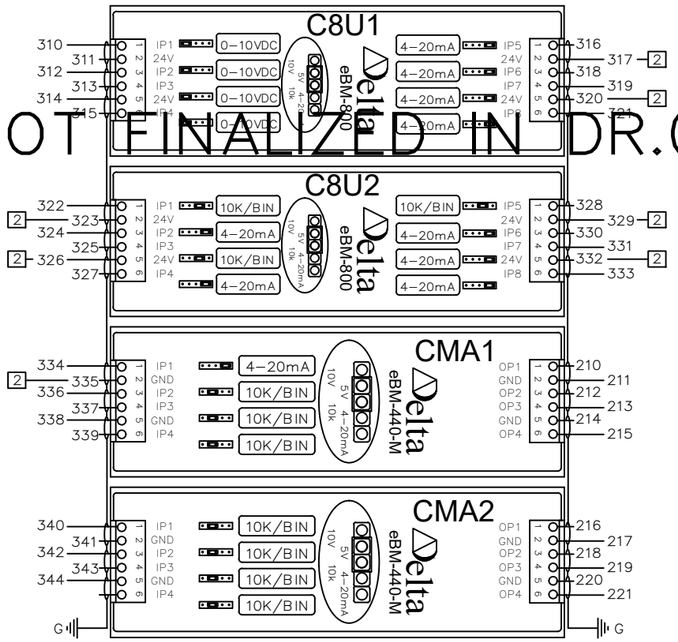
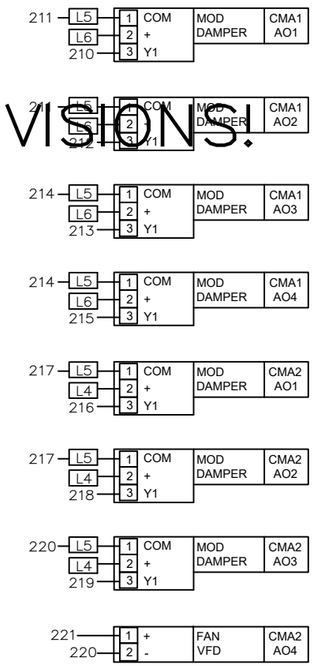
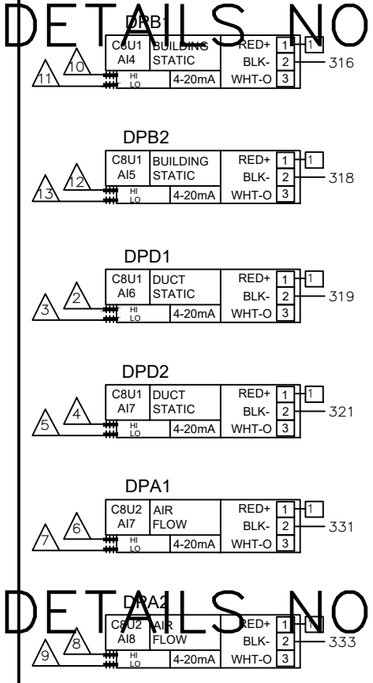
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









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C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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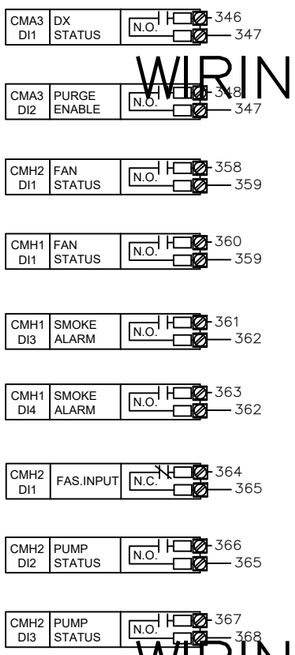
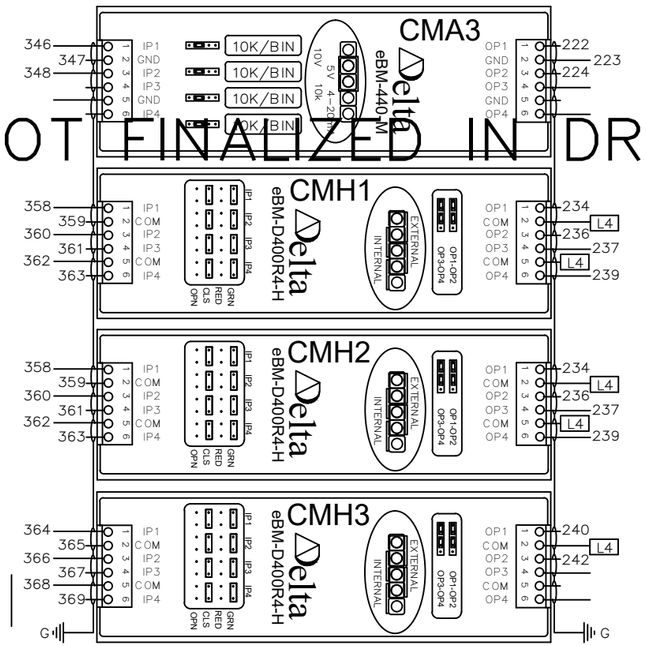
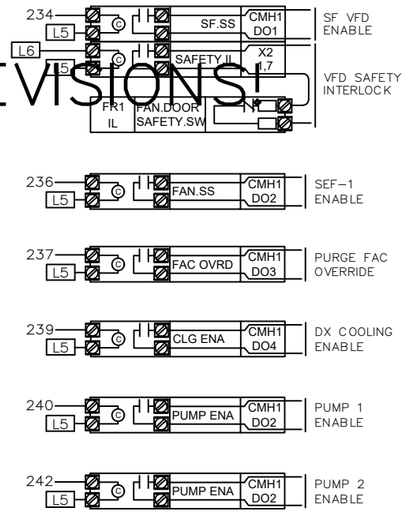




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	LOOP HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–218
JOB NUMBER:
J–2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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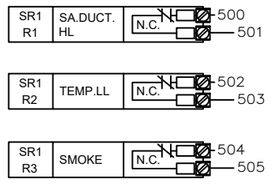

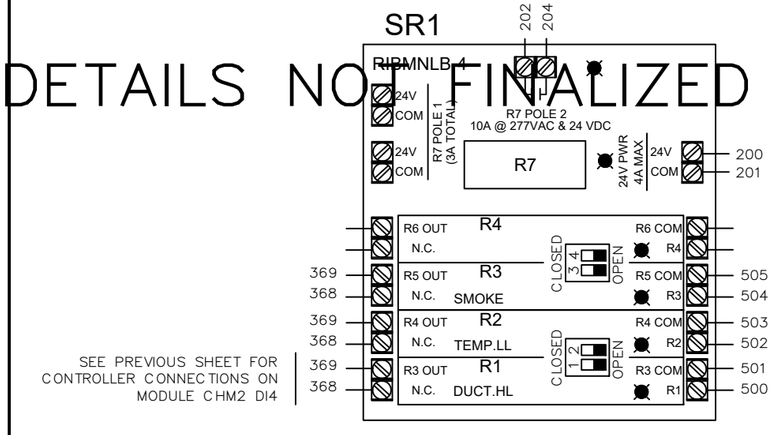

SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
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4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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REVISIONS	
DATE	REMARKS

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CONTRACT NO:

SHEET
NCHS-219
JOB NUMBER:
J-2304001

SYSTEM 27 CONTROL PANEL

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

GND

ETS1

300 301 L3

V1- V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7

R4 R3 R2 R1

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

CLOSED OPEN

TRANSFORMER

102 L2 206 207

TRANSFORMER

103 L2 208 209

TX1

100 L2 L3 H C G

24V CB Power 75VA 24VAC 24VAC

120 VAC LAPTOP PWR

200 201 CONTROLLER PWR

24V CB Power 75VA 24VAC 24VAC

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V -V GND L N

300 301 L3 101 L2

PS1

103 4.0A
102 4.0A
101 1.0A
100 5.0A

TB1

L1 L2 L3

H N 120 VAC

G PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7
206 L8 L8 L8
207 L9 L9 L9
208 L10 L10 L10
209 L11 L11 L11

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1

NET PWR

24 VAC

LINKNET (RS-485)

201 200

CEB1

PWR GND 24~

USB2 USB1

(NOT USED)

NET1 RS-485 NET2 RS-485

SHD + -

ETH 1 ETH 2 ETH 3

201 200

C8X1

PWR GND 24~

Delta eBX

eBUS Address

eBUS

Delta eBMGR-2

P7 24Vs P8 IP1 IP2

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H

GP1 COM LV GP2 GP3 GND LV GP4

IP1 24V IP2 IP3 24V IP4

I/O SHIELD DRAIN

L3 TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-A1 SYSTEM 27 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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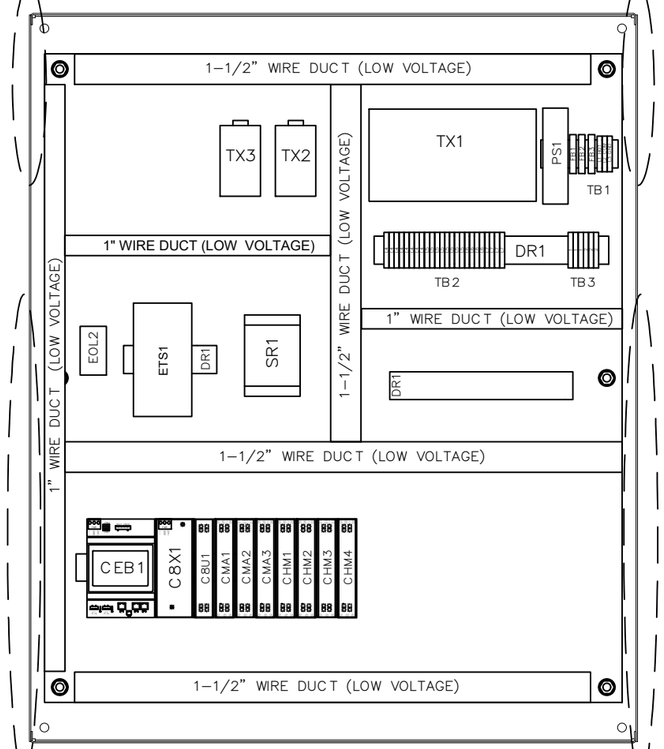
CONTRACT NO:

SHEET
NCHS-220
JOB NUMBER:
J-2304001

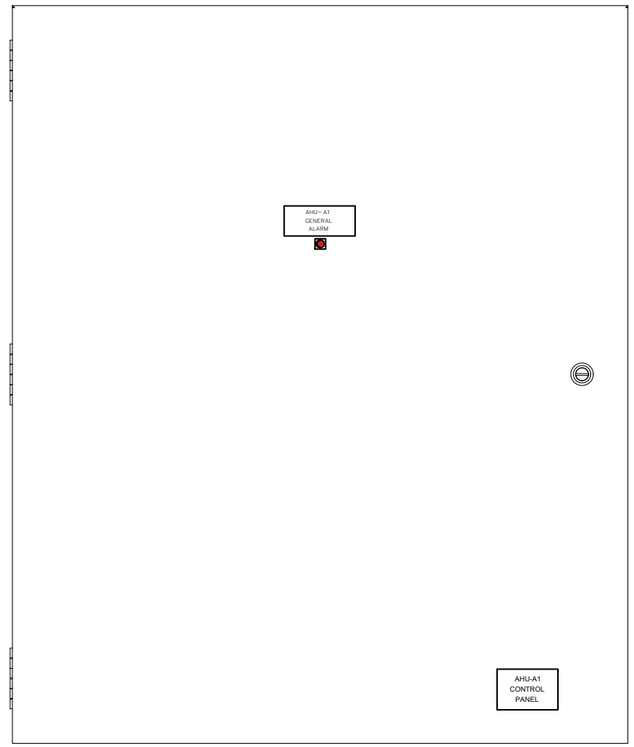
SYSTEM CONTROL PANEL 27 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

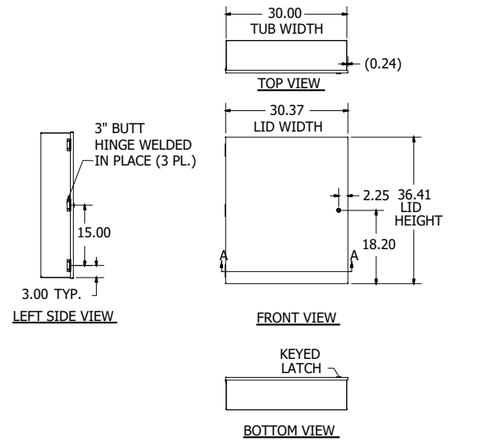
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

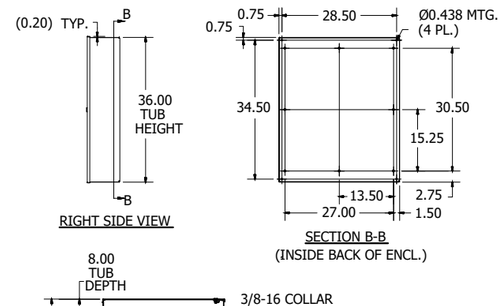
BILL OF MATERIALS

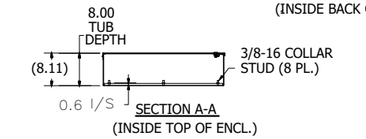
BILL OF MATERIALS

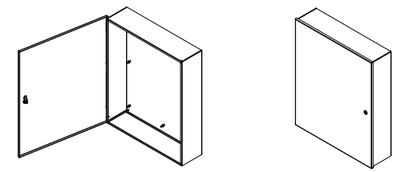
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

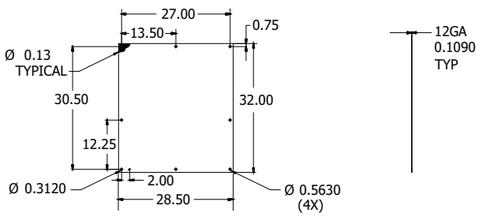








PANEL DIMENSIONS



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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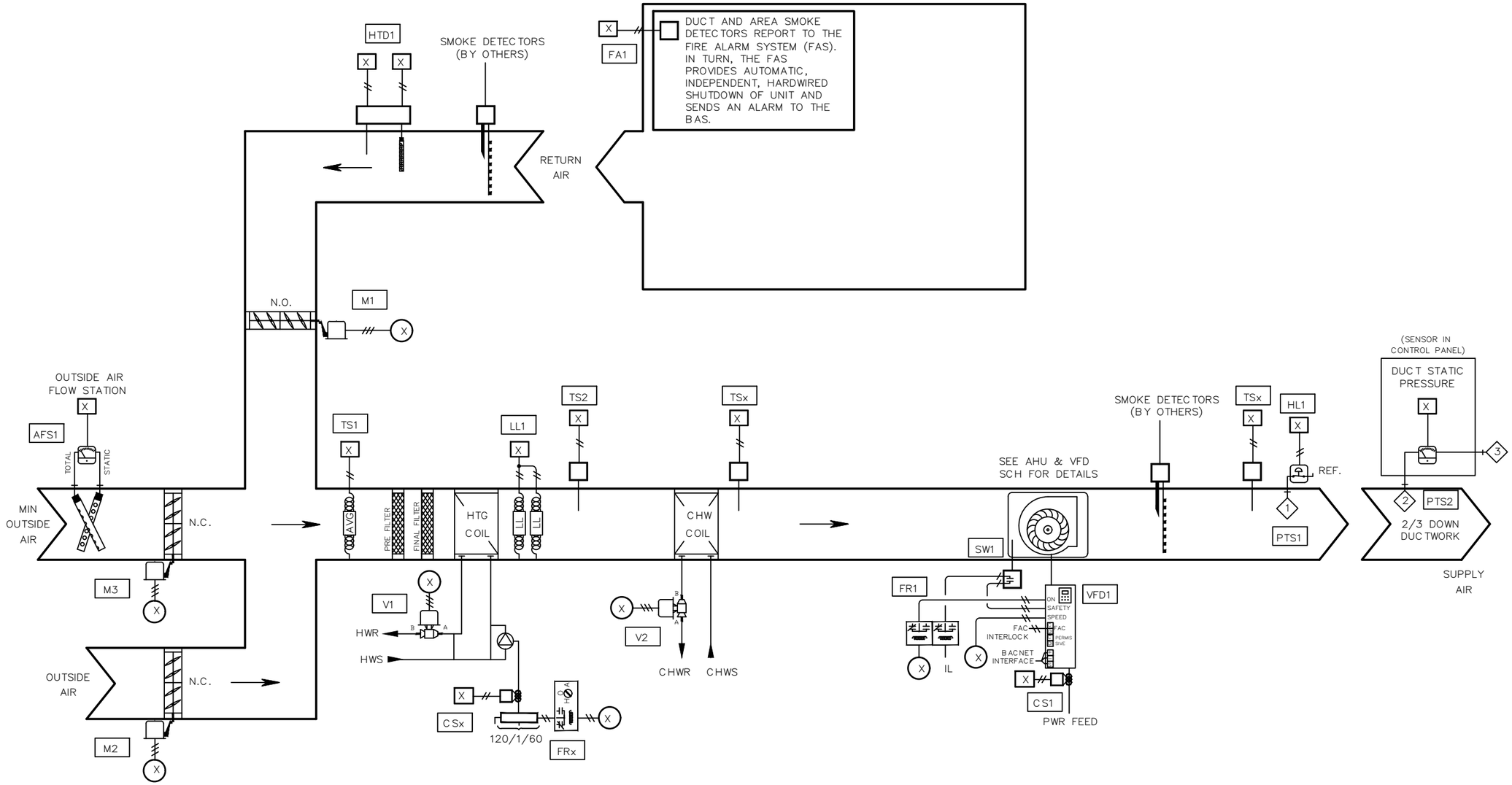
CONTRACT NO:

SHEET
NCHS–221
JOB NUMBER:
J–2304001

E–AHU–B1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–B1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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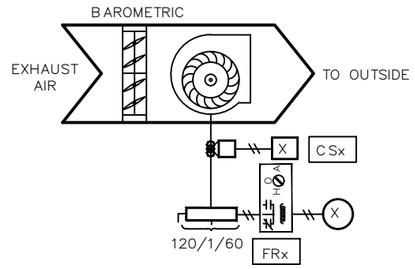
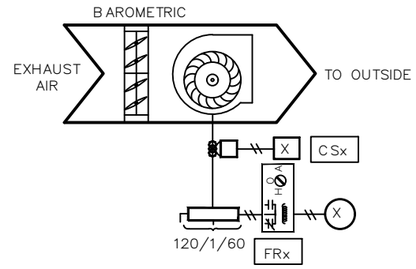
CONTRACT NO:

SHEET
NCHS–224
JOB NUMBER:
J–2304001

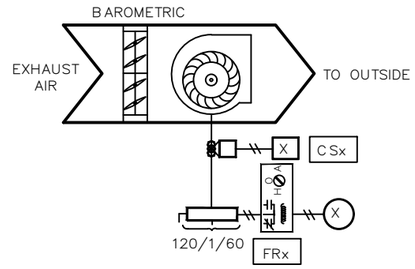
EXHAUST FAN – BAS CONTROLLED
EF–B1



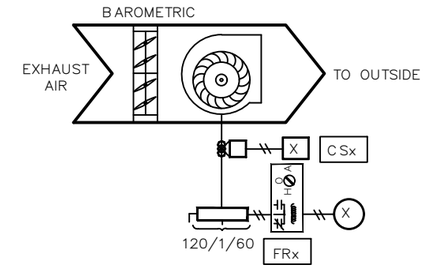
EXHAUST FAN – BAS CONTROLLED
EF–B2



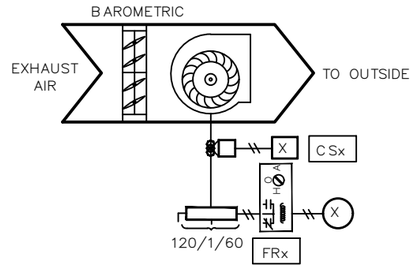
EXHAUST FAN – BAS CONTROLLED
EF–B3



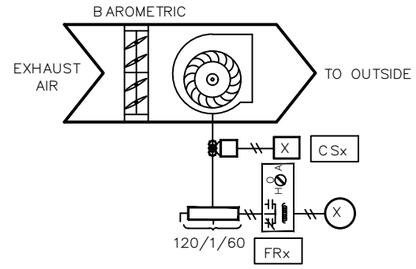
EXHAUST FAN – BAS CONTROLLED
EF–B4



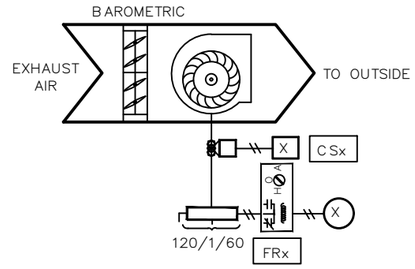
EXHAUST FAN – BAS CONTROLLED
EF–B5



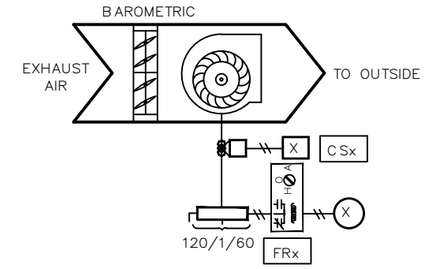
EXHAUST FAN – BAS CONTROLLED
EF–B6



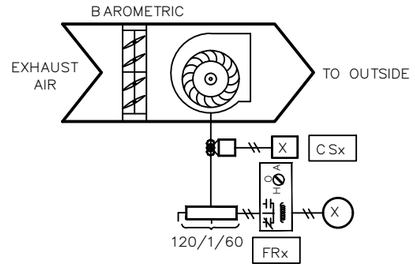
EXHAUST FAN – BAS CONTROLLED
EF–B9



EXHAUST FAN – BAS CONTROLLED
EF–B10



EXHAUST FAN – BAS CONTROLLED
EF–P9



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA B EXHAUST FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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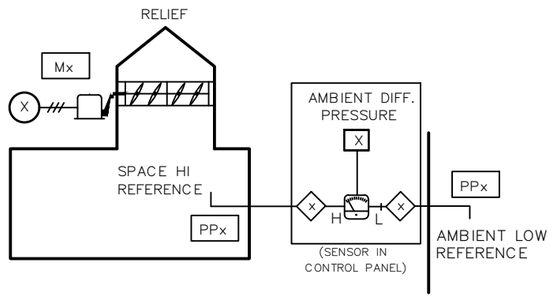
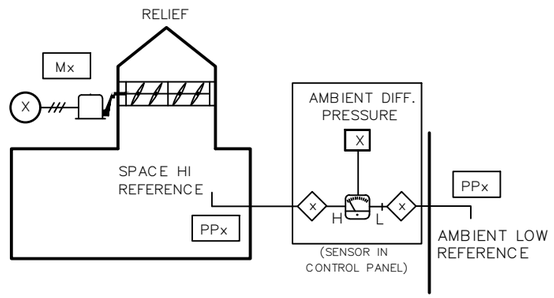
CONTRACT NO:

SHEET
NCHS–225
JOB NUMBER:
J–2304001

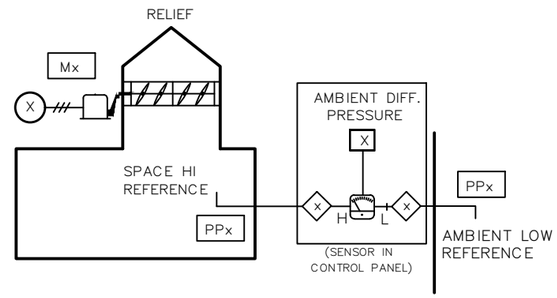
BUILDING PRESSURE CONTROL
E–IH–C1



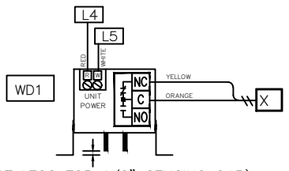
BUILDING PRESSURE CONTROL
E–IH–C2



BUILDING PRESSURE CONTROL
E–RH–B1



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA B RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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CONTRACT NO:

SHEET
NCHS–226
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-B1 STAT	Exhaust Fan B1 Status		X			
EF-B10 STAT	Exhaust Fan B10 Status		X			
EF-B2 STAT	Exhaust Fan B2 Status		X			
EF-B3 STAT	Exhaust Fan B3 Status		X			
EF-B4 STAT	Exhaust Fan B4 Status		X			
EF-B5 STAT	Exhaust Fan B5 Status		X			
EF-B6 STAT	Exhaust Fan B6 Status		X			
EF-B9 STAT	Exhaust Fan B9 Status		X			
EF-P9 STAT	Exhaust Fan P9 Status		X			
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-IH-C1 DPR	Relief Air Damper			X		
E-IH-C2 DPR	Relief Air Damper			X		
E-RH-B1 DPR	Relief Air Damper			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-B1 SS	Exhaust Fan B1 Fan Start / Stop				X	
EF-B10 SS	Exhaust Fan B10 Fan Start / Stop				X	
EF-B2 SS	Exhaust Fan B2 Fan Start / Stop				X	
EF-B3 SS	Exhaust Fan B3 Fan Start / Stop				X	
EF-B4 SS	Exhaust Fan B4 Fan Start / Stop				X	
EF-B5 SS	Exhaust Fan B5 Fan Start / Stop				X	
EF-B6 SS	Exhaust Fan B6 Fan Start / Stop				X	
EF-B9 SS	Exhaust Fan B9 Fan Start / Stop				X	
EF-P9 SS	Exhaust Fan P9 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**11**	**15**	**9**	**11**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-227
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-B1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFBn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

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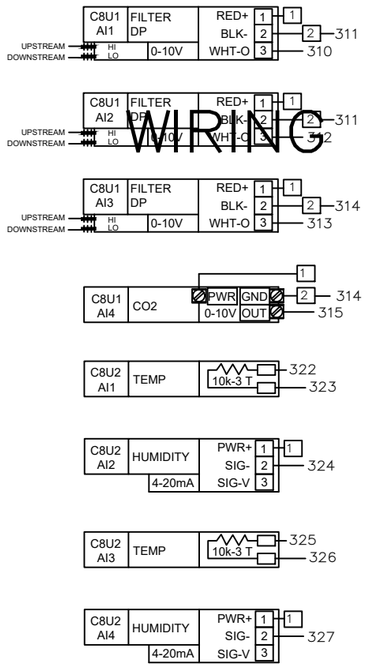
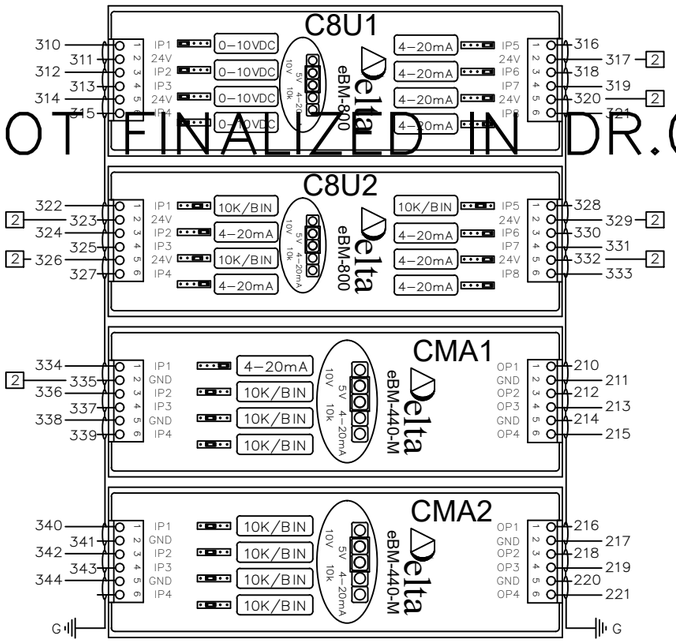
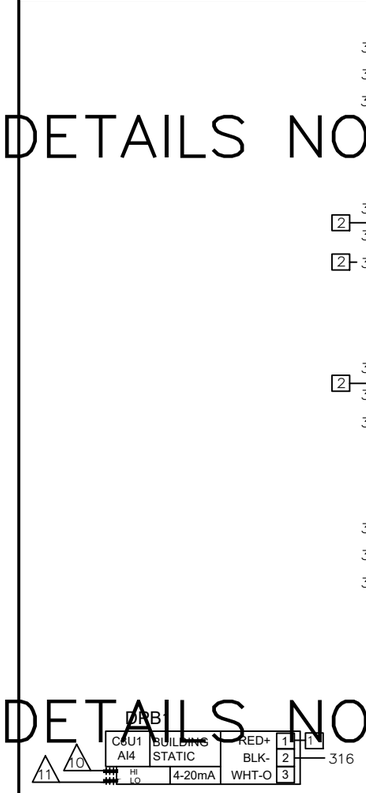
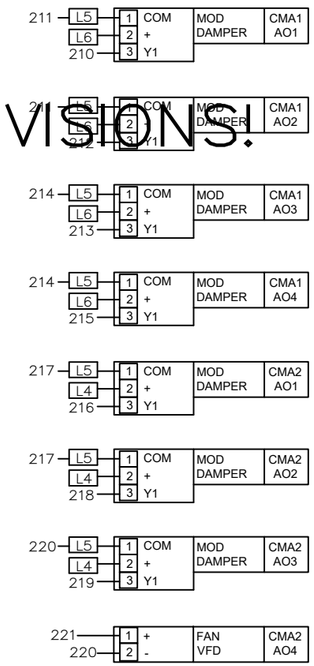
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

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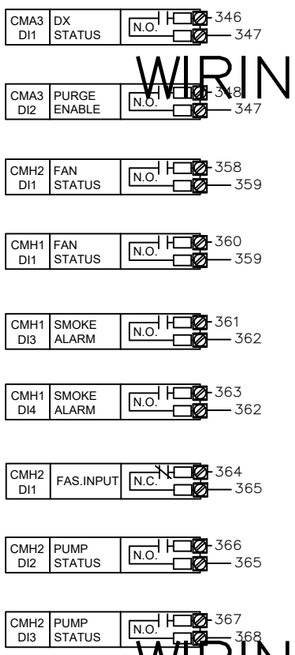
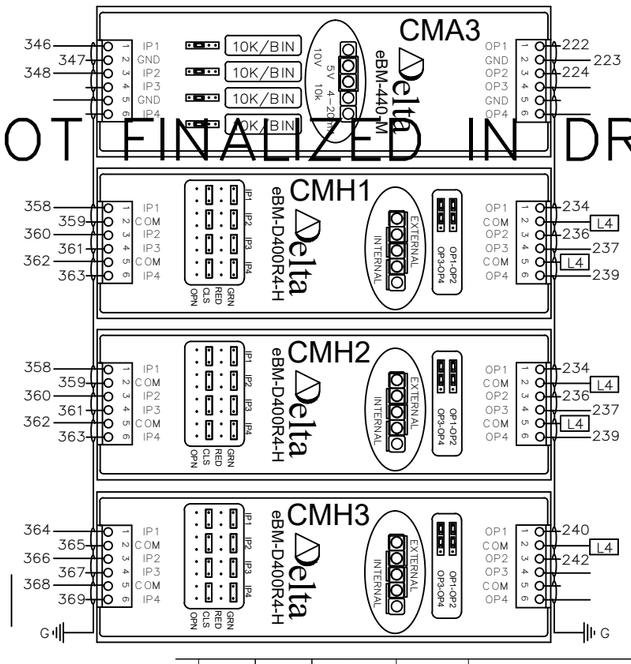
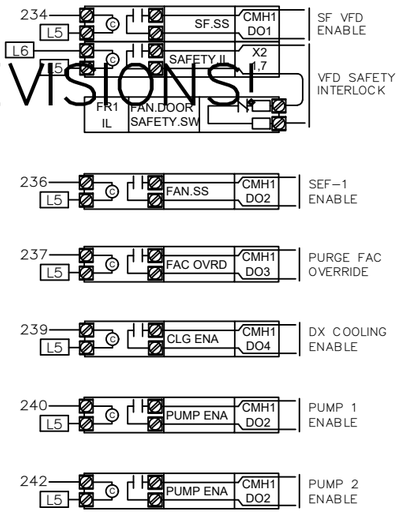




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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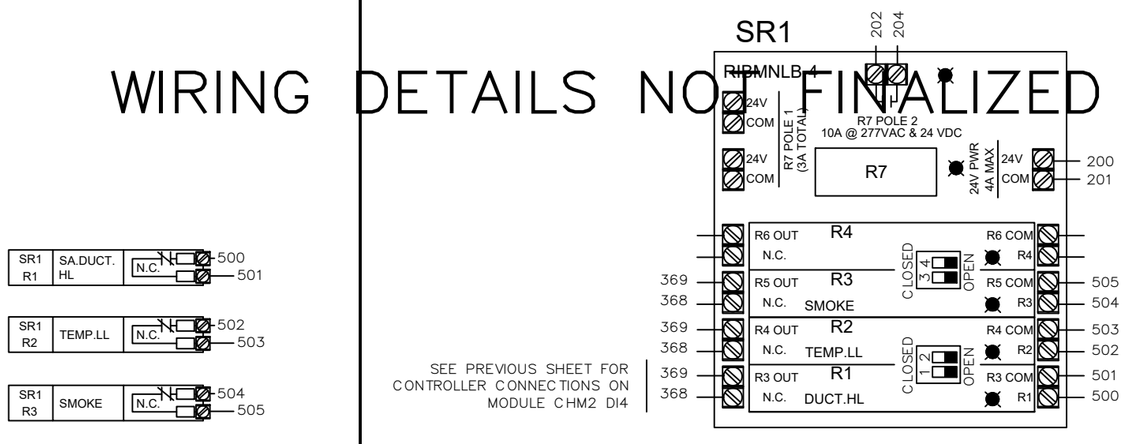

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INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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NCHS-231
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J-2304001

SYSTEM 28 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301
300

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

CLOSED
OPEN

TRANSFORMER

102
206
207

TX1

24V CB
Power
120 VAC LAPTOP PWR
75VA
24VAC

100
L2
L3
H
C
G

CONTROLLER PWR

FIELD DEV POWER

200
201
202
203

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

PS1

102 4.0A
101 1.0A
100 5.0A
G

PANEL GND LUG

TB1

L1 L2 L3
H N
120 VAC

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7
206 L8 L8 L8
207 L9 L9 L9

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1
DPB1
DPB2
DPB3

Power
GND / 4-20mA out
Voltage out

HIGH
LOW

PNEUMATIC

2 3 4 5 6 7 8 9

CEB1

C8X1

201
200

PWR
GND
24~

USB 2
USB 1
(NOT USED)

NET1 RS-485
NET2 RS-485
LAN 1
LAN 2
LAN 3

Delta eBMGR-2

Delta eBX

eBUS Address

eBUS

MS/TP

eBM-800
eBM-800
eBM-440-M
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-B1 SYSTEM 28 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

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NCHS-232
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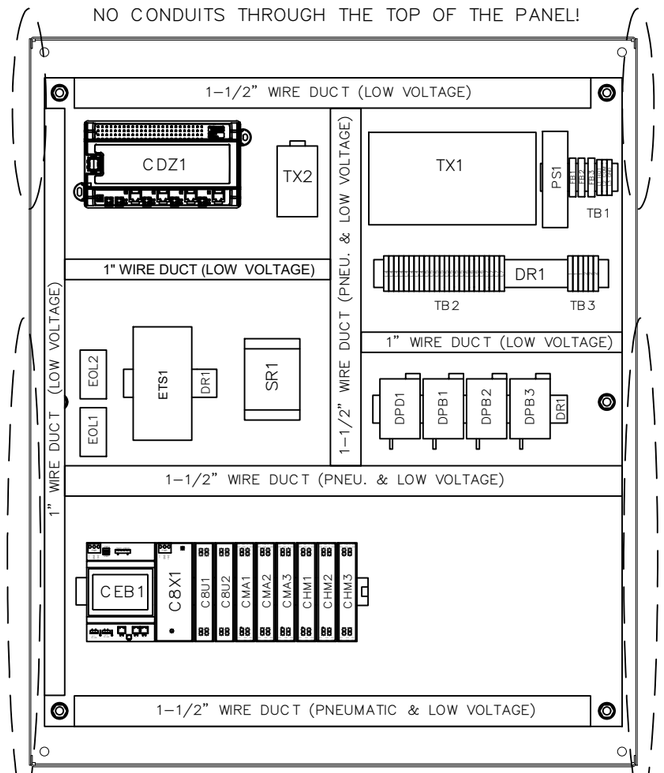
SYSTEM CONTROL PANEL 28 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

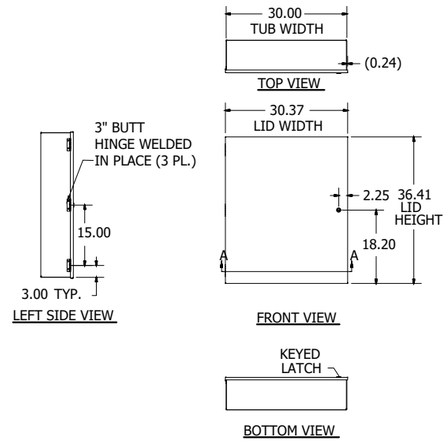
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

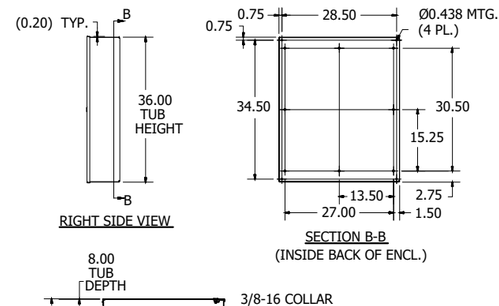
BILL OF MATERIALS

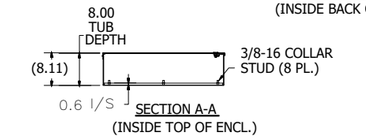
BILL OF MATERIALS

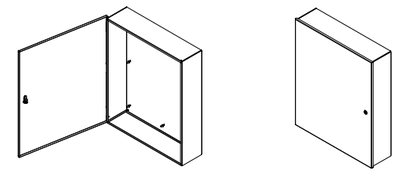
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

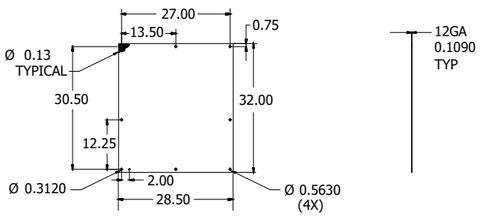








PANEL DIMENSIONS



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

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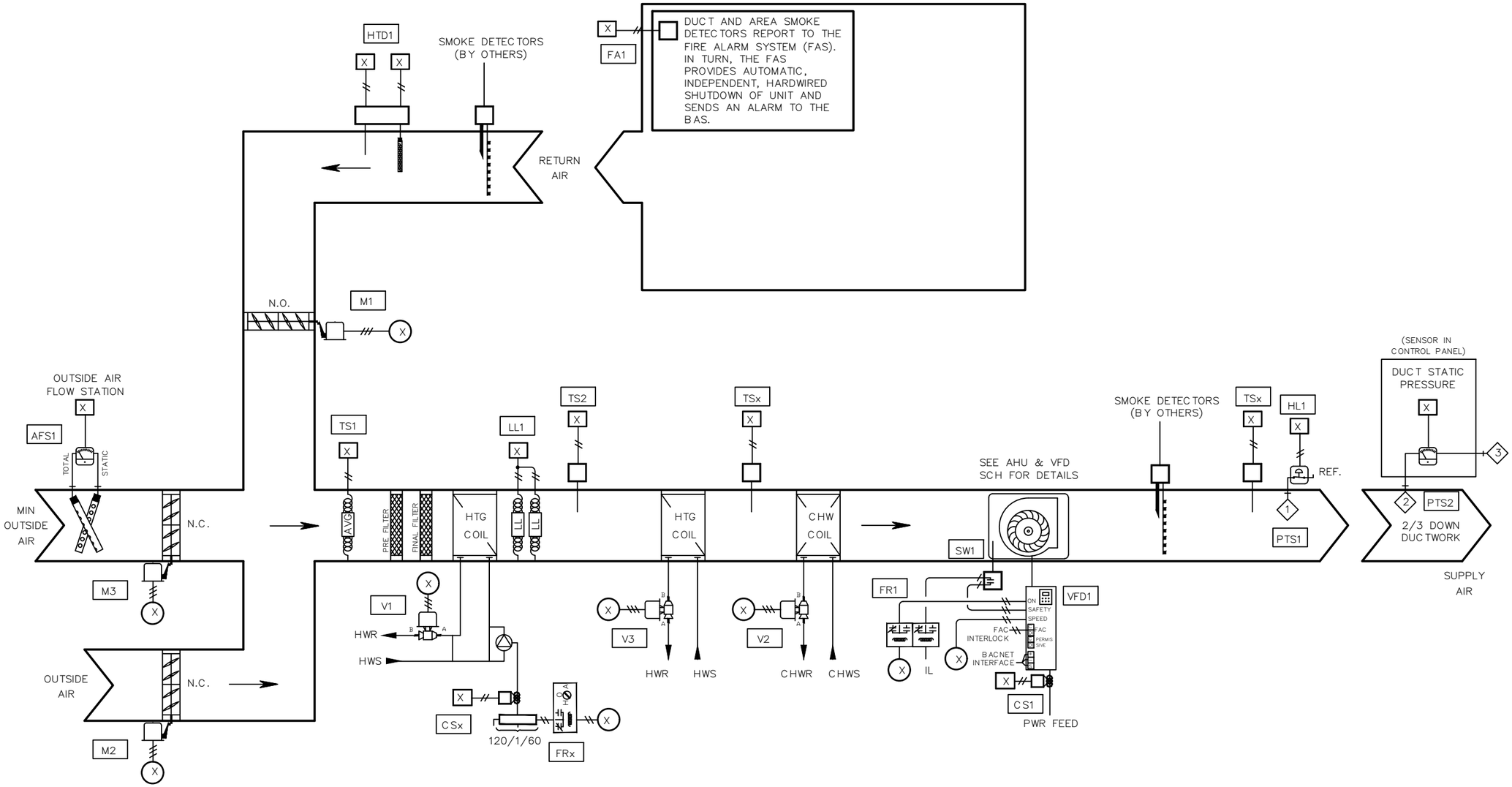
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–233
JOB NUMBER:
J–2304001

E-AHU-C4 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E-AHU-C4 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
4240 W 50 S
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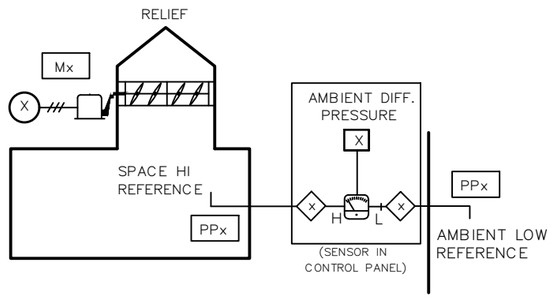
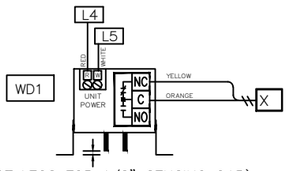
BUILDING PRESSURE CONTROL
RH–C2



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA C RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS–235
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J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPD1	Duct Static Pressure	X				
HCDAT	Heating Coil Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
HWV	Hot Water Valve			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-C2 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**9**	**6**	**8**	**2**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

AHU-C4 & AREA C MISC FIELD DEVICES POINT TABLE

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Temperature Control Services
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VAV AIR HANDLING UNIT AHU-C4 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), HEATING VALVE (HC-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
PREHEAT AND HEATING VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

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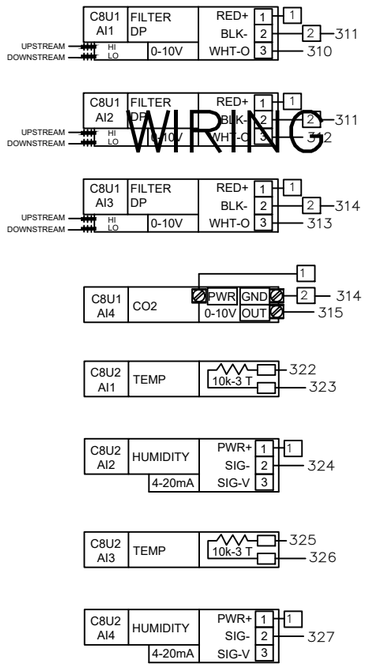

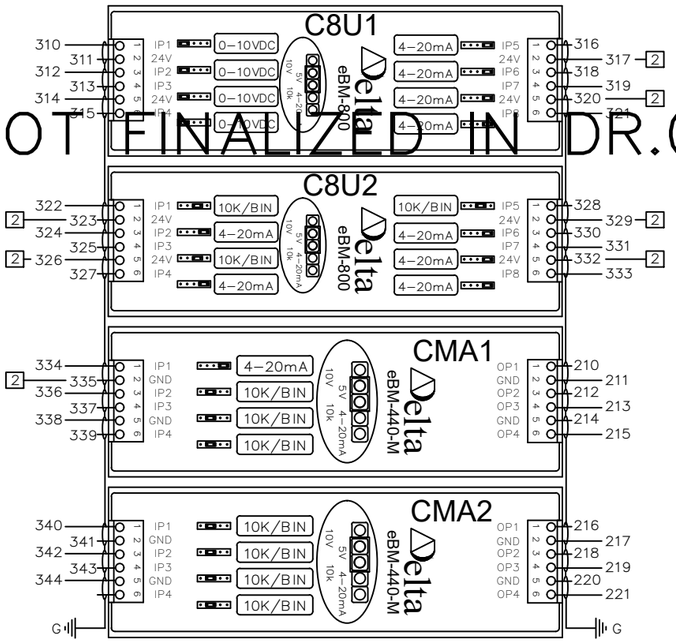

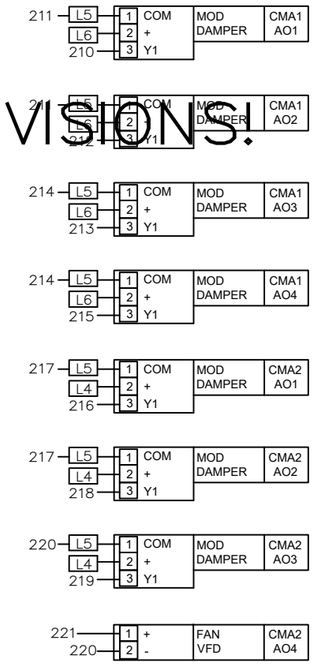

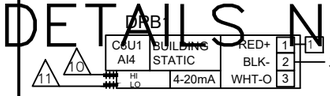

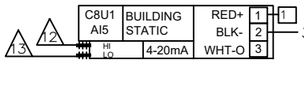

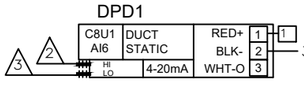

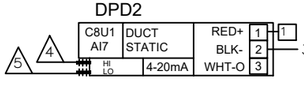

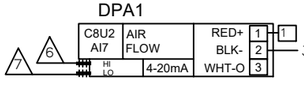

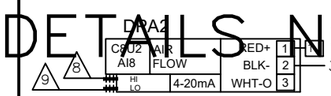

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	eBM-800 I/O MODULE
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	

C8U1 eBM-800 / C8U1 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	eBM-800 I/O MODULE
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	

C8U2 eBM-800 / C8U2 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	eBM-440-M I/O MODULE
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	
OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	

CMA1 eBM-440-M / CMA1 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	eBM-440-M I/O MODULE
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	
	CMA2	4	10100.1404				
OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	

CMA2 eBM-440-M / CMA2 eBM-440-M

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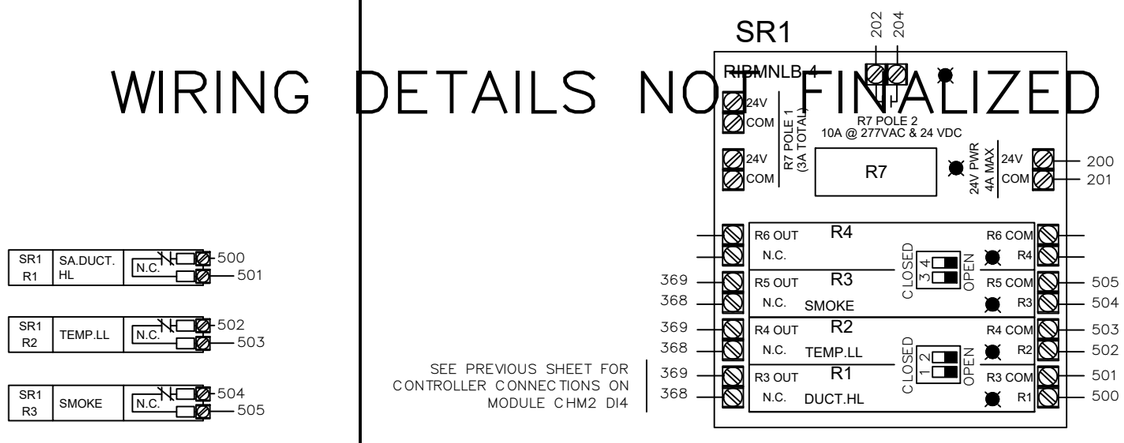

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC. ID.	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU-C4 SYSTEM 29 PANEL – I/O WIRING (2 OF 2)

Delta Controls
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SYSTEM 29 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301
300

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 10A @ 277VAC

24V COM

POWER 44 MAX

R7

R4 OUT N.C.
R4 COM
R4 N.O.

R3 OUT N.C.
R3 COM
R3 N.O.

R2 OUT N.C.
R2 COM
R2 N.O.

R1 OUT N.C.
R1 COM
R1 N.O.

CLOSED
LOW

CEC1

201
200

PWR

Delta
eBCON-2

eBUS
NET2

NET2 RS-485
[+] [-] SHD

LAN 1

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H

DP1 DP2 DP3 DP4

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

TX1

24V CB
24V CB

Power
Power

100
L2
L3

H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

24VAC
24VAC
75VA

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

L3
L2

PS1

1.0A
5.0A
101
100
G

PANEL GND LUG

TB1

L1
L2
L3

H
N

120 VAC

TB2

202
203
204
205

L4
L4
L4
L5
L5
L5
L6
L6
L6
L7
L7
L7

24 VAC TO FIELD

TB3

300
301

1
1
1
2
2
2

24 VDC TO FIELD

DPD1

DPB1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2
3
4
5

1
2
3
4
5

E-AHU-C4 SYSTEM 29 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

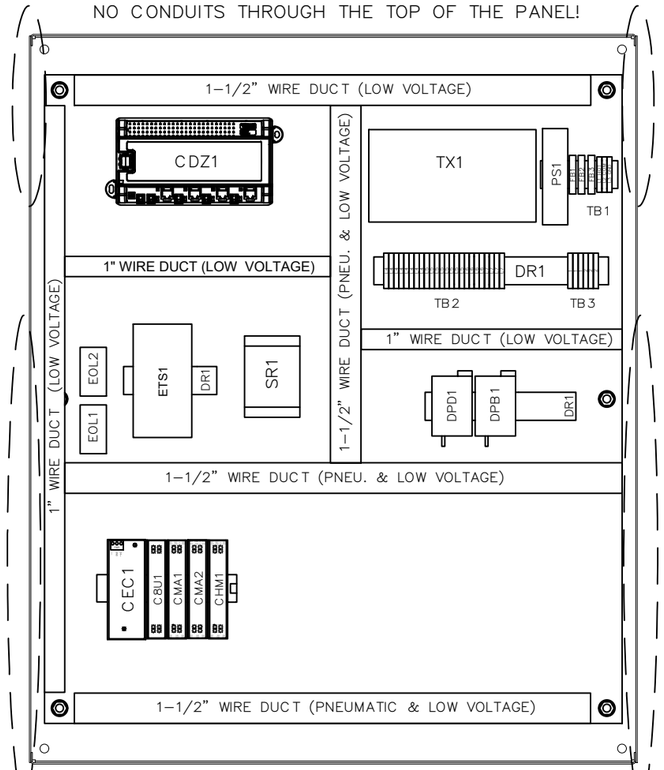
CONTRACT NO:

SHEET
NCHS-240
JOB NUMBER:
J-2304001

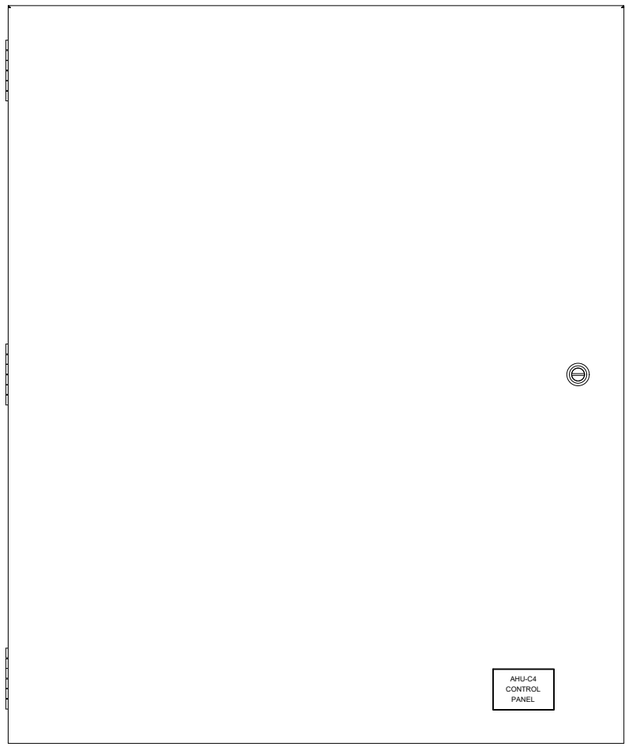
SYSTEM CONTROL PANEL 29 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

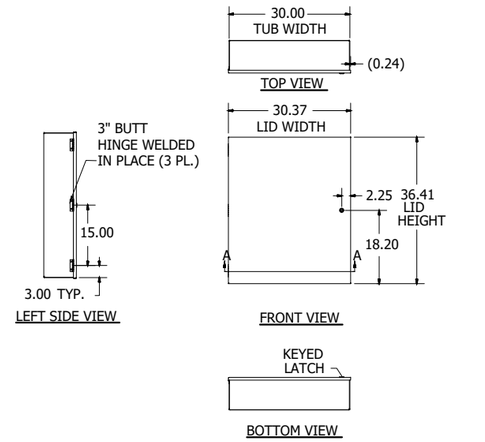
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

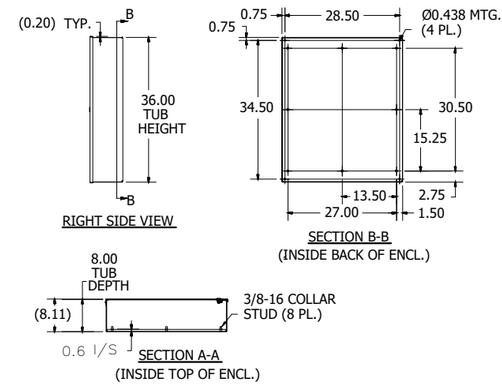
BILL OF MATERIALS

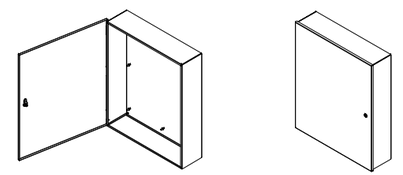
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

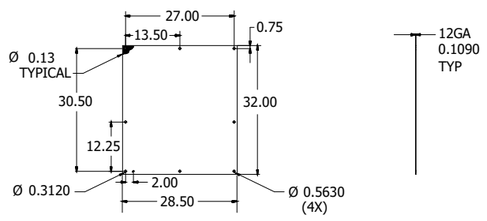
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



E-AHU-C4 SYSTEM 29 PANEL – DIMENSIONS & BOM

Delta Controls

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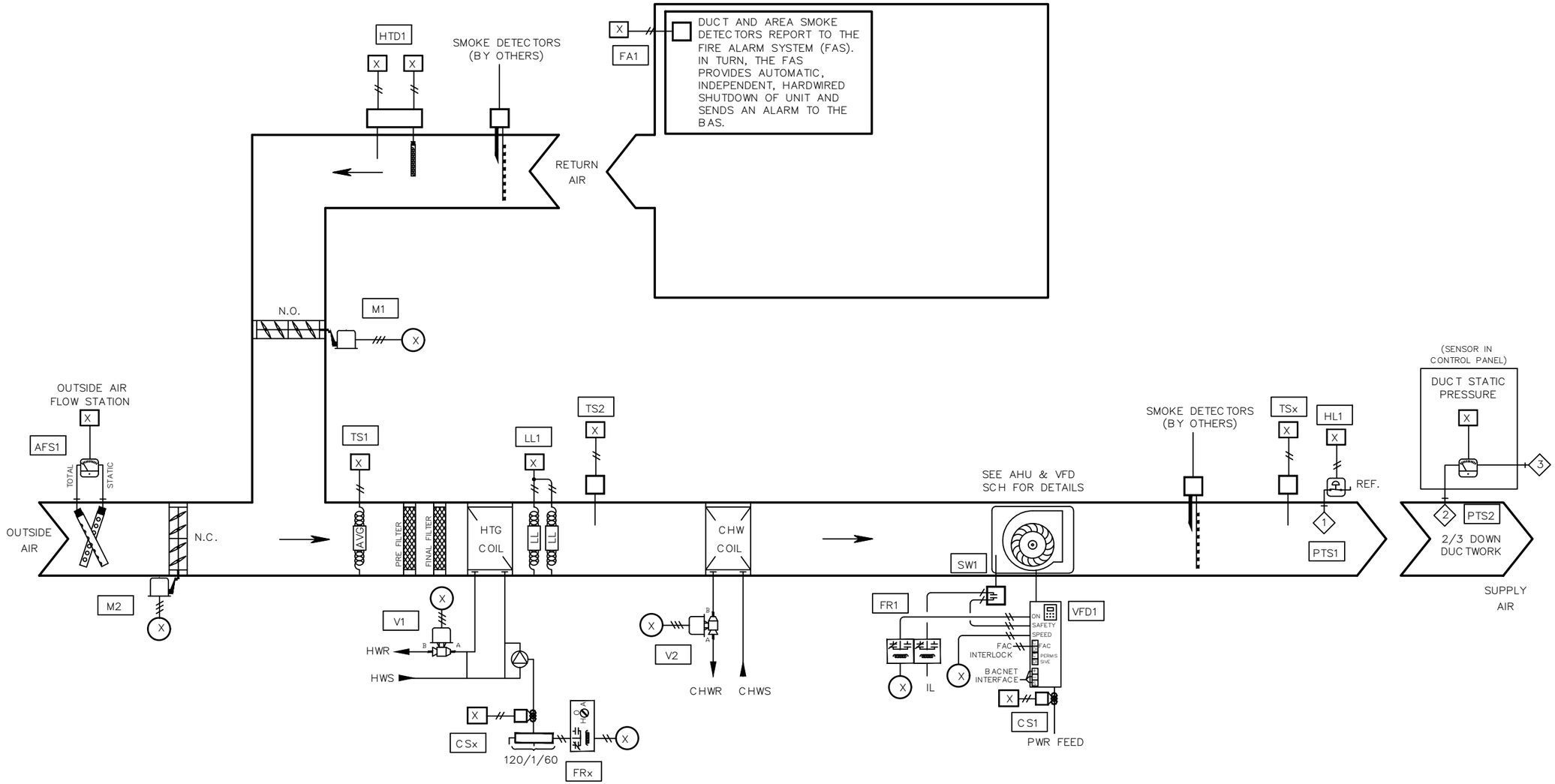
E–AHU–D1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

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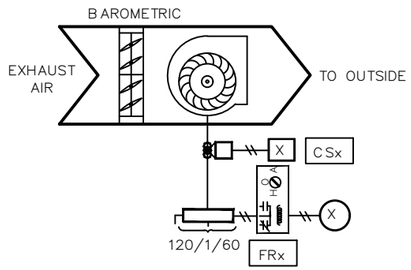
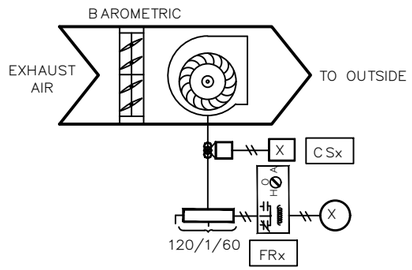
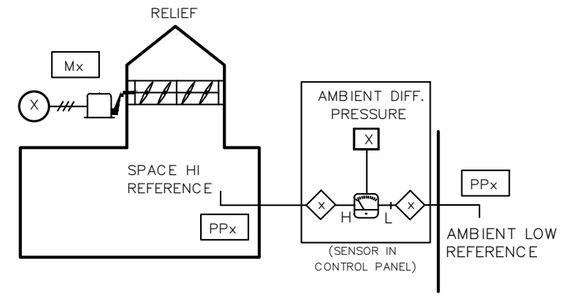
EXHAUST FAN – BAS CONTROLLED
EF–D1



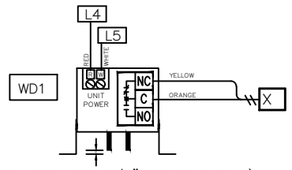
EXHAUST FAN – BAS CONTROLLED
EF–D2



BUILDING PRESSURE CONTROL
RH–D3



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA D EXHAUST, RELIEF & LEAK DETECTION FIELD DEVICES

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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-D1 STAT	Exhaust Fan D1 Status		X			
EF-D2 STAT	Exhaust Fan D2 Status		X			
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
RH-D3 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-D1 SS	Exhaust Fan D1 Fan Start / Stop				X	
EF-D2 SS	Exhaust Fan D2 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**8**	**8**	**6**	**4**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-D1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFDn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

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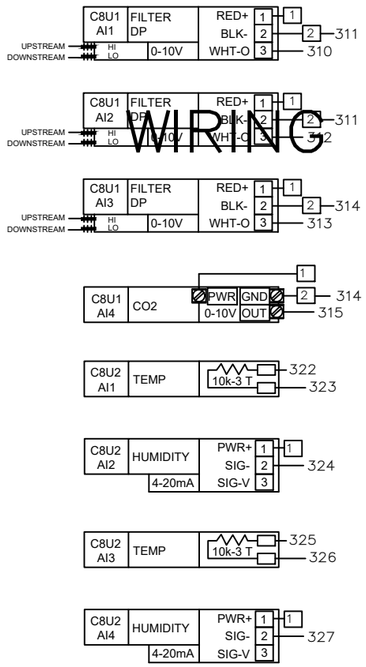
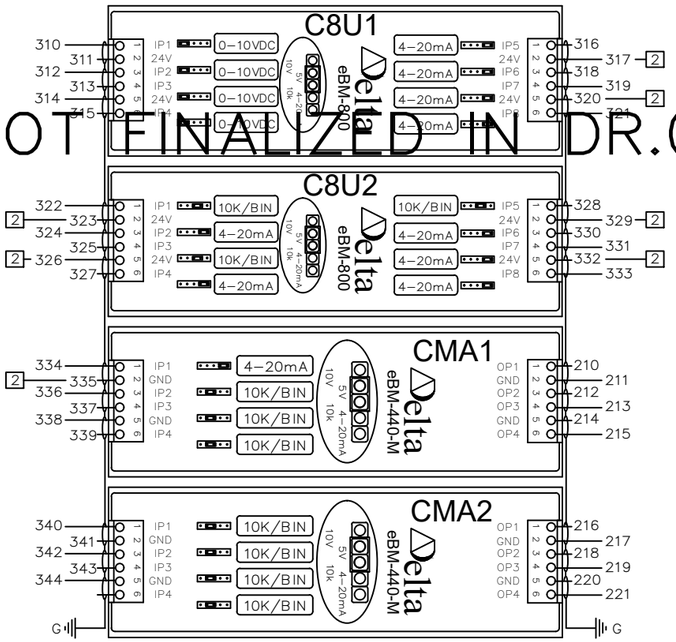
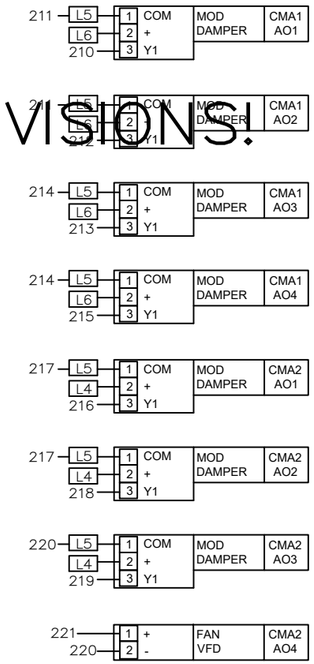
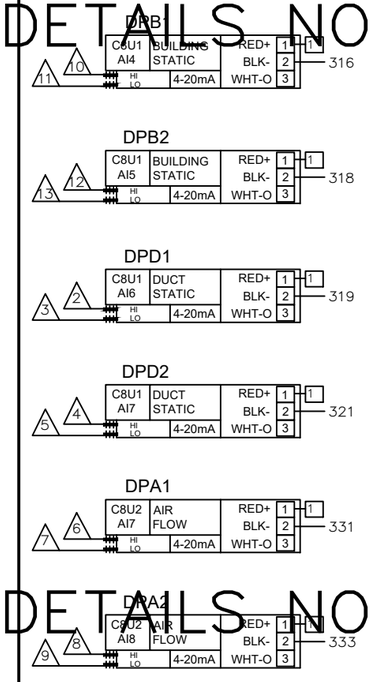
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

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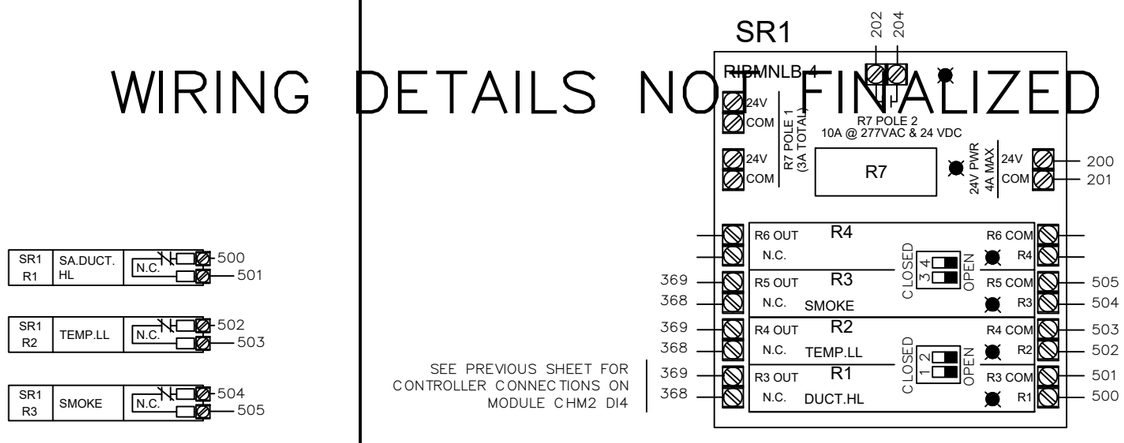

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-247
JOB NUMBER:
J-2304001

SYSTEM 30 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301 300 L3

V1- V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

24V COM

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 10A @ 277VAC

R7

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED LOOP

TX1

24V CB 24V CB

Power Power

100 L2 L3 H C G

120 VAC LAPTOP PWR

75VA 24VAC 24VAC 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L2 L3

PS1

1.0A 101

5.0A 100

G

PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

DPD1 DPB1

1

Power + GND / 4-20mA out - Voltage out 0

HIGH LOW

2 3 4 5

PNEUMATIC

5 4 3 2

CEB1 C8X1

201 200

PWR GND 24~

USB2 USB1 (NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485 NET2 RS-485 LAN 1 LAN 2

eBM-800 eBM-800 eBM-440-M eBM-440-M eBM-D400R4-H

OPD1 OPD2 OPD3 OPD4 HAO

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-D1 SYSTEM 30 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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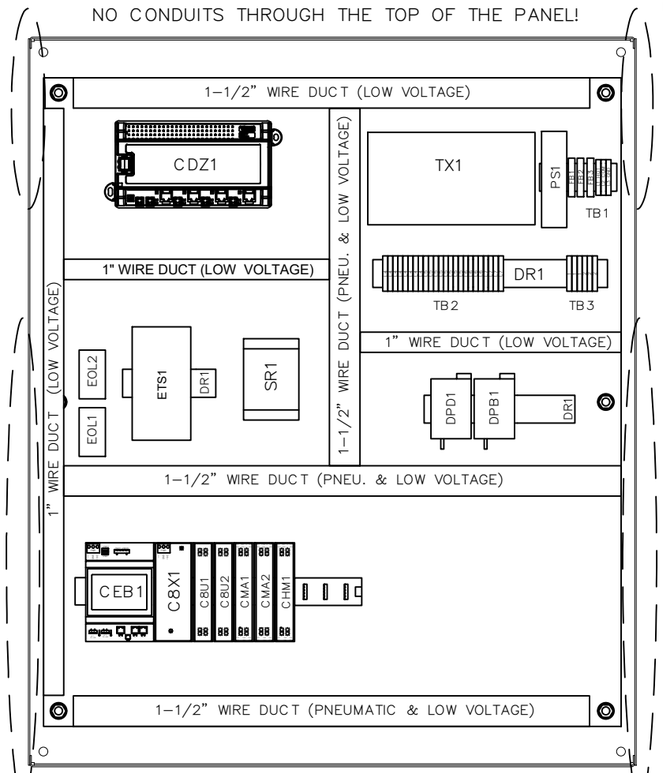
SYSTEM CONTROL PANEL 30 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

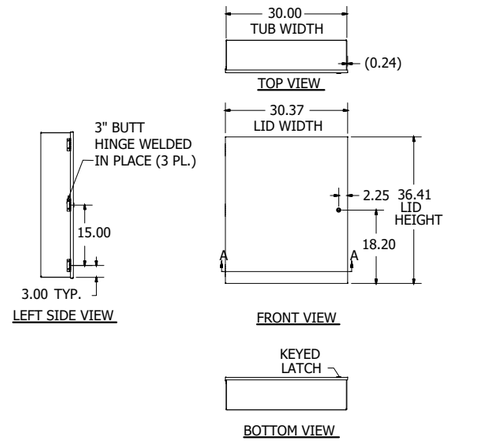
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

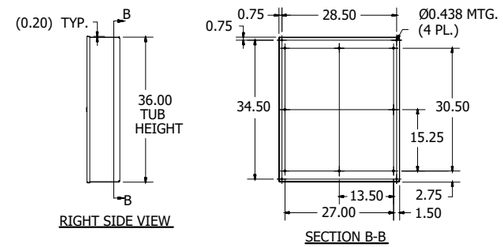
BILL OF MATERIALS

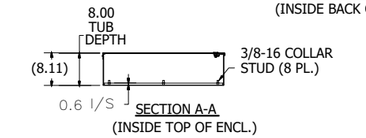
BILL OF MATERIALS

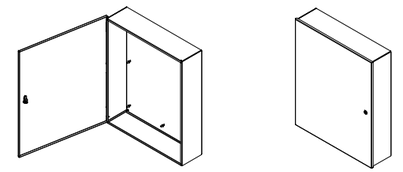
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

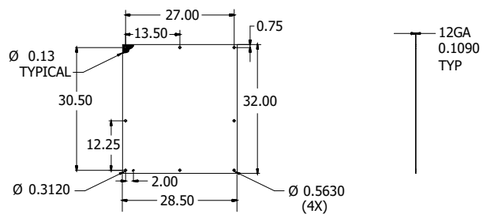








PANEL DIMENSIONS



E–AHU–D1 SYSTEM 30 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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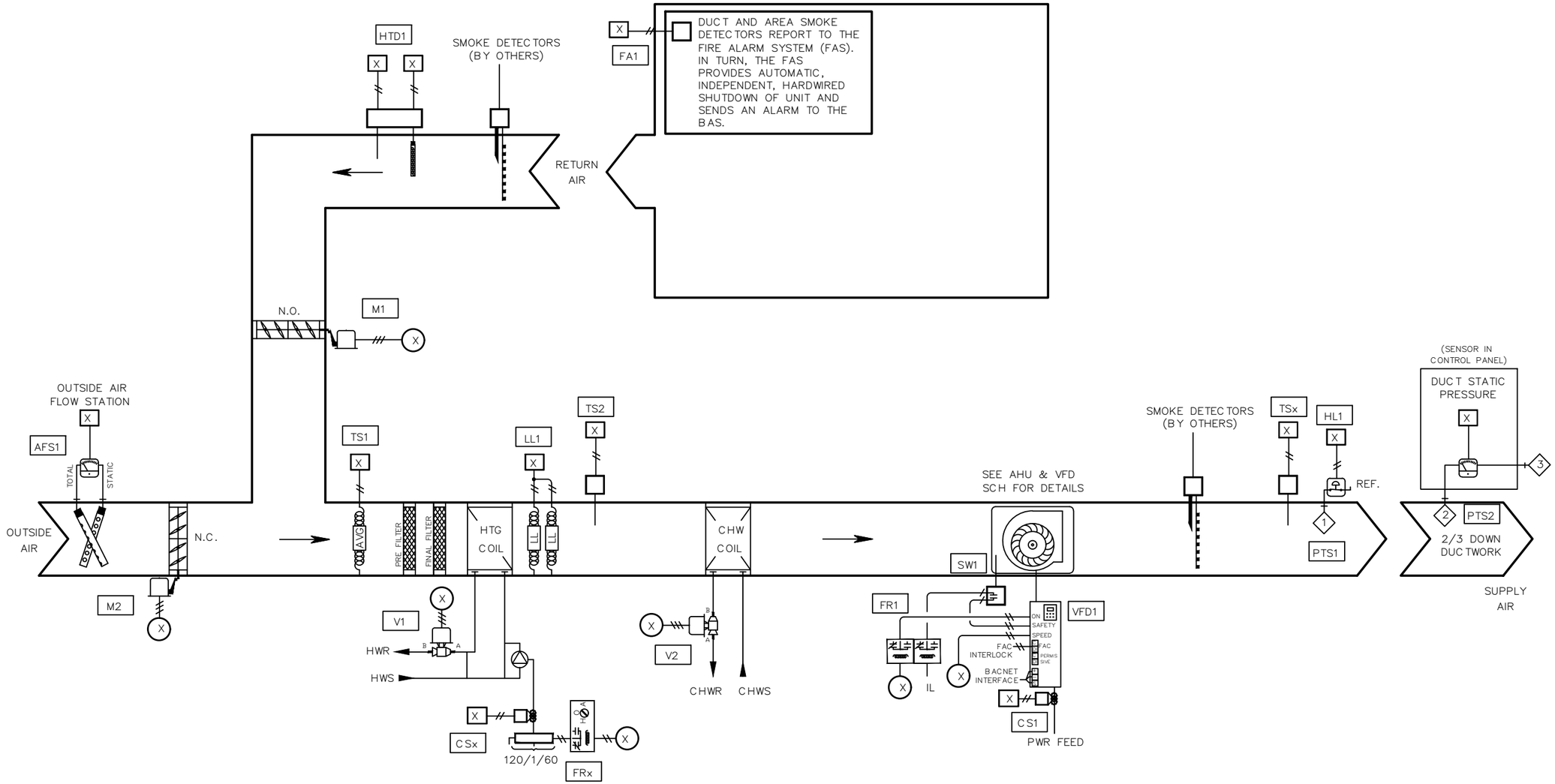
E–AHU–D2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
4240 W 50 S
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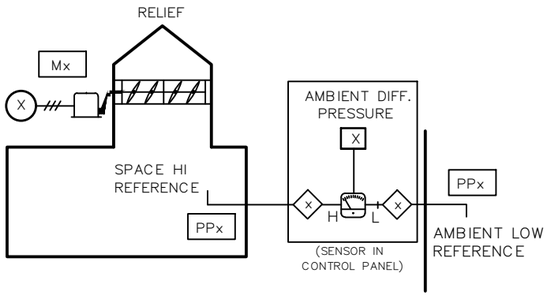
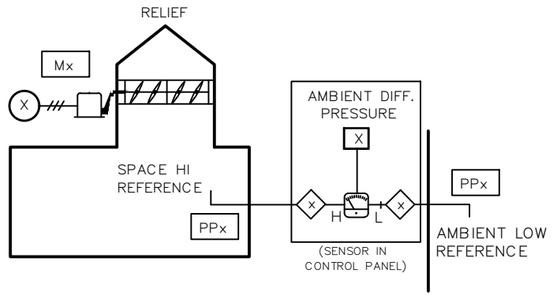
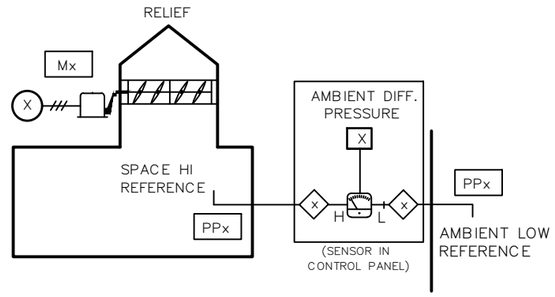
BUILDING PRESSURE CONTROL E–IH–D1



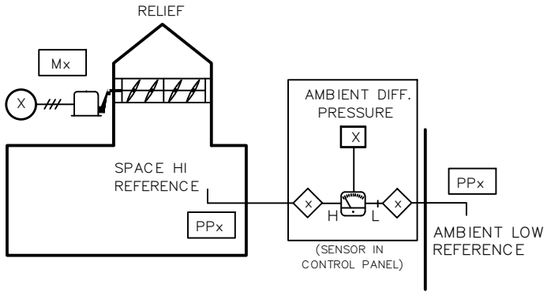
BUILDING PRESSURE CONTROL E–IH–D2



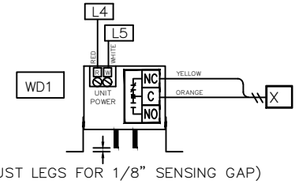
BUILDING PRESSURE CONTROL RH–D1



BUILDING PRESSURE CONTROL RH–D2



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA D RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS–251
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-IH-D1 DPR	Relief Air Damper			X		
E-IH-D2 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-D1 DPR	Relief Air Damper			X		
RH-D2 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**11**	**6**	**9**	**2**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-D2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:

SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ

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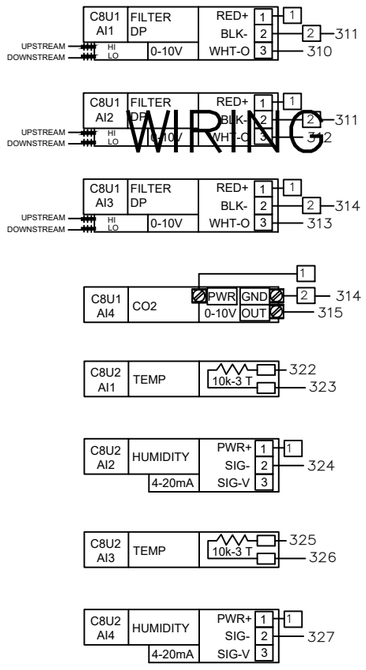
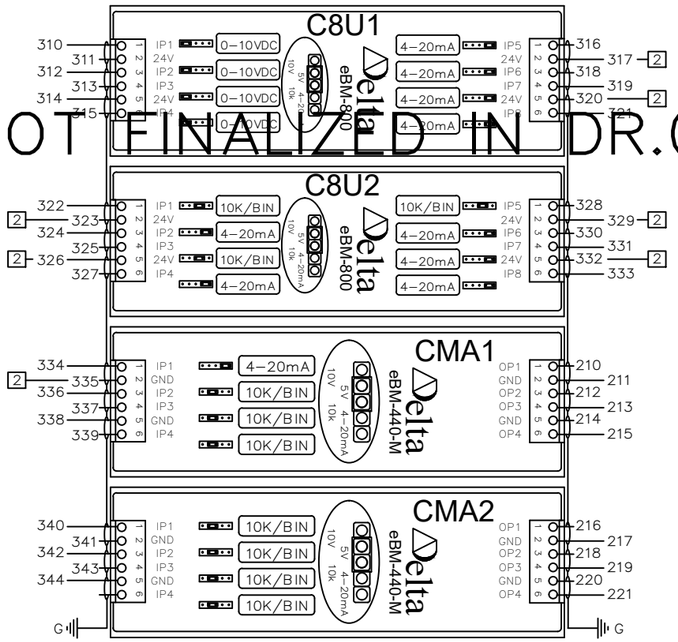
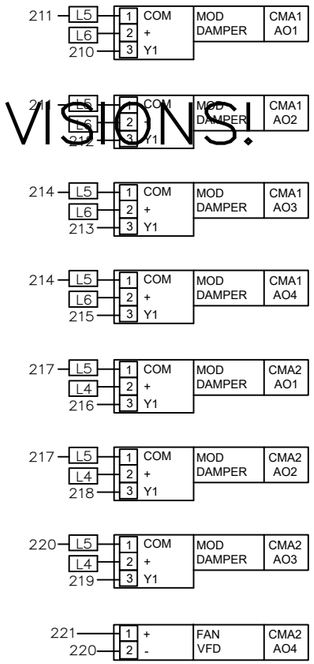
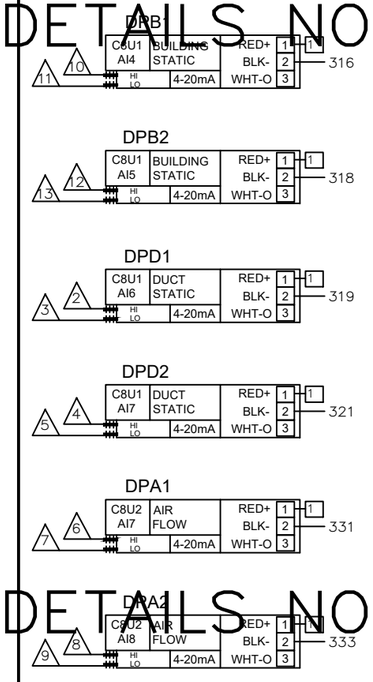
SYSTEM 31 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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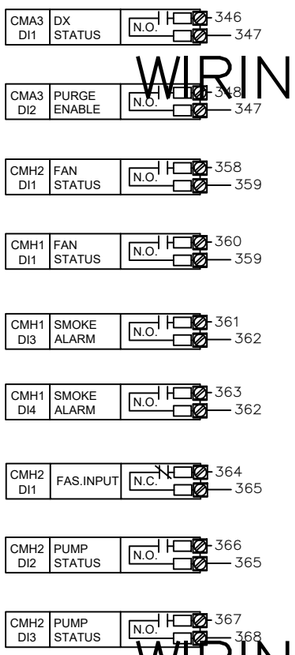
REVISIONS	
DATE	REMARKS

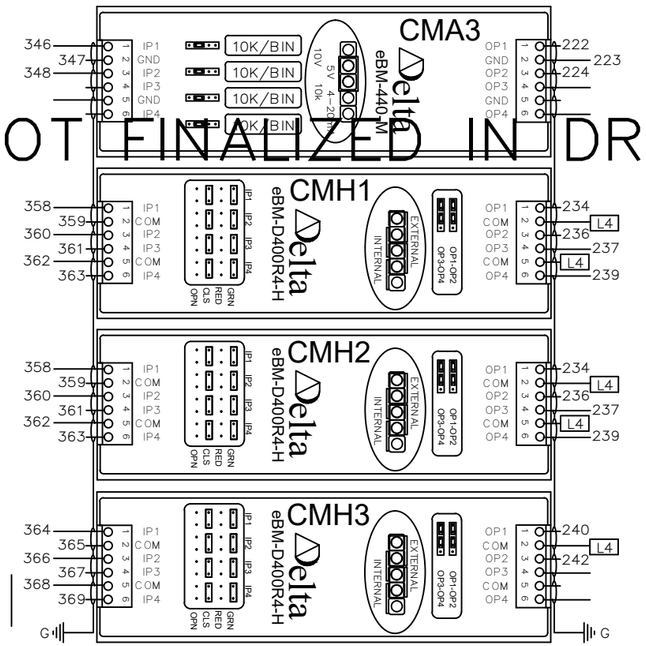
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

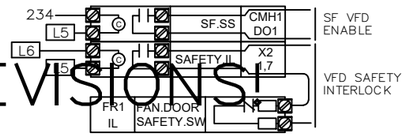
SHEET
NCHS-254
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!





SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

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SHEET
NCHS–255
JOB NUMBER:
J–2304001

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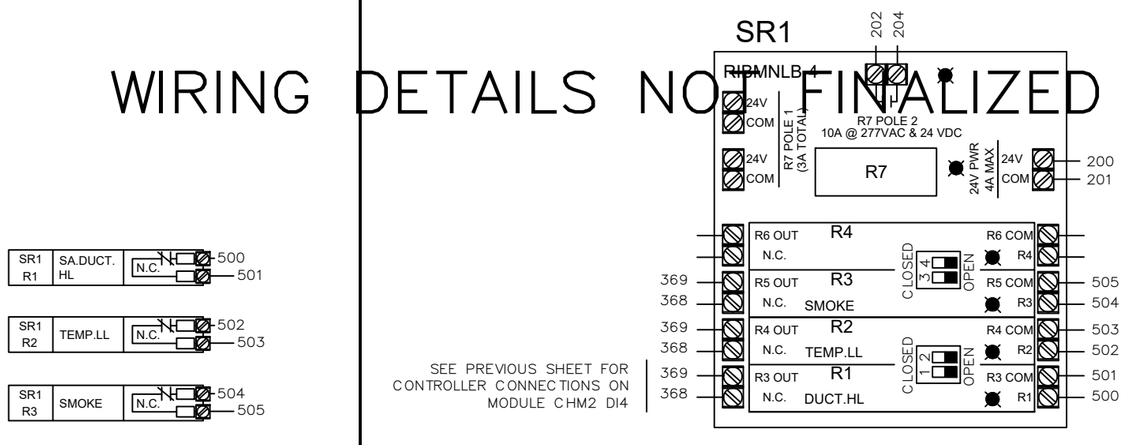

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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REVISIONS	
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CONTRACT NO:

SHEET
NCHS-256
JOB NUMBER:
J-2304001

SYSTEM 31 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TRANSFORMER

102 L2

206 207

TX1

24V CB | 24V CB

Power | Power

100 L2 L3

H C G

75VA 24VAC 24VAC

240 VAC LAPTOP PWR

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101

L3 L2

PS1

4.0A 1.0A 5.0A

102 101 100

TB1

L1 L2 L3

H N 120 VAC

G PANEL GND LUG

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

206 L8 L8 L8

207 L9 L9 L9

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

301 300

L3

ETS1

V1− V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

R4 R3 R2 R1

R4 OUT N.C. R4 COM R4

R3 OUT N.C. R3 COM R3

R2 OUT N.C. R2 COM R2

R1 OUT N.C. R1 COM R1

CLOSED LOOP

DPD1 | DPB1 | DPB2 | DPB3 | DPB4

1

Power + − GND / 4-20mA out Voltage out 0

HIGH LOW

PNEUMATIC

2 3 4 5 6 7 8 9 10 11

CEB1

C8X1

201 200

PWR GND 24~

USB2 USB1

(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485 NET2 RS-485

LAN 1 LAN 2 LAN 3

eBM-800 | eBM-440-M | eBM-440-M | eBM-440-M | eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-D2 SYSTEM 31 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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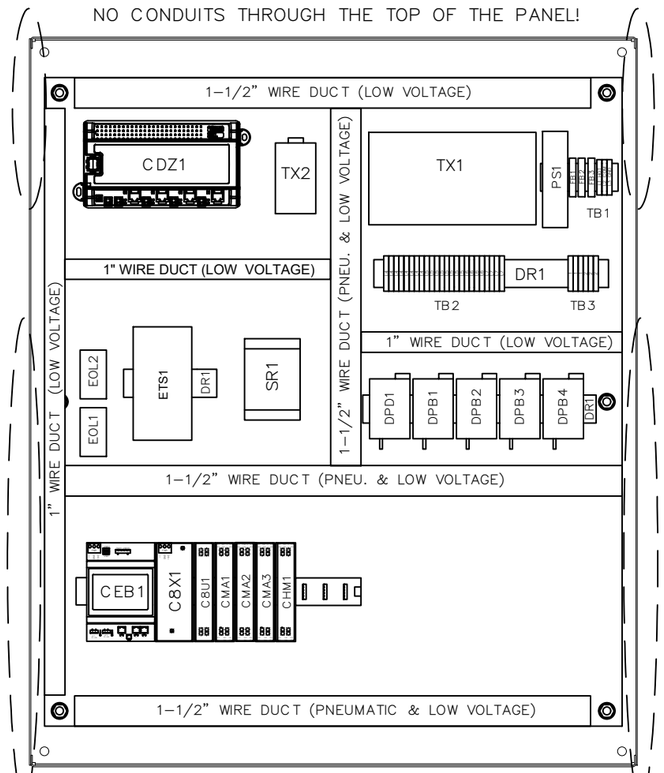
CONTRACT NO:

SHEET
NCHS-257
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 31 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

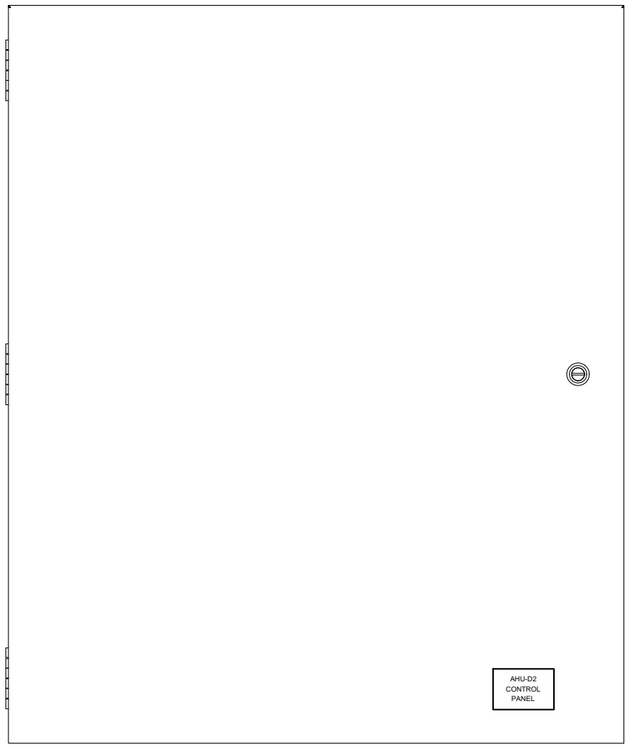
NO CONDUITS THROUGH THE TOP OF THE PANEL!



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

HIGH VOLTAGE FEEDS ENTER IN THIS AREA



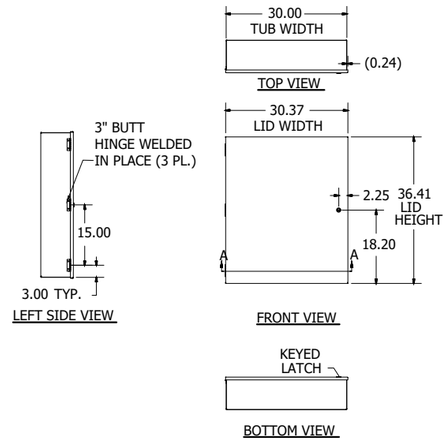
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

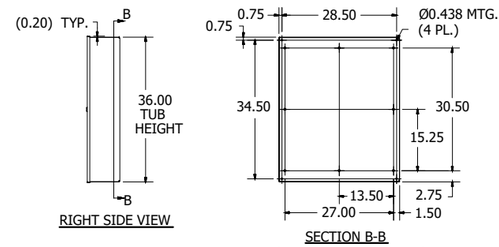
BILL OF MATERIALS

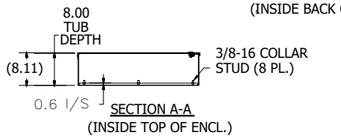
BILL OF MATERIALS

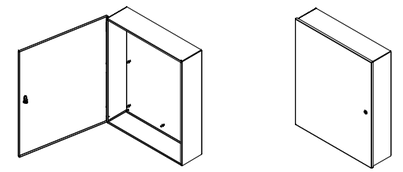
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

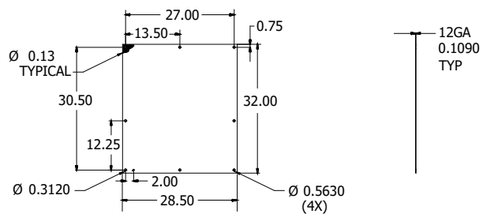








PANEL DIMENSIONS



E–AHU–D2 SYSTEM 31 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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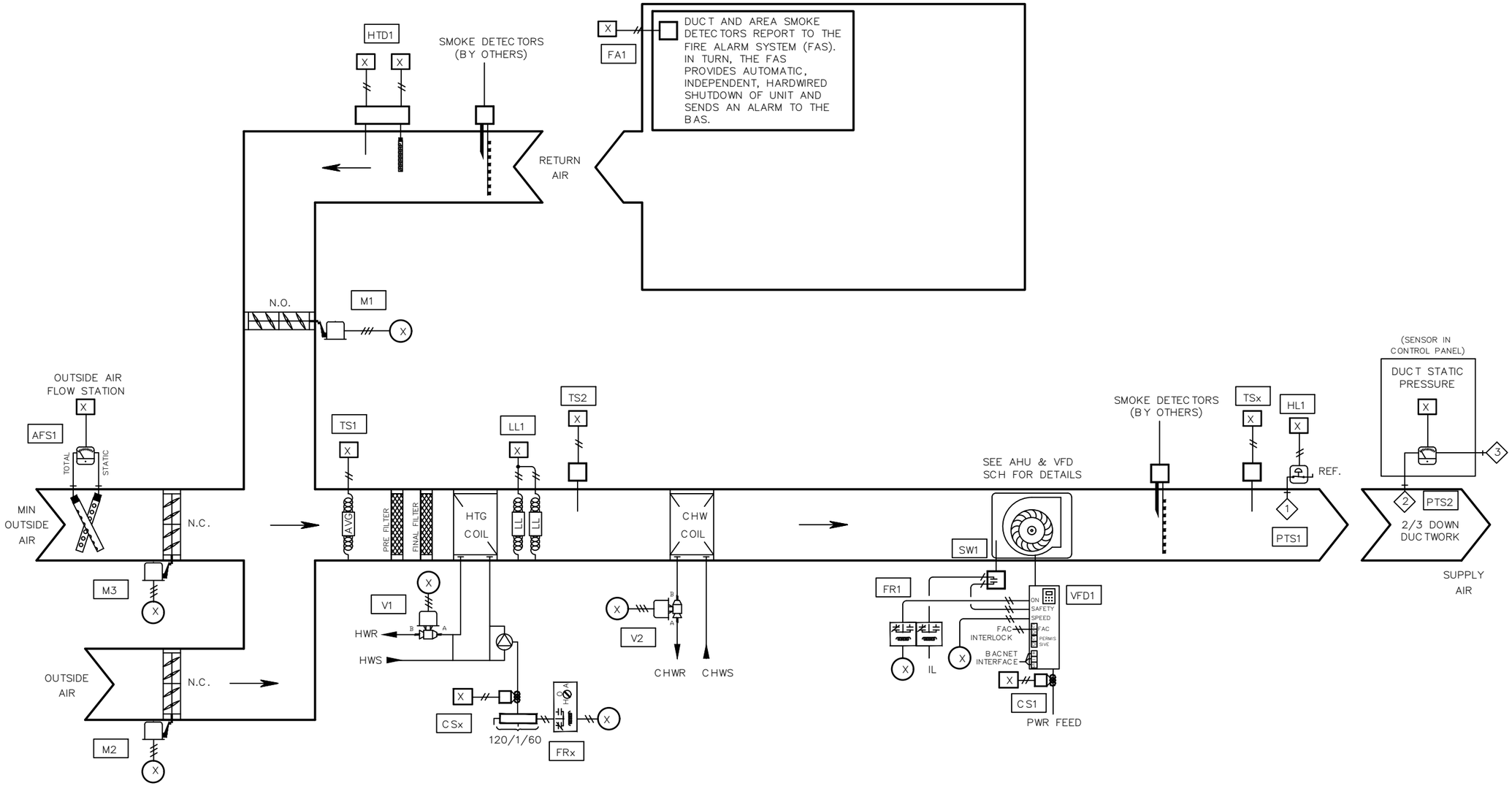
CONTRACT NO:

SHEET
NCHS–258
JOB NUMBER:
J–2304001

E–AHU–E1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–E1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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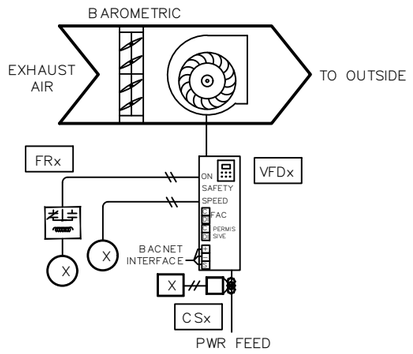
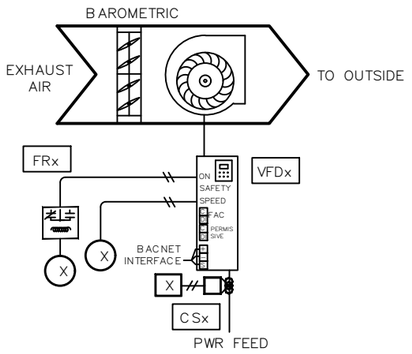
J–2304001

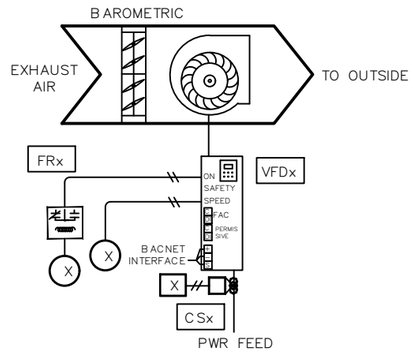
EXHAUST FAN – BAS CONTROLLED
EF–E1



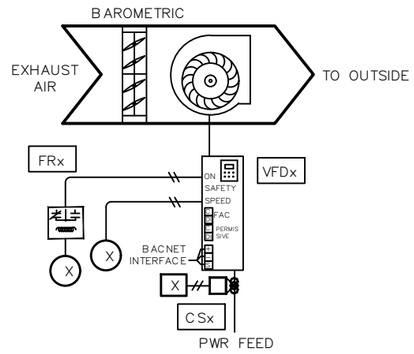
EXHAUST FAN – BAS CONTROLLED
EF–E2



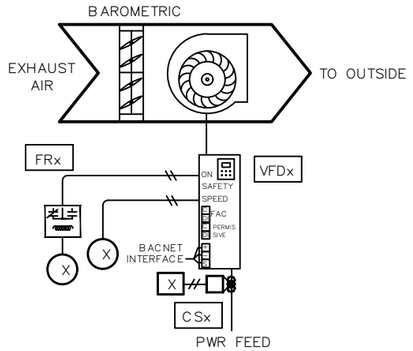
EXHAUST FAN – BAS CONTROLLED
EF–F1



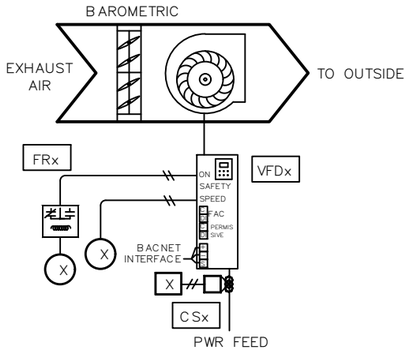
EXHAUST FAN – BAS CONTROLLED
EF–F3



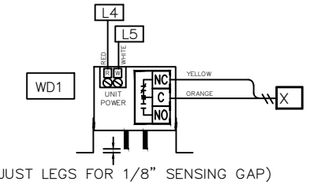
EXHAUST FAN – BAS CONTROLLED
EF–F4



EXHAUST FAN – BAS CONTROLLED
EF–F6

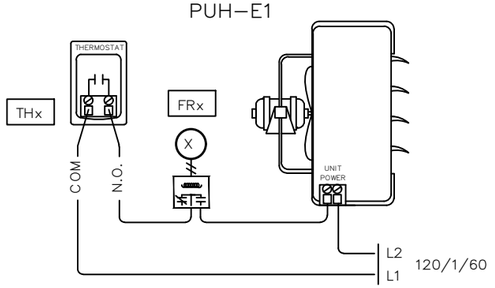


BASEMENT LEAK DETECTION

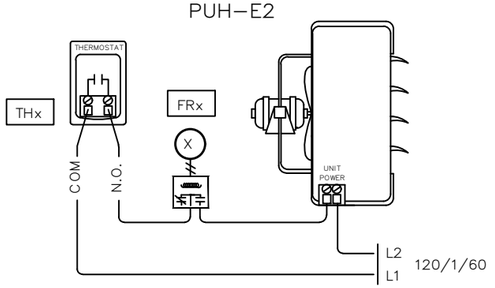


(ADJUST LEGS FOR 1/8" SENSING GAP)

PROPELLER UNIT HEATER
PUH–E1



PROPELLER UNIT HEATER
PUH–E2



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA E EXHAUST, PROPELLER UNIT HEATERS, & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-E1 STAT	Exhaust Fan E1 Status		X			
EF-E2 STAT	Exhaust Fan E2 Status		X			
EF-F1 STAT	Exhaust Fan F1 Status		X			
EF-F3 STAT	Exhaust Fan F3 Status		X			
EF-F4 STAT	Exhaust Fan F4 Status		X			
EF-F6 STAT	Exhaust Fan F6 Status		X			
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-E1 SS	Exhaust Fan E1 Fan Start / Stop				X	
EF-E2 SS	Exhaust Fan E2 Fan Start / Stop				X	
EF-F1 SS	Exhaust Fan F1 Fan Start / Stop				X	
EF-F3 SS	Exhaust Fan F3 Fan Start / Stop				X	
EF-F4 SS	Exhaust Fan F4 Fan Start / Stop				X	
EF-F6 SS	Exhaust Fan F6 Fan Start / Stop				X	
PUH-E1 EN	PUH E1 Enable				X	
PUH-E2 EN	PUH E2 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**7**	**12**	**6**	**10**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
Temperature Control Services
4240 W 50 S
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CONTRACT NO:

SHEET
NCHS-261
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-E1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

Delta Controls
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04/06/2023	ADD 3.3
	ISSUED FOR CONST
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REVISIONS	
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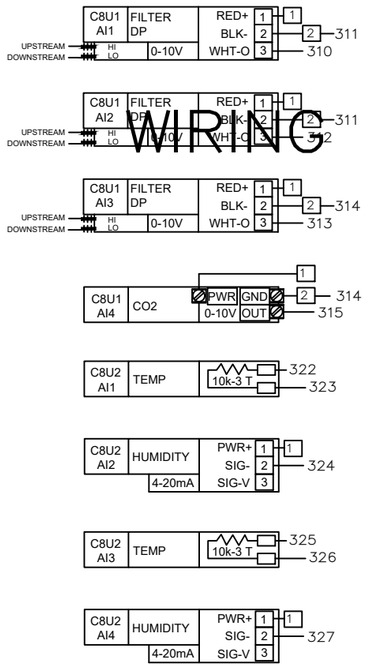
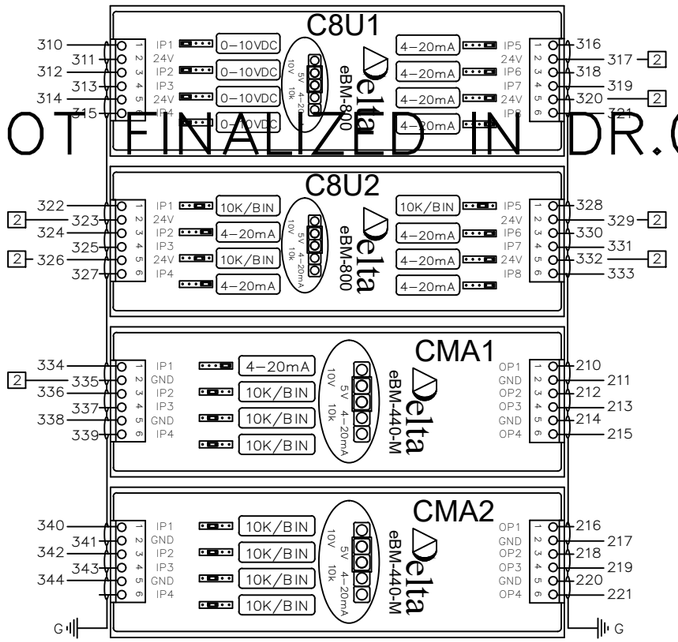
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

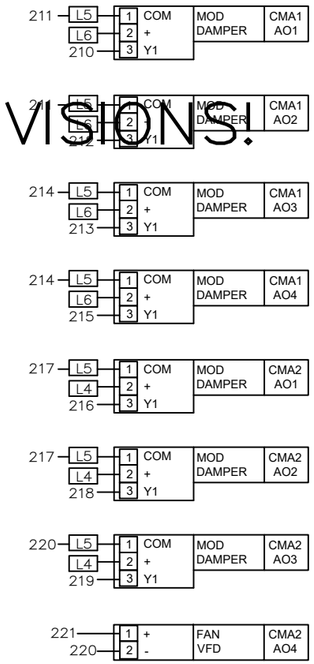
CONTRACT NO:

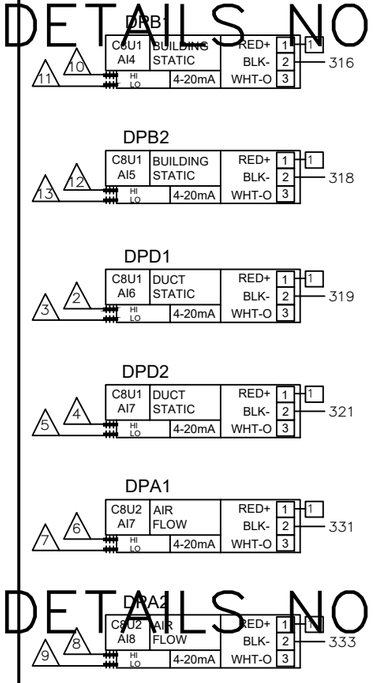
SHEET
NCHS-262
JOB NUMBER:
J-2304001

SYSTEM 32 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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Delta CONTROLS
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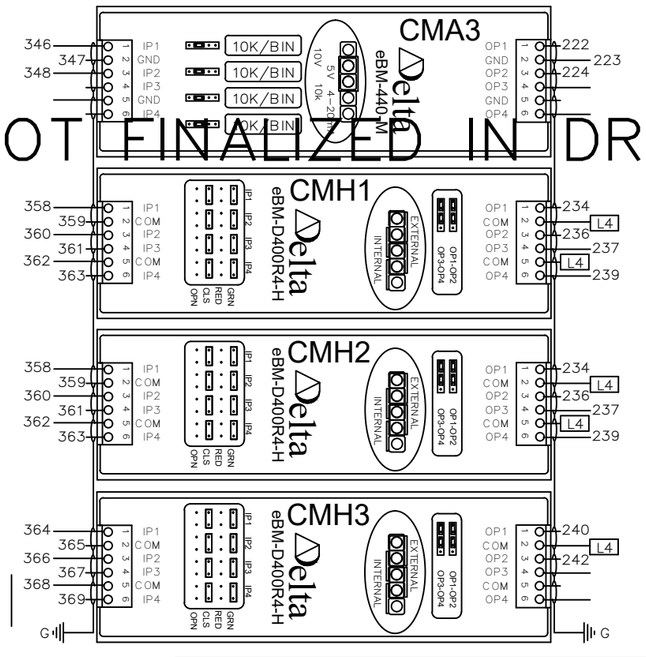
CMA3 DI1	DX STATUS	N.O.	346 / 347
CMA3 DI2	PURGE ENABLE	N.O.	348 / 347
CMH2 DI1	FAN STATUS	N.O.	358 / 359
CMH1 DI1	FAN STATUS	N.O.	360 / 359
CMH1 DI3	SMOKE ALARM	N.O.	361 / 362
CMH1 DI4	SMOKE ALARM	N.O.	363 / 362
CMH2 DI1	FAS.INPUT	N.C.	364 / 365
CMH2 DI2	PUMP STATUS	N.O.	366 / 365
CMH2 DI3	PUMP STATUS	N.O.	367 / 368



SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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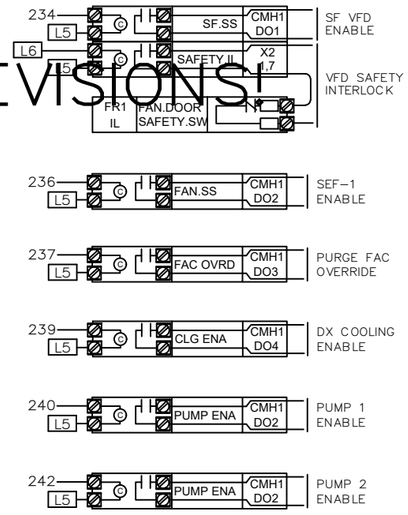

Delta Controls
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UPDATES	
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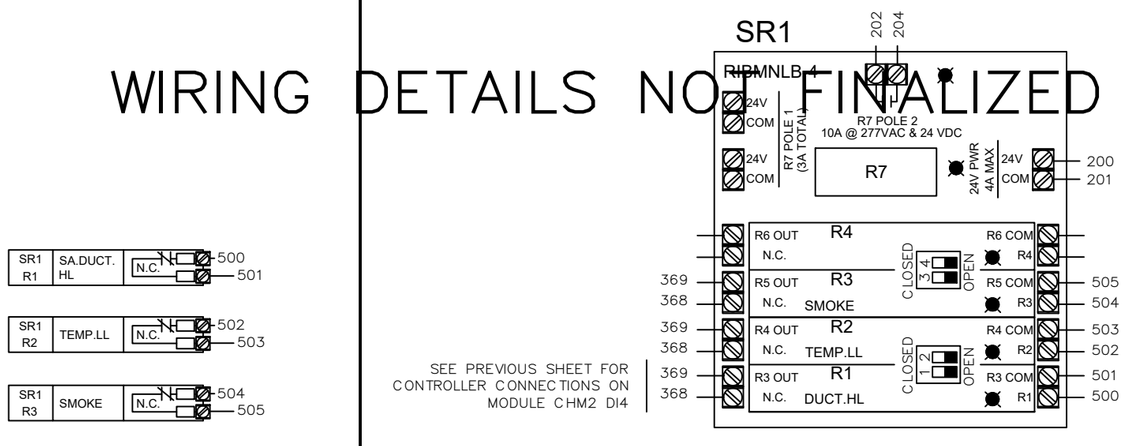

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CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

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NCHS-265
JOB NUMBER:
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SYSTEM 32 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TX1

24V CB | 24V CB

Power | Power

100
L2
L3
H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
101
5.0A
100
G

TB1

L1
L2
L3
H
N
120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2
3

300
301
L3

ETS1

V1-
V1+

ETHERNET SWITCH

1
3
5
4
2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

24V COM

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 AMP MAX

R7

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4
R3 COM R3
R2 COM R2
R1 COM R1

CLOSED
OPEN

201
200

CEB1

C8X1

PWR
GND
24~

USB 2
USB 1
(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485
NET2 RS-485
LAN 1
LAN 2

P7 24Vs P8
P5 24Vs P6

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

OP1 GND I/O OP2
OP3 GND I/O OP4
OP1 COM I/O OP2
OP3 COM I/O OP4

OPDO 1 HAO
OPDO 2 HAO
OPDO 3 HAO
OPDO 4 HAO

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

3
2

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-E1 SYSTEM 32 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
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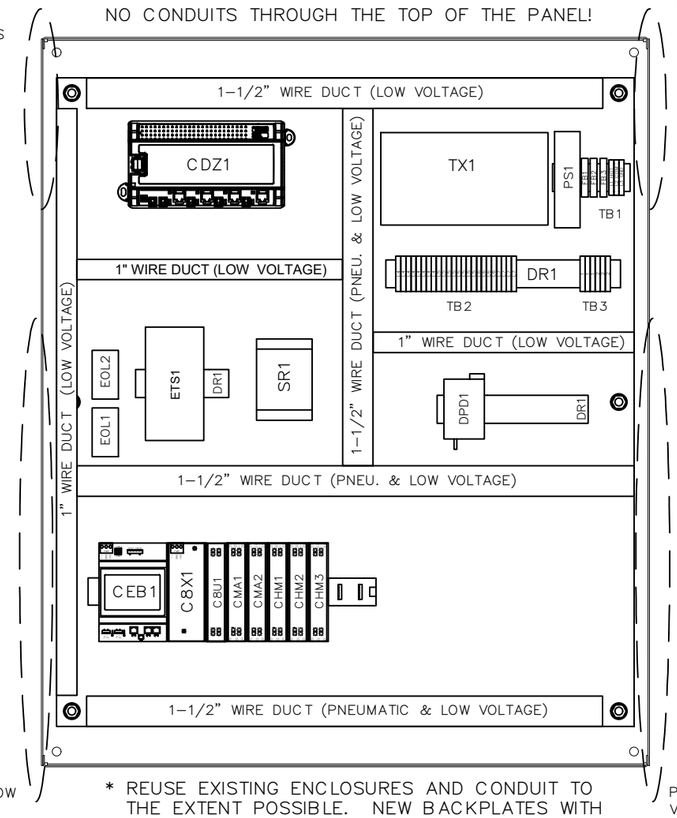
SYSTEM CONTROL PANEL 32 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

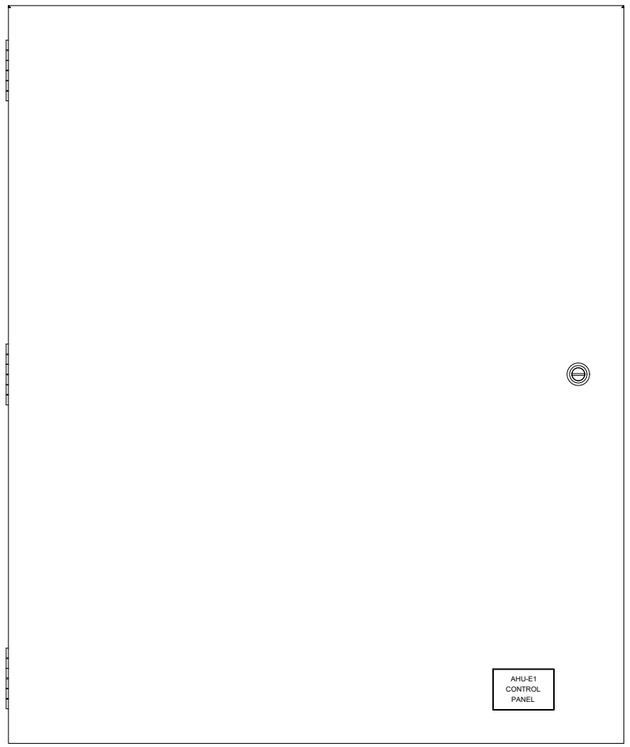


PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

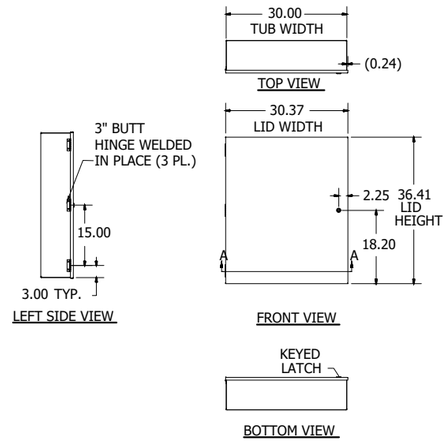


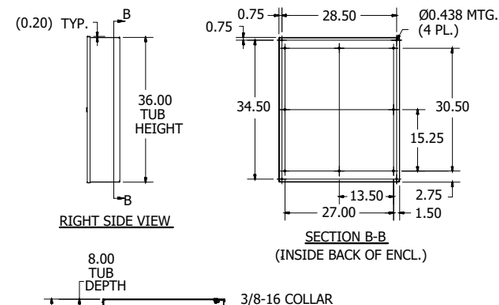
BILL OF MATERIALS

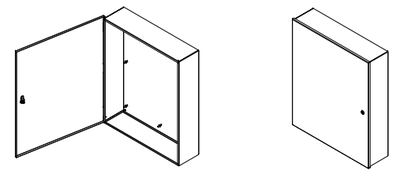
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

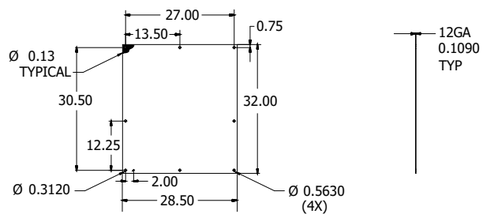
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



E-AHU-E1 SYSTEM 32 PANEL – DIMENSIONS & BOM

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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CONTRACT NO:

SHEET
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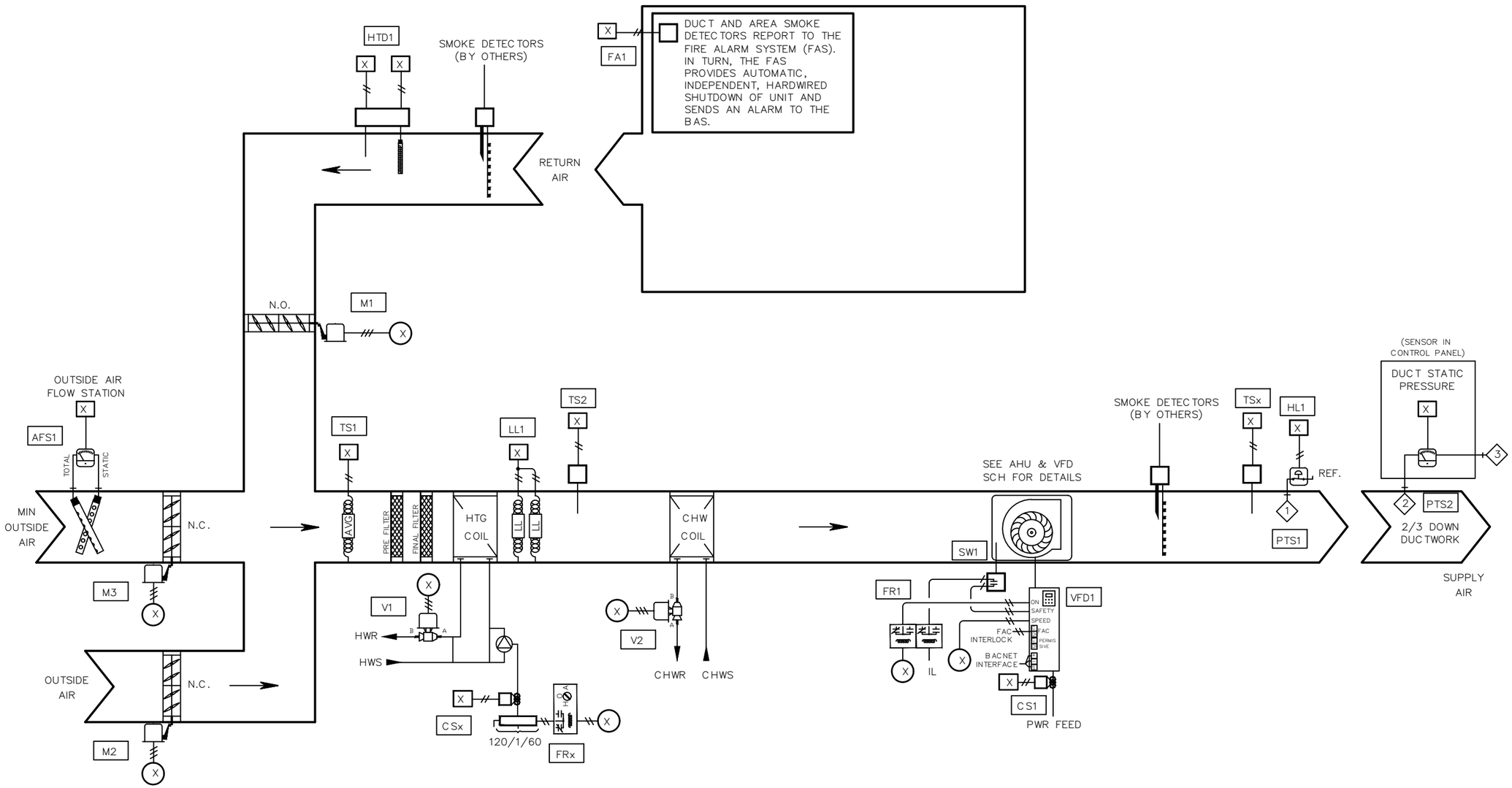
JOB NUMBER:
J-2304001

E-AHU-E2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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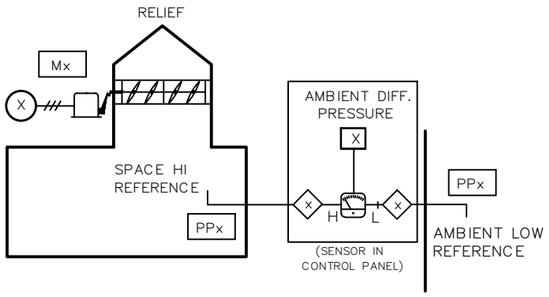
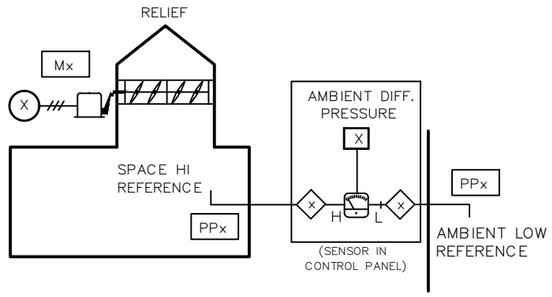
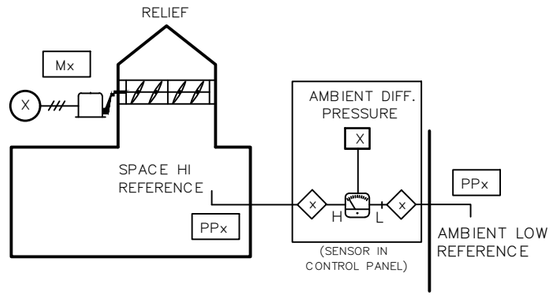
BUILDING PRESSURE CONTROL E-RH-E1



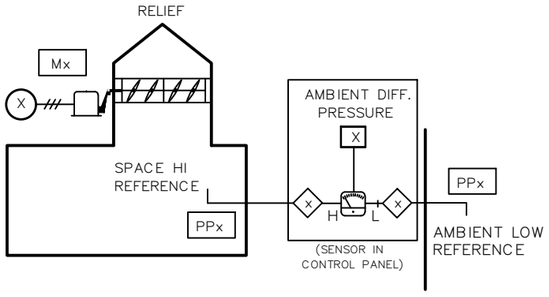
BUILDING PRESSURE CONTROL E-RH-E2



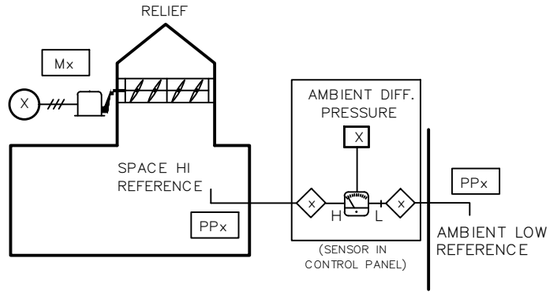
BUILDING PRESSURE CONTROL E-RH-E3



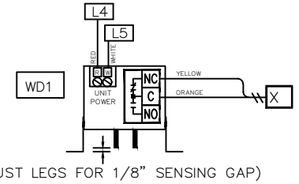
BUILDING PRESSURE CONTROL E-RH-E4



BUILDING PRESSURE CONTROL E-RH-E5



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA E RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPB5	Building Static Pressure 5	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-E1 DPR	Relief Air Damper			X		
E-RH-E2 DPR	Relief Air Damper			X		
E-RH-E3 DPR	Relief Air Damper			X		
E-RH-E4 DPR	Relief Air Damper			X		
E-RH-E5 DPR	Relief Air Damper			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**12**	**6**	**11**	**2**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-E2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (MINIMUM OF ZN-SP AND ZN-SP FROM E-AHU-E3) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFEn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Delta Controls
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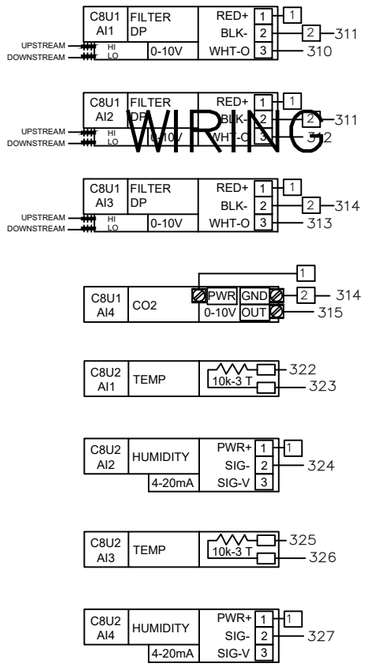
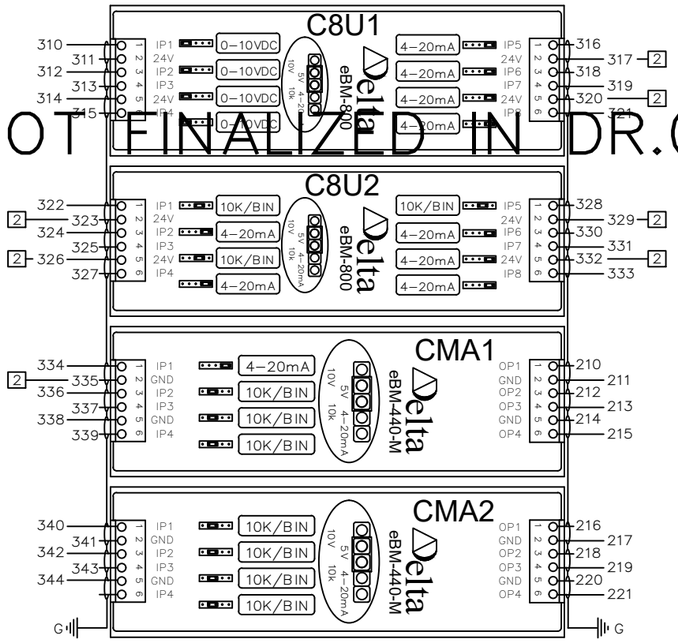
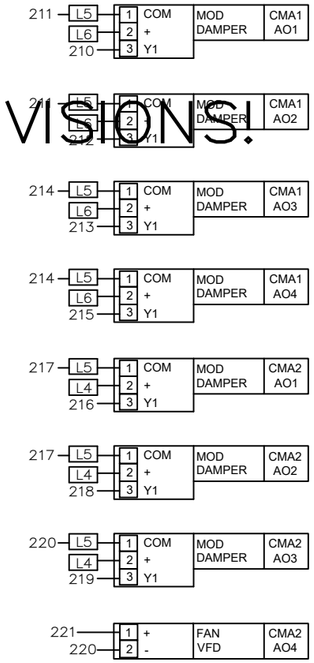
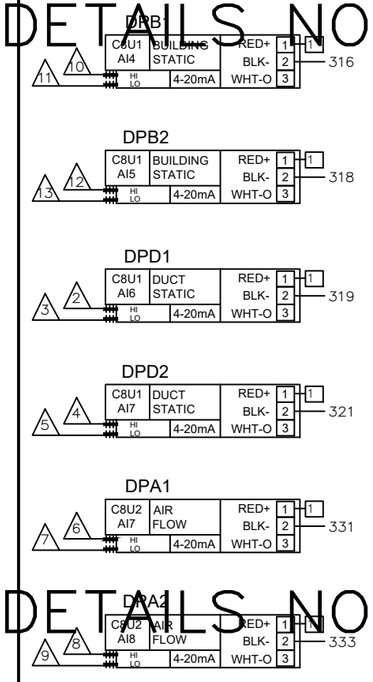
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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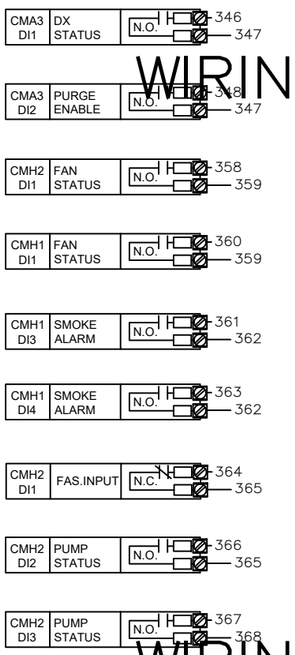
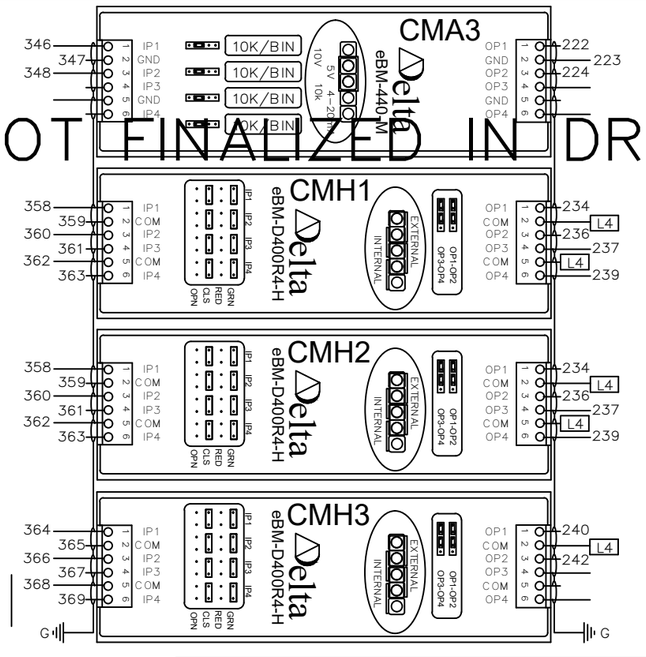
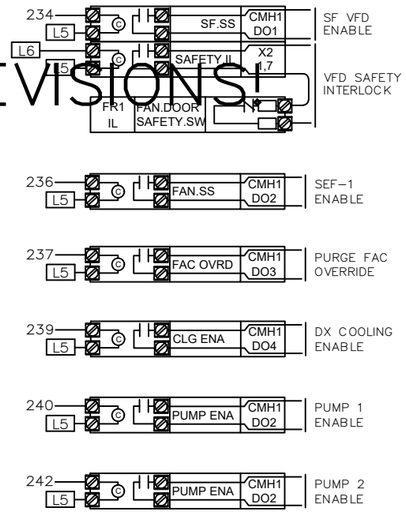




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–273
JOB NUMBER:
J–2304001

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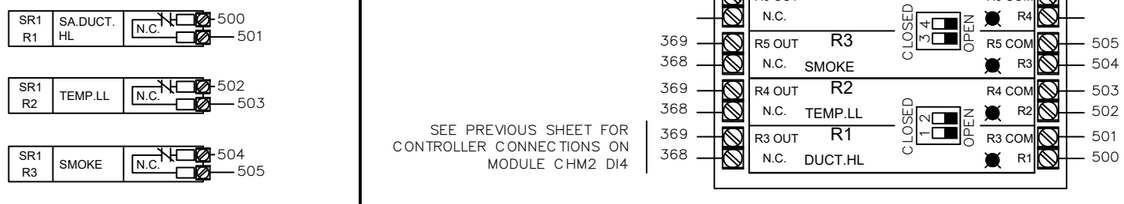

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

E-AHU-E2 SYSTEM 33 PANEL - I/O WIRING (3 OF 3)

Delta Controls
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SYSTEM 33 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

ETHERNET SWITCH

CAT5e

SR1

RIBMNLB-4

R7 POLE 2 10A @ 277VAC & 24 VDC

R1 POLE 1 10A @ 277VAC

TRANSFORMER

TX1

24V CB

Power

120 VAC LAPTOP PWR

CONTROLLER PWR

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

PS1

4.0A
1.0A
5.0A

PANEL GND LUG

TB1

120 VAC

TB2

24 VAC TO FIELD

TB3

24 VDC TO FIELD

DPD1 | DPB1 | DPB2 | DPB3 | DPB4 | DPB5

Power + / GND / 4-20mA out - / Voltage out O

HIGH / LOW

PNEUMATIC

CEB1

C8X1

eBMGR-2

eBX

eBUS Address

eBUS

(NOT USED)

eBM-800 | eBM-440-M | eBM-440-M | eBM-440-M | eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-E2 SYSTEM 33 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
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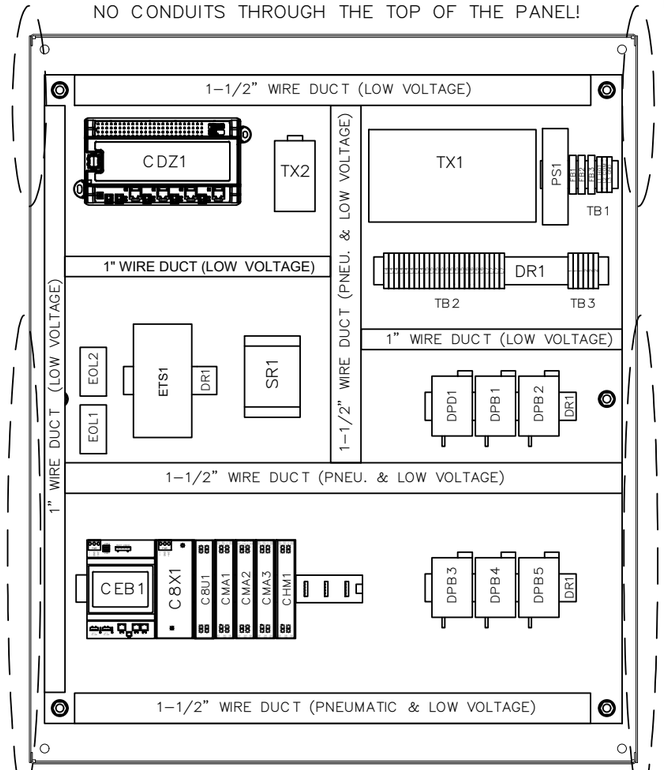
SYSTEM CONTROL PANEL 33 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

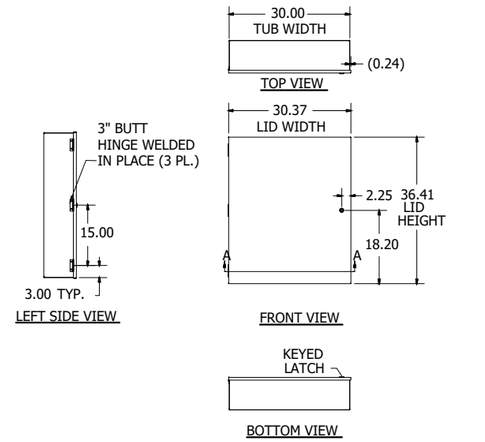
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

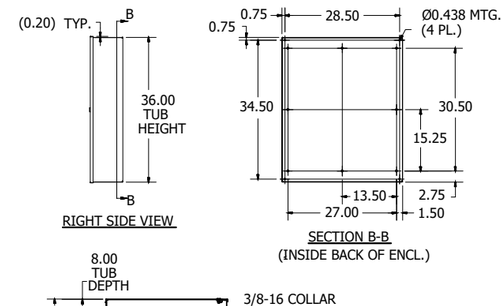
BILL OF MATERIALS

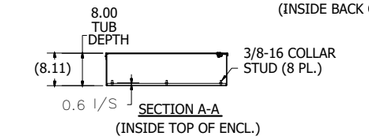
BILL OF MATERIALS

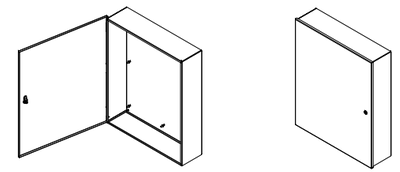
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

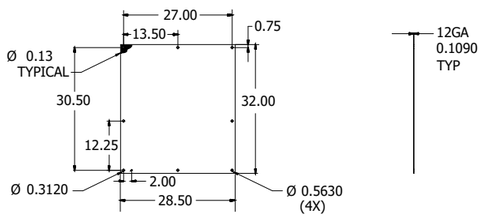








PANEL DIMENSIONS



E–AHU–E2 SYSTEM 33 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
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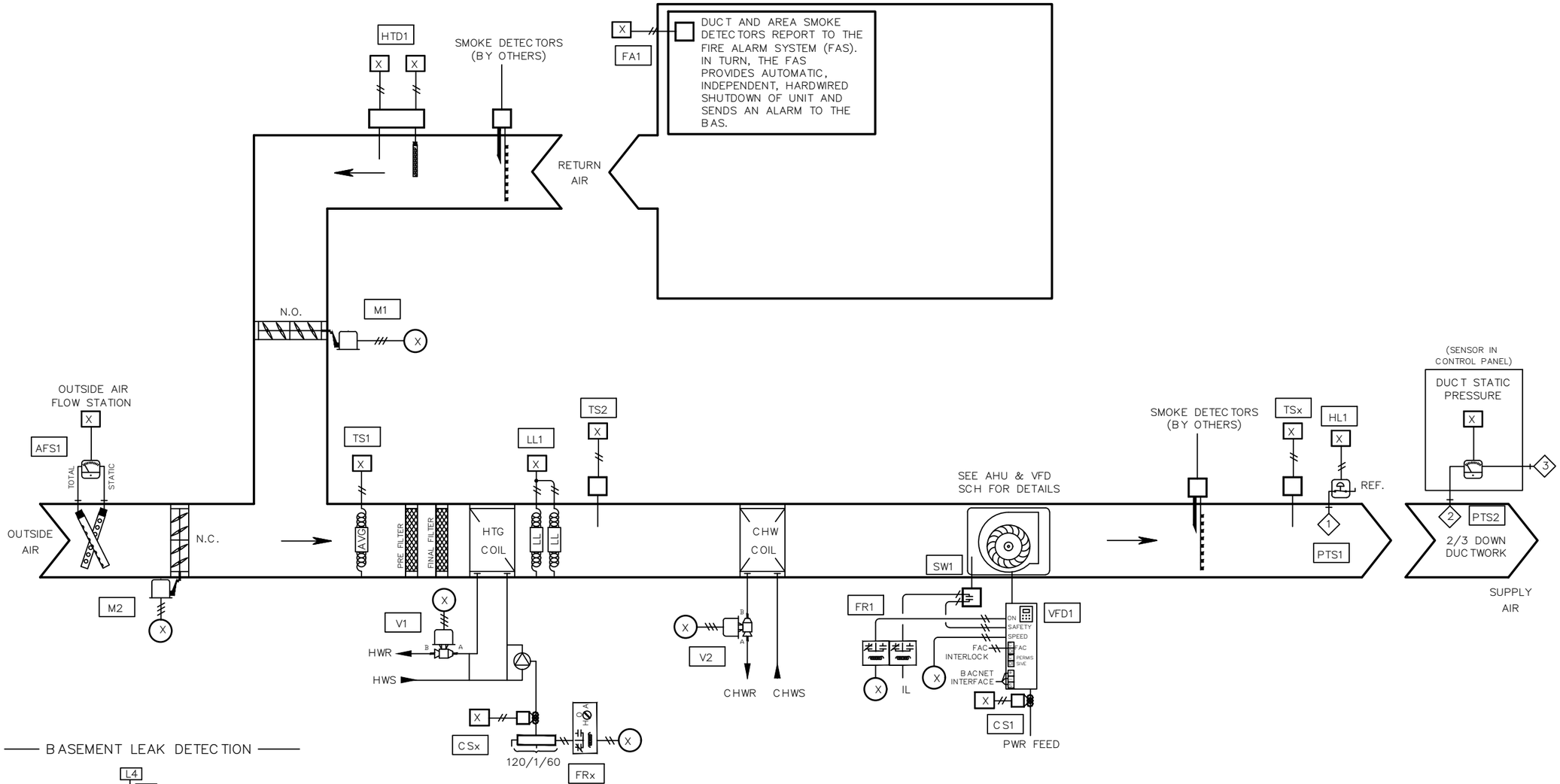
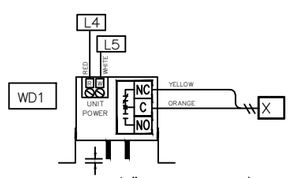
E-AHU-E3 FIELD DEVICES



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

E-AHU-E3 FIELD DEVICES

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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**7**	**6**	**5**	**2**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-E3 POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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VAV AIR HANDLING UNIT AHU-E3 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFEn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

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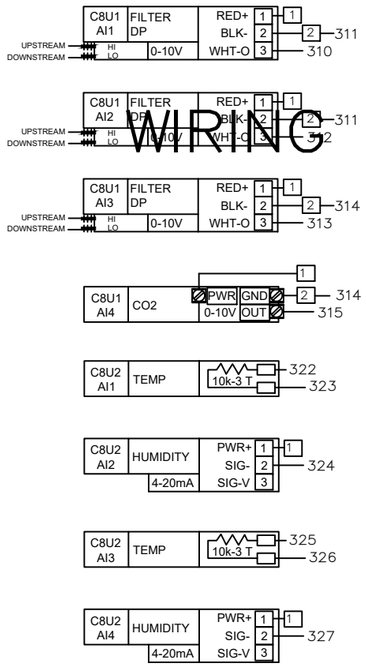

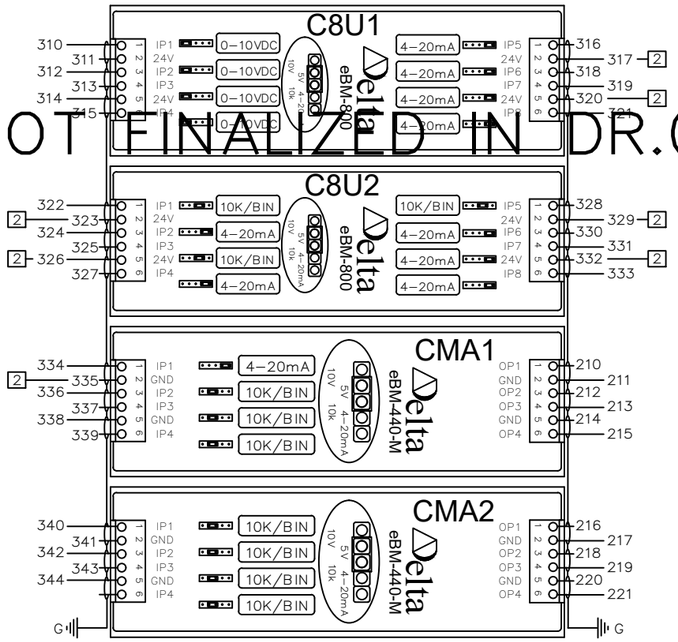

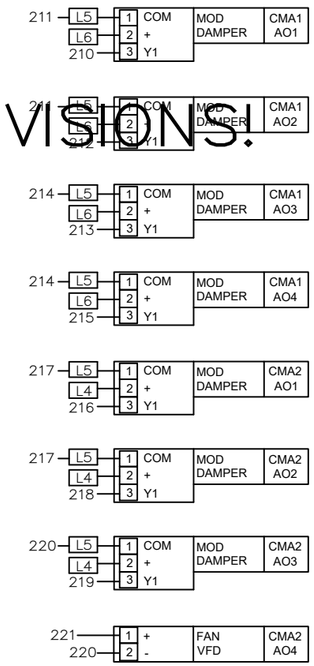

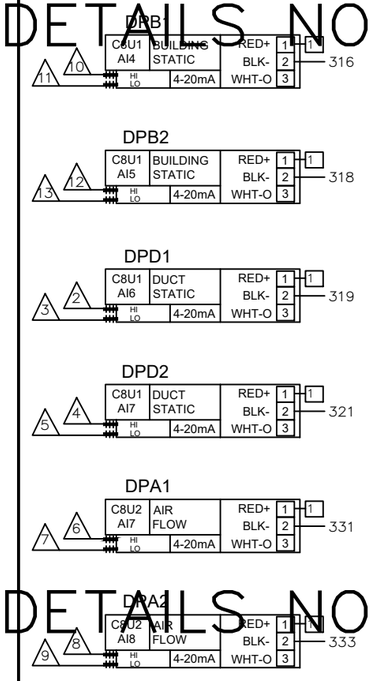

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C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

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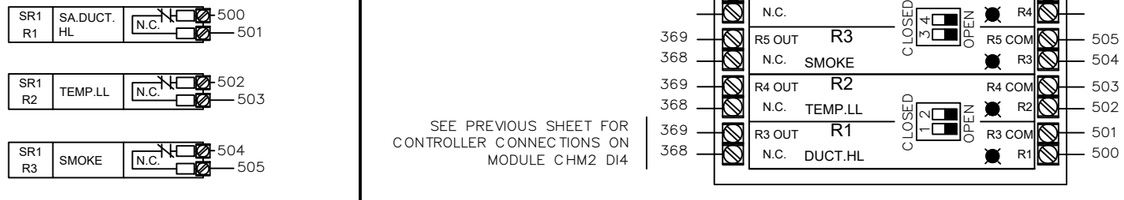

CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

AHU-E3 SYSTEM 34 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-281
JOB NUMBER:
J-2304001

SYSTEM 34 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

300
301

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 HP @ 120VAC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4 NO
R3 COM R3 NO
R2 COM R2 NO
R1 COM R1 NO

CLOSED

TX1

24V CB
24V CB

Power
Power

H C G

L2
L3
100

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

24VAC
24VAC
75VA

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

L3
L2

PS1

1.0A
5.0A
101
100
G

PANEL GND LUG

TB1

L1 L2 L3

H N

120 VAC

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1

1

Power +
GND / 4-20mA out -
Voltage out 0

HIGH
LOW

2
3

PNEUMATIC

3
2

CEC1

201
200

PWR

~ GND 24~

Delta
eBCON-2

eBUS
NET2

NET2 RS-485
[+] [-] SHD

LAN 1

eBM-440-M
eBM-440-M
eBM-440-M
eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-E3 SYSTEM 34 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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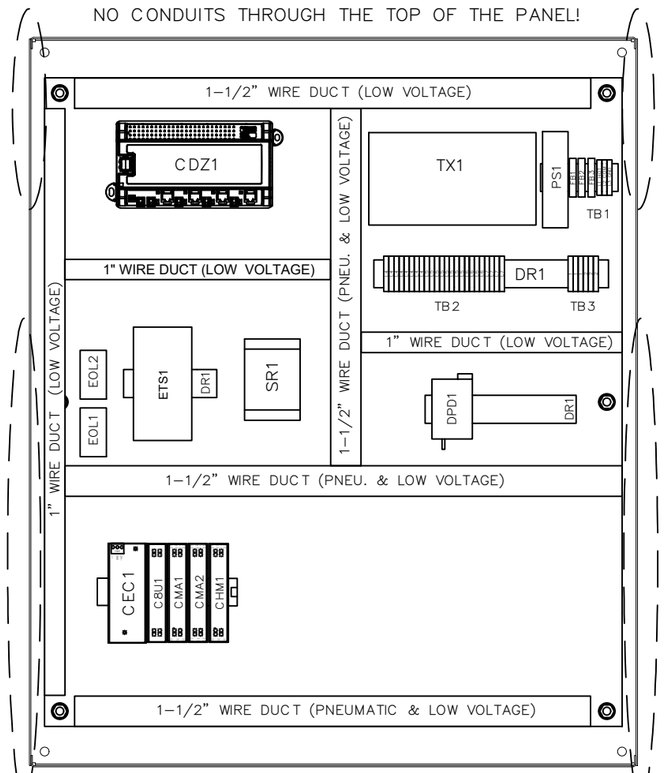
J-2304001

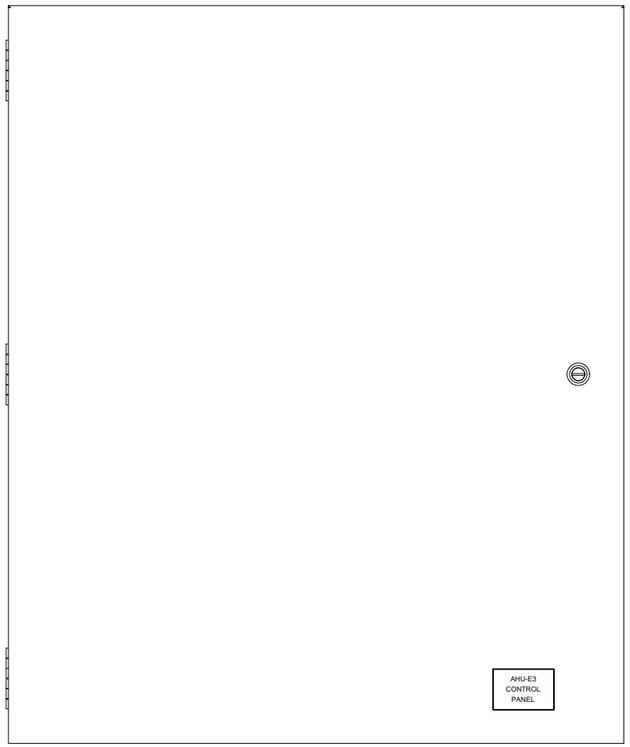
SYSTEM CONTROL PANEL 34 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

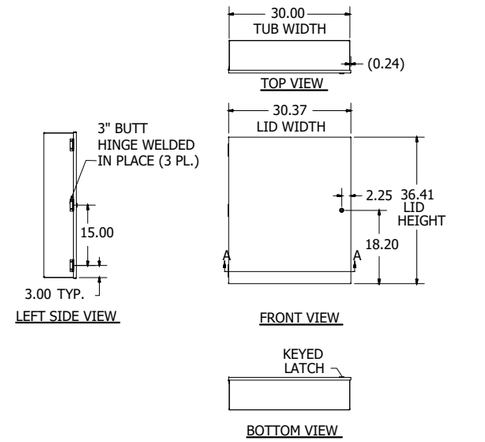
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

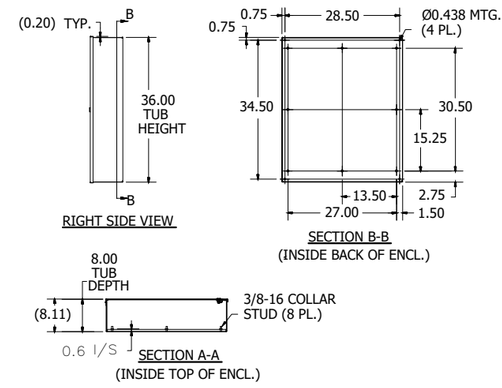
BILL OF MATERIALS

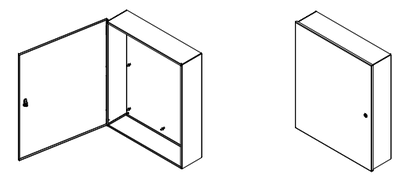
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

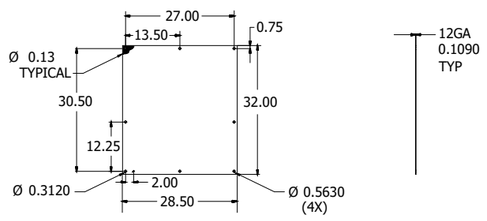
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



E-AHU-E3 SYSTEM 34 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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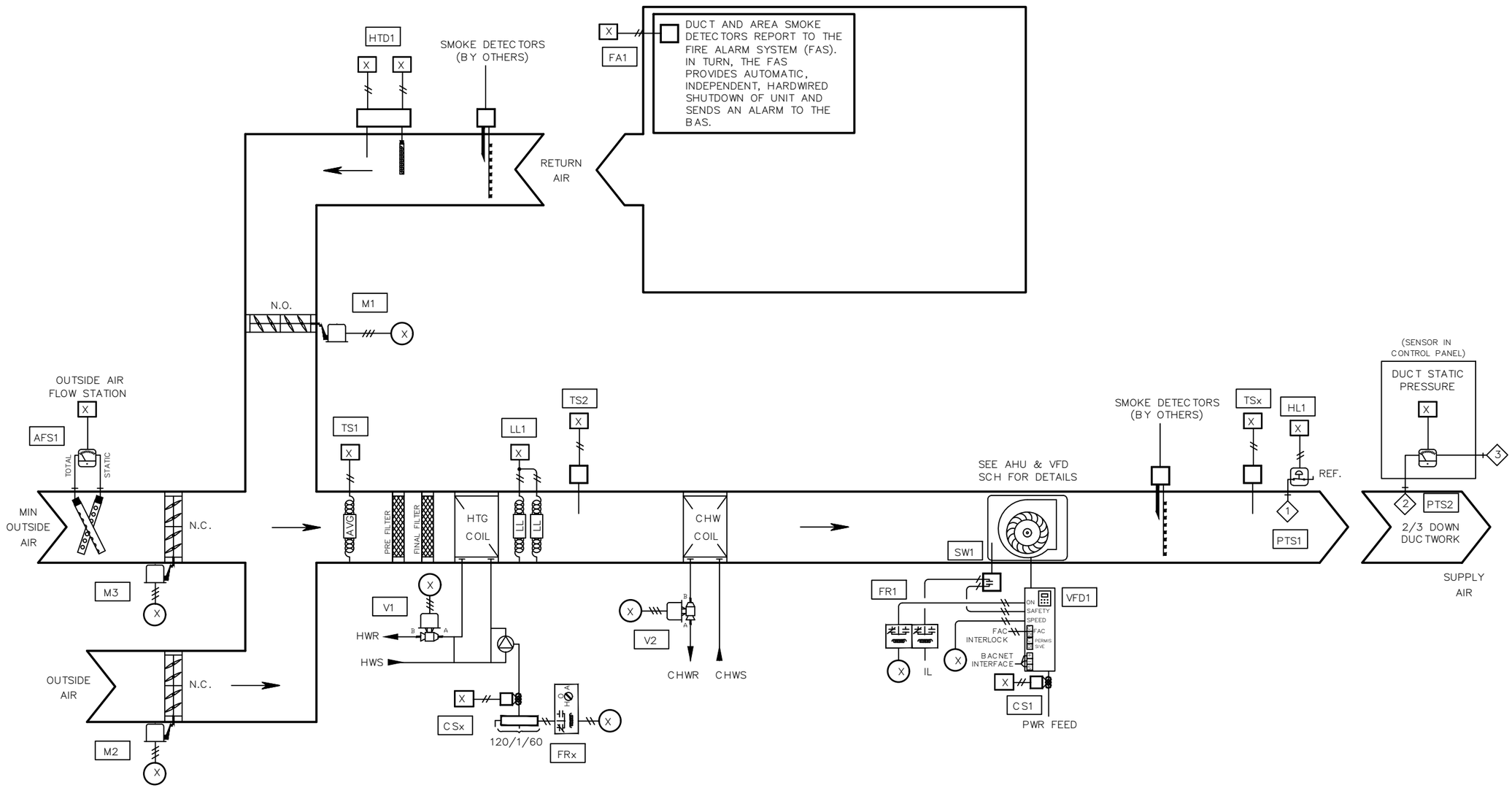
E–AHU–F1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–F1 FIELD DEVICES

Delta Controls

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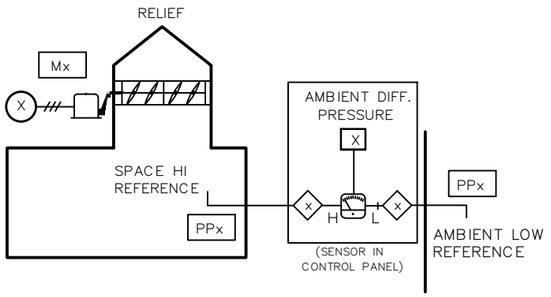
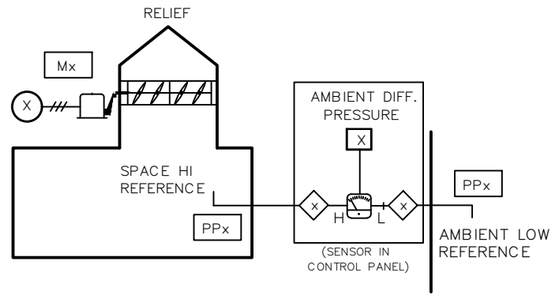
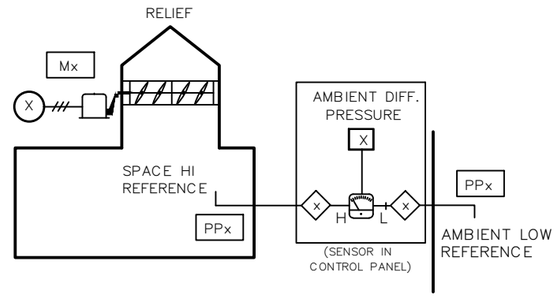
BUILDING PRESSURE CONTROL
E–RH–F1



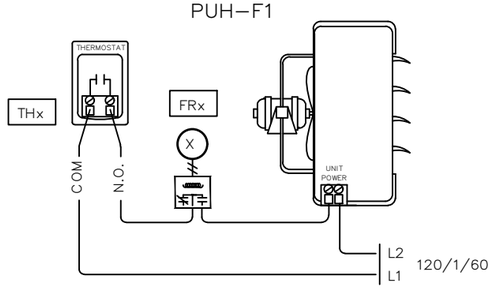
BUILDING PRESSURE CONTROL
E–RH–F2



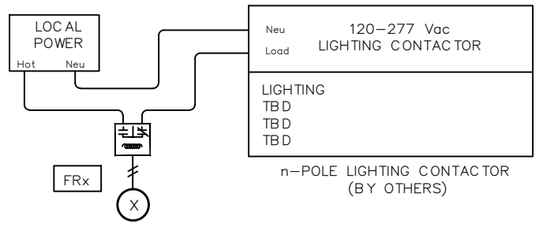
BUILDING PRESSURE CONTROL
E–RH–F3



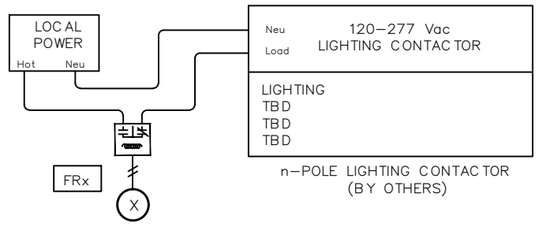
PROPELLER UNIT HEATER
PUH–F1



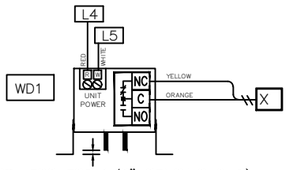
LIGHTING CONTACTOR CONTROLS
RF–1 – NORTH SECURITY



LIGHTING CONTACTOR CONTROLS
RF–2 – NORTH PARKING / SECURITY

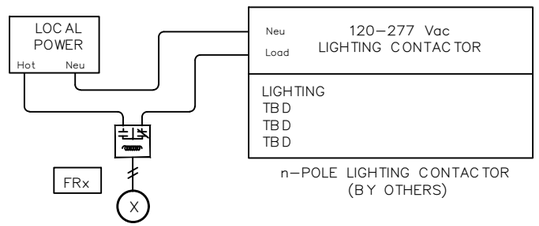


BASEMENT LEAK DETECTION

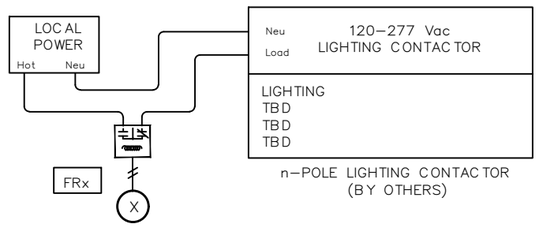


(ADJUST LEGS FOR 1/8" SENSING GAP)

LIGHTING CONTACTOR CONTROLS
RF–3 – NORTH PARKING



LIGHTING CONTACTOR CONTROLS
RF–4 – NORTH WALK



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA F EXHAUST, RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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E-MAIL: NATHAN@TCSBAS.COM

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CONTRACT NO:

SHEET
NCHS–285
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-F1 DPR	Relief Air Damper			X		
E-RH-F2 DPR	Relief Air Damper			X		
E-RH-F3 DPR	Relief Air Damper			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
LTG 1	Lighting Contactor - North Sec RF-1				X	
LTG 2	Lighting Contactor - N Pkg Sec RF-2				X	
LTG 3	Lighting Contactor - North Pkg RF-3				X	
LTG 4	Lighting Contactor - North Walk RF-4				X	
PUH-F1 EN	PUH F1 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**9**	**6**	**9**	**7**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-F1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFFn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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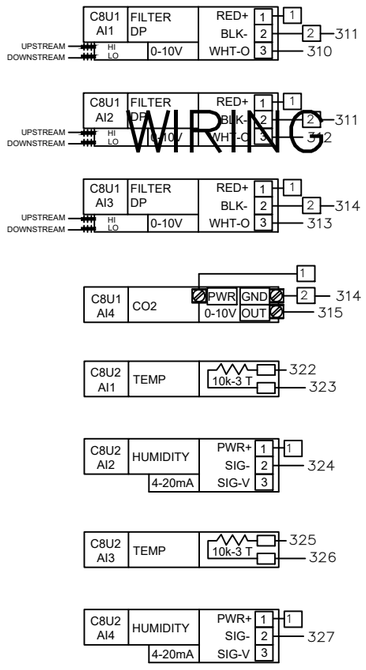
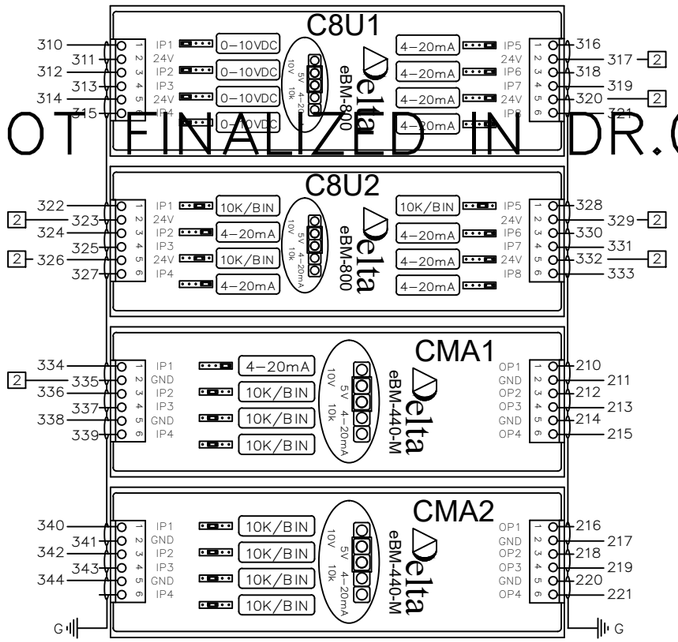
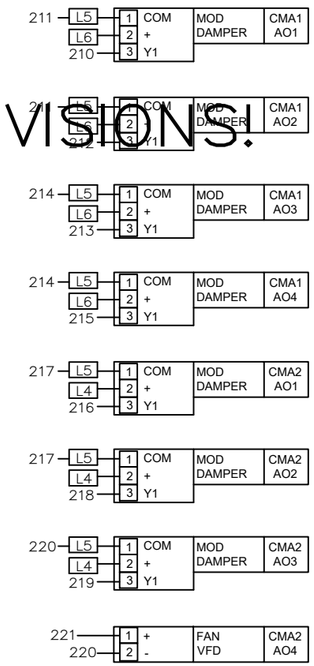
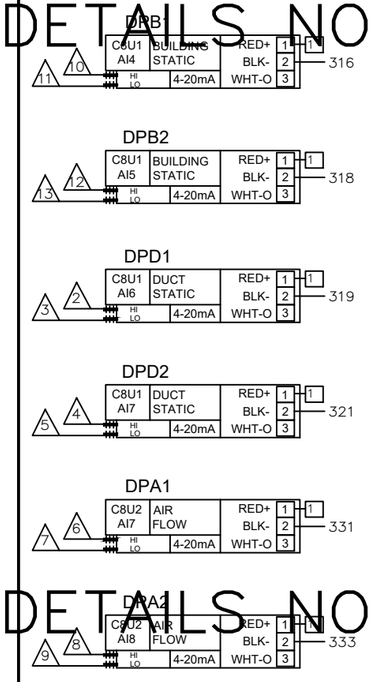
SYSTEM 35 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE — C8U1 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE — C8U2 eBM-800

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE — CMA1 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

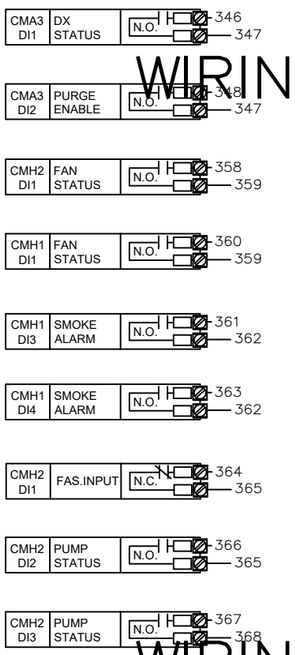
CONTRACT NO:

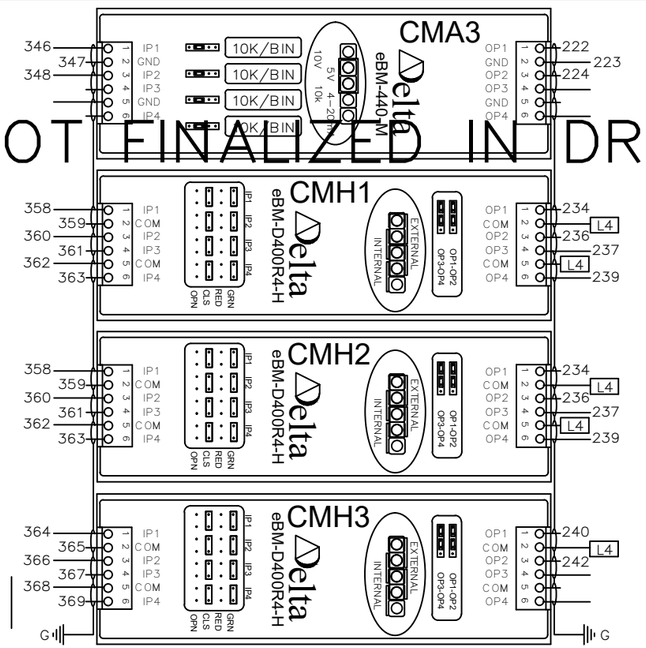
SHEET
NCHS-288
JOB NUMBER:
J-2304001

E-AHU-F1 SYSTEM 35 PANEL – I/O WIRING (1 OF 3)

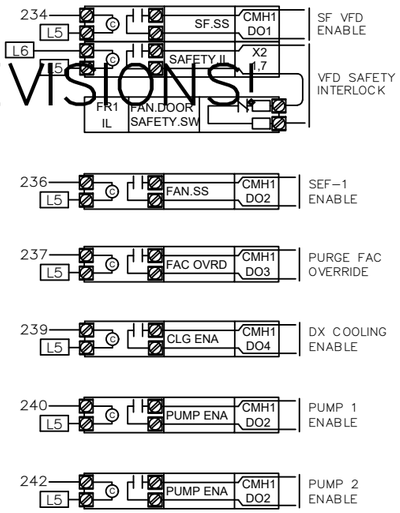
SYSTEM 35 CONTROL PANEL

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!





SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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E–AHU–F1 SYSTEM 35 PANEL – I/O WIRING (2 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–289
JOB NUMBER:
J–2304001

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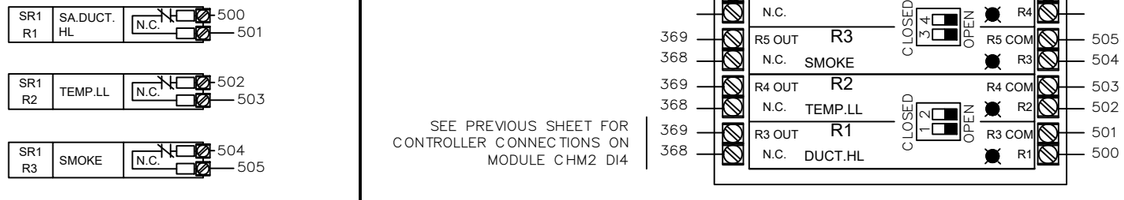

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

E-AHU-F1 SYSTEM 35 PANEL – I/O WIRING (3 OF 3)

Delta Controls
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4240 W 50 S
LEBANON, INDIANA 46052
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NCHS-290
JOB NUMBER:
J-2304001

SYSTEM 35 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

CAT-6a

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TRANSFORMER

102 L2

206 207

TX1

24V CB Power

24V CB Power

100 L2 L3 H C G

120 VAC LAPTOP PWR

75VA 24VAC 24VAC

200 201 CONTROLLER PWR

75VA 24VAC 24VAC

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L3 L2

PS1

102 4.0A

101 1.0A

100 5.0A

G PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

206 L8 L8 L8

207 L9 L9 L9

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

301 300 L3

ETS1

V1- V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201 24V COM

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

R4 OUT N.C. R4 COM R4

R3 OUT N.C. R3 COM R3

R2 OUT N.C. R2 COM R2

R1 OUT N.C. R1 COM R1

CLOSED OPEN

DPD1 DPB1 DPB2 DPB3

Power + - GND / 4-20mA out - Voltage out O

HIGH LOW

PNEUMATIC

2 3 4 5 6 7 8 9

201 200 CEB1

PWR GND 24~

USB2 USB1 (NOT USED)

NET1 RS-485 NET2 RS-485

LAN 1 LAN 2 LAN 3

201 200 C8X1

PWR GND 24~

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

L3 TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-F1 SYSTEM 35 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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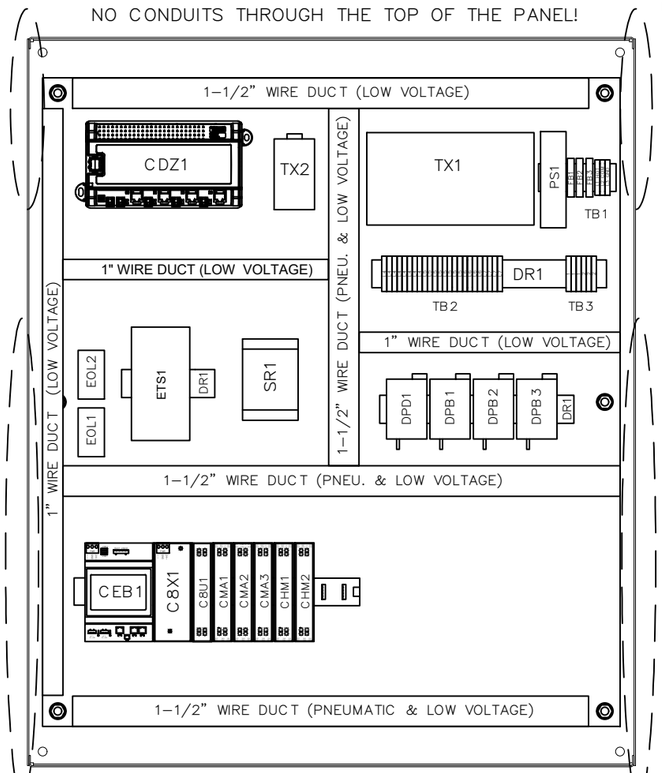
JOB NUMBER:
J-2304001

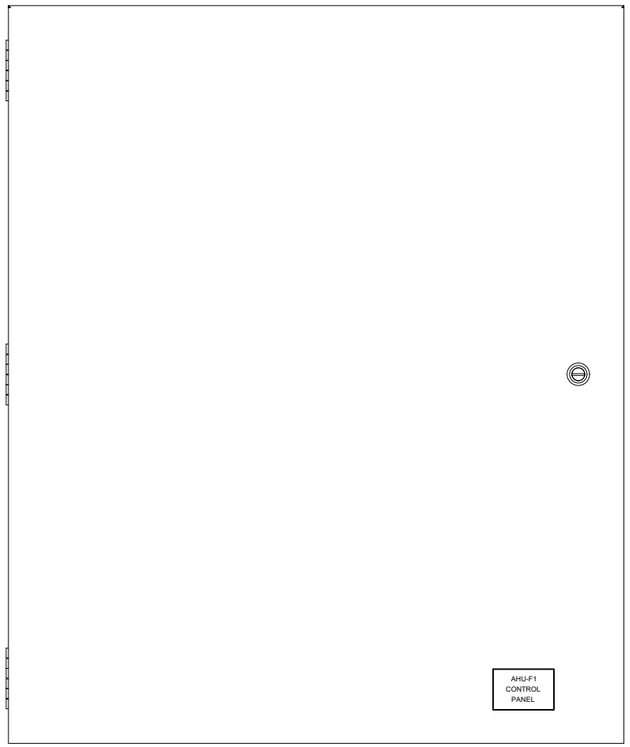
SYSTEM CONTROL PANEL 35 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

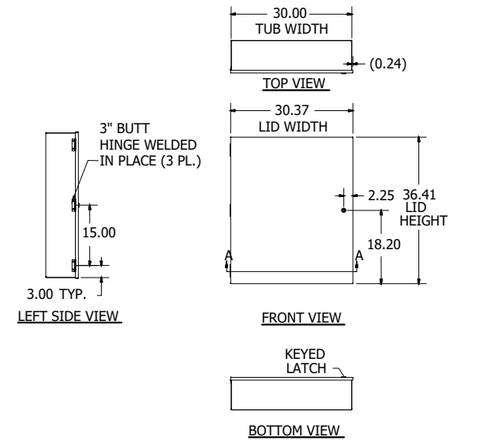
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

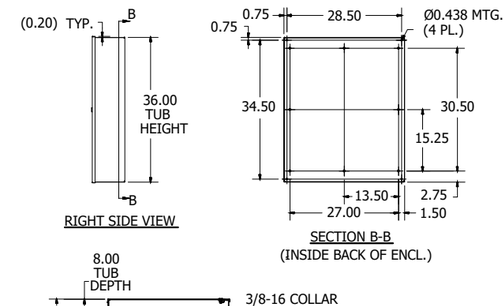
BILL OF MATERIALS

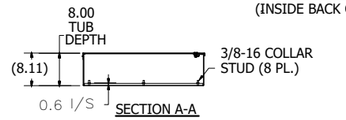
BILL OF MATERIALS

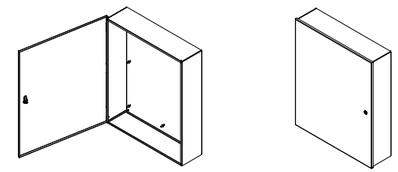
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

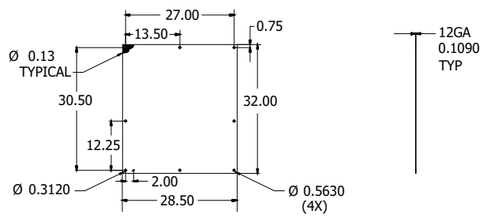








PANEL DIMENSIONS



E-AHU-F1 SYSTEM 35 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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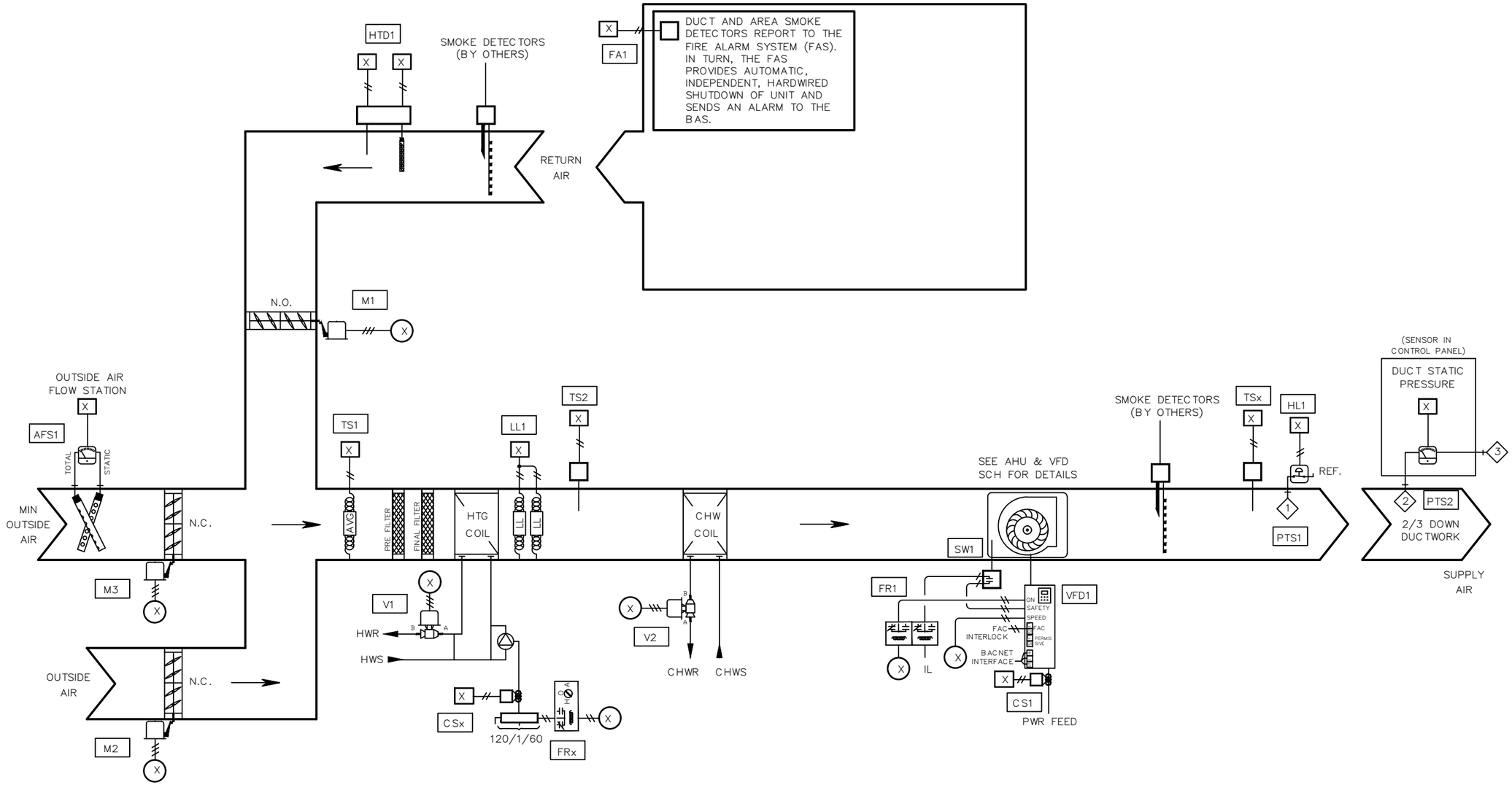
CONTRACT NO:

SHEET
NCHS–292
JOB NUMBER:
J–2304001

E–AHU–H1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–H1 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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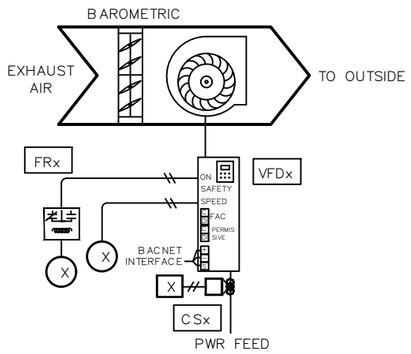
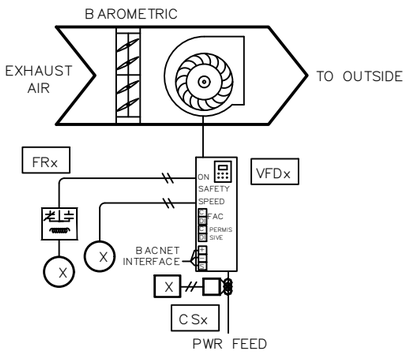
CONTRACT NO:

SHEET
NCHS–293
JOB NUMBER:
J–2304001

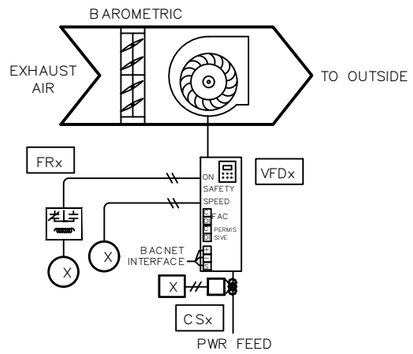
EXHAUST FAN – BAS CONTROLLED
EF–H1



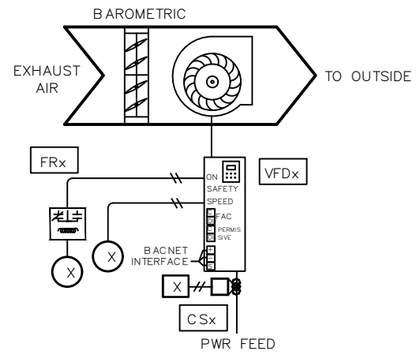
EXHAUST FAN – BAS CONTROLLED
EF–H2



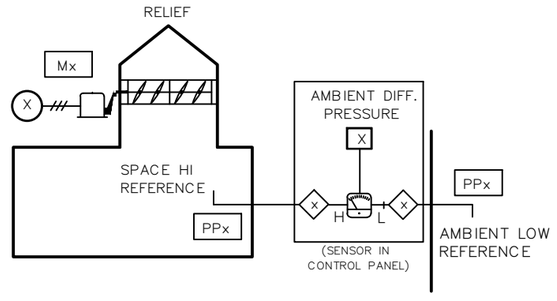
EXHAUST FAN – BAS CONTROLLED
EF–H4



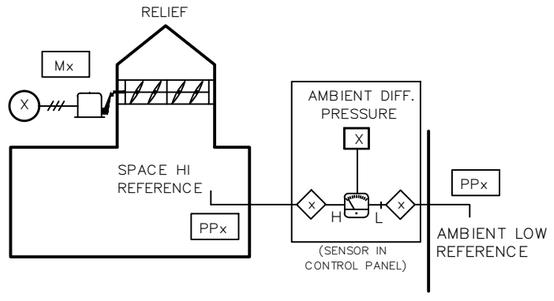
EXHAUST FAN – BAS CONTROLLED
EF–H5



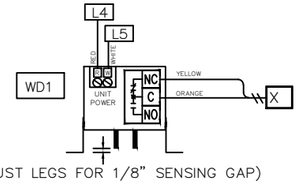
BUILDING PRESSURE CONTROL
RH–H1



BUILDING PRESSURE CONTROL
RH–H4



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA H EXHAUST, RELIEF, & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–294
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-H1 STAT	Exhaust Fan H1 Status		X			
EF-H2 STAT	Exhaust Fan H2 Status		X			
EF-H4 STAT	Exhaust Fan H4 Status		X			
EF-H5 STAT	Exhaust Fan H5 Status		X			
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-H1 DPR	Relief Air Damper			X		
RH-H4 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-H1 SS	Exhaust Fan H1 Fan Start / Stop				X	
EF-H2 SS	Exhaust Fan H2 Fan Start / Stop				X	
EF-H4 SS	Exhaust Fan H4 Fan Start / Stop				X	
EF-H5 SS	Exhaust Fan H5 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**9**	**10**	**8**	**6**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-H1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFHn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

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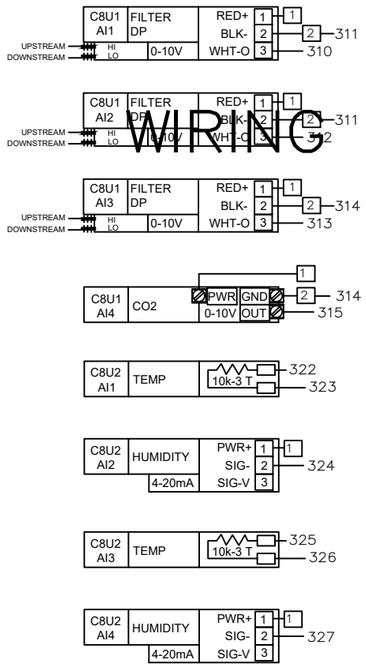

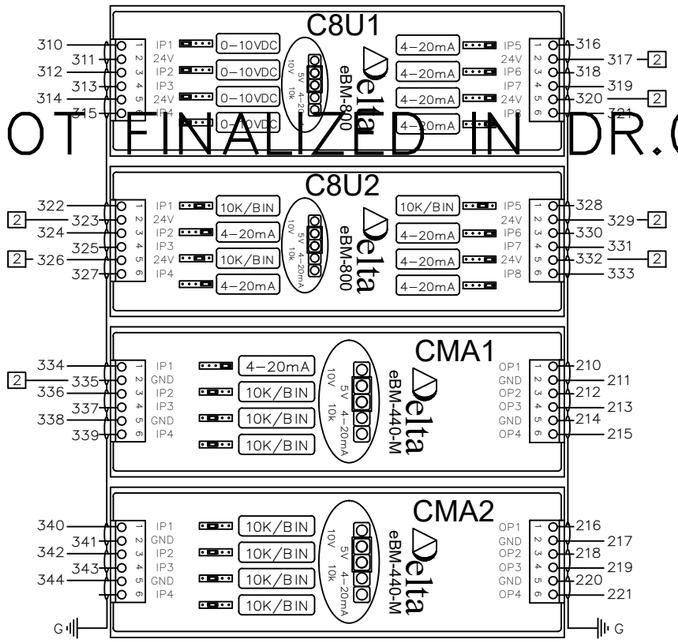

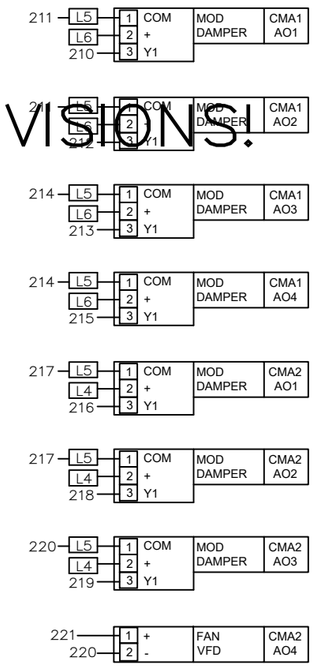

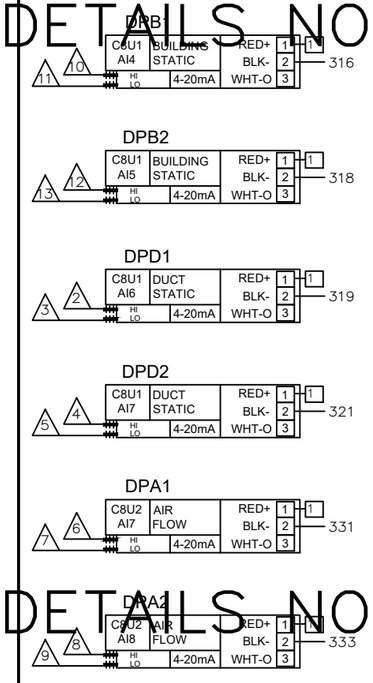

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800	C8U1 INPUTS	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1 INPUTS	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1 INPUTS	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1 INPUTS	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1 INPUTS	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1 INPUTS	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1 INPUTS	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1 INPUTS	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2 INPUTS	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2 INPUTS	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2 INPUTS	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2 INPUTS	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2 INPUTS	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2 INPUTS	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2 INPUTS	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2 INPUTS	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1 INPUTS	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1 INPUTS	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1 INPUTS	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1 INPUTS	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
	CMA1 OUTPUTS	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1 OUTPUTS	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1 OUTPUTS	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1 OUTPUTS	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2 INPUTS	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2 INPUTS	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2 INPUTS	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2 INPUTS	4	10100.1404			
	CMA2 OUTPUTS	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2 OUTPUTS	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2 OUTPUTS	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2 OUTPUTS	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

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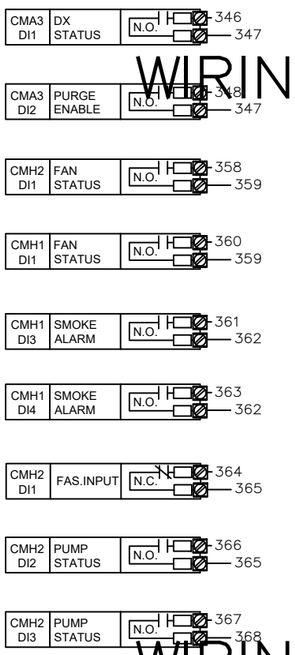
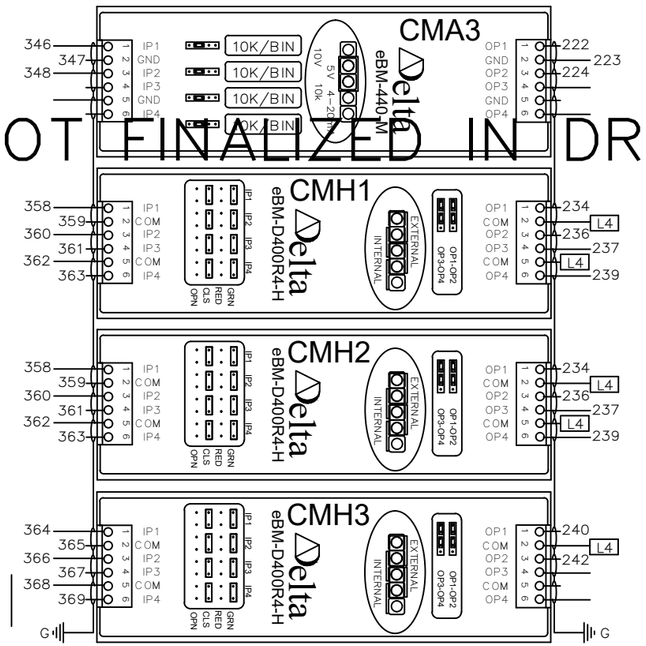
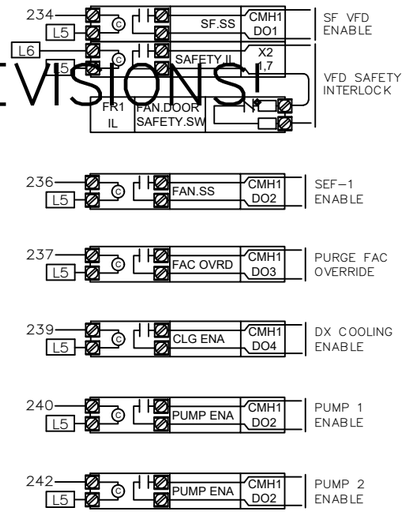




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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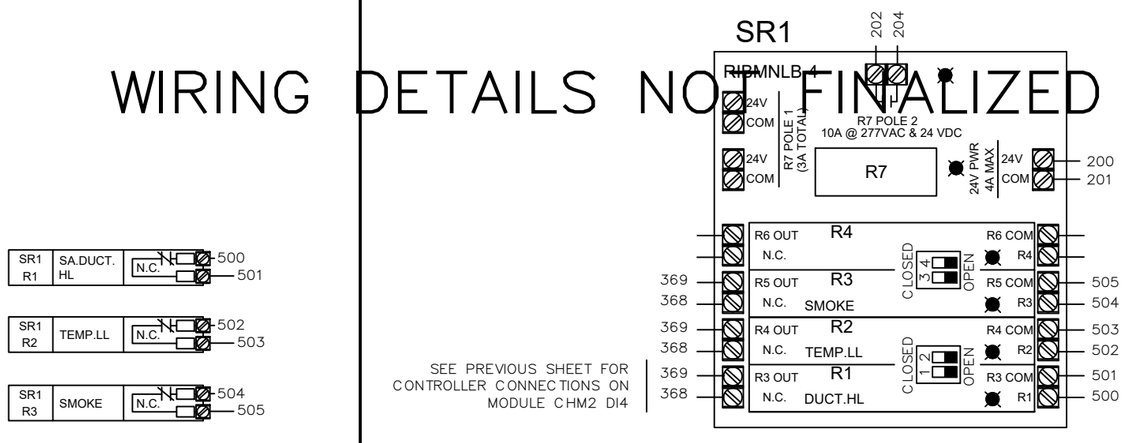

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CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC. ID.	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

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SYSTEM 36 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

300
301

ETS1

V1-
V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4
R3 COM R3
R2 COM R2
R1 COM R1

CLOSED OPEN

TX1

24V CB
24V CB

Power
Power

H C G

100
L2
L3

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
5.0A
101
100
G

TB1

L1 L2 L3
H N
120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1 | DPB1 | DPB2

1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2 3 4 5 6 7

CEB1

CEB1 PWR
GND
24~
USB2
USB1
(NOT USED)

C8X1

C8X1 PWR
GND
24~

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485
NET2 RS-485
LAN 1
LAN 2
LAN 3

P7 24Vs IP8
P6 24Vs IP6

eBM-800
eBM-440-M
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H

OP1 OP2 OP3 OP4
HAO

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-H1 SYSTEM 36 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

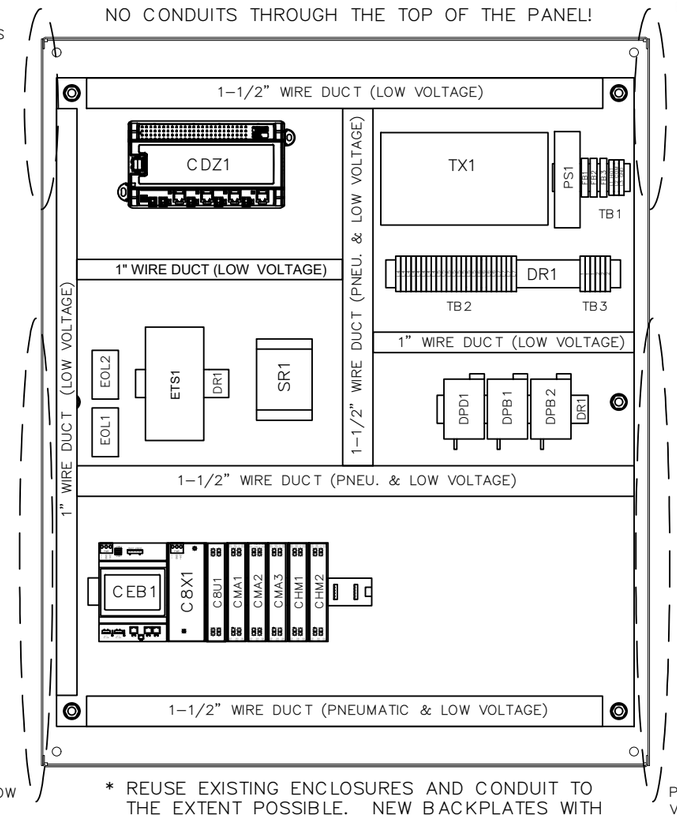
CONTRACT NO:

SHEET
NCHS-300
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 36 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

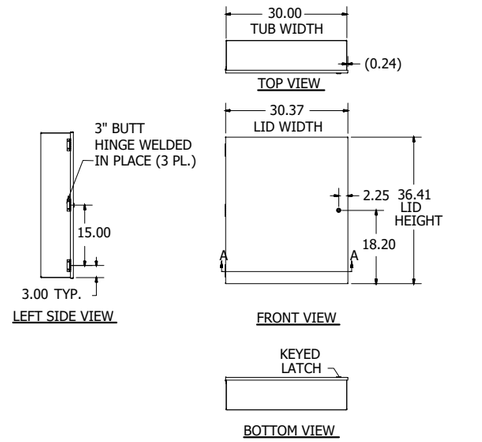
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

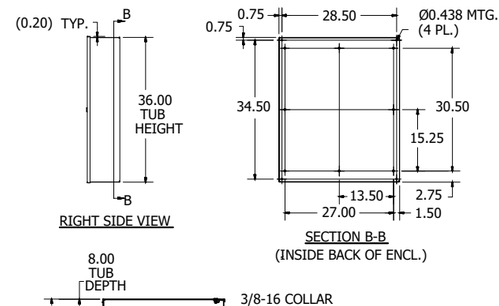
BILL OF MATERIALS

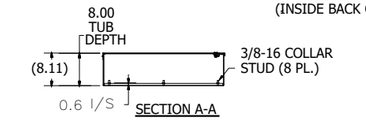
BILL OF MATERIALS

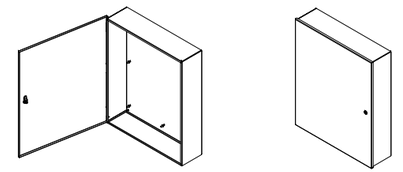
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

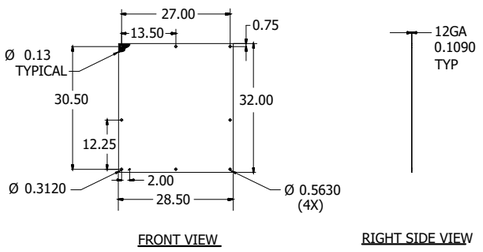








PANEL DIMENSIONS



Delta Controls

Temperature Control Services
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LEBANON, INDIANA 46052
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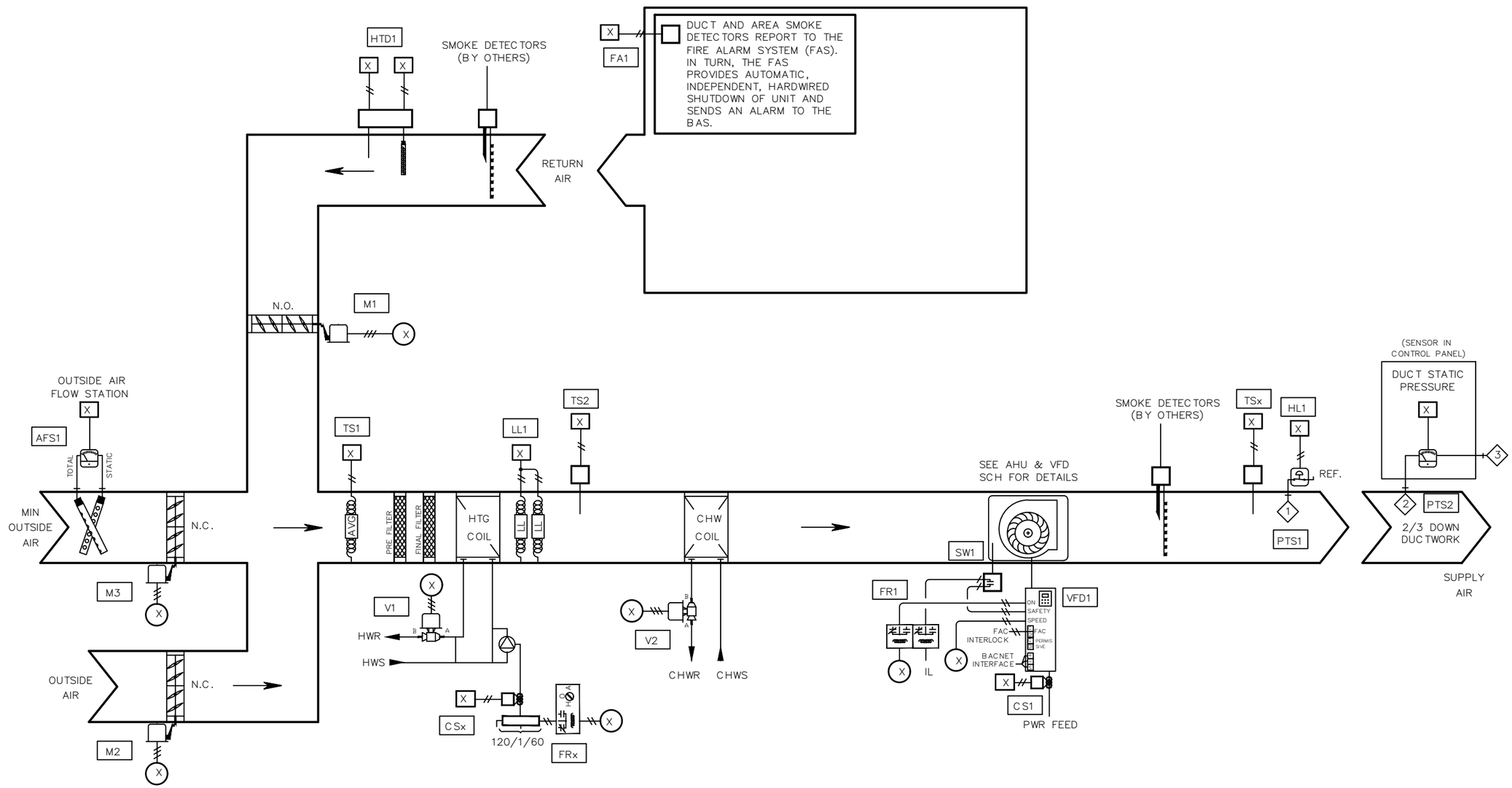
CONTRACT NO:

SHEET
NCHS–301
JOB NUMBER:
J–2304001

E–AHU–H2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–H2 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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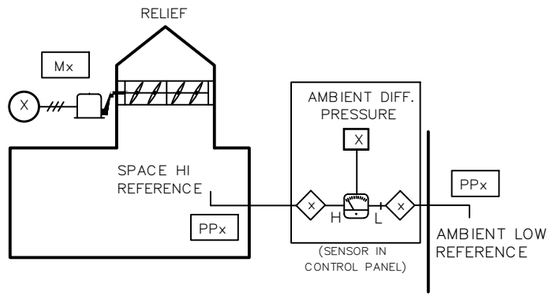
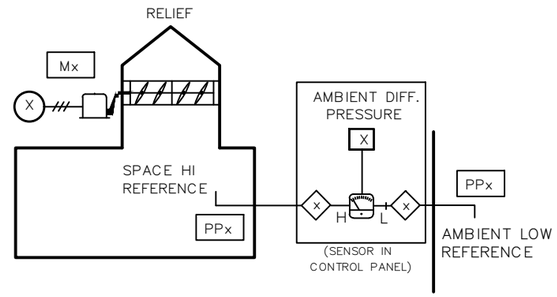
SHEET
NCHS–302
JOB NUMBER:
J–2304001

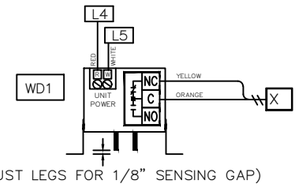
BUILDING PRESSURE CONTROL
RH–H2



BUILDING PRESSURE CONTROL
RH–H3



BASEMENT LEAK DETECTION



(ADJUST LEGS FOR 1/8" SENSING GAP)

BILL OF MATERIAL

NETWORK POINTS

(N1) THROUGH (Nx)

AREA H RELIEF & LEAK DETECTION FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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CONTRACT NO:

SHEET
NCHS–303
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LD1	Leak Detector		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-H2 DPR	Relief Air Damper			X		
RH-H3 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**9**	**6**	**8**	**2**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-H2 & AREA H MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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CONTRACT NO:

SHEET
NCHS-304
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-H2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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04/06/2023	ADD 3.3
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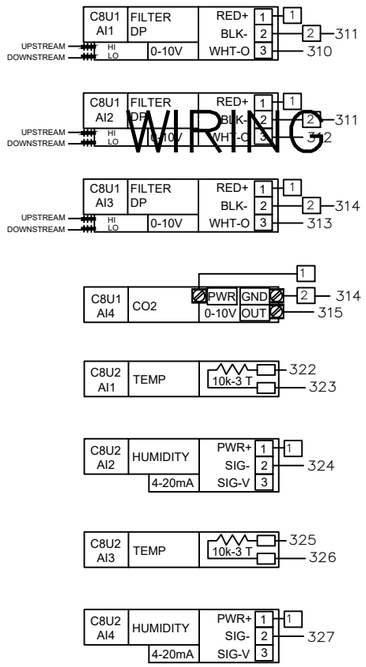
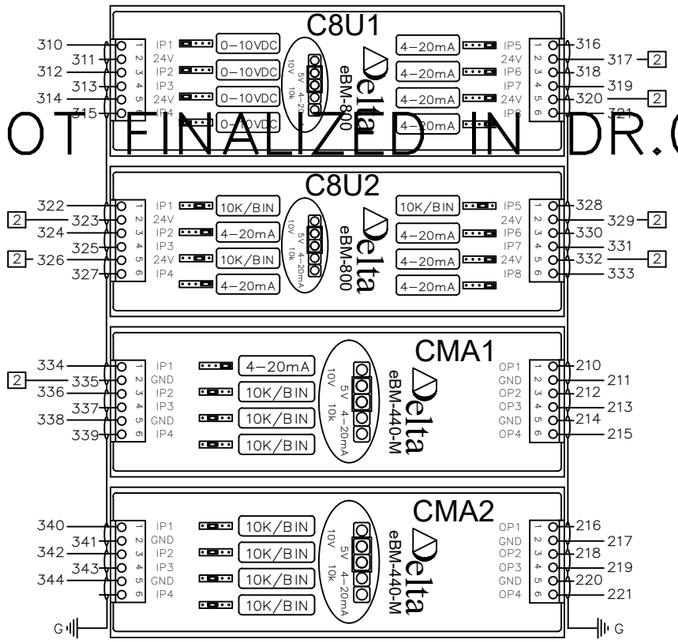
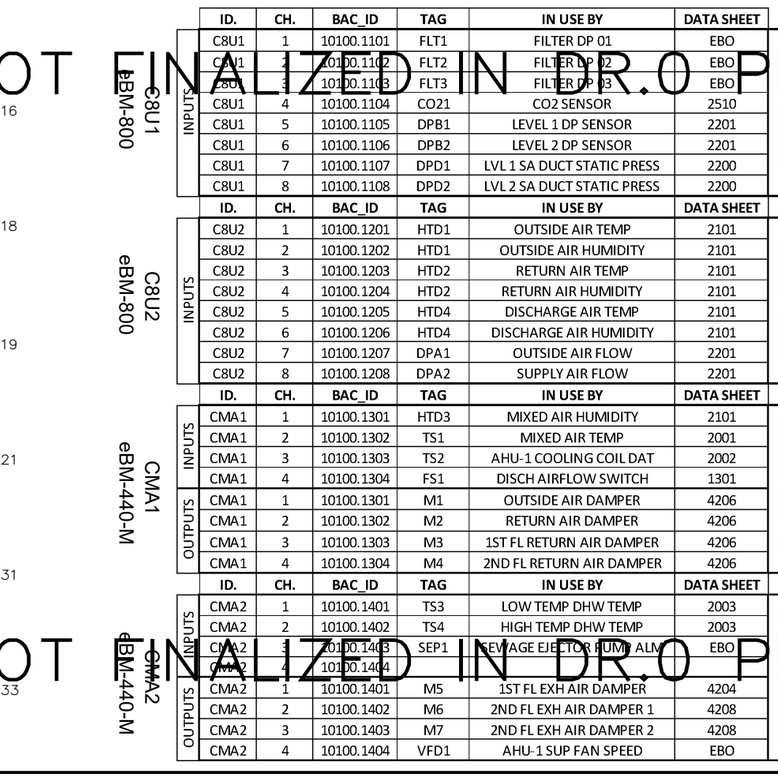
SHEET
NCHS-305
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!







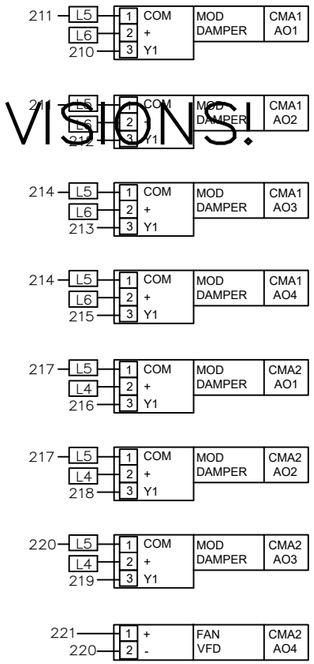
ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	C8U1 eBM-800 INPUTS
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	C8U2 eBM-800 INPUTS
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	CMA1 eBM-440-M INPUTS
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	CMA1 eBM-440-M OUTPUTS
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	CMA2 eBM-440-M INPUTS
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	
CMA2	4	10100.1404				
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	CMA2 eBM-440-M OUTPUTS
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!



Delta CONTROLS
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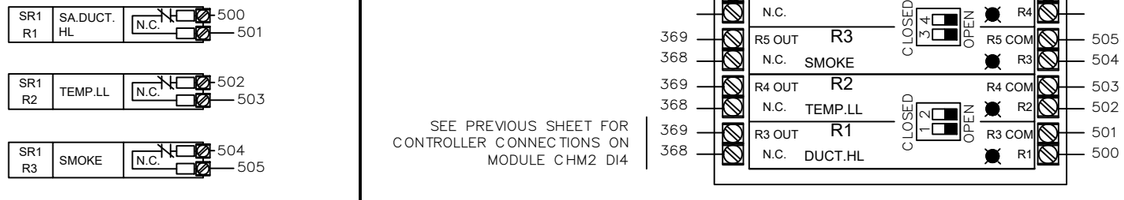

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC. ID.	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU–H2 SYSTEM 37 PANEL – I/O WIRING (2 OF 2)

Delta Controls
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SHEET
NCHS–307
JOB NUMBER:
J–2304001

SYSTEM 37 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

300
301

V1-
V1+

ETHERNET SWITCH

1 2 3 4 5

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4 NO
R3 COM R3 NO
R2 COM R2 NO
R1 COM R1 NO

CLOSED

CEC1

201
200

PWR

GND
24~

Delta
eBCON-2

eBUS
NET2

NET2 RS-485
[+] [-] SHD

LAN 1

MS/TP

I/O SHIELD DRAIN

TO PANEL GND LUG

L3

TX1

24V CB
24V CB

Power
Power

100
L2
L3

H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

24VAC
24VAC
75VA

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

L3
L2

PS1

1.0A
5.0A

101
100

G

PANEL GND LUG

TB1

L1
L2
L3

H
N

120 VAC

TB2

202
203
204
205

L4
L4
L4
L5
L5
L5
L6
L6
L6
L7
L7
L7

24 VAC TO FIELD

TB3

300
301

1
1
1
2
2
2

24 VDC TO FIELD

DPD1
DPB1
DPB2

1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2 3
4 5
6 7

7 6 5 4 3 2

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-H2 SYSTEM 37 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

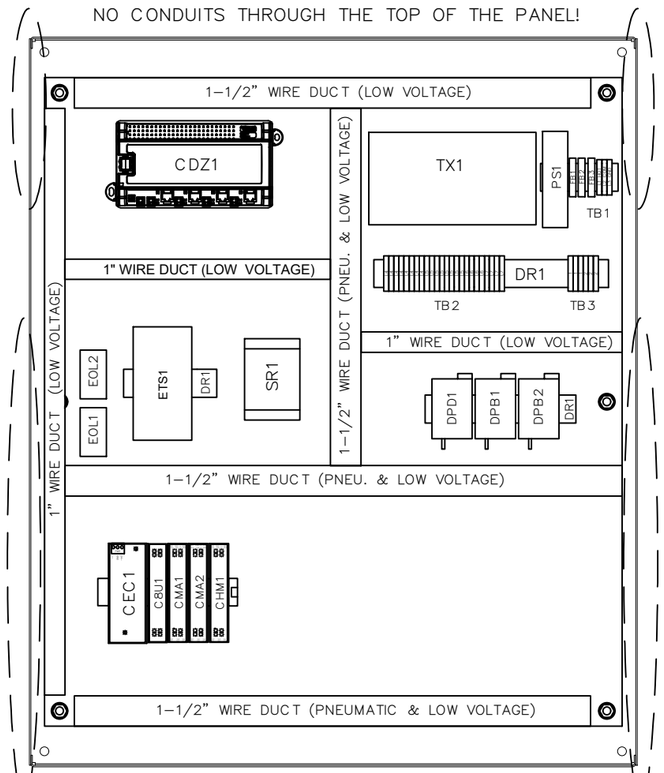
CONTRACT NO:

SHEET
NCHS-308
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 37 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

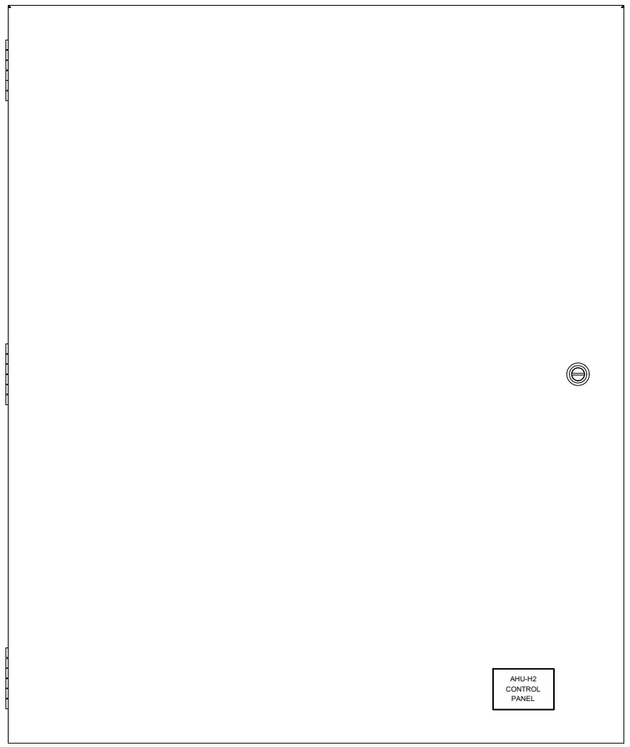


PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

BILL OF MATERIALS

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

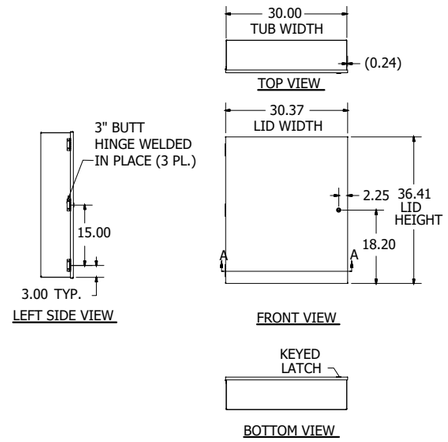


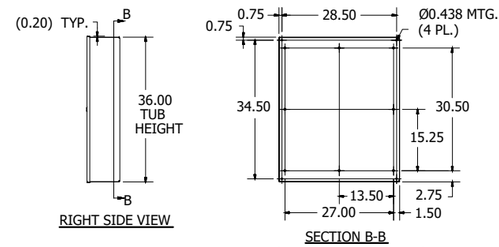
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

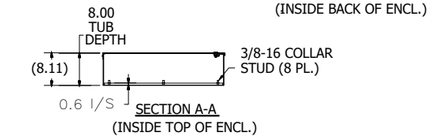
BILL OF MATERIALS

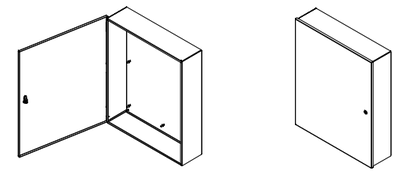
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

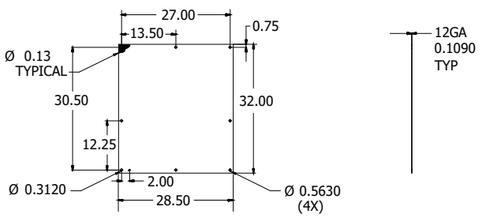








PANEL DIMENSIONS



E–AHU–H2 SYSTEM 37 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
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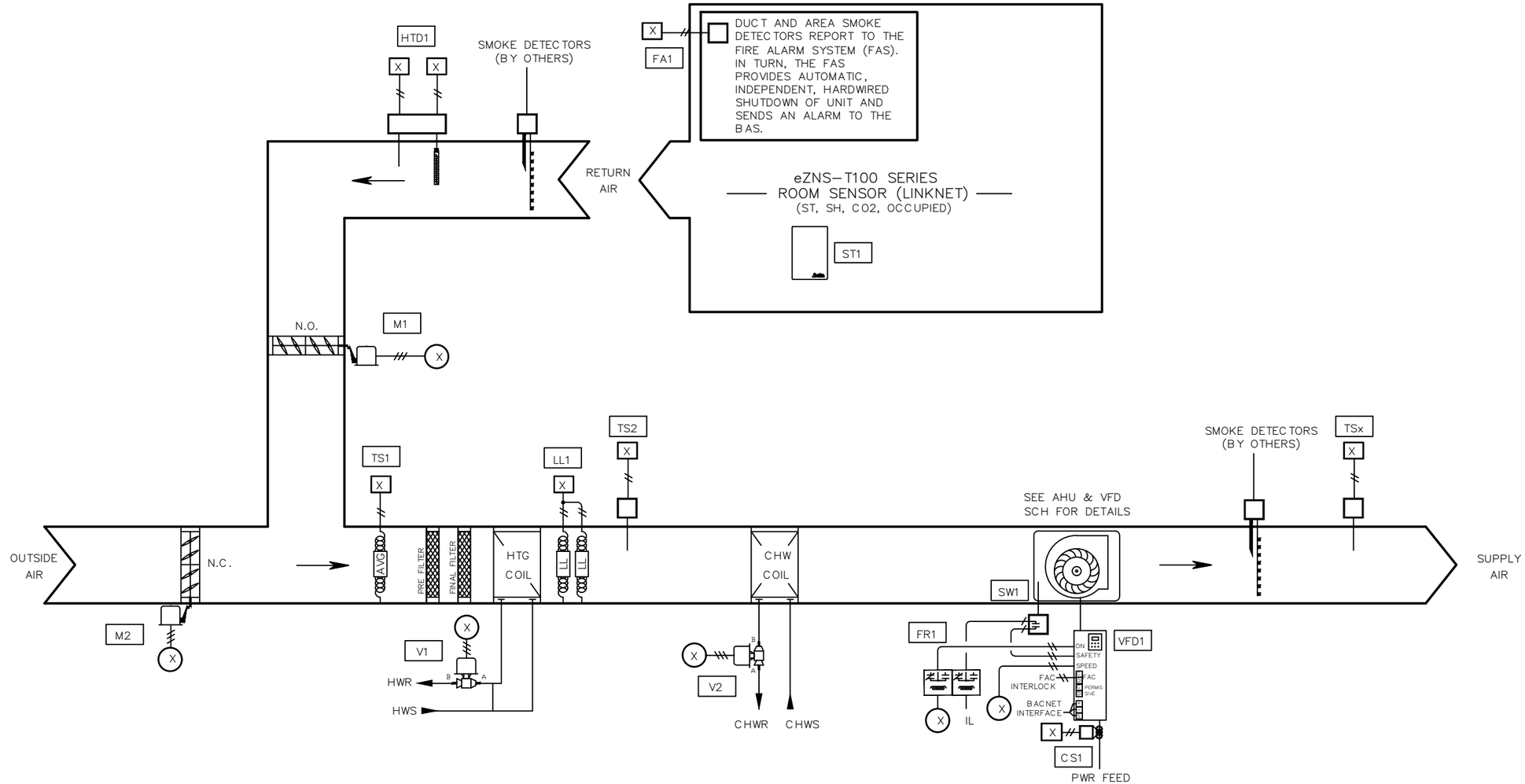
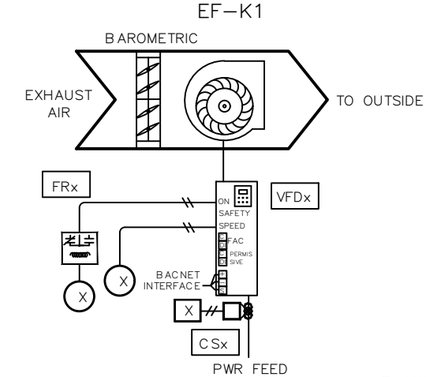
E–AHU–K1 FIELD DEVICES



EXHAUST FAN – BAS CONTROLLED
EF–K1



NETWORK POINTS
N1 THROUGH Nx

BILL OF MATERIAL

E–AHU–K1 & AREA K EXHAUST FIELD DEVICES

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Temperature Control Services
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
EF-K1 STAT	Exhaust Fan K1 Status		X			
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-K1 SS	Exhaust Fan K1 Fan Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**4**	**4**	**5**	**2**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-K1 & AREA K MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
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AIR HANDLING UNIT AHU-K1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

AHU-K1 SERVES THE EAST UPPER GYM

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZNn-CO2 FROM MAIN GYM SENSORS) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

Delta Controls
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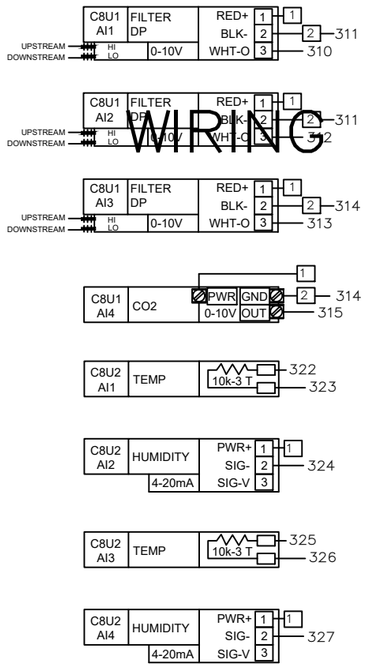
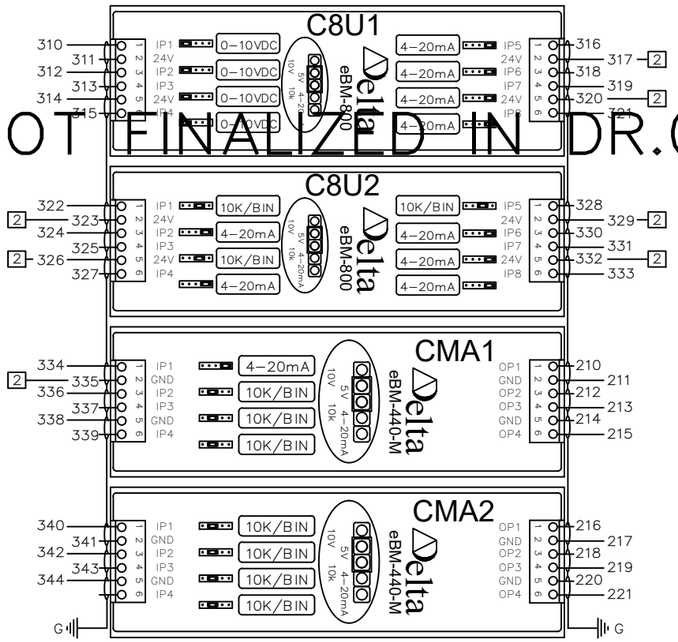
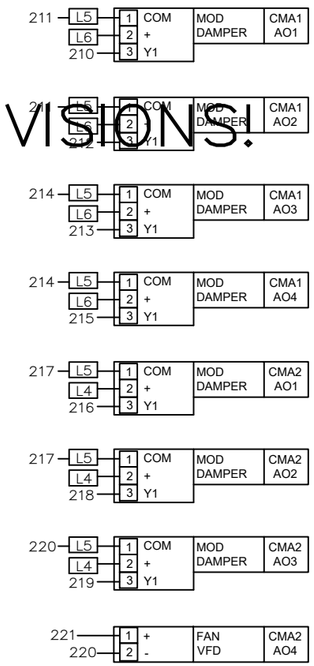
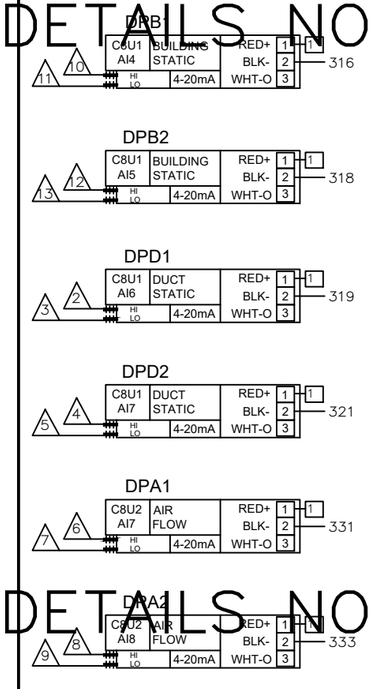
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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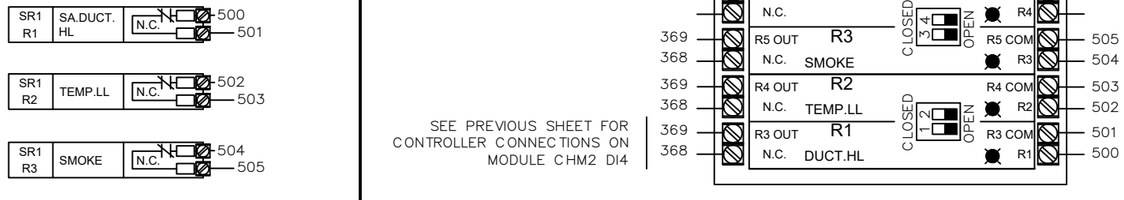

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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SYSTEM 38 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1

ETHERNET SWITCH

CAT5e

SR1 RIBMNLB-4

TX1

24V CB | 24V CB

Power | Power

120 VAC LAPTOP PWR

100 H C G L2 L3

75VA 24VAC 24VAC | 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L3 L2

PS1

102 1.0A 101 5.0A 100 G

TB1 L1 L2 L3 H N 120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1 NET PWR

24 VAC

LINKNET (RS-485)

CEB1 | C4X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800 | eBM-440-M | eBM-440-M | eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

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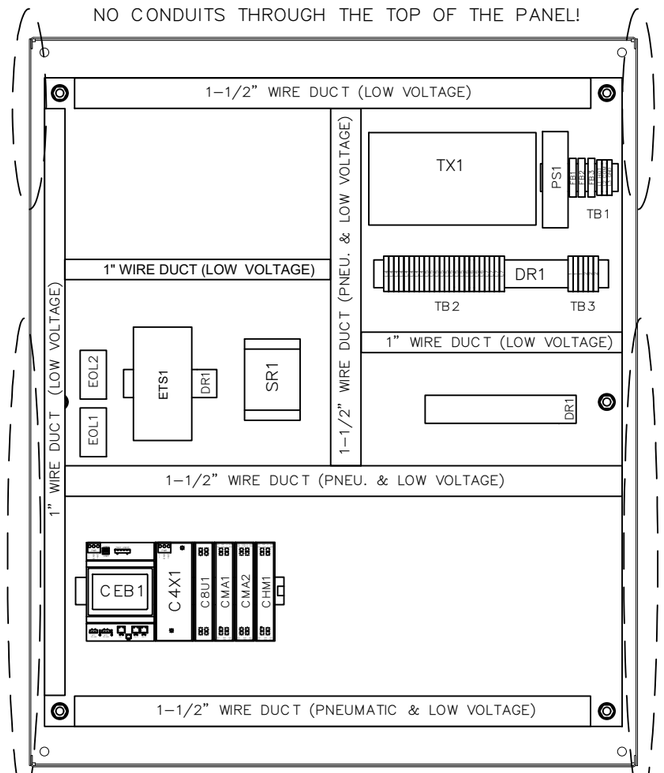
NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



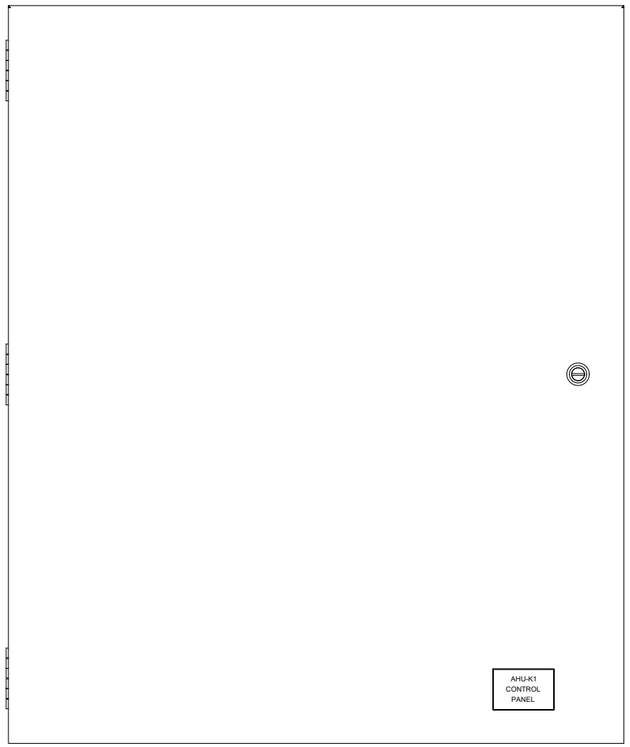
HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

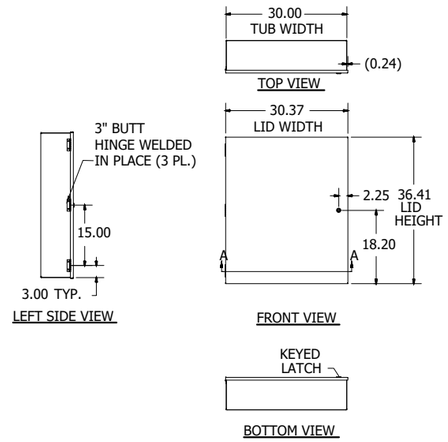
BILL OF MATERIALS

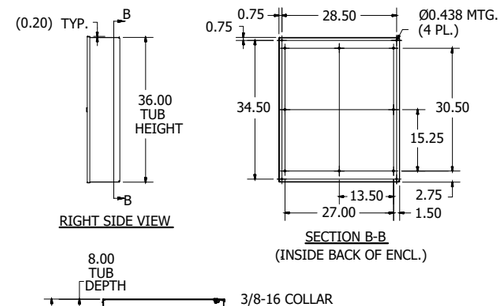


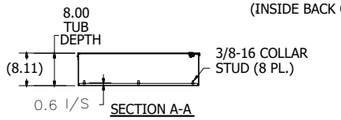
BILL OF MATERIALS

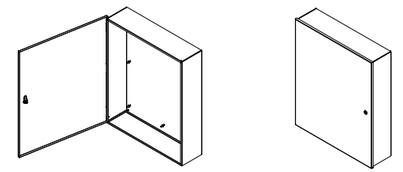
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

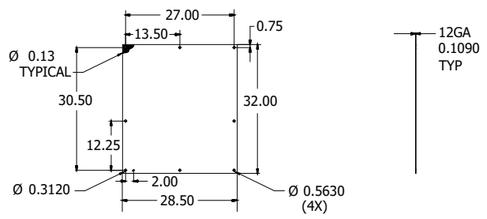








PANEL DIMENSIONS



E–AHU–K1 SYSTEM 38 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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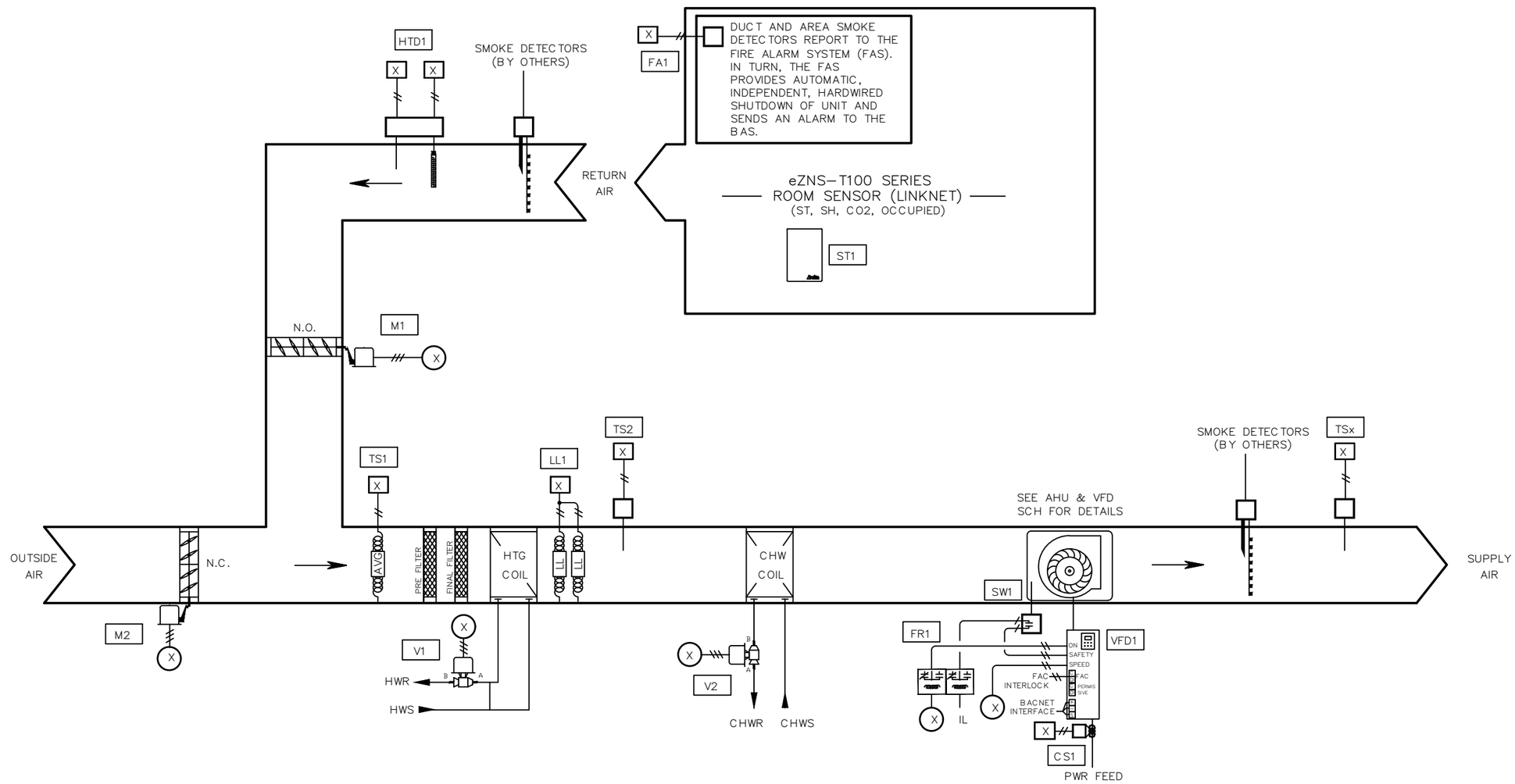
CONTRACT NO:

SHEET
NCHS–316
JOB NUMBER:
J–2304001

E–AHU–K2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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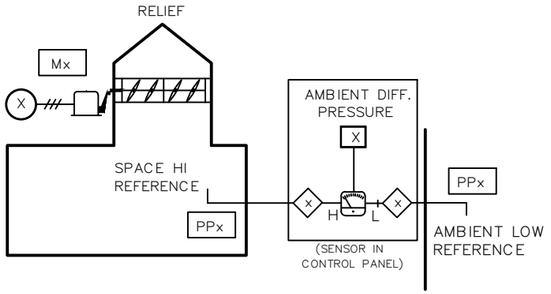
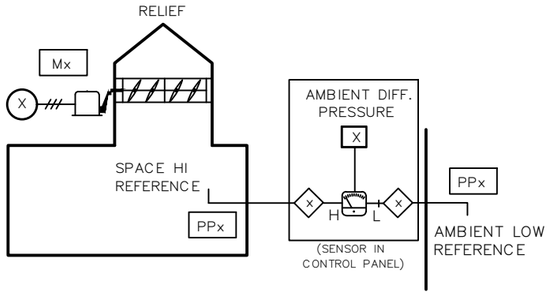
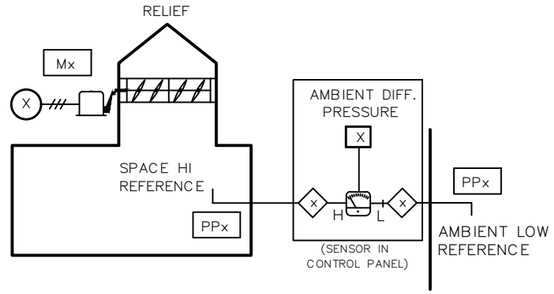
BUILDING PRESSURE CONTROL E–RH–K1



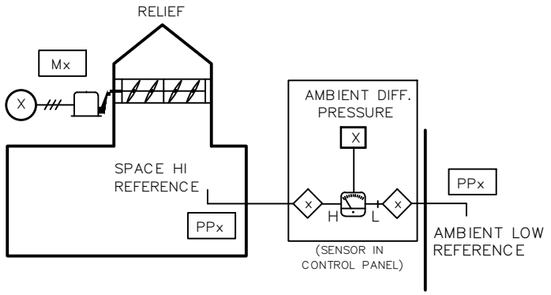
BUILDING PRESSURE CONTROL E–RH–K2



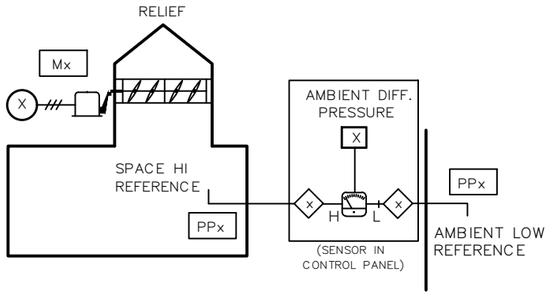
BUILDING PRESSURE CONTROL E–RH–K3



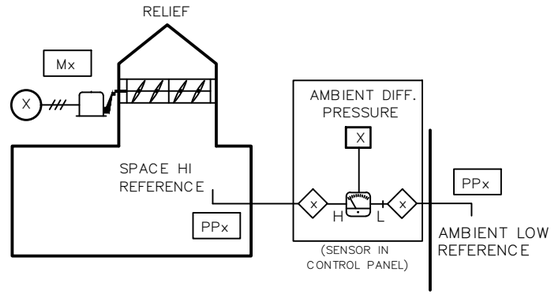
BUILDING PRESSURE CONTROL E–RH–K4



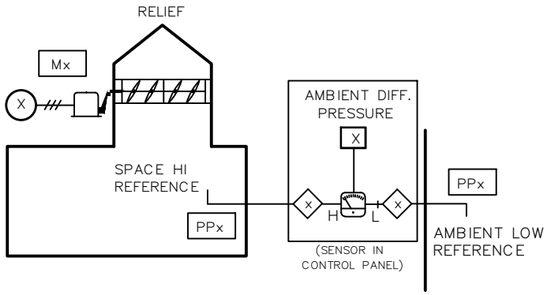
BUILDING PRESSURE CONTROL E–RH–K5



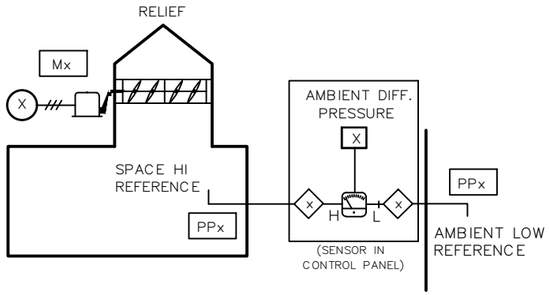
BUILDING PRESSURE CONTROL E–RH–K6



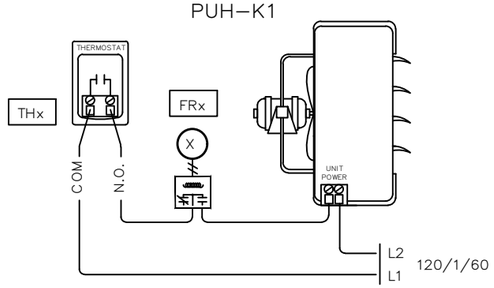
BUILDING PRESSURE CONTROL E–RH–K7



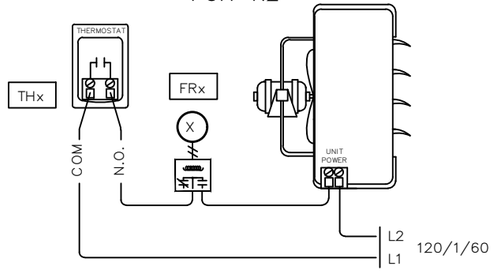
BUILDING PRESSURE CONTROL E–RH–K8



PROPELLER UNIT HEATER PUH–K1



PROPELLER UNIT HEATER PUH–K2



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA K RELIEF & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS–318
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J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPB5	Building Static Pressure 5	X				
DPB6	Building Static Pressure 6	X				
DPB7	Building Static Pressure 7	X				
DPB8	Building Static Pressure 8	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-K1 DPR	Relief Air Damper			X		
E-RH-K2 DPR	Relief Air Damper			X		
E-RH-K3 DPR	Relief Air Damper			X		
E-RH-K4 DPR	Relief Air Damper			X		
E-RH-K5 DPR	Relief Air Damper			X		
E-RH-K6 DPR	Relief Air Damper			X		
E-RH-K7 DPR	Relief Air Damper			X		
E-RH-K8 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
PUH-K1 EN	PUH K1 Enable				X	
PUH-K2 EN	PUH K2 Enable				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**13**	**3**	**13**	**3**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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AIR HANDLING UNIT AHU-K2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

LEAD ROTATION: AHU-K2 (EAST), AHU-K3 (CENTER), AND AHU-K4 (WEST) SERVE THE MAIN GYM AND SHALL ROTATE LEAD WEEKLY. DURING OCCUPANCY, ONLY THE LEAD AIR HANDLING UNITS SHALL OPERATE UNLESS ADDITIONAL CAPACITY IS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT. ALL THREE AIR HANDLING UNITS SHALL BE ALLOWED TO OPERATE IF SPACE TEMPERATURE DEVIATES MORE THAN 1F (ADJ) FROM SETPOINT. LAG AIR HANDLING UNITS SHALL OPERATE ONLY WHEN REQUIRED AND TURN OFF OTHERWISE.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, IF IN LEAD, OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFKn-C, EXCEPT EF-K1 AND EF-K2 SERVING AHU-K6) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: WHEN ANY GYM AIR HANDLING UNIT (AHU-K1 TO AHU-K5) AND UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD DAMPERS (E-RH-K1 TO E-RH-K8) SHALL START AND MODULATE IN SEQUENCE, ONE AFTER ANOTHER, TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPERS SHALL CLOSE WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSOR) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE (WHEN ALL GYM AIR HANDLING UNITS (AHU-K1 TO AHU-K5) ARE NOT OPERATIONAL)
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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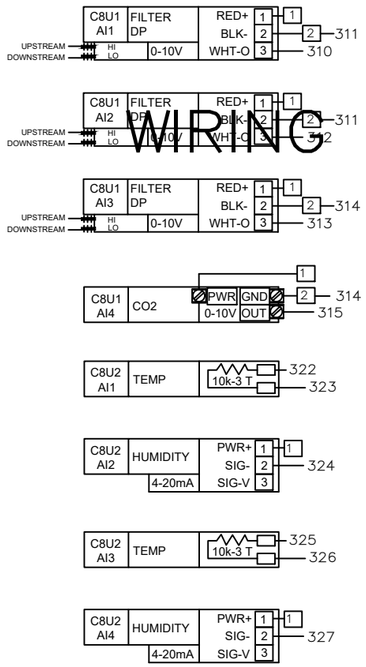
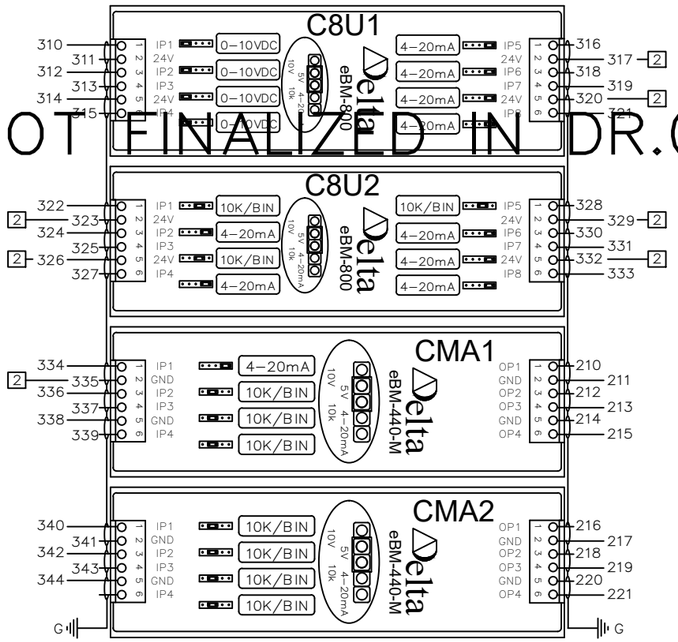
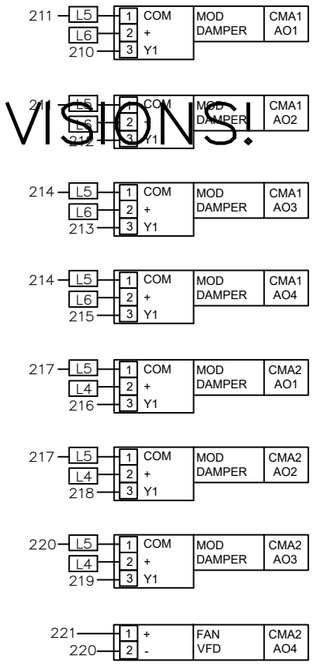
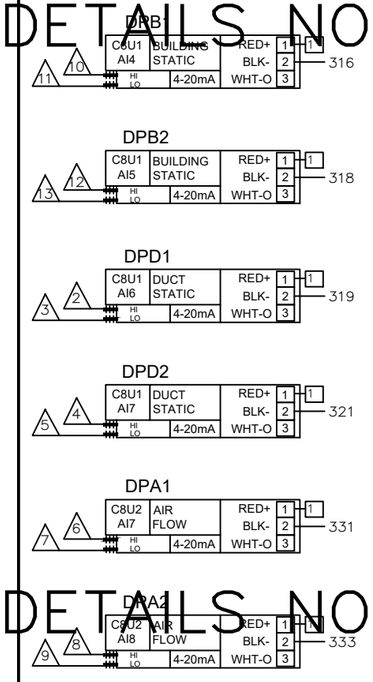
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-321
JOB NUMBER:
J-2304001

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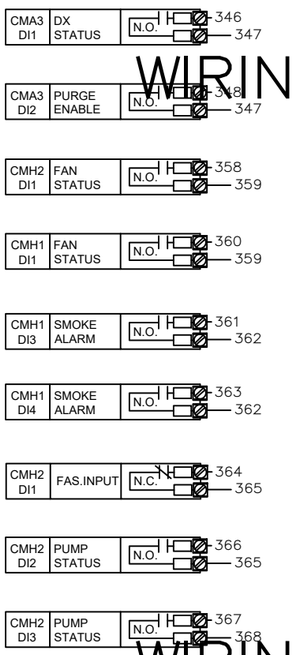
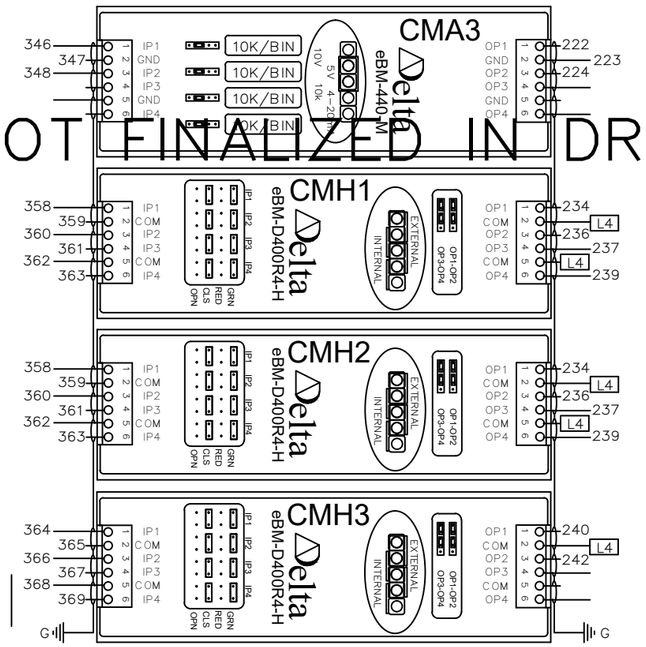
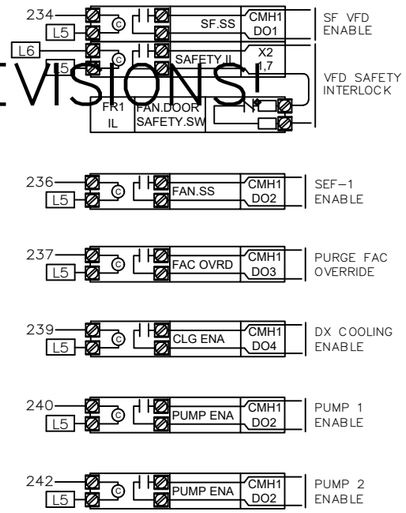




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



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CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806
	CMA3	3	10100.1503			
	CMA3	4	10100.1504			
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO
	CMA3	3	10100.1503			
	CMA3	4	10100.1504			

eBM-440-M I/O MODULE — CMA3 eBM-440-M

CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA4	1	10100.1601			
	CMA4	2	11500.1602			
	CMA4	3	10100.1603			
	CMA4	4	10100.1604			
OUTPUTS	CMA4	1	10100.1601			
	CMA4	2	11500.1602			
	CMA4	3	10100.1603			
	CMA4	4	10100.1604			

eBM-440-M I/O MODULE — CMA4 eBM-440-M

CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001

eBM-D400R4-H I/O MOD — CMH1 eBM-D400R-H

CMH2 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400
	CMH2	4	10100.1804	HL1	DUCT HIGH PRESSURE LIMIT	1200
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001
	CMH2	3	10100.1803			
	CMH2	4	10100.1804			

eBM-D400R4-H I/O MOD — CMH2 eBM-D400R-H

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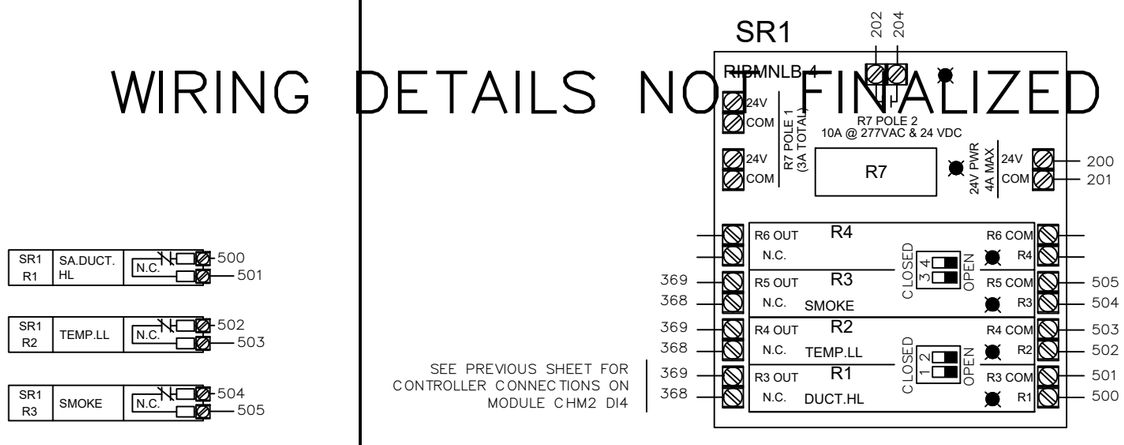

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

E-AHU-K2 SYSTEM 39 PANEL - I/O WIRING (3 OF 3)

Delta Controls
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NCHS-323
JOB NUMBER:
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SYSTEM 39 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1

ETHERNET SWITCH

CAT5e

TRANSFORMER

102 L2

206 207

TX1

24V CB

Power

120 VAC LAPTOP PWR

75VA

CONTROLLER PWR

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
−V
GND
L
N

PS1

4.0A
1.0A
5.0A

PANEL GND LUG

TB1

120 VAC

TB2

24 VAC TO FIELD

TB3

24 VDC TO FIELD

SR1

RIBMNLB-4

R7 POLE 2 10A @ 277VAC & 24 VDC

R4 R3 R2 R1

DPB1 DPB2 DPB3 DPB4 DPB5 DPB6 DPB7 DPB8

HIGH LOW

PNEUMATIC

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1

NET
PWR

24 VAC

LINKNET (RS-485)

CEB1

C8X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-K2 SYSTEM 39 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

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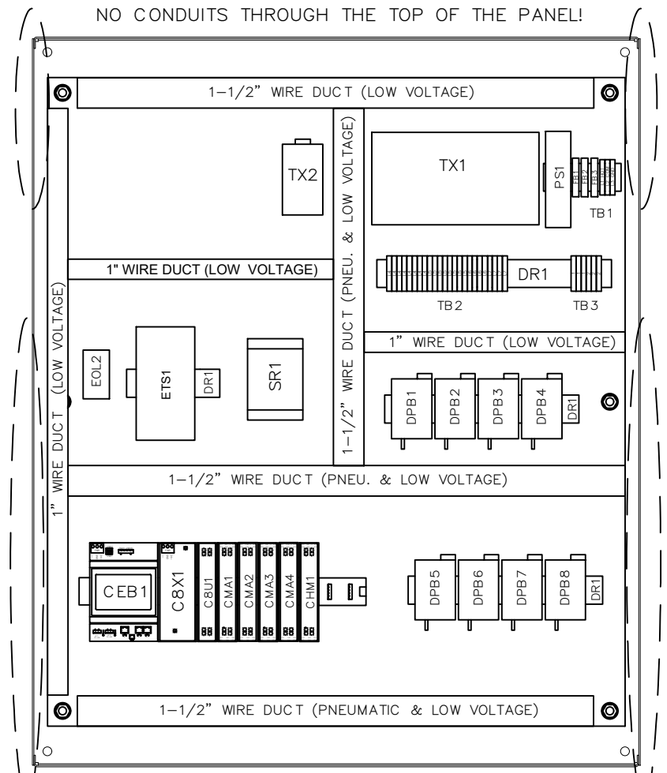
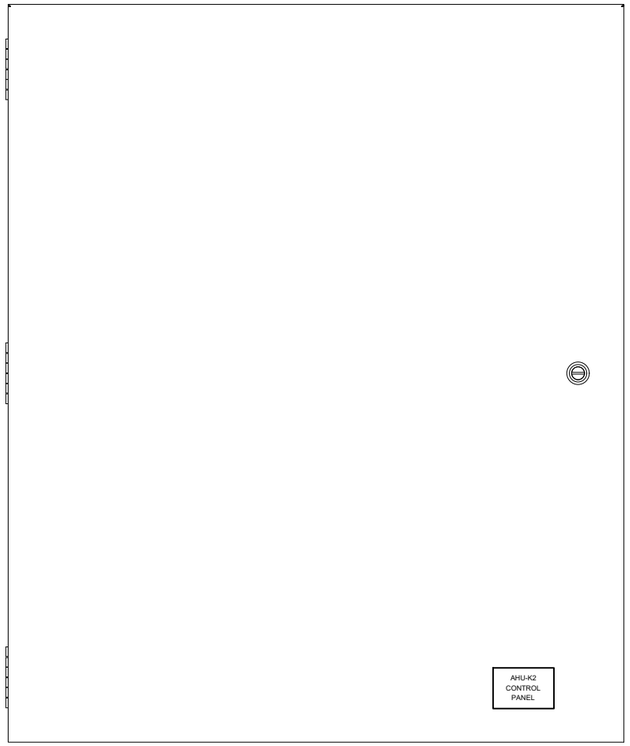
SYSTEM CONTROL PANEL 39 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

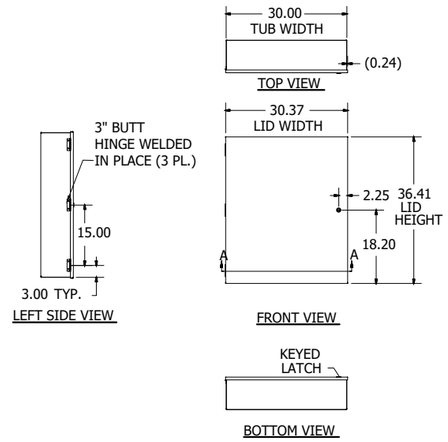
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

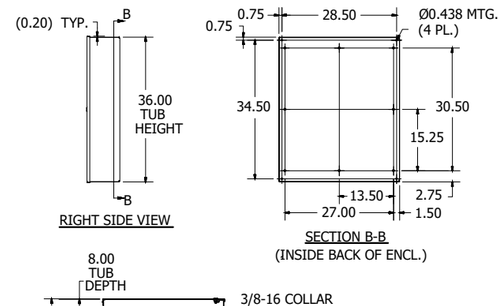
BILL OF MATERIALS

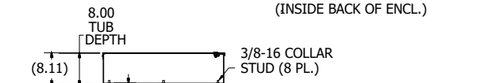
BILL OF MATERIALS

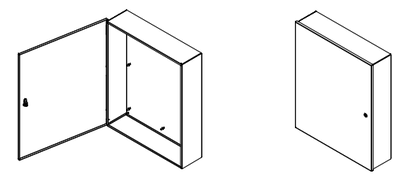
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

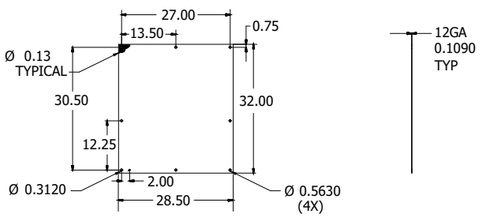








PANEL DIMENSIONS



E–AHU–K2 SYSTEM 39 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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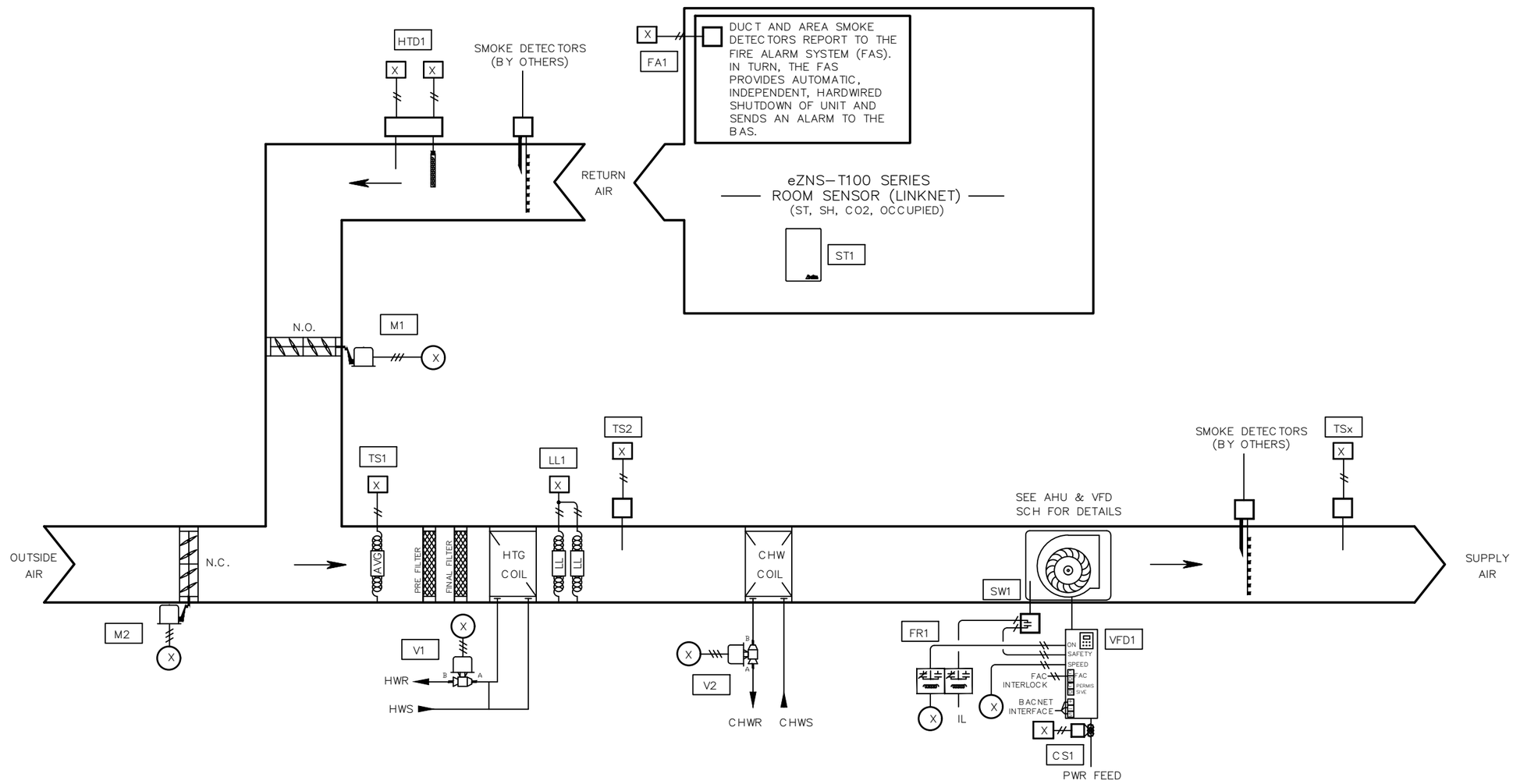
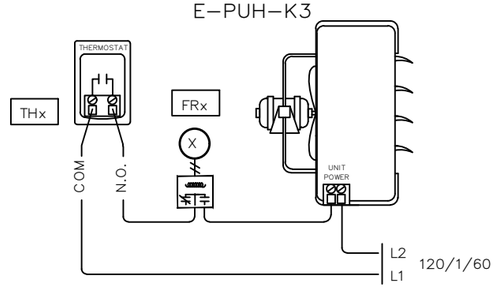
E–AHU–K3 FIELD DEVICES



PROPELLER UNIT HEATER
E–PUH–K3



NETWORK POINTS
N1 THROUGH Nx

BILL OF MATERIAL

E–AHU–K3 & AREA K PUH FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
E-PUH-K3 EN	PUH K3 Enable				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**4**	**3**	**5**	**2**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-K3 & AREA K MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
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AIR HANDLING UNIT AHU-K3 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

LEAD ROTATION: AHU-K2 (EAST), AHU-K3 (CENTER), AND AHU-K4 (WEST) SERVE THE MAIN GYM AND SHALL ROTATE LEAD WEEKLY. DURING OCCUPANCY, ONLY THE LEAD AIR HANDLING UNITS SHALL OPERATE UNLESS ADDITIONAL CAPACITY IS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT. ALL THREE AIR HANDLING UNITS SHALL BE ALLOWED TO OPERATE IF SPACE TEMPERATURE DEVIATES MORE THAN 1F (ADJ) FROM SETPOINT. LAG AIR HANDLING UNITS SHALL OPERATE ONLY WHEN REQUIRED AND TURN OFF OTHERWISE.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, IF IN LEAD, OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSOR) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE (WHEN ALL GYM AIR HANDLING UNITS (AHU-K1 TO AHU-K5) ARE NOT OPERATIONAL)
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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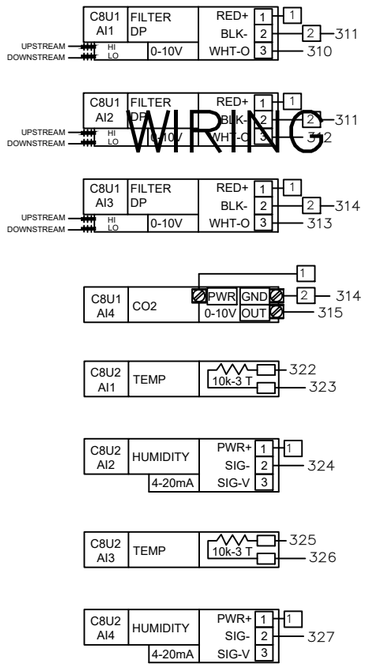

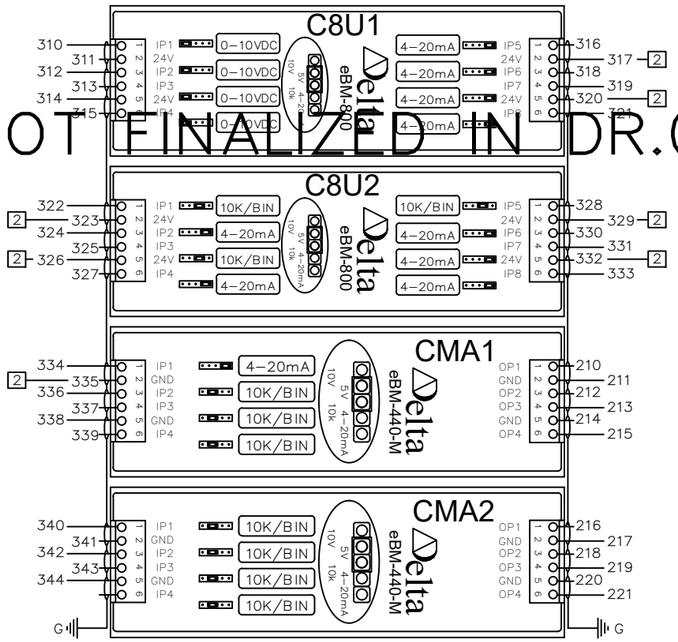

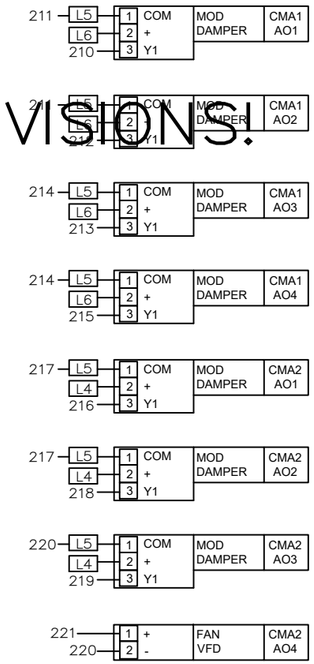

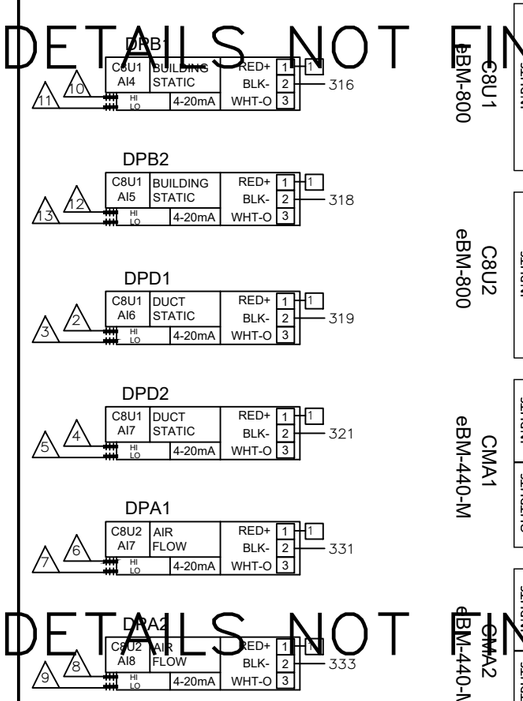

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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JOB TITLE: North Central High School
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NCHS-329
JOB NUMBER:
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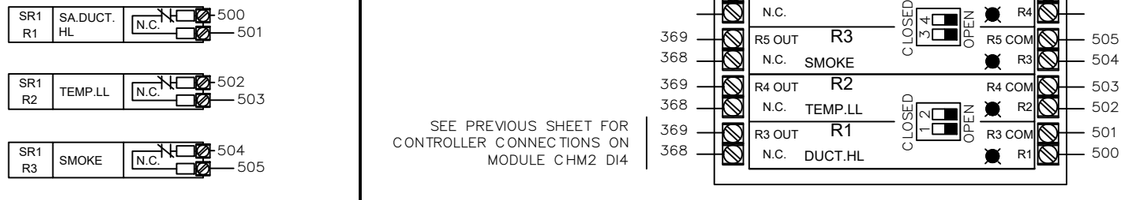

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

Delta Controls

Temperature Control Services
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SYSTEM 40 CONTROL PANEL

PANEL _____

CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

CAT-6a

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

EOL2

GND

ETS1

300

301

L3

V1-

V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202

204

200

201

24V COM

24V POWER 4A MAX

R7 POLE 2 10A @ 277VAC & 24 VDC

R7

R4 OUT N.C.

R4 COM

R4 NO

R4

R3 OUT N.C.

R3 COM

R3 NO

R3

CLOSED

R2 OUT N.C.

R2 COM

R2 NO

R2

R1 OUT N.C.

R1 COM

R1 NO

R1

TX1

24V CB

Power

100

H

C

G

L2

L3

75VA

24VAC

120 VAC LAPTOP PWR

200

201

202

203

CONTROLLER PWR

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V

-V

GND

L

N

300

301

101

L2

L3

PS1

TB1

1.0A

5.0A

101

100

G

L1

L2

L3

H

N

120 VAC

PANEL GND LUG

TB2

202

203

204

205

L4

L5

L6

L7

24 VAC TO FIELD

TB3

300

301

1

2

24 VDC TO FIELD

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1

NET

PWR

24 VAC

LINKNET (RS-485)

201

200

CEB1

PWR

GND

24~

USB2

USB1

(NOT USED)

NET1 RS-485

NET2 RS-485

LAN 1

LAN 2

eBMGR-2

C4X1

eBX

eBUS Address

eBUS

eBM-440-M

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-K3 SYSTEM 40 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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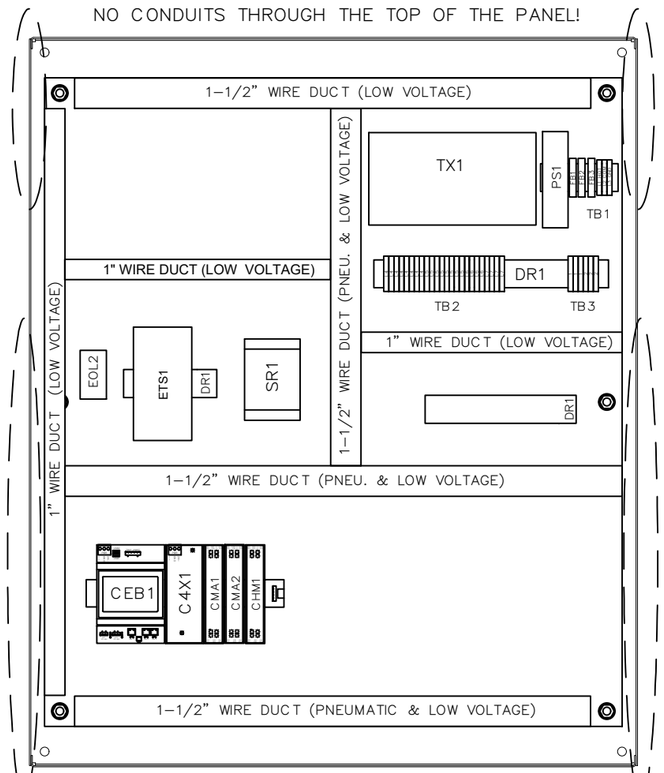
NCHS-331
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 40 LAYOUT

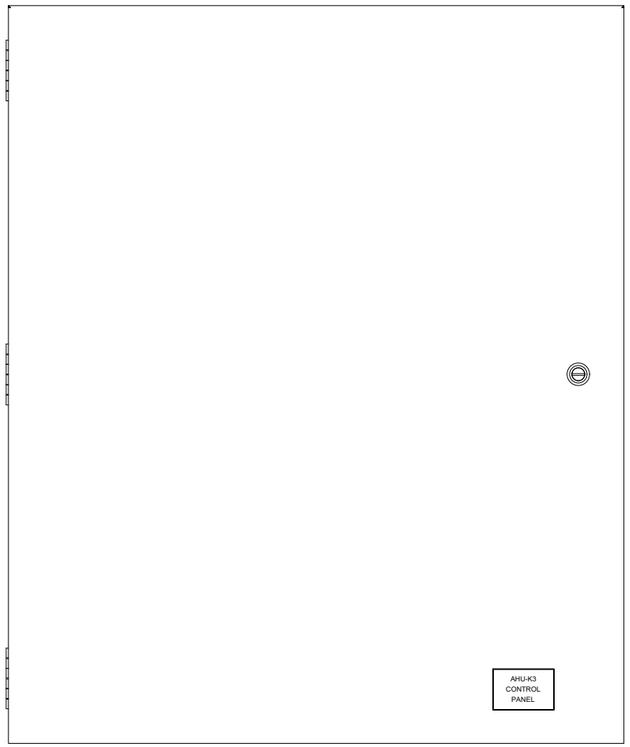
NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

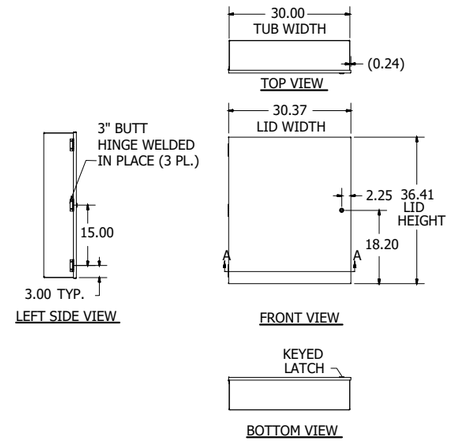
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

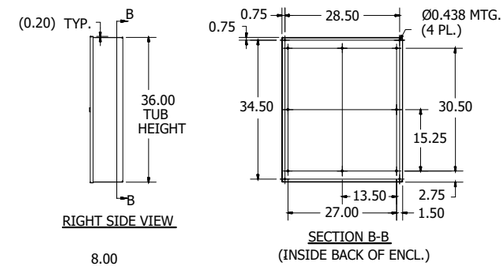
BILL OF MATERIALS

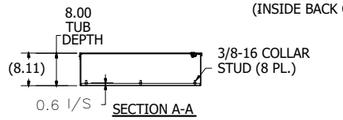
BILL OF MATERIALS

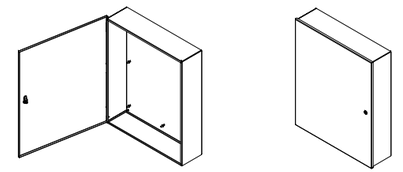
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

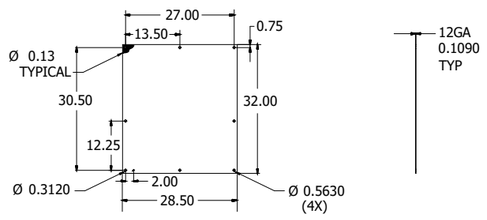








PANEL DIMENSIONS



E–AHU–K3 SYSTEM 40 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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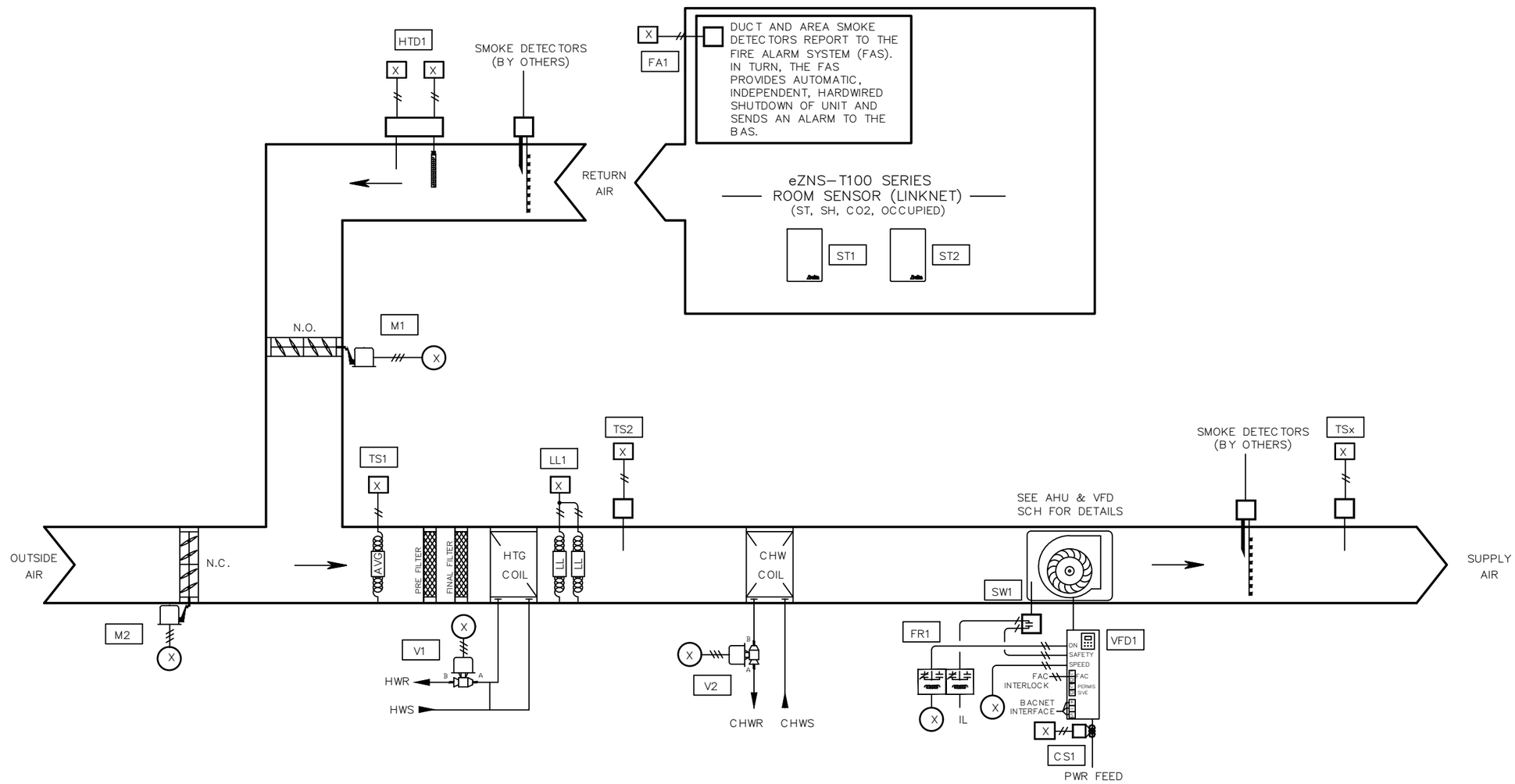
E–AHU–K4 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS–333
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
ST2	Space Temp					X
SH3	Space Humidity					X
S CO22	Space CO2					X
OCC2	Occupied Flag					X
	POINT TOTALS:	**4**	**3**	**5**	**1**	**8**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-K4 POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS-334
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-K4 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

LEAD ROTATION: AHU-K2 (EAST), AHU-K3 (CENTER), AND AHU-K4 (WEST) SERVE THE MAIN GYM AND SHALL ROTATE LEAD WEEKLY. DURING OCCUPANCY, ONLY THE LEAD AIR HANDLING UNITS SHALL OPERATE UNLESS ADDITIONAL CAPACITY IS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT. ALL THREE AIR HANDLING UNITS SHALL BE ALLOWED TO OPERATE IF SPACE TEMPERATURE DEVIATES MORE THAN 1F (ADJ) FROM SETPOINT. LAG AIR HANDLING UNITS SHALL OPERATE ONLY WHEN REQUIRED AND TURN OFF OTHERWISE.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE, IF IN LEAD, OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZN-CO2 FROM MAIN GYM SENSOR) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE (WHEN ALL GYM AIR HANDLING UNITS (AHU-K1 TO AHU-K5) ARE NOT OPERATIONAL)
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

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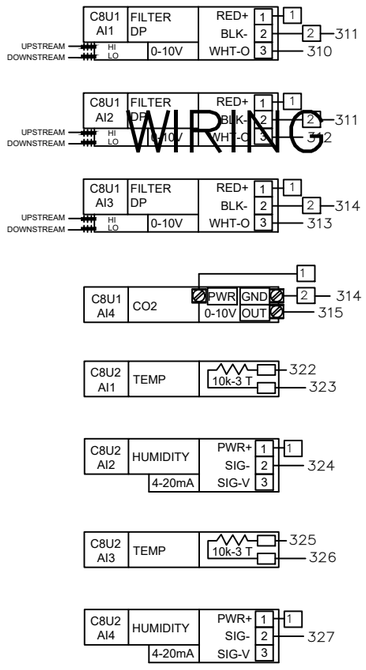
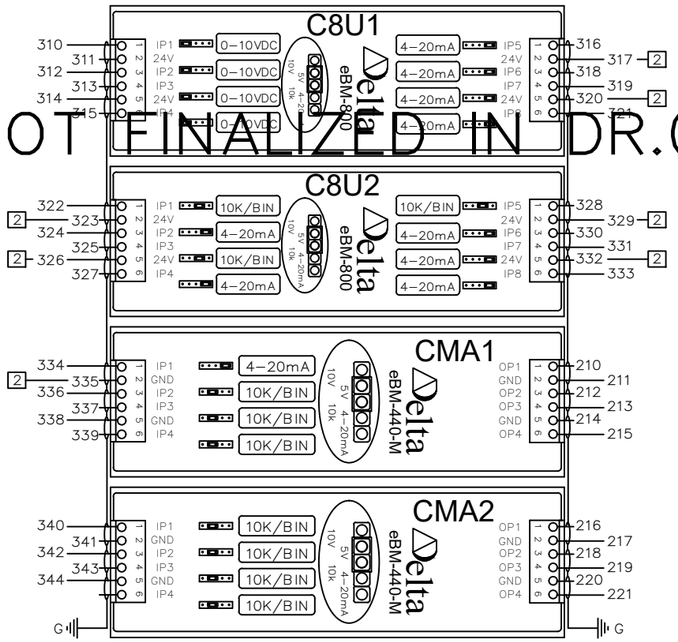
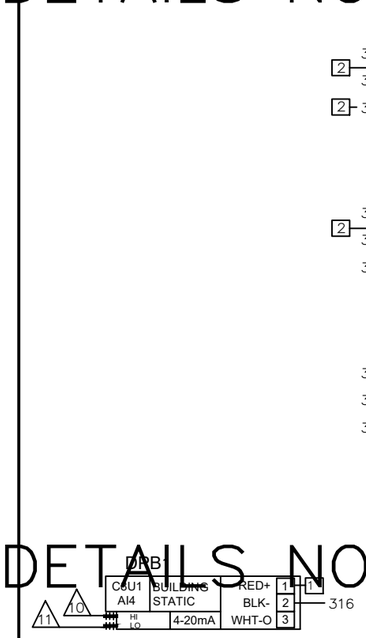
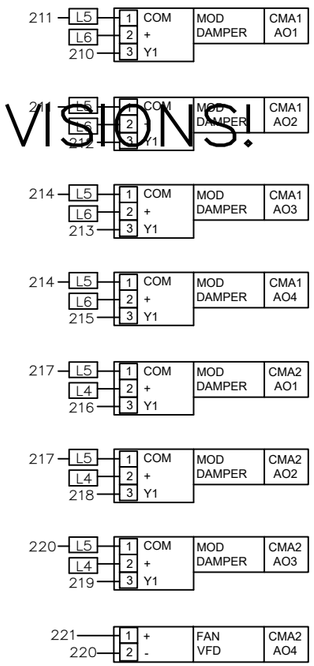
NCHS-335
JOB NUMBER:
J-2304001

SYSTEM 41 CONTROL PANEL









WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

E-AHU-K4 SYSTEM 41 PANEL – I/O WIRING (1 OF 2)

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-336
JOB NUMBER:
J-2304001

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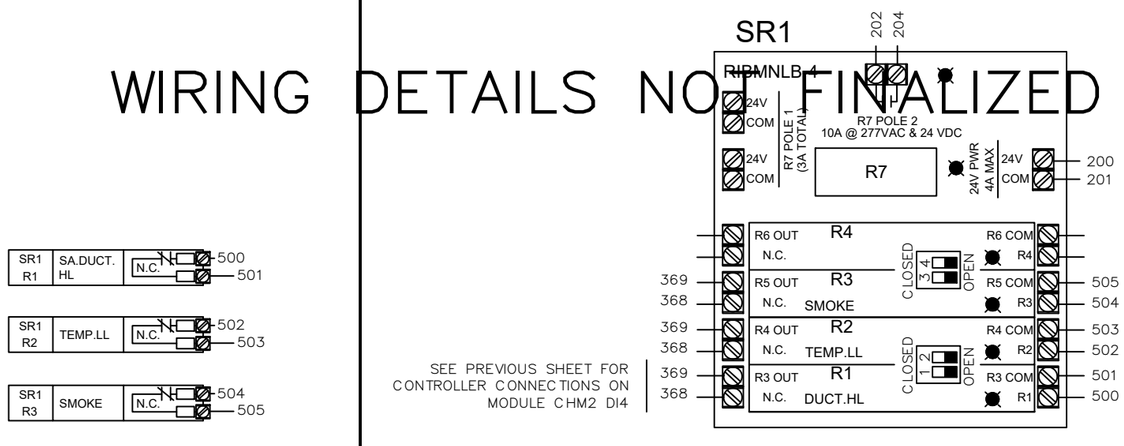

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU-K4 SYSTEM 41 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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CONTRACT NO:

SHEET
NCHS-337
JOB NUMBER:
J-2304001

SYSTEM 41 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1

ETHERNET SWITCH

CAT5e

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

SR1

RIBMNLB-4

TX1

24V CB

Power

120 VAC LAPTOP PWR

CONTROLLER PWR

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

PS1

TB1

1.0A

5.0A

PANEL GND LUG

120 VAC

TB2

TB3

24 VAC TO FIELD

24 VDC TO FIELD

EOL 4

ST1

ST2

NET

PWR

24 VAC

LINKNET (RS-485)

CEB1

C4X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

EOL3

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-K4 SYSTEM 41 PANEL - POWER & NETWORK WIRING

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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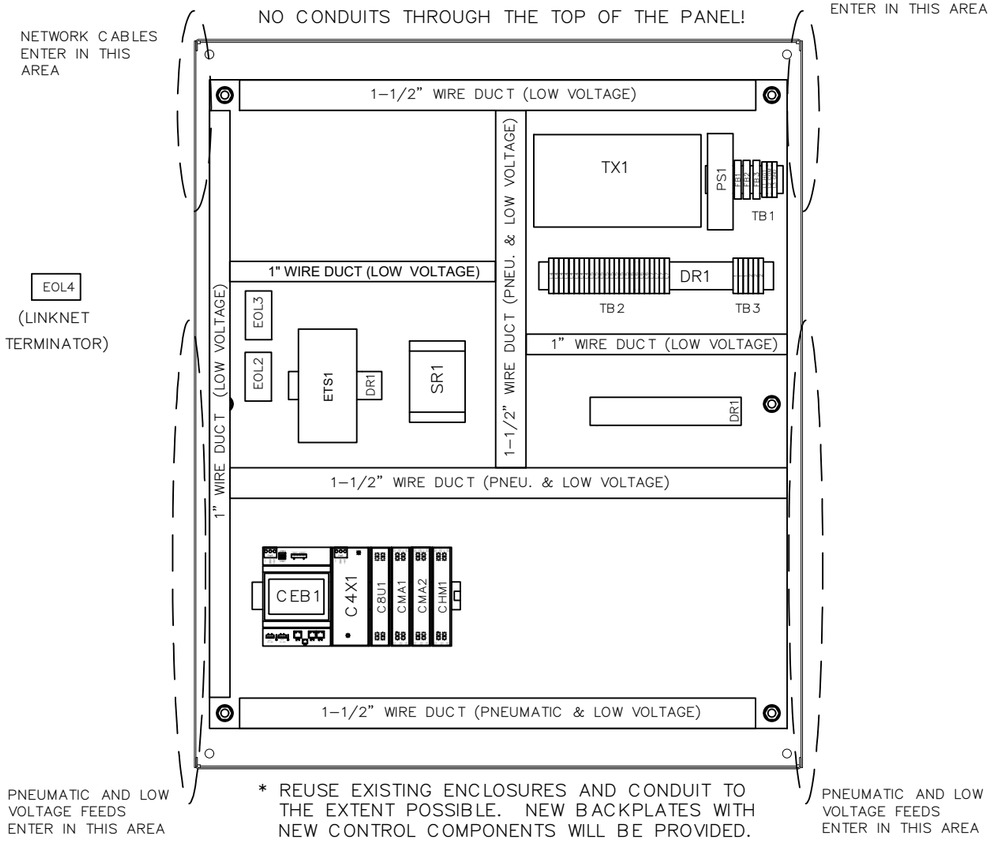
SHEET
NCHS-338
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 41 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

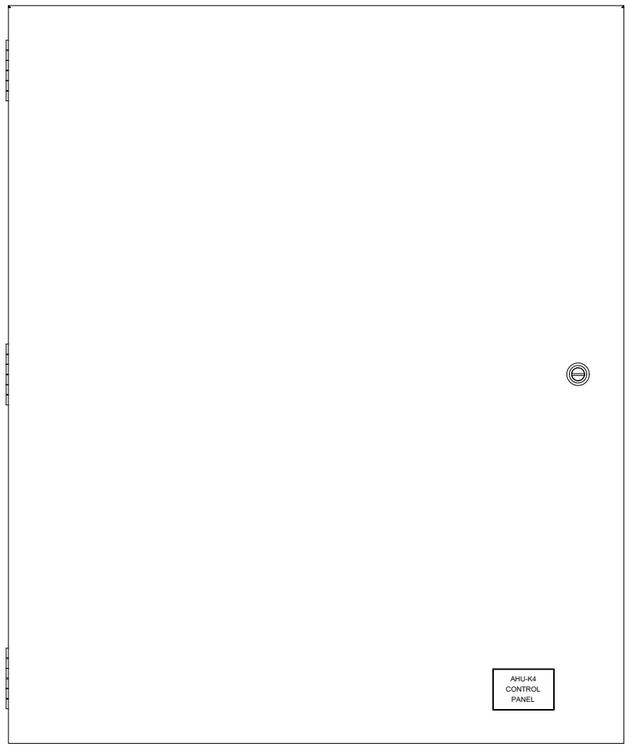


EOL4
(LINKNET TERMINATOR)

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

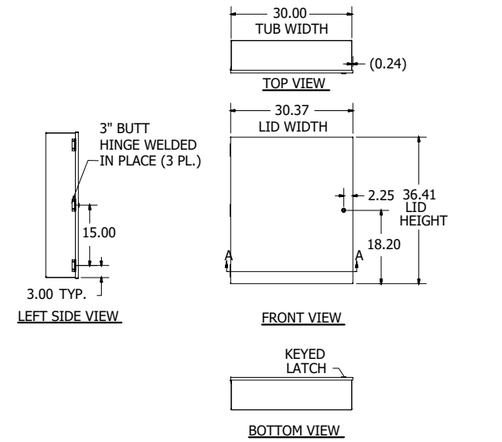


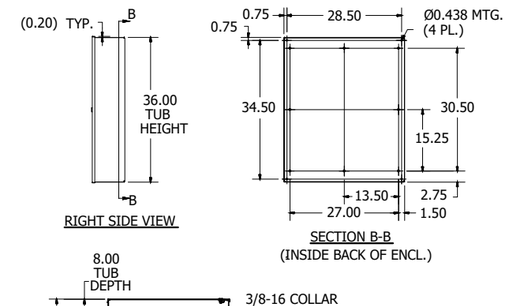
BILL OF MATERIALS

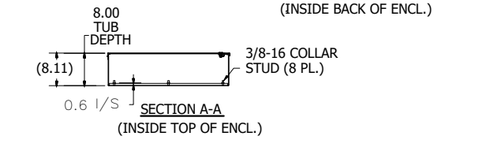
BILL OF MATERIALS

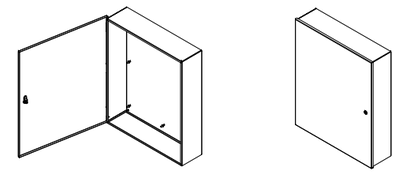
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

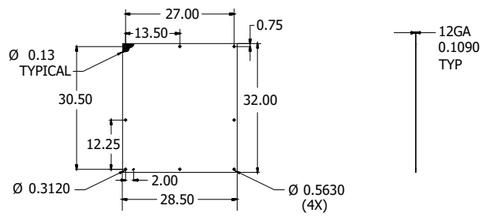








PANEL DIMENSIONS



Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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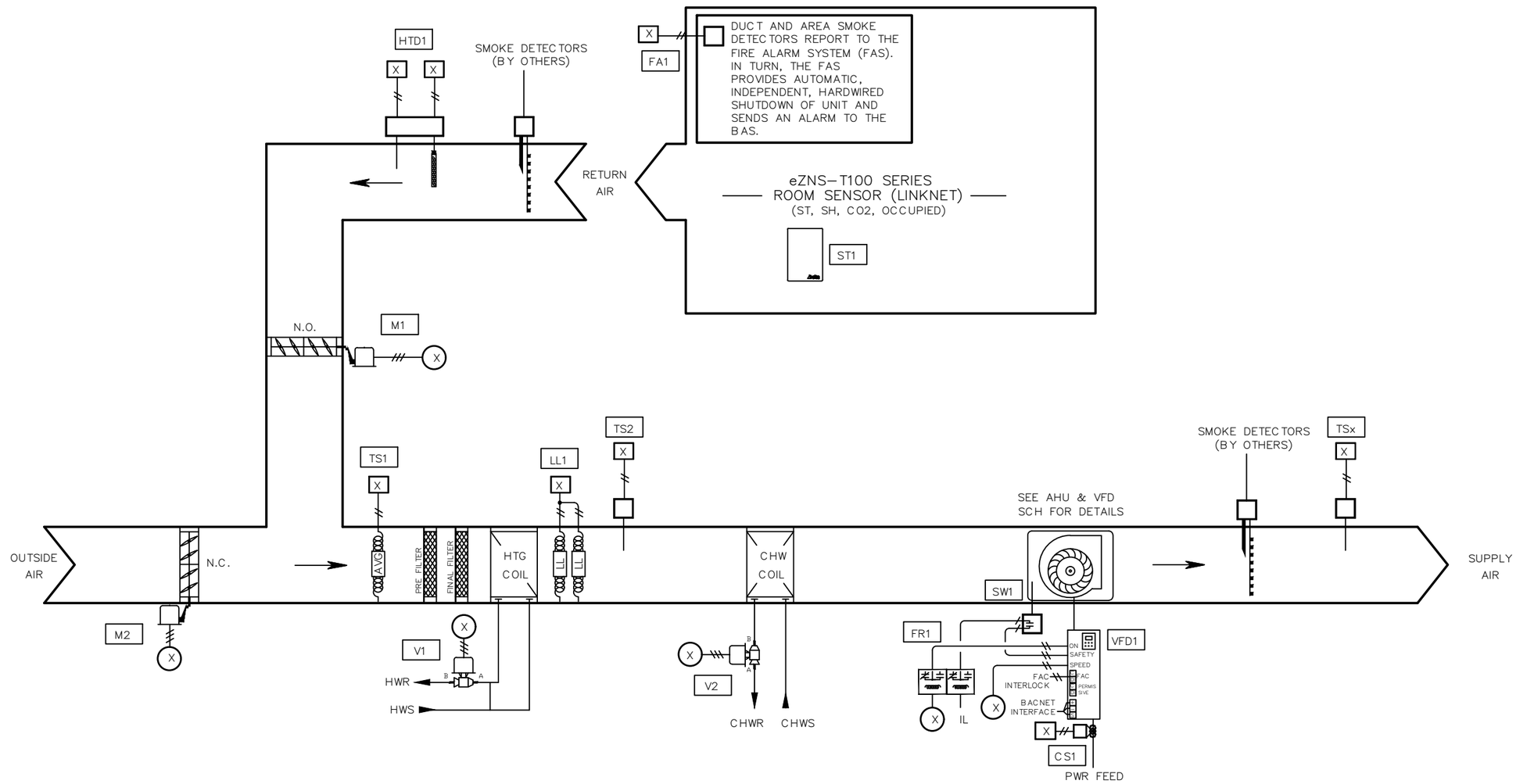
SHEET
NCHS–339
JOB NUMBER:
J–2304001

E-AHU-K5 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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SHEET
NCHS-340
JOB NUMBER:
J-2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
MAT	Mixed Air Temperature	X				
PHT	Preheat Discharge Air Temp	X				
RAT	Return Air Temperature	X				
LL	Low Limit (Freezestat)		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**4**	**3**	**5**	**1**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-K5 POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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SHEET
NCHS-341
JOB NUMBER:
J-2304001

AIR HANDLING UNIT AHU-K5 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

AHU-K5 SERVES THE WEST UPPER GYM

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR AS MANUALLY SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FAN SPEED SHALL BE MODULATED FROM MINIMUM SPEED OF 25% TO MAXIMUM SPEED OF 100 %. THE MAXIMUM SPEED SHALL BE DETERMINED BY THE BALANCER TO ACHIEVE THE SCHEDULED AIRFLOW REQUIRED. MINIMUM AND MAXIMUM FAN SPEEDS TO BE ADJUSTABLE.

OCCUPIED MODE: DISCHARGE AIR SETPOINT SHALL BE RESET FROM 55 F TO 95 F TO MAINTAIN ROOM TEMPERATURE AT SETPOINT OF 72 F (ADJ). PREHEAT AND COOLING COIL CONTROL VALVES SHALL MODULATE IN SEQUENCE TO MAINTAIN DISCHARGE AIR SETPOINT. ON A CALL FOR ADDITIONAL COOLING THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. ON A CALL FOR ADDITIONAL HEATING, THE SUPPLY FAN SHALL MODULATE FROM MINIMUM SPEED TO MAXIMUM SPEED TO SATISFY ROOM TEMPERATURE. THE PREHEAT AIR TEMPERATURE SENSOR (PH-T) SHALL BE UTILIZED IN LOGIC TO MAINTAIN A MINIMUM PREHEAT AIR TEMPERATURE OF 50F AT ALL TIMES BY MODULATE THE PREHEAT VALVE AS NECESSARY.

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE ZONE AIR ENTHALPY (ZN-T, ZN-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT.

ZONE CARBON DIOXIDE CONTROL: WHEN THE MAXIMUM ZONE CARBON DIOXIDE LEVEL (ZNn-CO2 FROM MAIN GYM SENSORS) EXCEEDS THE SETPOINT OF 1000PPM (ADJ), THE MIXED AIR DAMPERS SHALL MODULATE FROM MINIMUM POSITION TO BRING IN ADDITIONAL OUTSIDE AIR SUBJECT TO A MIXED AIR TEMPERATURE (MA-T) LOW LIMIT AND HIGH LIMIT EQUAL TO ENTERING AIR TEMPERATURES NOTED ON THE MECHANICAL SCHEDULE. LOW LIMIT SHALL BE EQUAL TO THE ENTERING AIR TEMPERATURE FOR THE PREHEAT COIL AND THE HIGH LIMIT SHALL BE THE ENTERING AIR TEMPERATURE FOR THE COOLING COIL.

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FANS TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

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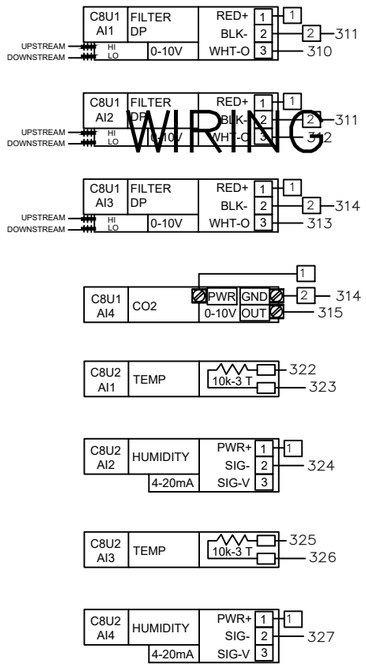

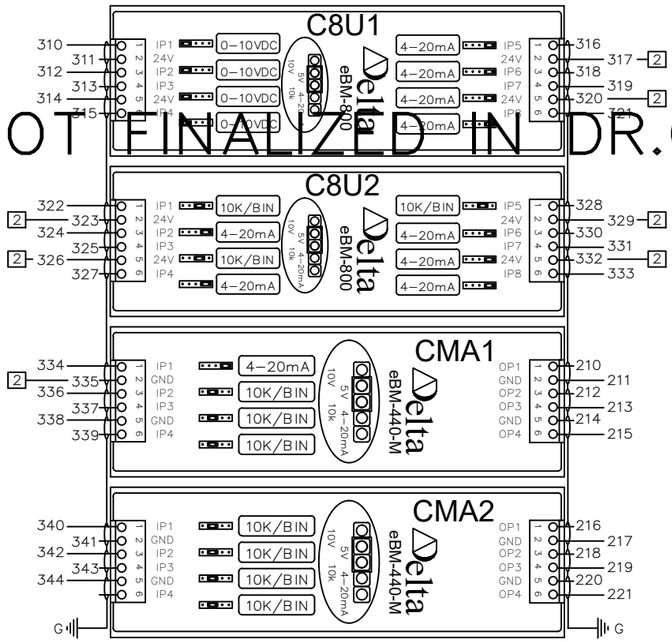

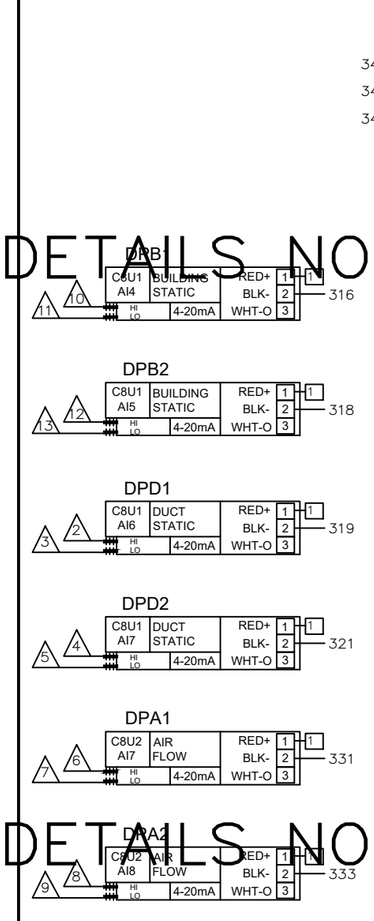

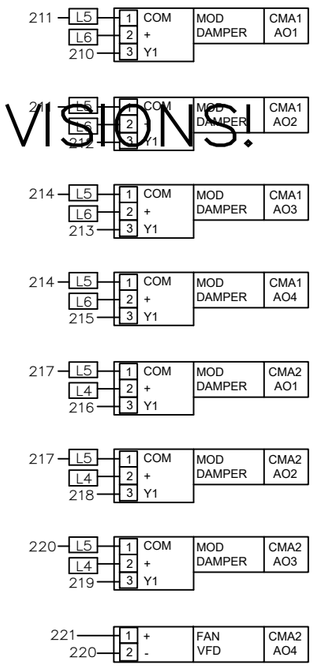

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C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

E-AHU-K5 SYSTEM 42 PANEL – I/O WIRING (1 OF 2)

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-343
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

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Temperature Control Services
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SYSTEM 42 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

CAT-6a

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

EOL2

SNS

ETS1

300
301
L3
V1-
V1+
ETHERNET SWITCH
1
3
5
2
4
CAT5e

SR1
RIBMNLB-4
202
204
200
201
24V COM
R7 POLE 3 10A @ 277VAC & 24 VDC
R7
R4 OUT N.C.
R4 COM
R4 N.O.
R3 OUT N.C.
R3 COM
R3 N.O.
R2 OUT N.C.
R2 COM
R2 N.O.
R1 OUT N.C.
R1 COM
R1 N.O.
CLOSED
OPEN
R4
R3
R2
R1

TX1
24V CB
24V CB
Power
Power
100
H
C
G
L2
L3
75VA
24VAC
24VAC
120 VAC LAPTOP PWR
200
201
202
203
CONTROLLER PWR
FIELD DEV POWER

24 VDC PWR
PWR SUPPLY
+V
-V
GND
L
N
300
301
101
L3
L2
PS1

1.0A
5.0A
101
100
G
PANEL GND LUG
TB1
L1
L2
L3
H
N
120 VAC

TB2
202
203
204
205
L4
L5
L6
L7
24 VAC TO FIELD

TB3
300
301
1
2
24 VDC TO FIELD

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1
NET
PWR
24 VAC
LINKNET (RS-485)

201
200
CEB1
PWR
GND
24~
USB2
USB1
(NOT USED)
NET1 RS-485
NET2 RS-485
LAN 1
LAN 2
LAN 3
eBMGR-2
MS/TP
LINKNET (RS-485)

C4X1
eBX
eBUS Address
eBUS
eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H
I/O SHIELD DRAIN
L3
TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-K5 SYSTEM 42 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

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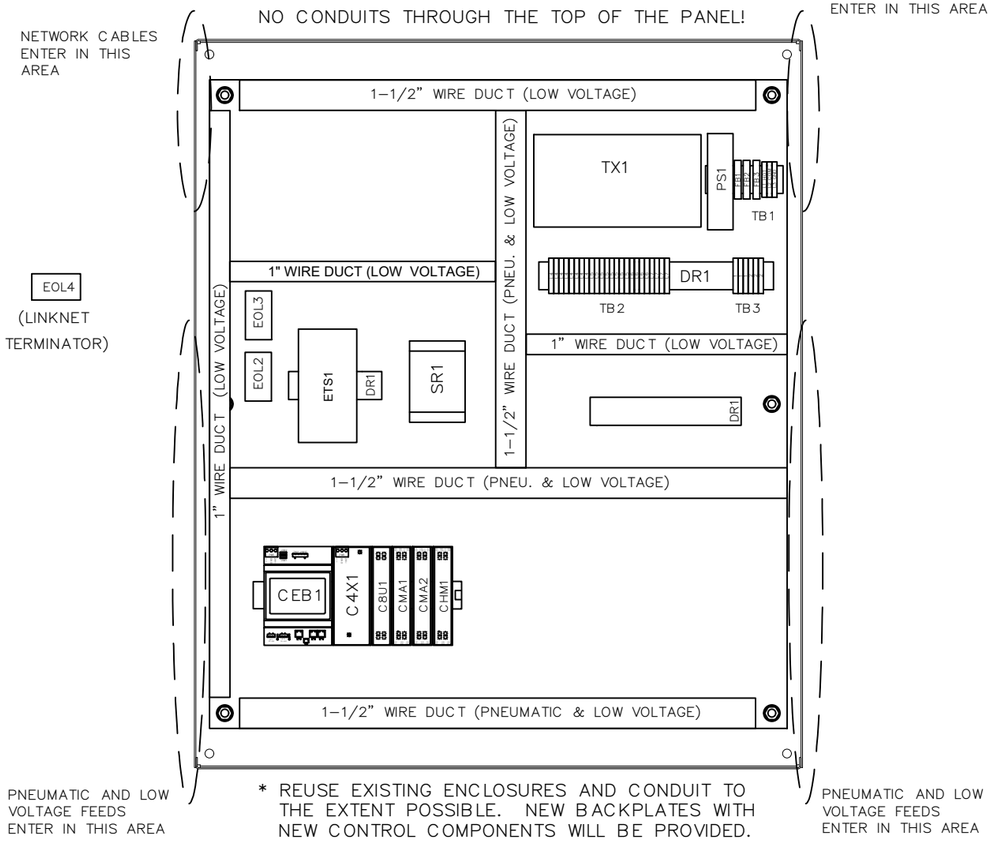
SYSTEM CONTROL PANEL 42 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

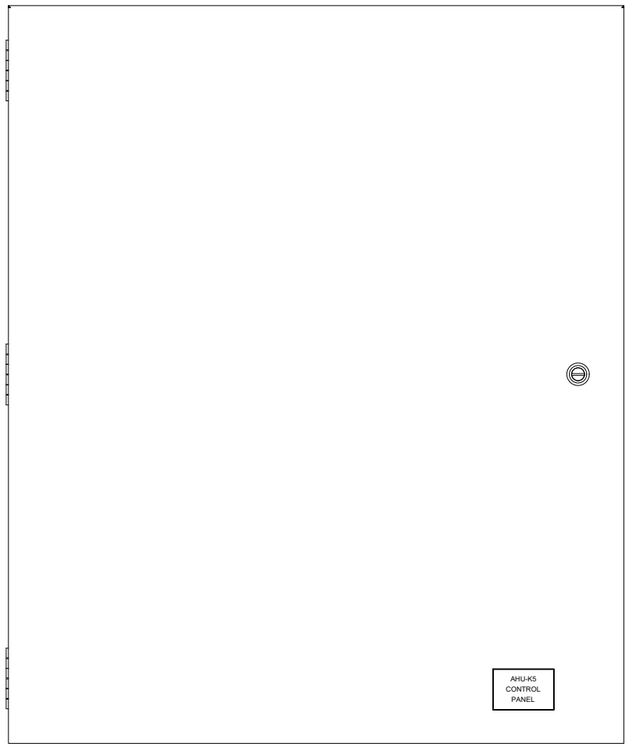


EOL4
(LINKNET TERMINATOR)

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

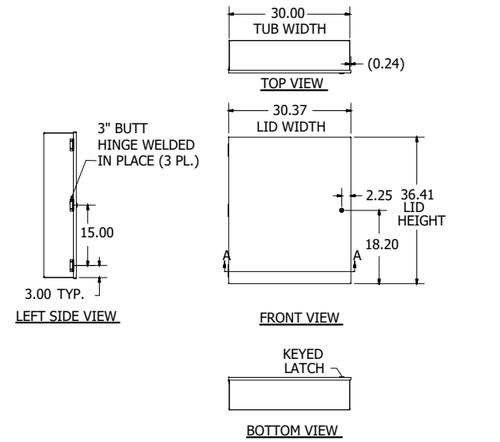


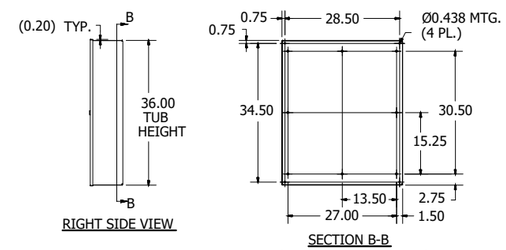
BILL OF MATERIALS

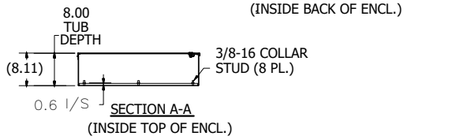
BILL OF MATERIALS

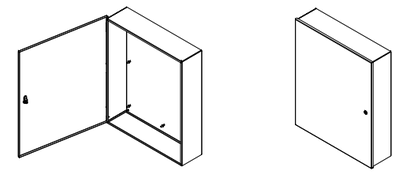
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

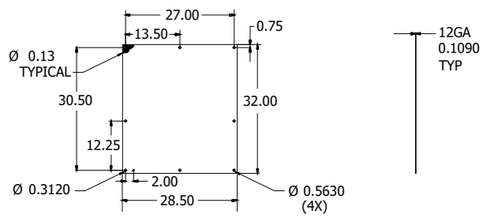








PANEL DIMENSIONS



Delta CONTROLS
Temperature Control Services
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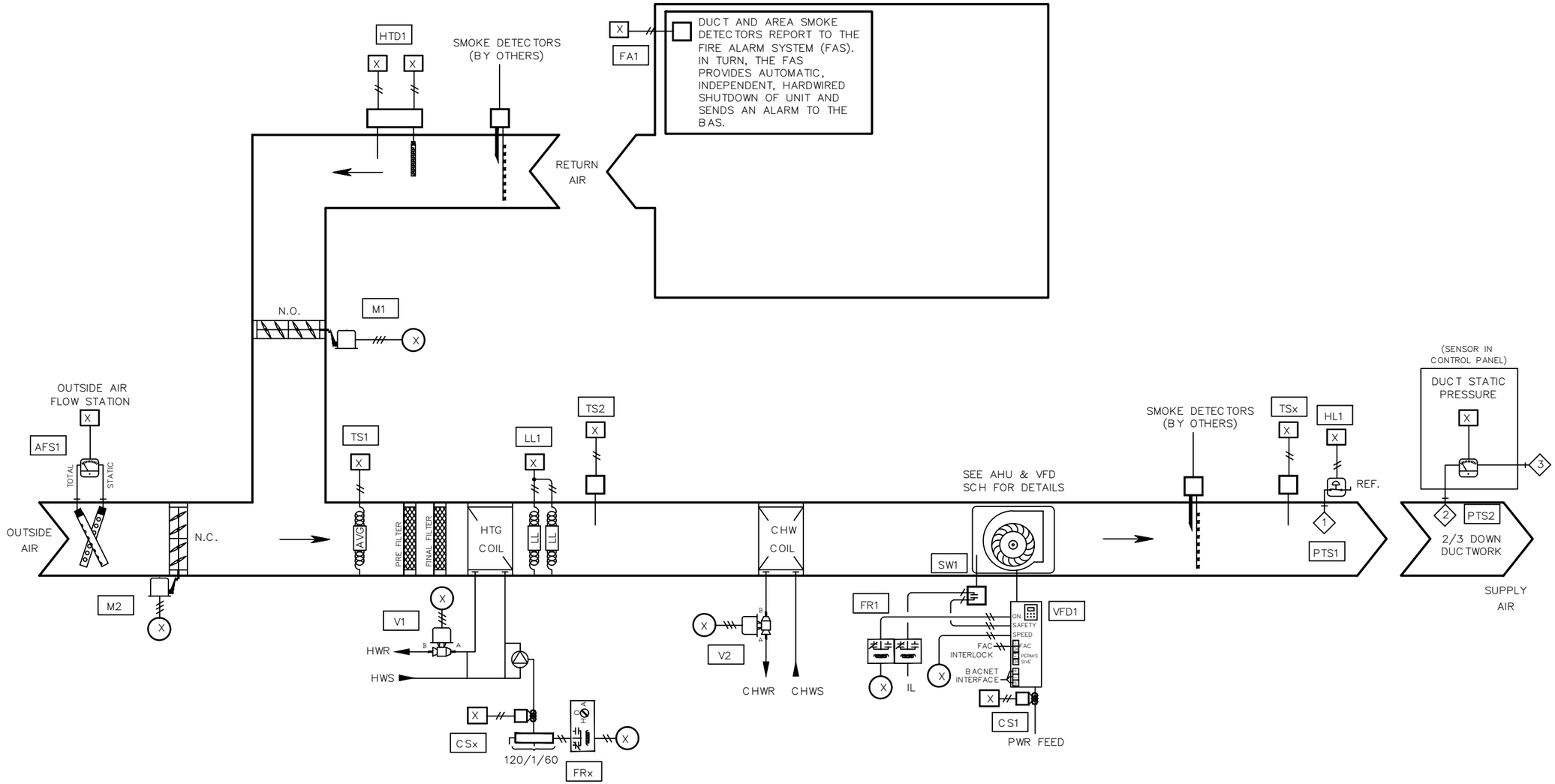
E–AHU–N1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
4240 W 50 S
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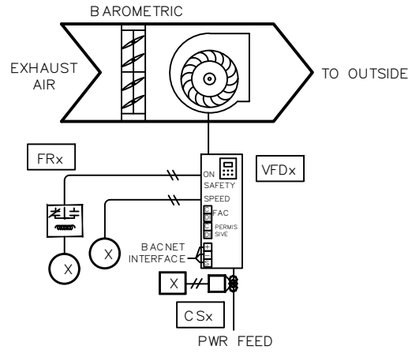
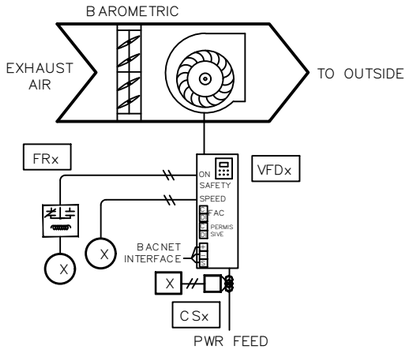
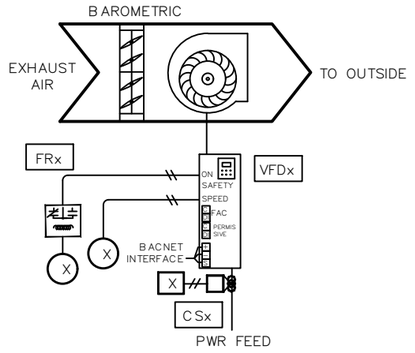
EXHAUST FAN – BAS CONTROLLED
EF–N1



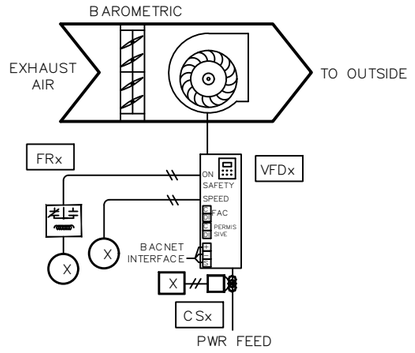
EXHAUST FAN – BAS CONTROLLED
EF–N2



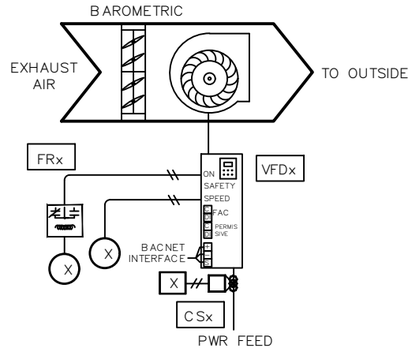
EXHAUST FAN – BAS CONTROLLED
EF–N3



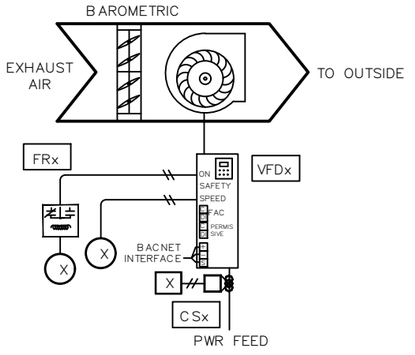
EXHAUST FAN – BAS CONTROLLED
EF–N6



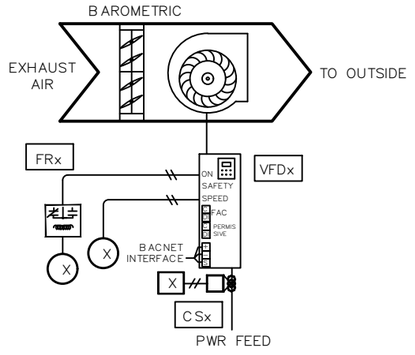
EXHAUST FAN – BAS CONTROLLED
EF–N10



EXHAUST FAN – BAS CONTROLLED
EF–N12



EXHAUST FAN – BAS CONTROLLED
EF–N14



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA N EXHAUST FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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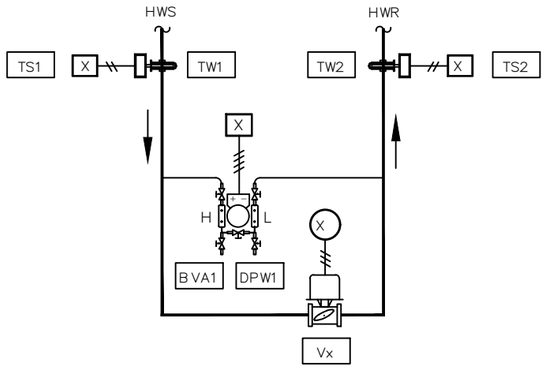
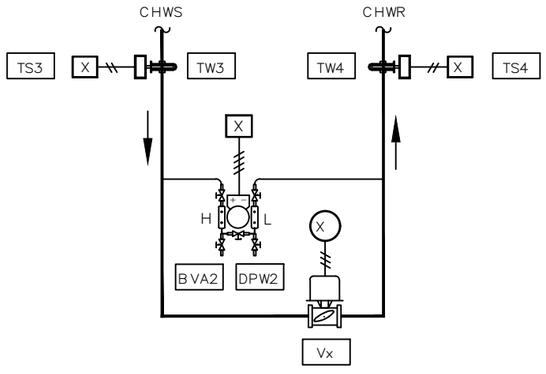
END OF LOOP CONTROLS – HOT WATER (PENTHOUSE 'N' EAST BUILDING)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. ARE LOCATED AT AHU–N1)



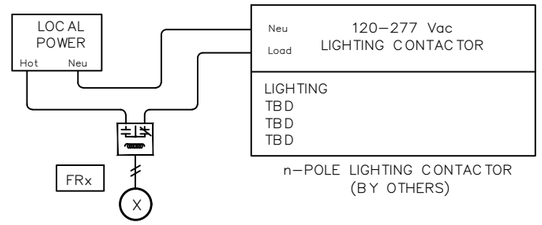
END OF LOOP CONTROLS – CHILL WATER (PENTHOUSE 'N' EAST BUILDING)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. ARE LOCATED AT AHU–N1)

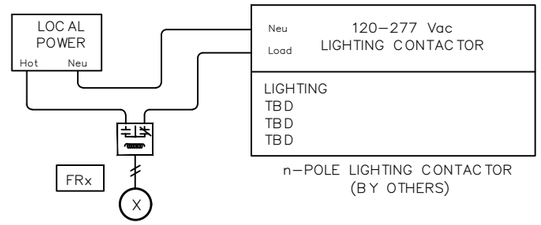


BILL OF MATERIAL

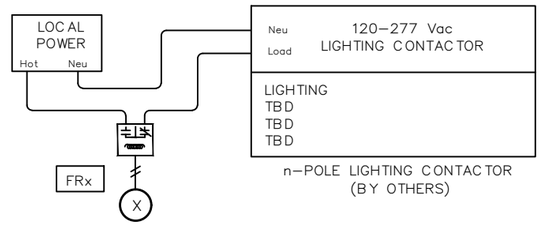
LIGHTING CONTACTOR CONTROLS
RN–1 – SECURITY LIGHTS EAST BUILDING



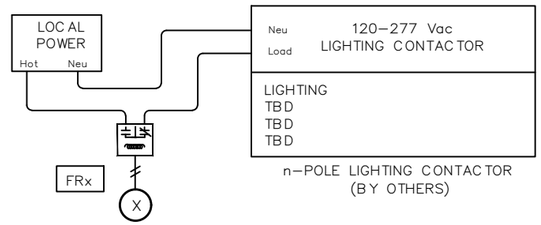
LIGHTING CONTACTOR CONTROLS
RN–2 – LIGHTS EAST BUILDING



LIGHTING CONTACTOR CONTROLS
RN–3 – SECURITY LIGHTS EAST LOT



LIGHTING CONTACTOR CONTROLS
RN–4 – LIGHTS EAST LOT



NETWORK POINTS
N1 THROUGH Nx

AREA N EAST BUILDING END OF LOOP PRESSURE CONTROL & LIGHTING FIELD DEVICES

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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CHWR EAST EOL	Chill Water Return Temp	X				
CHWS EAST EOL	Chill Water Supply Temp	X				
CW DP EAST EOL	End of Loop Diff Pressure - East Bldg	X				
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
HW DP EAST EOL	End of Loop Diff Pressure - East Bldg	X				
HWR EAST EOL	Hot Water Return Temp	X				
HWS EAST EOL	Hot Water Supply Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-N1 STAT	Exhaust Fan N1 Status		X			
EF-N10 STAT	Exhaust Fan N10 Status		X			
EF-N12 STAT	Exhaust Fan N12 Status		X			
EF-N14 STAT	Exhaust Fan N14 Status		X			
EF-N2 STAT	Exhaust Fan N2 Status		X			
EF-N3 STAT	Exhaust Fan N3 Status		X			
EF-N6 STAT	Exhaust Fan N6 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CW BYP VLV	EOL Bypass Valve - East Bldg			X		
CWV	Chill Water Valve			X		
HW BYP VLV	EOL Bypass Valve - East Bldg			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-N1 SS	Exhaust Fan N1 Fan Start / Stop				X	
EF-N10 SS	Exhaust Fan N10 Fan Start / Stop				X	
EF-N12 SS	Exhaust Fan N12 Fan Start / Stop				X	
EF-N14 SS	Exhaust Fan N14 Fan Start / Stop				X	
EF-N2 SS	Exhaust Fan N2 Fan Start / Stop				X	
EF-N3 SS	Exhaust Fan N3 Fan Start / Stop				X	
EF-N6 SS	Exhaust Fan N6 Fan Start / Stop				X	
LTG 1	Lighting Contactor - Sec Lts E Bldg RN-1				X	
LTG 2	Lighting Contactor - Lights E Bldg RN-2				X	
LTG 3	Lighting Contactor - Sec Lts E Lot RN-3				X	
LTG 4	Lighting Contactor - Lights E Lot RN-4				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**13**	**12**	**7**	**13**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-N1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

END OF LOOP CONTROLS (FROM PREVIOUS BAS CONTROL SEQUENCES):

THE TEMPERATURE OF THE SUPPLY WATER TO THE EQUIPMENT ROOM WILL BE USED TO POSITION THE END OF LOOP TEMPERATURE VALVE TO MAINTAIN THE CHILLED WATER SUPPLY AT 48 DEG. F AND THE HEATING WATER SUPPLY AT 145 DEG. F. THE PRESSURE TRANSMITTER WILL BE USED IN THE RESET OF THE PUMP VOLUME CONTROL SUCH THAT THE PUMP WILL MAINTAIN THE PROPER PRESSURE AT THE END OF THE MAIN.

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04/06/2023	ADD 3.3
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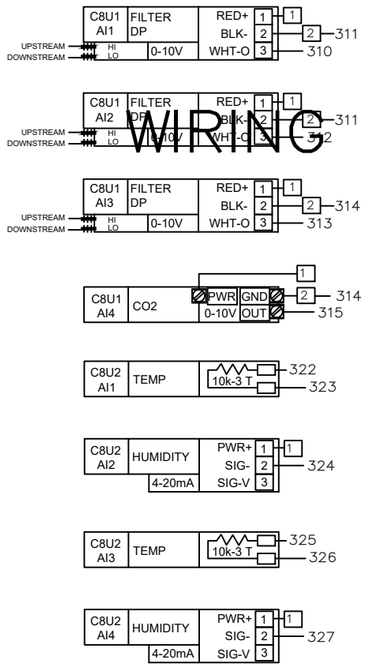
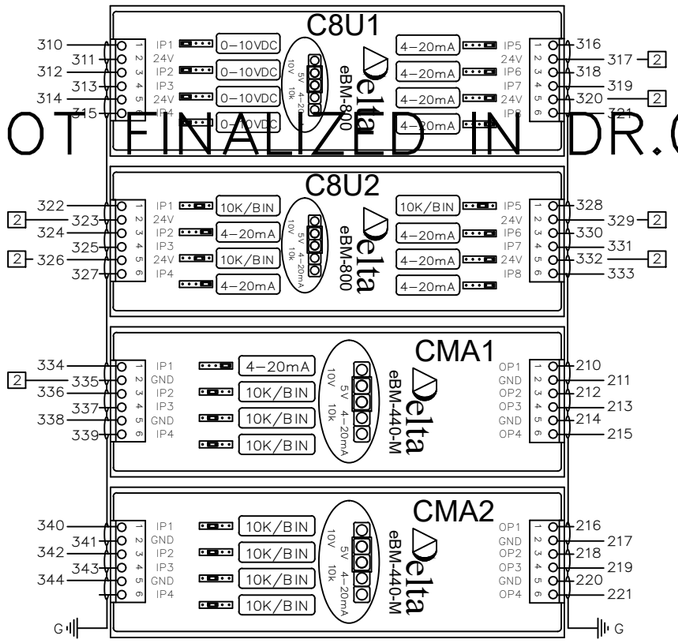
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

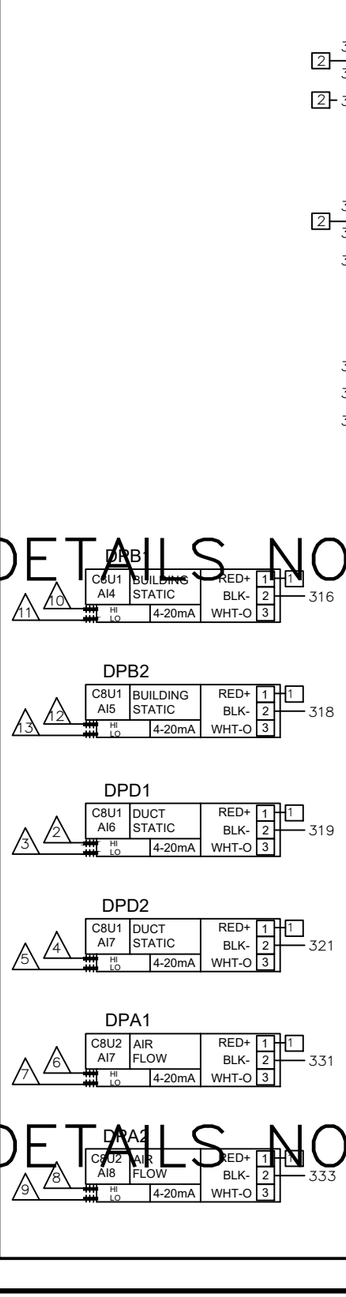
CONTRACT NO:

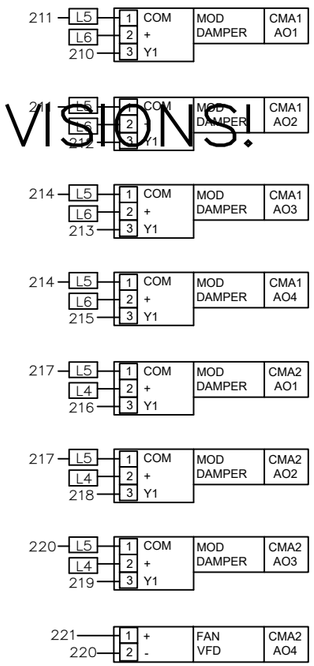
SHEET
NCHS-351
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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NCHS-352
JOB NUMBER:
J-2304001

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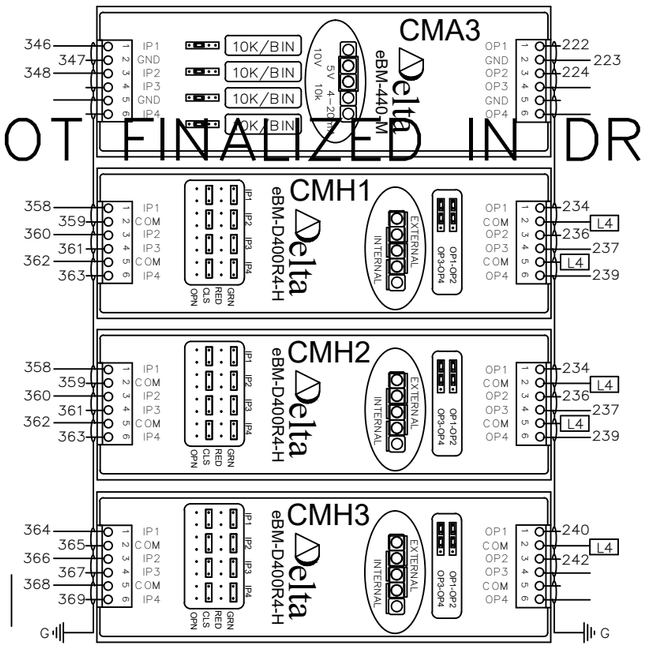
CMA3 DI1	DX STATUS	N.O.	346 / 347
CMA3 DI2	PURGE ENABLE	N.O.	348 / 347
CMH2 DI1	FAN STATUS	N.O.	358 / 359
CMH1 DI1	FAN STATUS	N.O.	360 / 359
CMH1 DI3	SMOKE ALARM	N.O.	361 / 362
CMH1 DI4	SMOKE ALARM	N.O.	363 / 362
CMH2 DI1	FAS.INPUT	N.C.	364 / 365
CMH2 DI2	PUMP STATUS	N.O.	366 / 365
CMH2 DI3	PUMP STATUS	N.O.	367 / 368



SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

234	L5	SF.SS	CMH1 DO1 — SF VFD ENABLE
L6 / L5		SAFETY.IL	X2 I7 — VFD SAFETY INTERLOCK
FR1 IL		FAN.DOOR SAFETY.SW	
236	L5	FAN.SS	CMH1 DO2 — SEF–1 ENABLE
237	L5	FAC OVRD	CMH1 DO3 — PURGE FAC OVERRIDE
239	L5	CLG ENA	CMH1 DO4 — DX COOLING ENABLE
240	L5	PUMP ENA	CMH1 DO2 — PUMP 1 ENABLE
242	L5	PUMP ENA	CMH1 DO2 — PUMP 2 ENABLE

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NCHS–353
JOB NUMBER:
J–2304001

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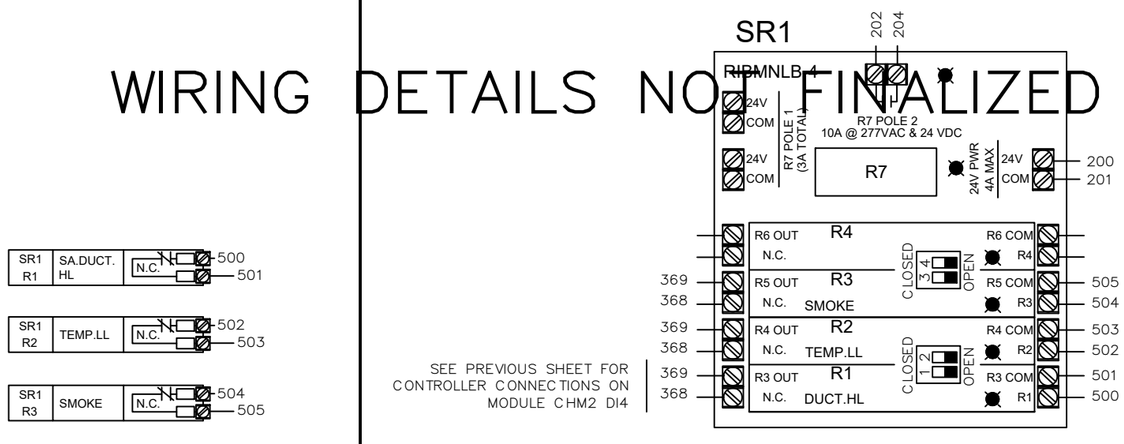

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

E-AHU-N1 SYSTEM 43 PANEL - I/O WIRING (3 OF 3)

Delta Controls
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SYSTEM 43 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TX1

24V CB | 24V CB

Power | Power

100
L2
L3
H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
101
5.0A
100
G

TB1

L1
L2
L3
H
N
120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2
3

300
301
L3

ETS1

V1-
V1+

ETHERNET SWITCH

1
3
5
2
4

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 HP @ 120VAC

24V COM

POWER 24 MAX

R7

R4 OUT N.C. R4 COM R4
R3 OUT N.C. R3 COM R3
R2 OUT N.C. R2 COM R2
R1 OUT N.C. R1 COM R1

CLOSED
OPEN

CEB1

C8X1

201
200

PWR
GND
24~

USB2
USB1
(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485
NET2 RS-485
LAN 1
LAN 2

P7 24Vs P8
P5 24Vs P6

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

OP1 COM I/O OP2
OP3 COM I/O OP4

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-N1 SYSTEM 43 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

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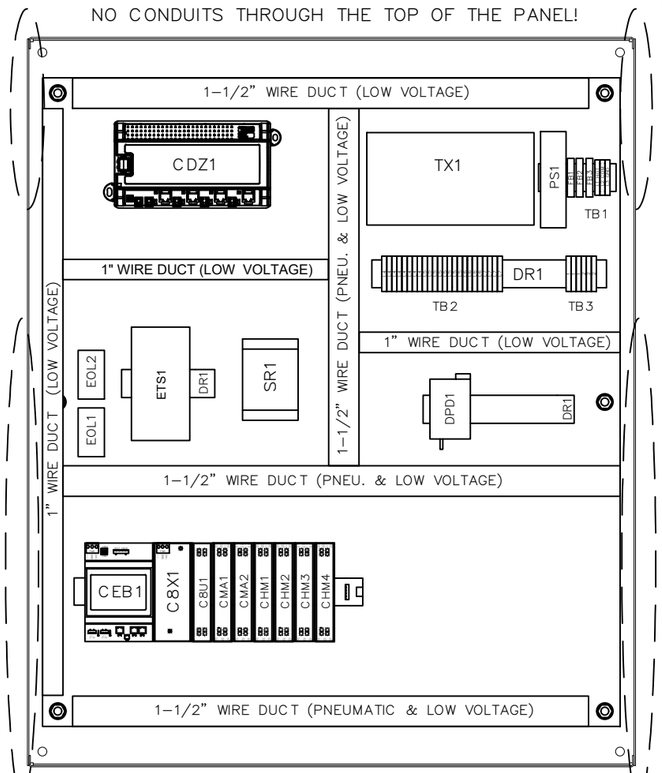
SYSTEM CONTROL PANEL 43 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

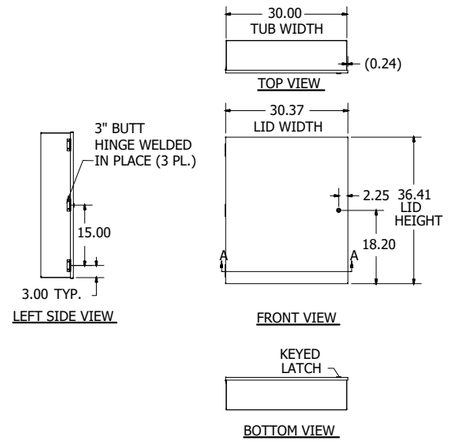
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

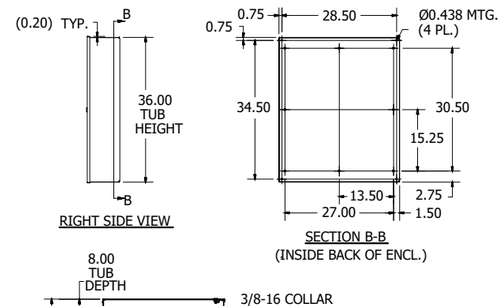
BILL OF MATERIALS

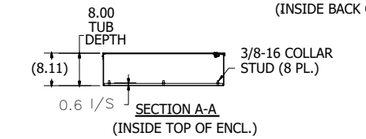
BILL OF MATERIALS

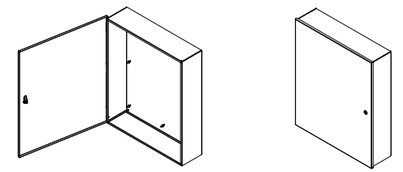
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

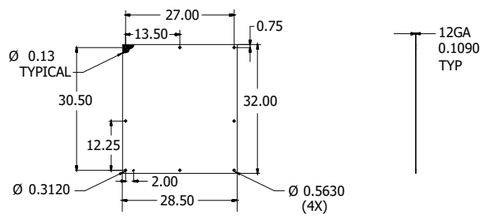








PANEL DIMENSIONS



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E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

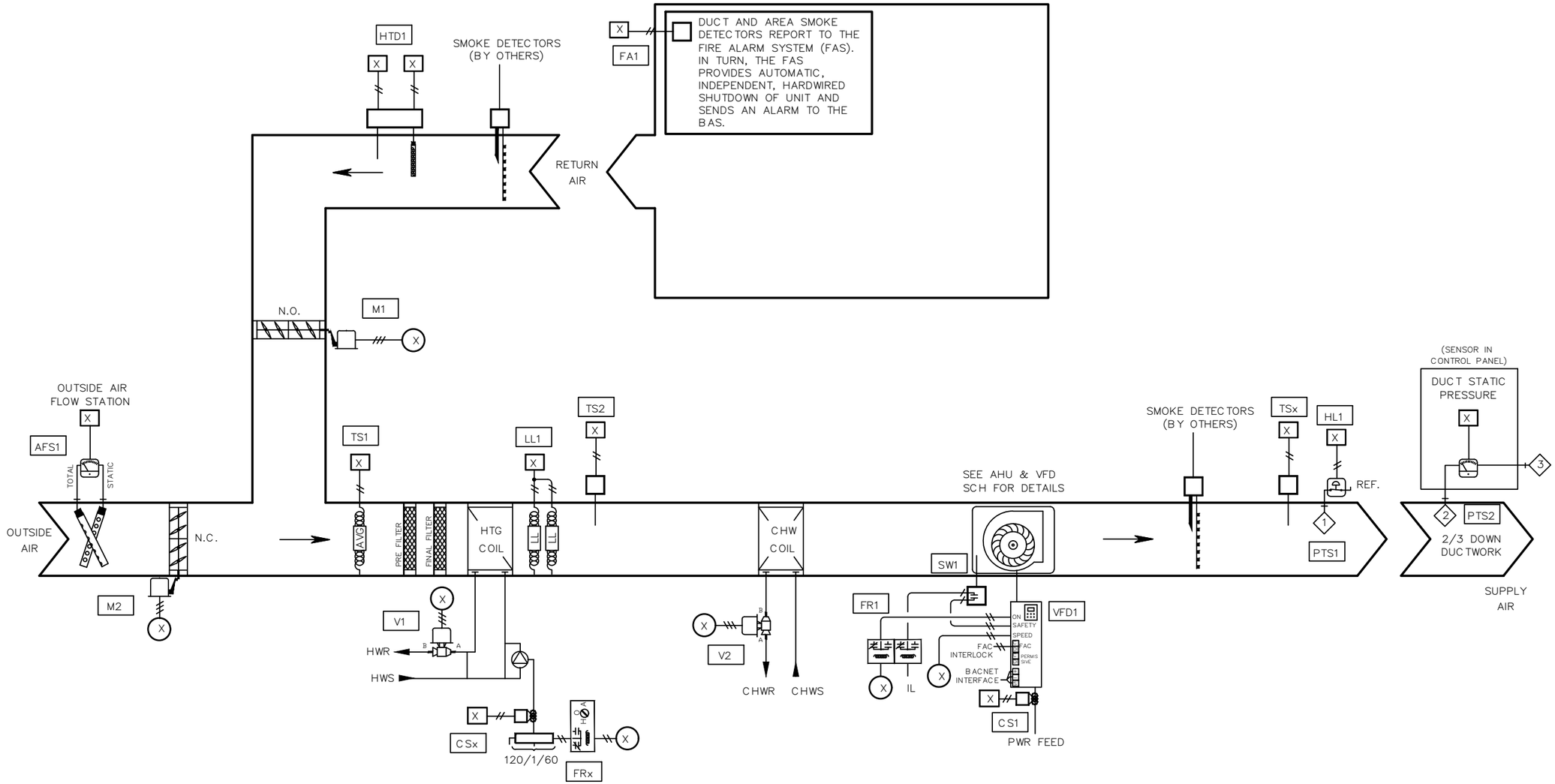
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–356
JOB NUMBER:
J–2304001

E–AHU–N2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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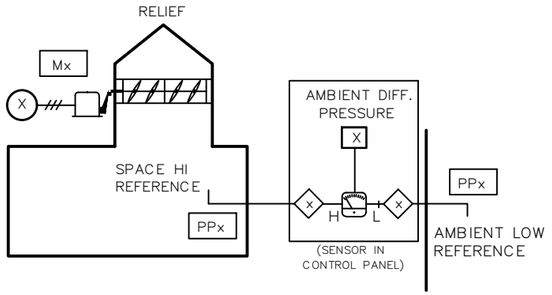
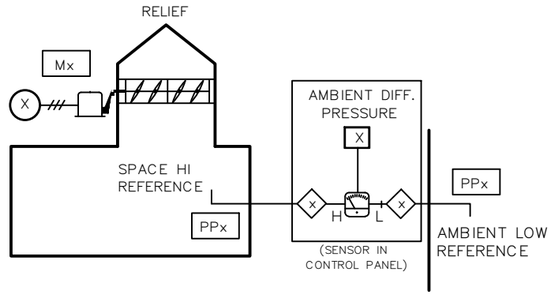
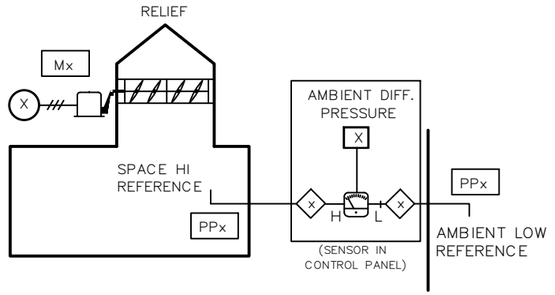
BUILDING PRESSURE CONTROL
E–RH–N1



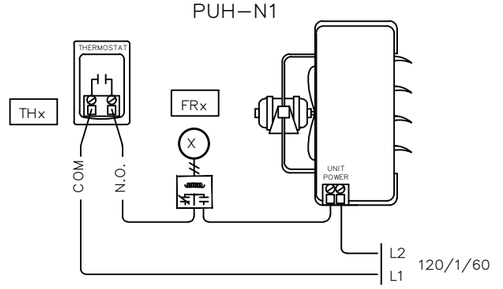
BUILDING PRESSURE CONTROL
E–RH–N2



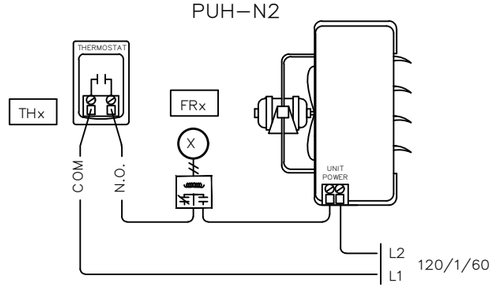
BUILDING PRESSURE CONTROL
RH–N3



PROPELLER UNIT HEATER
PUH–N1



PROPELLER UNIT HEATER
PUH–N2



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA N RELIEF & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
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CONTRACT NO:

SHEET
NCHS–358
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-N1 DPR	Relief Air Damper			X		
E-RH-N2 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-N3 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
PUH-N1 EN	PUH N1 Enable				X	
PUH-N2 EN	PUH N2 Enable				X	
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**10**	**5**	**8**	**4**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-N2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFNn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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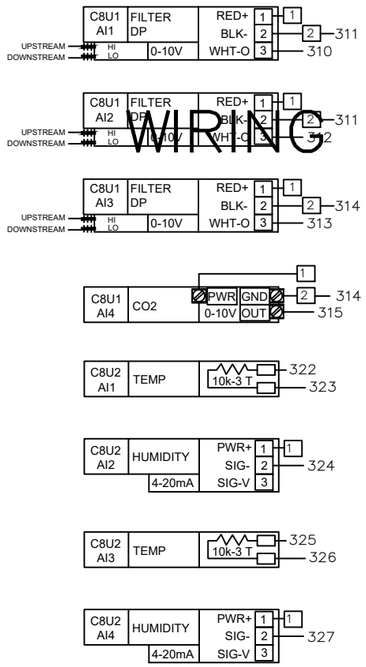
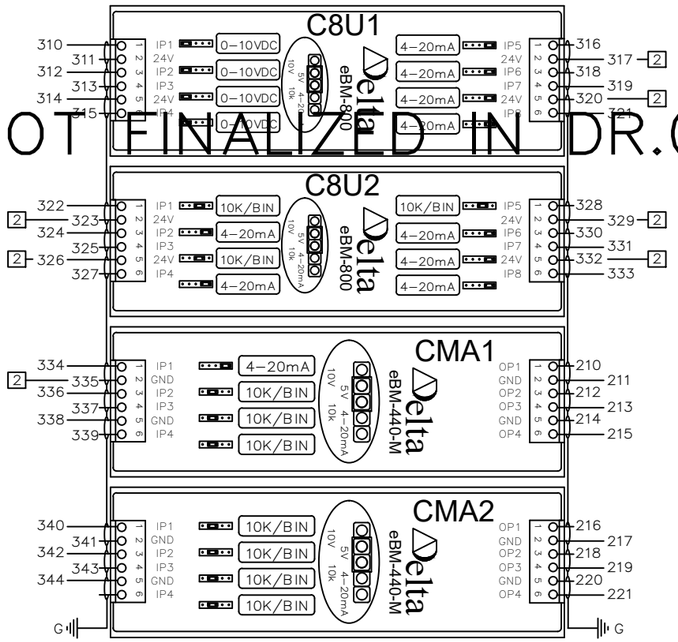
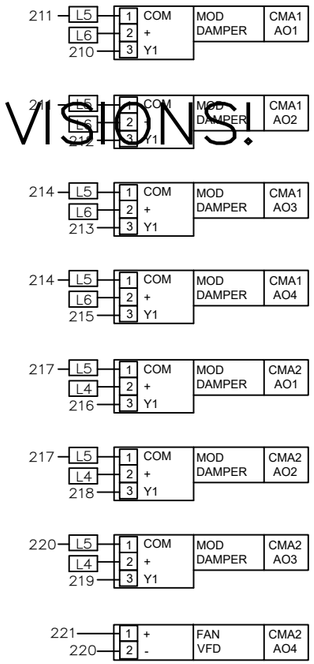
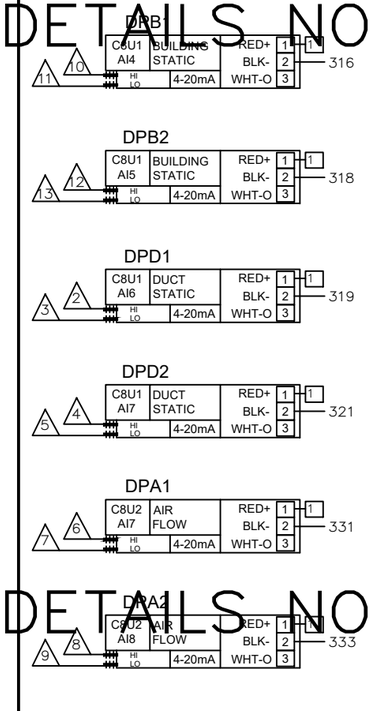
SHEET
NCHS-360
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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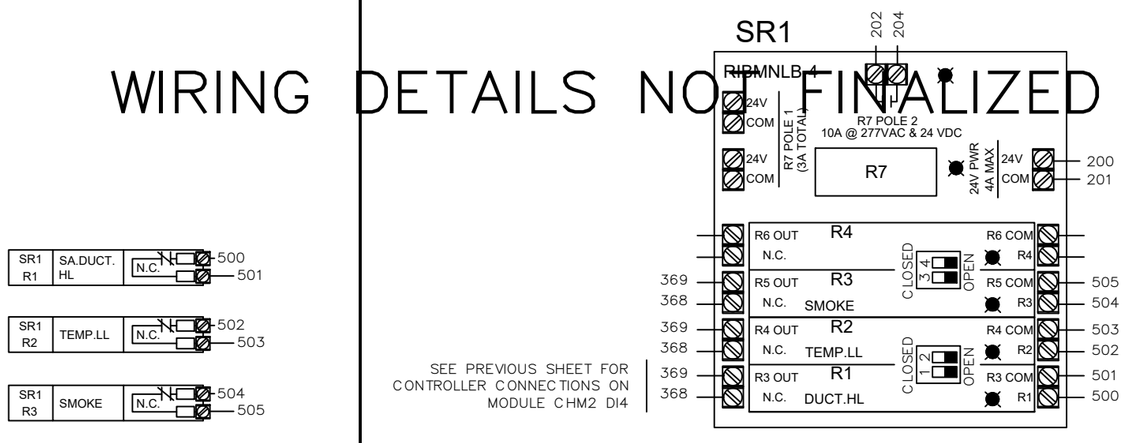

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INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU–N2 SYSTEM 44 PANEL – I/O WIRING (2 OF 2)

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SYSTEM 44 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301
300

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC
R7 POLE 1 16A @ 277VAC
R7
R4
R3
R2
R1

CLOSED
OPEN

CEC1

201
200

PWR

Delta
eBCON-2

eBUS
NET2

NET2 RS-485
[+] [-] SHD

LAN 1

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

TX1

24V CB
24V CB
Power
Power
120 VAC LAPTOP PWR
75VA
24VAC
24VAC
24VAC
24VAC
75VA

100
L2
L3
H
C
G

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
5.0A
101
100
G

TB1

L1
L2
L3
H
N
120 VAC

PANEL GND LUG

TB2

202
203
204
205

L4
L5
L6
L7

24 VAC TO FIELD

TB3

300
301

1
2

24 VDC TO FIELD

DPD1
DPB1
DPB2
DPB3

Power + GND (-) 4-20mA out - Voltage out 0

HIGH
LOW

PNEUMATIC

2 3 4 5 6 7 8 9

9 8 7 6 5 4 3 2

E-AHU-N2 SYSTEM 44 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

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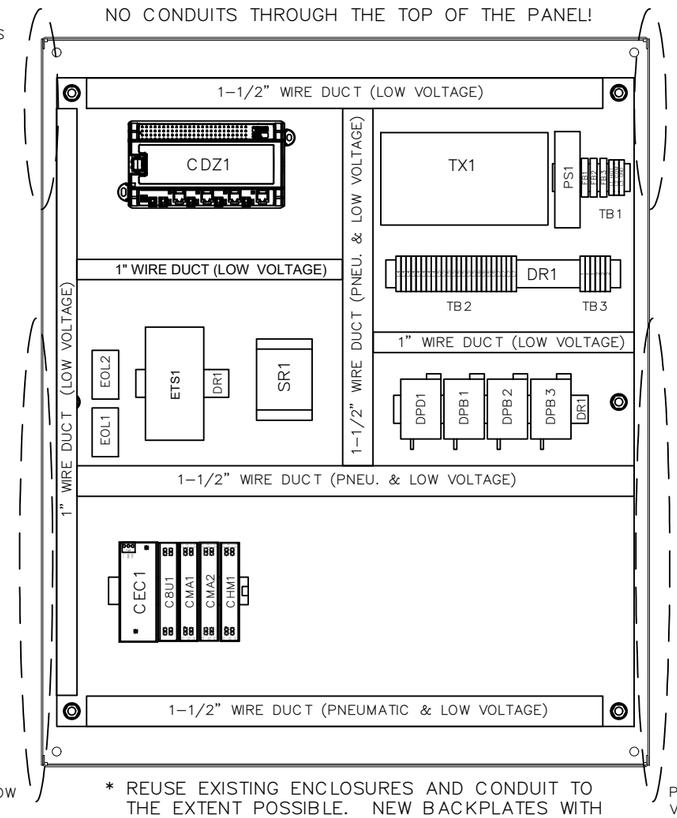
SYSTEM CONTROL PANEL 44 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



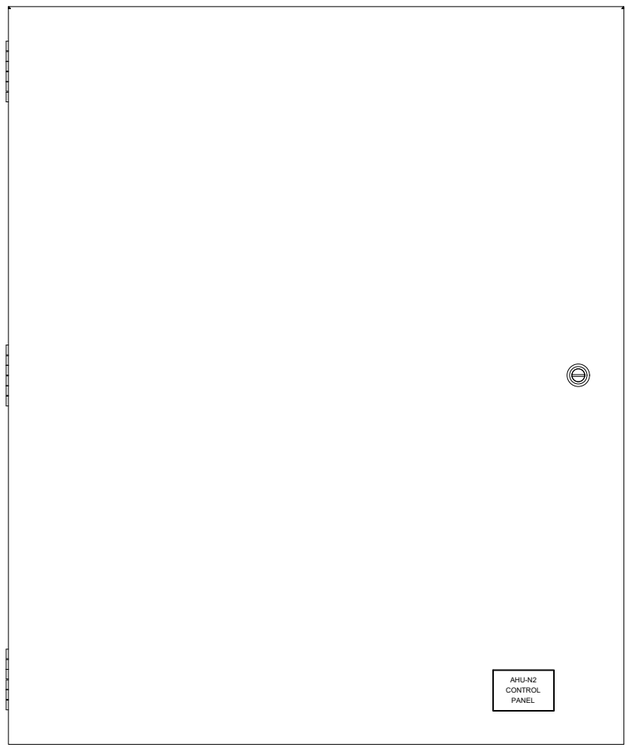
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

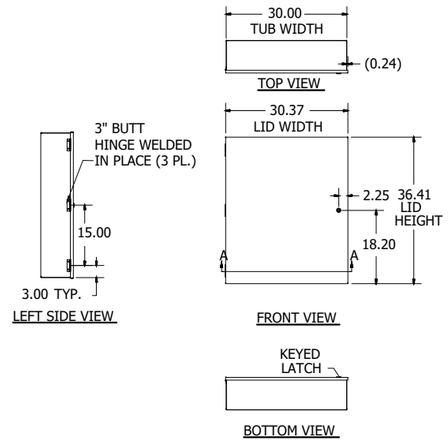
BILL OF MATERIALS

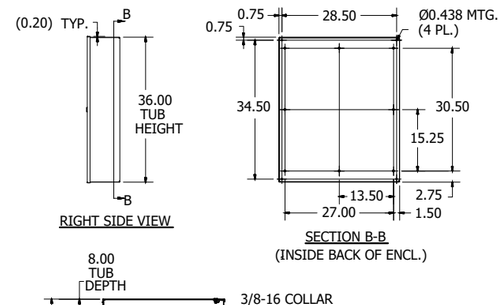


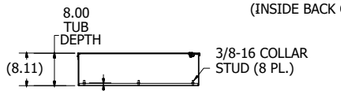
BILL OF MATERIALS

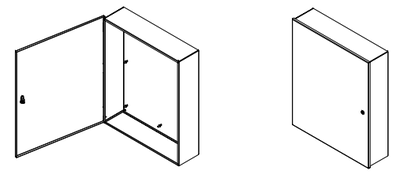
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

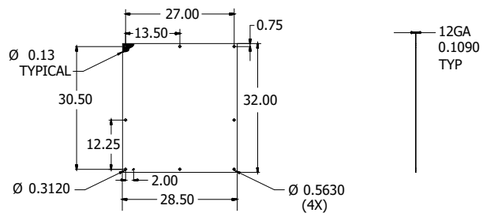








PANEL DIMENSIONS



E–AHU–N2 SYSTEM 44 PANEL – DIMENSIONS & BOM

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

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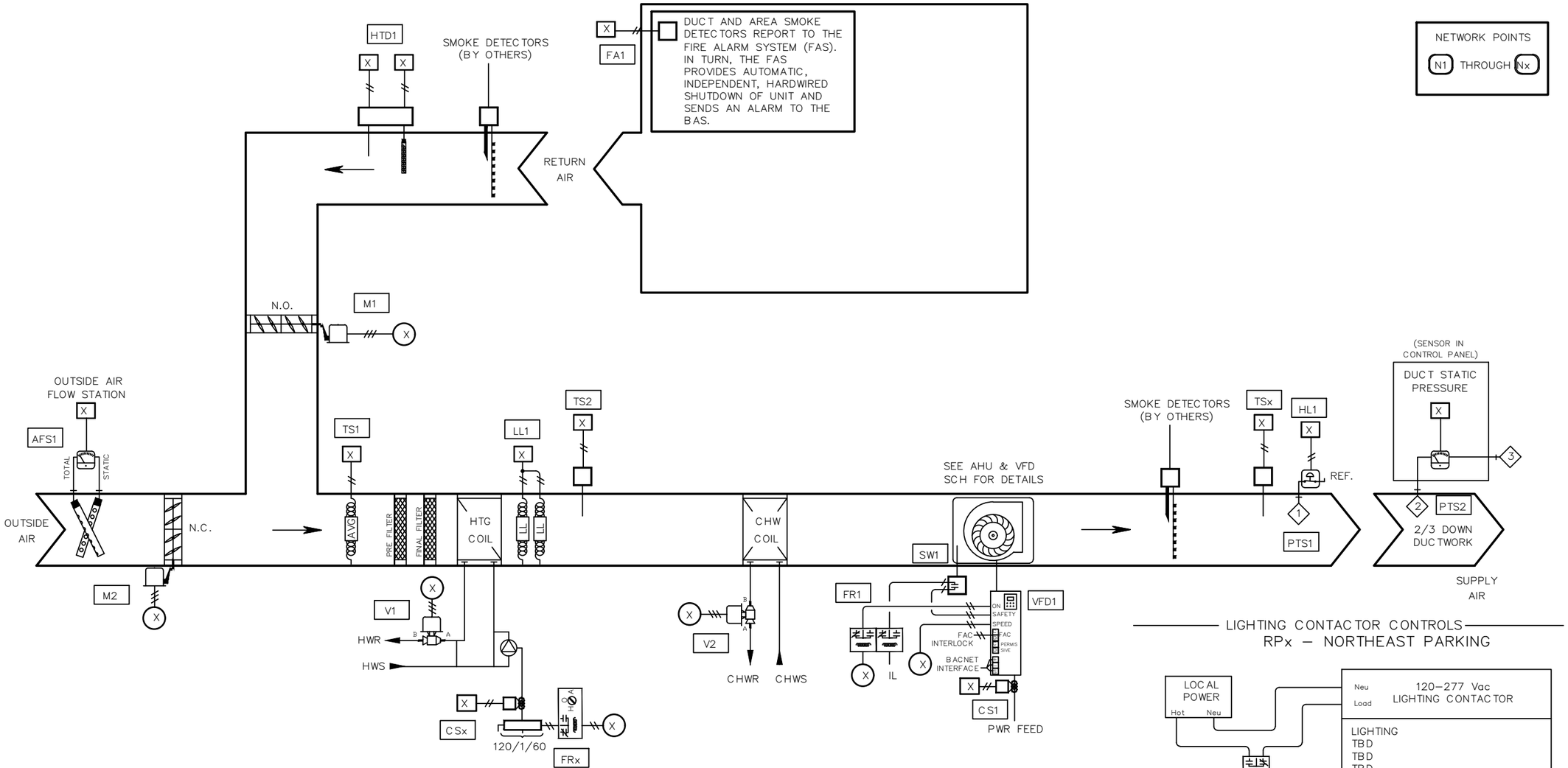
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–364
JOB NUMBER:
J–2304001

E–AHU–P1 FIELD DEVICES

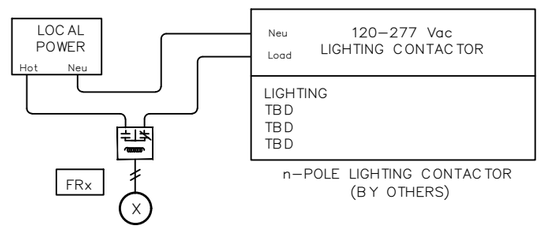


NETWORK POINTS

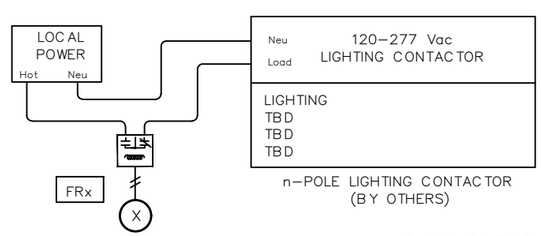
N1 THROUGH Nx

BILL OF MATERIAL

LIGHTING CONTACTOR CONTROLS
RPx – NORTHEAST PARKING



LIGHTING CONTACTOR CONTROLS
RPy – EXTERIOR WALL



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CONTRACT NO:

SHEET
NCHS–365
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
LTG 1	Lighting Contactor - NE Pkg RPx				X	
LTG 2	Lighting Contactor - Ext Wall Rpy				X	
SF SS	Supply Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
	POINT TOTALS:	**7**	**5**	**5**	**4**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-P1 & AREA P MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
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VAV AIR HANDLING UNIT AHU-P1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOODS SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

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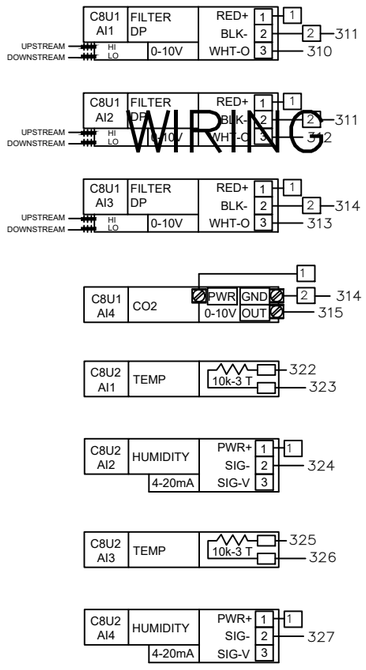
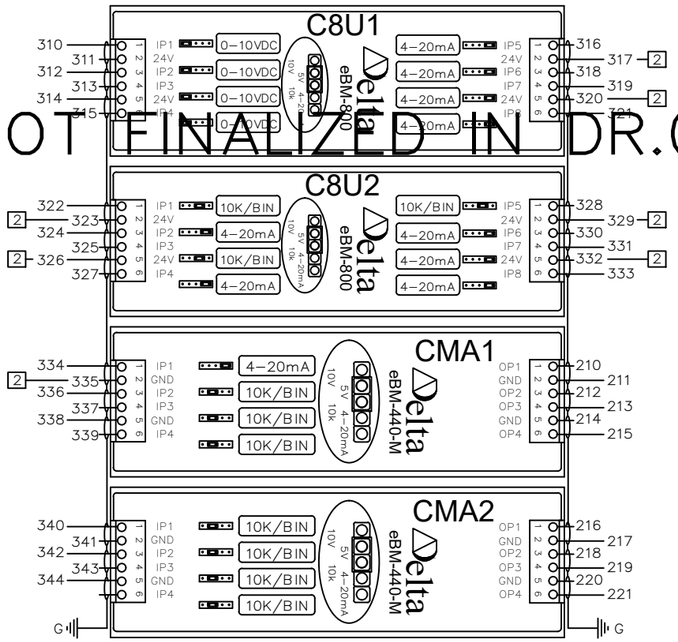
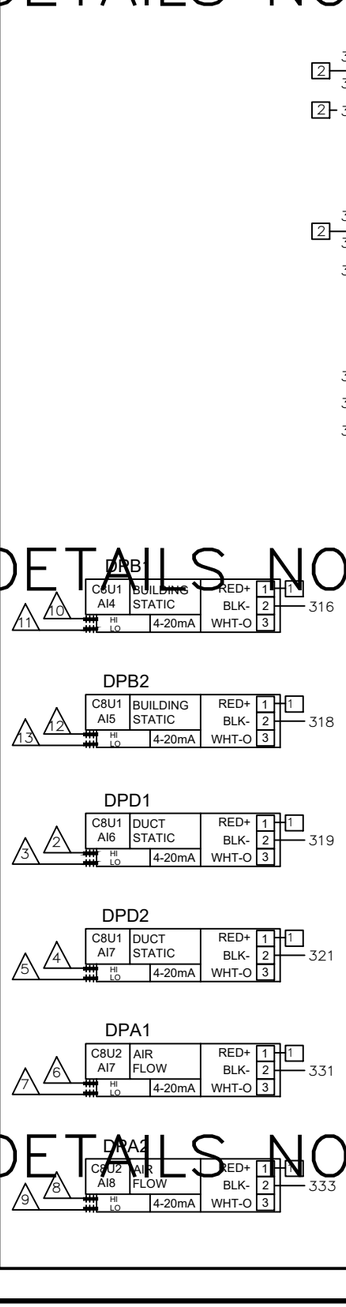
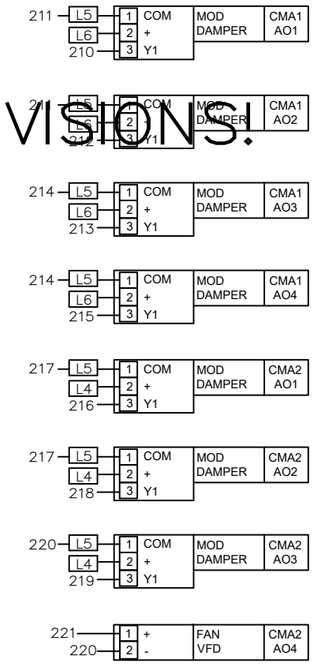
SYSTEM 45 CONTROL PANEL









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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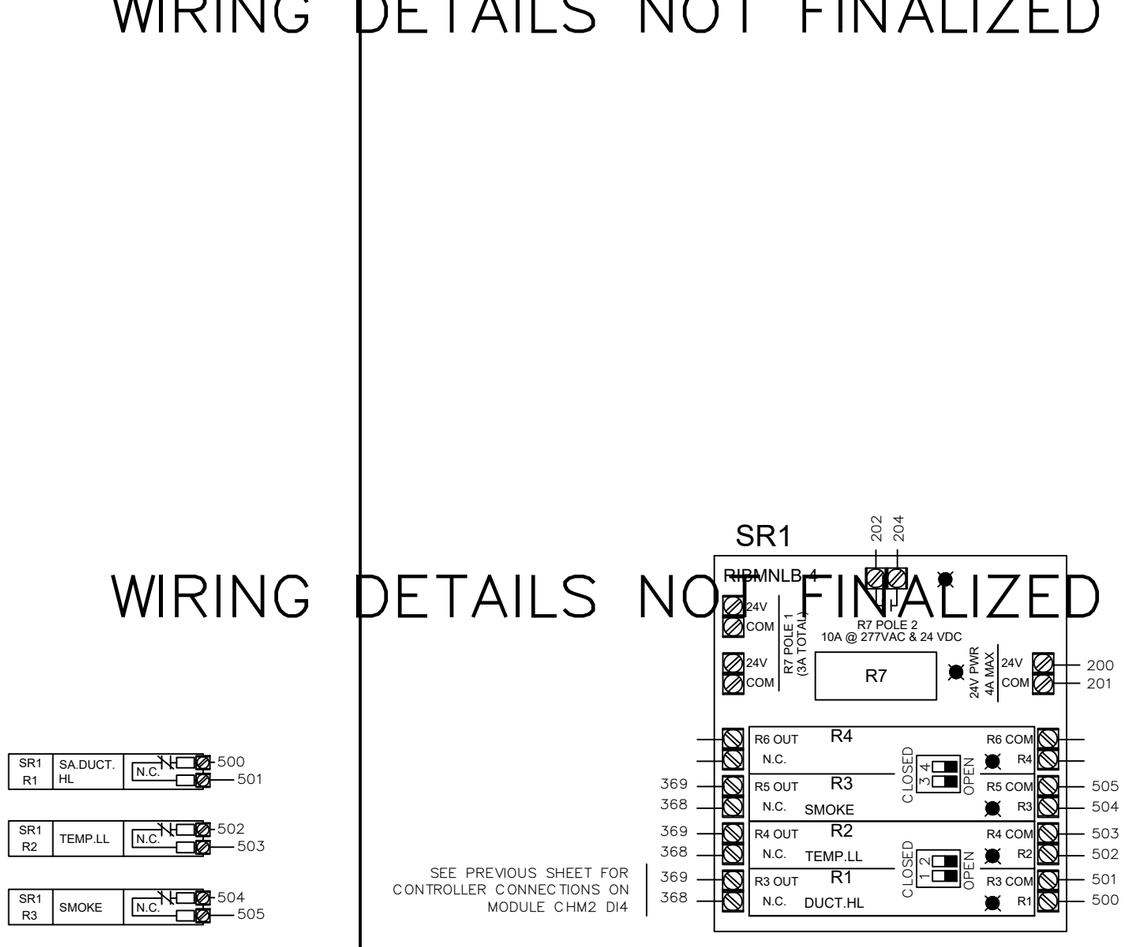

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

AHU-P1 SYSTEM 45 PANEL - I/O WIRING (2 OF 2)

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SYSTEM 45 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

V1- V1+ 300 301 L3

ETHERNET SWITCH

1 2 3 4 5

CAT5e

SR1

RIBMNLB-4

200 201 24V COM 202 204

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 HP @ 120VAC

R7 POWER 24 MAX

R7

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED OPEN

TX1

24V CB 24V CB

Power Power

100 L2 L3 H C G

75VA 24VAC 24VAC 120 VAC LAPTOP PWR 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V -V GND L N 300 301 101 L3 L2

PS1

1.0A 101

5.0A 100

G

PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

DPD1

1

Power + GND / 4-20mA out - Voltage out 0

HIGH LOW

2 3

PNEUMATIC

3 2

CEC1

201 200

PWR

~ GND 24~

Delta eBCON-2

eBUS NET2

NET2 RS-485 [+] [-] SHD

LAN

P7 24Vs P8 24Vs

eBM-800 eBM-440-M eBM-440-M eBM-D400R4-H

DP1 GND I/O DP2 DP3 GND I/O DP4

DP1 COM I/O DP2 DP3 COM I/O DP4

DP1 DP2 DP3 DP4 HAO

24V 24V 24V 24V

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-P1 SYSTEM 45 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

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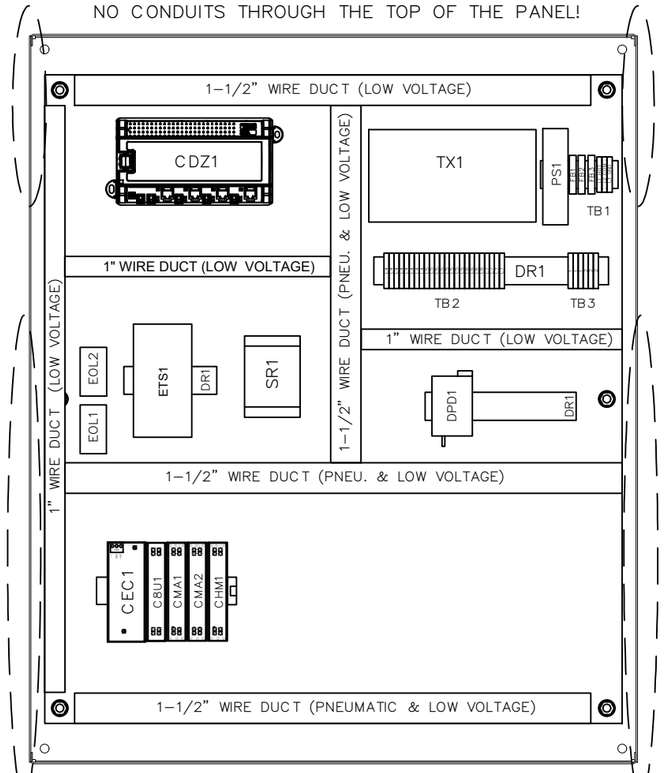
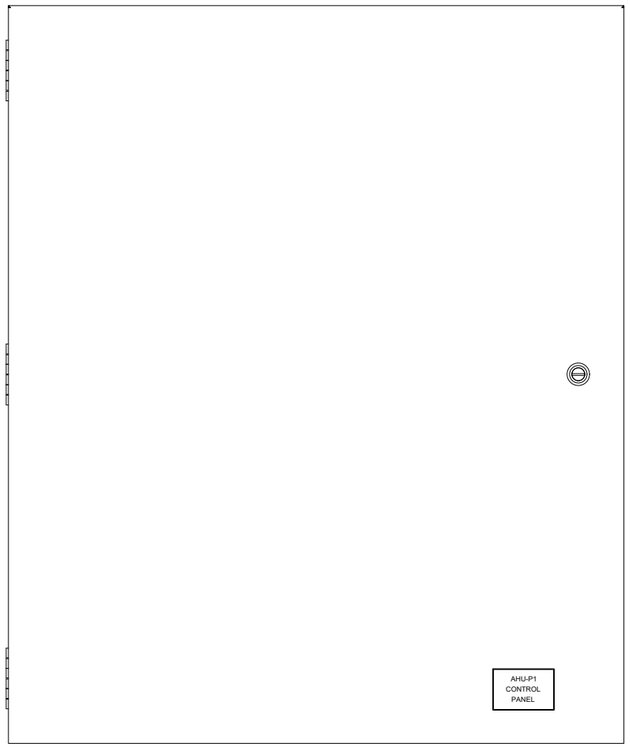
SYSTEM CONTROL PANEL 45 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

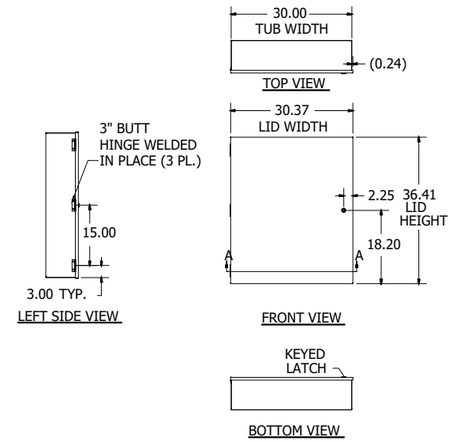
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

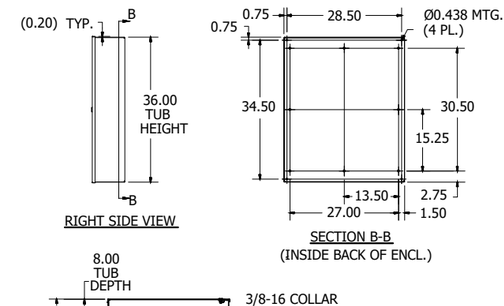
BILL OF MATERIALS

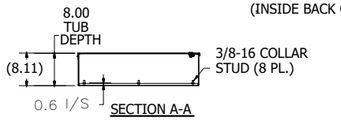
BILL OF MATERIALS

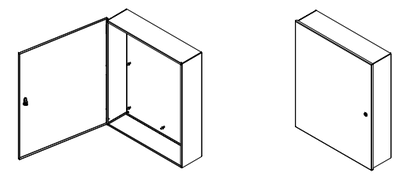
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

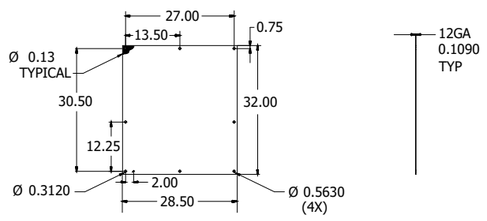








PANEL DIMENSIONS



E-AHU-P1 SYSTEM 45 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

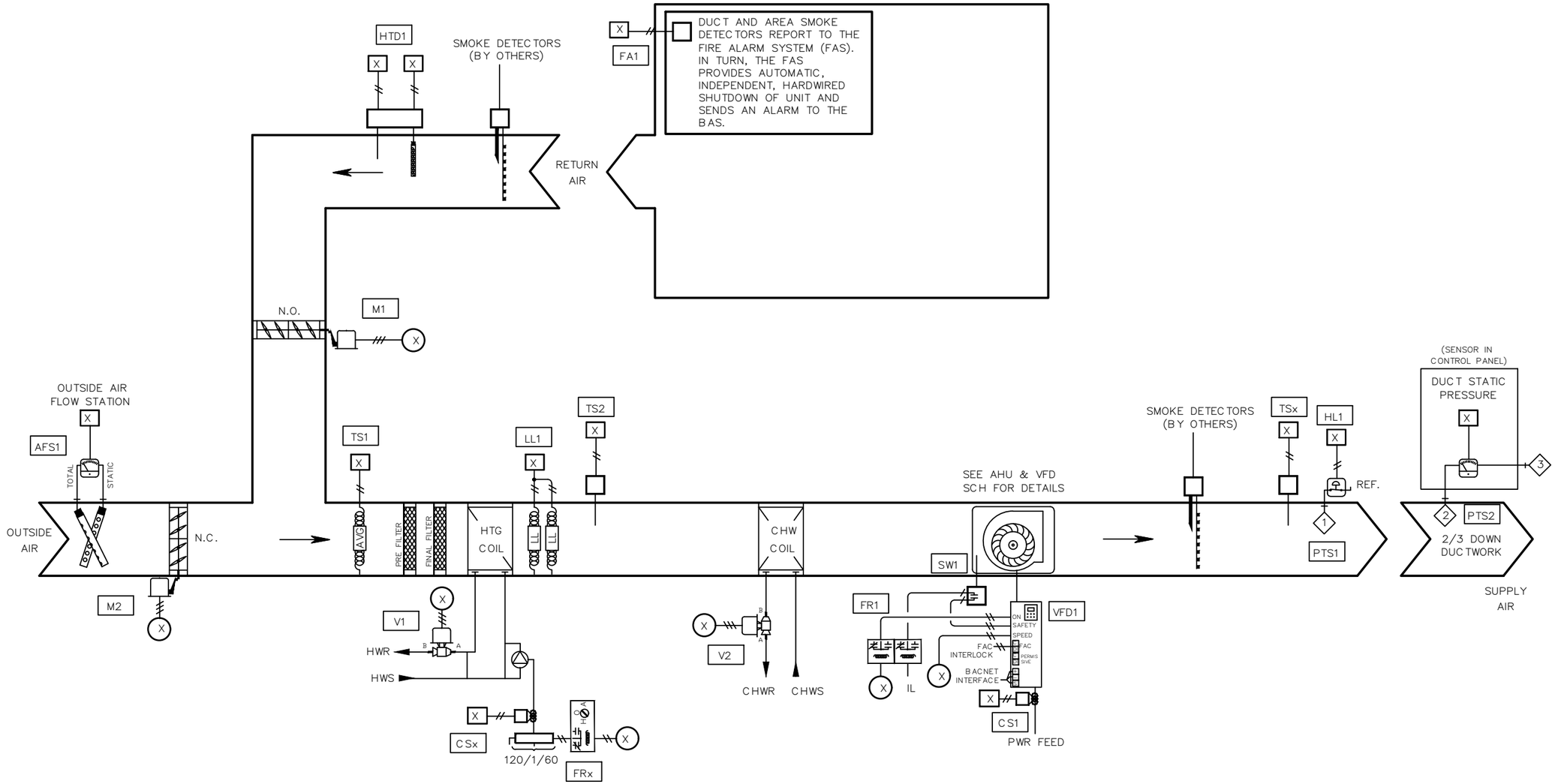
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-371
JOB NUMBER:
J-2304001

E–AHU–P2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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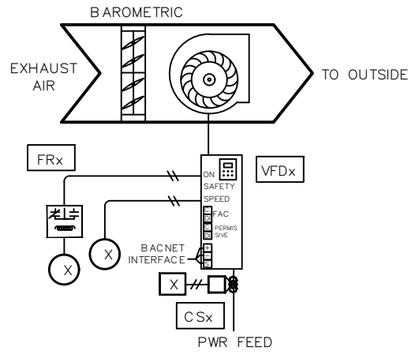
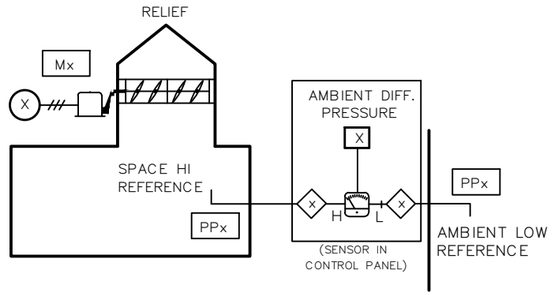
J–2304001

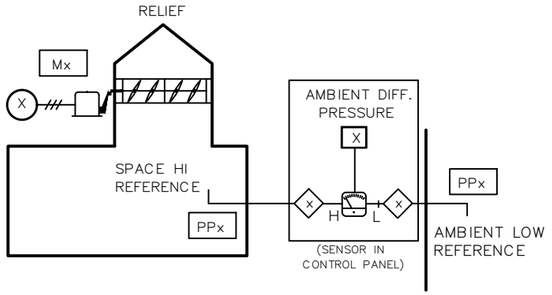
EXHAUST FAN – BAS CONTROLLED
EF–D3



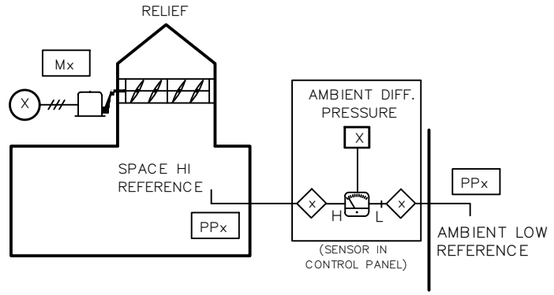
BUILDING PRESSURE CONTROL
E–RH–P1



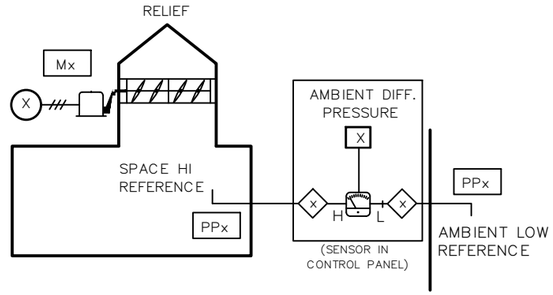
BUILDING PRESSURE CONTROL
E–RH–P2



BUILDING PRESSURE CONTROL
RH–P3



BUILDING PRESSURE CONTROL
RH–P4



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA P EXHAUST & RELIEF FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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CONTRACT NO:

SHEET
NCHS–373
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-D3 STAT	Exhaust Fan D3 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-P1 DPR	Relief Air Damper			X		
E-RH-P2 DPR	Relief Air Damper			X		
RH-P3 DPR	Relief Air Damper			X		
RH-P4 DPR	Relief Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-D3 SS	Exhaust Fan D3 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**11**	**6**	**9**	**3**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
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VAV AIR HANDLING UNIT AHU-P2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFPn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

Delta Controls
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4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
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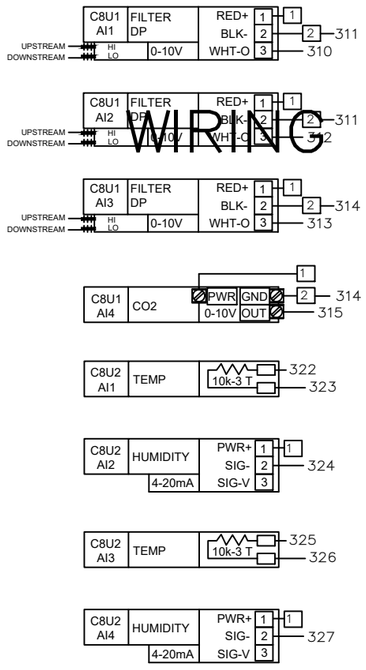
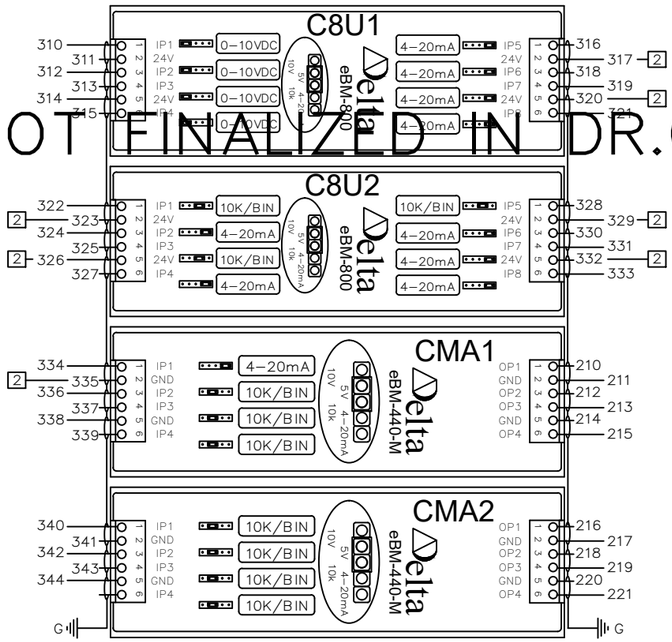
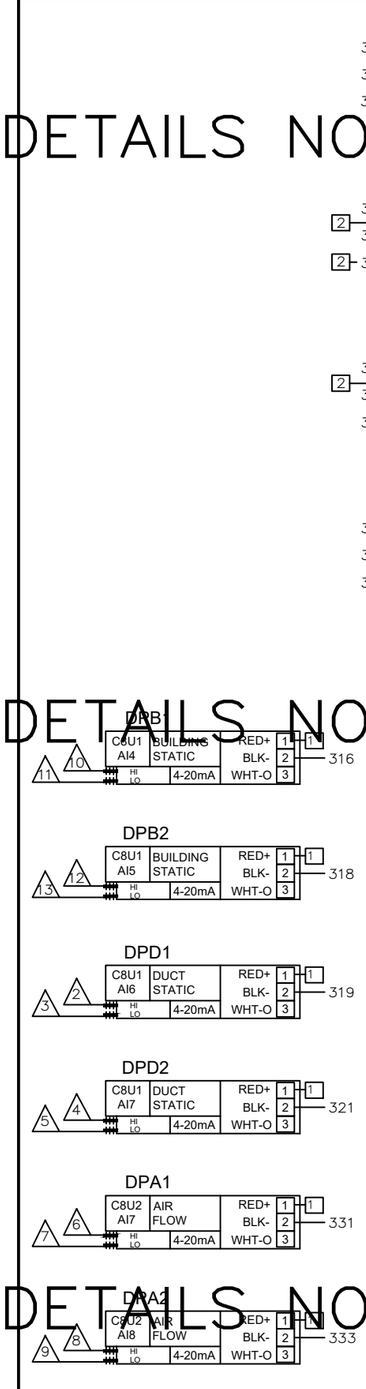
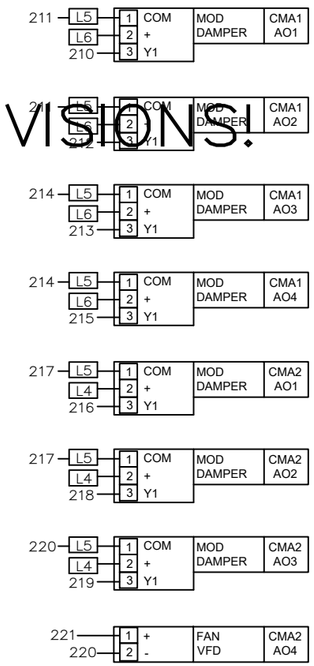
SHEET
NCHS-375
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

E-AHU-P2 SYSTEM 46 PANEL – I/O WIRING (1 OF 2)

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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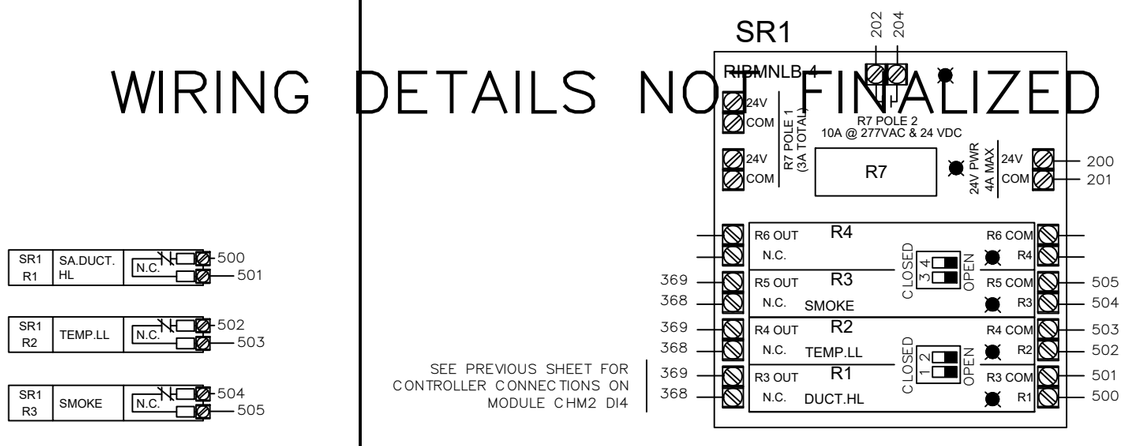

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CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

AHU-P2 SYSTEM 46 PANEL - I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
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SYSTEM 46 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

300 301 L3

V1- V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

24V COM

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 (N.O. CONTACT)

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED OPEN

TX1

24V CB 24V CB

Power Power

100 L2 L3 H C G

120 VAC LAPTOP PWR

75VA 24VAC 24VAC 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V -V GND L N

300 301 101 L2 L3

PS1

1.0A 101

5.0A 100

G

PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

DPD1 DPB1 DPB2 DPB3 DPB4

1

Power + GND / 4-20mA out - Voltage out 0

HIGH LOW

PNEUMATIC

2 3 4 5 6 7 8 9 10 11

11 10 9 8 7 6 5 4 3 2

201 200

CEB1

PWR 24~ GND

USB2 USB1

(NOT USED)

eBMGR-2

NET1 RS-485 NET2 RS-485

LAN 1 LAN 2 LAN 3

MS/TP

C8X1

eBX

eBUS Address

eBUS

P7 24Vs IP8 P5 24Vs IP6

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

E-AHU-P2 SYSTEM 46 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

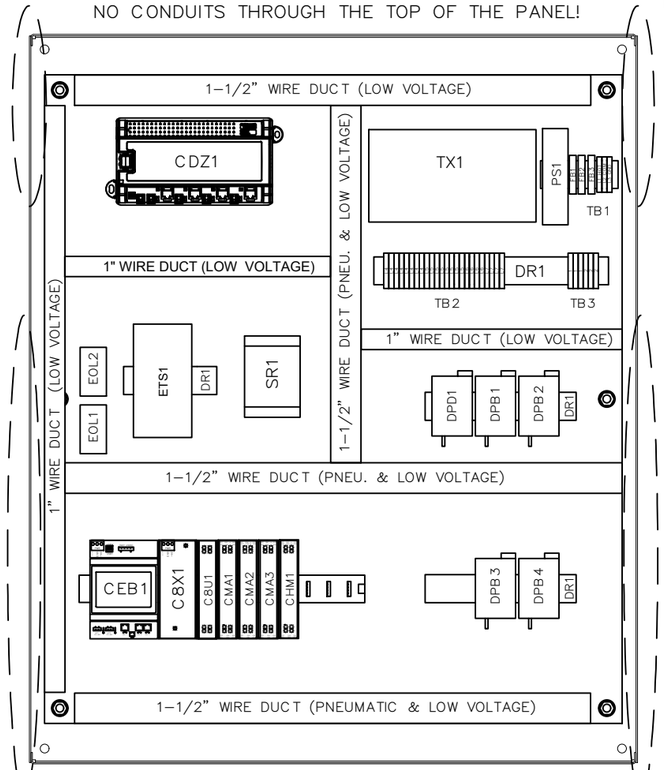
CONTRACT NO:

SHEET
NCHS-378
JOB NUMBER:
J-2304001

SYSTEM CONTROL PANEL 46 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

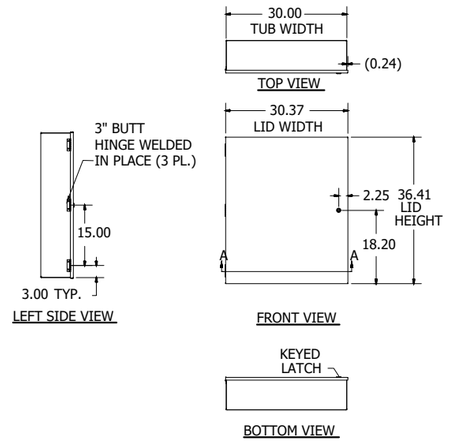
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

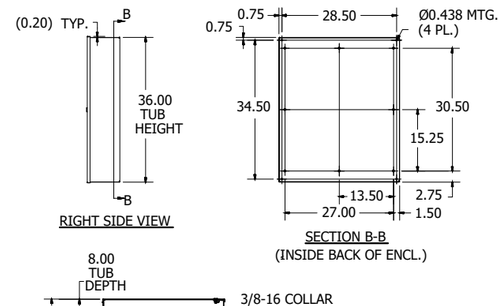
BILL OF MATERIALS

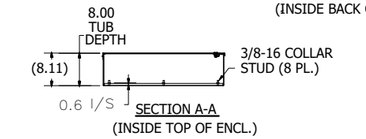
BILL OF MATERIALS

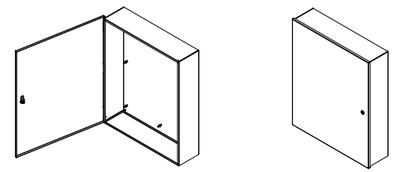
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

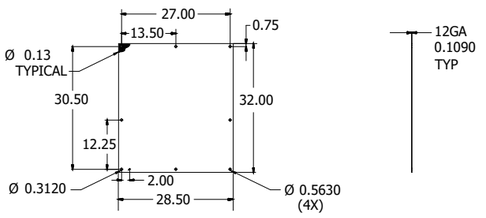








PANEL DIMENSIONS



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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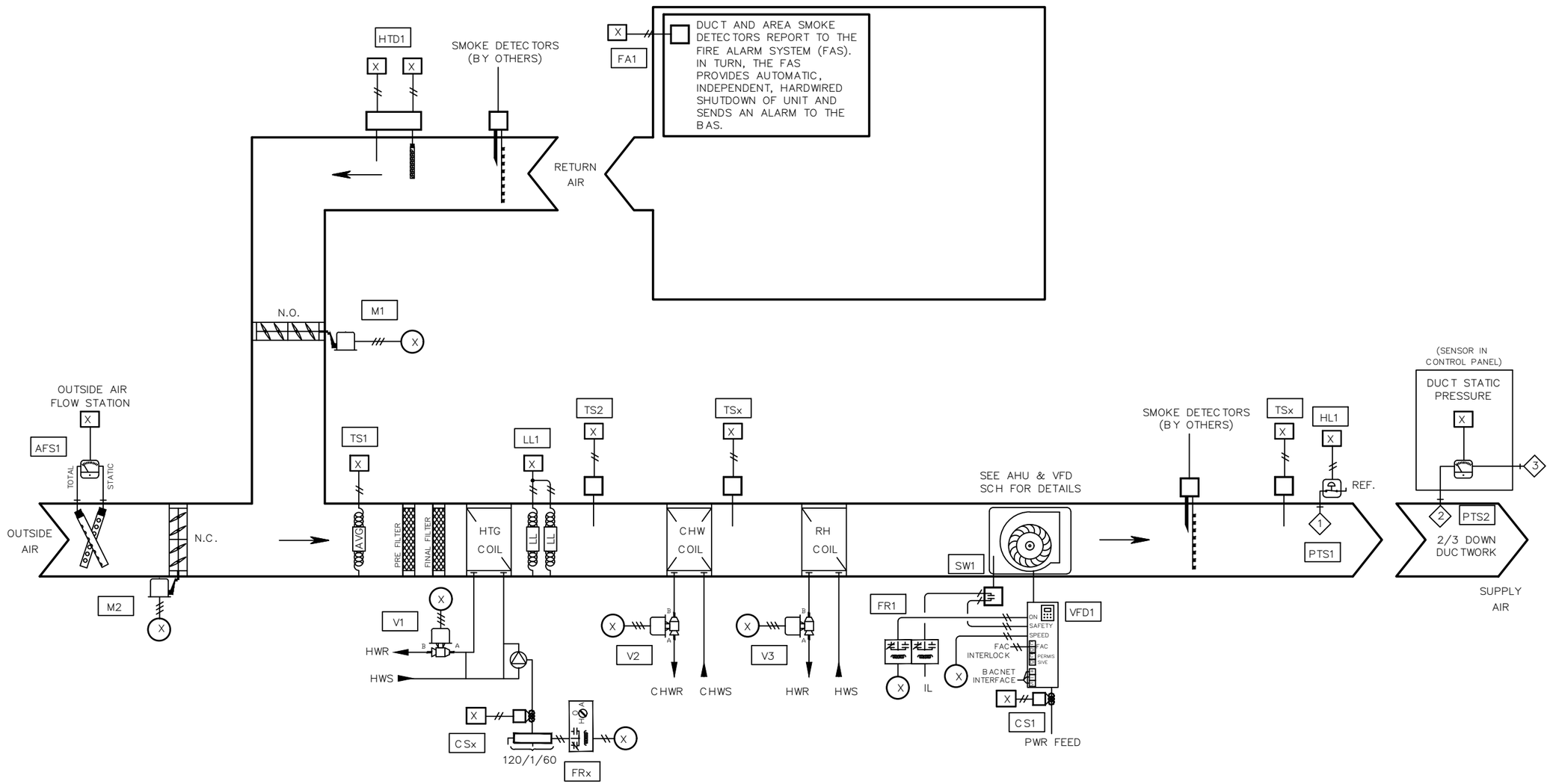
E–AHU–Q1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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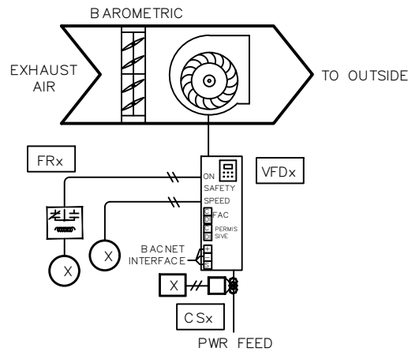
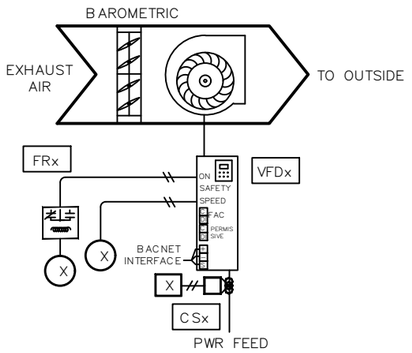
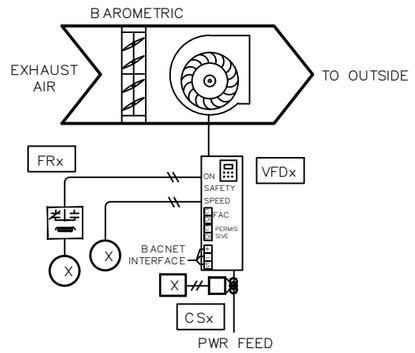
EXHAUST FAN – BAS CONTROLLED
EF–Q3



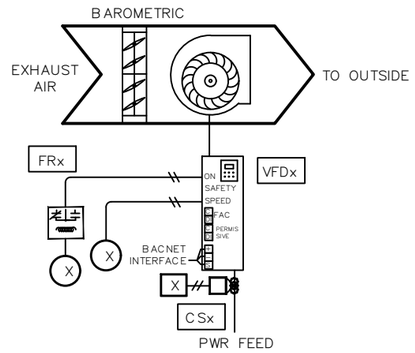
EXHAUST FAN – BAS CONTROLLED
EF–Q4



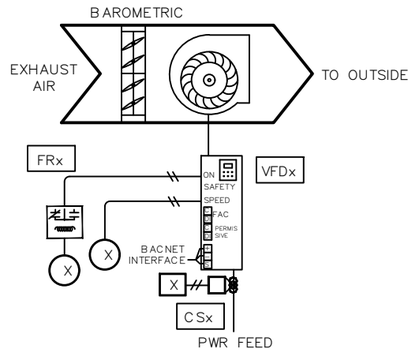
EXHAUST FAN – BAS CONTROLLED
EF–Q11



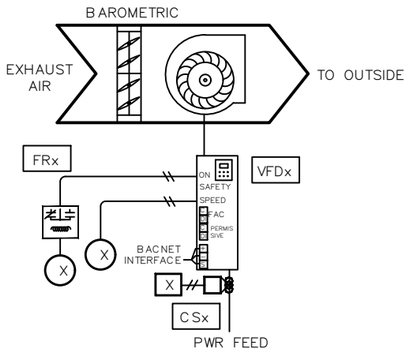
EXHAUST FAN – BAS CONTROLLED
EF–Q12



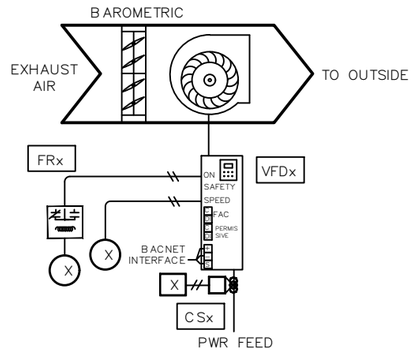
EXHAUST FAN – BAS CONTROLLED
EF–Q16



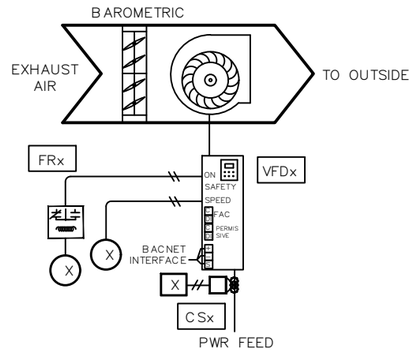
EXHAUST FAN – BAS CONTROLLED
EF–Q20



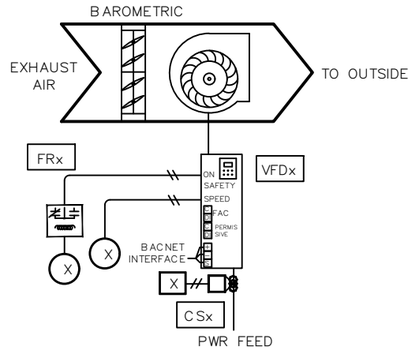
EXHAUST FAN – BAS CONTROLLED
EF–Q23



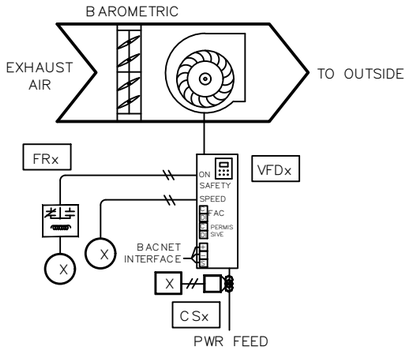
EXHAUST FAN – BAS CONTROLLED
EF–Q24



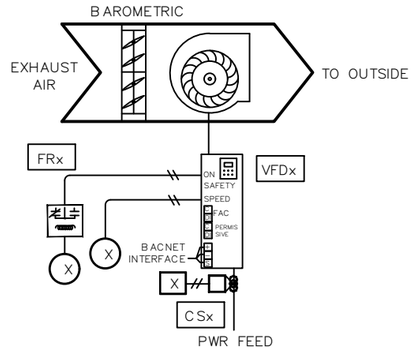
EXHAUST FAN – BAS CONTROLLED
EF–R2



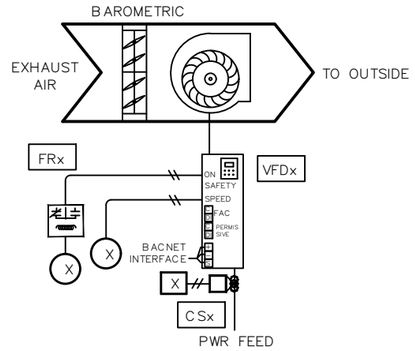
EXHAUST FAN – BAS CONTROLLED
EF–R3



EXHAUST FAN – BAS CONTROLLED
EF–R4



EXHAUST FAN – BAS CONTROLLED
EF–R5



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA Q EXHAUST FIELD DEVICES (1 OF 2)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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SHEET
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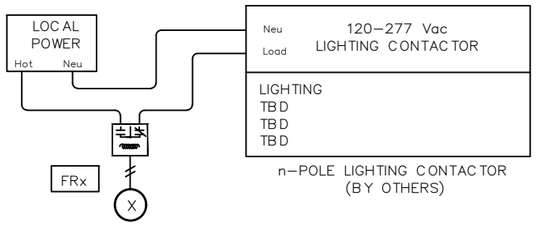
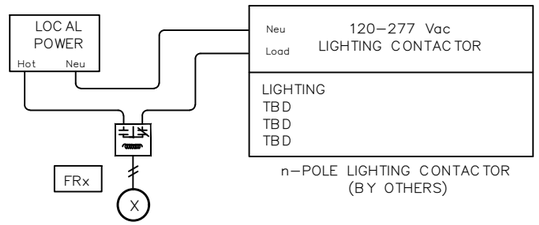
JOB NUMBER:
J–2304001

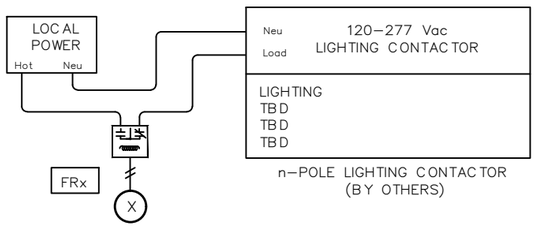
LIGHTING CONTACTOR CONTROLS
RR–3 – ZONE 4



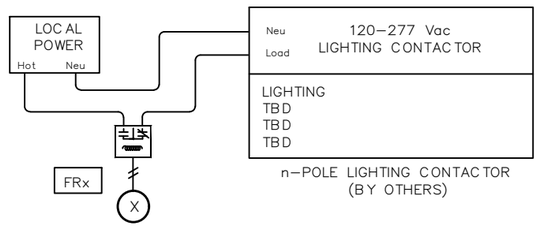
LIGHTING CONTACTOR CONTROLS
RR–4 – ZONE 8



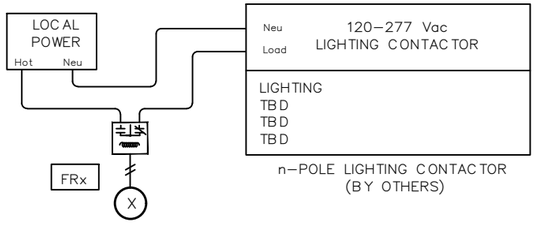
LIGHTING CONTACTOR CONTROLS
RR–5 – ZONE 12



LIGHTING CONTACTOR CONTROLS
RR–6 – ZONE 12

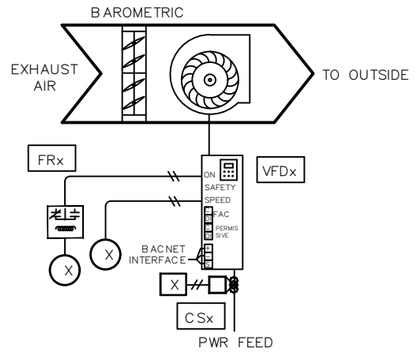


LIGHTING CONTACTOR CONTROLS
RR–7 – ZONE 12

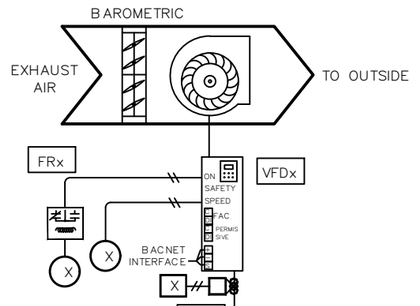


BILL OF MATERIAL

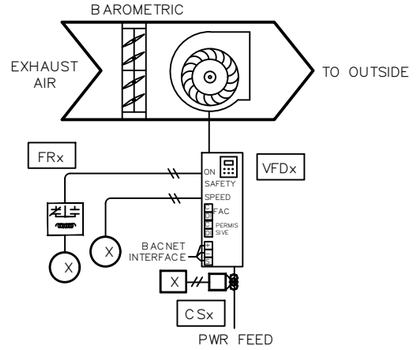
EXHAUST FAN – BAS CONTROLLED
EF–R13



EXHAUST FAN – BAS CONTROLLED
EF–R16



EXHAUST FAN – BAS CONTROLLED
EF–R17



NETWORK POINTS

N1 THROUGH Nx

AREA Q EXHAUST & LIGHTING FIELD DEVICES (2 OF 2)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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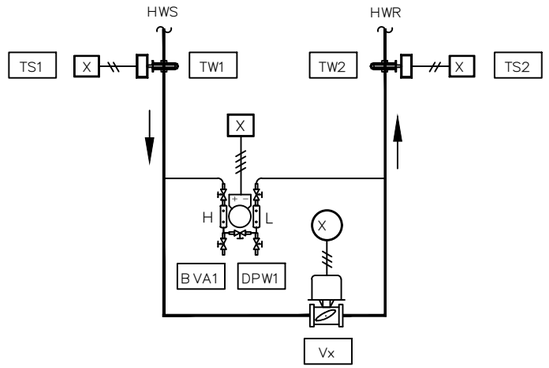
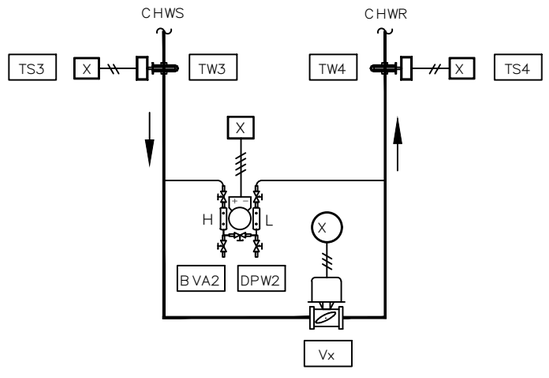
END OF LOOP CONTROLS – HOT WATER
(PENTHOUSE 'Q' WEST BUILDING)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. ARE LOCATED AT AHU–Q1)



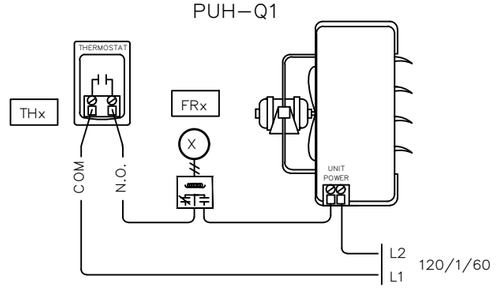
END OF LOOP CONTROLS – CHILL WATER
(PENTHOUSE 'Q' WEST BUILDING)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. ARE LOCATED AT AHU–Q1)

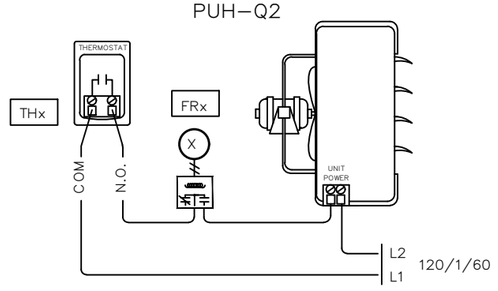


BILL OF MATERIAL

PROPELLER UNIT HEATER
PUH–Q1



PROPELLER UNIT HEATER
PUH–Q2



NETWORK POINTS
N1 THROUGH Nx

AREA Q WEST BUILDING END OF LOOP PRESSURE CONTROL & PROPELLER UNIT HEATER FIELD DEVICES

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
CHWR WEST EOL	Chill Water Return Temp	X				
CHWS WEST EOL	Chill Water Supply Temp	X				
CW DP WEST EOL	End of Loop Diff Pressure - West Bldg	X				
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
HW DP WEST EOL	End of Loop Diff Pressure - West Bldg	X				
HWR WEST EOL	Hot Water Return Temp	X				
HWS WEST EOL	Hot Water Supply Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-Q11 STAT	Exhaust Fan Q11 Status		X			
EF-Q12 STAT	Exhaust Fan Q12 Status		X			
EF-Q16 STAT	Exhaust Fan Q16 Status		X			
EF-Q20 STAT	Exhaust Fan Q20 Status		X			
EF-Q23 STAT	Exhaust Fan Q23 Status		X			
EF-Q24 STAT	Exhaust Fan Q24 Status		X			
EF-Q3 STAT	Exhaust Fan Q3 Status		X			
EF-Q4 STAT	Exhaust Fan Q4 Status		X			
EF-R13 STAT	Exhaust Fan R13 Status		X			
EF-R16 STAT	Exhaust Fan R16 Status		X			
EF-R17 STAT	Exhaust Fan R17 Status		X			
EF-R2 STAT	Exhaust Fan R2 Status		X			
EF-R3 STAT	Exhaust Fan R3 Status		X			
EF-R4 STAT	Exhaust Fan R4 Status		X			
EF-R5 STAT	Exhaust Fan R5 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CW BYP VLV	EOL Bypass Valve - West Bldg			X		
CWV	Chill Water Valve			X		
HW BYP VLV	EOL Bypass Valve - West Bldg			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
EF-Q11 SS	Exhaust Fan Q11 Fan Start / Stop				X	
EF-Q12 SS	Exhaust Fan Q12 Fan Start / Stop				X	
EF-Q16 SS	Exhaust Fan Q16 Fan Start / Stop				X	
EF-Q20 SS	Exhaust Fan Q20 Fan Start / Stop				X	
EF-Q23 SS	Exhaust Fan Q23 Fan Start / Stop				X	
EF-Q24 SS	Exhaust Fan Q24 Fan Start / Stop				X	
EF-Q3 SS	Exhaust Fan Q3 Fan Start / Stop				X	
EF-Q4 SS	Exhaust Fan Q4 Fan Start / Stop				X	
EF-R13 SS	Exhaust Fan R13 Fan Start / Stop				X	
EF-R16 SS	Exhaust Fan R16 Fan Start / Stop				X	
EF-R17 SS	Exhaust Fan R17 Fan Start / Stop				X	
EF-R2 SS	Exhaust Fan R2 Fan Start / Stop				X	
EF-R3 SS	Exhaust Fan R3 Fan Start / Stop				X	
EF-R4 SS	Exhaust Fan R4 Fan Start / Stop				X	
EF-R5 SS	Exhaust Fan R5 Fan Start / Stop				X	
LTG 1	Lighting Contactor - Zone 4 RR-3				X	
LTG 2	Lighting Contactor - Zone 8 RR-4				X	
LTG 3	Lighting Contactor - Zone 12 RR-5				X	
LTG 4	Lighting Contactor - Zone 12 RR-6				X	
LTG 5	Lighting Contactor - Zone 12 RR-7				X	
PUH-Q1 EN	PUH Q1 Enable				X	
PUH-Q2 EN	PUH Q2 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**14**	**20**	**8**	**24**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
Temperature Control Services
4240 W 50 S
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VAV AIR HANDLING UNIT AHU-Q1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

END OF LOOP CONTROLS (FROM PREVIOUS BAS CONTROL SEQUENCES):

THE TEMPERATURE OF THE SUPPLY WATER TO THE EQUIPMENT ROOM WILL BE USED TO POSITION THE END OF LOOP TEMPERATURE VALVE TO MAINTAIN THE CHILLED WATER SUPPLY AT 48 DEG. F AND THE HEATING WATER SUPPLY AT 145 DEG. F. THE PRESSURE TRANSMITTER WILL BE USED IN THE RESET OF THE PUMP VOLUME CONTROL SUCH THAT THE PUMP WILL MAINTAIN THE PROPER PRESSURE AT THE END OF THE MAIN.

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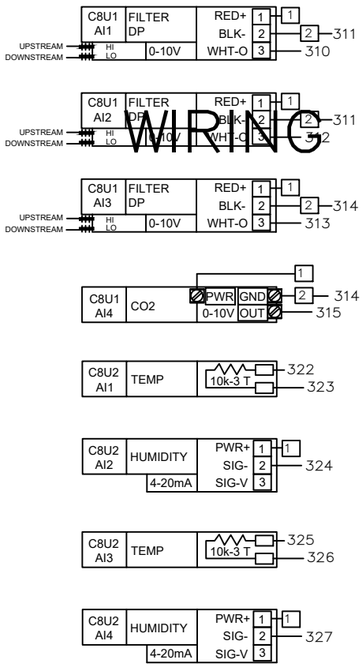

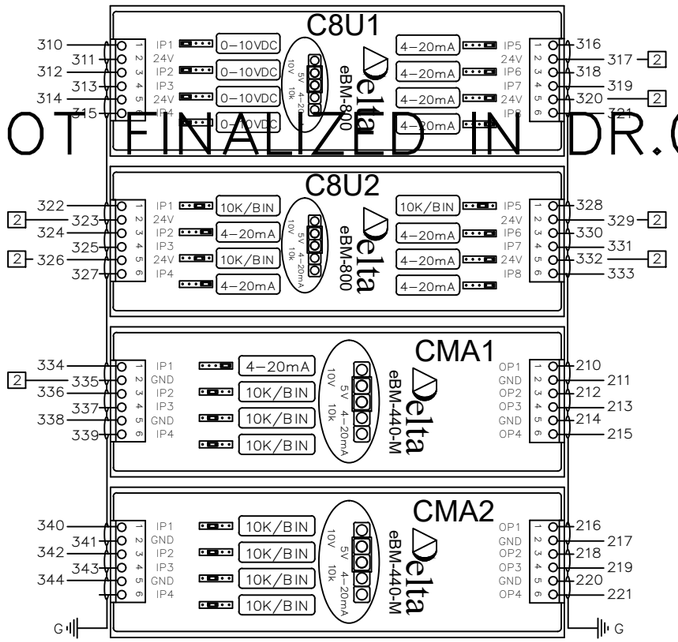

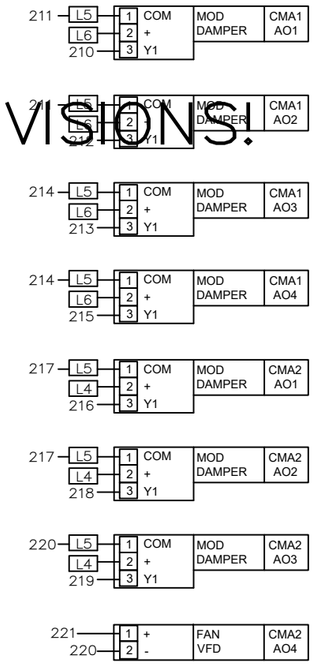

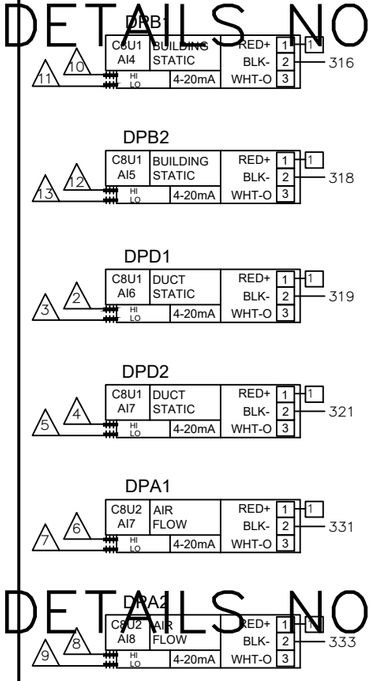

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	INPUTS
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	INPUTS
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	INPUTS
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	INPUTS
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	INPUTS
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	INPUTS
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	INPUTS

C8U1 eBM-800 — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	INPUTS
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	INPUTS
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	INPUTS
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	INPUTS
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	INPUTS
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	INPUTS
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	INPUTS

C8U2 eBM-800 — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	INPUTS
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	INPUTS
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	INPUTS
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	OUTPUTS
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	OUTPUTS
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	OUTPUTS

CMA1 eBM-440-M — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	INPUTS
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	INPUTS
CMA2	4	10100.1404				INPUTS
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	OUTPUTS
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	OUTPUTS
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	OUTPUTS

CMA2 eBM-440-M — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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AHU-Q1 SYSTEM 47 PANEL – I/O WIRING (1 OF 4)

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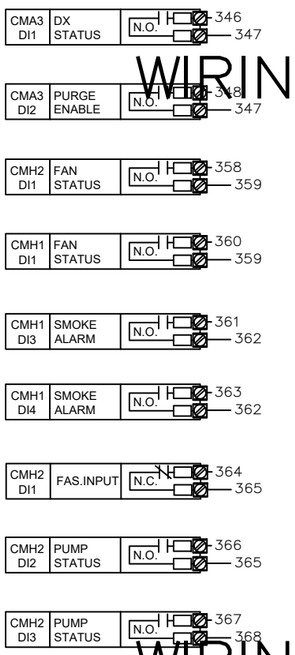
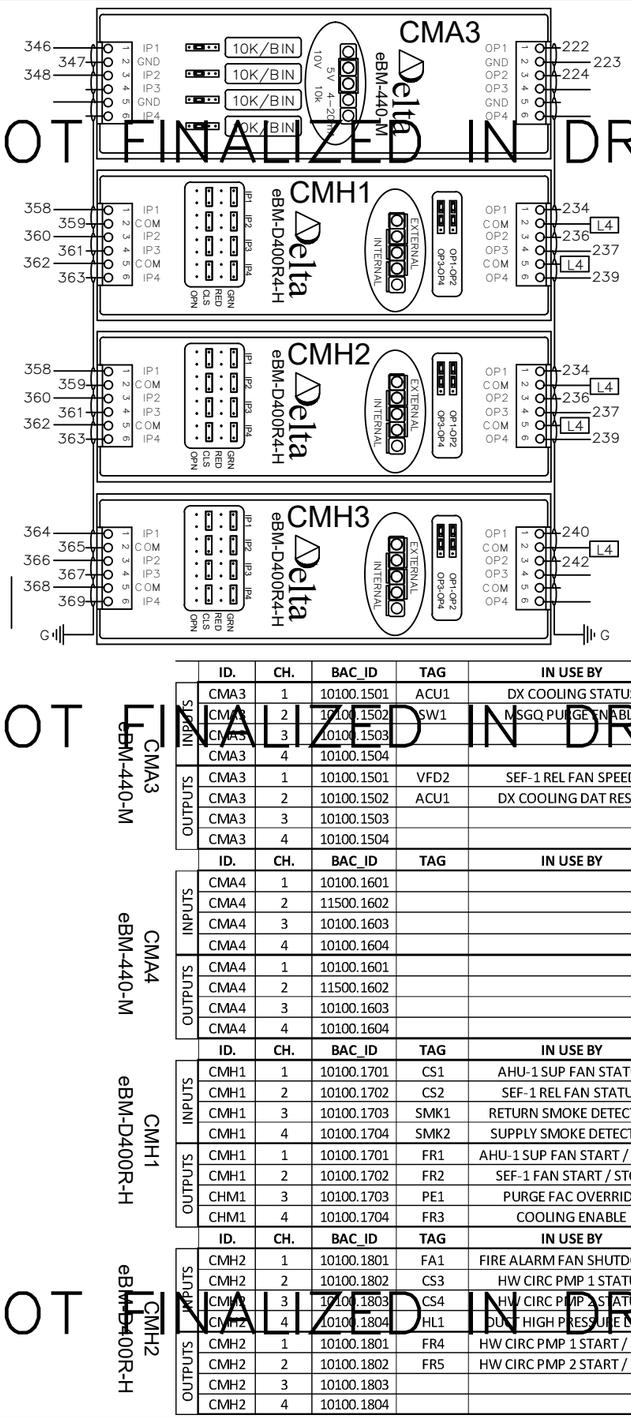
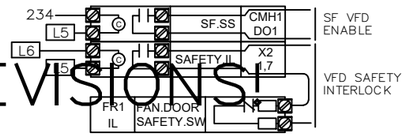




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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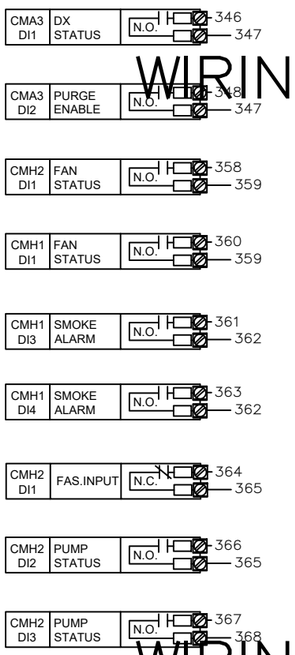

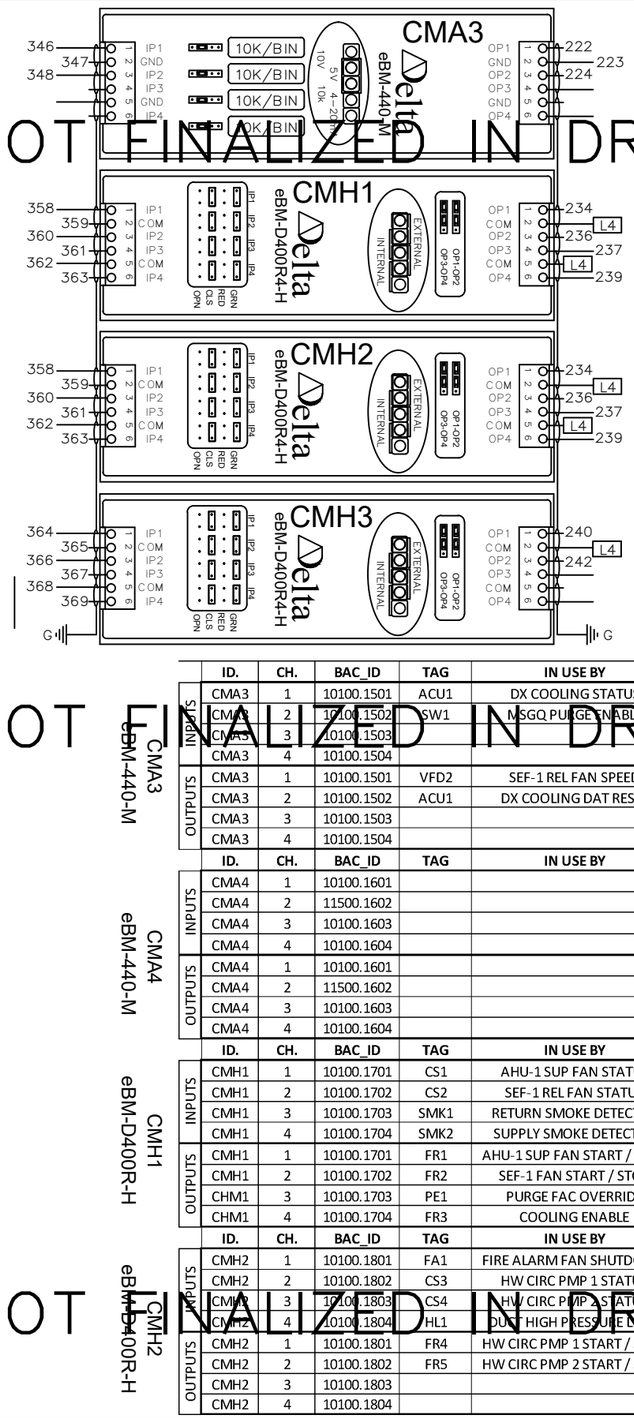

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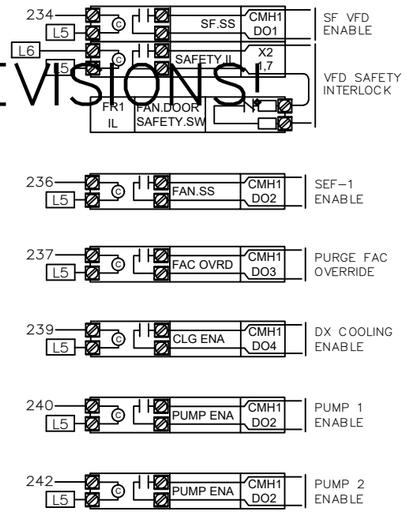

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–388
JOB NUMBER:
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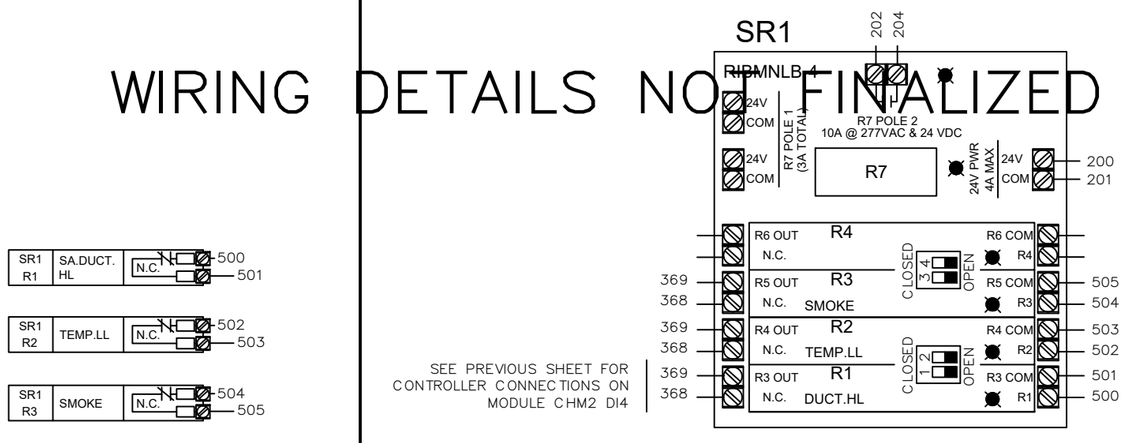

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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SYSTEM 47 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TRANSFORMER

102 L2

206 207

TX1

24V CB Power

24V CB Power

100 H C G L2 L3

75VA 24VAC 24VAC

120 VAC LAPTOP PWR

75VA 24VAC 24VAC

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 L3 101 L2

PS1

102 4.0A

101 1.0A

100 5.0A

G PANEL GND LUG

TB1

L1 L2 L3

H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

206 L8 L8 L8

207 L9 L9 L9

24 VAC TO FIELD

300 301 L3

ETS1

V1− V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

200 201 24V COM 202 204

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 AMP PILOT DUTY

R7

R4 OUT N.C. R4 COM R4

R3 OUT N.C. R3 COM R3

R2 OUT N.C. R2 COM R2

R1 OUT N.C. R1 COM R1

CLOSED OPEN

DPD1

Power + GND / 4-20mA out − Voltage out 0

HIGH LOW

PNEUMATIC

2 3

3 2

CEB1

201 200 PWR GND 24~

USB2 USB1 (NOT USED)

NET1 RS-485 NET2 RS-485

MS/TP

C8X1

eBX

eBUS Address

eBUS

eBMGR-2

eBM-800 eBM-800 eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

eNET BUS

C4X1

eBX

eBUS Address

eBUS

eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

SEE RISER DIAGRAMS FOR LOCATION

AHU-Q1 SYSTEM 47 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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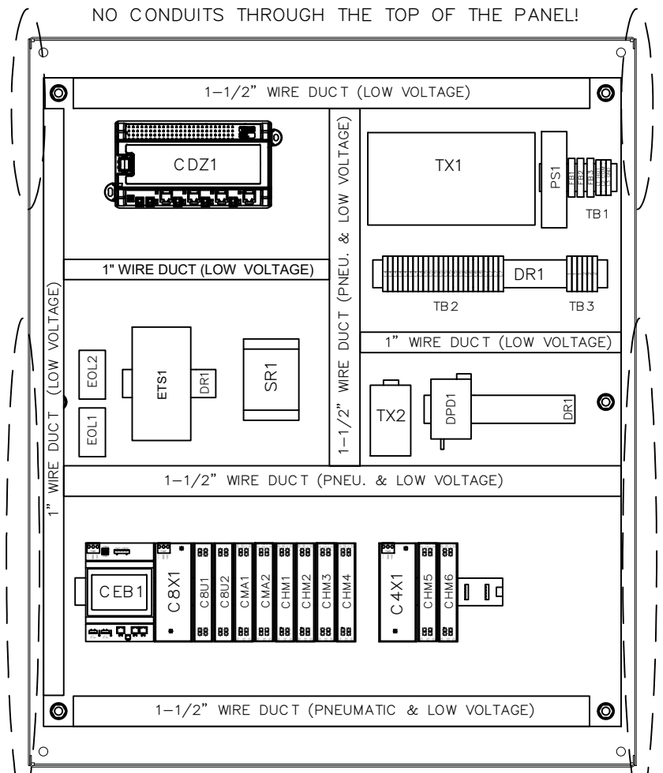
SYSTEM CONTROL PANEL 47 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

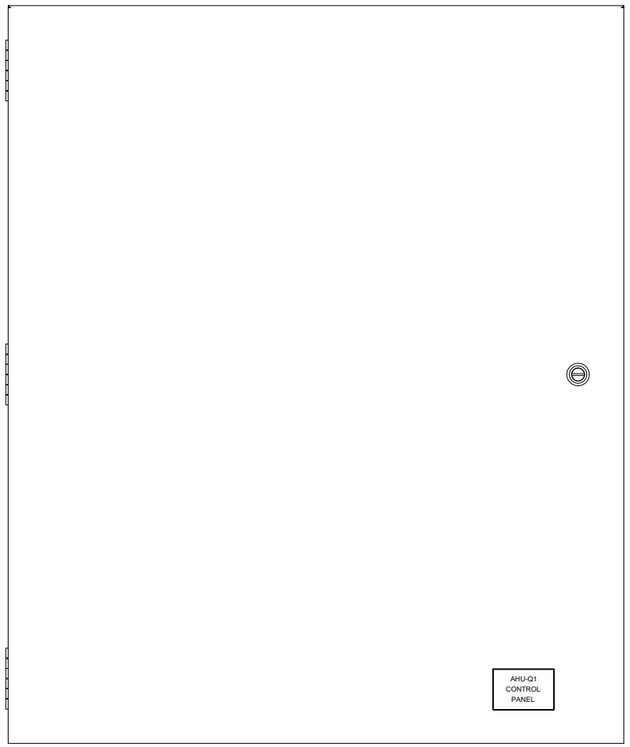


PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

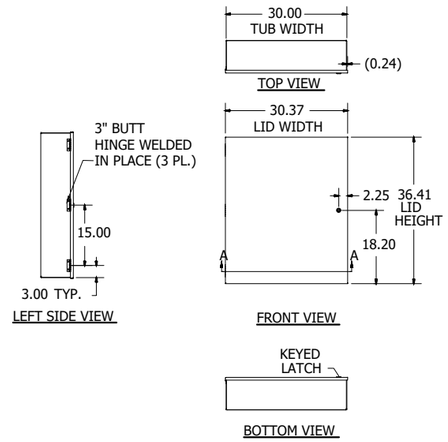


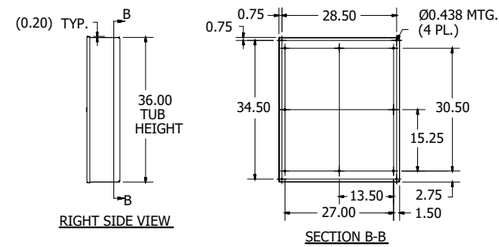
BILL OF MATERIALS

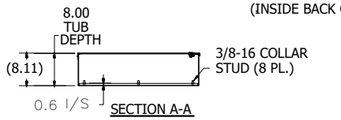
BILL OF MATERIALS

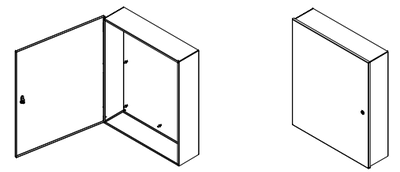
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

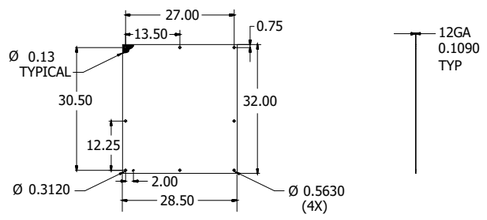








PANEL DIMENSIONS



AHU–Q1 SYSTEM 47 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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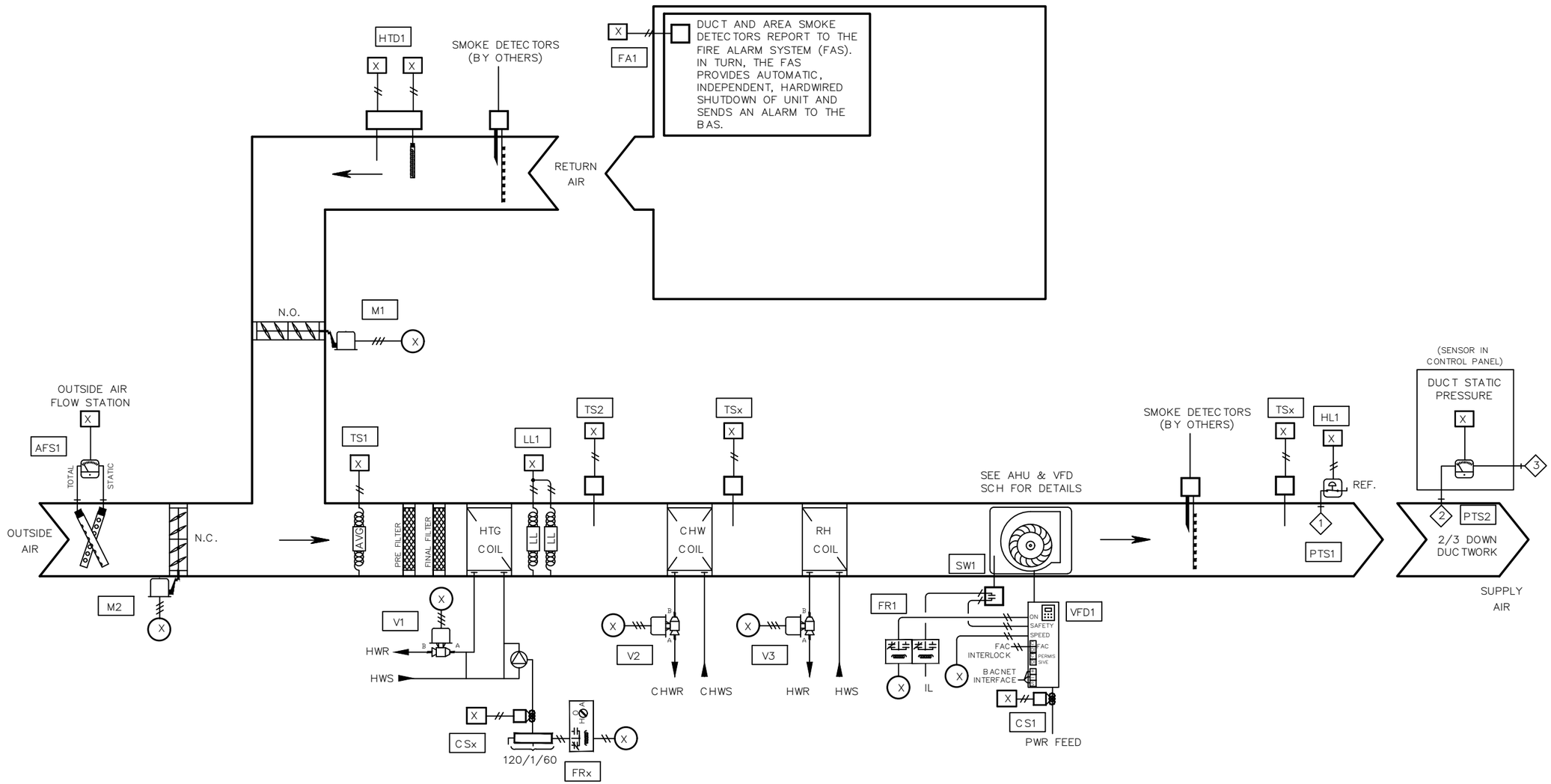
E–AHU–Q2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–Q2 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
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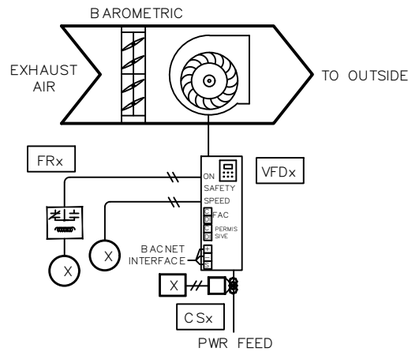
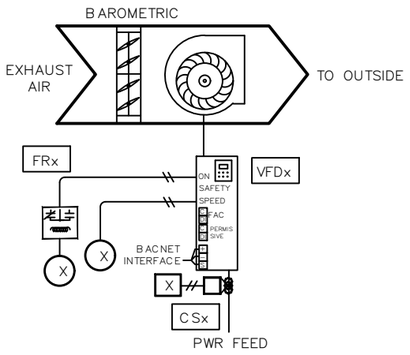
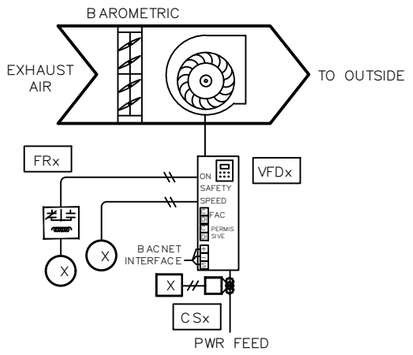
EXHAUST FAN – BAS CONTROLLED
EF–Q26



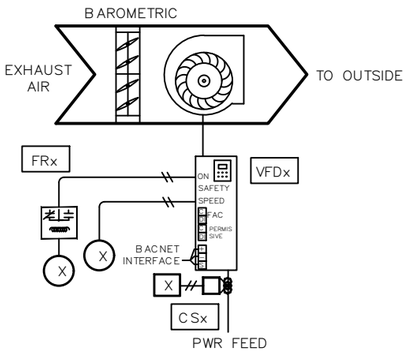
EXHAUST FAN – BAS CONTROLLED
EF–Q27



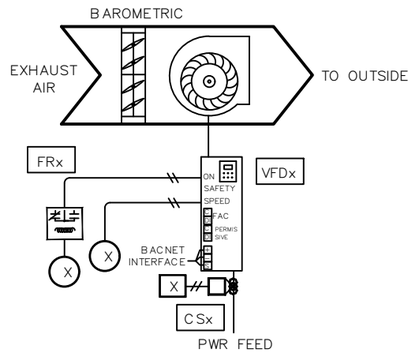
EXHAUST FAN – BAS CONTROLLED
EF–Q28



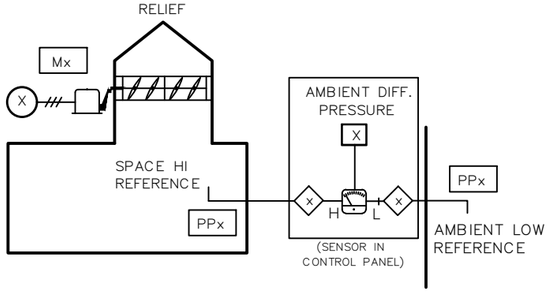
EXHAUST FAN – BAS CONTROLLED
EF–Q29



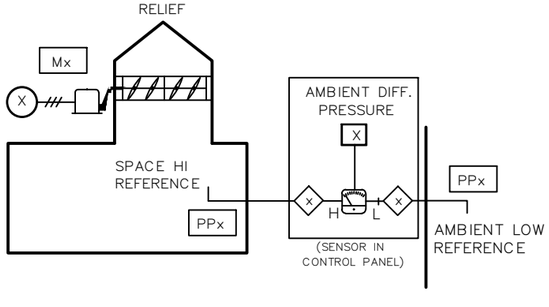
EXHAUST FAN – BAS CONTROLLED
EF–Q30



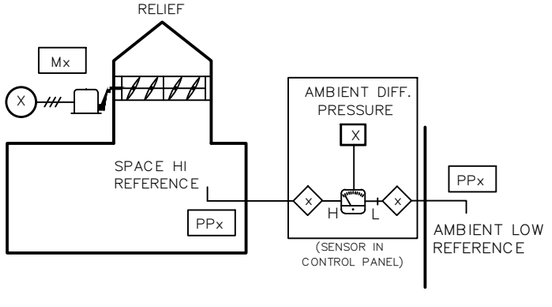
BUILDING PRESSURE CONTROL
E–RH–Q1



BUILDING PRESSURE CONTROL
E–RH–Q2



BUILDING PRESSURE CONTROL
RH–Q3



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA Q EXHAUST & RELIEF FIELD DEVICES

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-Q26 STAT	Exhaust Fan Q26 Status		X			
EF-Q27 STAT	Exhaust Fan Q27 Status		X			
EF-Q28 STAT	Exhaust Fan Q28 Status		X			
EF-Q29 STAT	Exhaust Fan Q29 Status		X			
EF-Q30 STAT	Exhaust Fan Q30 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-Q1 DPR	Relief Air Damper			X		
E-RH-Q2 DPR	Relief Air Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-Q3 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-Q26 SS	Exhaust Fan Q26 Fan Start / Stop				X	
EF-Q27 SS	Exhaust Fan Q27 Fan Start / Stop				X	
EF-Q28 SS	Exhaust Fan Q28 Fan Start / Stop				X	
EF-Q29 SS	Exhaust Fan Q29 Fan Start / Stop				X	
EF-Q30 SS	Exhaust Fan Q30 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**11**	**10**	**9**	**7**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

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VAV AIR HANDLING UNIT AHU-Q2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFQn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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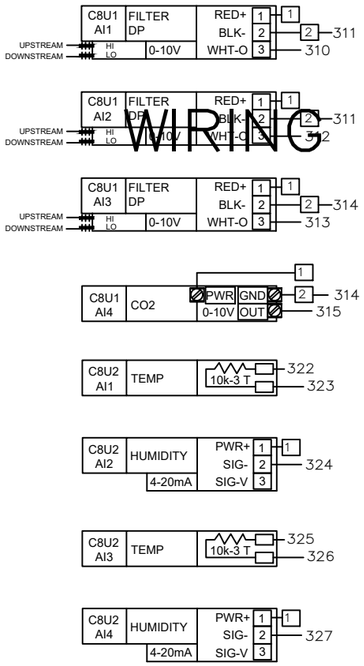
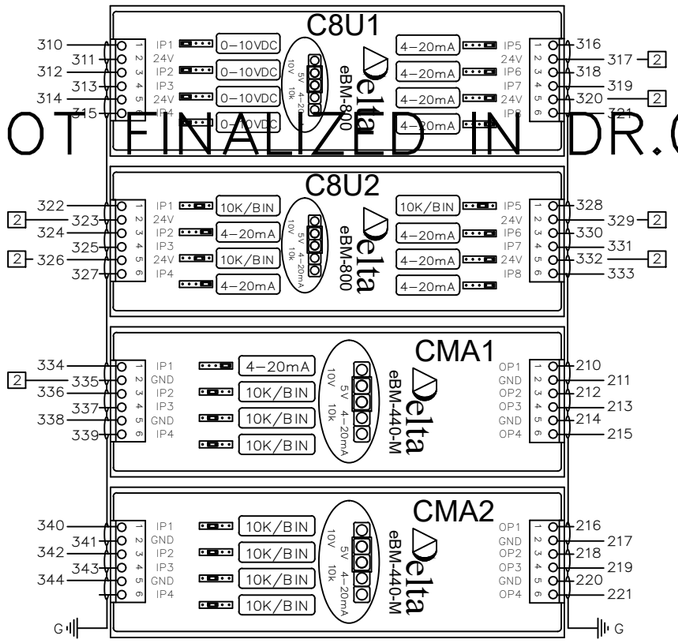
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

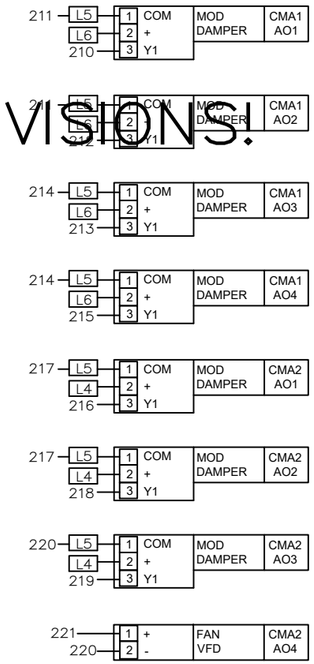
CONTRACT NO:

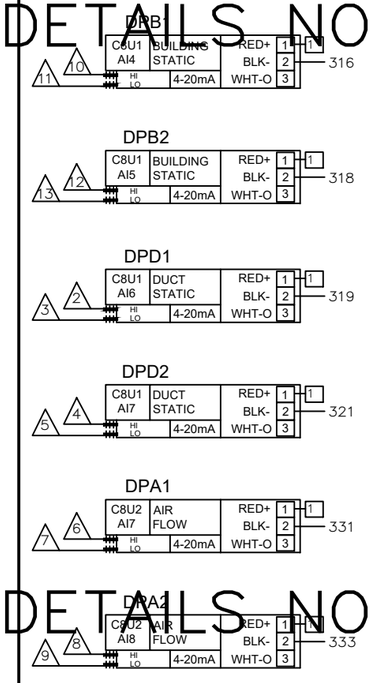
SHEET
NCHS-395
JOB NUMBER:
J-2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	C8U1 eBM-800
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO	
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO	
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510	
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201	
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201	
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200	
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	C8U2 eBM-800
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101	
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101	
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101	
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101	
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101	
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201	
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	CMA1 eBM-440-M
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001	
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002	
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301	
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206	
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206	
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206	

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	CMA2 eBM-440-M
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003	
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO	
CMA2	4	10100.1404				
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208	
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208	
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO	

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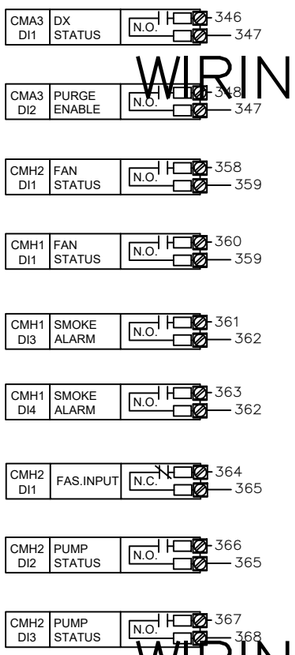
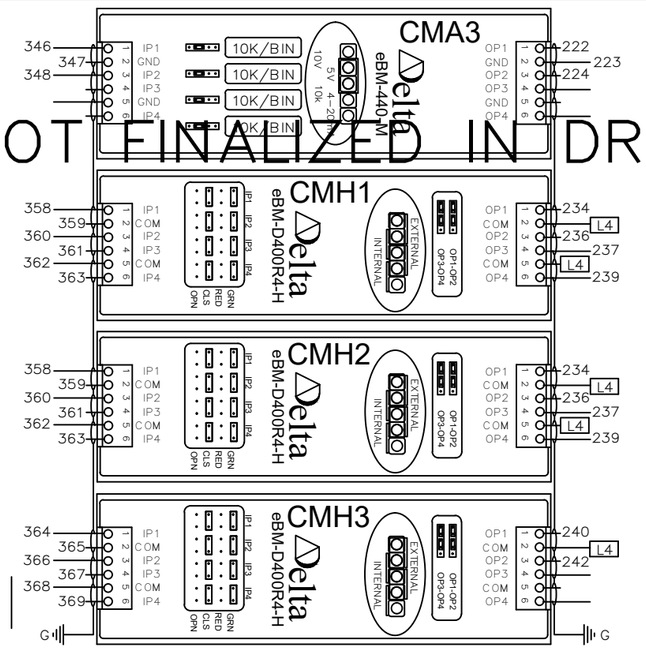
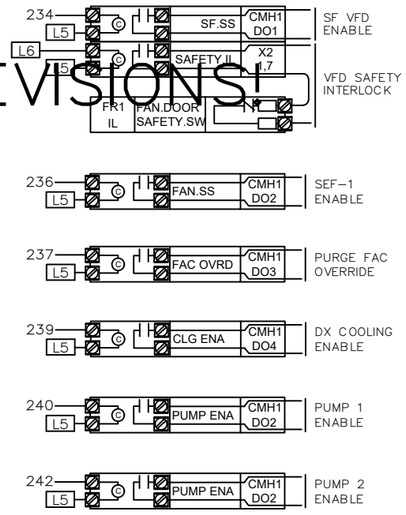




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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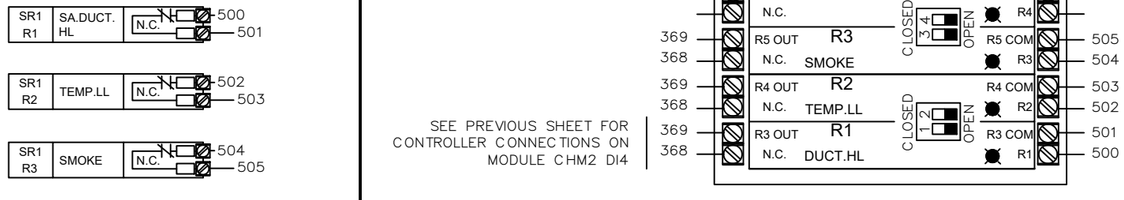

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU–Q2 SYSTEM 48 PANEL – I/O WIRING (3 OF 3)

Delta Controls
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SYSTEM 48 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND L3 200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301 300 L3

V1- V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 (N.O. CONTROL)

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED OPEN

TX1

24V CB 24V CB

Power Power

100 L2 L3 H C G

120 VAC LAPTOP PWR

75VA 24VAC 24VAC 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V -V GND L N

300 301 101 L2 L3

PS1

1.0A 101

5.0A 100

G

PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

DPD1 DPB1 DPB2 DPB3

Power + GND / 4-20mA out - Voltage out 0

HIGH LOW

PNEUMATIC

2 3 4 5 6 7 8 9

9 8 7 6 5 4 3 2

CEB1

201 200

PWR GND 24~

USB2 USB1 (NOT USED)

C8X1

201 200

PWR GND 24~

Delta eBX

eBUS Address

Delta eBMGR-2

NET1 RS-485 NET2 RS-485

ETH 1 ETH 2 ETH 3

eBUS

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

MS/TP

TO PANEL GND LUG L3

SEE RISER DIAGRAMS FOR LOCATION

AHU-Q2 SYSTEM 48 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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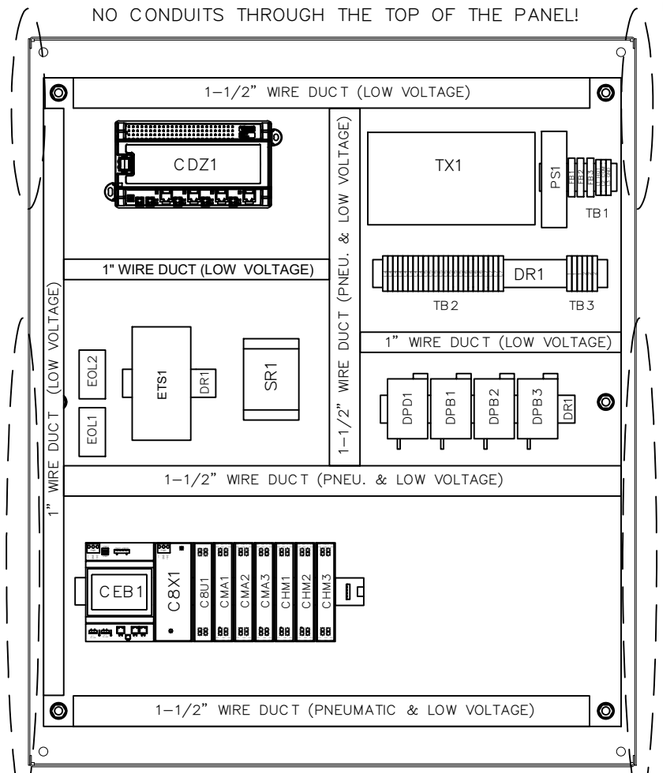
SYSTEM CONTROL PANEL 48 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

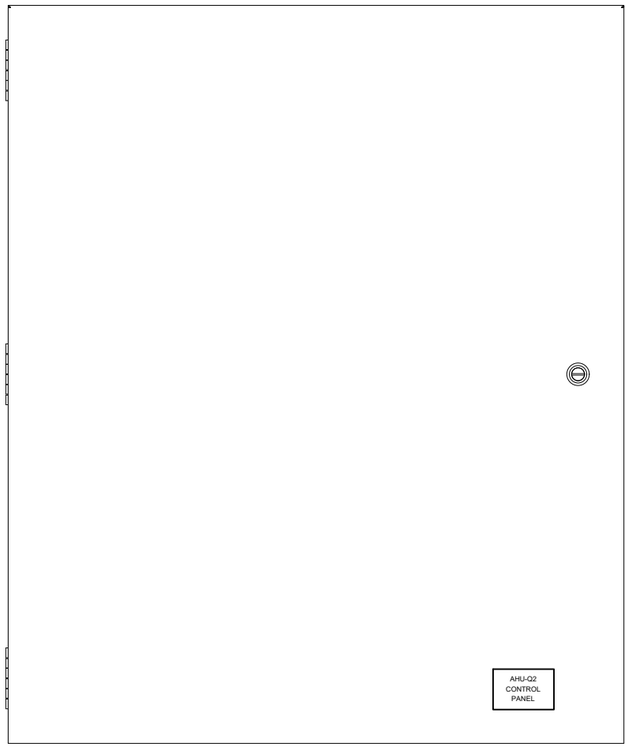
NO CONDUITS THROUGH THE TOP OF THE PANEL!



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

HIGH VOLTAGE FEEDS ENTER IN THIS AREA



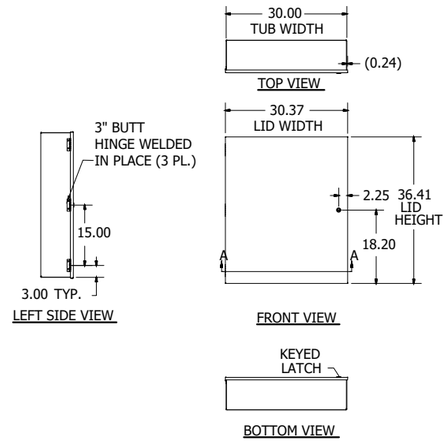
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

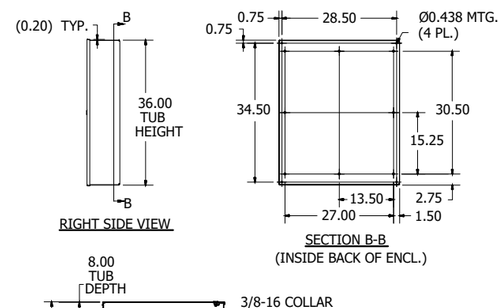
BILL OF MATERIALS

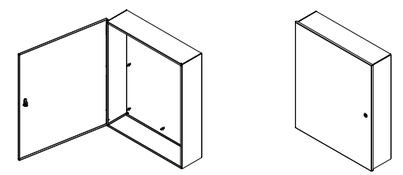
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

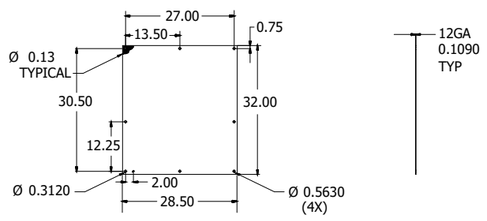
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



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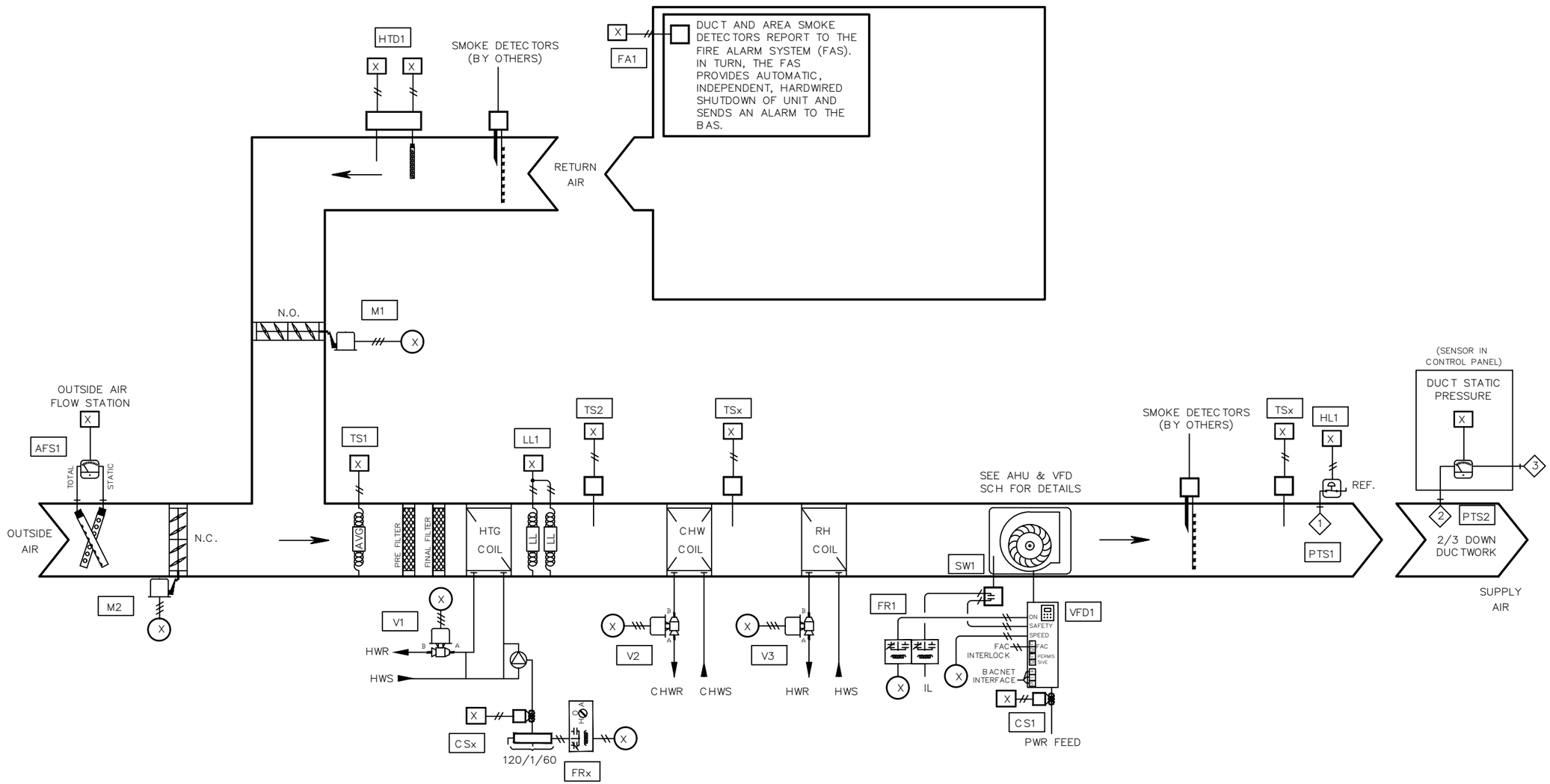
E–AHU–R1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–R1 FIELD DEVICES

Delta Controls

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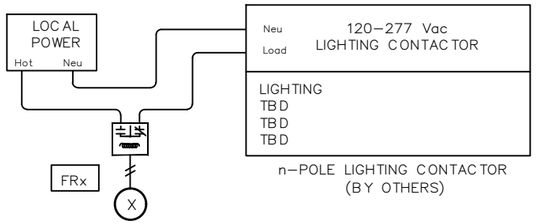
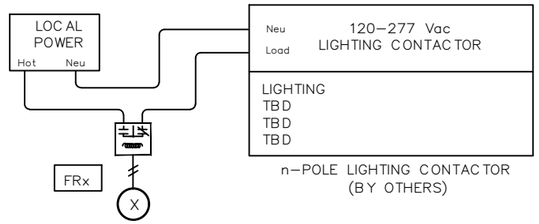
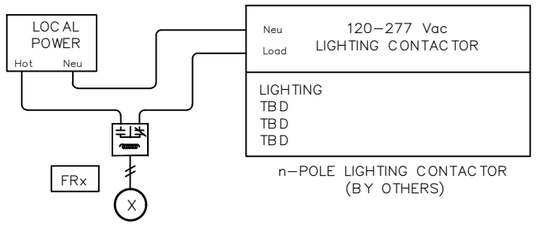
LIGHTING CONTACTOR CONTROLS
RR–1 – NORTH & WEST EXTERIOR



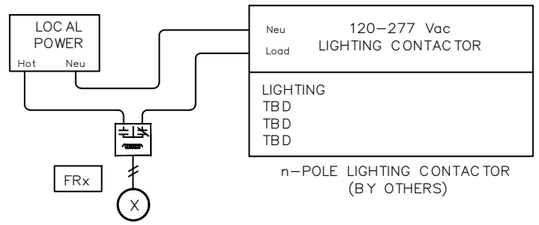
LIGHTING CONTACTOR CONTROLS
RU–1 – SOUTH PARKING



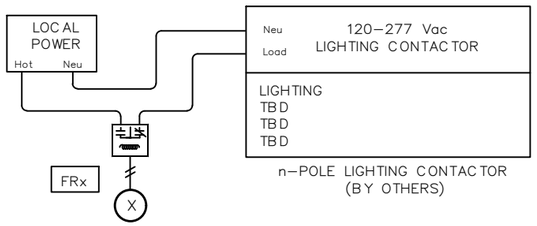
LIGHTING CONTACTOR CONTROLS
RZ–1 – SOUTH EXTERIOR AND WRESTLING



LIGHTING CONTACTOR CONTROLS
RZ–2 – WEST EXTERIOR & GYM



LIGHTING CONTACTOR CONTROLS
RZ–3 – SOUTH PARKING



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA R LIGHTING FIELD DEVICES

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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–402
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
LTG 1	Lighting Contactor - N & W Ext RR-1				X	
LTG 2	Lighting Contactor - S Pkg RU-1				X	
LTG 3	Lighting Contactor - S Ext & Wrst RZ-1				X	
LTG 4	Lighting Contactor - W Ext & Gym RZ-2				X	
LTG 5	Lighting Contactor - S Pkg RZ-3				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**8**	**5**	**6**	**7**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-R1 & AREA R MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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VAV AIR HANDLING UNIT AHU-R1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

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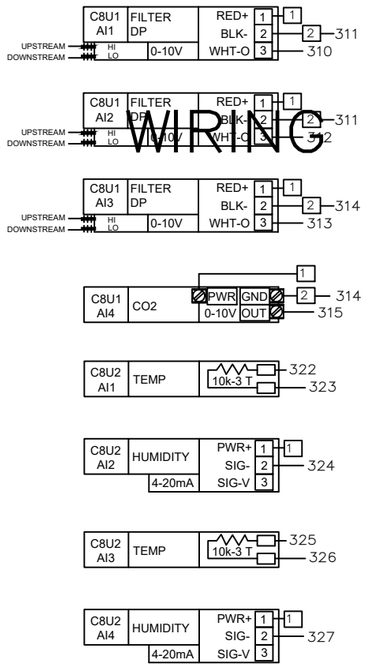
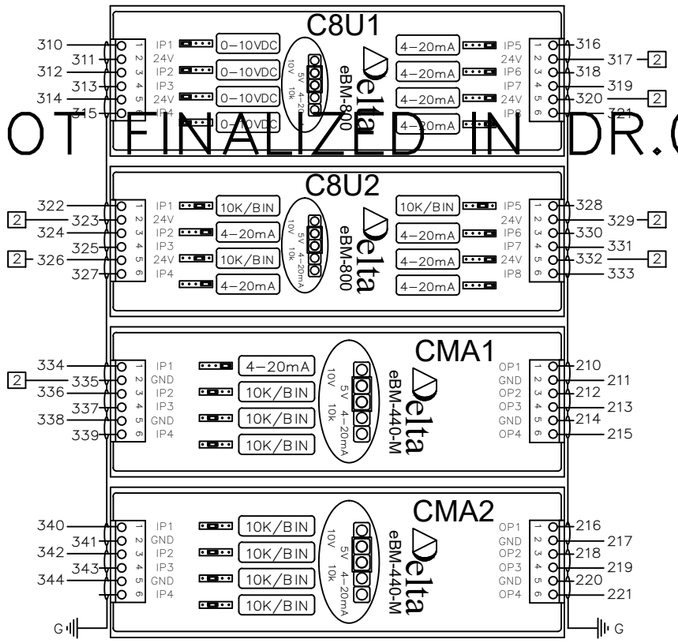
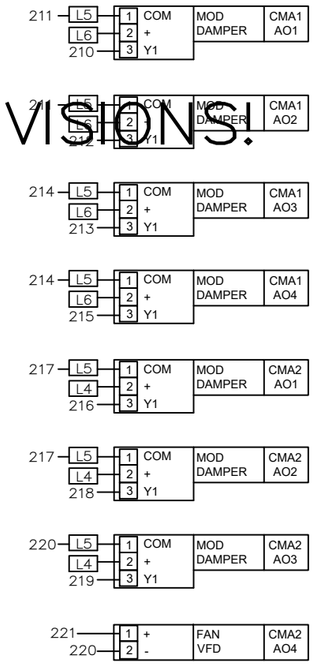
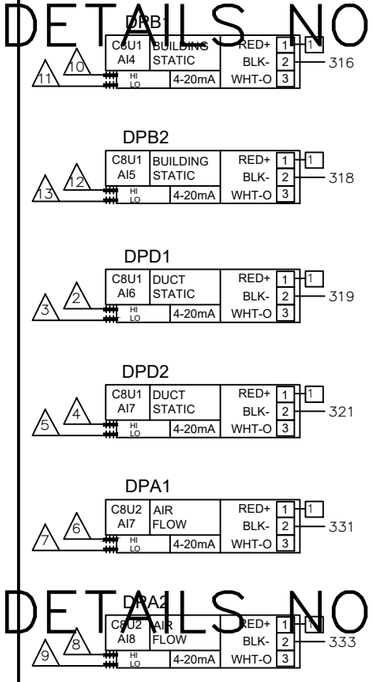
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta CONTROLS
Temperature Control Services
4240 W 50 S
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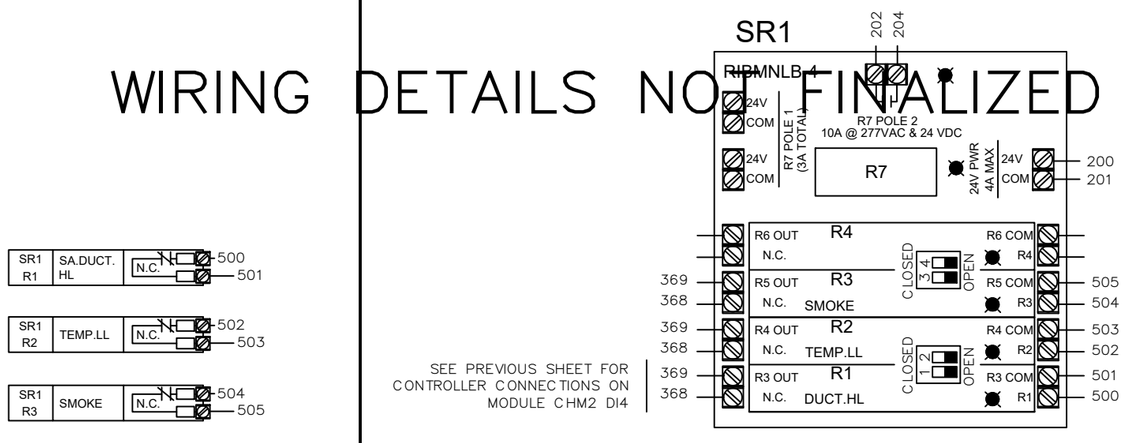

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CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

AHU-R1 SYSTEM 49 PANEL – I/O WIRING (2 OF 2)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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SYSTEM 49 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

300
301

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE C 10A @ 277VAC & 24 VDC

R7

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4
R3 COM R3
R2 COM R2
R1 COM R1

CLOSED
OPEN

TX1

24V CB
24V CB
Power
Power

H C G

100
L2
L3

75VA
24VAC
24VAC
24VAC
24VAC
75VA

120 VAC LAPTOP PWR

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101
L2
L3

PS1

1.0A
5.0A
101
100
G

TB1

L1 L2 L3

H N
120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1

1

Power +
GND / 4-20mA out -
Voltage out 0

HIGH
LOW

2
3

PNEUMATIC

CEB1

201
200

PWR
GND
24~

USB2
USB1
(NOT USED)

C8X1

201
200

PWR
GND
24~

Delta
eBMGR-2

Delta
eBX

eBUS Address

eBUS

NET1 RS-485
NET2 RS-485
LAN 1
LAN 2
LAN 3

P7 24Vs P8
P5 24Vs P6

eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

3
2

SEE RISER DIAGRAMS FOR LOCATION

AHU-R1 SYSTEM 49 PANEL – POWER & NETWORK WIRING

Delta CONTROLS
Temperature Control Services
4240 W 50 S
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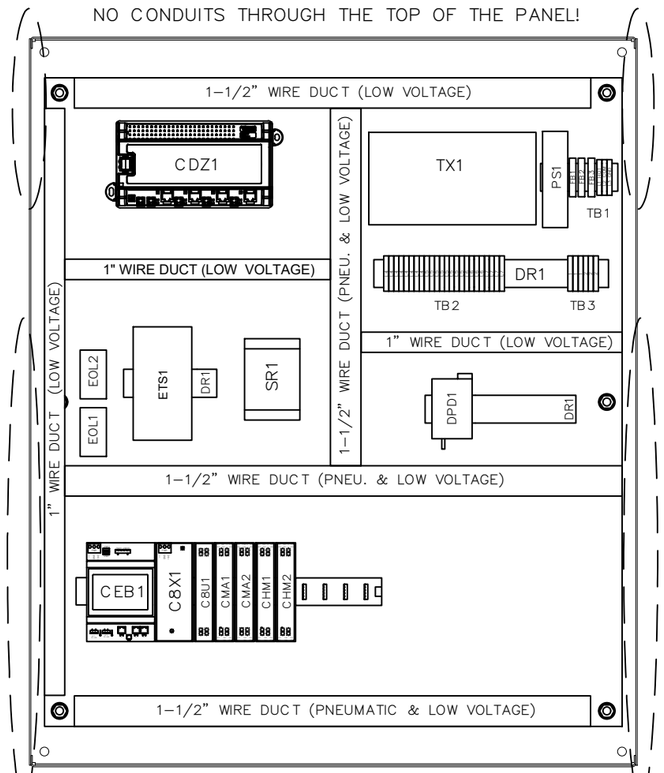
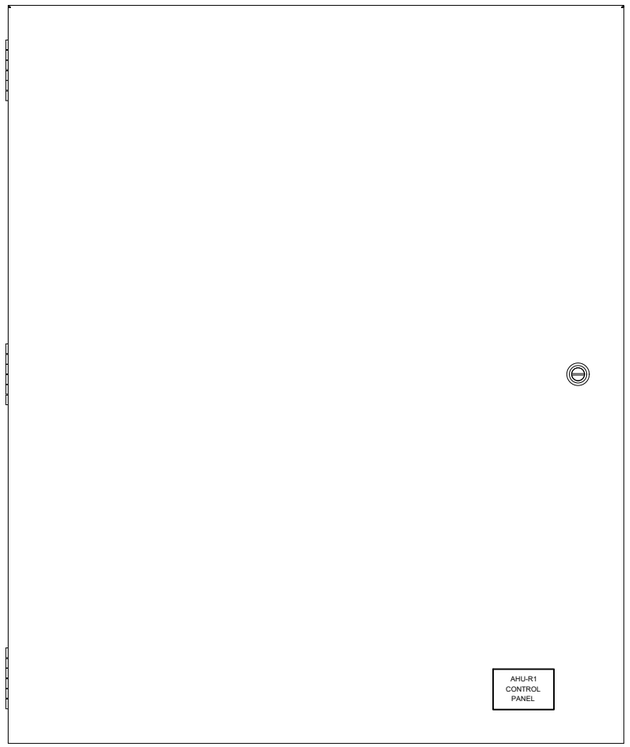
SYSTEM CONTROL PANEL 49 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

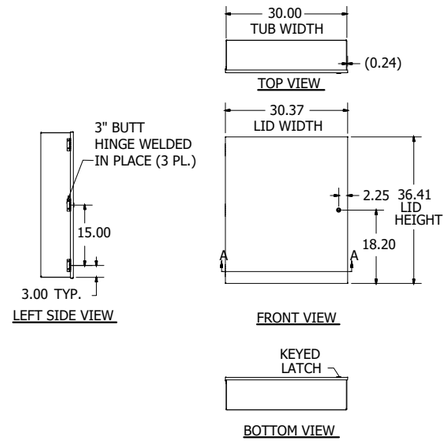
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

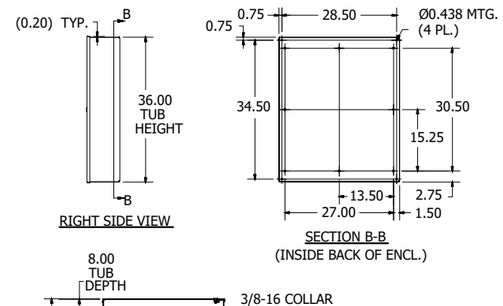
BILL OF MATERIALS

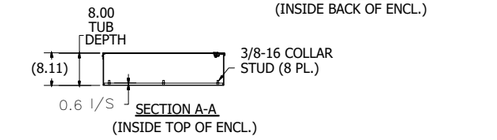
BILL OF MATERIALS

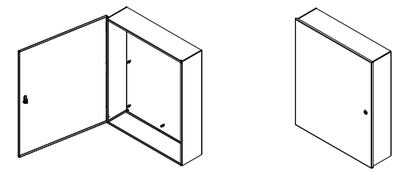
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

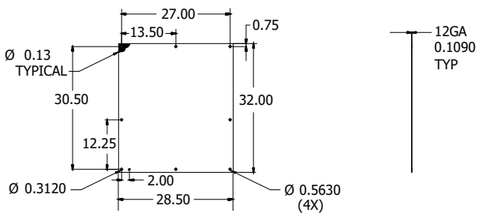








PANEL DIMENSIONS



AHU–R1 SYSTEM 49 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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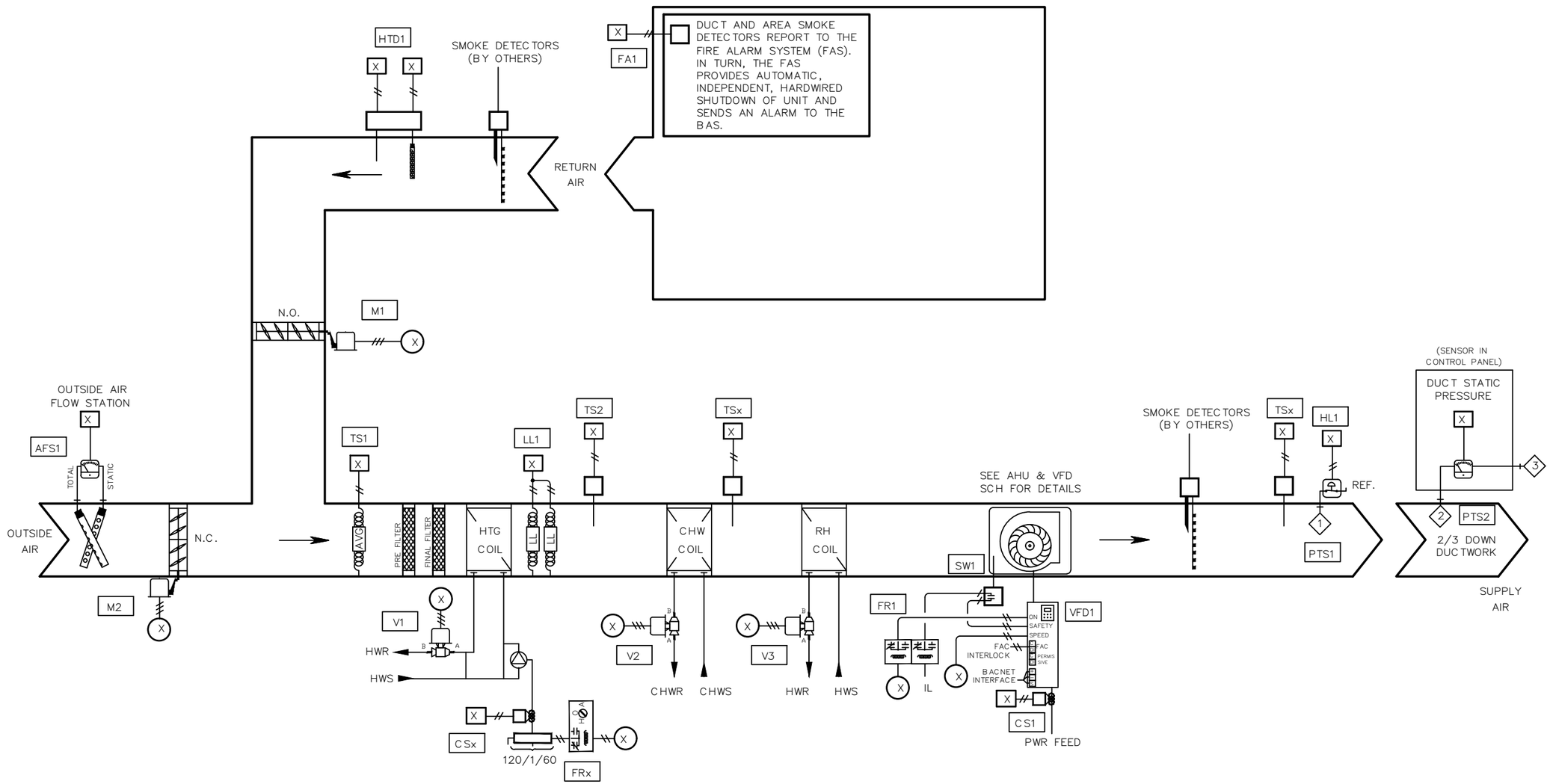
E–AHU–R2 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

Delta Controls

Temperature Control Services
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LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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REVISIONS	
DATE	REMARKS

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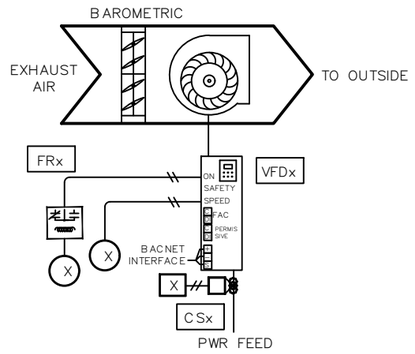
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–409
JOB NUMBER:
J–2304001

EXHAUST FAN – BAS CONTROLLED
EF–Q2



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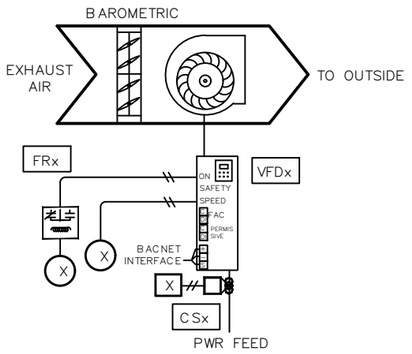
EF–Q5



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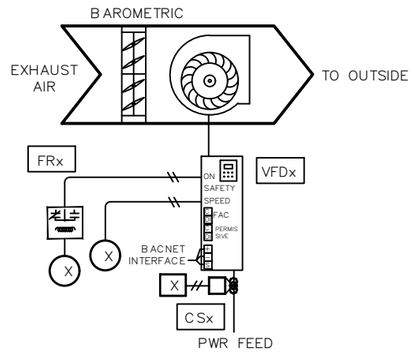
EF–Q6



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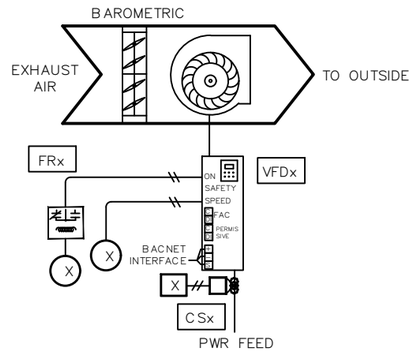

EXHAUST FAN – BAS CONTROLLED
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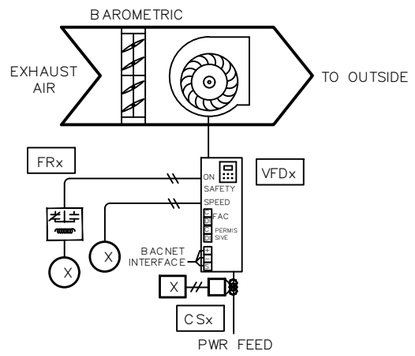

EXHAUST FAN – BAS CONTROLLED
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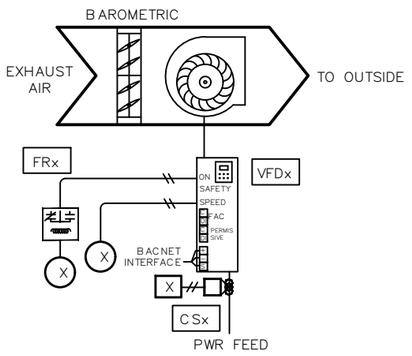

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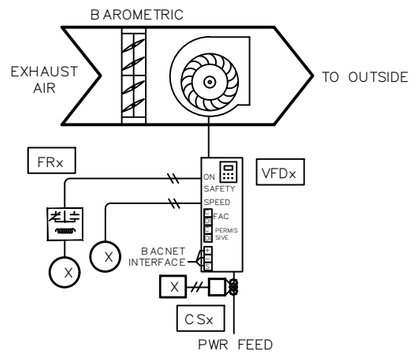
EF–Q13



EXHAUST FAN – BAS CONTROLLED
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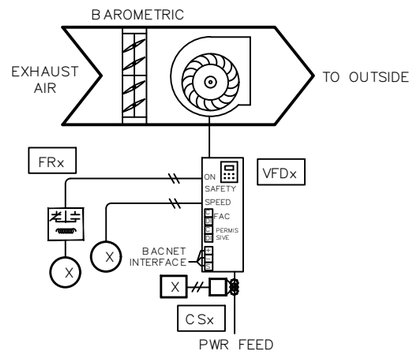
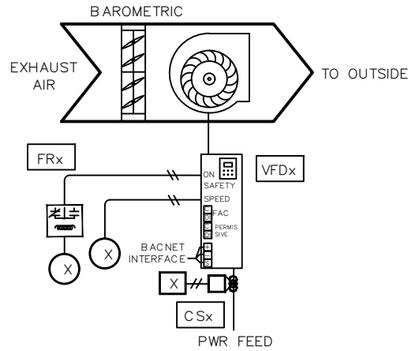
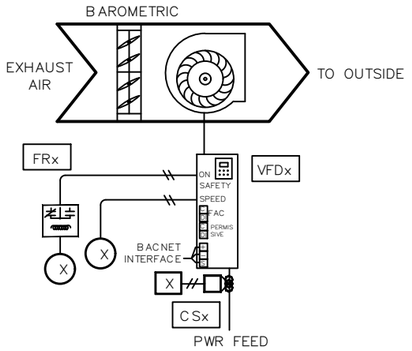


EXHAUST FAN – BAS CONTROLLED
EF–Q21



EXHAUST FAN – BAS CONTROLLED
EF–Q22



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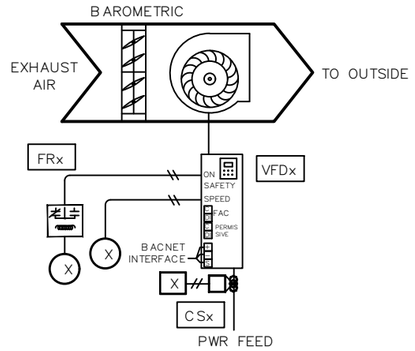

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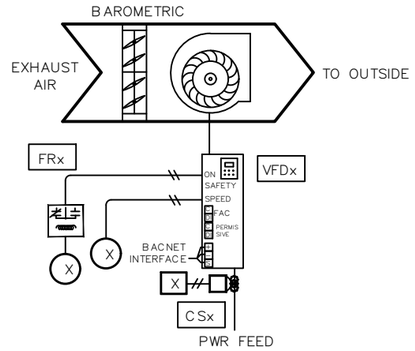

NETWORK POINTS

N1 THROUGH Nx

BILL OF MATERIAL

AREA R EXHAUST FIELD DEVICES (1 OF 2)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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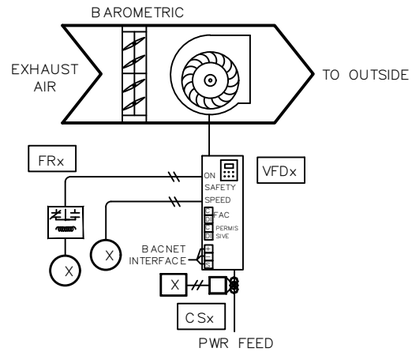

EXHAUST FAN – BAS CONTROLLED
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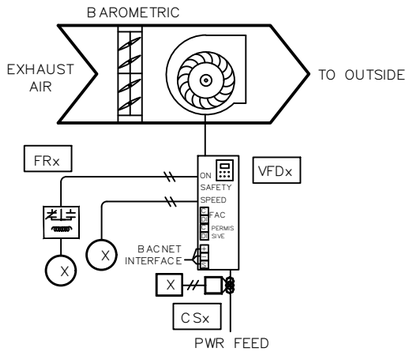

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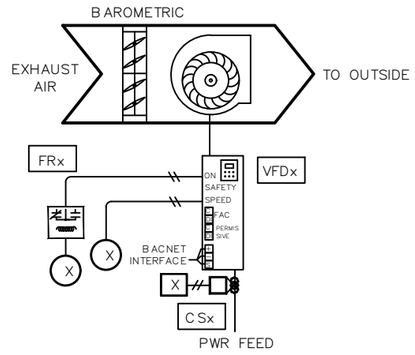
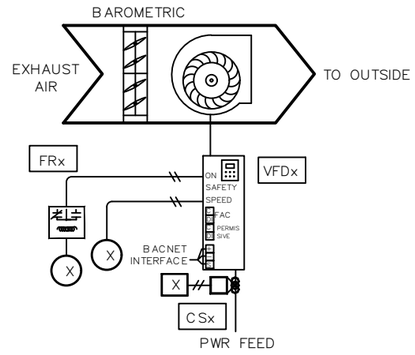
EF–R9



EXHAUST FAN – BAS CONTROLLED
EF–R12



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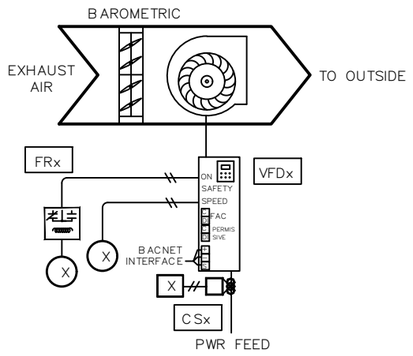

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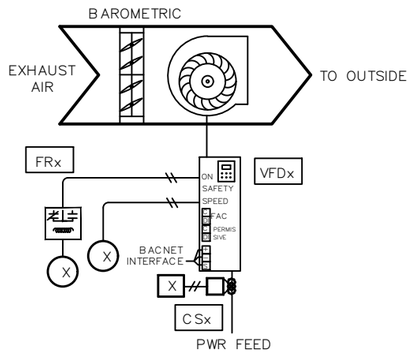
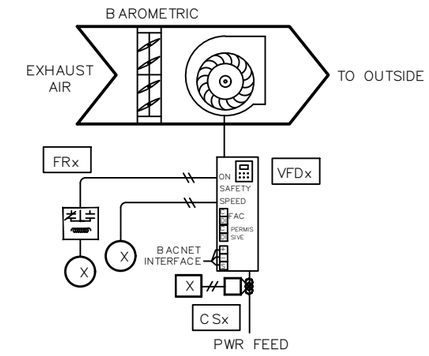
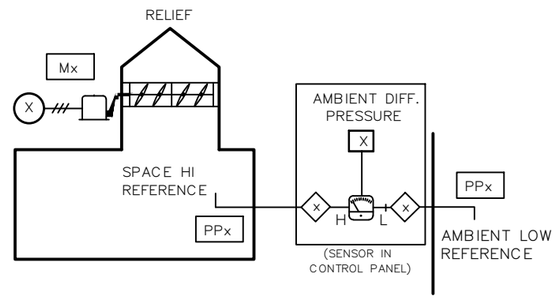


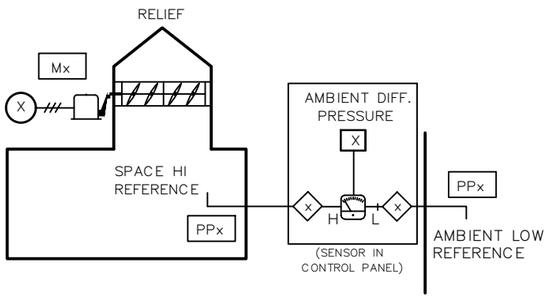
EXHAUST FAN – BAS CONTROLLED
EF–R19



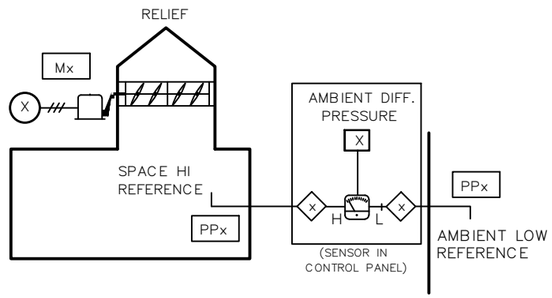
BUILDING PRESSURE CONTROL
E–RH–R2



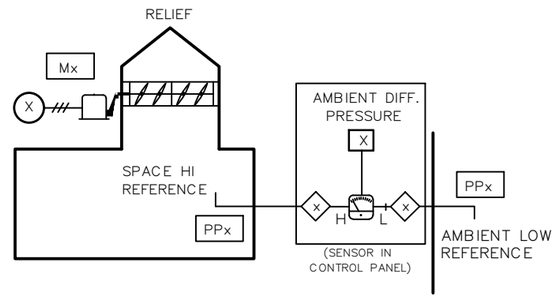
BUILDING PRESSURE CONTROL
RH–R1



BUILDING PRESSURE CONTROL
RH–R3



BUILDING PRESSURE CONTROL
RH–R4



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA R EXHAUST & RELIEF FIELD DEVICES (2 OF 2)

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS–411
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPB4	Building Static Pressure 4	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-Q10 STAT	Exhaust Fan Q10 Status		X			
EF-Q13 STAT	Exhaust Fan Q13 Status		X			
EF-Q14 STAT	Exhaust Fan Q14 Status		X			
EF-Q2 STAT	Exhaust Fan Q2 Status		X			
EF-Q21 STAT	Exhaust Fan Q21 Status		X			
EF-Q22 STAT	Exhaust Fan R22 Status		X			
EF-Q25 STAT	Exhaust Fan R25 Status		X			
EF-Q5 STAT	Exhaust Fan Q5 Status		X			
EF-Q6 STAT	Exhaust Fan Q6 Status		X			
EF-Q7 STAT	Exhaust Fan Q7 Status		X			
EF-Q8 STAT	Exhaust Fan Q8 Status		X			
EF-R12 STAT	Exhaust Fan R12 Status		X			
EF-R14 STAT	Exhaust Fan R14 Status		X			
EF-R15 STAT	Exhaust Fan R15 Status		X			
EF-R19 STAT	Exhaust Fan R19 Status		X			
EF-R6 STAT	Exhaust Fan R6 Status		X			
EF-R7 STAT	Exhaust Fan R7 Status		X			
EF-R8 STAT	Exhaust Fan R8 Status		X			
EF-R9 STAT	Exhaust Fan R9 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-R2 DPR	Relief Air Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
RH-R1 DPR	Relief Air Damper			X		
RH-R3 DPR	Relief Air Damper			X		
RH-R4 DPR	Relief Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
EF-Q10 SS	Exhaust Fan Q10 Fan Start / Stop				X	
EF-Q13 SS	Exhaust Fan Q13 Fan Start / Stop				X	
EF-Q14 SS	Exhaust Fan Q14 Fan Start / Stop				X	
EF-Q2 SS	Exhaust Fan Q2 Fan Start / Stop				X	
EF-Q21 SS	Exhaust Fan Q21 Fan Start / Stop				X	
EF-Q22 SS	Exhaust Fan R22 Fan Start / Stop				X	
EF-Q25 SS	Exhaust Fan R25 Fan Start / Stop				X	
EF-Q5 SS	Exhaust Fan Q5 Fan Start / Stop				X	
EF-Q6 SS	Exhaust Fan Q6 Fan Start / Stop				X	
EF-Q7 SS	Exhaust Fan Q7 Fan Start / Stop				X	
EF-Q8 SS	Exhaust Fan Q8 Fan Start / Stop				X	
EF-R12 SS	Exhaust Fan R12 Fan Start / Stop				X	
EF-R14 SS	Exhaust Fan R14 Fan Start / Stop				X	
EF-R15 SS	Exhaust Fan R15 Fan Start / Stop				X	
EF-R19 SS	Exhaust Fan R19 Fan Start / Stop				X	
EF-R6 SS	Exhaust Fan R6 Fan Start / Stop				X	
EF-R7 SS	Exhaust Fan R7 Fan Start / Stop				X	
EF-R8 SS	Exhaust Fan R8 Fan Start / Stop				X	
EF-R9 SS	Exhaust Fan R9 Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**12**	**24**	**10**	**21**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
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VAV AIR HANDLING UNIT AHU-R2 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFRn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:

-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

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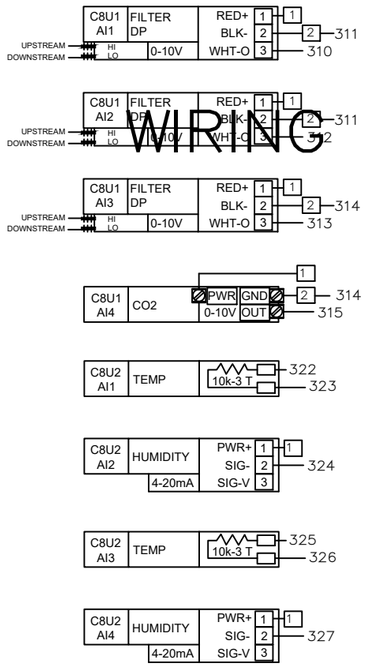
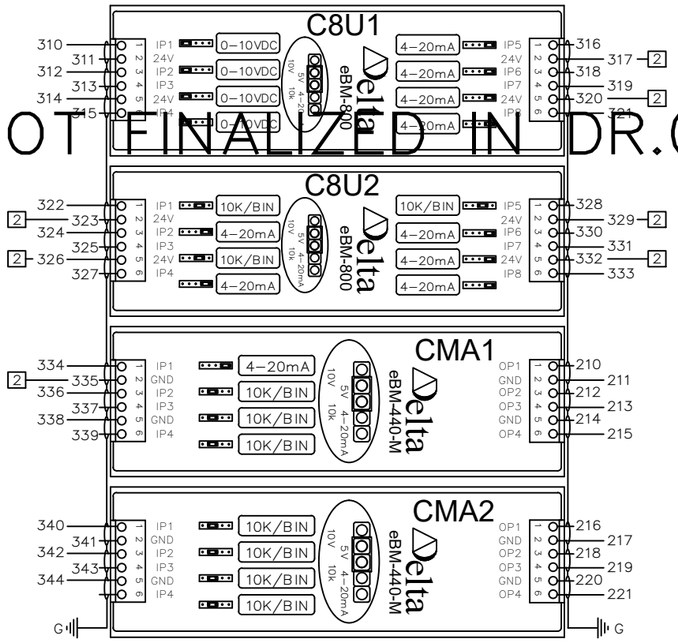
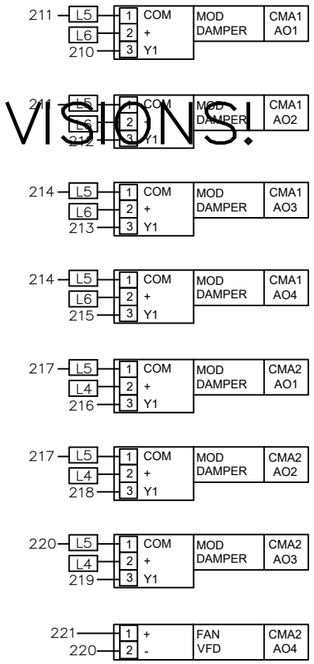
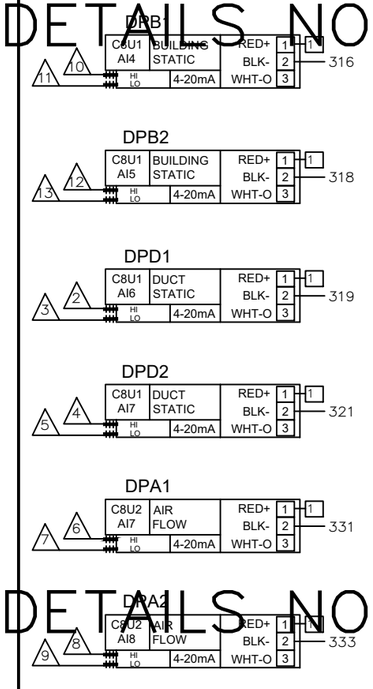
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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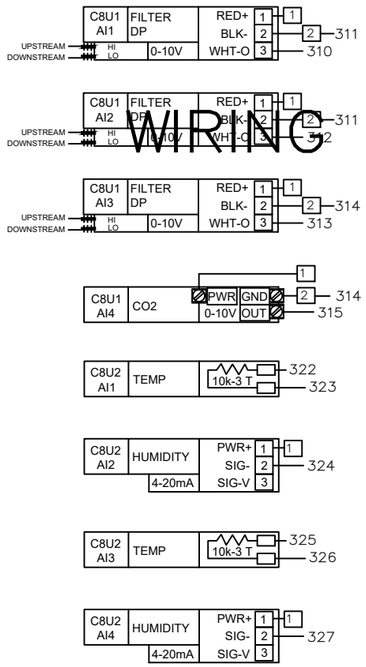

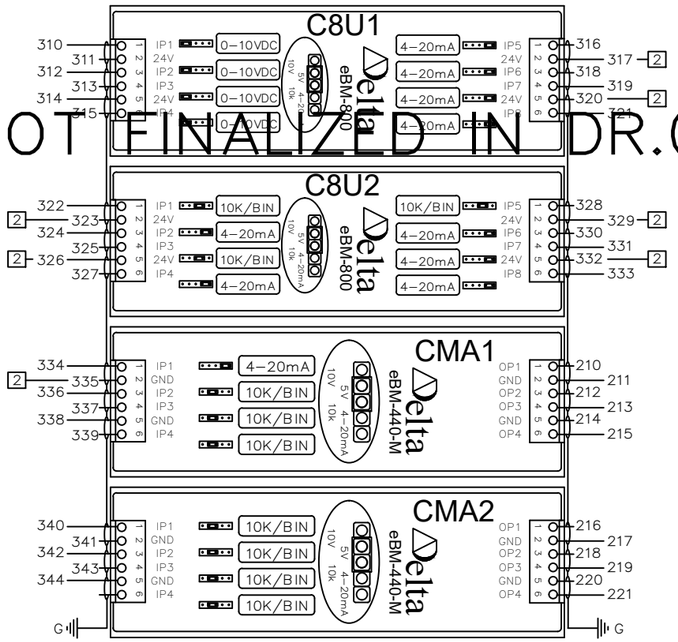

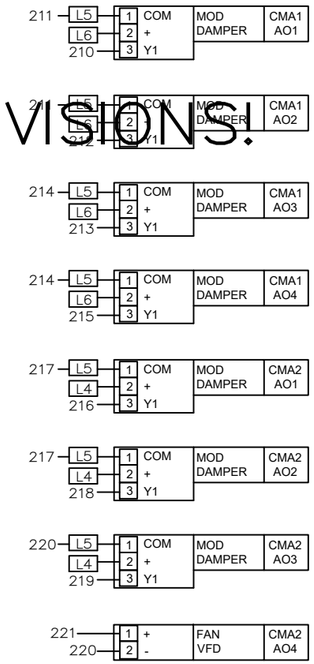

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U1 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — INPUTS — eBM-800 I/O MODULE — C8U2 eBM-800

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA1 eBM-440-M

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
CMA2	4	10100.1404			
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — INPUTS / OUTPUTS — eBM-440-M I/O MODULE — CMA2 eBM-440-M

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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AHU-R2 SYSTEM 50 PANEL – I/O WIRING (2 OF 4)

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-415
JOB NUMBER:
J-2304001

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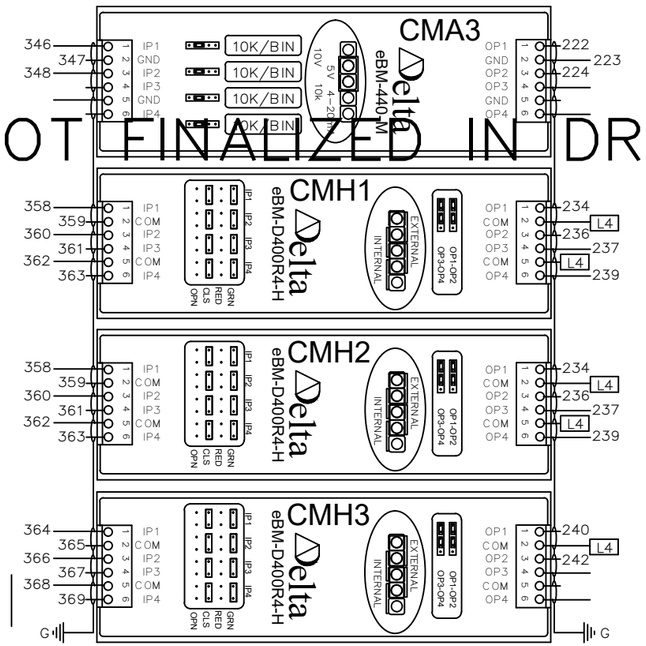
CMA3 DI1	DX STATUS	N.O.	346 — 347
CMA3 DI2	PURGE ENABLE	N.O.	348 — 347
CMH2 DI1	FAN STATUS	N.O.	358 — 359
CMH1 DI1	FAN STATUS	N.O.	360 — 359
CMH1 DI3	SMOKE ALARM	N.O.	361 — 362
CMH1 DI4	SMOKE ALARM	N.O.	363 — 362
CMH2 DI1	FAS.INPUT	N.C.	364 — 365
CMH2 DI2	PUMP STATUS	N.O.	366 — 365
CMH2 DI3	PUMP STATUS	N.O.	367 — 368



SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

L5	SF.SS	CMH1 DO1	SF VFD ENABLE
L6 / L5	SAFETY IL	X2 I7	VFD SAFETY INTERLOCK
FR1 IL	FAN.DOOR SAFETY.SW		
L5	FAN.SS	CMH1 DO2	SEF–1 ENABLE
L5	FAC OVRD	CMH1 DO3	PURGE FAC OVERRIDE
L5	CLG ENA	CMH1 DO4	DX COOLING ENABLE
L5	PUMP ENA	CMH1 DO2	PUMP 1 ENABLE
L5	PUMP ENA	CMH1 DO2	PUMP 2 ENABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–416
JOB NUMBER:
J–2304001

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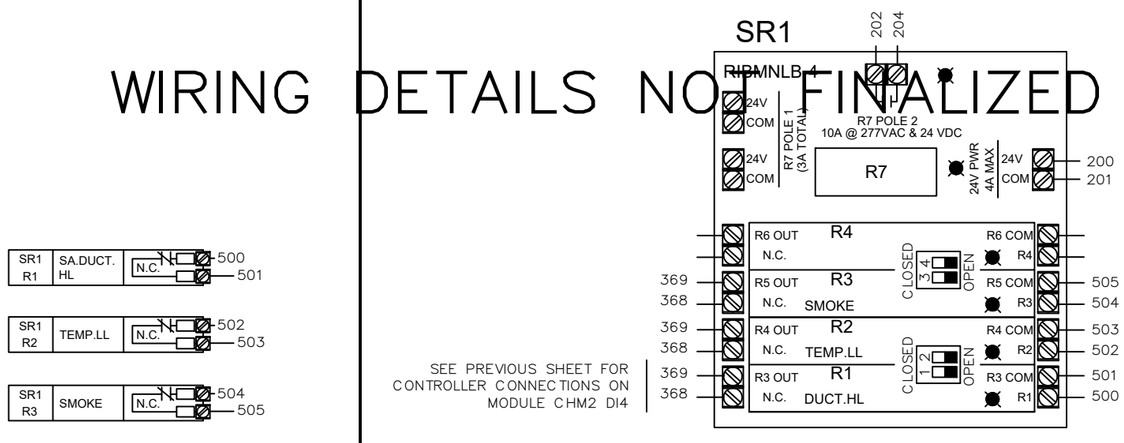

INPUTS - DFM-400-P

CFP1 DFM-400P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

AHU–R2 SYSTEM 50 PANEL – I/O WIRING (4 OF 4)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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J–2304001

SYSTEM 50 CONTROL PANEL

CAT-6a OR BETTER COMMUNICATION CABLE
TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

CAT-6a

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE
TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

GND

L3

200
201

TO SYSTEM 01 SUBNET LEG 02

TO SYSTEM 01 SUBNET LEG 03

TO SYSTEM 01 SUBNET LEG 04

300
301

ETS1

V1-
V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2
10A @ 277VAC & 24 VDC

R7

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4
R3
R2
R1

CLOSED

201
200

CEB1

PWR
GND
24~

USB2
USB1
(NOT USED)

eBMGR-2

NET1 RS-485
NET2 RS-485

MS/TP

C8X1

eBX

eBUS Address

eBUS

eBM-800
eBM-800
eBM-440-M
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

L3

eNET BUS

C4X1

eBX

eBUS Address

eBUS

eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

L3

SEE RISER DIAGRAMS FOR LOCATION

AHU-R2 SYSTEM 50 PANEL – POWER & NETWORK WIRING

Delta Controls

Temperature Control Services
4240 W 50 S
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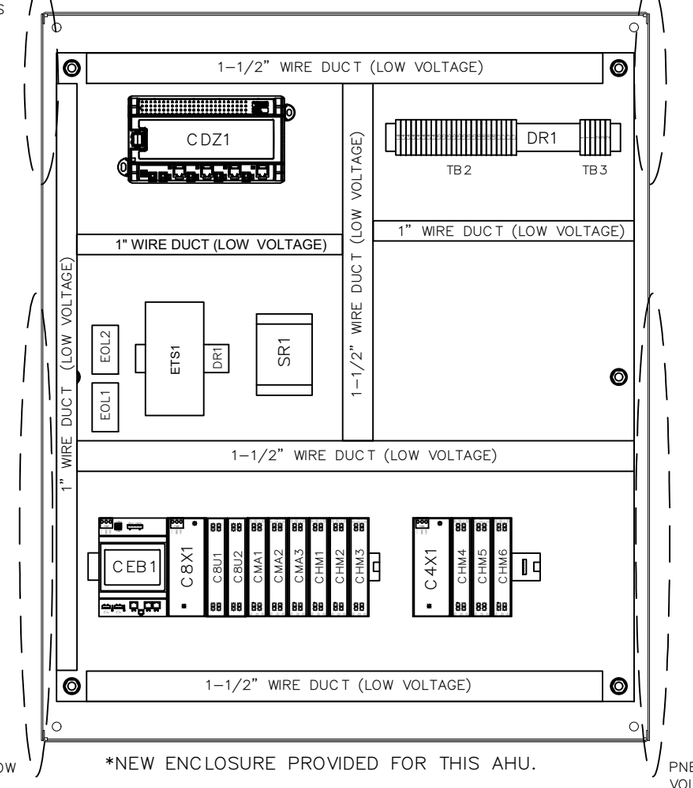
SYSTEM CONTROL PANEL 50 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

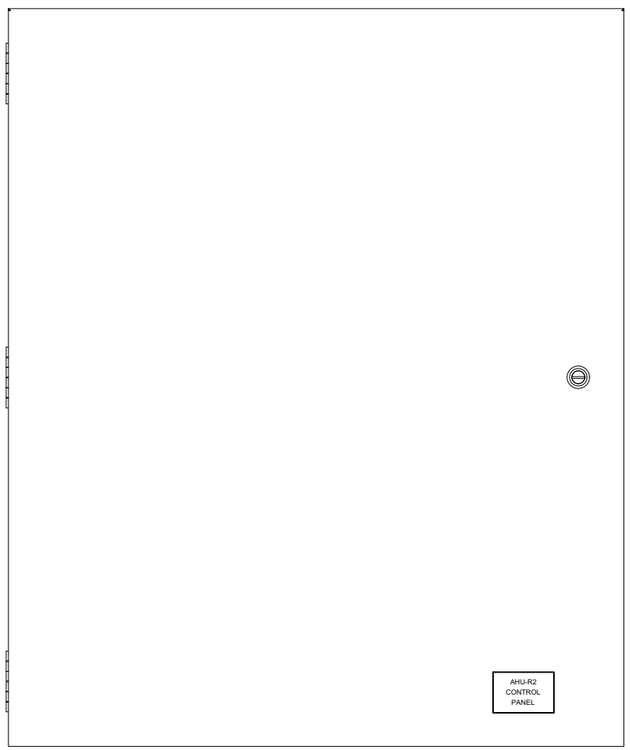


*NEW ENCLOSURE PROVIDED FOR THIS AHU.

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

BILL OF MATERIALS

HIGH VOLTAGE FEEDS ENTER IN THIS AREA

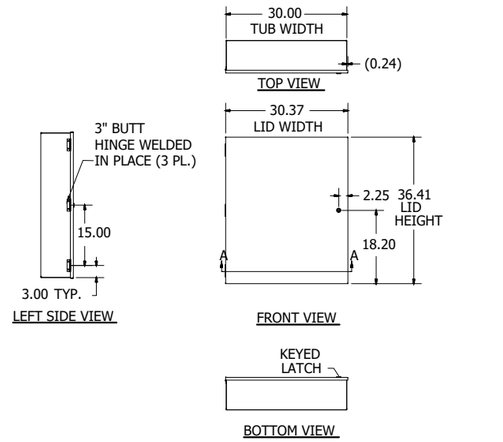


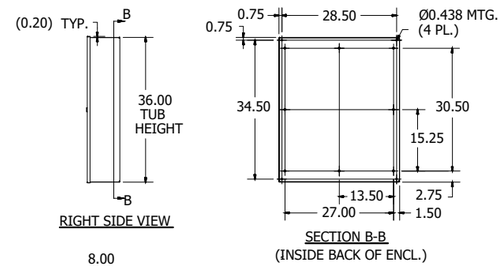
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

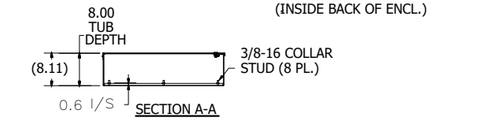
BILL OF MATERIALS

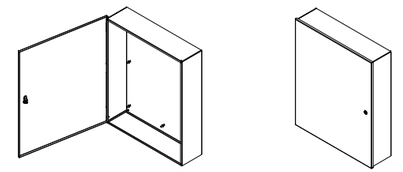
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

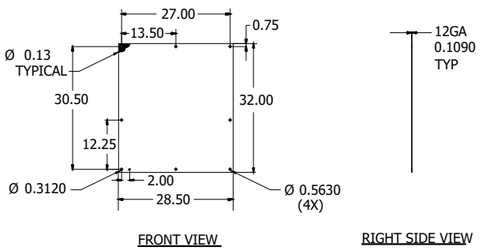








PANEL DIMENSIONS



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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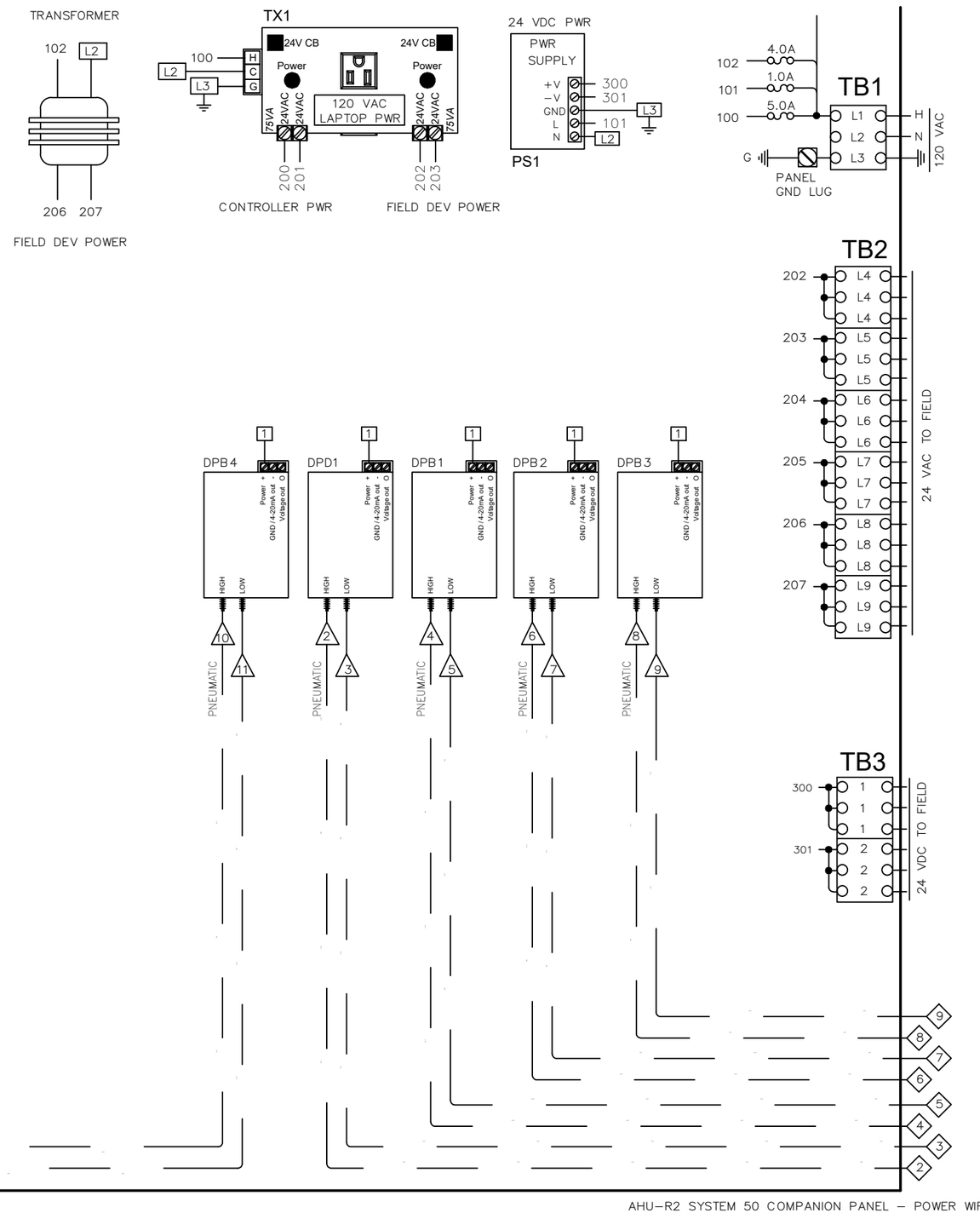
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–419
JOB NUMBER:
J–2304001

SYSTEM 50 COMPANION PANEL

PANEL _____
CIRCUIT _____



AHU–R2 SYSTEM 50 COMPANION PANEL – POWER WIRING & PNEUMATIC CONNECTIONS

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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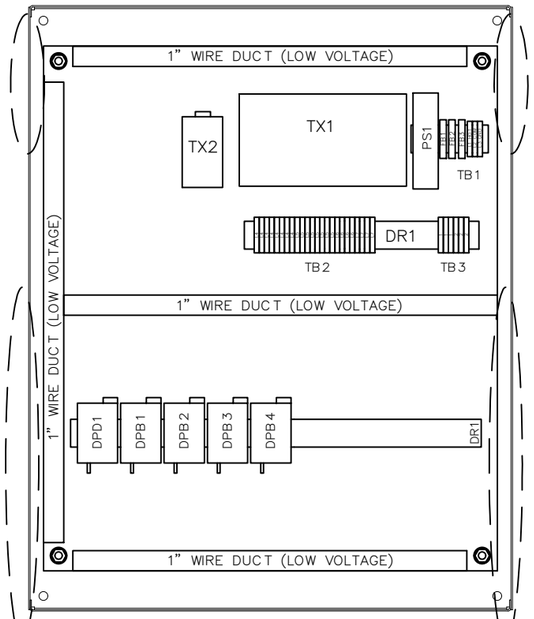
NCHS–420
JOB NUMBER:
J–2304001

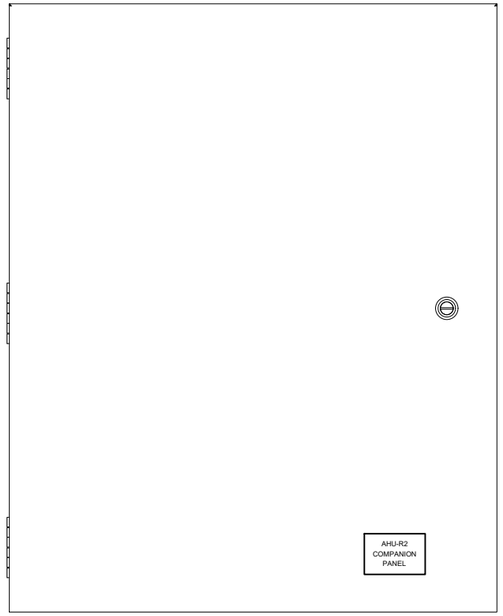
SYSTEM 50 COMPANION PANEL LAYOUT

NO CONDUITS THROUGH THE TOP OF THE PANEL!

NETWORK CABLES ENTER IN THIS AREA



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



*NEW ENCLOSURE PROVIDED

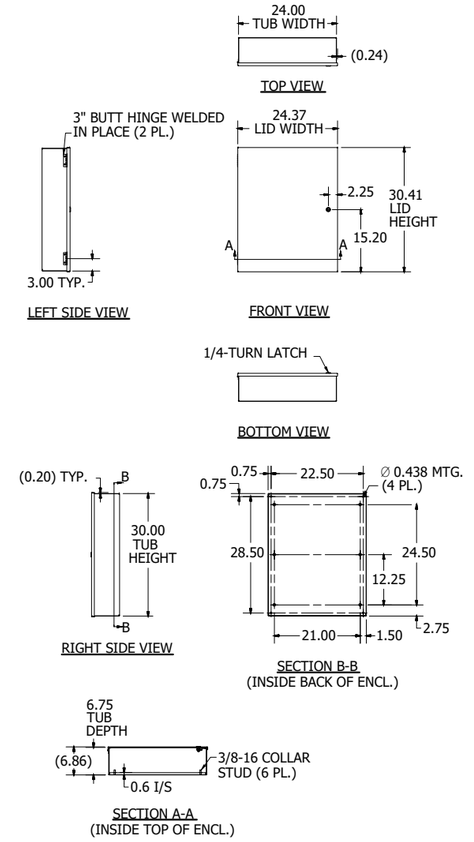
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

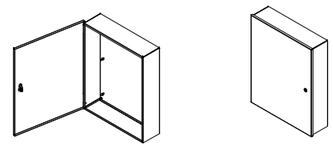
PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

BILL OF MATERIALS

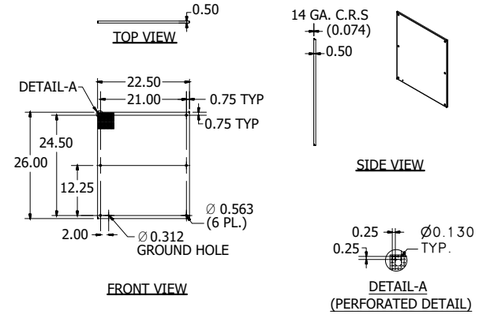
BILL OF MATERIALS

24" (W) x 30" (H) ENCLOSURE DIMENSIONS





PANEL DIMENSIONS



AHU-R2 SYSTEM 50 COMPANION PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
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LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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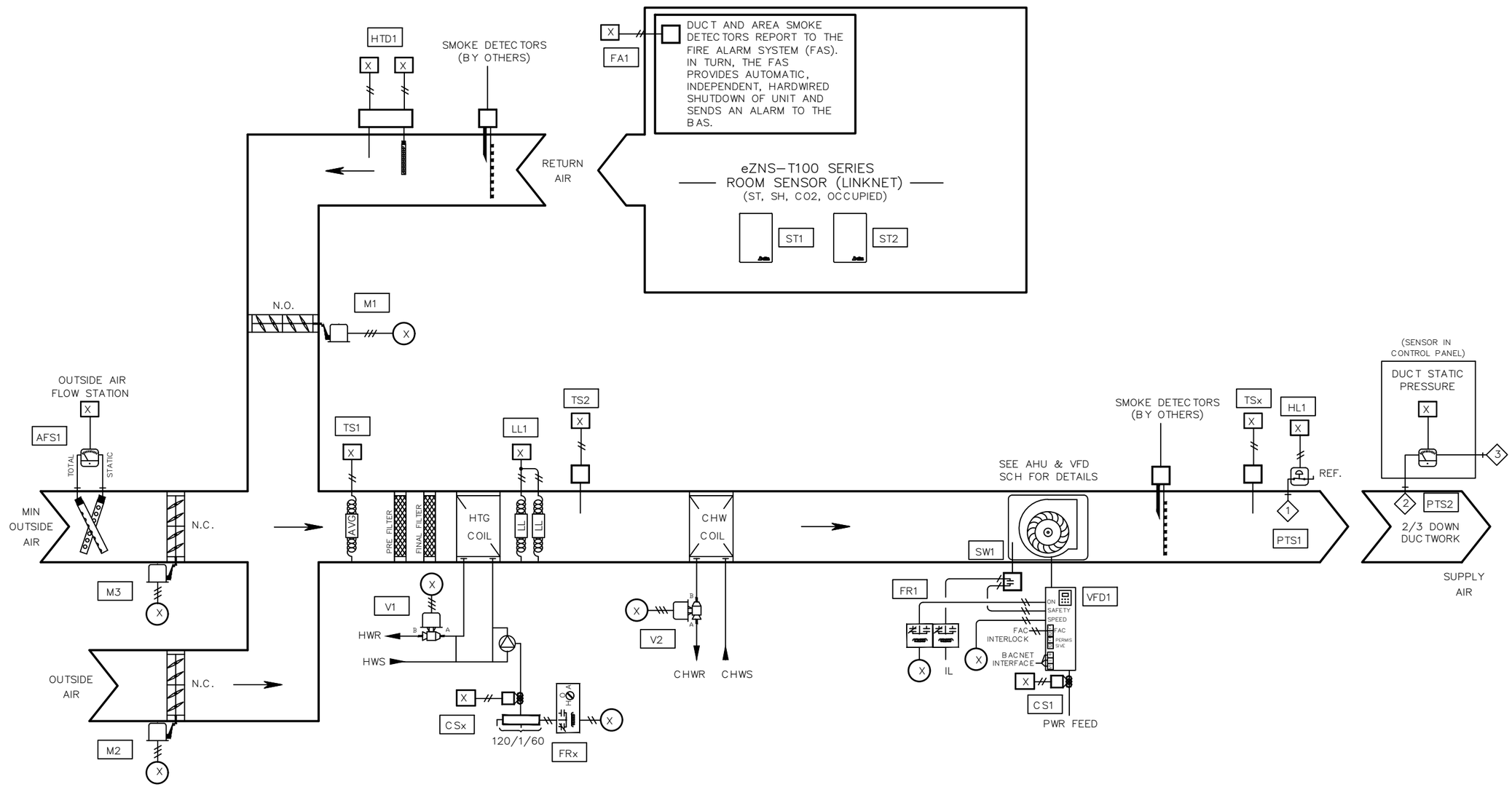
SHEET
NCHS-421
JOB NUMBER:
J-2304001

E–AHU–S1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–S1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
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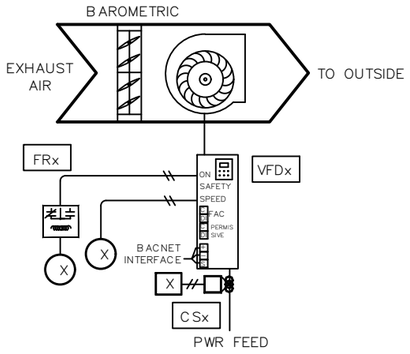
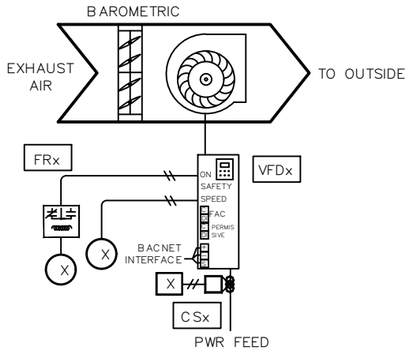
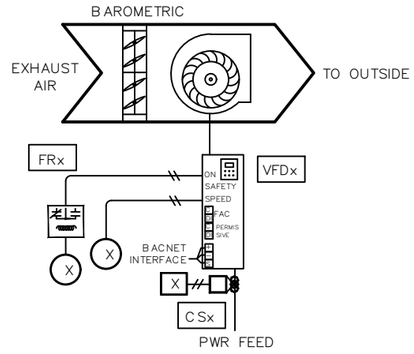
EXHAUST FAN – BAS CONTROLLED
EF–M3



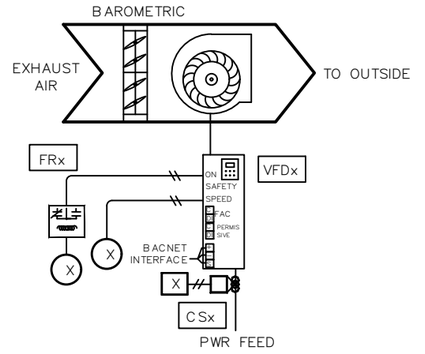
EXHAUST FAN – BAS CONTROLLED
EF–S2



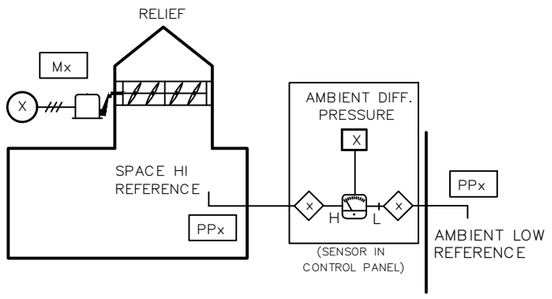
EXHAUST FAN – BAS CONTROLLED
EF–S3



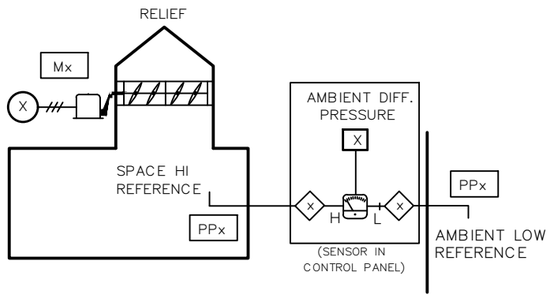
EXHAUST FAN – BAS CONTROLLED
EF–S6



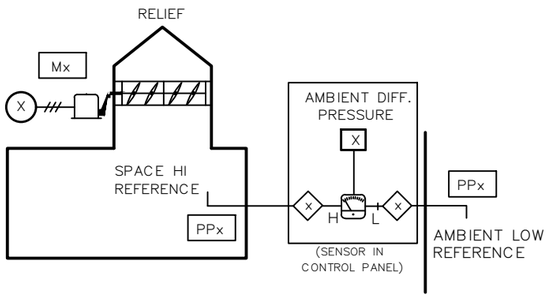
BUILDING PRESSURE CONTROL
E–RH–S1



BUILDING PRESSURE CONTROL
E–RH–S2



BUILDING PRESSURE CONTROL
E–RH–S3



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA S EXHAUST & RELIEF FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS–423
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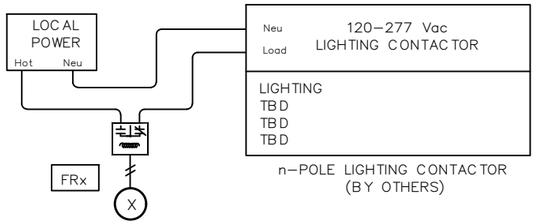
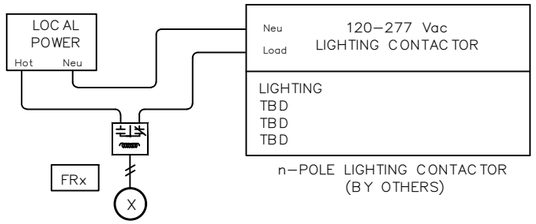
J–2304001

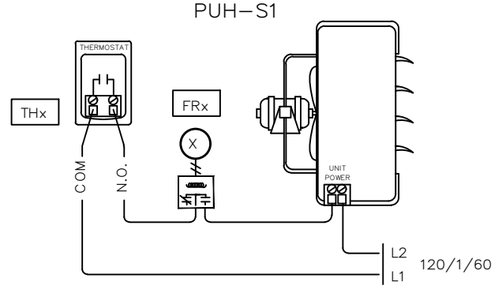
LIGHTING CONTACTOR CONTROLS
RS–4 – SOUTH BUILDING / SECURITY



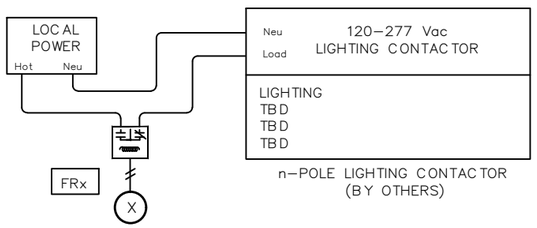
LIGHTING CONTACTOR CONTROLS
RS–6 – SOUTH PARKING / SECURITY



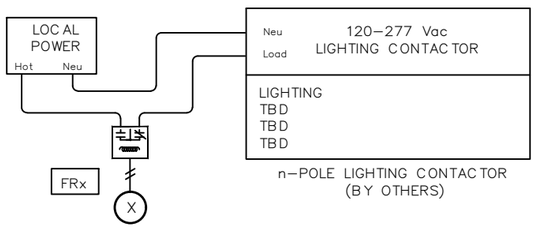
PROPELLER UNIT HEATER
PUH–S1



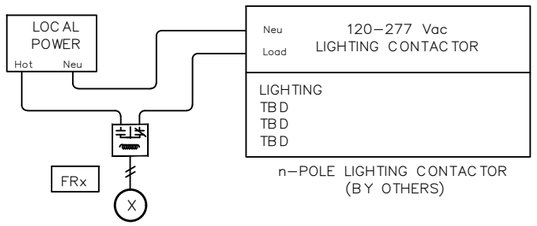
LIGHTING CONTACTOR CONTROLS
RS–5 – SOUTH BUILDING



LIGHTING CONTACTOR CONTROLS
RS–7 – SOUTH PARKING



LIGHTING CONTACTOR CONTROLS
RS–8 – SOUTH WALKWAY



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA S LIGHTING AND PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
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SHEET
NCHS–424
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPB3	Building Static Pressure 3	X				
DPD1	Duct Static Pressure	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF-M3 STAT	Exhaust Fan M3 Status		X			
EF-S2 STAT	Exhaust Fan S2 Status		X			
EF-S3 STAT	Exhaust Fan S3 Status		X			
EF-S6 STAT	Exhaust Fan S6 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
E-RH-S1 DPR	Relief Air Damper			X		
E-RH-S2 DPR	Relief Air Damper			X		
E-RH-S3 DPR	Relief Air Damper			X		
MIN OAD	Minimum Outside Air Damper			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF-M3 SS	Exhaust Fan M3 Fan Start / Stop				X	
EF-S2 SS	Exhaust Fan S2 Fan Start / Stop				X	
EF-S3 SS	Exhaust Fan S3 Fan Start / Stop				X	
EF-S6 SS	Exhaust Fan S6 Fan Start / Stop				X	
LTG 1	Lighting Contactor - S Bldg Sec RS-4				X	
LTG 2	Lighting Contactor - S Pkg Sec RS-6				X	
LTG 3	Lighting Contactor - South Bldg RS-5				X	
LTG 4	Lighting Contactor - South Pkg RS-7				X	
LTG 5	Lighting Contactor - South Walk RS-8				X	
PUH-S1 EN	PUH S1 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**10**	**9**	**9**	**12**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

Delta Controls
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VAV AIR HANDLING UNIT AHU-S1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFSn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV), AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MAXIMUM OUTSIDE AIR DAMPER (OA-DPR) SHALL CLOSE AND THE MINIMUM OUTSIDE AIR DAMPER (MOA-DPR) SHALL MODULATE TO MAINTAIN THE SCHEDULED AIRFLOW REQUIRED AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPER SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT AND HEATING VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

DDC INTERFACE TO EXTERIOR LIGHTING:

ONE PHOTOELECTRIC CELL SENSOR SHALL CONTROL NEW AND EXISTING TO REMAIN EXTERIOR LIGHTING CONTACTORS. LIGHTING CONTACTORS CONTROLLED FROM THE PREVIOUS CONTROL SYSTEM SHALL ALSO BE CONTROLLED BY THE NEW BUILDING AUTOMATION SYSTEM. PHOTOCELL SHALL BE INSTALLED WHERE NOT INFLUENCED BY EXTERIOR LIGHTING. LIGHTING CONTACTORS PROVIDED AND INSTALLED AND WIRED TO LIGHTING CIRCUITS BY THE DIV. 26 CONTRACTOR. SEE ELECTRICAL DRAWINGS FOR COUNT AND LOCATIONS. PROVIDE SEPARATE BINARY OUTPUT FOR EACH CONTACTOR FOR INDIVIDUAL CONTROL. PROVIDE GRAPHICAL REPRESENTATIONS FOR TIME-OF-DAY SCHEDULING OF INDIVIDUAL CONTACTORS AS WELL AS PHOTOCELL CONTROL. ALL CONTACTORS SHALL BE CONTROLLED BY ONE PHOTOCELL INPUT.

NOTE: FIELD VERIFICATION OF ALL ETR CONTACTOR INFORMATION REQUIRED.
NOTE: EXISTING BAS PHOTOCELLS LOCATED IN AREAS A (INSTALLED IN PHASE 1) AND AREA T (EXISTING BAS). NEW PHOTOCELL TO BE INSTALLED ON AHU-J3.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

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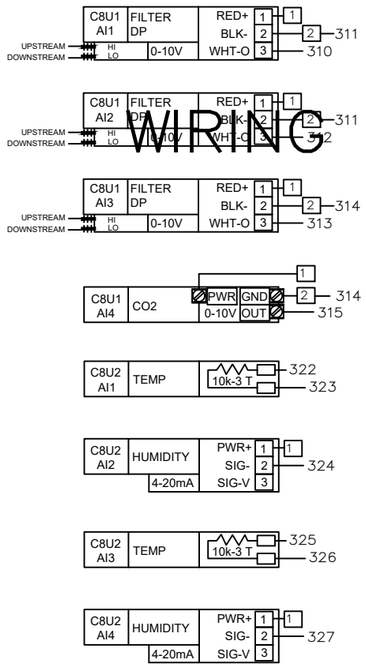
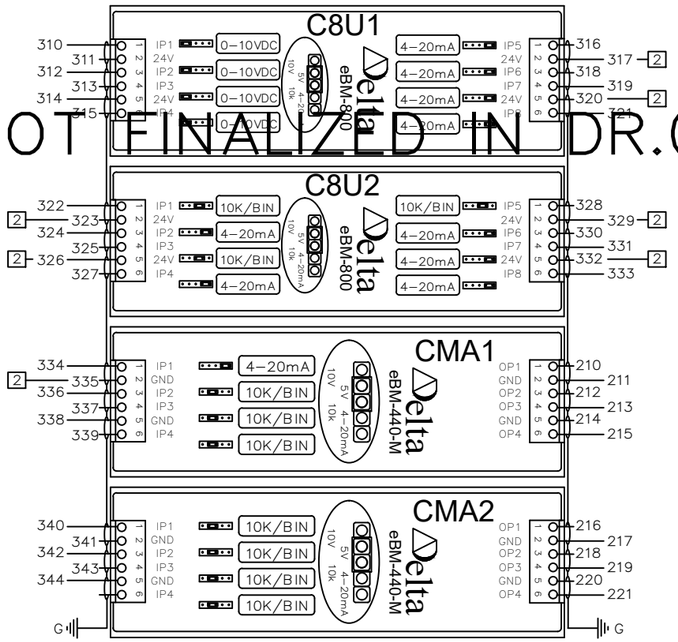
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

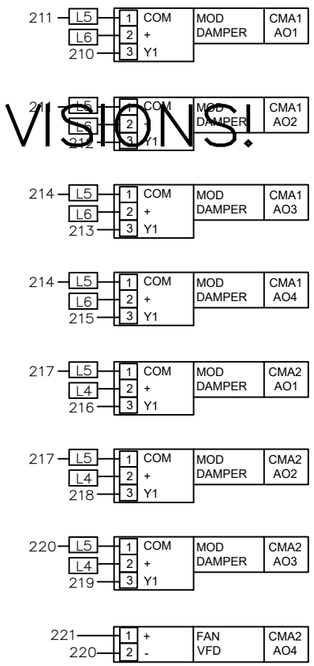
CONTRACT NO:

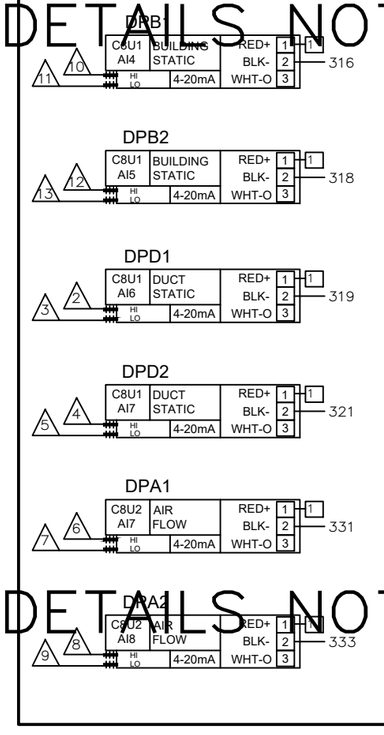
SHEET
NCHS-426
JOB NUMBER:
J-2304001

SYSTEM 51 CONTROL PANEL









ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO	INPUTS	C8U1 eBM-800 eBM-800 I/O MODULE
C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO		
C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO		
C8U1	4	10100.1104	CO21	CO2 SENSOR	2510		
C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201		
C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201		
C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200		
C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200		

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101	INPUTS	C8U2 eBM-800 eBM-800 I/O MODULE
C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101		
C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101		
C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101		
C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101		
C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101		
C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201		
C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201		

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101	INPUTS	CMA1 eBM-440-M eBM-440-M I/O MODULE
CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001		
CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002		
CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301		
CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206	OUTPUTS	
CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206		
CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206		
CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206		

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET		
CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003	INPUTS	CMA2 eBM-440-M eBM-440-M I/O MODULE
CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003		
CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO		
CMA2	4	10100.1404					
CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204	OUTPUTS	
CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208		
CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208		
CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO		

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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NCHS-427
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J-2304001

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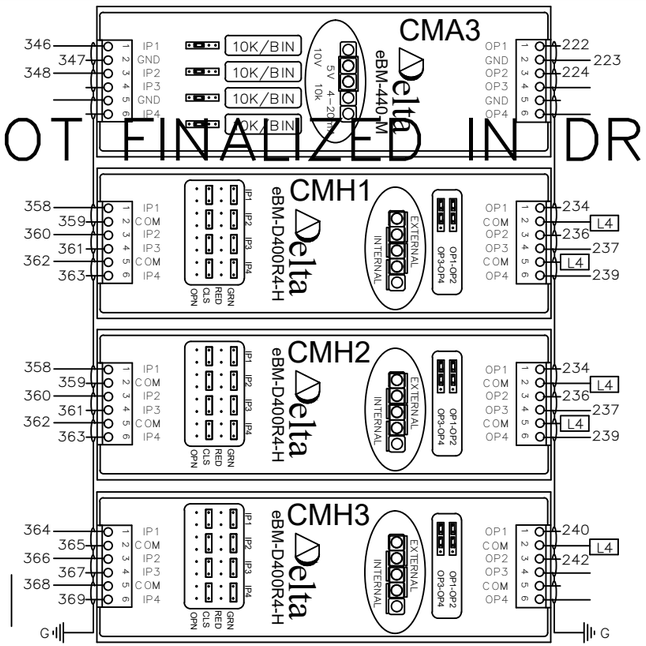
SYSTEM 51 CONTROL PANEL

CMA3 DI1	DX STATUS	N.O.	346 / 347
CMA3 DI2	PURGE ENABLE	N.O.	348 / 347
CMH2 DI1	FAN STATUS	N.O.	358 / 359
CMH1 DI1	FAN STATUS	N.O.	360 / 359
CMH1 DI3	SMOKE ALARM	N.O.	361 / 362
CMH1 DI4	SMOKE ALARM	N.O.	363 / 362
CMH2 DI1	FAS.INPUT	N.C.	364 / 365
CMH2 DI2	PUMP STATUS	N.O.	366 / 365
CMH2 DI3	PUMP STATUS	N.O.	367 / 368



SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806
	CMA3	3	10100.1503			
	CMA3	4	10100.1504			
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO
	CMA3	3	10100.1503			
	CMA3	4	10100.1504			

eBM-440-M I/O MODULE — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMA4	1	10100.1601			
	CMA4	2	11500.1602			
	CMA4	3	10100.1603			
	CMA4	4	10100.1604			
OUTPUTS	CMA4	1	10100.1601			
	CMA4	2	11500.1602			
	CMA4	3	10100.1603			
	CMA4	4	10100.1604			

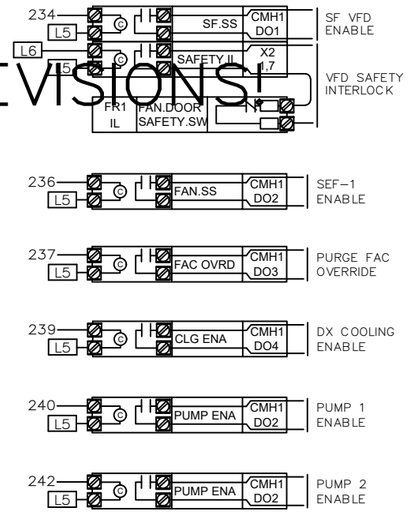
eBM-440-M I/O MODULE — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001

eBM-D400R4-H I/O MOD — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400
	CMH2	4	10100.1804	HL1	BOILER HIGH PRESSURE LIMIT	1200
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001
	CMH2	3	10100.1803			
	CMH2	4	10100.1804			

eBM-D400R4-H I/O MOD — CMH2 eBM-D400R-H



Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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SHEET
NCHS–428
JOB NUMBER:
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WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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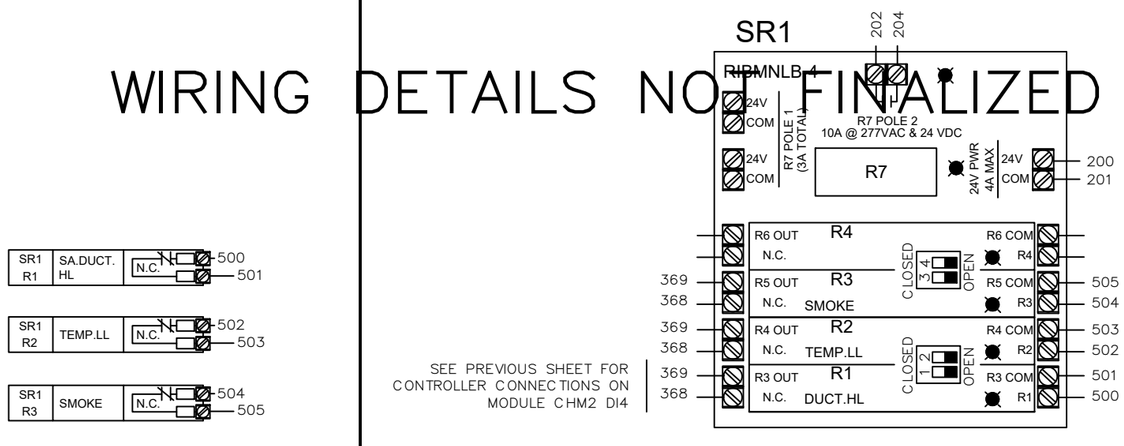

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC. ID.	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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SHEET
NCHS-429
JOB NUMBER:
J-2304001

SYSTEM 51 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301
300

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 (N.O. CONTACT)

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 COM R4 NO
R3 COM R3 NO
R2 COM R2 NO
R1 COM R1 NO

CLOSED OPEN

TX1

24V CB
24V CB

Power
Power

100
L2
L3

H C G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

L3
L2

PS1

1.0A
5.0A
101
100
G

TB1

L1 L2 L3

H N 120 VAC

PANEL GND LUG

TB2

202 L4 L4 L4
203 L5 L5 L5
204 L6 L6 L6
205 L7 L7 L7

24 VAC TO FIELD

TB3

300 1 1 1
301 2 2 2

24 VDC TO FIELD

DPD1 | DPB1 | DPB2 | DPB3

1

Power + / GND / 4-20mA out - / Voltage out O

HIGH
LOW

PNEUMATIC

2 3 4 5 6 7 8 9

CEB1

C8X1

201
200

PWR
GND
24~

USB2
USB1

(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

NET1 RS-485
NET2 RS-485

LAN 1 LAN 2 LAN 3

MS/TP

eBM-800
eBM-440-M
eBM-440-M
eBM-440-M
eBM-D400R4-H
eBM-D400R4-H
eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

SEE RISER DIAGRAMS FOR LOCATION

AHU-S1 SYSTEM 51 PANEL – POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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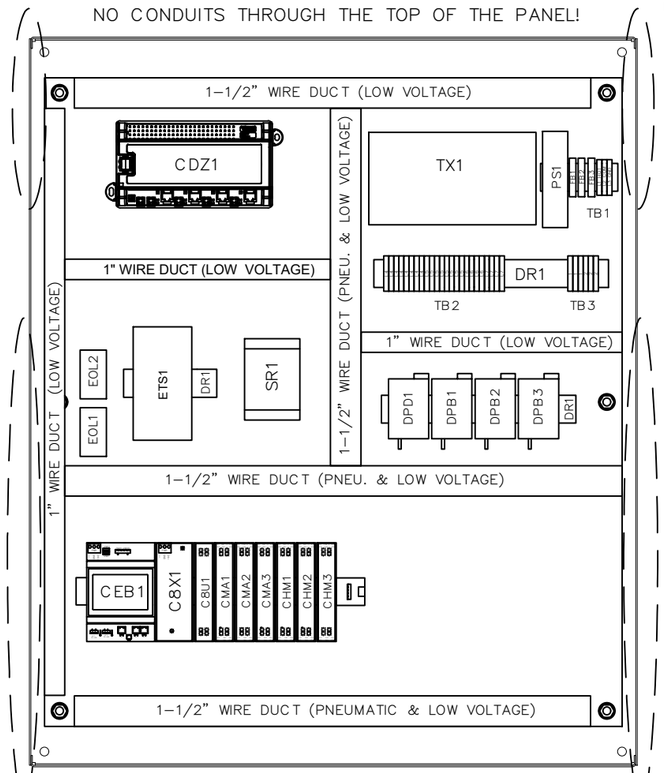
J-2304001

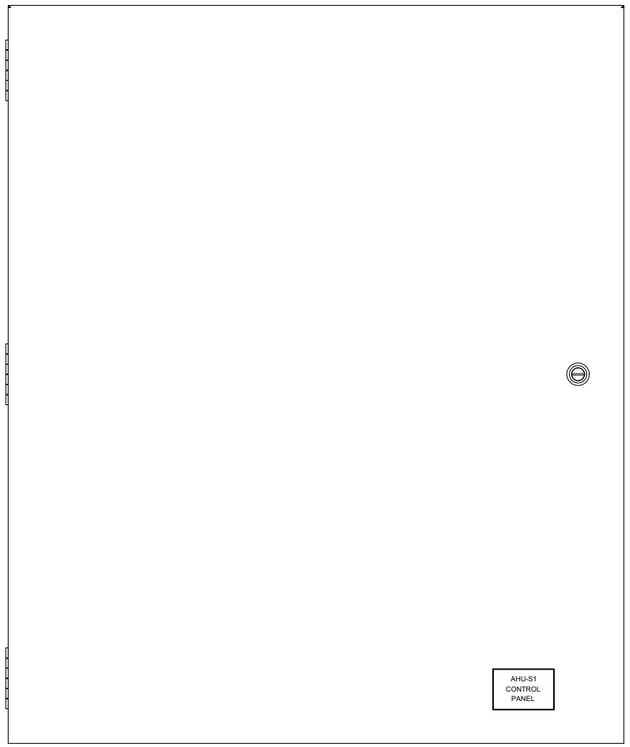
SYSTEM CONTROL PANEL 51 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

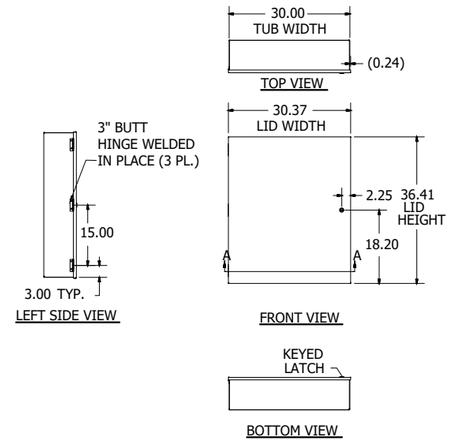
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

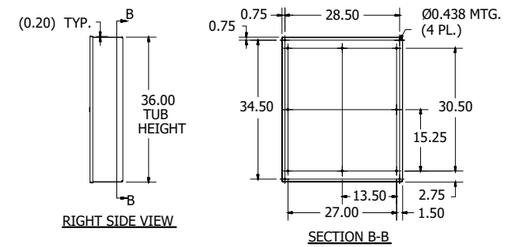
BILL OF MATERIALS

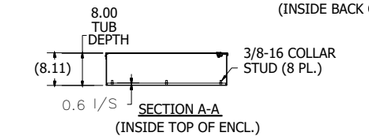
BILL OF MATERIALS

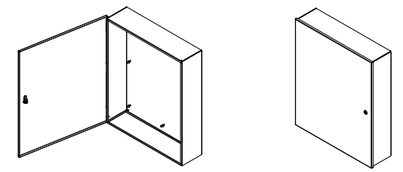
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

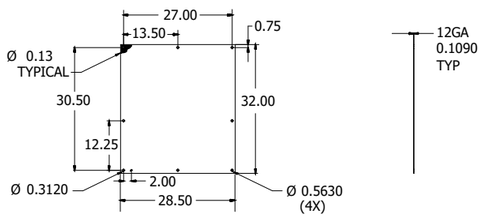








PANEL DIMENSIONS



AHU–S1 SYSTEM 51 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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SHEET
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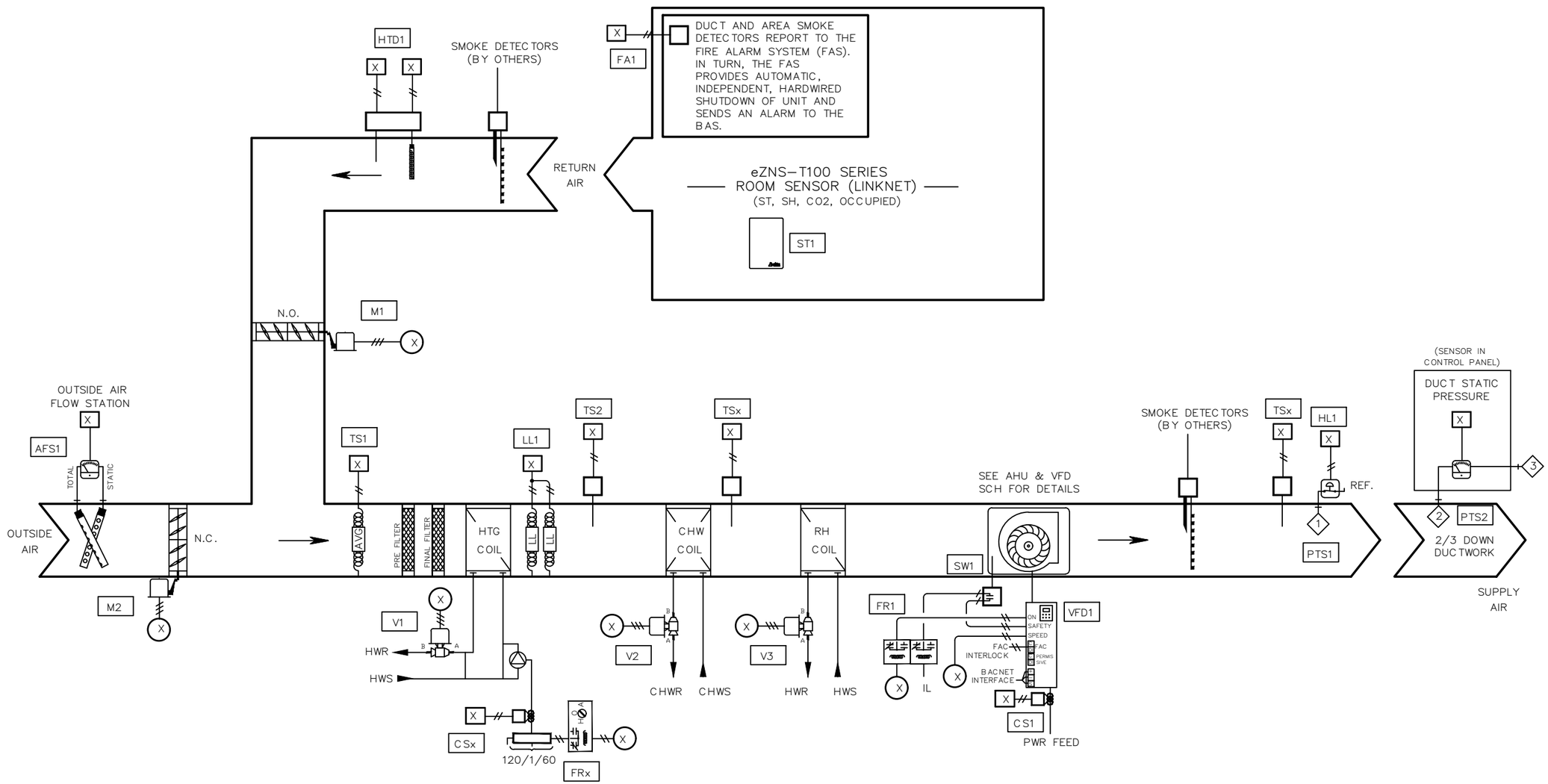
JOB NUMBER:
J–2304001

E–AHU–T1 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

E–AHU–T1 FIELD DEVICES

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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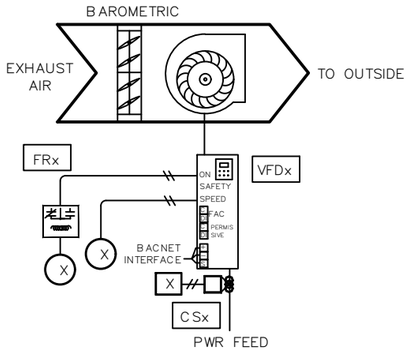
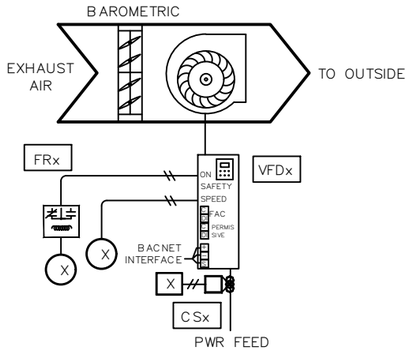
JOB NUMBER:
J–2304001

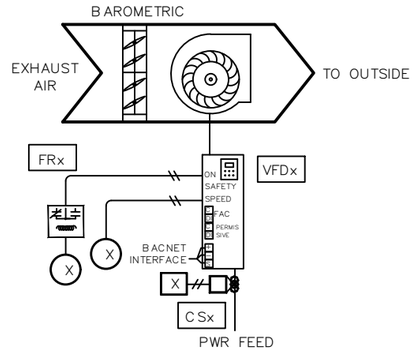
EXHAUST FAN – BAS CONTROLLED
EF–T2



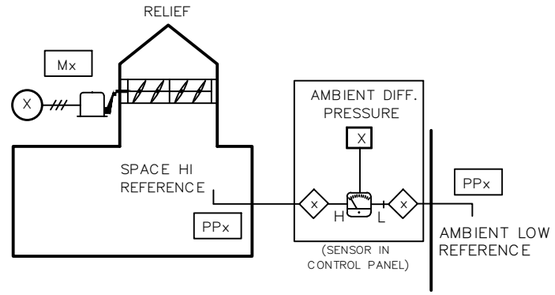
EXHAUST FAN – BAS CONTROLLED
EF–T3



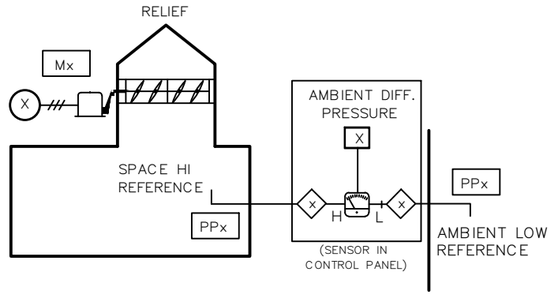
EXHAUST FAN – BAS CONTROLLED
E–EF–T4



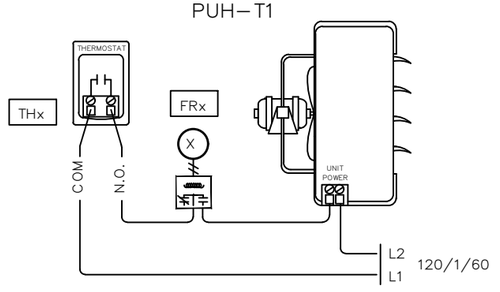
BUILDING PRESSURE CONTROL
E–RH–T1



BUILDING PRESSURE CONTROL
E–RH–T2



PROPELLER UNIT HEATER
PUH–T1



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

AREA T EXHAUST, RELIEF, & PROPELLER UNIT HEATER FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

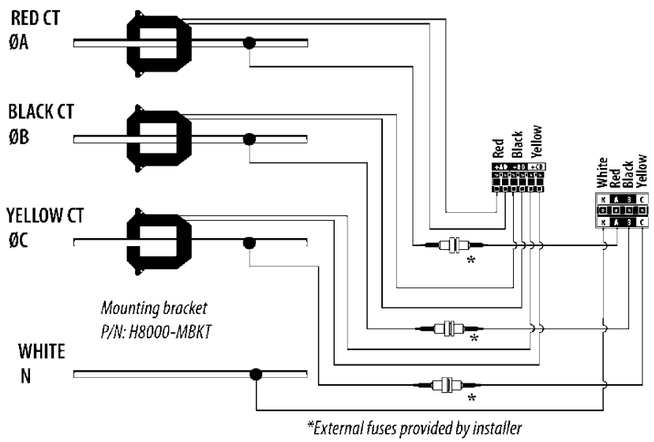
CONTRACT NO:

SHEET
NCHS–433
JOB NUMBER:
J–2304001

POWER METER HIGH VOLTAGE WIRING DETAIL

(FOR REFERENCE ONLY, NOT INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)

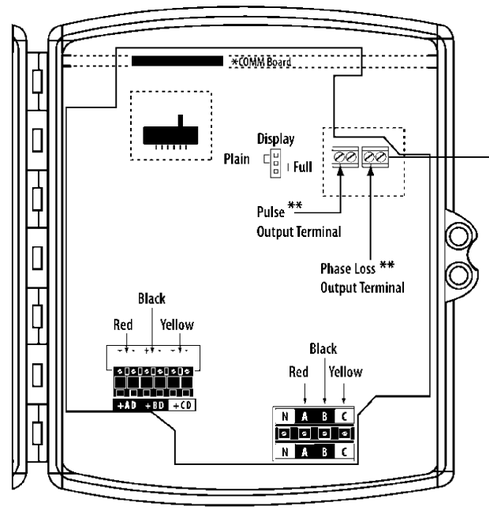
TYPICAL 208/480VAC, 4-WIRE, 3Ø INSTALLATION



(* PREVIOUS BAS DESIGN INDICATES VERIS AH04 TRIPLE FUSE KITS WERE INSTALLED)

POWER METER HIGH VOLTAGE WIRING DETAIL

(BACNET MS/TP COMMUNICATION AND PHASE LOSS MONITORING INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)



*COMM Board is Optional
**H8160 Series only

PHASE LOSS OUTPUT
(ONE CONNECTION PER METER)

X PL MTRS (SOUTH LOCKER ROOM)

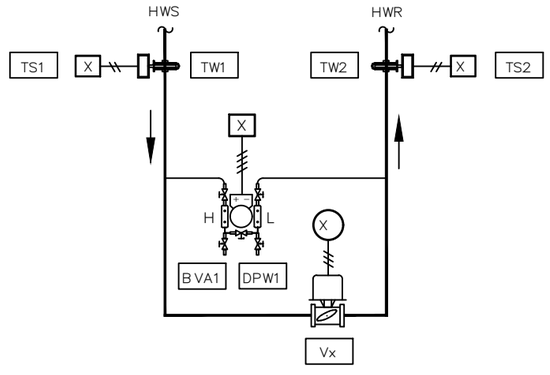
COMMUNICATION
CARD
(IF INSTALLED)

\+
–
S

BACNET
INTERFACE
(ONE CONNECTION PER METER)

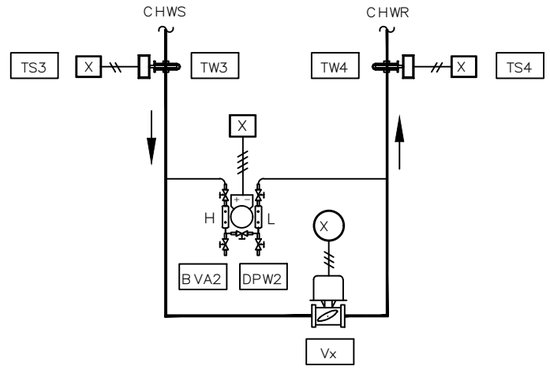
END OF LOOP CONTROLS – HOT WATER
(J. EVERETT LIGHT CAREER CENTER)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. WERE LOCATED AT NOW REMOVED AHU–D4)



END OF LOOP CONTROLS – CHILL WATER
(J. EVERETT LIGHT CAREER CENTER)

(CONFIRMATION OF EXISTING DEVICE LOCATIONS REQUIRED)
(PREVIOUS DESIGN INDICATES CTRLS. WERE LOCATED AT NOW REMOVED AHU–D4)



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA T JELCC END OF LOOP PRESSURE CONTROL & PHASE LOSS MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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SHEET
NCHS–434
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
CHWR JELCC EOL	Chill Water Return Temp	X				
CHWS JELCC EOL	Chill Water Supply Temp	X				
CW DP JELCC EOL	End of Loop Diff Pressure - JELCC	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
DPD1	Duct Static Pressure	X				
HW DP JELCC EOL	End of Loop Diff Pressure - JELCC	X				
HWR JELCC EOL	Hot Water Return Temp	X				
HWS JELCC EOL	Hot Water Supply Temp	X				
MAT	Mixed Air Temperature	X				
OA AFMS	Outside Airflow	X				
PHT	Preheat Discharge Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
E-EF-T4 STAT	Exhaust Fan T4 Status		X			
EF-T2 STAT	Exhaust Fan T2 Status		X			
EF-T3 STAT	Exhaust Fan T3 Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat)		X			
PL MTR S LOCKER	Phase Loss Elec Mtr S Locker Rm		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detector (device by others)		X			
SF STAT	Supply Fan Status		X			
CW BYP VLV	EOL Bypass Valve - JELCC Bldg			X		
CWV	Chill Water Valve			X		
E-RH-T1 DPR	Relief Air Damper			X		
E-RH-T2 DPR	Relief Air Damper			X		
HW BYP VLV	EOL Bypass Valve - JELCC Bldg			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RAD	Return Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
E-EF-T4 SS	Exhaust Fan T4 Fan Start / Stop				X	
EF-T2 SS	Exhaust Fan T2 Fan Start / Stop				X	
EF-T3 SS	Exhaust Fan T3 Fan Start / Stop				X	
PUH-T1 EN	PUH T1 Enable				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**16**	**9**	**10**	**6**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

E-AHU-T1 & AREA T MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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NCHS-435
JOB NUMBER:
J-2304001

VAV AIR HANDLING UNIT AHU-T1 SEQUENCE OF OPERATION

TCC SHALL UTILIZE EXISTING TEMPERATURE CONTROL PANEL TO HOUSE THE EQUIPMENT REQUIRED TO CONTROL THE AIR HANDLER.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE SCHEDULE OR MANUALLY AS SELECTED BY THE OPERATOR. MINIMUM RUN TIME SHALL BE 30 MINUTES (ADJ). IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM SHALL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

EXHAUST FAN CONTROL: THE ASSOCIATED EXHAUST FANS (EFTn-C) AS SHOWN ON M-602.3 WILL BE STARTED ACCORDING TO THE SCHEDULE AND NOTES.

BUILDING STATIC PRESSURE CONTROL: UPON A RISE IN BUILDING STATIC PRESSURE SETPOINT (ZN-SP) ABOVE SETPOINT OF +0.07" W.C. (ADJ), RELIEF HOOD(S) SHALL MODULATE TO MAINTAIN BUILDING STATIC PRESSURE AT A SETPOINT OF +0.05" W.C. (ADJ). THE DAMPER SHALL REMAIN CLOSED WHEN THE BUILDING STATIC PRESSURE FALLS BELOW 0.02" W.C. (ADJ).

SUPPLY DUCT STATIC PRESSURE CONTROL: THE SUPPLY FAN (SF-O) WILL MODULATE TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-SP) AT SETPOINT. THE INITIAL SETPOINT MAXIMUM SHALL BE 1.5" WITH A MINIMUM OF .5". BOTH SETTINGS SHALL BE DETERMINED BY THE BALANCE CONTRACTOR. SENSOR SHALL BE LOCATED 2/3 OF THE WAY DOWN THE MAIN DUCT RUN.

THE SYSTEM WILL SAMPLE THE VAV BOX DAMPER POSITIONS EVERY TWO MINUTES AND THE FAN SPEED WILL BE RESET AS FOLLOWS:
THE SUPPLY FAN STATIC WILL BE INCREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST BOX DAMPER POSITION IS GREATER THAN 80% OPEN.

THE SUPPLY FAN STATIC WILL REMAIN AS IS IF THE SECOND HIGHEST DAMPER POSITION IS BETWEEN 60% AND 80% OPEN.
THE SUPPLY FAN STATIC WILL BE DECREASED IN INCREMENTS OF .1" IF THE SECOND HIGHEST DAMPER POSITION IS LESS THAT 60% OPEN.

DISCHARGE TEMPERATURE CONTROL: THE MIXED AIR DAMPERS (OA,RA-DPR), PREHEAT VALVE (PH-VLV) AND COOLING VALVE (CLG-VLV) SHALL MODULATE TO MAINTAIN THE FOLLOWING DISCHARGE AIR TEMPERATURE SCHEDULE:

OUTSIDE AIR TEMPERATURE	DISCHARGE TEMPERATURE
0F	62F
70F	55F

ECONOMIZER SWITCHOVER: WHEN THE OUTSIDE AIR ENTHALPY (OA-T, OA-H) IS BELOW THE RETURN AIR ENTHALPY (RA-T, RA-H), THE ECONOMIZER MODE SHALL BE ENABLED. WHEN ECONOMIZER MODE IS ENABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL MODULATE TO CONTROL FOR MIXED AIR TEMPERATURE AND PROVIDE THE FIRST STAGE OF COOLING IN LIEU OF CHILLED WATER. CHILLED WATER VALVE SHALL MODULATE AS NECESSARY TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. WHEN ECONOMIZER MODE IS DISABLED, THE MIXED AIR DAMPER (OA-DPR, RA-DPR) SHALL RETURN TO MINIMUM POSITION TO MAINTAIN THE MINIMUM SCHEDULED OUTSIDE AIRFLOW AS MEASURED BY THE AIRFLOW MEASURING STATION (OA-CFM).

DEHUMIDIFICATION MODE: WHEN AVERAGE SPACE HUMIDITY AS COMMUNICATED FROM TERMINAL UNITS RISES ABOVE SETPOINT OF 60%RH (ADJ), THEN COOLING COIL SHALL OPEN FULLY, AND THE REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE AIR SETPOINT. THE FAN SPEED SHALL OPERATE AT FIXED SPEED 75% (ADJ) IN DEHUMIDIFICATION MODE. WHEN AVERAGE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE SEQUENCE SHALL RESUME NORMAL OPERATION.

PREHEAT COIL CIRCULATING PUMP: THE PREHEAT COIL CIRCULATING PUMP SHALL RUN CONSTANTLY ANYTIME THE OUTSIDE AIR TEMPERATURE IS BELOW 35F AND SHALL STOP ABOVE 40F. GENERATE AN ALARM IF STATUS DOES NOT MATCH THE COMMAND AFTER 60 SECONDS (ADJ).

MORNING WARM-UP: A MORNING WARMUP CYCLE SHALL BE IMPLEMENTED, UPON TRANSITION FROM UNOCCUPIED TO OCCUPIED MODE. FAN(S) TURN ON, OUTSIDE AIR DAMPER REMAINS CLOSED, RETURN AIR DAMPER REMAINS OPEN AND THE PREHEAT COIL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE OF 90F (ADJ). UNIT REMAINS IN THIS MODE UNTIL THE RETURN AIR TEMPERATURE (RA-T) REACHES THE MORNING WARMUP CYCLE TERMINATION SETPOINT OF 70F (ADJ). UPON REACHING THIS SETPOINT, THE AIR HANDLING UNIT ENTERS ITS NORMAL OCCUPIED MODE OF OPERATION (DISCHARGE TEMPERATURE CONTROL).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:

-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.
-IF A FIRE ALARM (RA-SD, SA-SD) SHUTDOWN CONTACT IS PROVIDED,
-IF DISCHARGE AIR HIGH LIMIT SWITCH IS IN ALARM,
-VALVES AND DAMPERS SHALL RETURN TO NORMAL POSITION VIA SPRING.

SHUTDOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND THE UNIT WILL BE SET AS FOLLOWS:
SUPPLY FAN WILL BE OFF
OUTSIDE AIR DAMPER WILL CLOSE
RETURN AIR DAMPER WILL OPEN
CHILLED WATER VALVE SHALL CLOSE
RELIEF HOOD DAMPERS SHALL CLOSE
AREA EXHAUST FANS SHALL STOP
PREHEAT VALVE SHALL MODULATE TO MAINTAIN A PREHEAT DISCHARGE TEMPERATURE (PH-T) OF 60F (ADJ)

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

ELECTRICAL UTILITY POWER MONITORING:

TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS.

PROPELLER UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

END OF LOOP CONTROLS (FROM PREVIOUS BAS CONTROL SEQUENCES):

THE TEMPERATURE OF THE SUPPLY WATER TO THE EQUIPMENT ROOM WILL BE USED TO POSITION THE END OF LOOP TEMPERATURE VALVE TO MAINTAIN THE CHILLED WATER SUPPLY AT 48 DEG. F AND THE HEATING WATER SUPPLY AT 145 DEG. F. THE PRESSURE TRANSMITTER WILL BE USED IN THE RESET OF THE PUMP VOLUME CONTROL SUCH THAT THE PUMP WILL MAINTAIN THE PROPER PRESSURE AT THE END OF THE MAIN.

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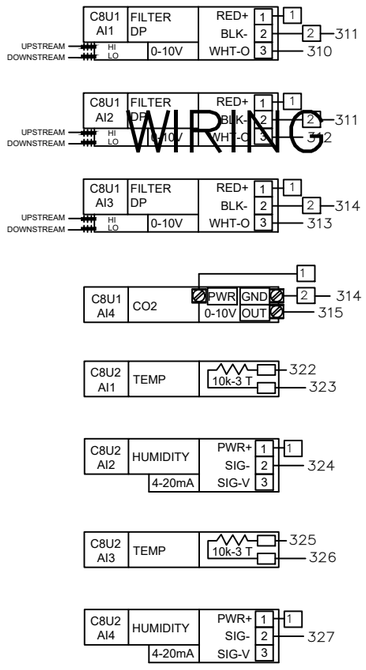

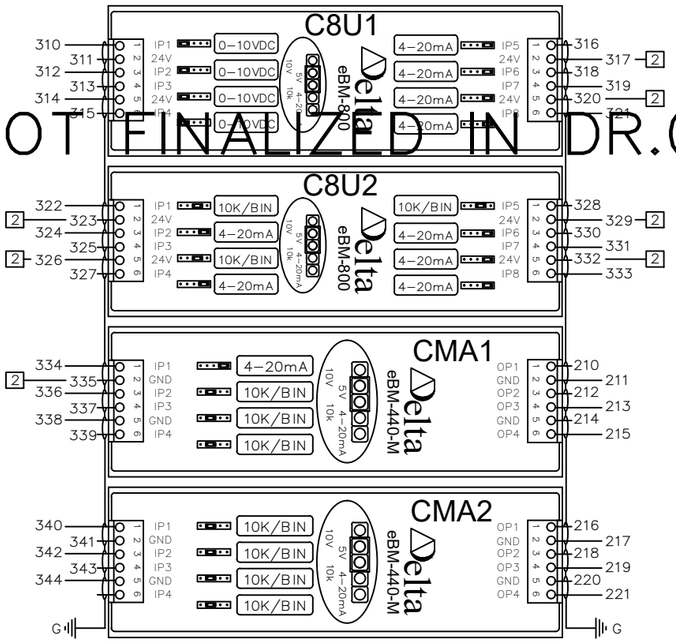

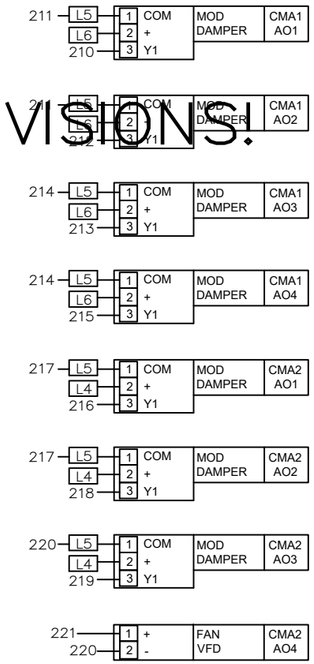

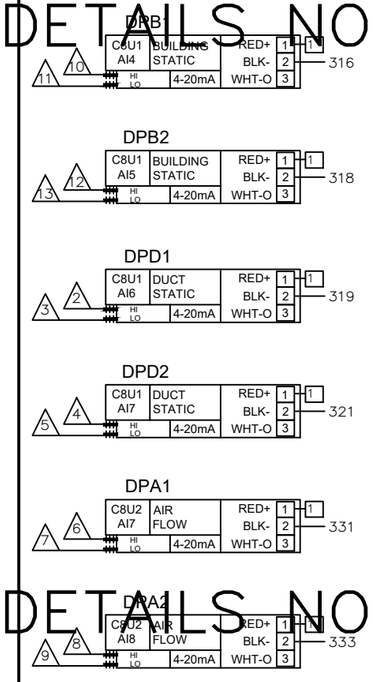

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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CMA3 DI1 | DX STATUS | N.O. | 346 / 347

CMA3 DI2 | PURGE ENABLE | N.O. | 348 / 347

CMH2 DI1 | FAN STATUS | N.O. | 358 / 359

CMH1 DI1 | FAN STATUS | N.O. | 360 / 359

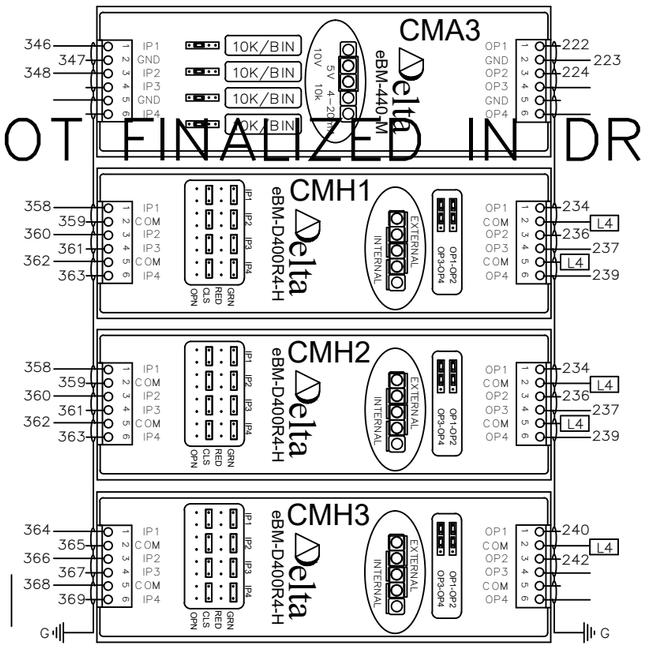
CMH1 DI3 | SMOKE ALARM | N.O. | 361 / 362

CMH1 DI4 | SMOKE ALARM | N.O. | 363 / 362

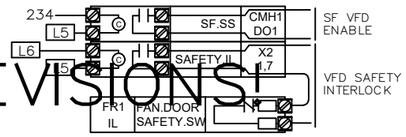
CMH2 DI1 | FAS.INPUT | N.C. | 364 / 365

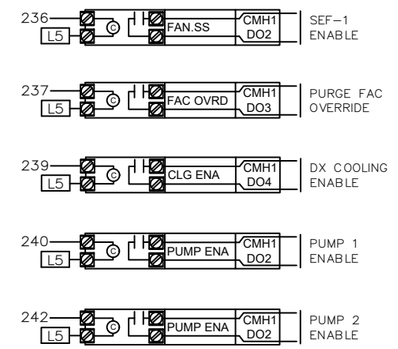
CMH2 DI2 | PUMP STATUS | N.O. | 366 / 365

CMH2 DI3 | PUMP STATUS | N.O. | 367 / 368



SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1





	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–438
JOB NUMBER:
J–2304001

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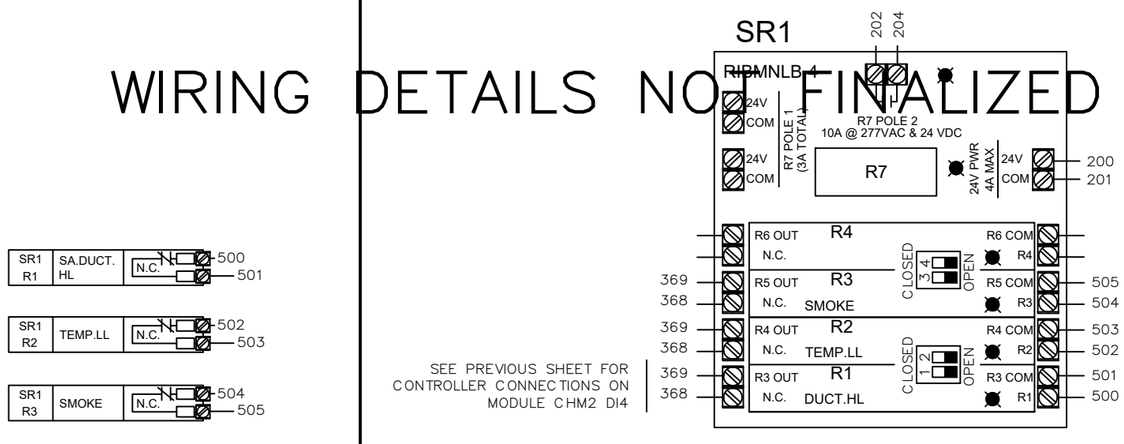

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

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SYSTEM 52 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

MS/TP SEG1 Err Tx Rx C

MS/TP SEG2 Err Tx Rx C

MS/TP SEG3 Err Tx Rx C

MS/TP SEG4 Err Tx Rx C

L3

200 201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

TRANSFORMER

102 L2

206 207

TX1

24V CB 24V CB

Power Power

100 L2 L3 H C G

75VA 24VAC 24VAC 120 VAC LAPTOP PWR 24VAC 24VAC 75VA

200 201 CONTROLLER PWR

202 203 FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V −V GND L N

300 301 101 L2 L3

PS1

102 4.0A

101 1.0A

100 5.0A

G PANEL GND LUG

TB1

L1 L2 L3 H N 120 VAC

TB2

202 L4 L4 L4

203 L5 L5 L5

204 L6 L6 L6

205 L7 L7 L7

206 L8 L8 L8

207 L9 L9 L9

24 VAC TO FIELD

TB3

300 1 1 1

301 2 2 2

24 VDC TO FIELD

301 300

L3

ETS1

V1− V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1

RIBMNLB-4

202 204

200 201

R7 POLE 2 10A @ 277VAC & 24 VDC

R7 POLE 1 16A @ 277VAC

24V COM

24V POWER 44 MAX

R7

R4 OUT N.C. R4 R4 COM R4

R3 OUT N.C. R3 R3 COM R3

R2 OUT N.C. R2 R2 COM R2

R1 OUT N.C. R1 R1 COM R1

CLOSED LOOP

DPD1 DPB1 DPB2

1

Power + GND / 4-20mA out − Voltage out O

HIGH LOW

2 3 4 5 6 7

PNEUMATIC

eZNS−T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

201 200

CEB1

C8X1

PWR GND 24~

USB2 USB1

(NOT USED)

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800 eBM-440-M eBM-440-M eBM-440-M eBM-D400R4-H eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

ST1

NET PWR

24 VAC

LINKNET (RS−485)

MS/TP

LINKNET (RS−485)

SEE RISER DIAGRAMS FOR LOCATION

AHU−T1 SYSTEM 52 PANEL − POWER & NETWORK WIRING

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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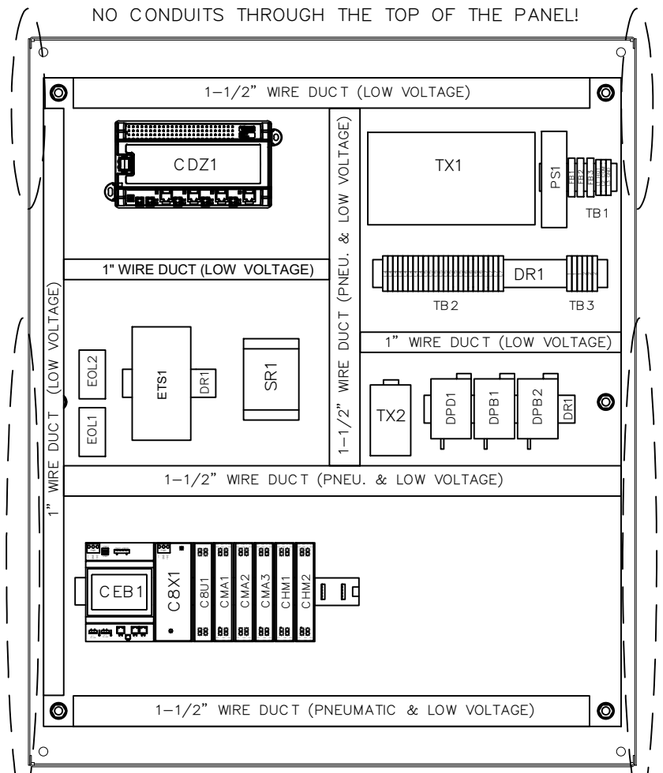
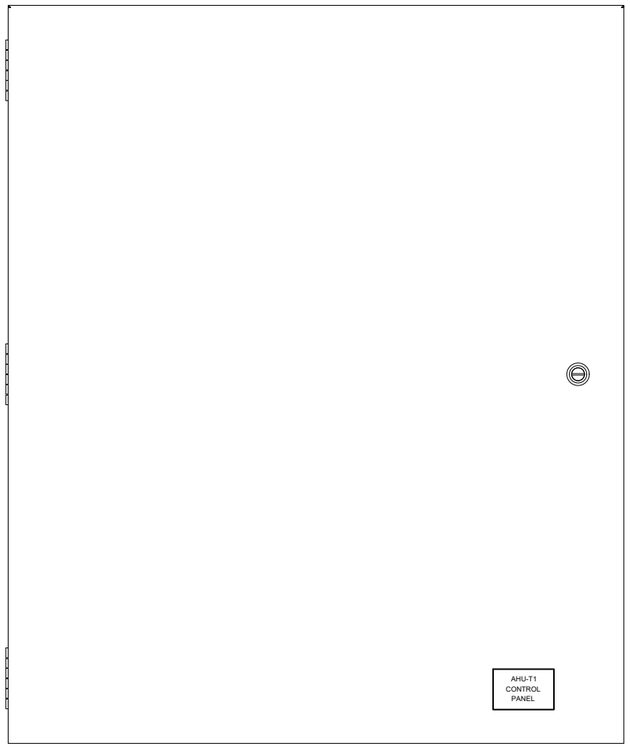
SYSTEM CONTROL PANEL 52 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

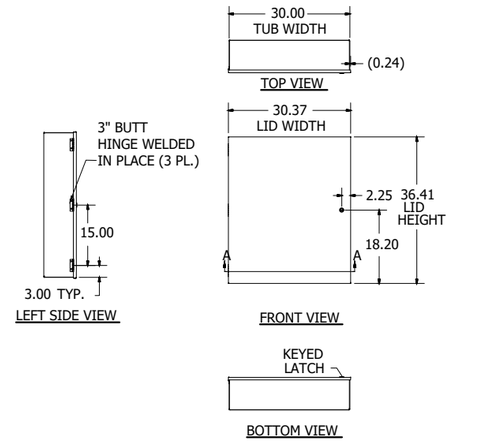
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

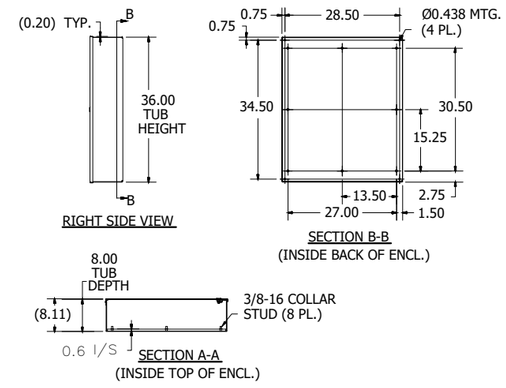
BILL OF MATERIALS

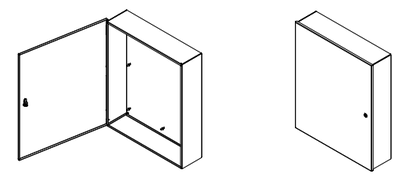
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

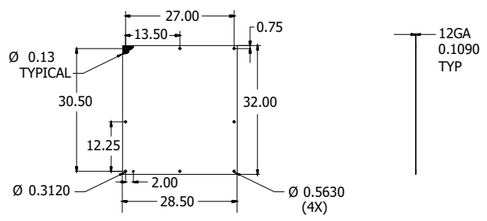
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



AHU–T1 SYSTEM 52 PANEL – DIMENSIONS & BOM

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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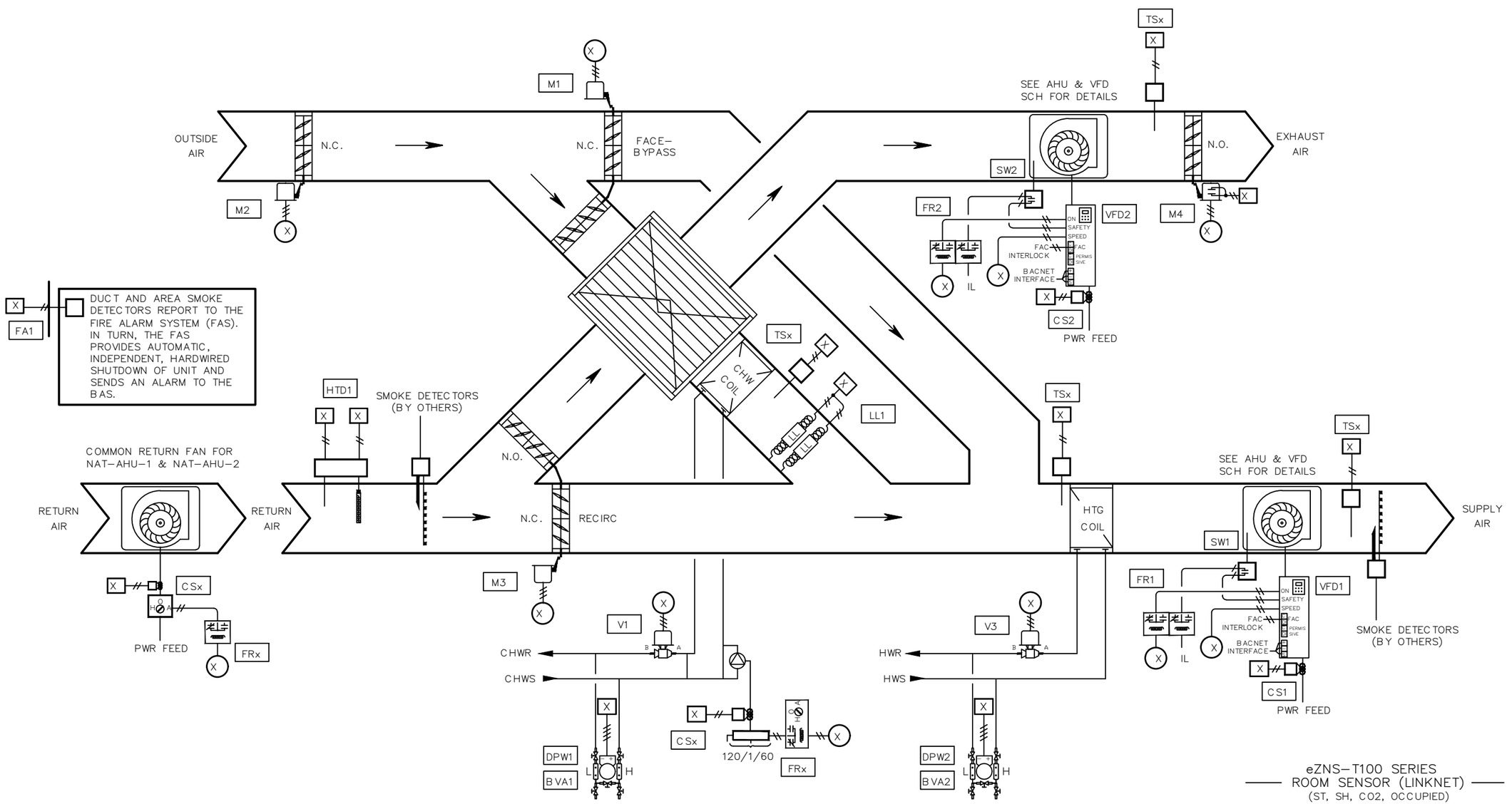
NAT–AHU–1 FIELD DEVICES



BILL OF MATERIAL

NAT–AHU–1 FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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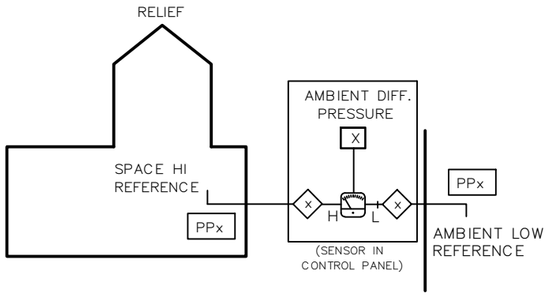
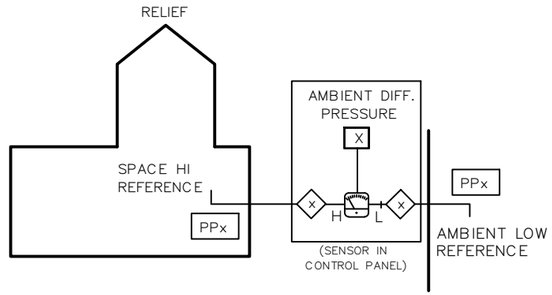
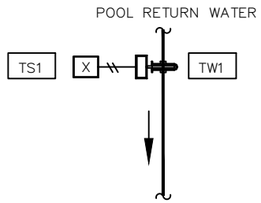
BUILDING PRESSURE MONITORING
AREA SENSOR 1



BUILDING PRESSURE MONITORING
AREA SENSOR 1



POOL RETURN WATER TEMPERATURE
(FIELD DETERMINATION OF LOCATION AND MOUNTING REQUIREMENTS REQUIRED.)



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

NAT–AHU–1 BUILDING PRESSURE AND POOL RETURN TEMPERATURE MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NCHS–443
JOB NUMBER:
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
CW DP NAT-AHU-1	Chill Water Diff Pressure	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
EAT	Exhaust Air Temp	X				
HW DP NAT-AHU-1	Hot Water Diff Pressure	X				
HXT	Heat Exchanger Air Temp	X				
POOLWTR-T	Pool Water Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EAD ES	Exhaust Air Damper Status		X			
EF STAT	Exhaust Fan Status		X			
LL	Low Limit (Freezestat) (qty 2)		X			
PUMP STAT	HW Circ Pump Status		X			
RF STAT	Return Fan Status		X			
SD	Smoke Detectors (devices by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
EAD	Exhaust Air Damper			X		
EF VFD	Exhaust Fan VFD Speed			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
RECIRC DPR	Recirculation Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF SS	Exhaust Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
RF SS	Return Fan Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**11**	**7**	**8**	**4**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

NAT-AHU-1 & MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
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NATATORIUM AIR HANDLING UNIT 1 AND 2 SEQUENCE OF OPERATION

TCC PROVIDED CONTROLLER SHALL BE INSTALLED, WIRED, AND CONNECTED TO EXISTING CONTROL CIRCUIT BY THE CONTROLS INSTALLATION CONTRACTOR. AHU-1 SHALL USE THE POOL SPACE (HIGH PRESSURE) AND CORRIDOR (NEGATIVE PRESSURE) AS THE REFERENCE STATIC PRESSURE POINTS FOR THE EXHAUST FAN TO MAINTAIN A NEGATIVE SPACE PRESSURE (ZN-SP) AS NOTED BELOW. TCC SHALL PROVIDE NEW PROGRAMMING AND CONTROL DEVICES TO MAINTAIN A FIXED DIFFERENTIAL BETWEEN POOL WATER TEMPERATURE AND SPECTATOR ADJUSTABLE ZONE TEMPERATURE. MINIMUM SPECTATOR TEMPERATURE SETPOINT SHALL BE 76 F AND MAXIMUM SHALL BE 80F (ADJ). TCC SHALL PROVIDE POOL WATER TEMPERATURE SENSOR FOR INSTALLATION BY THE CIC AND USE IN LOGIC WITHIN THE BUILDING AUTOMATION SYSTEM. CLASSROOM VAV CONTROLS SHALL BE REPLACED EXACTLY AS CURRENTLY IMPLEMENTED. SEE AS-BUILT TEMPERATURE CONTROL DRAWINGS FOR ADDITIONAL DETAILS. TCC SHALL REPLACE CONTROLS, VALVE ASSEMBLY, DAMPER ACTUATORS, AND VFDS. REFERENCE OWNER PROVIDED AS-BUILT DRAWINGS FOR ADDITIONAL DETAILS AND REQUIREMENTS. TCC SHALL ENABLE/DISABLE HIGH VOLUME LOW SPEED FANS ACCORDING TO SEQUENCE OF OPERATION PROVIDED ON M-708.3 DETAIL 1A.

DDC SHALL HAVE ONE DIGITAL OUTPUT FOR LOCAL INDICATION OF AN ALARM CONDITION. (I.E. BLOWER CURRENT/DIFFERENTIAL PRESSURE SWITCH, DAMPER END SWITCHES, FREEZE STAT, FIRE STAT, SMOKE, DIRTY FILTERS…).

1. AHU-1 AND AHU-2 SUPPLY FANS SHALL BE CONVERTED FROM THE EXISTING MOTOR STARTER SOLUTION TO VARIABLE FREQUENCY DRIVES. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES. AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY
   WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
2. PROVIDE LOW LIMIT PROTECTION, NUMBER AS REQUIRED ON THE DISCHARGE OF AHU CHILLED WATER COILS TO SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. PROVIDE STRAP ON SENSOR TO OVERRIDE CONTROL VALVE UPON SENSING 39F AT THE CHILLED WATER RETURN LINE
   OF THE COOLING COIL. LOW LIMIT PROTECTION ON THE DISCHARGE OF AHU CHILLED WATER COILS SHALL SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. IMMERSION SENSOR SHALL OVERRIDE CONTROL VALVE LOGIC UPON SENSING 39F (ADJ) AT THE CHILLED RETURN LINE OF
   THE COOLING COIL.
3. DIVISION 26 CONTRACTOR SHALL PROVIDE AND MOUNT DUCT DETECTORS IN THE SUPPLY AIR (SA) AND RETURN AIR (RA) DUCTS. CIC SHALL WIRE DETECTORS TO STOP THE SUPPLY FAN (SA) AND GENERATE A BAS ALARM.
4. EITHER OF THE ABOVE SAFETIES SHALL STOP THE FAN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN THE HEATING CONTROL VALVE WHEN IN ALARM.
5. POOL WATER TEMPERATURE SENSOR SHALL BE UTILIZED TO CALCULATE SPACE TEMPERATURE VERSUS WATER TEMPERATURE DIFFERENTIAL. TCC SHALL INCLUDE SPACE AND WATER TEMPERATURE ON GRAPHIC. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES.
   AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
6. OUTSIDE AIR HEAT EXCHANGER FACE AND BYPASS DAMPER: (THE OUTSIDE AIR MAXIMUM AND MINIMUM SETTINGS SHALL BE SET AT ORIGINAL START-UP VALUES.)
A. ENERGY RECOVERY MODE:
1. UNIT SHALL OPERATE IN ENERGY RECOVERY MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS 38F AND ABOVE.
2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE FULL OPEN TO FACE AND FULL CLOSED TO BYPASS TO PASS ALL OUTSIDE AIR THROUGH THE HEAT EXCHANGER.
B. WINTER DEFROST MODE:
1. UNIT SHALL OPERATE IN WINTER DEFROST MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS BELOW 38F.
2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE OPEN TO BYPASS AND CLOSED TO THE FACE, BYPASSING SOME OF THE OUTSIDE AIR TO PREVENT FROST FORMATION
   ON THE EXHAUST SIDE OF THE HEAT EXCHANGER. UNIT SHALL OPERATE IN THIS MODE UNTIL THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS ABOVE 38F.
7. COOLING
A. COOLING SHALL BE LOCKED OUT WHEN THE VALIDATED OUTSIDE AIR TEMPERATURE IS BELOW 55F.
B. THE COOLING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE AIR TEMPERATURE AT SETPOINT. THIS SIGNAL
   SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.
8. HEATING
A. THE HEATING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE TEMPERATURE AT SETPOINT. THIS SIGNAL
   SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.
9. SPACE PRESSURIZATION CONTROL
A. THE EXHAUST FAN VFD SHALL MODULATE FAN SPEED AS REQUIRED TO MAINTAIN NEGATIVE POOL SPACE PRESSURE RELATIVE TO THE ADJACENT SPACES. DIFFERENTIAL
   PRESSURE SETPOINT SHALL BE 0.04" W.C. (ADJ).
10. SPACE HUMIDITY CONTROL
A. RETURN AIR DEW POINT CONTROL: UNIT DEHUMIDIFICATION CONTROLS SHALL MAINTAIN RETURN AIR AT 86F AT 50% RH.
B. OUTSIDE AIR AND RECIRCULATION AIR DAMPERS
1. OA DAMPER AT MINIMUM POSITION, RECIRCULATION DAMPER AT MAXIMUM POSITION: THE EXHAUST FAN VFD OPERATES FAN AT MINIMUM EXHAUST SETTING.
2. OA DAMPER AT MAXIMUM POSITION, RECIRCULATION DAMPER AT MINIMUM POSITION: COOLING COIL PI VALVE MODULATES AS REQUIRED FOR COIL DISCHARGE TEMPERATURE CONTROL OR RETURN AIR DEW
   POINT CONTROL.
11. SUPPLY AIR TEMPERATURE RESET
A. THE SUPPLY AIR TEMPERATURE AT THE AHU DISCHARGE SHALL BE RESET WITHIN THE LIMITS BELOW TO MAINTAIN THE RETURN AIR TEMPERATURE AT SETPOINT OF 86F (ADJ).
1. SUPPLY AIR MINIMUM SETPOINT OF 60F (ADJ).
2. SUPPLY AIR MAXIMUM SETPOINT OF 120F (ADJ).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.

POOL WATER TEMP MONITORING:

BAS TO MONITOR POOL WATER RETURN TEMPERATURE. MAKE INFORMATION AVAILABLE ON FRONT-END GRAPHICS.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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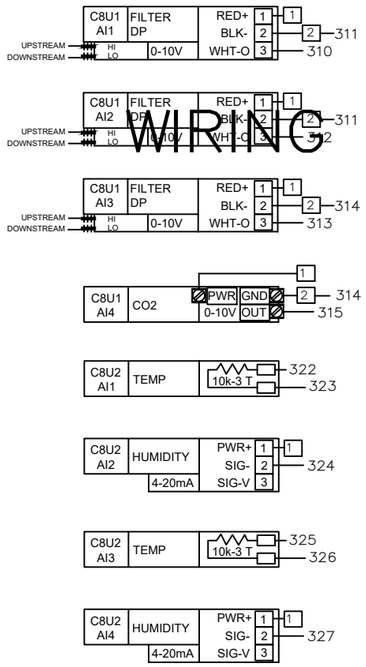
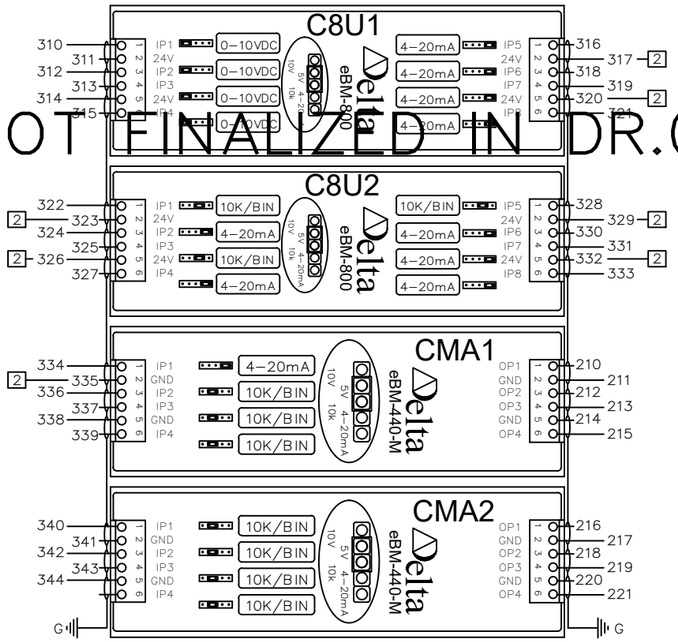
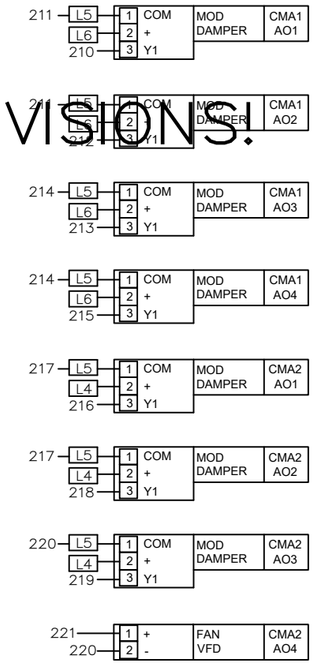
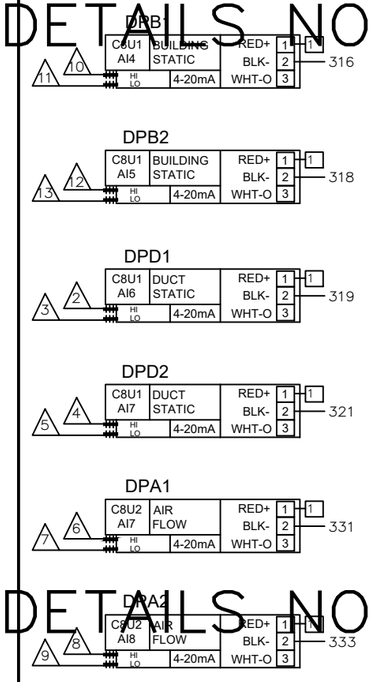
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200

C8U1 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201

C8U2 eBM-800 — eBM-800 I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206

CMA1 eBM-440-M — eBM-440-M I/O MODULE

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

CMA2 eBM-440-M — eBM-440-M I/O MODULE

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-446
JOB NUMBER:
J-2304001

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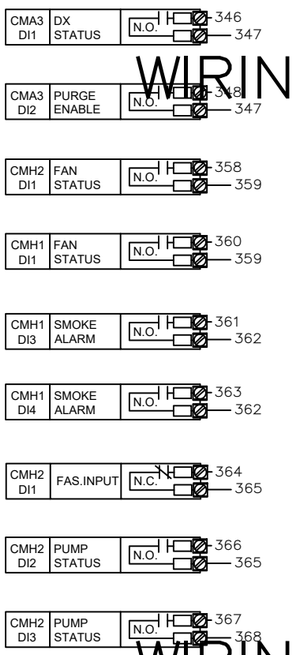
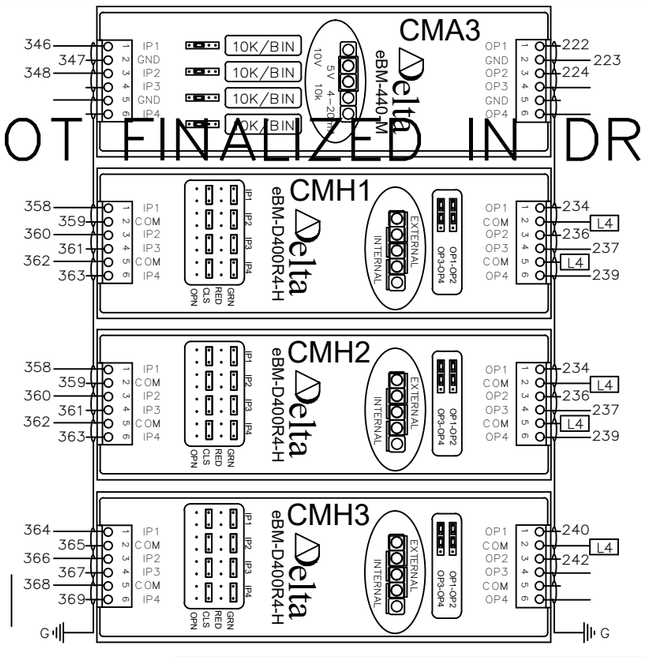
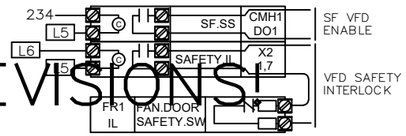




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
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DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–447
JOB NUMBER:
J–2304001

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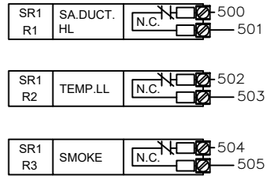
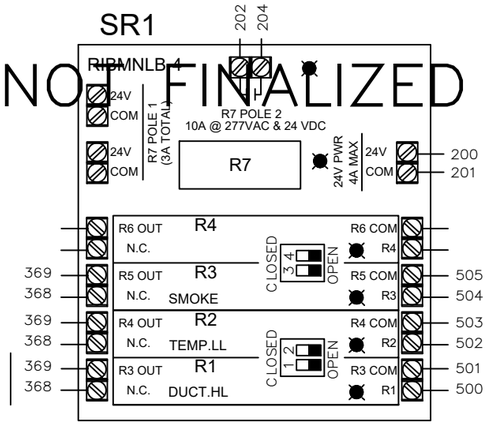


SEE PREVIOUS SHEET FOR CONTROLLER CONNECTIONS ON MODULE CHM2 DI4



CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NAT–AHU–1 SYSTEM 53 PANEL – I/O WIRING (3 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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SHEET
NCHS–448
JOB NUMBER:
J–2304001

SYSTEM 53 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

ETS1

ETHERNET SWITCH

CAT5e

SR1

RIBMNLB-4

TX1

24V CB

Power

120 VAC LAPTOP PWR

CONTROLLER PWR

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

PS1

TB1

PANEL GND LUG

120 VAC

TB2

24 VAC TO FIELD

TB3

24 VDC TO FIELD

DPB1

DPB2

PNEUMATIC

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1

NET

PWR

24 VAC

LINKNET (RS-485)

CEB1

C8X1

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800

eBM-440-M

eBM-D400R4-H

I/O SHIELD DRAIN

TO PANEL GND LUG

MS/TP

LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

NAT-AHU-1 SYSTEM 53 PANEL – POWER & NETWORK WIRING

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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REVISIONS	
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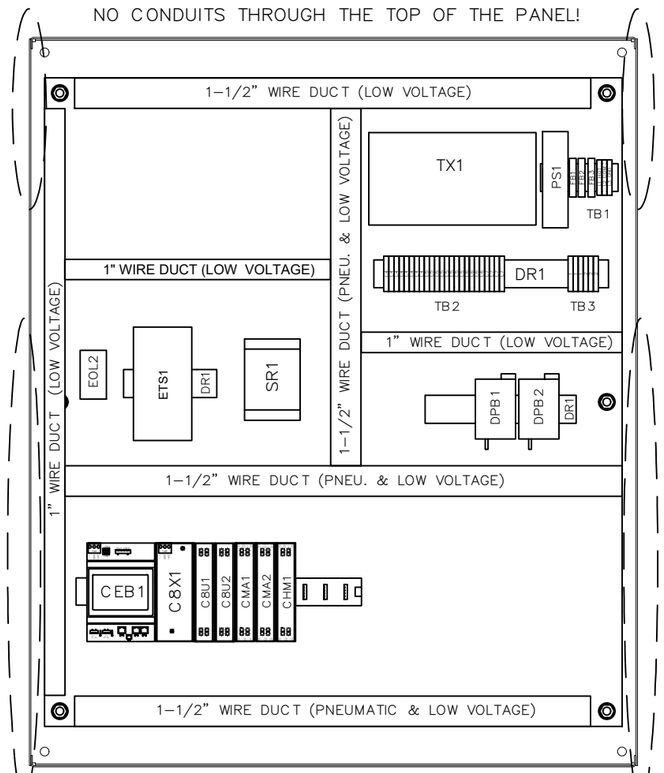
CONTRACT NO:

SHEET
NCHS-449
JOB NUMBER:
J-2304001

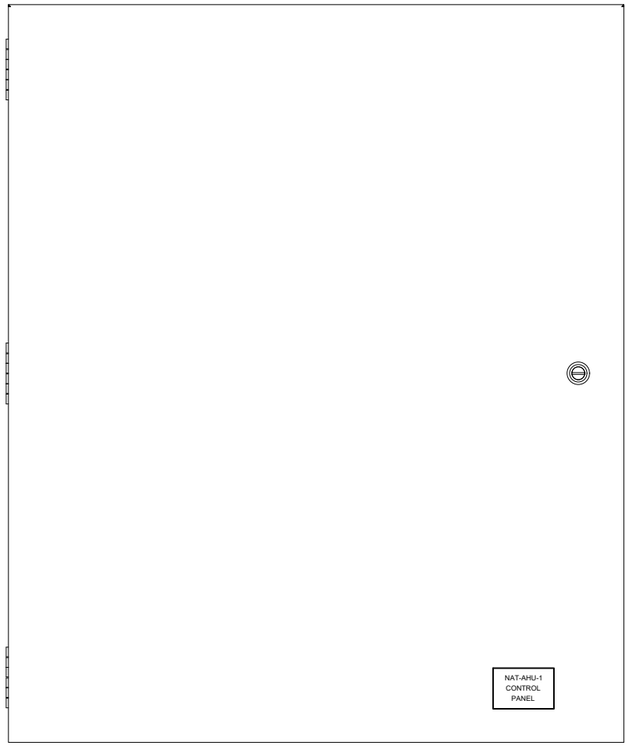
SYSTEM CONTROL PANEL 53 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

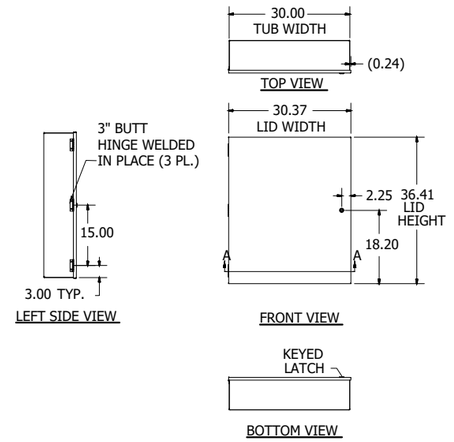
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

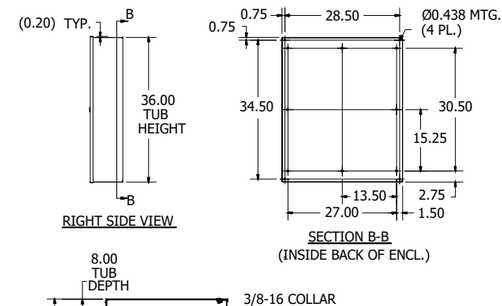
BILL OF MATERIALS

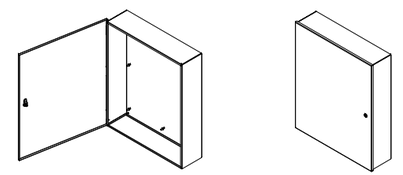
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

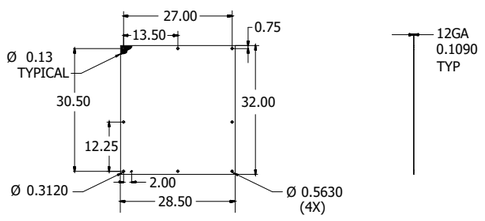
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



NAT–AHU–1 SYSTEM 53 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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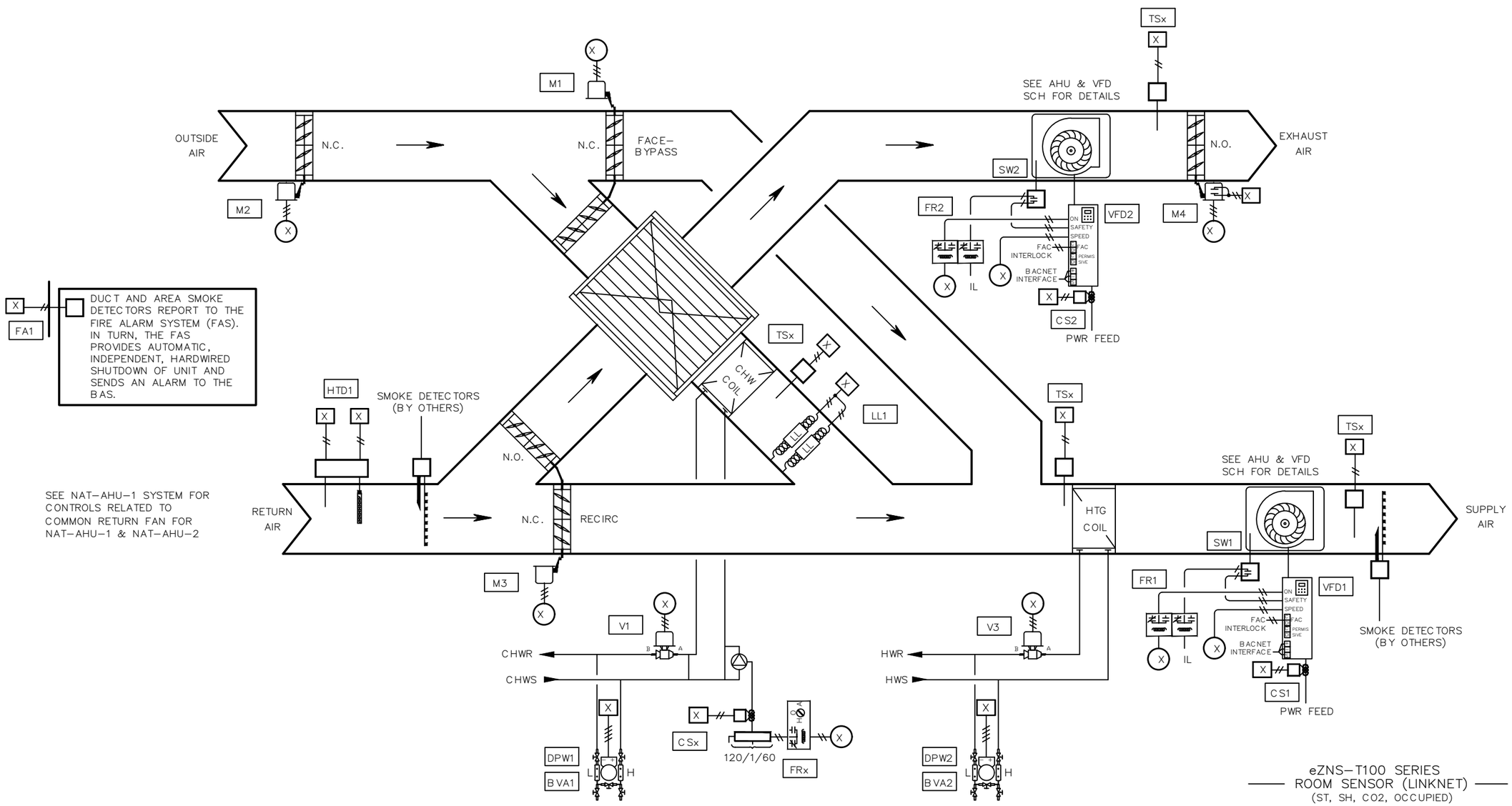
CONTRACT NO:

SHEET
NCHS–450
JOB NUMBER:
J–2304001

NAT–AHU–2 FIELD DEVICES



eZNS–T100 SERIES ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)

ST1

NETWORK POINTS
N1 THROUGH Nx

BILL OF MATERIAL

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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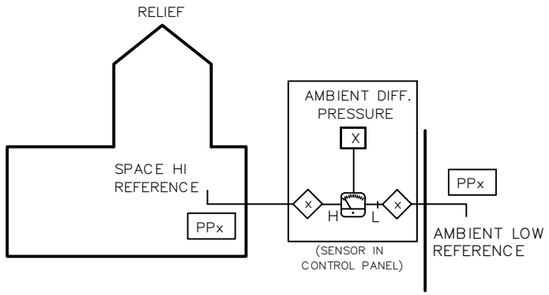
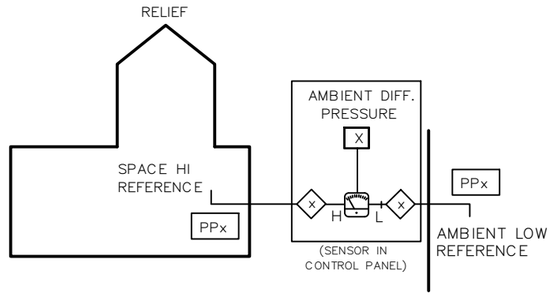
CONTRACT NO:

SHEET
NCHS–451
JOB NUMBER:
J–2304001

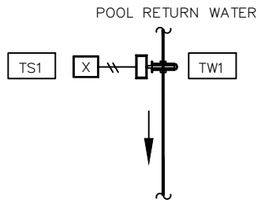
BUILDING PRESSURE MONITORING
AREA SENSOR 1



BUILDING PRESSURE MONITORING
AREA SENSOR 1



POOL RETURN WATER TEMPERATURE
(FIELD DETERMINATION OF LOCATION AND MOUNTING REQUIREMENTS REQUIRED.)



BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

NAT–AHU–2 BUILDING PRESSURE AND POOL RETURN TEMPERATURE MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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CONTRACT NO:

SHEET
NCHS–452
JOB NUMBER:
J–2304001

INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
CW DP NAT-AHU-1	Chill Water Diff Pressure	X				
DAT	Discharge Air Temp	X				
DPB1	Building Static Pressure 1	X				
DPB2	Building Static Pressure 2	X				
EAT	Exhaust Air Temp	X				
HW DP NAT-AHU-1	Hot Water Diff Pressure	X				
HXT	Heat Exchanger Air Temp	X				
POOLWTR-T	Pool Water Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EAD ES	Exhaust Air Damper Status		X			
EF STAT	Exhaust Fan Status		X			
LL	Low Limit (Freezestat) (qty 2)		X			
PUMP STAT	HW Circ Pump Status		X			
SD	Smoke Detectors (devices by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
EAD	Exhaust Air Damper			X		
EF VFD	Exhaust Fan VFD Speed			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
RECIRC DPR	Recirculation Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF SS	Exhaust Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
ST1	Space Temp					X
SH1	Space Humidity					X
S CO21	Space CO2					X
OCC1	Occupied Flag					X
	POINT TOTALS:	**11**	**6**	**8**	**3**	**4**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

NAT-AHU-2 & MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-453
JOB NUMBER:
J-2304001

NATATORIUM AIR HANDLING UNIT 1 AND 2 SEQUENCE OF OPERATION

TCC PROVIDED CONTROLLER SHALL BE INSTALLED, WIRED, AND CONNECTED TO EXISTING CONTROL CIRCUIT BY THE CONTROLS INSTALLATION CONTRACTOR. AHU-1 SHALL USE THE POOL SPACE (HIGH PRESSURE) AND CORRIDOR (NEGATIVE PRESSURE) AS THE REFERENCE STATIC PRESSURE POINTS FOR THE EXHAUST FAN TO MAINTAIN A NEGATIVE SPACE PRESSURE (ZN-SP) AS NOTED BELOW. TCC SHALL PROVIDE NEW PROGRAMMING AND CONTROL DEVICES TO MAINTAIN A FIXED DIFFERENTIAL BETWEEN POOL WATER TEMPERATURE AND SPECTATOR ADJUSTABLE ZONE TEMPERATURE. MINIMUM SPECTATOR TEMPERATURE SETPOINT SHALL BE 76 F AND MAXIMUM SHALL BE 80F (ADJ). TCC SHALL PROVIDE POOL WATER TEMPERATURE SENSOR FOR INSTALLATION BY THE CIC AND USE IN LOGIC WITHIN THE BUILDING AUTOMATION SYSTEM. CLASSROOM VAV CONTROLS SHALL BE REPLACED EXACTLY AS CURRENTLY IMPLEMENTED. SEE AS-BUILT TEMPERATURE CONTROL DRAWINGS FOR ADDITIONAL DETAILS. TCC SHALL REPLACE CONTROLS, VALVE ASSEMBLY, DAMPER ACTUATORS, AND VFDS. REFERENCE OWNER PROVIDED AS-BUILT DRAWINGS FOR ADDITIONAL DETAILS AND REQUIREMENTS. TCC SHALL ENABLE/DISABLE HIGH VOLUME LOW SPEED FANS ACCORDING TO SEQUENCE OF OPERATION PROVIDED ON M-708.3 DETAIL 1A.

DDC SHALL HAVE ONE DIGITAL OUTPUT FOR LOCAL INDICATION OF AN ALARM CONDITION. (I.E. BLOWER CURRENT/DIFFERENTIAL PRESSURE SWITCH, DAMPER END SWITCHES, FREEZE STAT, FIRE STAT, SMOKE, DIRTY FILTERS…).

1. AHU-1 AND AHU-2 SUPPLY FANS SHALL BE CONVERTED FROM THE EXISTING MOTOR STARTER SOLUTION TO VARIABLE FREQUENCY DRIVES. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES. AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY
   WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
2. PROVIDE LOW LIMIT PROTECTION, NUMBER AS REQUIRED ON THE DISCHARGE OF AHU CHILLED WATER COILS TO SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. PROVIDE STRAP ON SENSOR TO OVERRIDE CONTROL VALVE UPON SENSING 39F AT THE CHILLED WATER RETURN LINE
   OF THE COOLING COIL. LOW LIMIT PROTECTION ON THE DISCHARGE OF AHU CHILLED WATER COILS SHALL SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. IMMERSION SENSOR SHALL OVERRIDE CONTROL VALVE LOGIC UPON SENSING 39F (ADJ) AT THE CHILLED RETURN LINE OF
   THE COOLING COIL.
3. DIVISION 26 CONTRACTOR SHALL PROVIDE AND MOUNT DUCT DETECTORS IN THE SUPPLY AIR (SA) AND RETURN AIR (RA) DUCTS. CIC SHALL WIRE DETECTORS TO STOP THE SUPPLY FAN (SA) AND GENERATE A BAS ALARM.
4. EITHER OF THE ABOVE SAFETIES SHALL STOP THE FAN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN THE HEATING CONTROL VALVE WHEN IN ALARM.
5. POOL WATER TEMPERATURE SENSOR SHALL BE UTILIZED TO CALCULATE SPACE TEMPERATURE VERSUS WATER TEMPERATURE DIFFERENTIAL. TCC SHALL INCLUDE SPACE AND WATER TEMPERATURE ON GRAPHIC. THE LEAD AIR HANDLING UNIT SHALL OPERATE AT ALL TIMES.
   AHU-1 AND AHU-2 SHALL ROTATE LEAD WEEKLY AND OPERATE CONCURRENTLY WHEN THE LAG AIR HANDLER IS REQUIRED TO MAINTAIN REQUIRED SPACE TEMPERATURE AND HUMIDITY CONDITIONS. LAG AIR HANDLING UNIT SHALL AUTOMATICALLY TAKE OVER UPON LEAD FAILURE.
6. OUTSIDE AIR HEAT EXCHANGER FACE AND BYPASS DAMPER: (THE OUTSIDE AIR MAXIMUM AND MINIMUM SETTINGS SHALL BE SET AT ORIGINAL START-UP VALUES.)

A. ENERGY RECOVERY MODE:

1. UNIT SHALL OPERATE IN ENERGY RECOVERY MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS 38F AND ABOVE.
2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE FULL OPEN TO FACE AND FULL CLOSED TO BYPASS TO PASS ALL OUTSIDE AIR THROUGH THE HEAT EXCHANGER.

B. WINTER DEFROST MODE:

1. UNIT SHALL OPERATE IN WINTER DEFROST MODE WHEN THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS BELOW 38F.
2. THE OUTSIDE AIR HEAT EXCHANGER FACE & BYPASS DAMPER SHALL MODULATE OPEN TO BYPASS AND CLOSED TO THE FACE, BYPASSING SOME OF THE OUTSIDE AIR TO PREVENT FROST FORMATION
   ON THE EXHAUST SIDE OF THE HEAT EXCHANGER. UNIT SHALL OPERATE IN THIS MODE UNTIL THE EXHAUST AIR LEAVING THE HEAT EXCHANGER IS ABOVE 38F.

7. COOLING

A. COOLING SHALL BE LOCKED OUT WHEN THE VALIDATED OUTSIDE AIR TEMPERATURE IS BELOW 55F.

B. THE COOLING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE AIR TEMPERATURE AT SETPOINT. THIS SIGNAL
   SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.

8. HEATING

A. THE HEATING COIL PRESSURE INDEPENDENT (PI) CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE TEMPERATURE AT SETPOINT. THIS SIGNAL
   SHALL BE OVERRIDDEN BY LOGIC AS REQUIRED TO MAINTAIN HOT WATER COIL LEAVING TEMPERATURE MINIMUM OF 55F.

9. SPACE PRESSURIZATION CONTROL

A. THE EXHAUST FAN VFD SHALL MODULATE FAN SPEED AS REQUIRED TO MAINTAIN NEGATIVE POOL SPACE PRESSURE RELATIVE TO THE ADJACENT SPACES. DIFFERENTIAL
   PRESSURE SETPOINT SHALL BE 0.04" W.C. (ADJ).

10. SPACE HUMIDITY CONTROL

A. RETURN AIR DEW POINT CONTROL: UNIT DEHUMIDIFICATION CONTROLS SHALL MAINTAIN RETURN AIR AT 86F AT 50% RH.

B. OUTSIDE AIR AND RECIRCULATION AIR DAMPERS

1. OA DAMPER AT MINIMUM POSITION, RECIRCULATION DAMPER AT MAXIMUM POSITION: THE EXHAUST FAN VFD OPERATES FAN AT MINIMUM EXHAUST SETTING.
2. OA DAMPER AT MAXIMUM POSITION, RECIRCULATION DAMPER AT MINIMUM POSITION: COOLING COIL PI VALVE MODULATES AS REQUIRED FOR COIL DISCHARGE TEMPERATURE CONTROL OR RETURN AIR DEW
   POINT CONTROL.

11. SUPPLY AIR TEMPERATURE RESET

A. THE SUPPLY AIR TEMPERATURE AT THE AHU DISCHARGE SHALL BE RESET WITHIN THE LIMITS BELOW TO MAINTAIN THE RETURN AIR TEMPERATURE AT SETPOINT OF 86F (ADJ).

1. SUPPLY AIR MINIMUM SETPOINT OF 60F (ADJ).
2. SUPPLY AIR MAXIMUM SETPOINT OF 120F (ADJ).

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.

POOL WATER TEMP MONITORING:

BAS TO MONITOR POOL WATER RETURN TEMPERATURE. MAKE INFORMATION AVAILABLE ON FRONT-END GRAPHICS.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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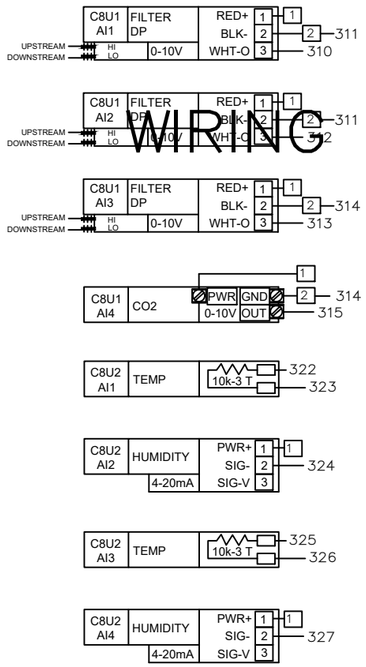
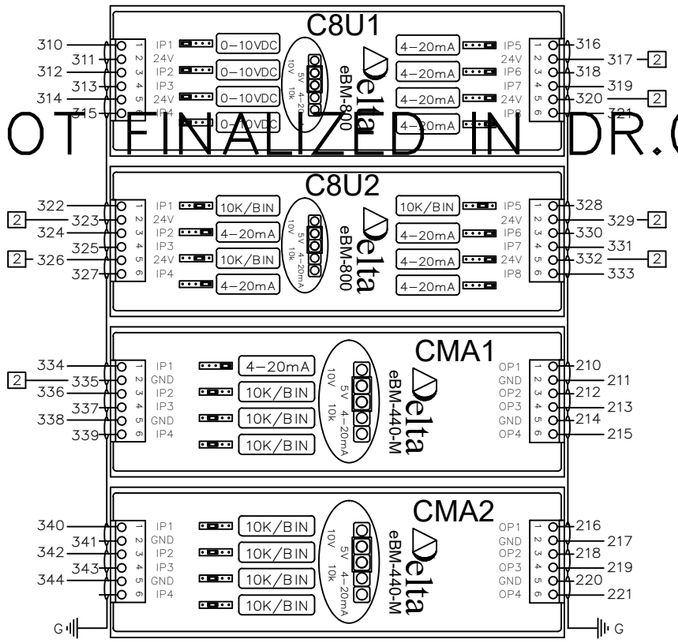
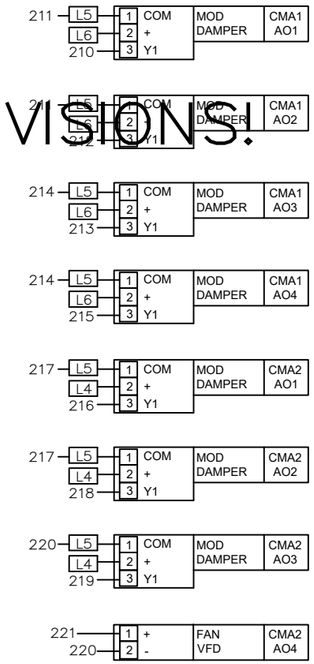
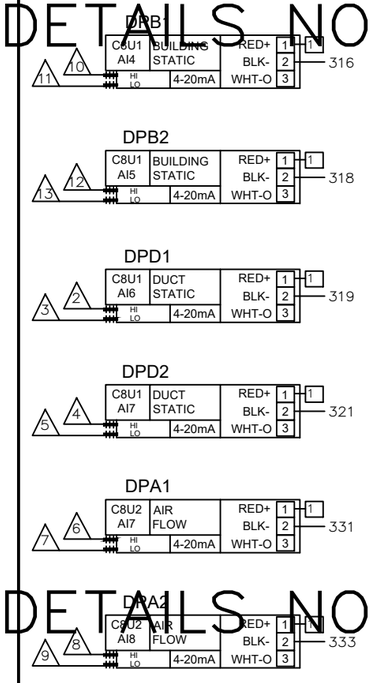
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

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J-2304001

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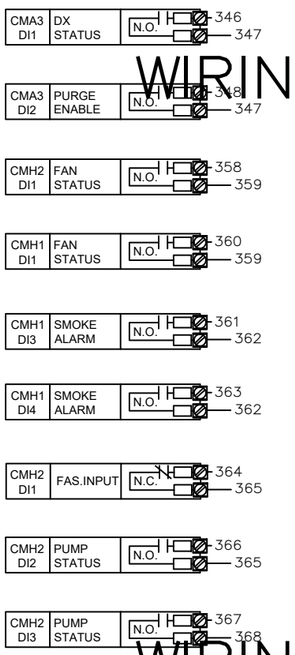
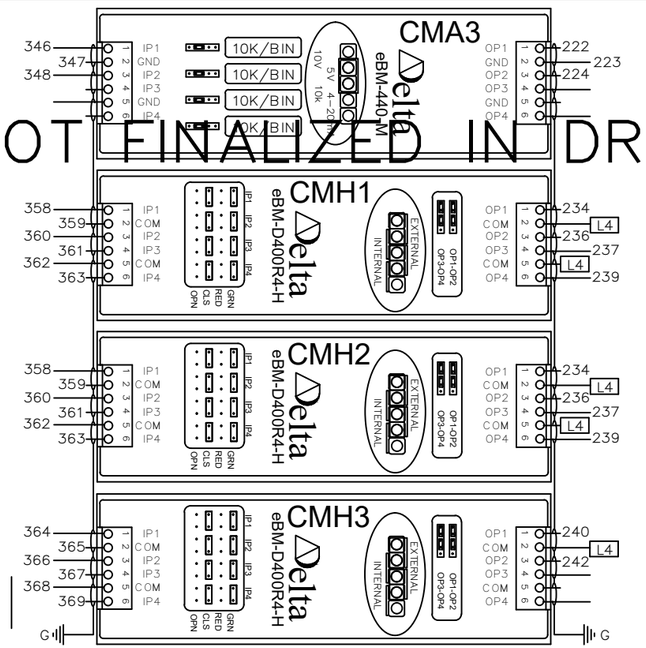
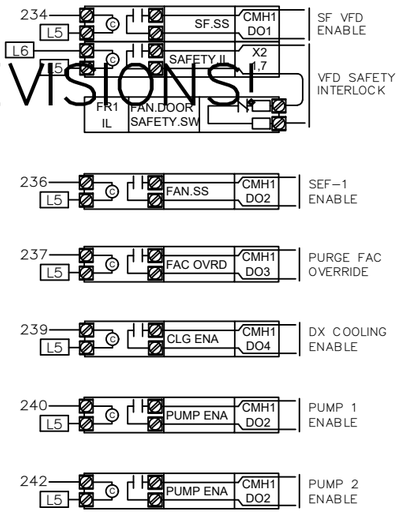




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1



	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	BOILER OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

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Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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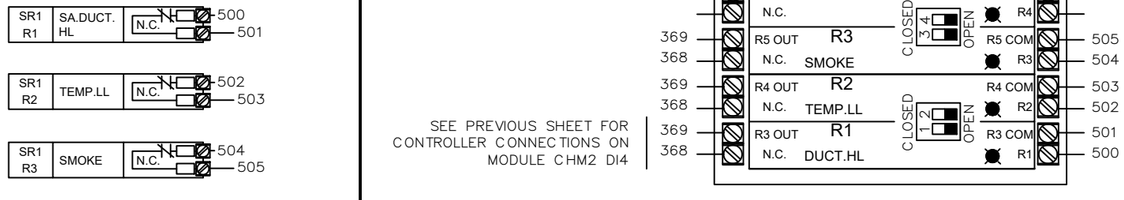

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CFP1
DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1
DFM-400P

NAT-AHU-2 SYSTEM 54 PANEL - I/O WIRING (3 OF 3)

Delta Controls
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SYSTEM 54 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL2

GND

300
301
L3

ETS1

V1-
V1+

ETHERNET SWITCH

1 3 5 2 4

CAT5e

SR1
RIBMNLB-4

202
204

200
201

R7 POLE 2 10A @ 277VAC & 24 VDC
R7 POLE 1 16A @ 277VAC

24V COM

POWER 24 MAX

R7

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

R4 R3 R2 R1

CLOSED OPEN

R4 COM R3 COM R2 COM R1 COM

TX1

24V CB
Power
120 VAC LAPTOP PWR

100
L2
L3
H
C
G

75VA
24VAC
24VAC

200
201
CONTROLLER PWR

202
203
FIELD DEV POWER

24 VDC PWR
PWR SUPPLY
+V
-V
GND
L
N
300
301
101
L2
L3
PS1

1.0A
5.0A
101
100
G
PANEL GND LUG

TB1
L1
L2
L3
H
N
120 VAC

TB2
202
203
204
205
L4
L5
L6
L7
24 VAC TO FIELD

TB3
300
301
1
2
24 VDC TO FIELD

DPB1
DPB2
Power + GND / 4-20mA out - Voltage out 0
HIGH
LOW
PNEUMATIC
1
4
5
6
7

eZNS-T100 SERIES ROOM SENSOR POWER & NETWORK WIRING

ST1
NET
PWR

24 VAC

LINKNET (RS-485)

201
200

CEB1

PWR
GND
24~
USB2
USB1
(NOT USED)
NET1 RS-485
NET2 RS-485
ETH 1
LAN 2
LAN 3

eBMGR-2

C8X1

eBX

eBus Address

eBUS

eBM-800
eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H

I/O SHIELD DRAIN

L3
TO PANEL GND LUG

MS/TP
LINKNET (RS-485)

SEE RISER DIAGRAMS FOR LOCATION

NAT-AHU-2 SYSTEM 54 PANEL - POWER & NETWORK WIRING

Delta CONTROLS
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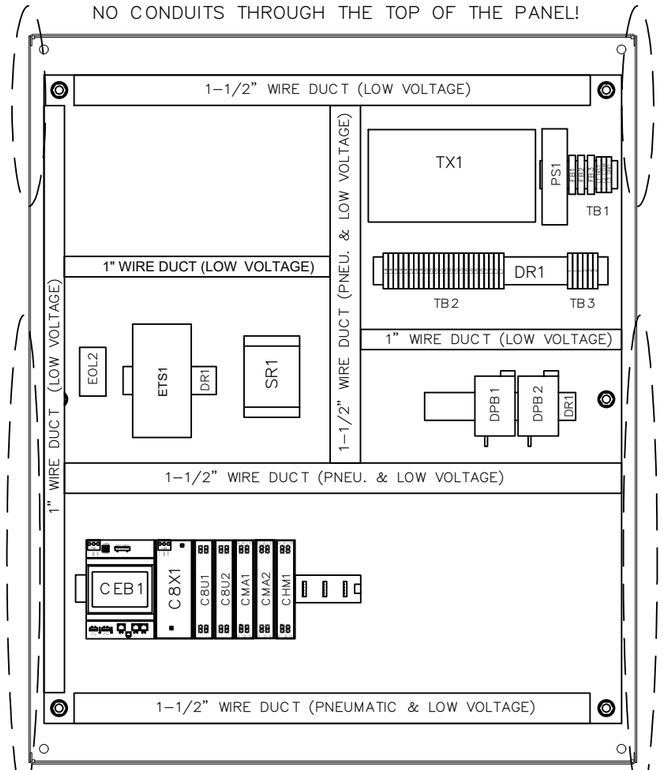
SYSTEM CONTROL PANEL 54 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!

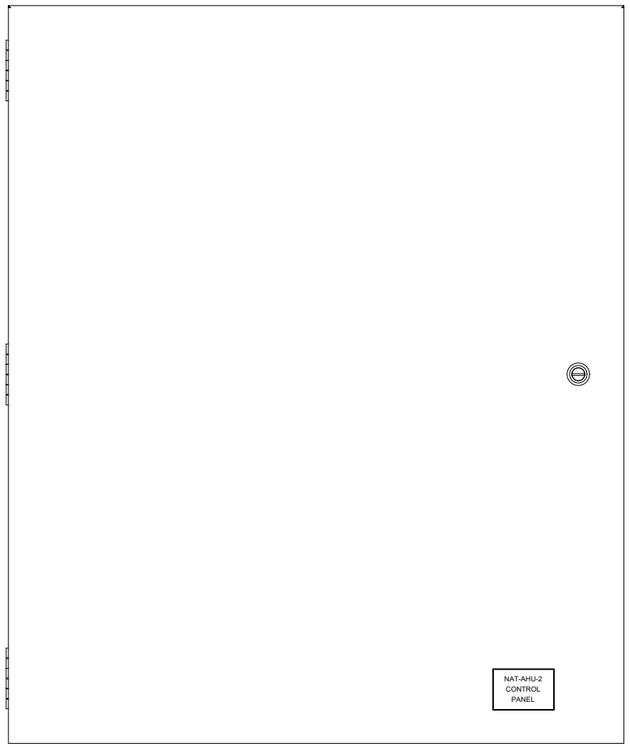


HIGH VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

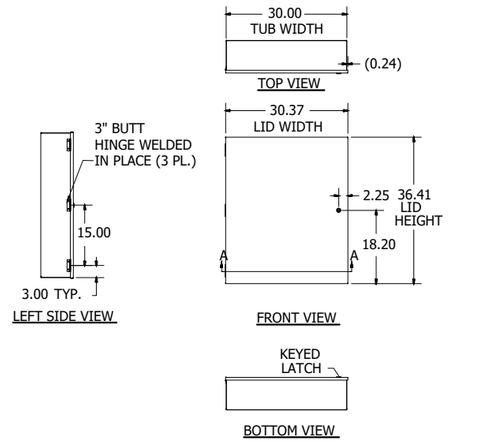


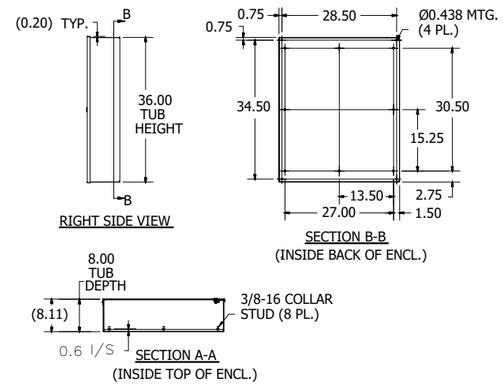
BILL OF MATERIALS

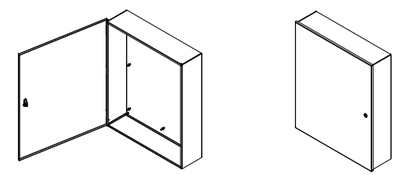
BILL OF MATERIALS

30" (W) x 36" (H) ENCLOSURE DIMENSIONS

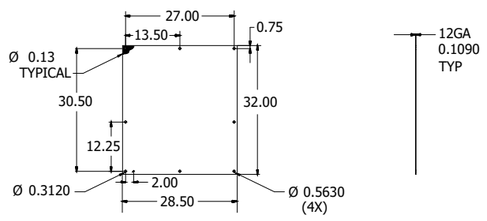
(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)







PANEL DIMENSIONS



NAT–AHU–2 SYSTEM 54 PANEL – DIMENSIONS & BOM

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
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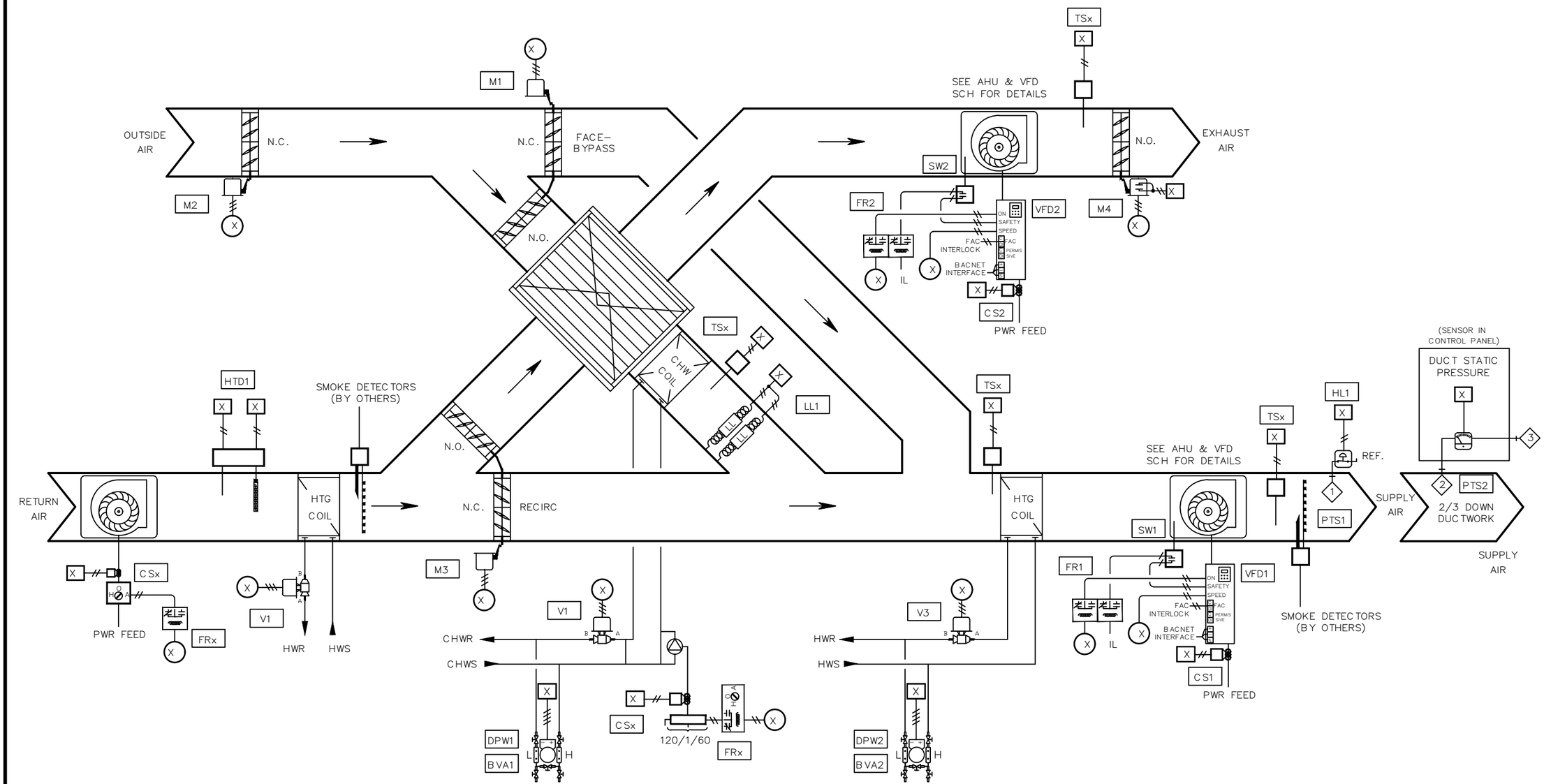
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–459
JOB NUMBER:
J–2304001

NAT–AHU–3 FIELD DEVICES



BILL OF MATERIAL

NETWORK POINTS

N1 THROUGH Nx

NAT–AHU–3 FIELD DEVICES

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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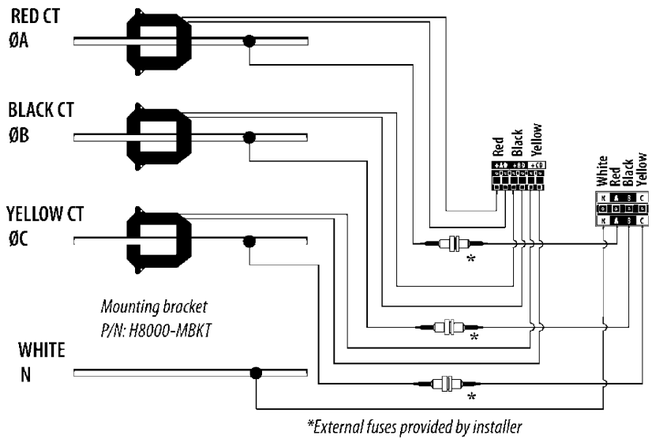
POWER METER HIGH VOLTAGE WIRING DETAIL

(FOR REFERENCE ONLY, NOT INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)

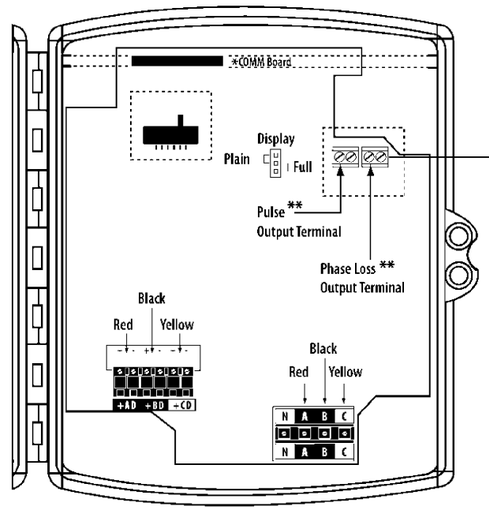
TYPICAL 208/480VAC, 4-WIRE, 3Ø INSTALLATION



(* PREVIOUS BAS DESIGN INDICATES VERIS AH04 TRIPLE FUSE KITS WERE INSTALLED)

POWER METER HIGH VOLTAGE WIRING DETAIL

(BACNET MS/TP COMMUNICATION AND PHASE LOSS MONITORING INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)



*COMM Board is Optional
**H8160 Series only

PHASE LOSS OUTPUT
(ONE CONNECTION PER METER)

X PL MTR (WEST GYM)

COMMUNICATION
CARD
(IF INSTALLED)

\+
–
S

BACNET
INTERFACE
(ONE CONNECTION PER METER)

BILL OF MATERIAL

NETWORK POINTS
N1 THROUGH Nx

AREA NATATORIUM PHASE LOSS MONITORING FIELD DEVICES

Delta Controls
Temperature Control Services
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INPUT / OUTPUT POINT TABLE

		Hardware Points				
Point Name	Point Description	AI	BI	AO	BO	LinkNet
CCDAT	Cooling Coil Discharge Air Temp	X				
CW DP NAT-AHU-3	Chill Water Diff Pressure	X				
DAT	Discharge Air Temp	X				
DPD1	Duct Static Pressure	X				
EAT	Exhaust Air Temp	X				
HW DP NAT-AHU-3	Hot Water Diff Pressure	X				
HXT	Heat Exchanger Air Temp	X				
RAH	Return Air Humidity	X				
RAT	Return Air Temperature	X				
EF STAT	Exhaust Fan Status		X			
HL	High Duct Static Limit		X			
LL	Low Limit (Freezestat) (qty 2)		X			
PL MTR WGYM	Phase Loss Elec Meter West Gym		X			
PUMP STAT	HW Circ Pump Status		X			
RF STAT	Return Fan Status		X			
SD	Smoke Detectors (devices by others)		X			
SF STAT	Supply Fan Status		X			
CWV	Chill Water Valve			X		
EAD	Exhaust Air Damper			X		
EF VFD	Exhaust Fan VFD Speed			X		
FBP	Face & Bypass Damper			X		
HWV	Hot Water Valve			X		
OAD	Outside Air Damper			X		
PHV	Preheat Valve			X		
RECIRC DPR	Recirculation Air Damper			X		
SF VFD	Supply Fan VFD Speed			X		
EF SS	Exhaust Fan Start / Stop				X	
PUMP SS	HW Circ Pump Start / Stop				X	
RF SS	Return Fan Start / Stop				X	
SF SS	Supply Fan Start / Stop				X	
	POINT TOTALS:	**9**	**8**	**9**	**4**	**0**

SOFTWARE AND NETWORK (NON-PHYSICAL) POINTS
WILL BE DEFINED AND INCLUDED IN A FUTURE REVISION.

NAT-AHU-3 & MISC FIELD DEVICES POINT TABLE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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NATATORIUM AIR HANDLING UNIT 3 SEQUENCE OF OPERATION

TCC PROVIDED CONTROLLER SHALL BE INSTALLED, WIRED, AND CONNECTED TO EXISTING CONTROL CIRCUIT BY THE CONTROLS INSTALLATION CONTRACTOR. AHU-1 SHALL USE THE POOL SPACE (HIGH PRESSURE) AND CORRIDOR (NEGATIVE PRESSURE) AS THE REFERENCE STATIC PRESSURE POINTS FOR THE EXHAUST FAN TO MAINTAIN A NEGATIVE SPACE PRESSURE (ZN-SP) AS NOTED BELOW. TCC SHALL PROVIDE NEW PROGRAMMING AND CONTROL DEVICES TO MAINTAIN A FIXED DIFFERENTIAL BETWEEN POOL WATER TEMPERATURE AND SPECTATOR ADJUSTABLE ZONE TEMPERATURE. MINIMUM SPECTATOR TEMPERATURE SETPOINT SHALL BE 76 F AND MAXIMUM SHALL BE 80F (ADJ). TCC SHALL PROVIDE POOL WATER TEMPERATURE SENSOR FOR INSTALLATION BY THE CIC AND USE IN LOGIC WITHIN THE BUILDING AUTOMATION SYSTEM. CLASSROOM VAV CONTROLS SHALL BE REPLACED EXACTLY AS CURRENTLY IMPLEMENTED. SEE AS-BUILT TEMPERATURE CONTROL DRAWINGS FOR ADDITIONAL DETAILS. TCC SHALL REPLACE CONTROLS, VALVE ACTUATORS, DAMPER ACTUATORS, AND VFDS. REFERENCE OWNER PROVIDED AS-BUILT DRAWINGS FOR ADDITIONAL DETAILS AND REQUIREMENTS.

DDC SHALL HAVE ONE DIGITAL OUTPUT FOR LOCAL INDICATION OF AN ALARM CONDITION. (I.E. BLOWER CURRENT/DIFFERENTIAL PRESSURE SWITCH, DAMPER END SWITCHES, FREEZE STAT, FIRE STAT, SMOKE, DIRTY FILTERS…).

1. AIR HANDLING UNIT AHU-3 SHALL BE VARIABLE VOLUME SUPPLY AND CONSTANT AIR VOLUME EXHAUST..
2. PROVIDE LOW LIMIT PROTECTION, NUMBER AS REQUIRED ON THE DISCHARGE OF AHU CHILLED WATER COILS TO SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. PROVIDE STRAP ON SENSOR TO OVERRIDE CONTROL VALVE UPON SENSING 39F AT THE CHILLED WATER RETURN LINE
   OF THE COOLING COIL. LOW LIMIT PROTECTION ON THE DISCHARGE OF AHU CHILLED WATER COILS SHALL SHUT UNIT OFF UPON SENSING FREEZE CONDITIONS. IMMERSION SENSOR SHALL OVERRIDE CONTROL VALVE LOGIC UPON SENSING 39F (ADJ) AT THE CHILLED RETURN LINE OF
   THE COOLING COIL.
3. DIVISION 26 CONTRACTOR SHALL PROVIDE AND MOUNT DUCT DETECTORS IN THE SUPPLY AIR (SA) AND RETURN AIR (RA) DUCTS. CIC SHALL WIRE DETECTORS TO STOP THE SUPPLY FAN (SA) AND GENERATE A BAS ALARM.
4. EITHER OF THE ABOVE SAFETIES SHALL STOP THE FAN, CLOSE THE OUTSIDE AIR DAMPER, AND OPEN THE HEATING CONTROL VALVE WHEN IN ALARM.
5. FAN SHALL HAVE A DUCT STATIC PRESSURE HIGH LIMIT, LOCATED CLOSE TO THE FAN DISCHARGE TO PREVENT OVER-PRESSURIZING THE DUCT SYSTEM.
6. DAY MODE

A. SA COOLING:

1. COOLING SHALL BE LOCKED OUT WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 55F.
2. THE COOLING COIL PRESSURE INDEPENDENT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN 55F AIR TEMPERATURE LEAVING THE COOLING COIL.

B. SA HEATING:

1. THE HEATING COIL PRESSURE INDEPENDENT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN AHU DISCHARGE TEMPERATURE PER THE CRITICAL ZONE RESET SEQUENCE BELOW. THIS SIGNAL SHALL BE OVER-RIDDEN AS REQUIRED TO MAINTAIN HOT WATER COIL
   LEAVING WATER TEMPERATURE MINIMUM OF 55F, AS MEASURED BY THE TEMPERATURE TRANSMITTER.

C. DEFROST MODE (EA HEATING):

1. THE HEATING COIL CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN EXHAUST AIR TEMPERATURE ABOVE THE DEFROST SETPOINT OF 35F (ADJ).

D. BYPASS DAMPERS SHALL REMAIN FULLY CLOSED.

7. THE OUTSIDE AIR MAXIMUM AND MINIMUM SETTINGS SHALL BE SET PER ORIGINAL SYSTEM START-UP BY BALANCER.
8. DIRTY FILTER ALARM: EACH FILTER SECTION AT THE AIR HANDLING UNIT SHALL BE FITTED WITH A DIFFERENTIAL PRESSURE SENSOR AND TRANSMITTER WITH OUTPUTS MONITORED BY THE BUILDING AUTOMATION SYSTEM. UPON SENSING A HIGH LIMIT OF 0.5" WATER DIFFERENTIAL, THE CONTROLLER SHALL SIGNAL A DIRTY FILTER ALARM.
9. CRITICAL ZONE RESET

A. THE AHU DISCHARGE AIR TEMPERATURE SHALL BE RESET FROM 55F TO 68F (MAX), AS REQUIRED TO KEEP THE VAV TERMINAL UNIT PRIMARY AIR VALVE IN THE 100% OPEN POSITION AT THE MOST CRITICAL ZONE. THE MOST CRITICAL ZONE IS THAT ZONE WITH THE GREATEST CALL
   FOR COOLING.

B. WHEN THE CRITICAL ZONE SPACE TEMPERATURE RISES MORE THAN 2F ABOVE THE COOLING SETPOINT, THE AHU DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET DOWNWARD AS REQUIRED TO MAINTAIN THE CRITICAL ZONE SPACE TEMPERATURE AT SETPOINT.

C. CRITICAL ZONE RESET SHALL BE ALLOWED WHEN THE OUTSIDE AIR TEMPERATURE IS 50F (ADJ) AND BELOW.

10. NIGHT MODE:

A. THE OUTSIDE AIR DAMPER SHALL BE CLOSED. THE SUPPLY FAN, EXHAUST FAN, AND ENERGY WHEEL SHALL ALL BE OFF.

B. AVERAGE OF SPACE TEMPERATURES SHALL BE CALCULATED BY TCC AND SHALL START THE AHU IF THE AVERAGE TEMPERATURE FALL BELOW THE NOMINAL NIGHT SETBACK TEMPERATURE OF 60F (ADJ). THE AHU SHALL OPERATE AS DESCRIBED BELOW IN THE MORNING WARM-UP
   SECTION AND SHALL SHUT OFF WHEN THE NOMINAL OCCUPIED SETPOINT IS REACHED.

C. THE AHU SHALL OPERATE AS DESCRIBED ABOVE IN THE DAY MODE SECTION WHEN SPACE OVERRIDE BUTTONS ARE PUSHED AT THE SPACE THERMOSTATS. THE AHU SHALL RETURN TO NIGHT MODE 10 MINUTES (ADJ) AFTER SPACE OVERRIDE PERIOD ENDS.

11. MORNING WARM-UP:

A. THE SYSTEM SHALL ENTER MORNING WARM-UP MODE WHEN THE SYSTEM IS GOING FROM NIGHT UNOCCUPIED MODE TO DAY MODE AND THE OUTSIDE AIR TEMPERATURE IS BELOW 60F (ADJ).

B. THE AHU OUTSIDE AIR DAMPER SHALL REMAIN CLOSED THROUGHOUT THIS MODE OF OPERATION AND THE BYPASS DAMPER SHALL OPEN. THE EXHAUST FAN AND THE ENERGY WHEEL SHALL REMAIN OFF THROUGHOUT THIS MODE OF OPERATION.

C. THE AHU SUPPLY FAN SHALL INITIATE AND THE SUPPLY AIR HEATING COIL CONTROL VALVE SHALL FULLY OPEN.

D. THE EXHAUST AIR HEATING COIL CONTROL VALVE SHALL MODULATE AS REQUIRED TO PREVENT FROST FORMATION ON THE ENERGY WHEEL.

E. THE TERMINAL UNIT BOXES SHALL OPERATE AS DESCRIBED IN THE MORNING WARM-UP SECTION OF THE TERMINAL UNIT SEQUENCE OF OPERATION.

F. THE SYSTEM SHALL OPERATE IN THIS MODE UNTIL ALL SPACES ARE AT THE OCCUPIED TEMPERATURE SETPOINT. THE SYSTEM SHALL THEN ENTER DAY MODE OF OPERATION.

SAFETY: THE SUPPLY FAN WILL BE SHUTDOWN IF ANY OF THE FOLLOWING OCCUR:
-IF A TEMPERATURE LOW LIMIT (LT-ALM) SWITCH SENSES A TEMPERATURE BELOW 38F (ADJ). IF THREE TRIPS OCCUR WITHIN A 24-HOUR PERIOD, THE THIRD TRIP WILL RESULT IN SOFTWARE OPERATION LOCKOUT AND REQUIRE MANUAL RESET THROUGH GRAPHICS.

ELECTRICAL UTILITY POWER MONITORING:

TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS.

Delta Controls
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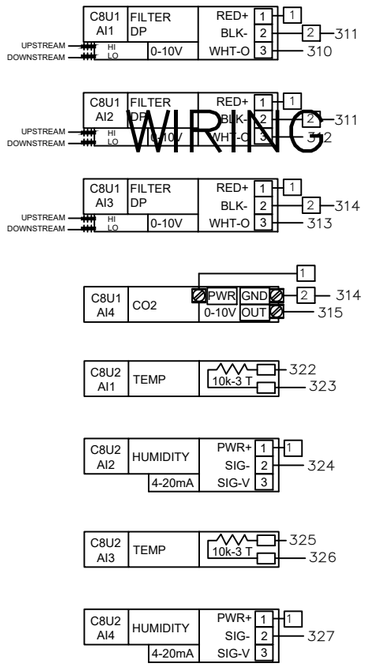
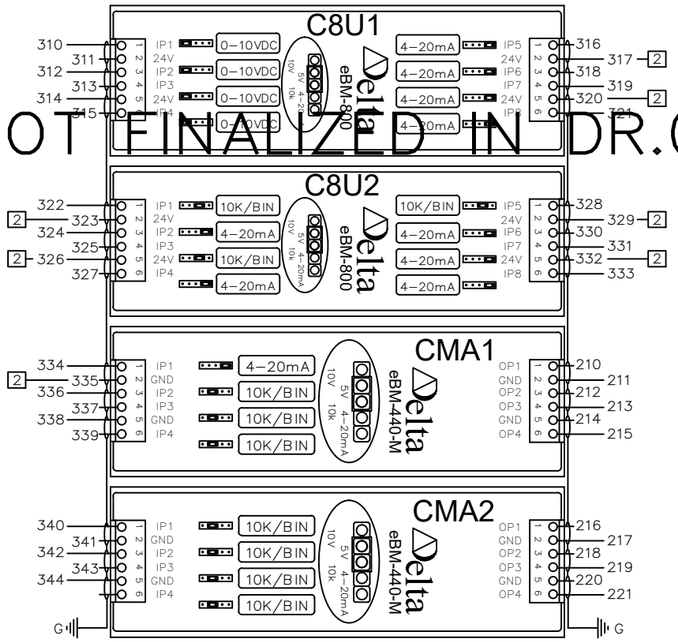
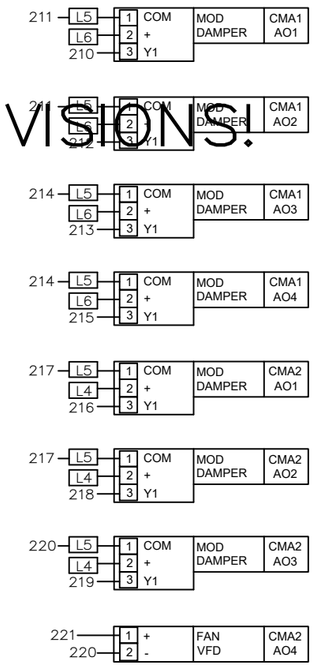
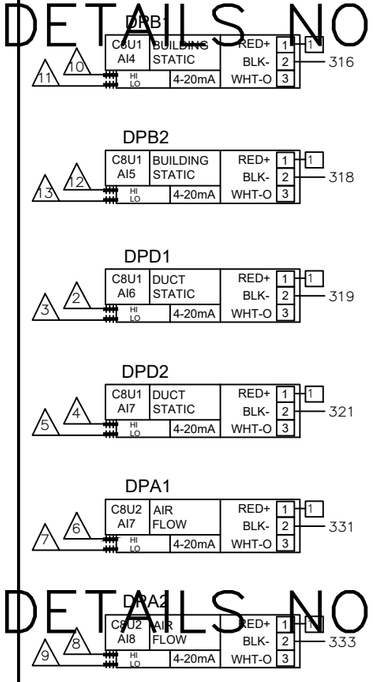
SYSTEM 55 CONTROL PANEL









	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
C8U1 eBM-800 INPUTS	C8U1	1	10100.1101	FLT1	FILTER DP 01	EBO
	C8U1	2	10100.1102	FLT2	FILTER DP 02	EBO
	C8U1	3	10100.1103	FLT3	FILTER DP 03	EBO
	C8U1	4	10100.1104	CO21	CO2 SENSOR	2510
	C8U1	5	10100.1105	DPB1	LEVEL 1 DP SENSOR	2201
	C8U1	6	10100.1106	DPB2	LEVEL 2 DP SENSOR	2201
	C8U1	7	10100.1107	DPD1	LVL 1 SA DUCT STATIC PRESS	2200
	C8U1	8	10100.1108	DPD2	LVL 2 SA DUCT STATIC PRESS	2200
C8U2 eBM-800 INPUTS	C8U2	1	10100.1201	HTD1	OUTSIDE AIR TEMP	2101
	C8U2	2	10100.1202	HTD1	OUTSIDE AIR HUMIDITY	2101
	C8U2	3	10100.1203	HTD2	RETURN AIR TEMP	2101
	C8U2	4	10100.1204	HTD2	RETURN AIR HUMIDITY	2101
	C8U2	5	10100.1205	HTD4	DISCHARGE AIR TEMP	2101
	C8U2	6	10100.1206	HTD4	DISCHARGE AIR HUMIDITY	2101
	C8U2	7	10100.1207	DPA1	OUTSIDE AIR FLOW	2201
	C8U2	8	10100.1208	DPA2	SUPPLY AIR FLOW	2201
CMA1 eBM-440-M INPUTS	CMA1	1	10100.1301	HTD3	MIXED AIR HUMIDITY	2101
	CMA1	2	10100.1302	TS1	MIXED AIR TEMP	2001
	CMA1	3	10100.1303	TS2	AHU-1 COOLING COIL DAT	2002
	CMA1	4	10100.1304	FS1	DISCH AIRFLOW SWITCH	1301
CMA1 eBM-440-M OUTPUTS	CMA1	1	10100.1301	M1	OUTSIDE AIR DAMPER	4206
	CMA1	2	10100.1302	M2	RETURN AIR DAMPER	4206
	CMA1	3	10100.1303	M3	1ST FL RETURN AIR DAMPER	4206
	CMA1	4	10100.1304	M4	2ND FL RETURN AIR DAMPER	4206
CMA2 eBM-440-M INPUTS	CMA2	1	10100.1401	TS3	LOW TEMP DHW TEMP	2003
	CMA2	2	10100.1402	TS4	HIGH TEMP DHW TEMP	2003
	CMA2	3	10100.1403	SEP1	SEWAGE EJECTOR PUMP ALM	EBO
	CMA2	4	10100.1404			
CMA2 eBM-440-M OUTPUTS	CMA2	1	10100.1401	M5	1ST FL EXH AIR DAMPER	4204
	CMA2	2	10100.1402	M6	2ND FL EXH AIR DAMPER 1	4208
	CMA2	3	10100.1403	M7	2ND FL EXH AIR DAMPER 2	4208
	CMA2	4	10100.1404	VFD1	AHU-1 SUP FAN SPEED	EBO

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!
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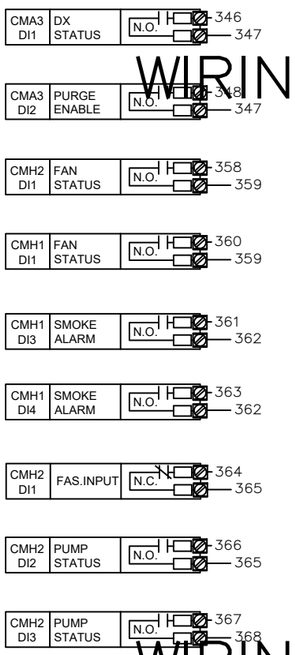
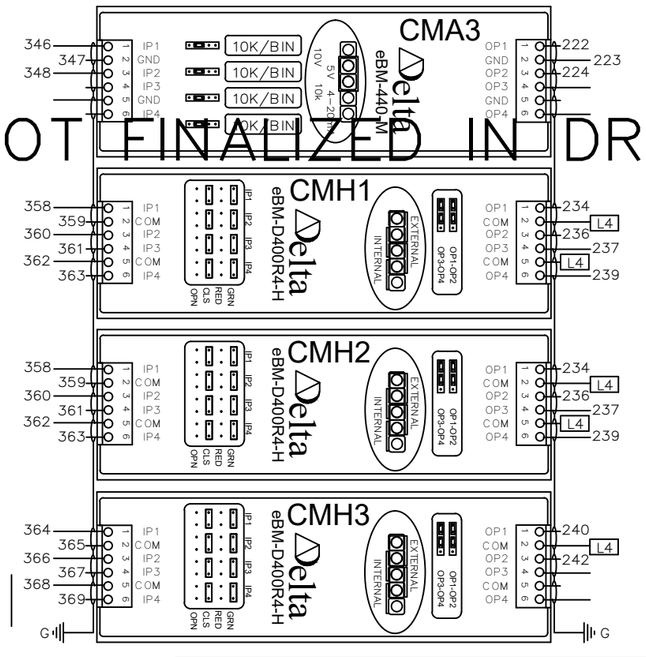
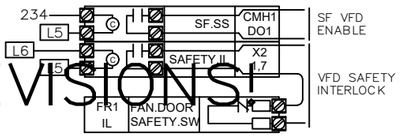
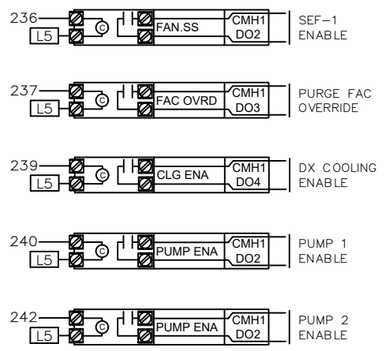




SEE FOLLOWING SHEET FOR CONTROLLER CONNECTIONS ON RELAY SR1–R1





	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA3	1	10100.1501	ACU1	DX COOLING STATUS	EBO	eBM-440-M I/O MODULE
	CMA3	2	10100.1502	SW1	MSGQ PURGE ENABLE	1806	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				
OUTPUTS	CMA3	1	10100.1501	VFD2	SEF-1 REL FAN SPEED	EBO	
	CMA3	2	10100.1502	ACU1	DX COOLING DAT RESET	EBO	
	CMA3	3	10100.1503				
	CMA3	4	10100.1504				

CMA3 eBM-440-M — CMA3 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMA4	1	10100.1601				eBM-440-M I/O MODULE
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				
OUTPUTS	CMA4	1	10100.1601				
	CMA4	2	11500.1602				
	CMA4	3	10100.1603				
	CMA4	4	10100.1604				

CMA4 eBM-440-M — CMA4 eBM-440-M

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH1	1	10100.1701	CS1	AHU-1 SUP FAN STATUS	1400	eBM-D400R4-H I/O MOD
	CMH1	2	10100.1702	CS2	SEF-1 REL FAN STATUS	1400	
	CMH1	3	10100.1703	SMK1	RETURN SMOKE DETECTOR	EBO	
	CMH1	4	10100.1704	SMK2	SUPPLY SMOKE DETECTOR	EBO	
OUTPUTS	CMH1	1	10100.1701	FR1	AHU-1 SUP FAN START / STOP	3002	
	CMH1	2	10100.1702	FR2	SEF-1 FAN START / STOP	3001	
	CHM1	3	10100.1703	PE1	PURGE FAC OVERRIDE	EBO	
	CHM1	4	10100.1704	FR3	COOLING ENABLE	3001	

CMH1 eBM-D400R-H — CMH1 eBM-D400R-H

	ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET	
INPUTS	CMH2	1	10100.1801	FA1	FIRE ALARM FAN SHUTDOWN	EBO	eBM-D400R4-H I/O MOD
	CMH2	2	10100.1802	CS3	HW CIRC PMP 1 STATUS	1400	
	CMH2	3	10100.1803	CS4	HW CIRC PMP 2 STATUS	1400	
	CMH2	4	10100.1804	HL1	OUT HIGH PRESSURE LIMIT	1200	
OUTPUTS	CMH2	1	10100.1801	FR4	HW CIRC PMP 1 START / STOP	3001	
	CMH2	2	10100.1802	FR5	HW CIRC PMP 2 START / STOP	3001	
	CMH2	3	10100.1803				
	CMH2	4	10100.1804				

CMH2 eBM-D400R-H — CMH2 eBM-D400R-H

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

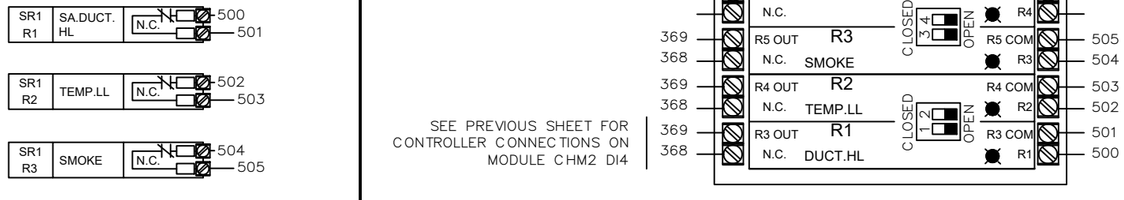
JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–465
JOB NUMBER:
J–2304001

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!



WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

CFP1 DFM-400P

INPUTS - DFM-400-P

ID.	CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
CFP1	1	10101.DI01	DWM1	LOW TEMP HW FLOW	EBO
CFP1	2	10101.DI02	DWM2	HIGH TEMP HW FLOW	EBO
CFP1	3	10101.DI03	DWM3	DOMESTIC WTR FLOW	EBO
CFP1	4	10101.DI04			

CFP1 DFM-400P

NAT-AHU-3 SYSTEM 55 PANEL - I/O WIRING (3 OF 3)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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NCHS-466
JOB NUMBER:
J-2304001

SYSTEM 55 CONTROL PANEL

PANEL _____
CIRCUIT _____

CAT-6a OR BETTER COMMUNICATION CABLE TO BUILDING ETHERNET NETWORK DROP
SEE RISER SHEET FOR TERMINATION LOCATION

2-CONDUCTOR SHIELDED BACNET COMMUNICATION CABLE TO BUILDING MS/TP DEVICES
SEE RISER SHEET FOR TERMINATION LOCATION

MS/TP

CAT-6a

EOL1

EOL2

CDZ1

DZNR-768

MS/TP SEGMENT 1 | MS/TP SEGMENT 2 | MS/TP SEGMENT 3 | MS/TP SEGMENT 4

POWER 24~ GND

L3

200
201

TO SYSTEM 01 SUBNET, LEG 02

TO SYSTEM 01 SUBNET, LEG 03

TO SYSTEM 01 SUBNET, LEG 04

ETS1

301
300

V1-
V1+

ETHERNET SWITCH

1 3 5 4 2

CAT5e

SR1

RIBMNLB-4

202
204

200
201

R7 POLE C 10A @ 277VAC & 24 VDC

R7 POLE A 1 (N.O.) 10A @ 277VAC & 24 VDC

R4 OUT N.C.
R3 OUT N.C.
R2 OUT N.C.
R1 OUT N.C.

CLOSED

TX1

24V CB
24V CB

Power
Power

100
L2
L3

H
C
G

75VA
24VAC
24VAC

120 VAC LAPTOP PWR

200
201

CONTROLLER PWR

202
203

FIELD DEV POWER

24 VDC PWR

PWR SUPPLY

+V
-V
GND
L
N

300
301
101

L3
L2

PS1

1.0A
5.0A
101
100
G

TB1

L1
L2
L3

H
N

120 VAC

PANEL GND LUG

TB2

202
203
204
205

L4
L5
L6
L7

24 VAC TO FIELD

TB3

300
301

1
2

24 VDC TO FIELD

DPD1

1

Power + GND / 4-20mA out - Voltage out 0

HIGH
LOW

2
3

PNEUMATIC

3
2

CEB1

201
200

PWR

USB2
USB1

(NOT USED)

C8X1

201
200

PWR

eBMGR-2

eBX

eBUS Address

eBUS

eBM-800
eBM-800
eBM-440-M
eBM-440-M
eBM-D400R4-H

I/O SHIELD DRAIN

L3

TO PANEL GND LUG

MS/TP

SEE RISER DIAGRAMS FOR LOCATION

NAT-AHU-3 SYSTEM 55 PANEL - POWER & NETWORK WIRING

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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REVISIONS	
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DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

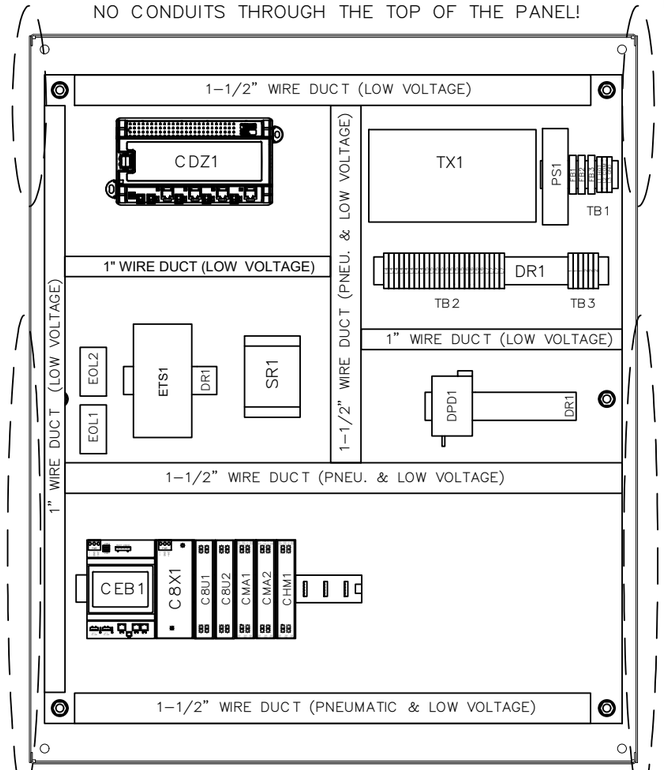
CONTRACT NO:

SHEET
NCHS-467
JOB NUMBER:
J-2304001

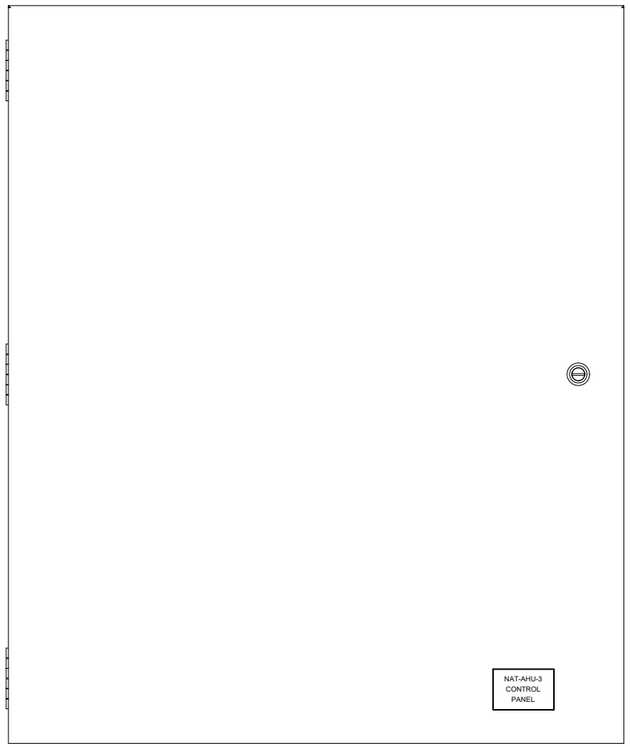
SYSTEM CONTROL PANEL 55 LAYOUT

NETWORK CABLES ENTER IN THIS AREA

NO CONDUITS THROUGH THE TOP OF THE PANEL!



HIGH VOLTAGE FEEDS ENTER IN THIS AREA



PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

PNEUMATIC AND LOW VOLTAGE FEEDS ENTER IN THIS AREA

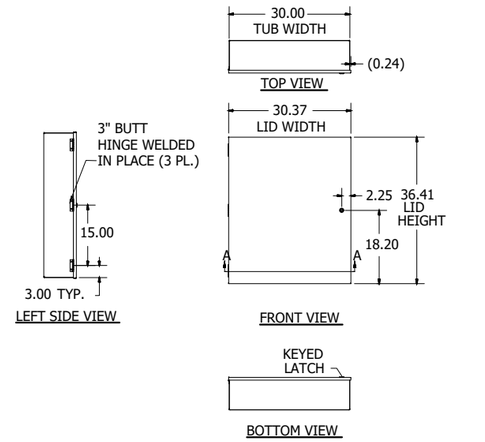
* REUSE EXISTING ENCLOSURES AND CONDUIT TO THE EXTENT POSSIBLE. NEW BACKPLATES WITH NEW CONTROL COMPONENTS WILL BE PROVIDED.

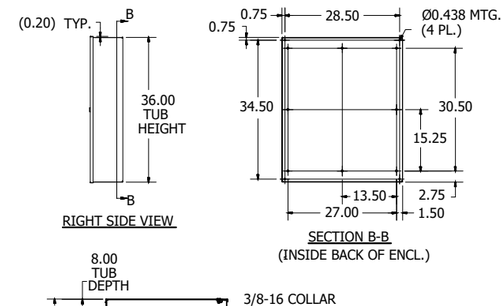
BILL OF MATERIALS

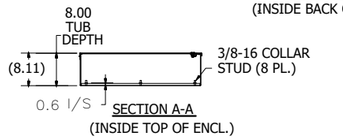
BILL OF MATERIALS

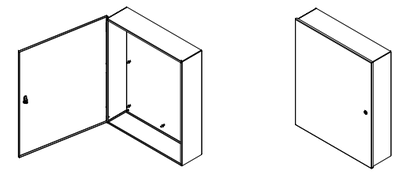
30" (W) x 36" (H) ENCLOSURE DIMENSIONS

(DIMENSIONS APPROXIMATE FOR EXISTING ENCLOSURES)

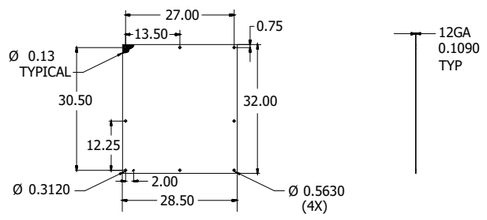








PANEL DIMENSIONS



NAT–AHU–1 SYSTEM 55 PANEL – DIMENSIONS & BOM

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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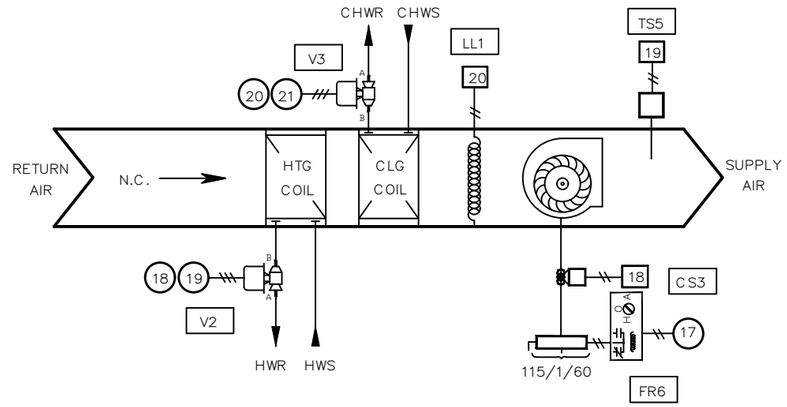
SHEET
NCHS–468
JOB NUMBER:
J–2304001

FAN COIL UNIT FIELD DEVICES
(TYPICAL FOR 5 FCUs)



eZNS–T100 SERIES ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)

FAN COIL UNIT SCHEDULE

IDENTITY DATA			FAN DATA				HEATING DATA			ELECTRICAL DATA					NOTES
MARK	MANUF	MODEL	CFM	SPEED	GPM	FLUID TYPE	TOTAL HEATING (BTUH)	GPM	FLUID TYPE	VOLTS (V)	PH	FREQ (HZ)	FLA (A)	MOCP (A)	
FCU-A1	TRANE	FCCB030	200	HIGH	1.3	WATER	4,840	0.5	WATER	115	1	60	2.8	15.0	
FCU-A2	TRANE	FCCB030	200	HIGH	1.3	WATER	4,840	0.5	WATER	115	1	60	2.8	15.0	
FCU-C1	TRANE	FCCB060	450	HIGH	2.8	WATER	9,900	0.7	WATER	115	1	60	3.9	15.0	
FCU-C2	TRANE	FCCB060	450	HIGH	2.8	WATER	9,900	0.7	WATER	115	1	60	3.9	15.0	
FCU-G1	TRANE	FCHB030	200	HIGH	1.3	WATER	4,840	0.5	WATER	115	1	60	2.8	15.0	

FAN COIL UNIT (FCU) FIELD DEVICES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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CONTRACT NO:

SHEET
NCHS–469
JOB NUMBER:
J–2304001

INPUTS

INPUTS - EZFCP-424R4-24

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
1	1**xx.AI01	CS1	FAN STATUS	1400
2	1**xx.DI02			
3	1**xx.AI03	TS1	CCDAT	2002
4	1**xx.AI04	TS2	DISCHARGE AIR TEMP	2008
5	1**xx.AI05	WD1	WATER DETECTOR	1804
6	1**xx.AI06			

DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

OUTPUTS

OUTPUTS - EZFCP-424R4-24

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
1	1**xx.D001	V1	HWV OPEN	3203/3222
2	1**xx.D002	V1	HWV CLOSE	3203/3222
3	1**xx.D003	V2	CWV OPEN	3222
4	1**xx.D004	V2	CWV CLOSE	3222
5	1**xx.A005			
6	1**xx.A006			
7	1**xx.D007	C1	FAN START / STOP	123
8	1**xx.D008			
9	1**xx.D009			
10	1**xx.D010			

DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NETWORK POINTS

LINKNET NETWORK POINTS - eZNS-T100

CH.	BAC_ID	TAG	IN USE BY	DATASHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	115
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	115
LN3	1**xx.LN3	ST1	SPACE CO2	115
LN4	1**xx.LN4	ST1	OCCUPANCY STATUS	115

NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	SUPPLY FAN ALARM
N2	1**xx.LN2	LOW DAT ALARM
N3	1**xx.LN3	HIGH DAT ALARM
N4	1**xx.LN4	ZONE HTG CALL
N5	1**xx.LN5	ZONE CLG CALL
N6	1**xx.LN6	OCCUPIED OVERRIDE
N7	1**xx.LN7	HW AVAILABLE
N8	1**xx.LN8	CW AVAILABLE
N9	1**xx.LN9	SAFETY TRIP
N10	1**xx.LN10	OCCUPIED
N11	1**xx.LN11	

FAN COIL UNIT WITH REHEAT SEQUENCE OF OPERATION

TCC SHALL PROVIDE CONTROLS AND DEVICES SPECIFIED AND CIC SHALL INSTALL AND PROVIDE ALL CONTROL AND POWER WIRING.

SUPPLY FAN START/STOP: THE SUPPLY FAN (SF-C) WILL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE SUPPLY FAN STATUS (SF-S) DOES NOT MATCH THE COMMANDED VALUE, AN ALARM WILL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

ZONE CONTROL: THE COOLING VALVE (CLG-VLV) AND HEATING VALVE (HTG-VLV) WILL MODULATE IN SEQUENCE TO MAINTAIN THE ZONE TEMPERATURE (ZN-T) AT SETPOINT OF 74F (ADJ) COOLING AND 70F (ADJ) HEATING.

DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

ZONE HUMIDITY CONTROL: IF THE SPACE HUMIDITY (ZN-H) RISES ABOVE 60% RH (ADJ) AND IF CHILLED AND HOT WATER IS AVAILABLE, THE COOLING VALVE (CLG-VLV) SHALL FULLY OPEN AND HEATING VALVE (HTG-VLV) WILL MODULATE IN SEQUENCE TO MAINTAIN THE ZONE SPACE TEMPERATURE AT SETPOINT. WHEN THE SPACE HUMIDITY FALLS BELOW 55% RH (ADJ), THE HOT AND CHILLED WATER CONTROL VALVES SHALL RETURN TO NORMAL OPERATION.

NIGHT SETBACK/NIGHT SETUP: WHEN IN "UNOCCUPIED" MODE, THE UNIT WILL CYCLE AS NECESSARY TO MAINTAIN THE NIGHT SETBACK ZONE TEMPERATURE AT SETPOINT WITHIN 60F AND 85F(ADJ). A DIFFERENTIAL PREVENTS THE UNIT FROM CYCLING EXCESSIVELY.

SHUTDOWN:
GENERATE AN ALARM AND SHUTDOWN OPERATION OF THE UNIT IN THE EVENT OF CONDENSATE SWITCH ALARM (COND-SW).
WHEN THE UNIT IS SHUTDOWN BY EITHER A STOP COMMAND OR SYSTEM SAFETY THE UNIT WILL BE SET AS FOLLOWS:

- SUPPLY FAN WILL BE OFF
- COOLING VALVE WILL CLOSE
- HEATING VALVE WILL MODULATE TO MAINTAIN THE DISCHARGE SENSOR AT 60F (ADJ)

POINTS LIST: THE POINTS LIST REPRESENTS THE MINIMUM POINTS TO BE PROVIDED AND DISPLAYED IN THE SYSTEM GRAPHICS. ADDITIONAL POINTS REQUIRED TO MEET THE SEQUENCE SHALL BE PROVIDED AND ALSO SHOWN.

DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
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	AS-BUILT

REVISIONS

DATE	REMARKS

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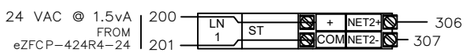
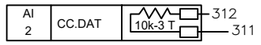
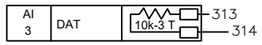
JOB NUMBER:
J-2304001

FAN COIL UNIT CONTROLS

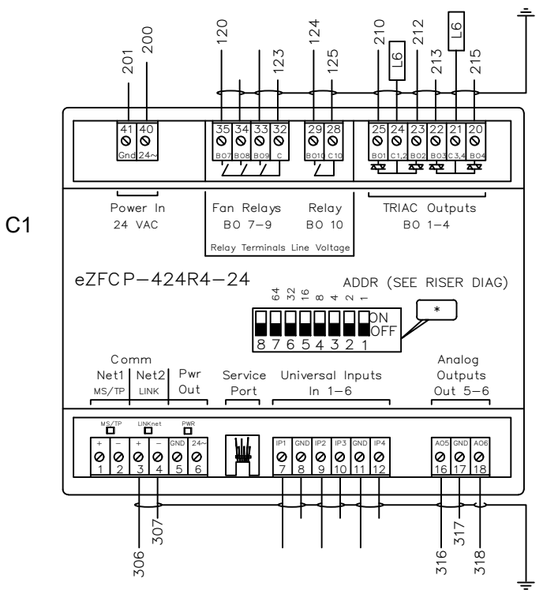
(TYPICAL FOR 5)



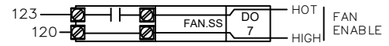


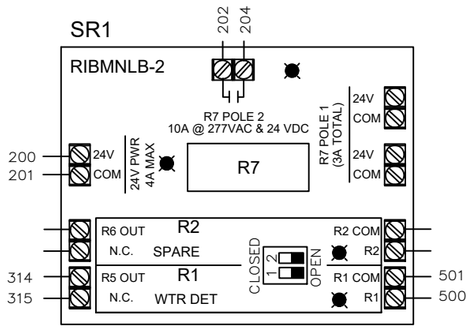


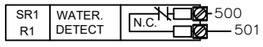
C1



IN	NAME
1	FAN_STATUS
2	
3	CC_DAT
4	DAT
5	WTR_DETECTOR
6	
OUT	**NAME**
1	
2	
3	
4	
5	HWV
6	CWV
7	FAN_SS
8	
9	
10	







FAN COIL UNIT WITH RETURN AIR ONLY CONTROL PANEL – I/O WIRING

Delta CONTROLS

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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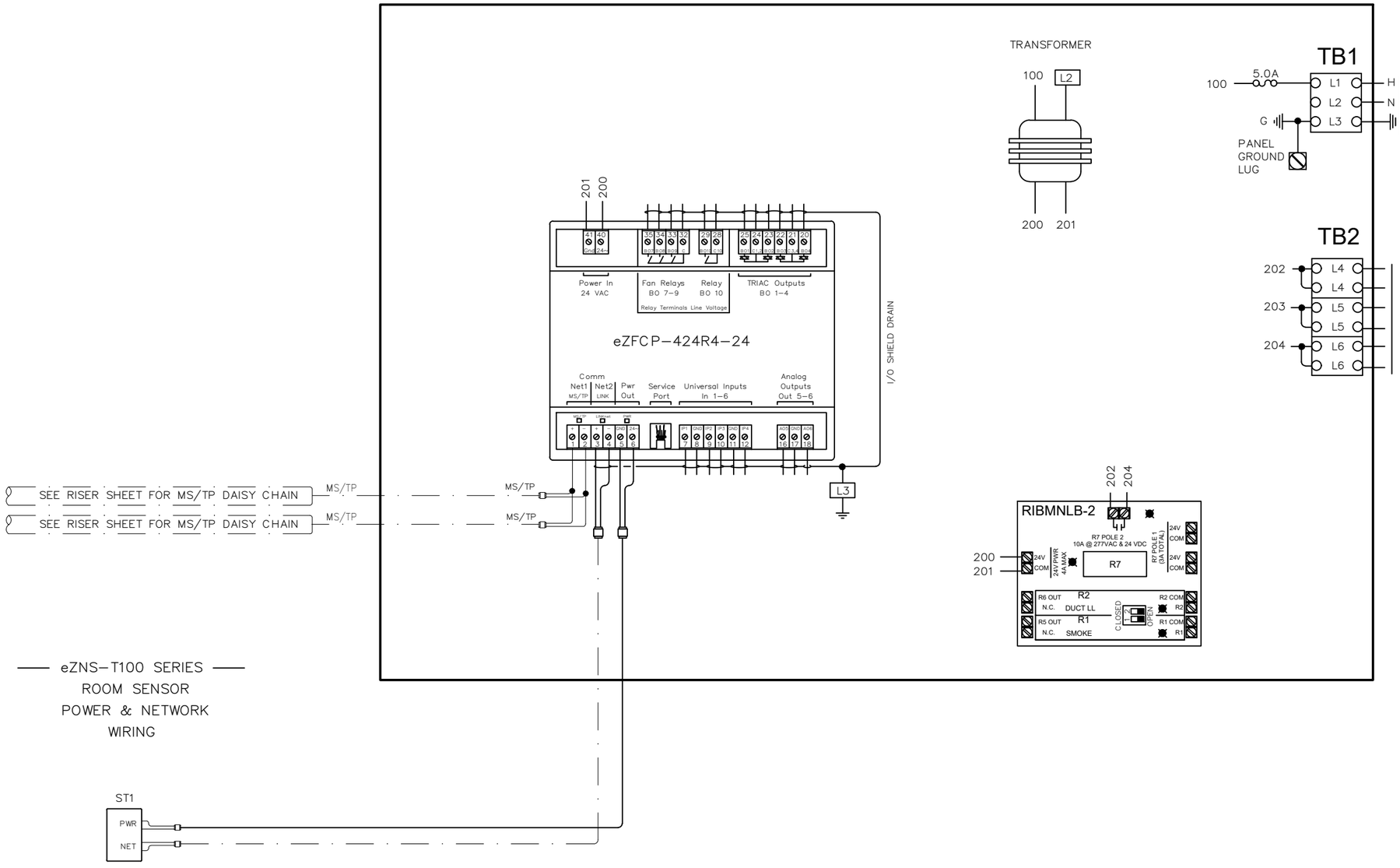
SHEET
NCHS-471
JOB NUMBER:
J-2304001

FCU W/ RETURN AIR – APPLICATION CONTROL PANEL

(TYPICAL FOR 5 PANELS)



FAN COIL UNIT, HYDRONIC WITH RETURN AIR ONLY CONTROL PANEL – POWER & NETWORK WIRING

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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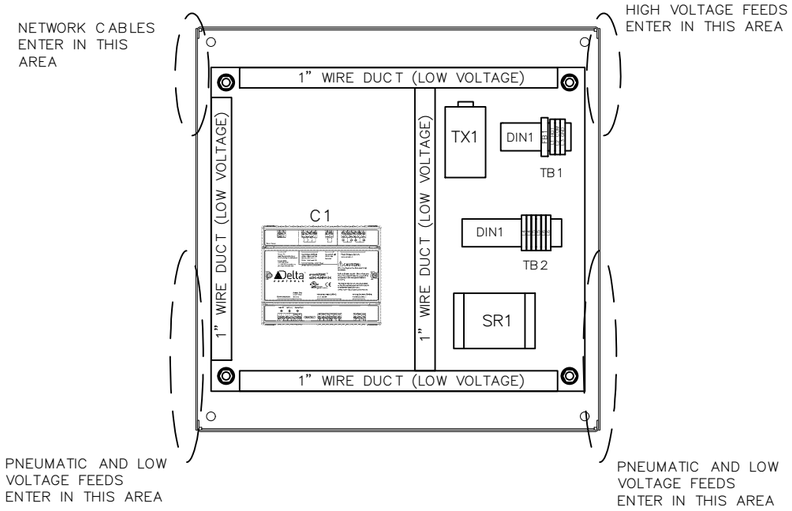
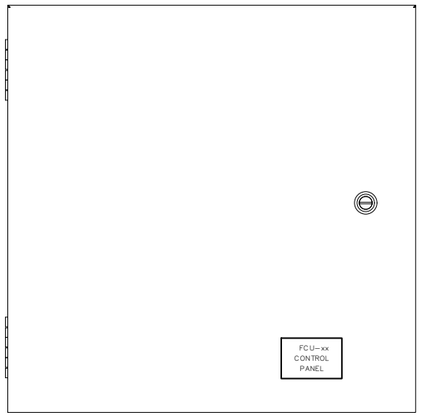
CONTRACT NO:

SHEET
NCHS–472
JOB NUMBER:
J–2304001

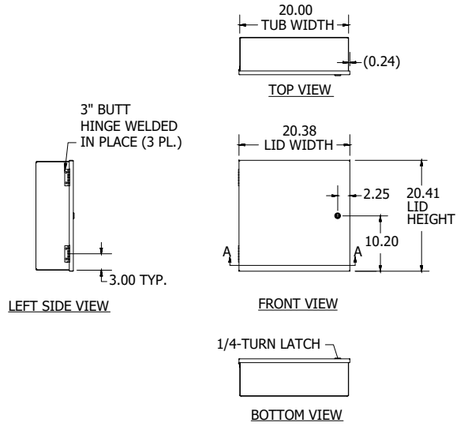
APPLICATION CONTROL PANEL LAYOUT
(TYPICAL FOR 5 PANELS)

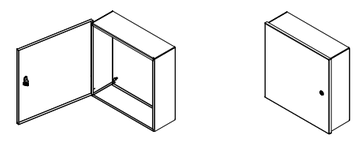
NO CONDUITS THROUGH THE TOP OF THE PANEL!



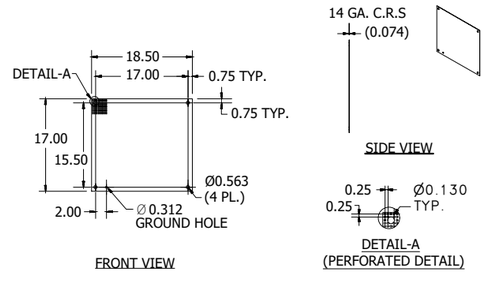


20" (W) x 20" (H) ENCLOSURE DIMENSIONS





PANEL DIMENSIONS



BILL OF MATERIALS

BILL OF MATERIALS

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

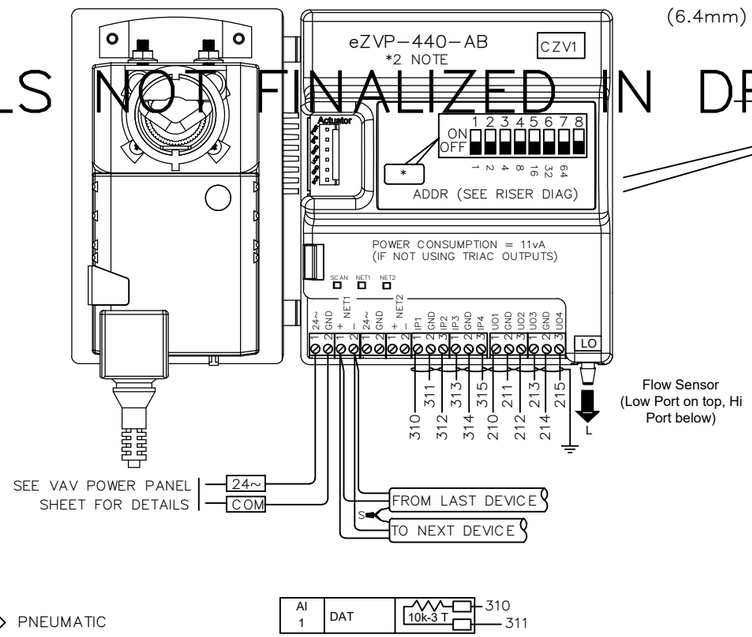
SHEET
NCHS-473
JOB NUMBER:
J-2304001

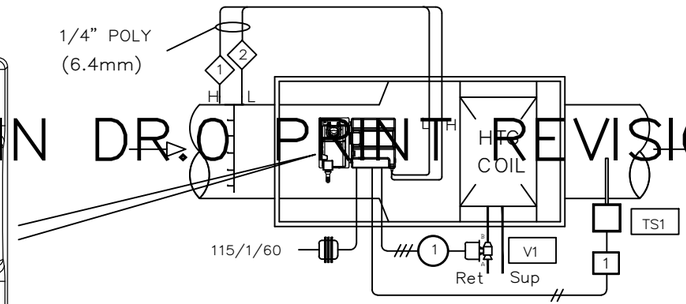
VARIABLE AIR VOLUME BOX DETAIL 'A' FIELD DEVICES & CONTROLS

(TYPICAL FOR 417)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

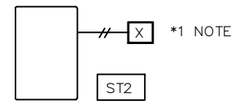
eZNS–T100 SERIES
ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)
(TYPICAL FOR 417)





Flow Sensor
(Low Port on top, Hi Port below)

IDF / MDF / ELEC ROOM
SPACE TEMPERATURE
(TYPICAL FOR 19)



NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	EF-8 OCCUPIED

NETWORK POINTS

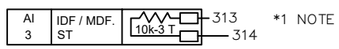
LINKNET NETWORK POINTS - eZNS-T100

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	132
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	132
LN3	1**xx.LN3	ST1	SPACE CO2	132
LN4	1**xx.LN4	ST1	OCCUPIED	132

PNEUMATIC

PNEUMATIC

LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



*1 NOTE

INPUTS

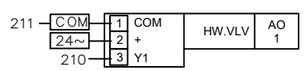
INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	128
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	OCC1	OCCUPANCY SENSOR	EBO
3	1**xx.AI03	ST1	MDF-C116 ST	2000
4	1**xx.DI04	CS1	EF-8 STATUS	1400

OUTPUTS

OUTPUTS - eZV-440

CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	128
1	1**xx.D001	V1	HOT WATER VLV	See Sch
2	1**xx.D002			
3	1**xx.D003	FR1	EF-8 START / STOP	3107
4	1**xx.A004			



BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

BACNet ADDRESS NOTES:
** – NUMBERS ARE DERIVED FROM THE SYSTEM CONTROLLER ADDRESS THAT THIS MS/TP DEVICE IS SUBORDINATE TO.
xx – NUMBERS ARE DERIVED FROM THE DIP SWITCH ADDRESS ON THE VAV CONTROLLER. VAV CONTROLLERS ON EACH MS/TP LEG MUST HAVE UNIQUE DIP SWITCH BACNet (MAC) ADDRESSES!

NOTES:
*1 – POINT NOT INSTALLED ON ALL CONTROLLERS. SEE VAV SCHEDULE FOR SPECIFIC REQUIREMENTS.
*2 – CONTROLLER TO BE SHIPPED TO FACTORY FOR MOUNTING.

VAV DETAIL 'A' FIELD DEVICES AND CONTROLS

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–474
JOB NUMBER:
J–2304001

VARIABLE AIR VOLUME BOX DETAIL 'B' FIELD DEVICES & CONTROLS

(TYPICAL FOR 64)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

eZNS–T100 SERIES
ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)
(TYPICAL FOR 64)

ST1

NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	EF-x OCCUPIED

NETWORK POINTS

LINKNET NETWORK POINTS - eZNS-T100

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	132
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	132
LN3	1**xx.LN3	ST1	SPACE CO2	132
LN4	1**xx.LN4	ST1	OCCUPIED	132

INPUTS

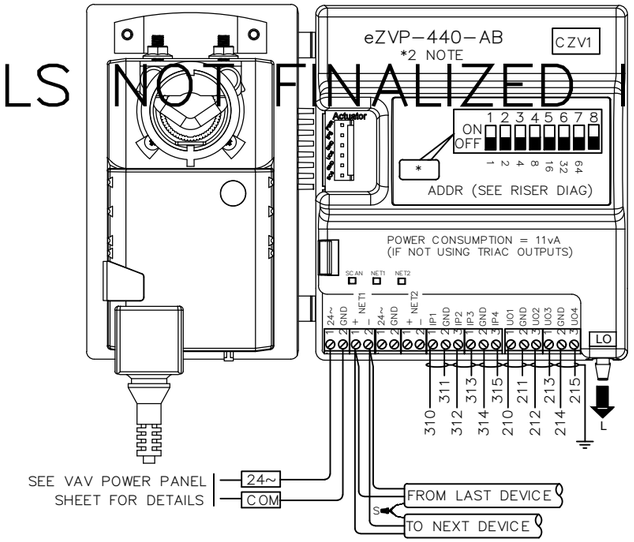
INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	128
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	OCC1	OCCUPANCY SENSOR	EBO
3	1**xx.AI03	ST1	IDF / MDF SPACE TEMP	2000
4	1**xx.DI04	CS1	EF-x STATUS	1400

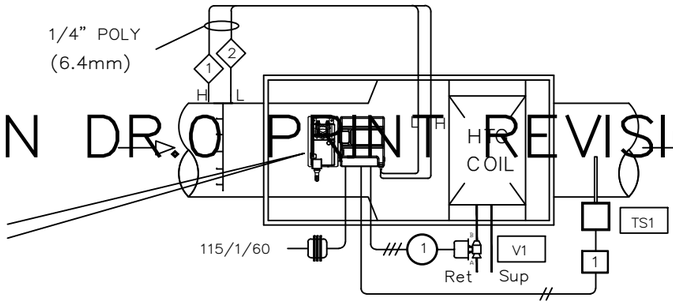
OUTPUTS

OUTPUTS - eZV-440

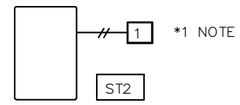
CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	128
1	1**xx.D001	V1	HOT WATER VLV	See Sch
2	1**xx.D002	V2	FTR HOT WATER VLV	See Sch
3	1**xx.D003	FR1	EF-x START / STOP	3107
4	1**xx.A004			



Flow Sensor
(Low Port on top, Hi Port below)



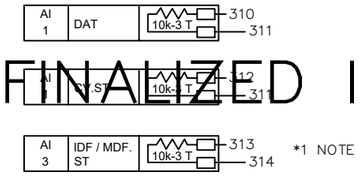
IDF / MDF / ELEC ROOM
SPACE TEMPERATURE
(TYPICAL FOR 7)



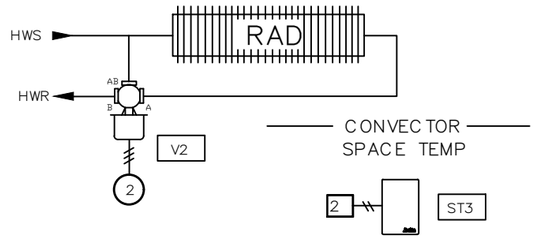
PNEUMATIC

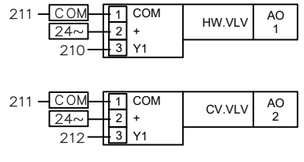
PNEUMATIC

LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



CONVECTOR
CV–X
(TYPICAL FOR 64)





BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

BACNet ADDRESS NOTES:
** – NUMBERS ARE DERIVED FROM THE SYSTEM CONTROLLER ADDRESS THAT THIS MS/TP DEVICE IS SUBORDINATE TO.
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NOTES:
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*2 – CONTROLLER TO BE SHIPPED TO FACTORY FOR MOUNTING.

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–475
JOB NUMBER:
J–2304001

VARIABLE AIR VOLUME BOX DETAIL 'C' FIELD DEVICES & CONTROLS

(TYPICAL FOR 16)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

eZNS–T100 SERIES
ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)
(TYPICAL FOR 16)

NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	EF-x OCCUPIED

NETWORK POINTS

LINKNET NETWORK POINTS - eZNS-T100

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	132
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	132
LN3	1**xx.LN3	ST1	SPACE CO2	132
LN4	1**xx.LN4	ST1	OCCUPIED	132

INPUTS

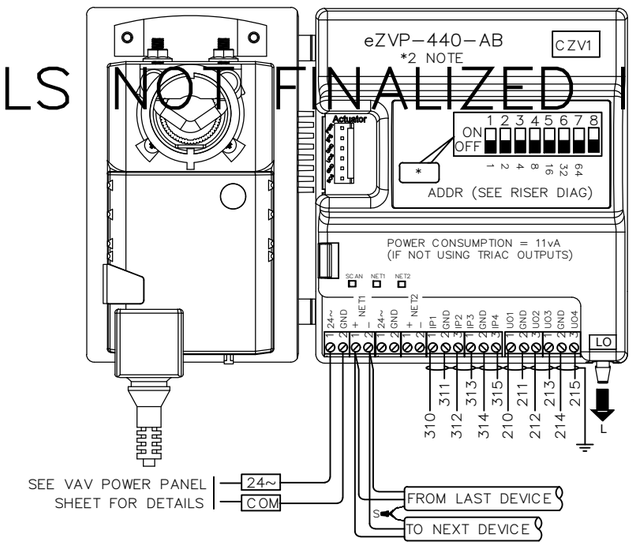
INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	128
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	OCC1	OCCUPANCY SENSOR	EBO
3	1**xx.AI03	ST1	IDF / MDF SPACE TEMP	2000
4	1**xx.DI04	CS1	EF-x STATUS	1400

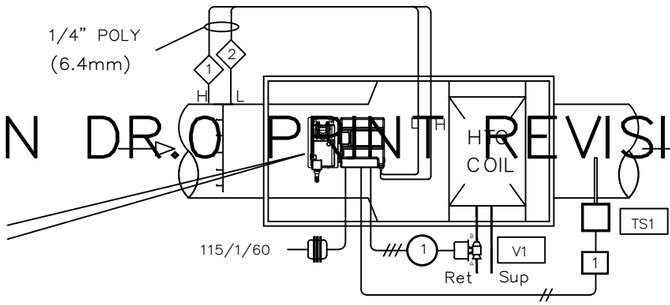
OUTPUTS

OUTPUTS - eZV-440

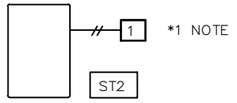
CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	128
1	1**xx.D001	V1	HOT WATER VLV	See Sch
2	1**xx.D002	V2	FTR HOT WATER VLV	See Sch
3	1**xx.D003	FR1	EF-x START / STOP	3107
4	1**xx.A004			



Flow Sensor
(Low Port on top, Hi Port below)



IDF / MDF / ELEC ROOM
SPACE TEMPERATURE
(TYPICAL FOR 1)

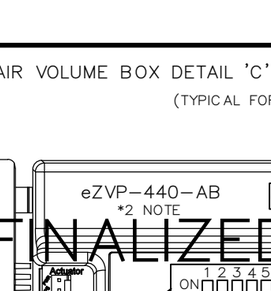


*1 NOTE

PNEUMATIC

PNEUMATIC

LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



CABINET UNIT HEATER
CUH-X
(TYPICAL FOR 16)

(THERMOSTAT BY MANUF.)

BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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VAV DETAIL 'C' FIELD DEVICES AND CONTROLS

Delta CONTROLS
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–476
JOB NUMBER:
J–2304001

VARIABLE AIR VOLUME BOX DETAIL 'D' FIELD DEVICES & CONTROLS

(TYPICAL FOR 1)

eZNS–T100 SERIES ROOM SENSOR (LINKNET)

(ST, SH, CO2, OCCUPIED)

(TYPICAL FOR 1)

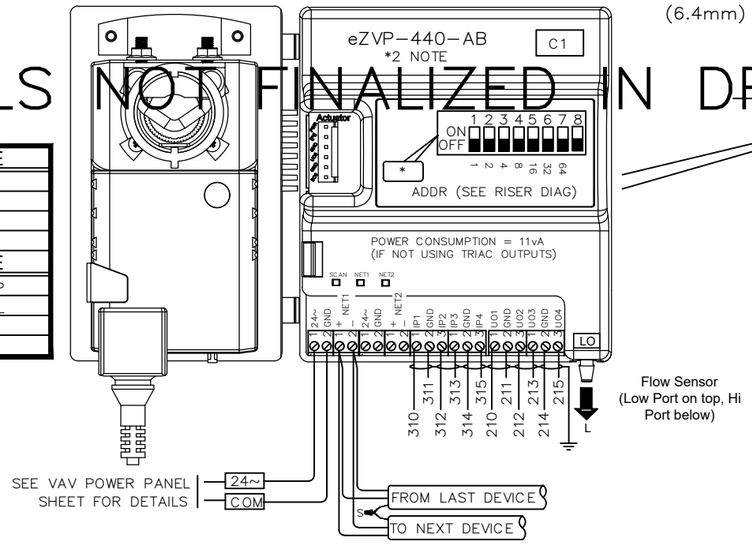
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

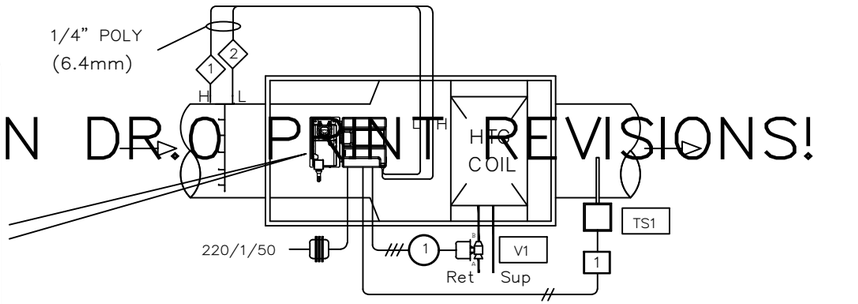
NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	IDF ROOM HIGH TEMP ALARM
N15	1**xx.LN15	FUME HOOD RUNTIME ALARM
N16	1**xx.LN16	CUH ENABLE

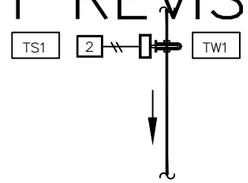
IN	NAME
1	DAT
2	ST
3	STPT
4	
OUT	NAME
1	HWV_OP
2	HWV_CL
3	
4	





HW LOOP TEMPERATURE MONITORING

(LOCATED IN MEN'S RESTROOM)



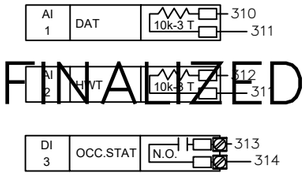
NETWORK POINTS

LINKNET NETWORK POINTS - DNS_24L

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	115
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	115
LN3	1**xx.LN3	ST1	SPACE CO2	115
LN4	1**xx.LN4	ST1	OCCUPANCY STATUS	115

PNEUMATIC

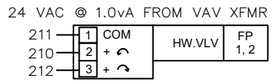
LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



INPUTS

INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	110
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	ST1	IDF ROOM XXX TEMP	2000
3	1**xx.AI03	CS1	FUME HOOD B105A STATUS	1400
4	1**xx.DI04	CS2	FUME HOOD B205B STATUS	1400



OUTPUTS

OUTPUTS - eZV-440

CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	110
1	1**xx.D001	V1	HOT WATER VLV OPEN	3203
2	1**xx.D002	V1	HOT WATER VLV CLOSE	3203
3	1**xx.D003	FR1	CUH ENABLE	3001
4	1**xx.A004			

BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

BACNet ADDRESS NOTES:
** – NUMBERS ARE DERIVED FROM THE SYSTEM CONTROLLER ADDRESS THAT THIS MS/TP DEVICE IS SUBORDINATE TO.
xx – NUMBERS ARE DERIVED FROM THE DIP SWITCH ADDRESS ON THE VAV CONTROLLER. VAV CONTROLLERS ON EACH MS/TP LEG MUST HAVE UNIQUE DIP SWITCH BACNet (MAC) ADDRESSES!

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NOTES:

*2 – CONTROLLER TO BE SHIPPED TO FACTORY FOR MOUNTING.

VAV DETAIL 'D' FIELD DEVICES AND CONTROLS

Delta CONTROLS
Temperature Control Services
13920 WENDESSA DRIVE
FISHERS, INDIANA 46038
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–477
JOB NUMBER:
J–2304001

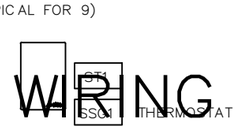
VARIABLE AIR VOLUME BOX DETAIL 'E' FIELD DEVICES & CONTROLS

(TYPICAL FOR 9)

eZNS–T100 SERIES ROOM SENSOR (LINKNET)

(ST, SH, CO2, OCCUPIED)

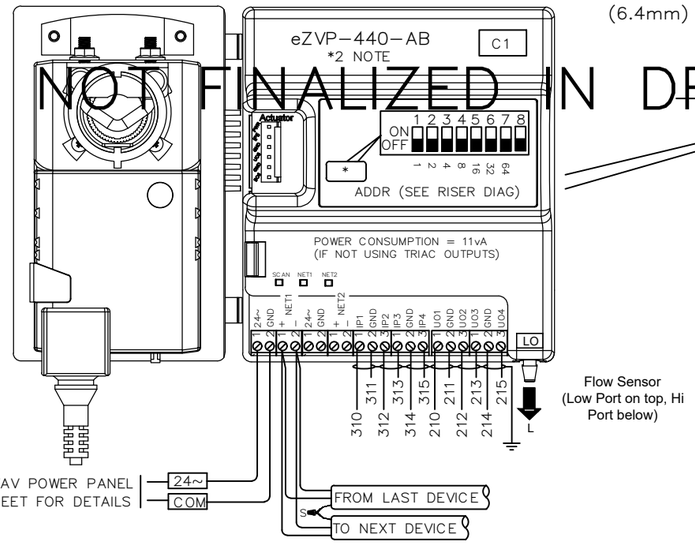
(TYPICAL FOR 9)

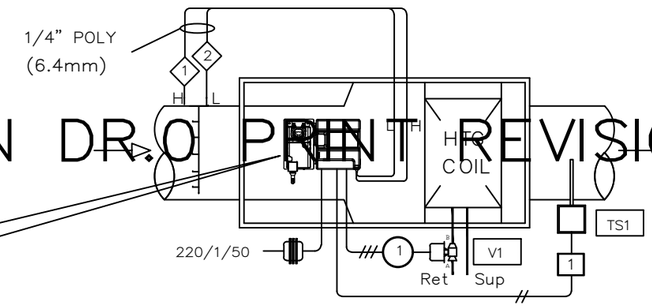


WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NETWORK POINTS

IN	NAME
1	DAT
2	ST
3	STPT
4	
OUT	**NAME**
1	HWV_OP
2	HWV_CL
3	
4	



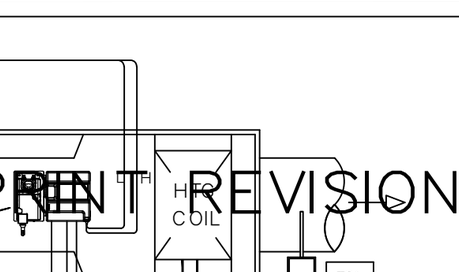


EXHAUST FAN – BAS CONTROLLED

EF 3–1

(TYPICAL FOR 1, NOT ON SCHEDULE, ETR EQUIPMENT FROM PREVIOUS SYSTEM)

(REPLACE RELAY AND CURRENT SENSOR AS SHOWN)



NETWORK POINTS

LINKNET NETWORK POINTS - DNS_24L

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	115
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	115
LN3	1**xx.LN3	ST1	SPACE CO2	115
LN4	1**xx.LN4	ST1	OCCUPANCY STATUS	115

INPUTS

INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	110
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	ST1	IDF ROOM XXX TEMP	2000
3	1**xx.AI03	CS1	FUME HOOD B105A STATUS	1400
4	1**xx.DI04	CS2	FUME HOOD B205B STATUS	1400

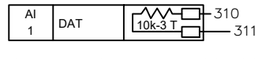
OUTPUTS

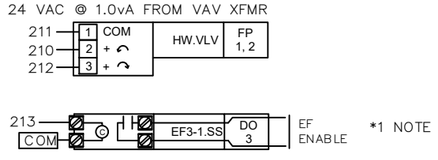
OUTPUTS - eZV-440

CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	110
1	1**xx.D001	V1	HOT WATER VLV OPEN	3203
2	1**xx.D002	V1	HOT WATER VLV CLOSE	3203
3	1**xx.D003	FR1	CUH ENABLE	3001
4	1**xx.A004			

PNEUMATIC

LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)





BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

BACNet ADDRESS NOTES:
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NOTES:
*1 – POINT NOT INSTALLED ON ALL CONTROLLERS. SEE VAV SCHEDULE FOR SPECIFIC REQUIREMENTS.
*2 – CONTROLLER TO BE SHIPPED TO FACTORY FOR MOUNTING.

VAV DETAIL 'E' FIELD DEVICES AND CONTROLS

Delta Controls
Temperature Control Services
13920 WENDESSA DRIVE
FISHERS, INDIANA 46038
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–478
JOB NUMBER:
J–2304001

VARIABLE AIR VOLUME BOX DETAIL 'F FIELD DEVICES & CONTROLS

(TYPICAL FOR 1)

eZNS–T100 SERIES ROOM SENSOR (LINKNET)

(ST, SH, CO2, OCCUPIED)
(TYPICAL FOR 1)

ST1
ESS01 THERMOSTAT GUARD

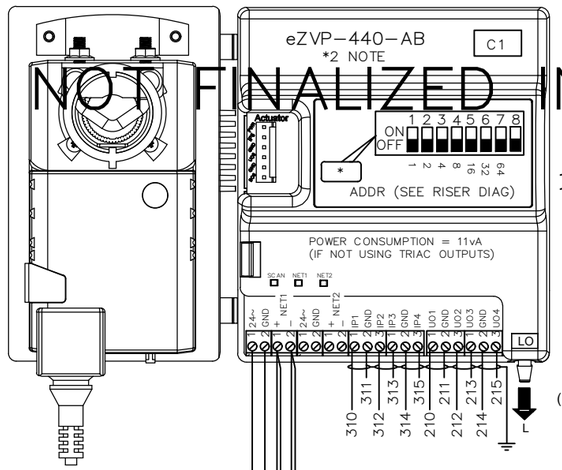
WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NETWORK POINTS

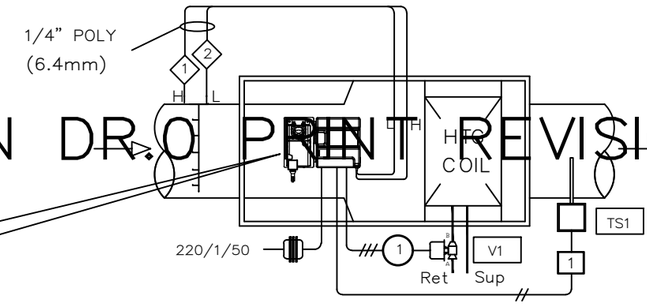
NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	IDF ROOM HIGH TEMP ALARM
N15	1**xx.LN15	FUME HOOD RUNTIME ALARM
N16	1**xx.LN16	CUH ENABLE

IN	NAME
1	DAT
2	ST
3	STPT
4	
OUT	NAME
1	HWV_OP
2	HWV_CL
3	
4	

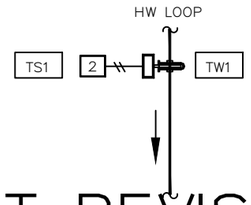


Flow Sensor
(Low Port on top, Hi Port below)



HW LOOP TEMPERATURE MONITORING

(FIELD DETERMINATION OF LOCATION AND MOUNTING REQUIREMENTS REQUIRED.)
(INSTALL IN RETURN WATER PIPING.)



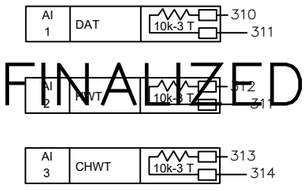
NETWORK POINTS

LINKNET NETWORK POINTS - DNS_24L

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	115
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	115
LN3	1**xx.LN3	ST1	SPACE CO2	115
LN4	1**xx.LN4	ST1	OCCUPANCY STATUS	115

PNEUMATIC

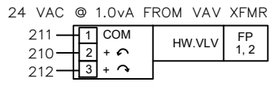
LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



INPUTS

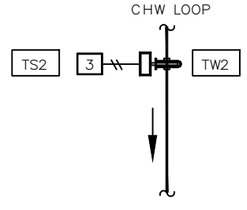
INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	110
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	ST1	IDF ROOM XXX TEMP	2000
3	1**xx.AI03	CS1	FUME HOOD B105A STATUS	1400
4	1**xx.DI04	CS2	FUME HOOD B205B STATUS	1400



CW LOOP TEMPERATURE MONITORING

(FIELD DETERMINATION OF LOCATION AND MOUNTING REQUIREMENTS REQUIRED.)
(INSTALL IN RETURN WATER PIPING.)



OUTPUTS

OUTPUTS - eZV-440

CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	110
1	1**xx.D001	V1	HOT WATER VLV OPEN	3203
2	1**xx.D002	V1	HOT WATER VLV CLOSE	3203
3	1**xx.D003	FR1	CUH ENABLE	3001
4	1**xx.A004			

BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

BACNet ADDRESS NOTES:
** – NUMBERS ARE DERIVED FROM THE SYSTEM CONTROLLER ADDRESS THAT THIS MS/TP DEVICE IS SUBORDINATE TO.
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WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NOTES:
*2 – CONTROLLER TO BE SHIPPED TO FACTORY FOR MOUNTING.

VAV DETAIL 'F' FIELD DEVICES AND CONTROLS

Delta Controls
Temperature Control Services
13920 WENDESSA DRIVE
FISHERS, INDIANA 46038
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

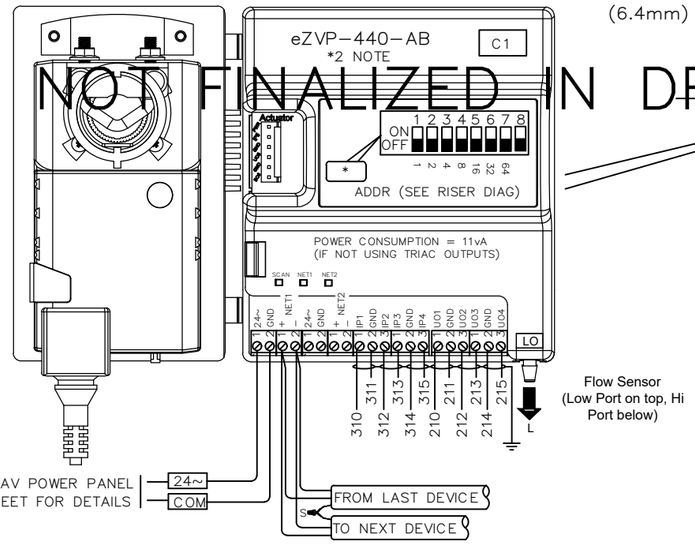
SHEET
NCHS–479
JOB NUMBER:
J–2304001

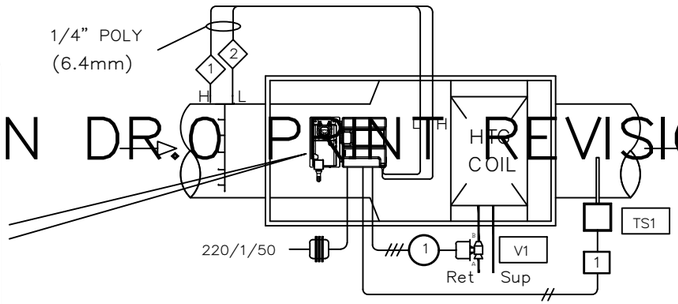
VARIABLE AIR VOLUME BOX DETAIL 'G' FIELD DEVICES & CONTROLS

(TYPICAL FOR 8)

eZNS–T100 SERIES
ROOM SENSOR (LINKNET)
(ST, SH, CO2, OCCUPIED)
(TYPICAL FOR 8)

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!





IN	NAME
1	DAT
2	ST
3	STPT
4	
OUT	**NAME**
1	HWV_OP
2	HWV_CL
3	
4	

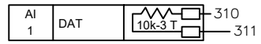
NETWORK POINTS

NETWORK POINTS

CH.	BAC_ID	IN USE BY
N1	1**xx.LN1	AIRFLOW SETPOINT
N2	1**xx.LN2	COOLING SETPOINT
N3	1**xx.LN3	DAT HEATING SETPOINT LIMIT
N4	1**xx.LN4	HEATING SETPOINT
N5	1**xx.LN5	HEATING MODE
N6	1**xx.LN6	UNOCCUPIED HEATING STPT
N7	1**xx.LN7	UNOCCUPIED COOLING STPT
N8	1**xx.LN8	UNOCCUPIED LOW LIMIT
N9	1**xx.LN9	HIGH DAT ALARM
N10	1**xx.LN10	HIGH ZONE TEMP ALARM
N11	1**xx.LN11	LOW DAT ALARM
N12	1**xx.LN12	LOW ZONE TEMP ALARM
N13	1**xx.LN13	OCCUPIED
N14	1**xx.LN14	IDF ROOM HIGH TEMP ALARM
N15	1**xx.LN15	FUME HOOD RUNTIME ALARM
N16	1**xx.LN16	CUH ENABLE

PNEUMATIC

LINE	IN USE BY
1	TOTAL PRESSURE (HI PORT)
2	STATIC PRESSURE (LO PORT)



WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

NETWORK POINTS

LINKNET NETWORK POINTS - DNS-24L

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
LN1	1**xx.LN1	ST1	SPACE TEMP SENSOR	115
LN2	1**xx.LN2	ST1	SPACE HUMIDITY	115
LN3	1**xx.LN3	ST1	SPACE CO2	115
LN4	1**xx.LN4	ST1	OCCUPANCY STATUS	115

INPUTS

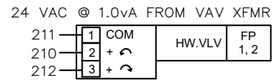
INPUTS - eZV-440

CH.	BAC_ID	TAG	IN USE BY	DATA SHEET
AF	1**xx.AF	C1	AIRFLOW SENSOR	110
1	1**xx.AI01	TS1	DISCHARGE AIR TEMP	2002
2	1**xx.AI02	ST1	IDF ROOM XXX TEMP	2000
3	1**xx.AI03	CS1	FUME HOOD B105A STATUS	1400
4	1**xx.DI04	CS2	FUME HOOD B205B STATUS	1400

OUTPUTS

OUTPUTS - eZV-440

CH	BAC_ID	TAG	IN USE BY	DATA SHEET
DPR	1**xx.DPR	C1	DAMPER	110
1	1**xx.D001	V1	HOT WATER VLV OPEN	3203
2	1**xx.D002	V1	HOT WATER VLV CLOSE	3203
3	1**xx.D003	FR1	CUH ENABLE	3001
4	1**xx.A004			



BILL OF MATERIALS

WIRING DETAILS NOT FINALIZED IN DR.0 PRINT REVISIONS!

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VAV DETAIL 'G' FIELD DEVICES AND CONTROLS

Delta CONTROLS
Temperature Control Services
13920 WENDESSA DRIVE
FISHERS, INDIANA 46038
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS–480
JOB NUMBER:
J–2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
1	B1	B1-01			TRANE	VCWF	14	1,500	975	600	2.40			E-CV-N1				B	
2	B1	B1-02			TRANE	VCWF	12	1,000	650	400	1.70			E-CV-N3				B	
3	B1	B1-03			TRANE	VCWF	8	500	325	200	1.10	IDF D108C	SS-B1	E-CV-N2				B	
4	B1	B1-04			TRANE	VCWF	8	350	230	140	0.70							A	
5	B1	B1-05			TRANE	VCWF	5	250	165	100	0.80							A	
6	B1	B1-06			TRANE	VCWF	10	800	520	320	1.20							A	
7	B1	B1-07			TRANE	VCWF	10	800	520	320	1.20							A	
8	B1	B1-08			TRANE	VCWF	12	1,050	685	420	1.80							A	
9	B1	B1-09			TRANE	VCWF	10	800	520	320	1.20							A	
10	B1	B1-10			TRANE	VCWF	12	1,050	685	420	1.80							A	
11	B1	B1-11			TRANE	VCWF	12	1,050	685	420	1.80							A	
12	B1	B1-12			TRANE	VCWF	12	1,050	685	420	1.80							A	
13	B1	B1-13			TRANE	VCWF	12	1,100	715	440	1.60							A	
14	B1	B1-14			TRANE	VCWF	12	1,070	695	430	1.60							A	
15	B1	B1-15			TRANE	VCWF	12	870	565	350	1.40							A	
16	B1	B1-16			TRANE	VCWF	12	870	565	350	1.40							A	
17	B1	B1-17			TRANE	VCWF	12	870	565	350	1.40							A	
18	B1	B1-18			TRANE	VCWF	12	950	620	380	1.60							A	
19	B1	B1-19			TRANE	VCWF	14	1,500	975	600	2.40							A	
20	B1	B1-20			TRANE	VCWF	12	870	565	350	1.40							A	
21	B1	B1-21			TRANE	VCWF	10	800	520	320	1.20							A	
22	C1	C1-01			TRANE	VCWF	12	1,000	650	400	1.70				E-CH-J3			B	
23	C1	C1-02			NOT USED						-							A	
24	C1	C1-03			TRANE	VCWF	12	1,000	650	400	1.70				E-CH-J1			B	
25	C1	C1-04	Corridor		TRANE	VCWF	10	780	505	310	1.30							A	
26	C1	C1-05			TRANE	VCWF	8	500	325	200	1.10							A	
27	C1	C1-06			TRANE	VCWF	4	100	100	100	0.10							A	
28	C1	C1-07			TRANE	VCWF	4	100	100	100	0.10							A	
29	C1	C1-08			TRANE	VCWF	10	600	390	240	0.80							A	
30	C4	C4-01			TRANE	VCWF	10	800	520	320	1.20							A	
31	C4	C4-02			TRANE	VCWF	12	1,100	715	440	1.90							A	
32	C4	C4-03			TRANE	VCWF	12	1,100	715	440	1.90							A	
33	C4	C4-04			TRANE	VCWF	12	1,100	715	440	1.90							A	
34	C4	C4-05			TRANE	VCWF	12	1,100	715	440	1.90							A	
35	C4	C4-06			TRANE	VCWF	12	1,100	715	440	1.90							A	
36	C4	C4-07			TRANE	VCWF	12	1,100	715	440	1.90							A	
37	C4	C4-08			TRANE	VCWF	10	800	520	320	1.20							A	
38	C4	C4-09			TRANE	VCWF	14	1,500	975	600	2.40							A	
39	C4	C4-10			TRANE	VCWF	12	1,100	715	440	1.90							A	
40	C4	C4-11			TRANE	VCWF	14	1,500	975	600	2.40							A	
41	C4	C4-12			TRANE	VCWF	12	1,100	715	440	1.90							A	
42	C4	C4-13			TRANE	VCWF	8	400	260	160	0.90							A	
43	C4	C4-14			TRANE	VCWF	10	550	360	220	0.80							A	
44	C4	C4-15			TRANE	VCWF	10	750	490	300	1.10							A	
45	C4	C4-16			TRANE	VCWF	10	750	490	300	1.10							A	
46	C4	C4-17			TRANE	VCWF	10	840	545	335	1.20							A	
47	C4	C4-18			TRANE	VCWF	10	1,050	685	420	1.80							A	
48	C4	C4-19			TRANE	VCWF	10	800	520	320	1.40							A	
49	C4	C4-20			TRANE	VCWF	10	800	520	320	1.20							A	
50	C4	C4-21			TRANE	VCWF	12	1,000	650	400	1.70	ELEC D577A						A	
51	C4	C4-22			TRANE	VCWF	5	250	165	100	0.40							A	
52	C4	C4-23			TRANE	VCWF	10	750	490	300	1.10	IDF C200	SS-B2					A	

*1 - USE TAMPERPROOF SPACE TEMPERATURE SENSOR.
*2 - OCCUPANCY SENSOR TIE-IN, LOCATED IN WOMEN'S RR.
*3 - HOT WATER LOOP TEMP SENSOR, LOCATED IN MEN'S RR.
*4 - CHILLED WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*5 - HOT WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*6 - USE ADJUSTABLE SPACE TEMPERATURE SENSOR.
*7 - INSTALLED UNDER PREVIOUS PHASE, NO WORK UNDER THIS PHASE.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-481
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
53	C4	C4-24			TRANE	VCWF	10	600	390	240	1.00							A	
54	C4	C4-25			TRANE	VCWF	5	250	165	100	0.50							A	
55	D1	D1-01			TRANE	VCWF	14	1,185	770	475	2.00							A	
56	D1	D1-02			TRANE	VCWF	12	1,000	650	400	1.70							A	
57	D1	D1-03			TRANE	VCWF	12	1,000	650	400	1.70							A	
58	D1	D1-04			TRANE	VCWF	5	250	165	100	0.80							A	
59	D1	D1-05			TRANE	VCWF	5	250	165	100	0.80							A	
60	D1	D1-06			TRANE	VCWF	5	250	165	100	0.80							A	
61	D1	D1-07			TRANE	VCWF	12	900	585	360	1.10							A	
62	D1	D1-08			TRANE	VCWF	8	375	245	150	0.80							A	
63	D1	D1-09			TRANE	VCWF	10	700	455	280	1.40			CV-D6				B	
64	D1	D1-10			TRANE	VCWF	10	600	390	240	0.80							A	
65	D1	D1-11			TRANE	VCWF	6	300	195	120	0.40							A	
66	D1	D1-12			TRANE	VCWF	10	550	360	220	0.80							A	
67	D1	D1-13			TRANE	VCWF	8	400	260	160	0.90							A	
68	D1	D1-14			TRANE	VCWF	8	400	260	160	0.90							A	
69	D1	D1-15			TRANE	VCWF	4	125	100	100	0.20			CV-D5				B	
70	D1	D1-16			TRANE	VCWF	6	325	210	130	0.50							A	
71	D1	D1-17			TRANE	VCWF	4	125	100	100	0.20							A	
72	D1	D1-18			TRANE	VCWF	4	100	100	100	0.10							A	
73	D1	D1-19			TRANE	VCWF	6	300	195	120	0.40							A	
74	D1	D1-20			TRANE	VCWF	10	1,050	685	420	1.70							A	
75	D1	D1-21			TRANE	VCWF	14	1,200	780	480	1.80							A	
76	D1	D1-22			TRANE	VCWF	14	1,200	780	480	1.80							A	
77	D1	D1-23			TRANE	VCWF	14	1,200	780	480	1.80							A	
78	D1	D1-24			TRANE	VCWF	14	1,200	780	480	1.80							A	
79	D1	D1-25			TRANE	VCWF	14	1,200	780	480	1.80							A	
80	D1	D1-26			TRANE	VCWF	14	1,250	815	500	2.00							A	
81	D1	D1-27			TRANE	VCWF	14	1,450	945	580	2.50							A	
82	D1	D1-28			TRANE	VCWF	4	100	100	100	0.10							A	
83	D1	D1-29			TRANE	VCWF	4	100	100	100	0.10							A	
84	D2	D2-01			TRANE	VCWF	10	550	360	220	0.80			CV-D1				B	
85	D2	D2-02			TRANE	VCWF	12	1,100	715	440	1.90	IDF A115	SS-D1					A	
86	D2	D2-03			TRANE	VCWF	10	800	520	320	1.20							A	
87	D2	D2-04			TRANE	VCWF	12	1,000	650	400	1.70							A	
88	D2	D2-05			TRANE	VCWF	16	2,000	1,300	800	3.00			CV-D7				B	
89	D2	D2-06			TRANE	VCWF	12	800	520	320	1.40			CV-D2				B	
90	D2	D2-07			TRANE	VCWF	4	100	100	100	0.10							A	
91	D2	D2-08			TRANE	VCWF	4	100	100	100	0.10			CV-D3				B	
92	D2	D2-09			TRANE	VCWF	4	150	100	100	0.30			CV-D4				B	
93	D2	D2-10			TRANE	VCWF	12	1,100	715	440	1.90			CV-D8				B	
94	D2	D2-11			TRANE	VCWF	10	800	520	320	1.20							A	
95	D2	D2-12			TRANE	VCWF	12	1,090	710	435	1.90							A	
96	D2	D2-13			TRANE	VCWF	12	1,050	685	420	1.80							A	
97	D2	D2-14			TRANE	VCWF	10	650	425	260	0.90			CV-D9				B	
98	D2	D2-15			TRANE	VCWF	12	1,050	685	420	1.80							A	
99	D2	D2-16			TRANE	VCWF	12	1,050	685	420	1.80							A	
100	D2	D2-17			TRANE	VCWF	12	800	520	320	1.40							A	
101	D2	D2-18			TRANE	VCWF	14	1,200	780	480	1.80							A	
102	E1	E1-01			TRANE	VCWF	14	1,400	910	560	2.20							A	
103	E1	E1-02			TRANE	VCWF	12	900	585	360	1.50							A	
104	E1	E1-03			TRANE	VCWF	14	1,400	910	560	2.20							A	

*1 - USE TAMPERPROOF SPACE TEMPERATURE SENSOR.
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PHASE 3 VAV SCHEDULE (2 OF 10)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-482
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
105	E1	E1-04			TRANE	VCWF	12	900	585	360	1.50							A	
106	E1	E1-05			TRANE	VCWF	14	1,500	975	600	2.40				CH-E1			C	
107	E1	E1-06			TRANE	VCWF	10	750	490	300	1.10							A	
108	E1	E1-07			TRANE	VCWF	10	750	490	300	1.10							A	
109	E1	E1-08			TRANE	VCWF	10	750	490	300	1.10							A	
110	E1	E1-09			TRANE	VCWF	10	750	490	300	1.10							A	
111	E1	E1-10			TRANE	VCWF	10	750	490	300	1.10							A	
112	E1	E1-11			TRANE	VCWF	4	150	100	100	0.30							A	
113	E1	E1-12			TRANE	VCWF	4	100	100	100	0.10							A	
114	E1	E1-13			TRANE	VCWF	10	650	425	260	0.90							A	
115	E2	E2-01			TRANE	VCWF	12	1,000	650	400	1.70							A	
116	E2	E2-02			TRANE	VCWF	12	1,000	650	400	1.70							A	
117	E2	E2-03			TRANE	VCWF	8	500	325	200	1.10							A	
118	E2	E2-04			TRANE	VCWF	8	450	295	180	1.00							A	
119	E2	E2-05			TRANE	VCWF	6	300	195	120	0.40							A	
120	E2	E2-06			TRANE	VCWF	5	200	130	100	0.50							A	
121	E2	E2-07			TRANE	VCWF	16	1,950	1,270	780	2.80							A	
122	E2	E2-08			TRANE	VCWF	16	1,950	1,270	780	2.80							A	
123	E2	E2-09			TRANE	VCWF	14	1,200	780	480	1.90							A	
124	E2	E2-10			TRANE	VCWF	10	750	490	300	1.10							A	
125	E2	E2-11			TRANE	VCWF	10	800	520	320	1.20							A	
126	E2	E2-12			TRANE	VCWF	4	150	100	100	0.30	IDF A226K	SS-F1					A	
127	E2	E2-13			TRANE	VCWF	5	200	130	100	0.50							A	
128	E2	E2-14			TRANE	VCWF	16	1,950	1,270	780	2.80							A	
129	E2	E2-15			TRANE	VCWF	14	1,400	910	560	2.20							A	
130	E2	E2-16			TRANE	VCWF	14	1,400	910	560	2.20							A	
131	E2	E2-17			TRANE	VCWF	6	300	195	120	0.40							A	
132	E2	E2-18			TRANE	VCWF	6	300	195	120	0.40							A	
133	E2	E2-19			TRANE	VCWF	12	1,000	650	400	1.70							A	
134	E2	E2-20			TRANE	VCWF	12	1,000	650	400	1.70							A	
135	E2	E2-21			TRANE	VCWF	4	100	100	100	0.10							A	
136	E2	E2-22			NOT USED						-							A	
137	E2	E2-23			TRANE	VCWF	8	450	295	180	1.00							A	
138	E2	E2-24			TRANE	VCWF	14	1,400	910	560	2.20							A	
139	E3	E3-01			TRANE	VCWF	14	1,400	910	560	2.20							A	
140	E3	E3-02			TRANE	VCWF	10	700	455	280	1.00				CH-F1			C	
141	E3	E3-03			TRANE	VCWF	12	1,000	650	400	1.70			CV-F5				B	
142	E3	E3-04			TRANE	VCWF	12	1,000	650	400	1.70			CV-E1				B	
143	E3	E3-05			TRANE	VCWF	6	300	195	120	0.40	IDF A134	SS-E1					A	
144	E3	E3-06			TRANE	VCWF	8	400	260	160	0.90				CH-E2			C	
145	E3	E3-07			TRANE	VCWF	5	200	130	100	0.50							A	
146	E3	E3-08			TRANE	VCWF	5	225	145	90	0.50							A	
147	E3	E3-09			TRANE	VCWF	14	1,200	780	480	1.90							A	
148	E3	E3-10			TRANE	VCWF	8	500	325	200	1.10							A	
149	F1	F1-01			TRANE	VCWF	14	1,500	975	600	2.40			CV-F2				B	
150	F1	F1-02			TRANE	VCWF	4	125	100	100	0.20							A	
151	F1	F1-03			TRANE	VCWF	12	1,000	650	400	1.70			CV-F1				B	
152	F1	F1-04			TRANE	VCWF	4	150	100	100	0.30							A	
153	F1	F1-05			TRANE	VCWF	4	150	100	100	0.30	IDF A153						A	
154	F1	F1-06			TRANE	VCWF	6	325	210	130	0.50							A	
155	F1	F1-07			TRANE	VCWF	12	1,000	650	400	1.70							A	
156	F1	F1-08			TRANE	VCWF	4	60	60	60	0.10			CV-F3				B	

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PHASE 3 VAV SCHEDULE (3 OF 10)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-483
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
157	F1	F1-09			TRANE	VCWF	14	1,200	780	480	1.90			CV-F4				B	
158	F1	F1-10			TRANE	VCWF	8	500	325	200	1.10							A	
159	F1	F1-11			TRANE	VCWF	10	750	490	300	1.10							A	
160	F1	F1-12			TRANE	VCWF	5	250	165	100	0.80							A	
161	F1	F1-13			TRANE	VCWF	4	100	100	100	0.10							A	
162	F1	F1-14			TRANE	VCWF	4	100	100	100	0.10							A	
163	F1	F1-15			TRANE	VCWF	14	1,400	910	560	2.20							A	
164	F1	F1-16			TRANE	VCWF	14	1,400	910	560	2.20							A	
165	F1	F1-17			TRANE	VCWF	5	250	165	100	0.80							A	
166	F1	F1-18			TRANE	VCWF	10	750	490	300	1.10							A	
167	F1	F1-19			TRANE	VCWF	12	1,000	650	400	1.70			CV-F7				B	
168	F1	F1-20			TRANE	VCWF	10	750	490	300	1.10							A	
169	F1	F1-21			TRANE	VCWF	4	125	100	100	0.20			CV-F6				B	
170	F1	F1-22			TRANE	VCWF	5	160	105	100	0.40							A	
171	F1	F1-23			TRANE	VCWF	4	125	100	100	0.20							A	
172	F1	F1-24			TRANE	VCWF	10	600	390	240	0.80							A	
173	F1	F1-25			TRANE	VCWF	5	160	105	100	0.40							A	
174	G4	G4-01			TRANE	VCWF	10	600	390	240	0.80	STOR L106	SS-G1					A	
175	G4	G4-02			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
176	G4	G4-03			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
177	G4	G4-04			TRANE	VCWF	16	1,700	1,105	680	2.50							A	
178	G4	G4-05			TRANE	VCWF	16	1,700	1,105	680	2.50							A	
179	G4	G4-06			TRANE	VCWF	12	860	560	345	1.30							A	
180	G4	G4-07			TRANE	VCWF	16	1,700	1,105	680	2.50							A	
181	G4	G4-08			TRANE	VCWF	16	1,700	1,105	680	2.50							A	
182	G4	G4-09			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
183	G4	G4-10			TRANE	VCWF	10	600	390	240	0.80							A	
184	G4	E-G4-11			-	-	8	550	360	220	0.80							A	7
185	G4	E-G4-12			-	-	5	350	230	140	0.50							A	7
186	G4	E-G4-13			-	-	8	550	360	220	0.80							A	7
187	H1	H1-01			TRANE	VCWF	12	1,100	715	440	1.90			CV-H5				B	
188	H1	H1-02			TRANE	VCWF	4	100	100	100	0.10							A	
189	H1	H1-03			TRANE	VCWF	4	100	100	100	0.10							A	
190	H1	H1-04			TRANE	VCWF	8	350	230	140	0.70			CV-H4				B	
191	H1	H1-05			TRANE	VCWF	4	100	100	100	0.10							A	
192	H1	H1-06			TRANE	VCWF	4	100	100	100	0.10							A	
193	H1	H1-07			TRANE	VCWF	4	100	100	100	0.10							A	
194	H1	H1-08			TRANE	VCWF	4	100	100	100	0.10							A	
195	H1	H1-09			TRANE	VCWF	4	150	100	100	0.30			CV-H3				B	
196	H1	H1-10			TRANE	VCWF	12	1,090	710	435	1.90							A	
197	H1	H1-11			TRANE	VCWF	10	720	470	290	1.50							A	
198	H1	H1-12			TRANE	VCWF	12	900	585	360	1.50							A	
199	H1	H1-13			TRANE	VCWF	10	720	470	290	1.20			E-CV-H1				B	
200	H1	H1-14			TRANE	VCWF	12	900	585	360	1.50			E-CV-H2				B	
201	H1	H1-15			TRANE	VCWF	12	1,125	730	450	2.00							A	
202	H1	H1-16			TRANE	VCWF	12	1,125	730	450	2.00							A	
203	H1	H1-17			TRANE	VCWF	10	850	555	340	1.30							A	
204	H1	H1-18			TRANE	VCWF	10	850	555	340	1.30							A	
205	H1	H1-19			TRANE	VCWF	10	850	555	340	1.30							A	
206	H1	H1-20			TRANE	VCWF	10	850	555	340	1.30							A	
207	H1	H1-21			TRANE	VCWF	10	850	555	340	1.30	IDF L205	SS-H1					A	
208	H1	H1-22			TRANE	VCWF	12	1,000	650	400	1.70							A	

*1 - USE TAMPERPROOF SPACE TEMPERATURE SENSOR.
*2 - OCCUPANCY SENSOR TIE-IN, LOCATED IN WOMEN'S RR.
*3 - HOT WATER LOOP TEMP SENSOR, LOCATED IN MEN'S RR.
*4 - CHILLED WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*5 - HOT WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*6 - USE ADJUSTABLE SPACE TEMPERATURE SENSOR.
*7 - INSTALLED UNDER PREVIOUS PHASE, NO WORK UNDER THIS PHASE.

PHASE 3 VAV SCHEDULE (4 OF 10)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-484
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS							
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp	Control Detail	NOTES
209	H1	H1-23			TRANE	VCWF	14	1,195	775	480	2.10							A	
210	H1	H1-24			TRANE	VCWF	12	1,000	650	400	1.70			E-CV-H6				B	
211	H1	H1-25			TRANE	VCWF	12	1,135	740	455	2.00			E-CV-H7				B	
212	H1	H1-26			TRANE	VCWF	12	875	570	350	1.50							A	
213	H2	H2-01			TRANE	VCWF	14	1,500	975	600	2.40							A	
214	H2	H2-02			TRANE	VCWF	12	1,000	650	400	1.70							A	
215	H2	H2-03			TRANE	VCWF	10	800	520	320	1.20							A	
216	H2	H2-04			TRANE	VCWF	12	1,000	650	400	1.70							A	
217	H2	H2-05			TRANE	VCWF	12	1,000	650	400	1.70							A	
218	H2	H2-06			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
219	H2	H2-07			TRANE	VCWF	12	1,050	685	420	1.80							A	
220	H2	H2-08			TRANE	VCWF	12	1,100	715	440	1.90							A	
221	H2	H2-09			TRANE	VCWF	10	700	455	280	1.00							A	
222	H2	H2-10			TRANE	VCWF	12	900	585	360	1.50							A	
223	H2	H2-11			TRANE	VCWF	12	900	585	360	1.50							A	
224	H2	H2-12			TRANE	VCWF	12	900	585	360	1.50							A	
225	H2	H2-13			TRANE	VCWF	10	700	455	280	1.00							A	
226	H2	H2-14			TRANE	VCWF	12	1,000	650	400	1.70							A	
227	H2	H2-15			TRANE	VCWF	10	800	520	320	1.20							A	
228	J1	J1-01			TRANE	VCWF	10	800	520	320	1.20							A	
229	J1	J1-02			TRANE	VCWF	4	100	100	100	0.10							A	
230	J1	J1-03			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
231	J1	J1-04			TRANE	VCWF	10	750	490	300	1.10							A	
232	J1	J1-05			TRANE	VCWF	10	800	520	320	1.20							A	
233	J1	J1-06			TRANE	VCWF	10	800	520	320	1.20			CV-M2				B	
234	J1	J1-07			TRANE	VCWF	16	1,600	1,040	640	2.30							A	
235	J1	J1-08			TRANE	VCWF	10	800	520	320	1.20							A	
236	J1	J1-09			TRANE	VCWF	16	1,600	1,040	640	2.30							A	
237	J1	J1-10			TRANE	VCWF	8	400	260	160	1.10							A	
238	J1	J1-11			TRANE	VCWF	5	200	130	100	0.50							A	
239	J1	J1-12			TRANE	VCWF	5	200	130	100	0.50							A	
240	J1	J1-13			TRANE	VCWF	16	2,250	1465	900	2.40							A	
241	J1	J1-14			TRANE	VCWF	14	1,400	910	560	2.20							A	
242	J1	J1-15			TRANE	VCWF	14	1,500	975	600	2.40							A	
243	J1	J1-16			TRANE	VCWF	14	1,500	975	600	2.40							A	
244	J1	J1-17			TRANE	VCWF	8	400	260	160	0.60							A	
245	J1	J1-18			TRANE	VCWF	10	600	390	240	0.80							A	
246	J1	J1-19			TRANE	VCWF	8	400	260	160	0.60							A	
247	J1	J1-20			TRANE	VCWF	8	400	260	160	0.60			CV-L3				B	
248	J2	J2-01			TRANE	VCWF	16	1,800	1,170	720	2.60							A	
249	J2	J2-02			TRANE	VCWF	5	200	130	100	0.50				CH-J2			C	
250	J2	J2-03			TRANE	VCWF	16	1,750	1,140	700	2.70							A	
251	J2	J2-04			TRANE	VCWF	16	1,750	1,140	700	2.50							A	
252	J2	J2-05			TRANE	VCWF	16	1,750	1,140	700	2.50							A	
253	J2	J2-06			TRANE	VCWF	8	500	325	200	1.10							A	
254	J2	J2-07			TRANE	VCWF	12	1,100	715	440	1.90	IDF K112	SS-J1					A	
255	J2	J2-08			TRANE	VCWF	5	200	130	100	0.50			CV-J1				B	
256	J2	J2-09			TRANE	VCWF	5	200	130	100	0.50			CV-J2				B	
257	J2	J2-10			TRANE	VCWF	16	1,700	1,105	680	2.50							A	
258	J2	J2-11			TRANE	VCWF	12	1,100	715	440	1.70							A	
259	J2	J2-12			TRANE	VCWF	10	800	520	320	1.20	IDF D219A	SS-J2					A	
260	J2	J2-13			TRANE	VCWF	12	1,000	650	400	1.70							A	

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LEBANON, INDIANA 46052
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UPDATES

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04/06/2023	ADD 3.3
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REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-485
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS							
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp	Control Detail	NOTES
261	J2	J2-14			TRANE	VCWF	10	825	535	330	1.40				E-CH-K1			C	
262	J3	J3-01	L113	Classroom	TRANE	VCWF	14	1,200	780	480	3.70							A	
263	J3	J3-02			TRANE	VCWF	14	1,200	780	480	3.70							A	
264	J3	J3-03	L117	Piano Theory	TRANE	VCWF	8	540	350	215	0.80							A	
265	J3	J3-04			TRANE	VCWF	14	1,500	975	600	2.40							A	
266	J3	J3-05			TRANE	VCWF	14	1,500	975	600	2.40							A	
267	J3	J3-06			TRANE	VCWF	14	1,500	975	600	2.40							A	
268	J3	J3-07			TRANE	VCWF	5	250	165	100	0.20							A	
269	J3	J3-08			TRANE	VCWF	8	350	230	140	0.80							A	
270	J3	J3-09			TRANE	VCWF	8	350	230	140	0.20							A	
271	J3	J3-10			TRANE	VCWF	5	250	165	100	0.20							A	
272	J3	J3-11			TRANE	VCWF	10	800	520	320	1.20							A	
273	J3	J3-12			TRANE	VCWF	4	125	100	100	0.90							A	
274	J3	J3-13			TRANE	VCWF	6	300	195	120	0.40							A	
275	J3	J3-14			TRANE	VCWF	8	350	230	140	0.40							A	
276	J3	J3-15			TRANE	VCWF	4	150	100	100	0.75							A	
277	J3	J3-16			TRANE	VCWF	4	150	100	100	0.75							A	
278	M1	M1-01			TRANE	VCWF	12	1,000	650	400	1.70							A	
279	M1	M1-02			TRANE	VCWF	10	550	360	220	0.80			CV-M3				B	
280	M1	M1-03			TRANE	VCWF	10	550	360	220	0.80			CV-M4				B	
281	M1	M1-04			TRANE	VCWF	10	700	455	280	1.00			CV-M1				B	
282	M1	M1-05			TRANE	VCWF	4	125	100	100	0.20							A	
283	M1	M1-06			TRANE	VCWF	4	150	100	100	0.30							A	
284	M1	M1-07			TRANE	VCWF	8	400	260	160	0.60			CV-M8				B	
285	M1	M1-08	Unit M Mech Rm		TRANE	VCWF	24/16	4,500	2,925	1,800	7.00							A	
286	M1	M1-09	Unit M Mech Rm		TRANE	VCWF	24/16	4,400	2,860	1,760	6.00							A	
287	M1	M1-10	Unit M Mech Rm		TRANE	VCWF	24/16	4,450	2,895	1,780	6.50							A	
288	N1	N1-01			TRANE	VCWF	16	1,650	1075	660	2.40	ELEC H113						A	
289	N1	N1-02			TRANE	VCWF	16	1,900	1,235	760	3.00							A	
290	N1	N1-03			TRANE	VCWF	16	1,900	1,235	760	3.00							A	
291	N1	N1-04			TRANE	VCWF	16	1,750	1,140	700	2.70							A	
292	N1	N1-05			TRANE	VCWF	10	720	470	290	1.10							A	
293	N1	N1-06			TRANE	VCWF	16	1,900	1,235	760	3.00				CH-N1			C	
294	N1	N1-07			TRANE	VCWF	8	400	260	160	0.90							A	
295	N1	N1-08			TRANE	VCWF	4	150	100	100	0.30							A	
296	N1	N1-09			TRANE	VCWF	14	1,500	975	600	2.40							A	
297	N1	N1-10			TRANE	VCWF	10	550	550	550	1.20							A	
298	N1	N1-11	Passage D157A		TRANE	VCWF	6	300	195	120	0.40	ELEC D107A			CH-A1			C	
299	N1	N1-12			TRANE	VCWF	14	1,200	780	480	1.80	ELEC H118						A	
300	N1	N1-13			TRANE	VCWF	14	1,200	780	480	1.80				CH-N2			C	
301	N2	N2-01			TRANE	VCWF	10	800	520	320	1.20			CV-N4				B	
302	N2	N2-02			TRANE	VCWF	14	1,400	910	560	2.20							A	
303	N2	N2-03			TRANE	VCWF	6	300	195	120	0.40							A	
304	N2	N2-04			TRANE	VCWF	10	800	520	320	1.20			CV-N5				B	
305	N2	N2-05			TRANE	VCWF	10	800	520	320	1.20							A	
306	N2	N2-06			TRANE	VCWF	10	800	520	320	1.20							A	
307	N2	N2-07			TRANE	VCWF	14	1,400	910	560	2.20							A	
308	N2	N2-08			TRANE	VCWF	14	1,500	975	600	1.80							A	
309	N2	N2-09			TRANE	VCWF	14	1,400	910	560	2.20							A	
310	N2	N2-10			TRANE	VCWF	10	800	520	320	1.20							A	
311	N2	N2-11			TRANE	VCWF	10	800	520	320	1.20							A	
312	N2	N2-12			TRANE	VCWF	14	1,400	910	560	2.20							A	

*1 - USE TAMPERPROOF SPACE TEMPERATURE SENSOR.
*2 - OCCUPANCY SENSOR TIE-IN, LOCATED IN WOMEN'S RR.
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*4 - CHILLED WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*5 - HOT WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
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PHASE 3 VAV SCHEDULE (6 OF 10)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
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REVISIONS	
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-486
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
313	N2	N2-13			TRANE	VCWF	8	500	325	200	1.10							A	
314	N2	N2-14			TRANE	VCWF	14	1,200	780	480	1.80							A	
315	N2	N2-15			TRANE	VCWF	14	1,200	780	480	1.80							A	
316	N2	N2-16			TRANE	VCWF	10	800	520	320	1.70							A	
317	P1	P1-01			TRANE	VCWF	5	250	165	100	0.50							A	
318	P1	P1-02			TRANE	VCWF	4	100	100	100	0.10	IDF B108L	SS-P1					A	
319	P1	P1-03			TRANE	VCWF	10	800	520	320	1.20							A	
320	P1	P1-04			TRANE	VCWF	8	350	230	140	0.70							A	
321	P1	P1-05			TRANE	VCWF	14	1,200	780	480	1.90							A	
322	P1	P1-06			TRANE	VCWF	10	600	390	240	0.80							A	
323	P1	P1-07			TRANE	VCWF	4	100	100	100	0.10			CV-P3				B	
324	P1	P1-08			TRANE	VCWF	5	200	130	100	0.50							A	
325	P1	P1-09			TRANE	VCWF	6	300	195	120	0.40							A	
326	P1	P1-10			TRANE	VCWF	8	350	230	140	0.70			CV-P1				B	
327	P1	P1-11			TRANE	VCWF	12	900	585	360	1.50			CV-P2				B	
328	P1	P1-12			TRANE	VCWF	4	100	100	100	0.10							A	
329	P1	P1-13			TRANE	VCWF	4	100	100	100	0.10							A	
330	P1	P1-14			TRANE	VCWF	4	100	100	100	0.10							A	
331	P1	P1-15			TRANE	VCWF	4	100	100	100	0.10							A	
332	P1	P1-16			TRANE	VCWF	12	900	585	360	1.50							A	
333	P1	P1-17			TRANE	VCWF	12	1,150	750	460	2.00							A	
334	P1	P1-18			TRANE	VCWF	4	100	100	100	0.10							A	
335	P1	P1-19			TRANE	VCWF	5	200	130	100	0.50							A	
336	P1	P1-20			NOT USED						-							A	
337	P1	P1-21			TRANE	VCWF	6	300	195	120	0.40							A	
338	P1	P1-22			TRANE	VCWF	10	600	390	240	1.00							A	
339	P1	P1-23			TRANE	VCWF	6	300	195	120	0.40							A	
340	P1	P1-24			TRANE	VCWF	4	100	100	100	0.10							A	
341	P1	P1-25			TRANE	VCWF	4	100	100	100	0.10							A	
342	P1	P1-26			TRANE	VCWF	4	100	100	100	0.10							A	
343	P1	P1-27			TRANE	VCWF	4	100	100	100	0.10			E-CV-P5				B	
344	P1	P1-28			TRANE	VCWF	12	900	585	360	1.50			CV-P4				B	
345	P1	P1-29			TRANE	VCWF	24/16	3,000	1,950	1200	3.10							A	
346	P1	P1-30			TRANE	VCWF	14	1,500	975	600	2.40							A	
347	P1	P1-31			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
348	P1	P1-32			TRANE	VCWF	12	1,000	650	400	1.70							A	
349	P1	P1-33			TRANE	VCWF	14	1,500	975	600	2.40							A	
350	P1	P1-34			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
351	P1	P1-35			TRANE	VCWF	4	100	100	100	0.10							A	
352	P2	P2-01			TRANE	VCWF	14	1,450	945	580	2.50			CV-P8				B	
353	P2	P2-02			TRANE	VCWF	8	500	325	200	1.10			CV-P6				B	
354	P2	P2-03			TRANE	VCWF	4	125	100	100	0.20			CV-P9				B	
355	P2	P2-04			TRANE	VCWF	8	350	230	140	0.70							A	
356	P2	P2-05			TRANE	VCWF	6	300	195	120	0.40							A	
357	P2	P2-06			TRANE	VCWF	8	350	230	140	0.40							A	
358	P2	P2-07			TRANE	VCWF	14	1,200	780	480	1.80							A	
359	P2	P2-08			TRANE	VCWF	6	300	195	120	0.40							A	
360	P2	P2-09			TRANE	VCWF	10	800	520	320	1.20							A	
361	P2	P2-10			TRANE	VCWF	14	1,260	820	505	2.10							A	
362	P2	P2-11			TRANE	VCWF	14	1,400	910	560	2.20							A	
363	P2	P2-12			TRANE	VCWF	6	300	195	120	0.40							A	
364	P2	P2-13			TRANE	VCWF	14	1,200	780	480	1.90							A	

*1 - USE TAMPERPROOF SPACE TEMPERATURE SENSOR.
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CONTRACT WITH: MSD Washington Township
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SHEET
NCHS-487
JOB NUMBER:
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IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
365	P2	P2-14			TRANE	VCWF	10	800	520	320	1.20							A	
366	P2	P2-15			TRANE	VCWF	10	800	520	320	1.20							A	
367	P2	P2-16			TRANE	VCWF	14	1,260	820	505	2.10	IDF H206						A	
368	P2	P2-17			TRANE	VCWF	10	800	520	320	1.20							A	
369	P2	P2-18			TRANE	VCWF	10	800	520	320	1.20							A	
370	P2	P2-19			TRANE	VCWF	14	1,260	820	505	2.10							A	
371	P2	P2-20			TRANE	VCWF	10	620	405	250	0.90							A	
372	P2	P2-21			TRANE	VCWF	10	800	520	320	1.20							A	
373	P2	P2-22			TRANE	VCWF	10	800	520	320	1.20							A	
374	P2	P2-23			TRANE	VCWF	14	1,260	820	505	2.10							A	
375	P2	P2-24			TRANE	VCWF	14	1,200	780	480	1.90							A	
376	P2	P2-25			TRANE	VCWF	5	200	130	100	0.50			CV-P7				B	
377	Q1	Q1-01			TRANE	VCWF	14	1,500	975	600	2.50							A	
378	Q1	Q1-02			TRANE	VCWF	14	1,400	910	560	2.30							A	
379	Q1	Q1-03			TRANE	VCWF	14	1,500	975	600	2.50							A	
380	Q1	Q1-04			TRANE	VCWF	14	1,500	975	600	2.40							A	
381	Q1	Q1-05			TRANE	VCWF	14	1,400	910	560	2.30							A	
382	Q1	Q1-06			TRANE	VCWF	6	180	115	100	0.50	SCI PREP N123	SS-Q1					A	
383	Q1	Q1-07			TRANE	VCWF	6	300	195	120	0.50							A	
384	Q1	Q1-08			TRANE	VCWF	14	1,500	975	600	2.50	ELEC N125B						A	
385	Q1	Q1-09			TRANE	VCWF	14	1,400	910	560	2.30							A	
386	Q1	Q1-10			TRANE	VCWF	16	2,000	1,300	800	3.00				CH-Q1			C	
387	Q1	Q1-11			TRANE	VCWF	8	500	325	200	1.10				CH-Q2			C	
388	Q1	Q1-12			TRANE	VCWF	8	550	360	220	N/A			E-CV-Q1				B	
389	Q1	Q1-13			TRANE	VCWF	14	1,400	910	560	2.20							A	
390	Q1	Q1-14			TRANE	VCWF	14	1,400	910	560	2.20							A	
391	Q1	Q1-15			TRANE	VCWF	6	300	195	120	0.40							A	
392	Q2	Q2-01			TRANE	VCWF	14	1,500	975	600	2.40							A	
393	Q2	Q2-02			TRANE	VCWF	6	300	195	120	0.50							A	
394	Q2	Q2-03			TRANE	VCWF	16	1,600	1,040	640	2.50							A	
395	Q2	Q2-04			TRANE	VCWF	14	1,500	975	600	2.40							A	
396	Q2	Q2-05			TRANE	VCWF	6	300	195	120	0.50							A	
397	Q2	Q2-06			TRANE	VCWF	14	1,500	975	600	2.40							A	
398	Q2	Q2-07			TRANE	VCWF	16	1,800	1,170	720	2.90							A	
399	Q2	Q2-08			TRANE	VCWF	14	1,500	975	600	2.40							A	
400	Q2	Q2-09			TRANE	VCWF	16	1,600	1,040	640	2.30							A	
401	Q2	Q2-10			TRANE	VCWF	14	1,500	975	600	2.40			CV-Q2				B	
402	Q2	Q2-11			TRANE	VCWF	14	1,500	975	600	2.40							A	
403	Q2	Q2-12			TRANE	VCWF	14	1,500	975	600	2.40							A	
404	Q2	Q2-13			TRANE	VCWF	10	700	455	280	2.40	ELEC N232						A	
405	Q2	Q2-14			TRANE	VCWF	14	1,500	975	600	2.40	IDF N234						A	
406	Q2	Q2-15			TRANE	VCWF	6	300	195	120	0.40							A	
407	Q2	Q2-16			TRANE	VCWF	6	300	195	120	0.40	ELEC N228C						A	
408	Q2	Q2-17			TRANE	VCWF	8	400	260	160	0.60							A	
409	R1	R1-01			TRANE	VCWF	14	1,500	975	600	2.40							A	
410	R1	R1-02			TRANE	VCWF	6	300	195	120	0.40	IDF A160						A	
411	R1	R1-03			TRANE	VCWF	6	300	195	120	0.50			E-CV-R1				B	
412	R1	R1-04			TRANE	VCWF	14	1400	910	560	1.40							A	
413	R1	R1-05			TRANE	VCWF	14	1,500	975	600	2.40							A	
414	R1	R1-06			NOT USED						-							A	
415	R1	R1-07	CORR N000	CORR A & N	TRANE	VCWF	14	1,500	975	600	2.40			E-CV-R2				B	
416	R1	R1-08			TRANE	VCWF	14	1400	910	560	1.50	IDF N110	SS-R1	E-CV-R3				B	

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*4 - CHILLED WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*5 - HOT WATER LOOP TEMP SENSOR, INSTALL IN RETURN WATER PIPING.
*6 - USE ADJUSTABLE SPACE TEMPERATURE SENSOR.
*7 - INSTALLED UNDER PREVIOUS PHASE, NO WORK UNDER THIS PHASE.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-488
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
417	R1	R1-09			TRANE	VCWF	16	2,200	1,430	880	3.30	IDF B143A		E-CV-R4				B	
418	R1	R1-10			TRANE	VCWF	14	1,500	975	600	2.50				CH-R2			C	
419	R1	R1-11			TRANE	VCWF	12	1,000	650	400	1.60							A	
420	R1	R1-12			TRANE	VCWF	14	1,400	910	560	2.30				E-CH-R1			C	
421	R1	R1-13			TRANE	VCWF	14	1,500	975	600	2.40				CH-R3			C	
422	R1	R1-14			TRANE	VCWF	6	300	195	120	0.50							A	
423	R2	R2-01			TRANE	VCWF	14	1,400	910	560	2.20							A	
424	R2	R2-02			TRANE	VCWF	12	1,000	650	400	1.70							A	
425	R2	R2-03			TRANE	VCWF	8	350	230	140	0.70							A	
426	R2	R2-04			TRANE	VCWF	14	1,200	780	480	1.90			E-CV-R6				B	
427	R2	R2-05			TRANE	VCWF	8	500	325	200	0.70							A	
428	R2	R2-06			TRANE	VCWF	12	1,000	650	400	1.80							A	
429	R2	R2-07			TRANE	VCWF	12	1,000	650	400	1.70							A	
430	R2	R2-08			TRANE	VCWF	16	2,000	1,300	800	3.00			E-CV-R7				B	
431	R2	R2-09			TRANE	VCWF	12	1,000	650	400	1.70			E-CV-R5				B	
432	R2	R2-10			TRANE	VCWF	12	1,000	650	400	1.50							A	
433	R2	R2-11			TRANE	VCWF	16	1,600	1,040	640	2.30							A	
434	R2	R2-12			TRANE	VCWF	12	1,000	650	400	1.50							A	
435	R2	R2-13			TRANE	VCWF	16	1,800	1,170	720	2.70							A	
436	S1	S1-01			TRANE	VCWF	10	620	405	250	0.90	ELEC L122		E-CV-L2				B	
437	S1	S1-02			TRANE	VCWF	10	800	520	320	1.20							A	
438	S1	S1-03			TRANE	VCWF	10	800	520	320	1.20							A	
439	S1	S1-04			TRANE	VCWF	8	350	230	140	0.70							A	
440	S1	S1-05			TRANE	VCWF	16	1,800	1,170	720	2.80			E-CV-S1				B	
441	S1	S1-06			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
442	S1	S1-07			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
443	S1	S1-08			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
444	S1	S1-09			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
445	S1	S1-10			TRANE	VCWF	16	2,000	1,300	800	3.00							A	
446	S1	S1-11			TRANE	VCWF	14	1,485	965	595	2.50							A	
447	S1	S1-12			TRANE	VCWF	16	1,815	1,180	725	2.80							A	
448	S1	S1-13			TRANE	VCWF	16	1,650	1,075	660	2.50							A	
449	S1	S1-14			TRANE	VCWF	14	1,200	780	480	1.90							A	
450	S1	S1-15			TRANE	VCWF	12	880	570	350	1.50							A	
451	S1	S1-16			TRANE	VCWF	5	185	120	100	0.50			E-CV-S3				B	
452	S1	S1-17			TRANE	VCWF	16	1800	1,170	720	2.60			E-CV-S2				B	
453	S1	S1-18			TRANE	VCWF	5	250	165	100	0.80	ELEC G116D & STOR F106	SS-L1 (STOR F106)	E-CV-L1				B	2 ST Monitoring
454	S1	S1-19			TRANE	VCWF	6	300	195	120	0.40							A	
455	T1	E-T1-01			--	--	8	400	260	160	0.90							A	
456	T1	E-T1-02			--	--	12	900	585	360	1.50							A	
457	T1	E-T1-03			--	--	14	1,300	845	520	2.10							A	
458	T1	E-T1-04			--	--	4	125	80	50	0.20							A	
459	T1	E-T1-05			--	--	14	1500	975	600	2.40							A	
460	T1	E-T1-06			--	--	14	1500	975	600	2.40							A	
461	T1	E-T1-07			--	--	5	200	130	80	0.50							A	
462	T1	T1-08			TRANE	VCWF	10	550	360	220	0.80							A	
463	T1	T1-09			TRANE	VCWF	10	550	360	220	0.80							A	
464	T1	T1-10			TRANE	VCWF	12	1,100	715	440	1.90							A	
465	T1	T1-11			TRANE	VCWF	12	1,150	750	460	2.00							A	
466	T1	T1-12			TRANE	VCWF	12	1,150	750	460	2.00							A	
467	T1	T1-13			TRANE	VCWF	12	1,000	650	400	1.70							A	
468	T1	T1-14			TRANE	VCWF	14	1,400	910	560	2.20							A	

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*7 - INSTALLED UNDER PREVIOUS PHASE, NO WORK UNDER THIS PHASE.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-489
JOB NUMBER:
J-2304001

IDENTITY DATA												ALTERNATE CONTROLS						Control Detail	NOTES
ITEM	AHU	MARK	ROOM	SERVICE	MANUF.	MODEL	NEW INLET DIA	NEW COOLING MAX AIRFLOW (CFM)	NEW HEATING MAX AIRFLOW (CFM)	NEW OCC MIN AIRFLOW (CFM)	NEW FLOW (GPM)	IDF / MDF / Elec Rm Temp Monitoring	IDF Associated Split A/C (no BAS ctrls)	Hydronic Convector	CUH / UH Control	Exhaust Fan	Loop Temp		
469	AA1	AA1-01			TRANE	VCWF	14	1400	910	560	0.90							A	
470	AA1	AA1-02			TRANE	VCWF	8	450	295	180	1.80							A	
471	AA1	AA1-03			TRANE	VCWF	10	600	390	240	1.10			CV-AA3				B	
472	AA1	AA1-04			TRANE	VCWF	8	400	260	160	0.80			CV-AA4				B	
473	AA1	AA1-05			TRANE	VCWF	8	450	295	180	3.00			CV-AA2				B	
474	AA1	AA1-06			TRANE	VCWF	14	1200	780	480	1.10							A	
475	AA1	AA1-07			TRANE	VCWF	8	500	325	200	1.10			CV-AA1				B	
476	AA1	AA1-08			TRANE	VCWF	5	200	130	100	2.20							A	
477	AA1	AA1-09			TRANE	VCWF	16	2250	1465	900	0.80							A	
478	AA1	AA1-10			TRANE	VCWF	16	2250	1465	900	0.90							A	
479	AA1	AA1-11			TRANE	VCWF	4	100	100	100	1.00							A	
480	AA1	AA1-12			TRANE	VCWF	4	100	100	100	4.00							A	
481	AA1	AA1-13			TRANE	VCWF	4	100	100	100	4.00							A	
482	AA1	AA1-14			TRANE	VCWF	4	100	100	100	0.10							A	
483	AA1	AA1-15			TRANE	VCWF	5	200	130	80	0.10							A	
484	AA1	AA1-16			TRANE	VCWF	8	500	325	200	0.10							A	
485	AA1	AA1-17			TRANE	VCWF	14	1300	845	520	0.10							A	
486	AA1	AA1-18			TRANE	VCWF	16	2,250	1465	900	2.10							A	
487	AA1	AA1-19			TRANE	VCWF	16	2250	1465	900	0.50							A	
488	AA1	AA1-20			TRANE	VCWF	14	1500	975	600	1.10							A	
489	AA1	AA1-21	G101E	Band	TRANE	VCWF	4	100	100	100	4.00							A	
490	AA1	AA1-22	G101E	Practice	TRANE	VCWF	4	100	100	100	4.00							A	
491	AA1	AA1-23			TRANE	VCWF	4	100	100	100	2.40							A	
492	AA1	AA1-24			TRANE	VCWF	4	100	100	100	0.10							A	
493	AA1	AA1-25			TRANE	VCWF	14	1200	780	480	0.10							A	
494	AA1	AA1-26			TRANE	VCWF	10	750	490	300	0.10							A	
495	AA1	AA1-27			TRANE	VCWF	8	500	325	200	0.10							A	
496	AA1	AA1-28			TRANE	VCWF	16	2,000	1300	800	1.80				CH-AA1			C	
497	AA1	AA1-29			TRANE	VCWF	8	500	325	200	1.10							A	
498	NAT	108	108		ETR	ETR					8.10						Y	D	1, 2, 3
499	NAT	138	138		ETR	ETR					12.20					EF 3-1		E	1
500	NAT	101A	101A		PRICE	ETR					12.20							E	1
501	NAT	112	112		PRICE	ETR					3.30							E	1
502	NAT	116	116		PRICE	ETR					12.20							E	1
503	NAT	117	117		PRICE	ETR					?							E	1
504	NAT	122	122		PRICE	ETR					5.40							E	1
505	NAT	127	127		PRICE	ETR					12.20							E	1
506	NAT	132	132		PRICE	ETR					12.20							E	1
507	NAT	133	133		PRICE	ETR					12.20							E	1
508	NAT	101B	101B		PRICE	ETR					12.20						Y	F	1, 4, 5
509	NAT	102	102		PRICE	ETR					2.70							G	6
510	NAT	103	103		PRICE	ETR					1.20							G	6
511	NAT	104	104		PRICE	ETR					1.20							G	6
512	NAT	105	105		PRICE	ETR					2.70							G	6
513	NAT	106	106		PRICE	ETR					2.70							G	6
514	NAT	113	113		PRICE	ETR					1.20							G	6
515	NAT	114	114		PRICE	ETR					12.20							G	6
516	NAT	135	135		PRICE	ETR					1.20							G	6

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PHASE 3 VAV SCHEDULE (10 OF 10)

Delta Controls
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UPDATES	
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-490
JOB NUMBER:
J-2304001

VAV BOX WITH REHEAT SEQUENCE OF OPERATION (NEW VAVs ADDED UNDER PHASE 3)

DISCHARGE AIR TEMPERATURE SENSOR: TCC SHALL PROVIDE A SUPPLY AIR TEMPERATURE SENSOR (DA-T) FOR MONITORING PURPOSES AND TO LIMIT THE DISCHARGE AT 95F (ADJ).

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-CFM) AND THE REHEAT VALVE (HTG-VLV) SHALL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT OF 72F (ADJ) PLUS THE DEAD BAND, THE PRIMARY AIR DAMPER SHALL INCREASE THE CFM AND THE REHEAT VALVE SHALL REMAIN FULLY CLOSED. ON A DROP IN TEMPERATURE BELOW THE HEATING SETPOINT OF 70F (ADJ), THE REHEAT VALVE SHALL MODULATE OPEN AFTER LOOP SIGNAL INCREASE AND THE PRIMARY AIR DAMPER SHALL MAINTAIN MINIMUM CFM UP TO THE HEATING MAX AIRFLOW. REFERENCE DIAGRAM AND SETPOINT MATRIX FOR FURTHER DETAILS.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN IN THE UNOCCUPIED MODE, THE VAV BOX SEQUENCE SHALL BE THE SAME AS THE ABOVE OCCUPIED SEQUENCE. UNOCCUPIED HEATING SETPOINT SHALL BE 65F (ADJ) AND THE COOLING SETPOINT SHALL BE 82F (ADJ). WHEN ANY TWO VAV BOXES REACH EITHER THEIR HEATING OR COOLING SETPOINT, THE AIR HANDLING UNIT SHALL START AND RUN TO MAINTAIN THE UNOCCUPIED SETPOINT. PROVIDE DIFFERENTIAL TO PREVENT SHORT CYCLING OF AHU.

VAV BOX WITH REHEAT SEQUENCE OF OPERATION (TYPICAL FOR 19 NATATORIUM VAV BOXES AS SHOWN IN PREVIOUS BAS AS-BUILT DRAWINGS)

DISCHARGE AIR TEMPERATURE SENSOR: TCC SHALL PROVIDE A SUPPLY AIR TEMPERATURE SENSOR (DA-T) FOR MONITORING PURPOSES AND TO LIMIT THE DISCHARGE AT 95F (ADJ).

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-CFM) AND THE REHEAT VALVE (HTG-VLV) SHALL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT OF 72F (ADJ) PLUS THE DEAD BAND, THE PRIMARY AIR DAMPER SHALL INCREASE THE CFM AND THE REHEAT VALVE SHALL REMAIN FULLY CLOSED. ON A DROP IN TEMPERATURE BELOW THE HEATING SETPOINT OF 70F (ADJ), THE REHEAT VALVE SHALL MODULATE OPEN AFTER LOOP SIGNAL INCREASE AND THE PRIMARY AIR DAMPER SHALL MAINTAIN MINIMUM CFM UP TO THE HEATING MAX AIRFLOW. REFERENCE DIAGRAM AND SETPOINT MATRIX FOR FURTHER DETAILS.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN IN THE UNOCCUPIED MODE, THE VAV BOX SEQUENCE SHALL BE THE SAME AS THE ABOVE OCCUPIED SEQUENCE. UNOCCUPIED HEATING SETPOINT SHALL BE 65F (ADJ) AND THE COOLING SETPOINT SHALL BE 82F (ADJ). WHEN ANY TWO VAV BOXES REACH EITHER THEIR HEATING OR COOLING SETPOINT, THE AIR HANDLING UNIT SHALL START AND RUN TO MAINTAIN THE UNOCCUPIED SETPOINT. PROVIDE DIFFERENTIAL TO PREVENT SHORT CYCLING OF AHU.

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO THE OWNER-DEFINED SCHEDULE. IF THE EXHAUST FAN STATUS (EF-S) DOES NOT MATCH THE COMMANDED VALUE AFTER 180 SECONDS (ADJ), AN ALARM SHALL BE GENERATED. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

CONVECTOR HEATING:

WHEN OUTSIDE AIR TEMPERATURE IS ABOVE 50 F (ADJ), THE HOT WATER VALVE SHALL REMAIN CLOSED. BELOW 45 F (ADJ) OUTSIDE AIR TEMPERATURE, THE RADIANT HEATING VALVES SHALL CYCLE OPEN AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT SETPOINT OF 68F (ADJ).

CABINET UNIT HEATER:

ZONE TEMPERATURE CONTROL: THE THERMOSTAT (ZN-T) WILL OPEN THE 2-POSITION HEATING VALVE (HTG-VLV) AND ENABLE THE CABINET HEATER FAN TO MAINTAIN THE ZONE TEMPERATURE AT 70F (ADJ). THE BUILDING AUTOMATION SYSTEM SHALL DISABLE (BAS-OVR) HEATER OPERATION WHEN THE OUTDOOR AIR TEMPERATURE (OA-T) IS ABOVE 65F (ADJ).

IDF/MDF AND ELECTRICAL HVAC SPLIT SYSTEM MONITORING:

INSTALL AND WIRE BAS FLAT PLATE SPACE TEMPERATURE SENSORS FOR MONITOR OF IDF/MDF SPACES AND ALARM CONDITIONS. ALL STAND-ALONE HVAC SYSTEMS WILL HAVE BAS SPACE TEMPERATURE MONITORING IN ADDITION TO THE CONTROLS FROM THE MANUFACTURER. AN ALARM WILL BE GENERATED IF THE SPACE RISES ABOVE 81F (ADJ) OR DROPS BELOW 59F (ADJ). THESE SPACES ALSO REQUIRE A SEPARATE THERMOSTAT FOR LOCAL EQUIPMENT CONTROL.

MONITORING AND CONTROL POINTS FROM PREVIOUS BAS:

INCLUDES POINTS FOUND IN VAV INSTALLATION DETAILS D THROUGH G AND INCLUDES:
- OCCUPANCY SENSOR
- HOT AND CHILL WATER LOOP TEMPERATURE MONITORING
- EXHAUST FAN 3-1

DETAILS REGARDING CONTROL, MONITORING, OR ALARMING WERE NOT PROVIDED IN PREVIOUS BAS AS-BUILT DRAWINGS. DETERMINE CURRENT CONTROL STRATEGIES FROM THE EXISTING BAS PRIOR TO CHANGEOVER AND DUPLICATE THOSE STRATEGIES IN THE NEW BAS.

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

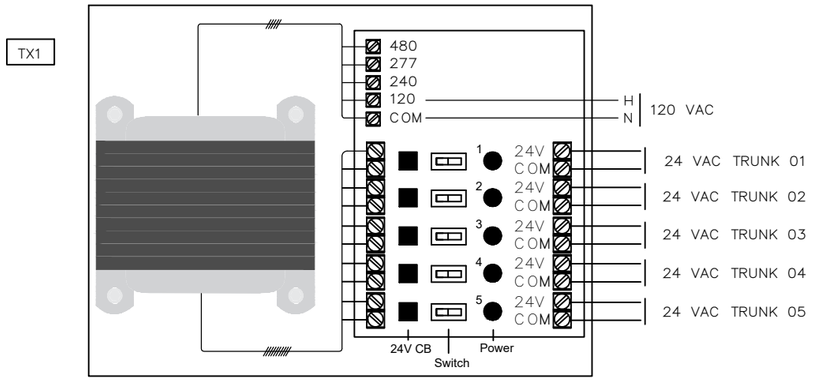
CONTRACT NO:

SHEET
NCHS-491
JOB NUMBER:
J-2304001

VAV POWER DISTRIBUTION DETAILS

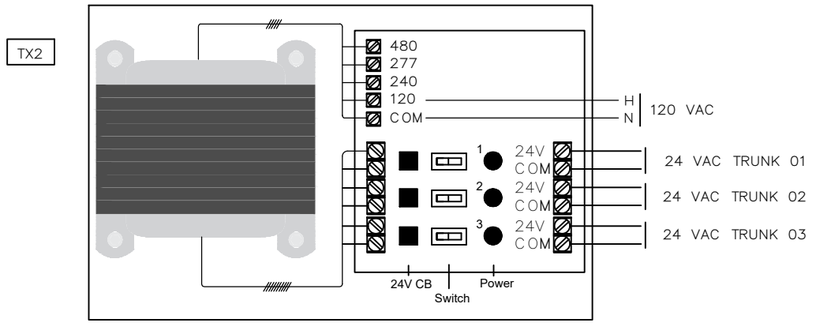
REMOTE 500 vA TRANSFORMER PANEL

(SEE VAV POWER PANEL SCHEDULE FOR LOCATIONS & QUANTITIES)
(LOCATE POWER PANELS ADJACENT TO THE SYSTEM CONTROL PANELS ON THE SCHEDULE)



REMOTE 300 vA TRANSFORMER PANEL

(SEE VAV POWER PANEL SCHEDULE FOR LOCATIONS & QUANTITIES)
(LOCATE POWER PANELS ADJACENT TO THE SYSTEM CONTROL PANELS ON THE SCHEDULE)



24 VAC Power Cable Sizing - Maximum allowable voltage drop

1. Supply voltage deviation should not exceed 2 VAC at any given terminal controller.
2. Table indicates the maximum one-way distance for power wiring based on load and wire size.
   a. These values will limit the voltage drop as indicated above.
3. To calculate the required wire size and maximum length:
   a. Determine power requirements for the controller and all connected devices including but not limited to:
      i. The controller itself with all onboard devices.
      ii. LINKNet controllers and devices
      iii. eZNS T-100 room sensors powered from the controller
      iv. Valve and damper actuators.
      v. Powered sensors.
      vi. Control relays.
4. Data for 18 AWG and greater wire in the accompanying table are from Chapter 9, Table 8 of the 2005 NEC. Resistance values based on a temperature of 75°C.
5. Data in the following table is based on the formula:
   a. Wire length (ft) = (Voltage Drop / (ohms per kFt * load in amps) * 1000) /2

Typical Power Calculations:

eZV-440	11 VA
eZFC-424R4-24	15 VA
DVC-V322A-B	15 VA
DNS-24L/LB/H24LB	1.5 VA
DNS-C24/CH24	3 VA
eZNS-T100 (ST)	2 VA (no backlight)
eZNS-T100 (ST)	4 VA (with backlight)
eZNS-T100 (ST/CO2)	6 VA (with backlight)
CQB24-SR	1 VA
LF24-SR	5 VA
TFB24-S	5 VA

		AWG (ohms / kFt)						
		22 Ga	20 Ga	18 Ga	16 Ga	14 Ga	12 Ga	10 Ga
		16.46	10.35	7.95	4.99	3.14	1.98	1.24
A	VA	Max One-Way Distance to Load (ft)						
0.11	2.5	552	878	1144	1822	2895	4591	7331
0.21	5	289	460	599	954	1517	2405	3840
0.42	10	145	230	302	481	764	1212	1935
0.83	20	73	116	151	240	382	606	968
1.25	30	49	77	101	160	255	404	645
1.67	40	36	58	75	120	191	303	484
2.08	50	29	46	60	96	153	242	387
2.5	60	24	39	50	80	127	202	323
2.92	70	21	33	43	69	109	173	276
3.33	80	18	29	38	60	96	152	242
3.75	90	16	26	34	53	85	135	215
4	96	15	24	31	50	80	126	202

VAV POWER PANEL SCHEDULE

IDENTITY DATA			PANEL 1 MODEL	PANEL 2 MODEL	NOTES
ITEM	SERVICE	INSTALL ADJACENT TO:			
1	AHU-B1 VAVs	System Panel 28	PSH-500	--	1
2	AHU-C1VAVs	System Panel 16	PSH-300	--	1
3	AHU-C4 VAVs	System Panel 29	PSH-500	--	1
4	AHU-D1 VAVs	System Panel 30	PSH-500	PSH-300	1, 3
5	AHU-D2 VAVs	System Panel 31	PSH-500	--	1
6	AHU-E1 VAVs	System Panel 32	PSH-300	--	1
7	AHU-E2 VAVs	System Panel 33	PSH-500	--	1
8	AHU-E3 VAVs	System Panel 34	PSH-300	--	1
9	AHU-F1 VFDs	System Panel 35	PSH-500	--	1
10	AHU-G4 VFDs	System Panel 06	PSH-300	--	1, 2
11	AHU-H1 VFDs	System Panel 36	PSH-500	--	1
12	AHU-H2 VFDs	System Panel 37	PSH-300	--	1
13	AHU-J1 VFDs	System Panel 20	PSH-500	--	1
14	AHU-J2 VFDs	System Panel 21	PSH-300	--	1
15	AHU-J3 VFDs	System Panel 22	PSH-500	--	1
16	AHU-M1 VFDs	System Panel 24	PSH-300	--	1
18	AHU-N1 VFDs	System Panel 43	PSH-300	--	1
19	AHU-N2 VFDs	System Panel 44	PSH-500	--	1
20	AHU-P1 VFDs	System Panel 45	PSH-500	PSH-300	1, 3
21	AHU-P2 VFDs	System Panel 46	PSH-500	--	1
22	AHU-Q1 VFDs	System Panel 47	PSH-300	--	1
23	AHU-Q2 VFDs	System Panel 48	PSH-500	--	1
24	AHU-R1 VFDs	System Panel 49	PSH-300	--	1
25	AHU-R2 VFDs	System Panel 50	PSH-300	--	1
26	AHU-S1 VFDs	System Panel 51	PSH-500	--	1
27	AHU-T1 VFDs	System Panel 52	PSH-300	--	1
28	AHU-AA1 VFDs	System Panel 26	PSH-500	PSH-300	1, 3
29	NAT-AHU-3 VFDs	System Panel 55	PSH-500	--	1

*1 - SEE VAV POWER DISTRIBUTION PANEL WIRING SHEET FOR DETAILS ON HOW TO DIVIDE LOADS.
*2 - SYSTEM PANEL INSTALLED ON PREVIOUS PHASE.
*3 - TWO VAV POWER PANELS USED FOR THIS SYSTEM.

BILL OF MATERIALS

24 VAC Power Trunks:
1. Typically utilizes #14 Gauge or heaver cable.
2. Typically, each leg is intended to support four (4) to five (5) VAV box controllers maximum.
3. See table for cable requirements for long runs and/or high VA requirements.

VAV POWER DISTRIBUTION PANEL WIRING

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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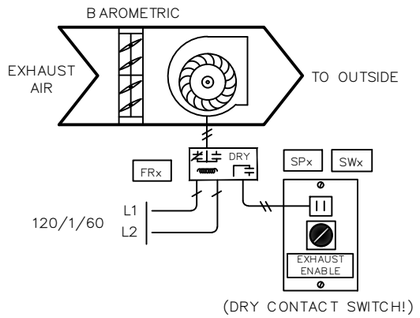
SHEET
NCHS-492
JOB NUMBER:
J-2304001

— EXHAUST FAN – TOGGLE SWITCH CTRL —
EF–C6



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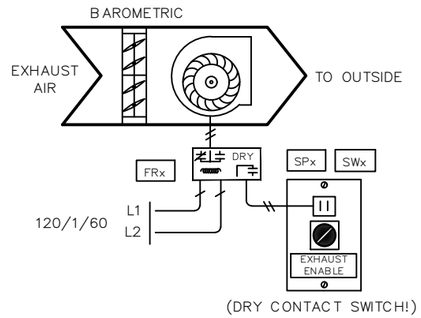
— EXHAUST FAN – TOGGLE SWITCH CTRL —
EF–E5



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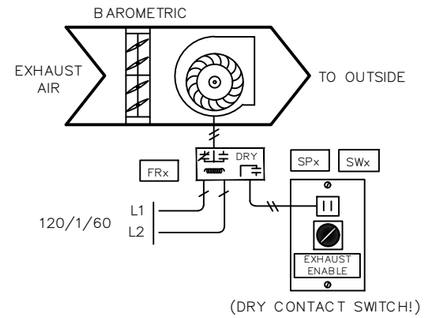

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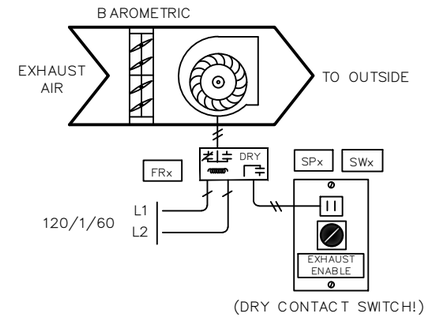

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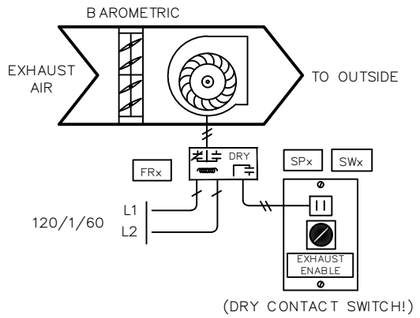
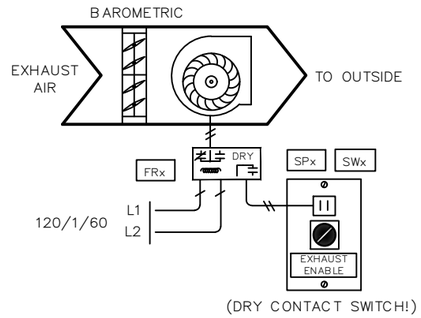
EF–N7



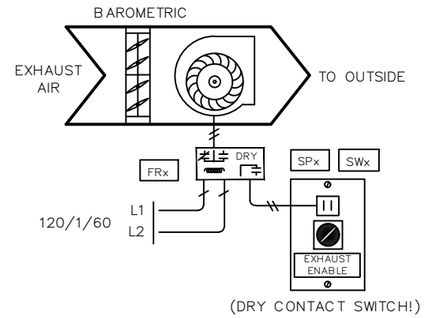
(DRY CONTACT SWITCH!)

— EXHAUST FAN – TOGGLE SWITCH CTRL —
EF–N8



(DRY CONTACT SWITCH!)

— EXHAUST FAN – TOGGLE SWITCH CTRL —
EF–P8



(DRY CONTACT SWITCH!)

BILL OF MATERIALS

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO WALL MOUNTED TOGGLE SWITCH. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

EXHAUST FANS – STANDALONE WITH TOGGLE SWITCH CONTROLS

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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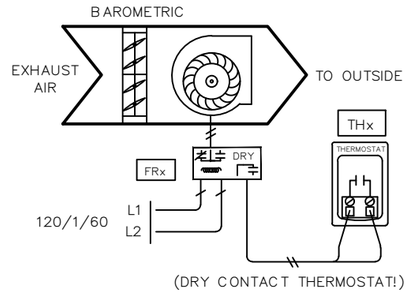
CONTRACT NO:

SHEET
NCHS–493
JOB NUMBER:
J–2304001

EXHAUST FAN – THERMOSTAT CTRL

EF–C9



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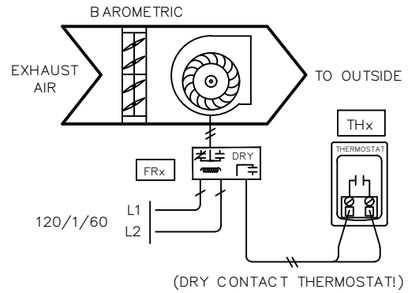
EF–E3



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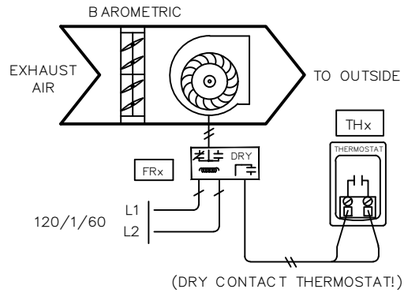

EXHAUST FAN – THERMOSTAT CTRL

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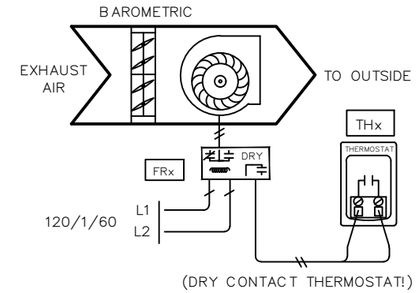

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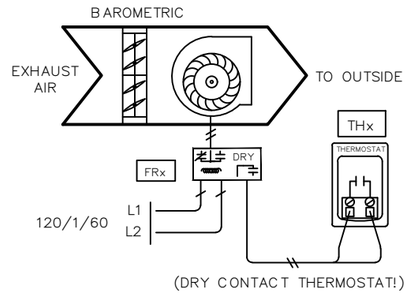
EF–F5



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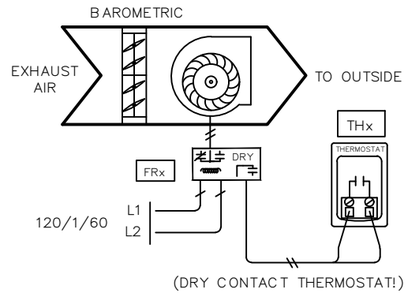
EF–F7



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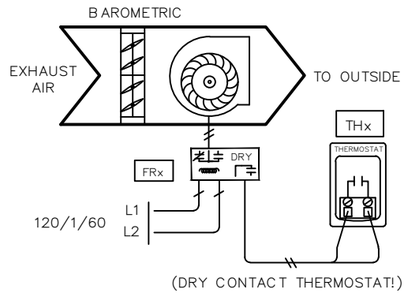
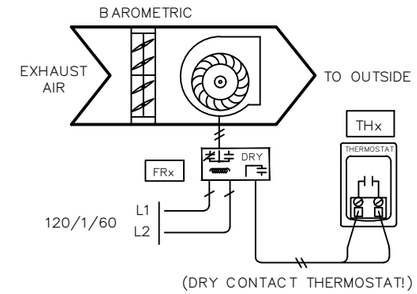
EF–G5



EXHAUST FAN – THERMOSTAT CTRL

EF–G7



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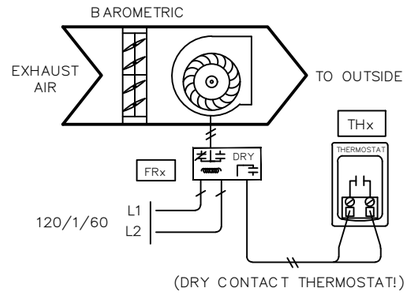
EF–H3



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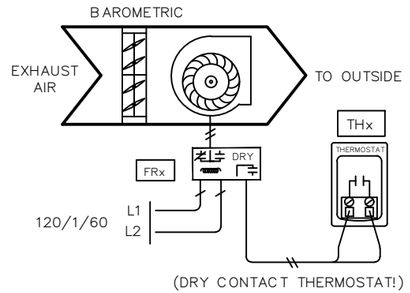

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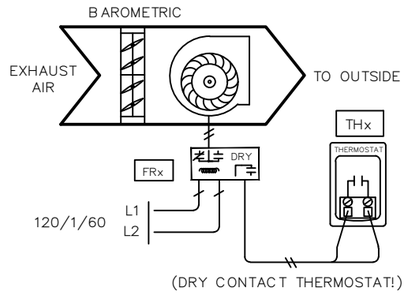
EF–K7



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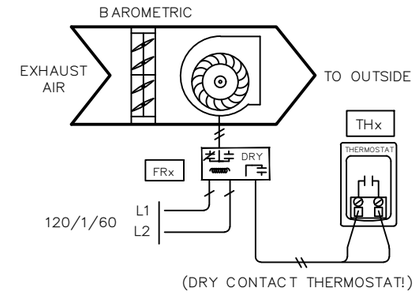

BILL OF MATERIALS

EXHAUST FAN SEQUENCE OF OPERATION:

THE EXHAUST FAN SHALL BE STARTED ACCORDING TO WALL MOUNTED THERMOSTAT. CONTRACTOR SHALL SET ADJUSTABLE THERMOSTAT TO CONTROL SPACE TEMPERATURE TO 75F. SEE ELECTRICAL DRAWINGS FOR DISCONNECT LOCATION INFORMATION.

EXHAUST FANS – STANDALONE WITH THERMOSTAT CONTROLS (1 OF 3)

Delta Controls

Temperature Control Services

4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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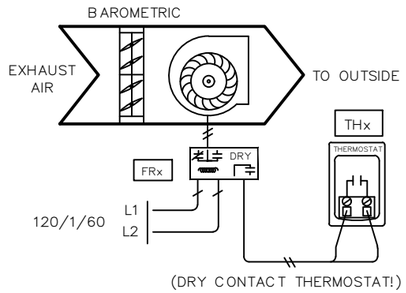
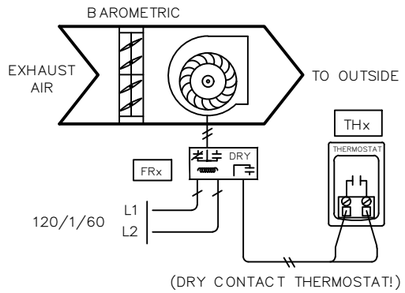
EXHAUST FAN – THERMOSTAT CTRL

EF–K9



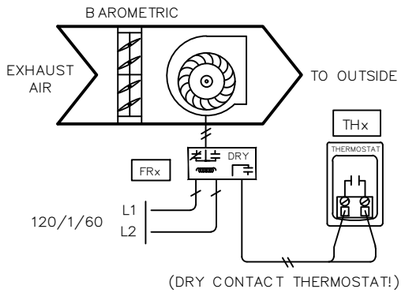
EXHAUST FAN – THERMOSTAT CTRL

EF–L3



EXHAUST FAN – THERMOSTAT CTRL

EF–M7



EXHAUST FAN – THERMOSTAT CTRL

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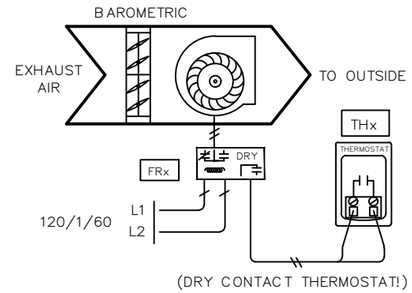
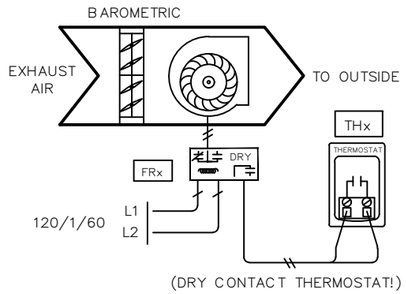


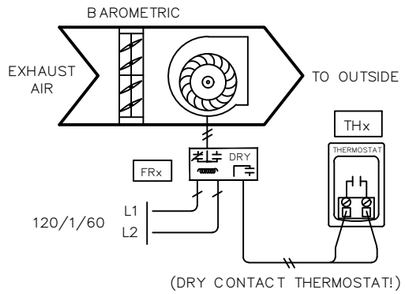
EXHAUST FAN – THERMOSTAT CTRL

EF–N5



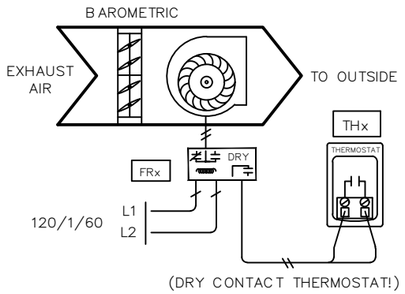
EXHAUST FAN – THERMOSTAT CTRL

EF–N9



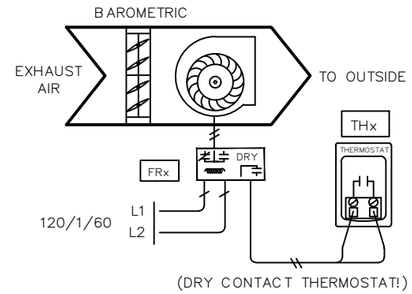
EXHAUST FAN – THERMOSTAT CTRL

EF–N11



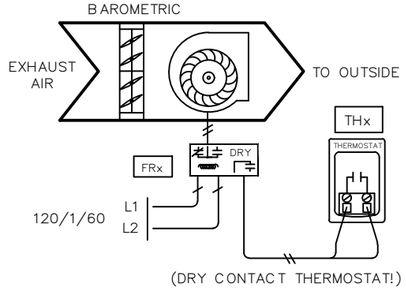
EXHAUST FAN – THERMOSTAT CTRL

EF–N13



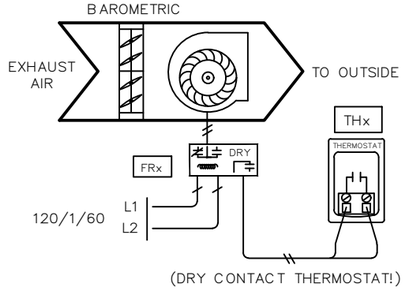
EXHAUST FAN – THERMOSTAT CTRL

EF–N15



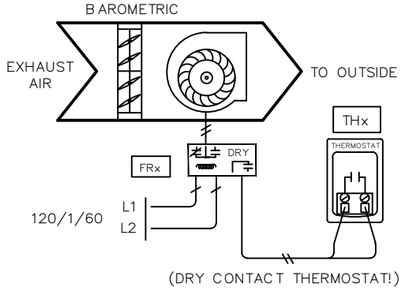
EXHAUST FAN – THERMOSTAT CTRL

EF–P7



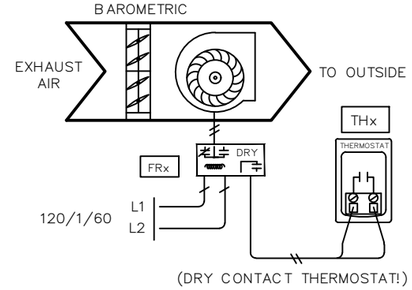
EXHAUST FAN – THERMOSTAT CTRL

EF–P8



EXHAUST FAN – THERMOSTAT CTRL

EF–Q1



BILL OF MATERIALS

EXHAUST FANS – STANDALONE WITH THERMOSTAT CONTROLS (2 OF 3)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
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REVISIONS	
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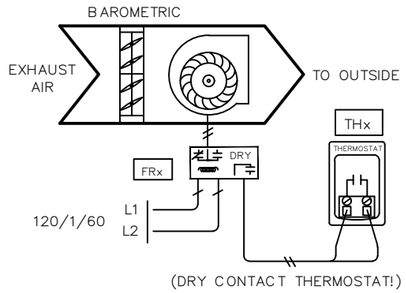
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

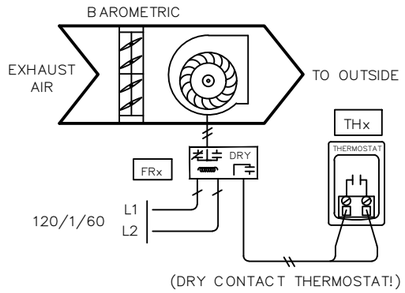
CONTRACT NO:

SHEET
NCHS–495
JOB NUMBER:
J–2304001

EXHAUST FAN – THERMOSTAT CTRL
EF–Q9



EXHAUST FAN – THERMOSTAT CTRL
EF–Q15



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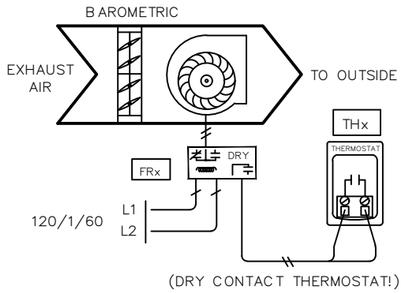
EF–Q18



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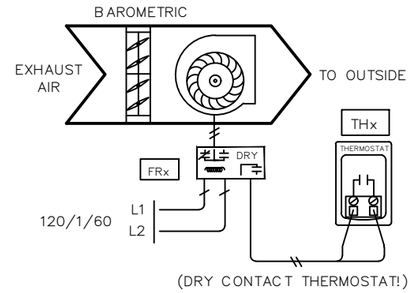
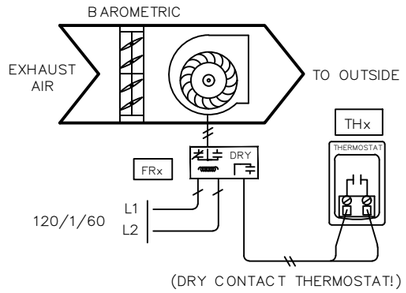


EXHAUST FAN – THERMOSTAT CTRL
EF–R1



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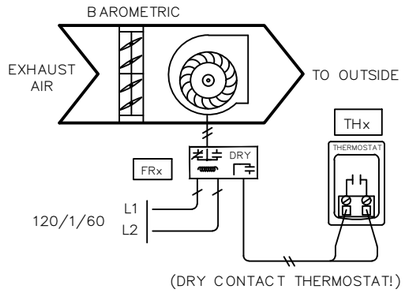
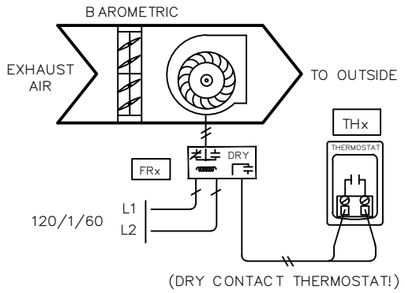
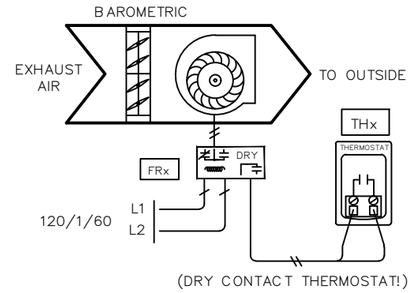


EXHAUST FAN – THERMOSTAT CTRL
EF–R11



EXHAUST FAN – THERMOSTAT CTRL
EF–S1



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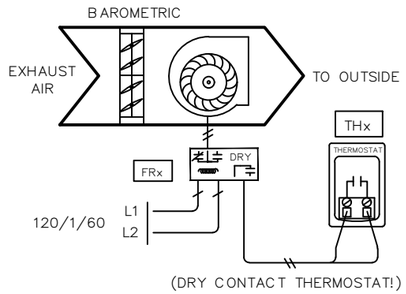
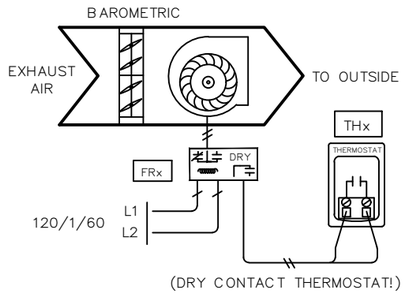
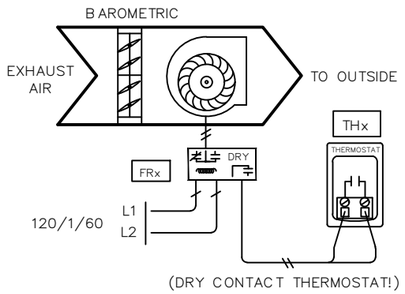
EF–S4



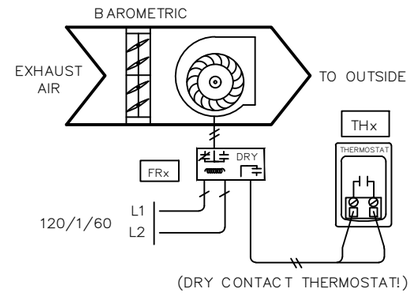
EXHAUST FAN – THERMOSTAT CTRL
EF–S5



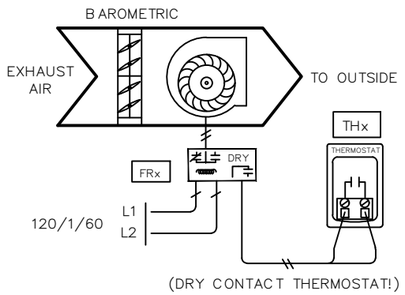
EXHAUST FAN – THERMOSTAT CTRL
EF–T1



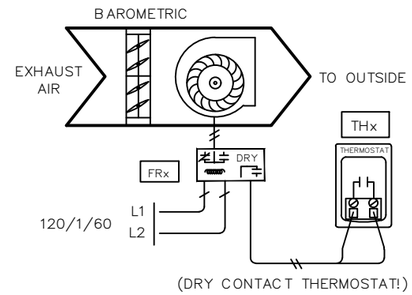
EXHAUST FAN – THERMOSTAT CTRL
EF–15



EXHAUST FAN – THERMOSTAT CTRL
EF–W1



EXHAUST FAN – THERMOSTAT CTRL
EF–AA4



BILL OF MATERIALS

EXHAUST FANS – STANDALONE WITH THERMOSTAT CONTROLS (3 OF 3)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
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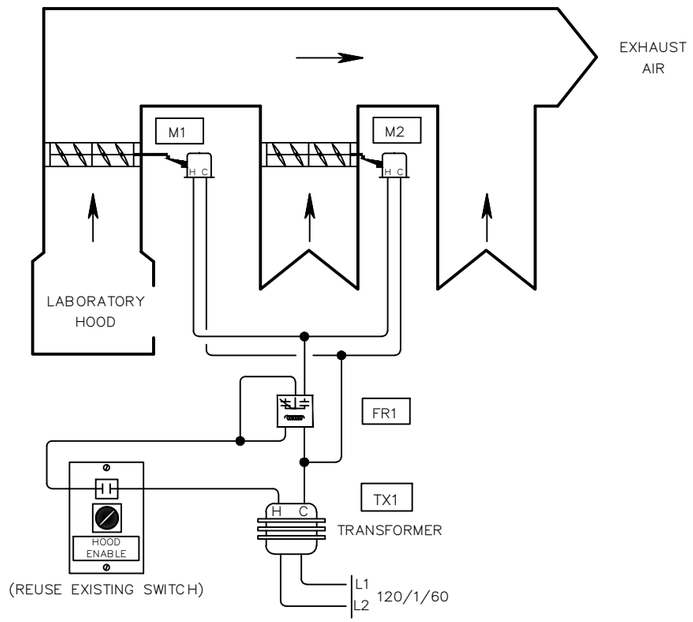
CONTRACT NO:

SHEET
NCHS–496
JOB NUMBER:
J–2304001

LAB HOOD EXHAUST INTERLOCK
(TYPICAL FOR 24 HOODS)



SCIENCE ROOM LAB HOOD SEQUENCE OF OPERATION

LAB HOOD OPERATION: THE LAB HOOD SWITCH SHALL BE CONTROLLED MANUALLY BY THE OPERATOR. WHEN THE SWITCH IS TURNED ON, THE BAS CONTROL RELAY SHALL DRIVE THE NORMALLY CLOSED HOOD AND NORMALLY OPEN ZONE DAMPER ACTUATORS. WHEN THE OPERATOR TURNS THE HOOD SWITCH OFF, BOTH DAMPERS SHALL SPRING TO NORMAL POSITION.

NOTE:
SEE EXHAUST FAN SCHEDULE TO DETERMINE WHICH EXHAUST FANS HAVE ASSOCIATED LAB HOOD DAMPER INTERLOCKS. DAMPER HOODS OPERATE LOCALLY AND INDEPENDENTLY OF BAS–CONTROLLED EXHAUST FANS.

PREVIOUS BAS DESIGN INDICATED A TOTAL OF (28) LAB HOOD INTERLOCK SYSTEMS. ONLY (24) LAB HOODS IDENTIFIED IN CURRENT (PHASE 3) MECHANICAL DESIGN. FIELD CONFIRMATION OF TOTAL NUMBER OF LAB HOODS REQUIRED.

BILL OF MATERIALS

STANDALONE LAB HOOD CONTROLS – AREAS Q & R

Delta Controls
Temperature Control Services
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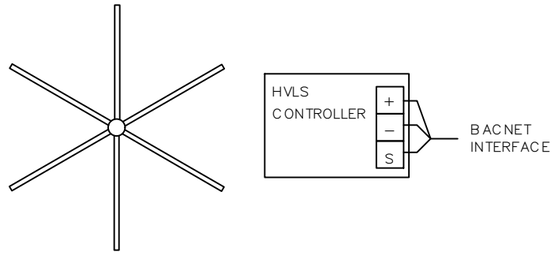
HIGH VOLUME, LOW SPEED FANS
HVLSF–X



EXHAUST FAN SCHEDULE										
IDENTITY DATA					ELECTRICAL DATA					
MARK	MANUF	SERVICES	MODEL	HP	VOLTS (V)	PH	FREQ (HZ)	UNIT CONTROL	CONTROLLED FROM	NOTES
CF-1	GREENHECK	Unit U Level 2	DC-5	0.25	120	1	60	FACTORY BACNET CTRL	Mech K225B AHU-S1 MS/TP	Standalone Ctrls, MS/TP comm to BAS
CF-2	GREENHECK	Unit U Level 2	DC-5	0.25	120	1	60	FACTORY BACNET CTRL	Mech K225B AHU-S1 MS/TP	Standalone Ctrls, MS/TP comm to BAS
CF-3	GREENHECK	Unit V Level 2	DC-5	0.25	120	1	60	FACTORY BACNET CTRL	Mech K225B AHU-S1 MS/TP	Standalone Ctrls, MS/TP comm to BAS

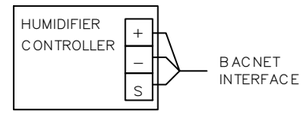
HIGH VOLUME LOW SPEED (HVLS) FANS SEQUENCE OF OPERATION

THE HVLS FANS SHALL BE FURNISHED WITH A SINGLE CONTROLLER WITH BACnet MSTP INTERFACE AND 50 FEET OF CAT-5E CONTROL CABLE FOR INTERLOCKING ALL FAN OPERATION. THE CIC CONTRACTOR SHALL INSTALL THE 50-FT OF CAT-5E CONTROL CABLE, THE CONTROLLER, AND ALSO FURNISH AND INSTALL ANY ADDITIONAL CAT-5E CABLE REQUIRED TO INTERLOCK THE OPERATION OF ALL FANS. THE CIC CONTRACTOR SHALL PROVIDE AND INSTALL A LOCKABLE PANEL TO INSTALL THE CEILING FAN CONTROLLER IN AND 24VDC/24VAC POWER (AS REQUIRED) PER MECHANICAL DRAWINGS.

OCCUPIED MODE: THE FANS (HVLSFn-C) SHALL BE COMMANDED TO RUN BASED MANUAL OPERATION AT THE LOCAL INTERFACE. THE BACnet MSTP INTERFACE SHALL NOT BE CONNECTED AT THIS TIME. A MAXIMUM SPEED OF 50 FT/MIN AT 4' A.F.F. SHALL BE MAINTAINED WHEN THE FANS ARE OPERATING. ALL FANS SHALL RUN CONCURRENTLY WHEN ENABLED AT THE SAME SPEED.

FIRE SAFETY MODE: THE FANS SHALL BE FURNISHED WITH A N.C. FIRE ALARM RELAY FOR INTERLOCK WITH THE FIRE ALARM SYSTEM. THE CIC CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR TO PROVIDE A FIRE ALARM OUTPUT FROM WHICH THE CONTROLLER CAN UTILIZE. THE CIC CONTRACTOR SHALL FURNISH AND INSTALL WIRING TO THE FIRE ALARM PANEL. THE FIRE ALARM CONTRACTOR SHALL BE RESPONSIBLE FOR TERMINATION OF THE WIRING. UPON SENSING AN ALARM, THE HVLS FAN SHALL BE HARDWIRED TO PREVENT OPERATION UNTIL THE ALARM IS CLEARED.

SPACE HUMIDIFIERS
HAA–X



ELECTRIC HUMIDIFIER SCHEDULE - 23 84 13														
IDENTITY DATA				OUTPUT (LB/H)	WATER DATA		ELECTRICAL DATA						CONTROLLED FROM	NOTES
MARK	MANUF	MODEL	SERVES		TYPE	FLOW (GPM)	CAP. (KW)	VOLTS (V)	PH	FREQ (HZ)	MCA (A)	MOCP (A)		
H-AA1	DRISTEEM	RX-63-1	ORCHESTRA	63.0	DCW	0.12	21	480	3	60	27.1	30.0	FACTORY BACNET CTRL	Standalone Ctrls, MS/TP comm to BAS
H-AA2	DRISTEEM	RX-12-1	ORCHESTRA STORAGE	12.0	DCW	<0.1	4	480	3	60	7.2	10.0	FACTORY BACNET CTRL	Standalone Ctrls, MS/TP comm to BAS
H-AA3	DRISTEEM	RX-6-1	BAND/INSTRUMENT CORRIDOR	18.0	DCW	<0.1	6	480	3	60	7.2	10.0	FACTORY BACNET CTRL	Standalone Ctrls, MS/TP comm to BAS

SPACE HUMIDIFIERS HAA-1, HAA-2, H-AA3: TCC SHALL CONNECT TO SPACE HUMIDIFIERS VIA BACNET MSTP FOR MONITORING OF THE UNITS.

Delta Controls
Temperature Control Services
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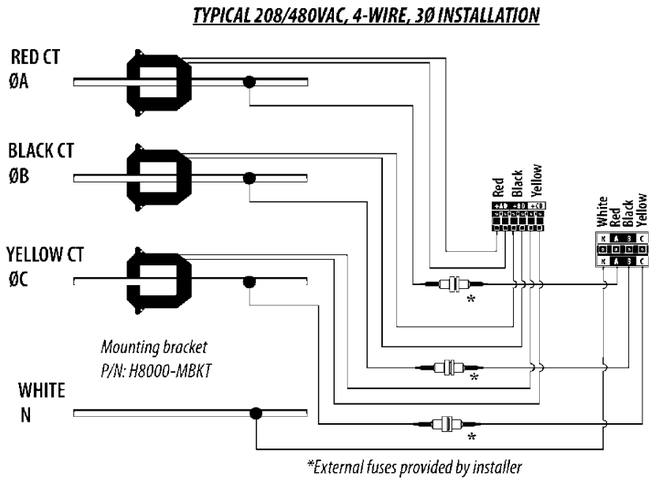
J–2304001

POWER METER HIGH VOLTAGE WIRING DETAIL

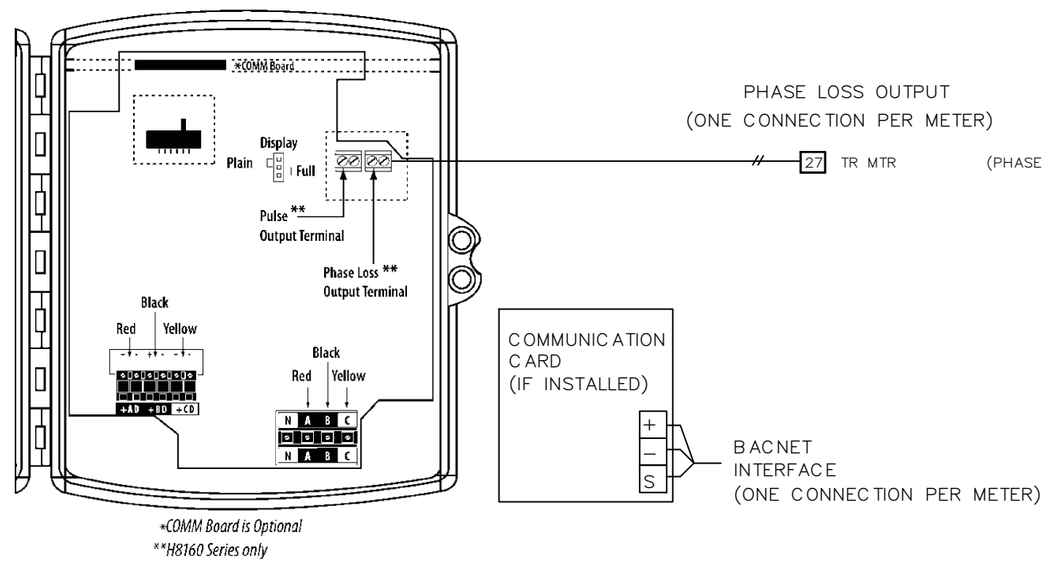
(FOR REFERENCE ONLY, NOT INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)



(* PREVIOUS BAS DESIGN INDICATES VERIS AH04 TRIPLE FUSE KITS WERE INSTALLED)

POWER METER HIGH VOLTAGE WIRING DETAIL

(BACNET MS/TP COMMUNICATION AND PHASE LOSS MONITORING INCLUDED IN PHASE 3 SCOPE)
(TYPICAL FOR ONE (1) METER IN THIS AREA)



NOTE:
METER MONITORING ADDED UNDER PHASE 3 PROJECT. CONNECTION OF METER (HARD-WIRE INPUT AND BACNET) TO THE BAS SHALL OCCUR AT SYSTEM CONTROL PANEL 01, HOT WATER PLANT, IN THE TRANSPORTATION BUILDING.

NETWORK POINTS
N1 THROUGH Nx

TRANSPORTATION BUILDING PHASE LOSS MONITORING FIELD DEVICES

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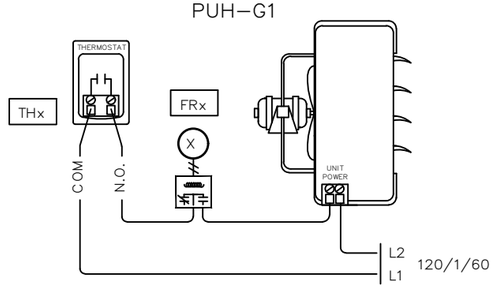
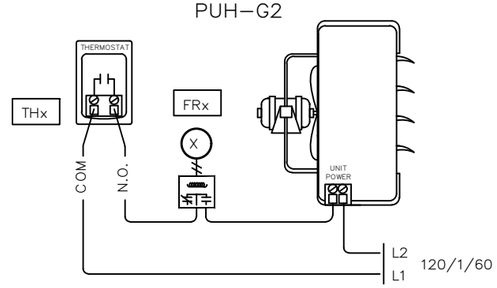
PROPELLER UNIT HEATER
PUH–G1



PROPELLER UNIT HEATER
PUH–G2



NOTE:
PROPELLER UNIT HEATERS ADDED UNDER PHASE 3 PROJECT. CONNECTION OF INTERLOCK TO THE BAS SHALL OCCUR AT SYSTEM CONTROL PANEL 03, AHU–G1, LOCATED IN AREA G. WIRE INTERLOCK TO OUTPUTS 8 AND 9 OF THE DSC–1212E CONTROLLER.

NETWORK POINTS
N1 THROUGH Nx

AHU–G1 PROPELLER UNIT HEATER FIELD DEVICES

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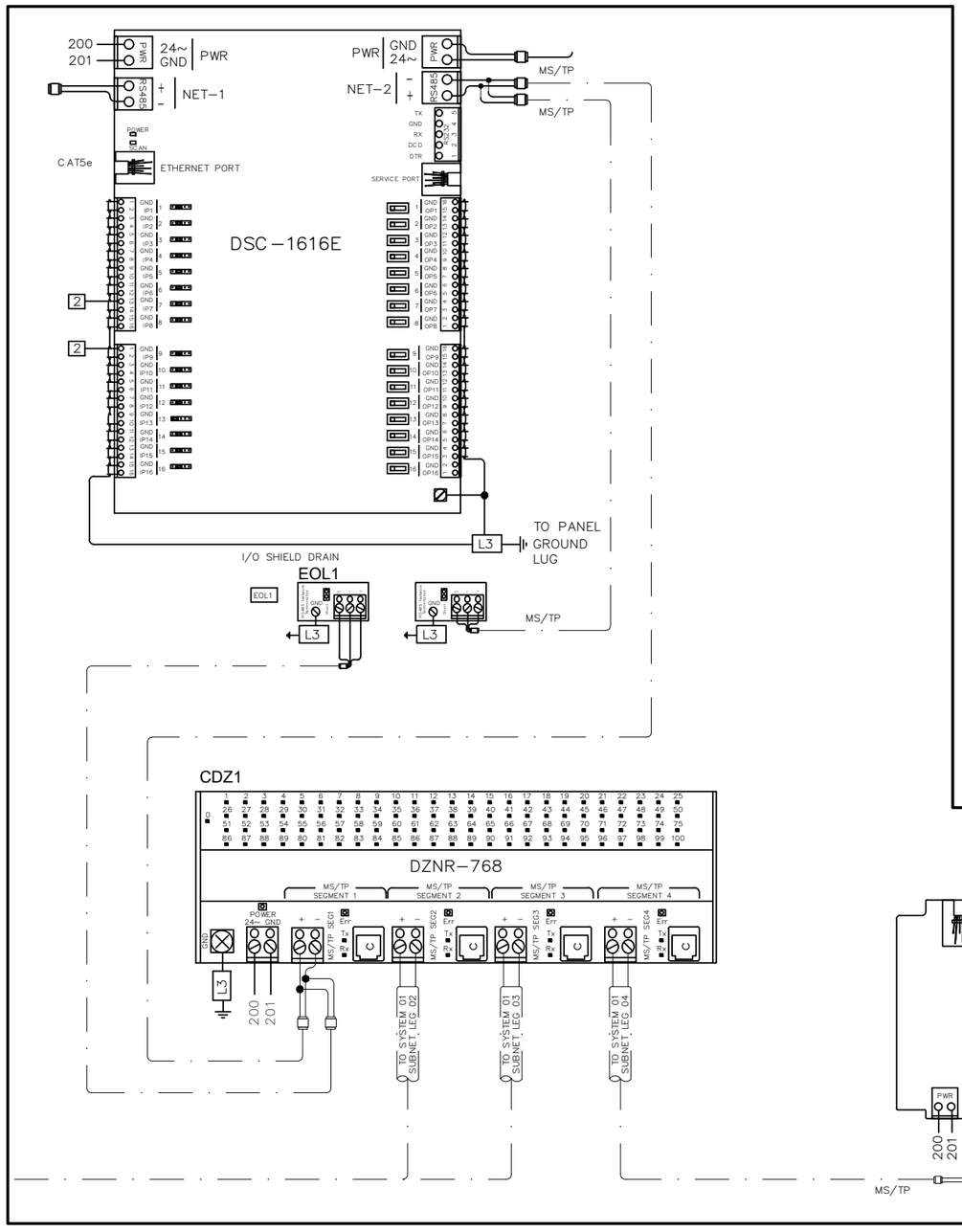
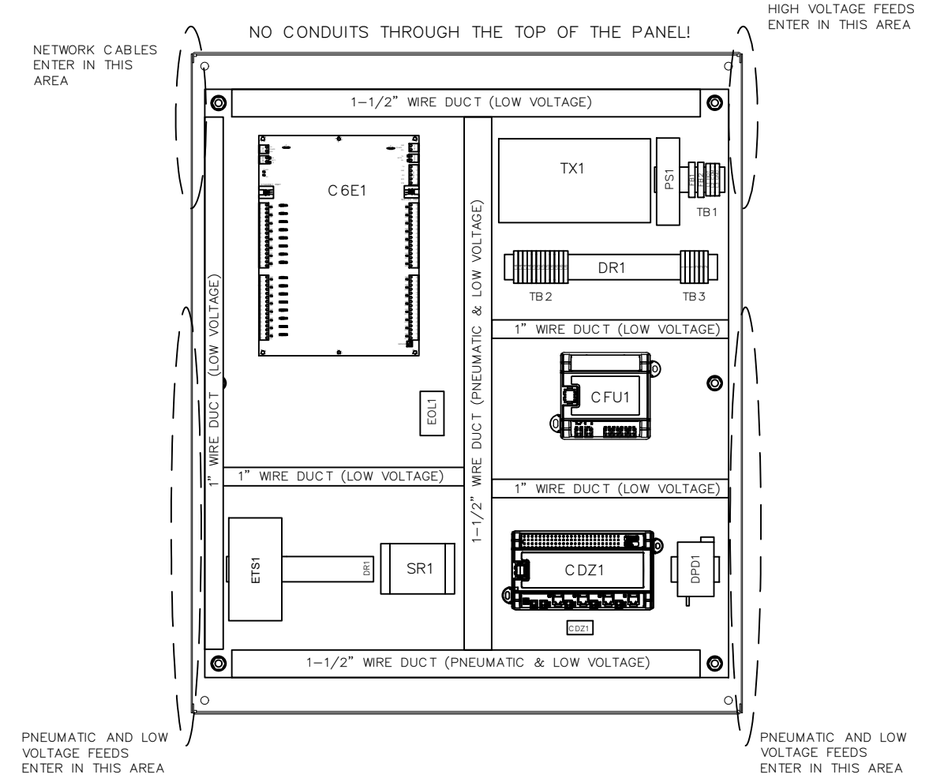
(EXISTING) SYSTEM CONTROL PANEL 06

(COMPONENTS SHOWN FOR CLARITY. ONLY DEVICES BEING ADDED ARE ONE (1) DZNR–768 BACNET MS/TP REPEATER (ITEM CDZ1) AND ONE (1) NETWORK TERMINATOR (ITEM TRM1)





BILL OF MATERIALS

NOTE:
REWORK MS/TP CABLING AS INDICATED TO INCORPORATE DFM–400 ON DZNR–768 REPEATER, SEGMENT 4, IN LIEU OF A DIRECT CONNECTION TO NET 2 OF THE SYSTEM CONTROLLER.

AHU–G4 PANEL DEVICE ADDS UNDER PHASE 3 PROJECT

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J–2304001

CONTROLS INSTALLATION CONTRACTOR (CIC) MISCELLANEOUS SEQUENCES AND INFORMATION:

IT IS THE INTENTION OF THIS PROJECT TO PROVIDE DELTA CONTROLS DEVICES FOR ALL NEW EQUIPMENT EXCEPT NOTED PACKAGED EQUIPMENT AND CAPABLE OF ACHIEVING THE SEQUENCE OF OPERATION UTILIZING BACnet IP AND MSTP COMMUNICATION. TEMPERATURE CONTROLS SERVICES (TCS) SHALL PROVIDE ALL REQUIRED CONTROLS EQUIPMENT PER THE DRAWINGS AND SPECIFICATIONS AND WILL FUNCTION AS THE TCC. THE MECHANICAL CONTRACTOR SHALL PERFORM THE CIC SCOPE OF WORK AS QUALIFIED OR SUBCONTRACT THE WORK AS NEEDED. TCS AS THE TCC SHALL IDENTIFY AND COMMUNICATE TO THE CONTROLS INSTALLATION CONTRACTOR (CIC) ANY INSTALLATION DISCREPANCIES OR ISSUES FOR RESOLUTION BY THE CIC. ALL COORDINATION AND COMMUNICATION WITH TCS SHALL INCLUDE BRIAN SHEPPERD - BRIAN@TCSBAS.COM

TCS SHALL PROVIDE A COMPREHENSIVE GRAPHIC PACKAGE TO INCLUDE ALL NEW EQUIPMENT CONTROLLED OR MONITORED BY THE BUILDING AUTOMATION SYSTEM AND SHALL PROVIDE EQUIPMENT POINT DATABASE, LICENSING, SCHEDULES, TRENDING, AND REPORTS.

TCS SHALL COORDINATE WITH THE CLIENT FOR: EMAIL ALARM INFORMATION, 1-YEAR TRENDING AND REPORTS, OCCUPIED AND HOLIDAY SCHEDULES, AND SPECIALTY EQUIPMENT PARAMETERS AND ALARMING.

IDF/MDF AND ELECTRICAL HVAC SPLIT SYSTEM MONITORING SS-n: TCC SHALL REFERENCE THE MECHANICAL SCHEDULE AND CIC SHALL INSTALL AND WIRE BAS FLAT PLATE SPACE TEMPERATURE SENSORS FOR MONITOR OF IDF/MDF SPACES AND ALARM CONDITIONS. ALL STAND-ALONE HVAC SYSTEMS WILL HAVE BAS SPACE TEMPERATURE MONITORING IN ADDITION TO THE CONTROLS FROM THE MANUFACTURER. AN ALARM WILL BE GENERATED IF THE SPACE RISES ABOVE 81F (ADJ) OR DROPS BELOW 59F (ADJ). THESE SPACES ALSO REQUIRE A SEPARATE THERMOSTAT FOR LOCAL EQUIPMENT CONTROL THAT CIC WILL ENSURE IS CONFIGURED AND OPERATING PROPERLY. SEE MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.

CONTROL PANELS: TCC SHALL PROVIDE AND CIC SHALL INSTALL TEMPERATURE CONTROL PANEL BACKPLATES THAT ARE HOFFMAN STYLE FOR ALL AIR HANDLING UNITS EXCEPT AHU-AA1, AHU-J3, AND AHU-K6. THE TECHNOLOGY CONTRACTOR WILL PROVIDE ETHERNET DROPS FOR ALL PANELS THAT DO NOT ALREADY HAVE BUILDING NETWORK CONNECTIVITY AND THE DIVISION 26 CONTRACTOR SHALL PROVIDE 120 VAC CIRCUITS FOR ALL NEW PANELS DEDICATED TO PANEL AND VAV POWER. CIC IS RESPONSIBLE TO DEMOLISH EXISTING CONTROL PANEL CONTENTS BY REMOVING THE BACKPLATE AND ALL CONTENTS FROM THE EXISTING TO REMAIN PANELS WITH THE EXCEPTION TO FIELD CONTROL WIRING AND CONDUIT. CIC IS RESPONSIBLE TO INSTALL THE REPLACEMENT BACKPLATE WITH NEW CONTROLS PRE-MOUNTED AND PROVIDED BY TCC AND TERMINATE PER TCC DRAWINGS. ADDITIONAL CABLING SHALL ALSO BE INSTALLED BY THE CIC IN CONDUIT WITHIN MECHANICAL ROOMS. CLEARLY LABEL PANELS AS TO THE EQUIPMENT CONTROLLED AND INCLUDE A COPY OF THE CONTROL DRAWINGS IN A PROTECTIVE COVER AFFIXED ON THE INSIDE PANEL DOOR. SEPARATE CIRCUIT PROVIDED BY DIVISION 26 FOR VAV POWER PANELS.

BUILDING NETWORK ETHERNET INTERFACE: ONE (1) DATA DROP SHALL BE PROVIDED BY THE TELECOMMUNICATIONS CONTRACTOR FOR USE BY TCC IN EACH MECHANICAL ROOM TO EACH TEMPERATURE CONTROL PANEL. SEE TELECOMMUNICATIONS DRAWINGS.

ELECTRICAL UTILITY POWER MONITORING: TCC SHALL MONITOR FOR PHASE LOSS ON EXISTING TO REMAIN POWER METERS. TCC SHALL GENERATE AN ALARM UPON PHASE LOSS FOR MANUAL DECISION TO SHUTDOWN CHILLERS, AIR HANDLING UNITS, AND BOILERS. EXISTING TO REMAIN EQUIPMENT INCLUDE:

1. CENTRAL PLANT MDPC - GE POWERLOGIX
2. MAIN ELECTRICAL ROOM MDPA-LEFT - HAWKEYE 8100
3. MAIN ELECTRICAL ROOM MDPA-RIGHT - HAWKEYE 8100
4. MAIN ELECTRICAL ROOM MDPB-LEFT A - HAWKEYE 8100
5. MAIN ELECTRICAL ROOM MDPB-LEFT B - HAWKEYE 8100
6. MAIN ELECTRICAL ROOM MDPB-RIGHT A - HAWKEYE 8100
7. MAIN ELECTRICAL ROOM MDPB-RIGHT A - HAWKEYE 8100
8. NATATORIUM - FIELD DETERMINED
9. WEST GYM - FIELD DETERMINED
10. SOUTH LOCKER ROOM - FIELD DETERMINED
11. TRANSPORTATION BUILDING - FIELD DETERMINED

EXISTING TO REMAIN HVAC EQUIPMENT: TCC SHALL PROVIDE AND CIC SHALL INSTALL REPLACEMENT CONTROLS FOR THE EQUIPMENT SHOWN ON THE OWNER PROVIDED AS-BUILT DRAWINGS SHOWN ON M-701.3 TO M-731.3. CIC SHALL REFERENCE TCC (TEMPERATURE CONTROL SERVICES) DRAWINGS ISSUED BY ADDENDUM FOR DETAILED REQUIREMENTS.

BUILDING ANNUNCIATOR PANEL: UPON BRINGING AN AIR HANDLING UNIT ONLINE TCS SHALL BE RESPONSIBLE TO COMMUNICATE CRITICAL ALARMS TO THE EXISTING TO REMAIN ANNUNICATOR PANEL CONTROLLER.

SPACE HUMIDIFIERS HAA-1, HAA-2, H-AA3: TCC SHALL CONNECT TO SPACE HUMIDIFIERS VIA BACNET MSTP FOR MONITORING OF THE UNITS.

MISCELLANEOUS REQUIREMENTS AND SEQUENCES OF OPERATION FOR PHASE 3 EQUIPMENT

Delta Controls
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
NCHS-502
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																		Ordering Data				
																			2 WAY	3 WAY													
																			2VDC FAIL		2VDC FAIL											
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
1	1	3	RCP-K1 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
2	1	3	RCP-K2 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
3	1	3	RCP-K3 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
4	1	3	RCP-K4 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
5	1	3	RCP-K5 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
6	1	3	RCP-K6 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
7	1	3	RCP-M1 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
8	1	3	RCP-M2 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
9	1	3	RCP-M3 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
10	1	3	RCP-M4 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
11	1	3	RCP-M5 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
12	1	3	RCP-M6 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
13	1	3	RCP-M7 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
14	1	3	RCP-M8 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
15	1	3	RCP-M9 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
16	1	3	RCP-M10 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
17	1	3	RCP-M11 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
18	1	3	RCP-M12 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
19	1	3	RCP-M13 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
20	1	3	RCP-M14 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
21	1	3	RCP-M15 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
22	1	3	RCP-M16 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
23	1	3	RCP-M17 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
24	1	3	RCP-M18 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
25	1	3	RCP-M19 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
26	1	3	RCP-M20 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
27	1	3	RCP-M21 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
28	1	3	RCP-M22 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
29	1	3	RCP-M23 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
30	1	3	RCP-M24 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
31	1	3	RCP-M25 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
32	1	3	RCP-M26 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
33	1	3	RCP-M27 HWV	0.19	4.00	0.10		200.0	0.50		0.00	X			X		X			X			X								--		
34	1	3	FCU-A1 CWV	1.30	4.00	0.65		200.0	0.50		0.00	X			X				X	X			X							TFRB24-SR		--		
35	1	3	FCU-A1 HWV	0.50	4.00	0.25		200.0	0.50		0.00	X			X				X	X		X							TFRB24-SR		--		
36	1	3	FCU-A2 CWV	1.30	4.00	0.65		200.0	0.50		0.00	X			X				X	X			X							TFRB24-SR		--		
37	1	3	FCU-A2 HWV	0.50	4.00	0.25		200.0	0.50		0.00	X			X				X	X		X							TFRB24-SR		--		
38	1	3	FCU-C1 CWV	2.80	4.00	1.40		200.0	0.50		0.00	X			X				X	X			X							TFRB24-SR		--		
39	1	3	FCU-C1 HWV	0.70	4.00	0.35		200.0	0.50		0.00	X			X				X	X		X							TFRB24-SR		--		
40	1	3	FCU-C2 CWV	2.80	4.00	1.40		200.0	0.50		0.00	X			X				X	X			X							TFRB24-SR		--		
41	1	3	FCU-C2 HWV	0.70	4.00	0.35		200.0	0.50		0.00	X			X				X	X		X							TFRB24-SR		--		
42	1	3	FCU-G1 CWV	1.30	4.00	0.65		200.0	0.50		0.00	X			X				X	X			X							TFRB24-SR		--		
43	1	3	FCU-G1 HWV	0.50	4.00	0.25		200.0	0.50		0.00	X			X				X	X		X							TFRB24-SR		--		
44	1	3	VAV B1-01 HWV	2.40	4.00	1.20		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
45	1	3	VAV B1-02 HWV	1.70	4.00	0.85		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
46	1	3	VAV B1-03 HWV	1.10	4.00	0.55		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
47	1	3	VAV B1-04 HWV	0.70	4.00	0.35		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
48	1	3	VAV B1-05 HWV	0.80	4.00	0.40		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
49	1	3	VAV B1-06 HWV	1.20	4.00	0.60		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				
50	1	3	VAV B1-07 HWV	1.20	4.00	0.60		75.0	0.50		0.00	X			X				X				X							CQB24-SR-R				

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-11
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																				Ordering Data				
																				2 WAY				3 WAY											
																				2VDC FAIL		2VDC FAIL											
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
51	1	3	VAV B1-08 HWV	1.80	4.00	0.90		75.0	0.50		0.00	X			X				X				X								CQB24-SR-R			
52	1	3	VAV B1-09 HWV	1.20	4.00	0.60		75.0	0.50		0.00	X			X				X				X								CQB24-SR-R			
53	1	3	VAV B1-10 HWV	1.80	4.00	0.90		75.0	0.50		0.00	X			X				X				X								CQB24-SR-R			
54	1	3	VAV B1-11 HWV	1.80	4.00	0.90		75.0	0.50		0.00	X			X				X				X								CQB24-SR-R			
55	1	3	VAV B1-12 HWV	1.80	4.00	0.90		75.0	0.50		0.00	X			X				X				X								CQB24-SR-R			
56	1	3	VAV B1-13 HWV	1.60	4.00	0.80		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
57	1	3	VAV B1-14 HWV	1.60	4.00	0.80		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
58	1	3	VAV B1-15 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
59	1	3	VAV B1-16 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
60	1	3	VAV B1-17 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
61	1	3	VAV B1-18 HWV	1.60	4.00	0.80		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
62	1	3	VAV B1-19 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
63	1	3	VAV B1-20 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
64	1	3	VAV B1-21 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
65	1	3	VAV C1-01 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
66	1	3	VAV C1-03 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
67	1	3	VAV C1-04 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
68	1	3	VAV C1-05 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
69	1	3	VAV C1-06 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
70	1	3	VAV C1-07 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
71	1	3	VAV C1-08 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
72	1	3	VAV C4-01 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
73	1	3	VAV C4-02 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
74	1	3	VAV C4-03 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
75	1	3	VAV C4-04 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
76	1	3	VAV C4-05 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
77	1	3	VAV C4-06 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
78	1	3	VAV C4-07 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
79	1	3	VAV C4-08 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
80	1	3	VAV C4-09 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
81	1	3	VAV C4-10 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
82	1	3	VAV C4-11 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
83	1	3	VAV C4-12 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
84	1	3	VAV C4-13 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
85	1	3	VAV C4-14 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
86	1	3	VAV C4-15 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
87	1	3	VAV C4-16 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
88	1	3	VAV C4-17 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
89	1	3	VAV C4-18 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
90	1	3	VAV C4-19 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
91	1	3	VAV C4-20 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
92	1	3	VAV C4-21 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
93	1	3	VAV C4-22 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
94	1	3	VAV C4-23 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
95	1	3	VAV C4-24 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
96	1	3	VAV C4-25 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
97	1	3	VAV D1-01 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
98	1	3	VAV D1-02 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
99	1	3	VAV D1-03 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
100	1	3	VAV D1-04 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-12
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																				Ordering Data				
																			2 WAY		3 WAY														
																			2VDC FAIL		2VDC FAIL													
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn .	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
101	1	3	VAV D1-05 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
102	1	3	VAV D1-06 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
103	1	3	VAV D1-07 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
104	1	3	VAV D1-08 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
105	1	3	VAV D1-09 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
106	1	3	VAV D1-10 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
107	1	3	VAV D1-11 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
108	1	3	VAV D1-12 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
109	1	3	VAV D1-13 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
110	1	3	VAV D1-14 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
111	1	3	VAV D1-15 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
112	1	3	VAV D1-16 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
113	1	3	VAV D1-17 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
114	1	3	VAV D1-18 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
115	1	3	VAV D1-19 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
116	1	3	VAV D1-20 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
117	1	3	VAV D1-21 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
118	1	3	VAV D1-22 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
119	1	3	VAV D1-23 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
120	1	3	VAV D1-24 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
121	1	3	VAV D1-25 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
122	1	3	VAV D1-26 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
123	1	3	VAV D1-27 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
124	1	3	VAV D1-28 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
125	1	3	VAV D1-29 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
126	1	3	VAV D2-01 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
127	1	3	VAV D2-02 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
128	1	3	VAV D2-03 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
129	1	3	VAV D2-04 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
130	1	3	VAV D2-05 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
131	1	3	VAV D2-06 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
132	1	3	VAV D2-07 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
133	1	3	VAV D2-08 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
134	1	3	VAV D2-09 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
135	1	3	VAV D2-10 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
136	1	3	VAV D2-11 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
137	1	3	VAV D2-12 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
138	1	3	VAV D2-13 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
139	1	3	VAV D2-14 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
140	1	3	VAV D2-15 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
141	1	3	VAV D2-16 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
142	1	3	VAV D2-17 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
143	1	3	VAV D2-18 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
144	1	3	VAV E1-01 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
145	1	3	VAV E1-02 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
146	1	3	VAV E1-03 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
147	1	3	VAV E1-04 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
148	1	3	VAV E1-05 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
149	1	3	VAV E1-06 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
150	1	3	VAV E1-07 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

PHASE 3 VALVE SCHEDULE (3 OF 16)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-13
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																						Ordering Data				
																					2 WAY		3 WAY														
																					2VDC FAIL		2VDC FAIL													
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
151	1	3	VAV E1-08 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
152	1	3	VAV E1-09 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
153	1	3	VAV E1-10 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
154	1	3	VAV E1-11 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
155	1	3	VAV E1-12 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
156	1	3	VAV E1-13 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
157	1	3	VAV E2-01 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
158	1	3	VAV E2-02 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
159	1	3	VAV E2-03 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
160	1	3	VAV E2-04 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
161	1	3	VAV E2-05 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
162	1	3	VAV E2-06 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
163	1	3	VAV E2-07 HWV	2.80	4.00	1.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
164	1	3	VAV E2-08 HWV	2.80	4.00	1.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
165	1	3	VAV E2-09 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
166	1	3	VAV E2-10 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
167	1	3	VAV E2-11 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
168	1	3	VAV E2-12 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
169	1	3	VAV E2-13 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
170	1	3	VAV E2-14 HWV	2.80	4.00	1.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
171	1	3	VAV E2-15 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
172	1	3	VAV E2-16 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
173	1	3	VAV E2-17 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
174	1	3	VAV E2-18 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
175	1	3	VAV E2-19 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
176	1	3	VAV E2-20 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
177	1	3	VAV E2-21 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
178	1	3	VAV E2-23 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
179	1	3	VAV E2-24 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
180	1	3	VAV E3-01 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
181	1	3	VAV E3-02 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
182	1	3	VAV E3-03 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
183	1	3	VAV E3-04 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
184	1	3	VAV E3-05 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
185	1	3	VAV E3-06 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
186	1	3	VAV E3-07 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
187	1	3	VAV E3-08 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
188	1	3	VAV E3-09 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
189	1	3	VAV E3-10 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
190	1	3	VAV F1-01 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
191	1	3	VAV F1-02 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
192	1	3	VAV F1-03 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
193	1	3	VAV F1-04 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
194	1	3	VAV F1-05 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
195	1	3	VAV F1-06 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
196	1	3	VAV F1-07 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
197	1	3	VAV F1-08 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
198	1	3	VAV F1-09 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
199	1	3	VAV F1-10 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
200	1	3	VAV F1-11 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

PHASE 3 VALVE SCHEDULE (4 OF 16)

Delta CONTROLS

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-14
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																					Ordering Data				
																			2 WAY		3 WAY															
																			2VDC FAIL		2VDC FAIL															
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn .	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
201	1	3	VAV F1-12 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
202	1	3	VAV F1-13 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
203	1	3	VAV F1-14 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
204	1	3	VAV F1-15 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
205	1	3	VAV F1-16 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
206	1	3	VAV F1-17 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
207	1	3	VAV F1-18 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
208	1	3	VAV F1-19 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
209	1	3	VAV F1-20 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
210	1	3	VAV F1-21 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
211	1	3	VAV F1-22 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
212	1	3	VAV F1-23 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
213	1	3	VAV F1-24 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
214	1	3	VAV F1-25 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
215	1	3	VAV G4-01 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
216	1	3	VAV G4-02 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
217	1	3	VAV G4-03 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
218	1	3	VAV G4-04 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
219	1	3	VAV G4-05 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
220	1	3	VAV G4-06 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
221	1	3	VAV G4-07 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
222	1	3	VAV G4-08 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
223	1	3	VAV G4-09 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
224	1	3	VAV G4-10 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
225	1	3	VAV E-G4-11 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
226	1	3	VAV E-G4-12 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
227	1	3	VAV E-G4-13 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
228	1	3	VAV H1-01 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
229	1	3	VAV H1-02 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
230	1	3	VAV H1-03 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
231	1	3	VAV H1-04 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
232	1	3	VAV H1-05 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
233	1	3	VAV H1-06 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
234	1	3	VAV H1-07 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
235	1	3	VAV H1-08 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
236	1	3	VAV H1-09 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
237	1	3	VAV H1-10 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
238	1	3	VAV H1-11 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
239	1	3	VAV H1-12 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
240	1	3	VAV H1-13 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
241	1	3	VAV H1-14 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
242	1	3	VAV H1-15 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
243	1	3	VAV H1-16 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
244	1	3	VAV H1-17 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
245	1	3	VAV H1-18 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
246	1	3	VAV H1-19 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
247	1	3	VAV H1-20 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
248	1	3	VAV H1-21 HWV	1.30	4.00	0.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
249	1	3	VAV H1-22 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
250	1	3	VAV H1-23 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

PHASE 3 VALVE SCHEDULE (5 OF 16)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-15
JOB NUMBER:
J-2304001

	From Project Specifications								Valve Type and Actuator Specifications																				Ordering Data				
																				2 WAY		3 WAY										
																				2VDC FAIL		2VDC FAIL										
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
251	1	3	VAV H1-24 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
252	1	3	VAV H1-25 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
253	1	3	VAV H1-26 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
254	1	3	VAV H2-01 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
255	1	3	VAV H2-02 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
256	1	3	VAV H2-03 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
257	1	3	VAV H2-04 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
258	1	3	VAV H2-05 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
259	1	3	VAV H2-06 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
260	1	3	VAV H2-07 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
261	1	3	VAV H2-08 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
262	1	3	VAV H2-09 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
263	1	3	VAV H2-10 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
264	1	3	VAV H2-11 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
265	1	3	VAV H2-12 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
266	1	3	VAV H2-13 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
267	1	3	VAV H2-14 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
268	1	3	VAV H2-15 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
269	1	3	VAV J1-01 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
270	1	3	VAV J1-02 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
271	1	3	VAV J1-03 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
272	1	3	VAV J1-04 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
273	1	3	VAV J1-05 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
274	1	3	VAV J1-06 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
275	1	3	VAV J1-07 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
276	1	3	VAV J1-08 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
277	1	3	VAV J1-09 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
278	1	3	VAV J1-10 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
279	1	3	VAV J1-11 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
280	1	3	VAV J1-12 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
281	1	3	VAV J1-13 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
282	1	3	VAV J1-14 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
283	1	3	VAV J1-15 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
284	1	3	VAV J1-16 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
285	1	3	VAV J1-17 HWV	0.60	4.00	0.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
286	1	3	VAV J1-18 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
287	1	3	VAV J1-19 HWV	0.60	4.00	0.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
288	1	3	VAV J1-20 HWV	0.60	4.00	0.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
289	1	3	VAV J2-01 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
290	1	3	VAV J2-02 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
291	1	3	VAV J2-03 HWV	2.70	4.00	1.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
292	1	3	VAV J2-04 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
293	1	3	VAV J2-05 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
294	1	3	VAV J2-06 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
295	1	3	VAV J2-07 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
296	1	3	VAV J2-08 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
297	1	3	VAV J2-09 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
298	1	3	VAV J2-10 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
299	1	3	VAV J2-11 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
300	1	3	VAV J2-12 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

PHASE 3 VALVE SCHEDULE (6 OF 16)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-16
JOB NUMBER:
J-2304001

	From Project Specifications											Valve Type and Actuator Specifications																				Ordering Data				
																				2 WAY		3 WAY														
																				2VDC FAIL		2VDC FAIL													
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn .	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
301	1	3	VAV J2-13 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
302	1	3	VAV J2-14 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
303	1	3	VAV J3-01 HWV	3.70	4.00	1.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
304	1	3	VAV J3-02 HWV	3.70	4.00	1.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
305	1	3	VAV J3-03 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
306	1	3	VAV J3-04 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
307	1	3	VAV J3-05 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
308	1	3	VAV J3-06 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
309	1	3	VAV J3-07 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
310	1	3	VAV J3-08 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
311	1	3	VAV J3-09 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
312	1	3	VAV J3-10 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
313	1	3	VAV J3-11 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
314	1	3	VAV J3-12 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
315	1	3	VAV J3-13 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
316	1	3	VAV J3-14 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
317	1	3	VAV J3-15 HWV	0.75	4.00	0.38		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
318	1	3	VAV J3-16 HWV	0.75	4.00	0.38		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
319	1	3	VAV M1-01 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
320	1	3	VAV M1-02 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
321	1	3	VAV M1-03 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
322	1	3	VAV M1-04 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
323	1	3	VAV M1-05 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
324	1	3	VAV M1-06 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
325	1	3	VAV M1-07 HWV	0.60	4.00	0.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
326	1	3	VAV M1-08 HWV	7.00	4.00	3.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
327	1	3	VAV M1-09 HWV	6.00	4.00	3.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
328	1	3	VAV M1-10 HWV	6.50	4.00	3.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
329	1	3	VAV N1-01 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
330	1	3	VAV N1-02 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
331	1	3	VAV N1-03 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
332	1	3	VAV N1-04 HWV	2.70	4.00	1.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
333	1	3	VAV N1-05 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
334	1	3	VAV N1-06 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
335	1	3	VAV N1-07 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
336	1	3	VAV N1-08 HWV	0.30	4.00	0.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
337	1	3	VAV N1-09 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
338	1	3	VAV N1-10 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
339	1	3	VAV N1-11 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
340	1	3	VAV N1-12 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
341	1	3	VAV N1-13 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
342	1	3	VAV N2-01 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
343	1	3	VAV N2-02 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
344	1	3	VAV N2-03 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
345	1	3	VAV N2-04 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
346	1	3	VAV N2-05 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
347	1	3	VAV N2-06 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
348	1	3	VAV N2-07 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
349	1	3	VAV N2-08 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
350	1	3	VAV N2-09 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-17
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																				Ordering Data				
																				2 WAY		3 WAY												
																				2VDC FAIL		2VDC FAIL												
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
351	1	3	VAV N2-10 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
352	1	3	VAV N2-11 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
353	1	3	VAV N2-12 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
354	1	3	VAV N2-13 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
355	1	3	VAV N2-14 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
356	1	3	VAV N2-15 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
357	1	3	VAV N2-16 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
358	1	3	VAV P1-01 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
359	1	3	VAV P1-02 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
360	1	3	VAV P1-03 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
361	1	3	VAV P1-04 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
362	1	3	VAV P1-05 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
363	1	3	VAV P1-06 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
364	1	3	VAV P1-07 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
365	1	3	VAV P1-08 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
366	1	3	VAV P1-09 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
367	1	3	VAV P1-10 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
368	1	3	VAV P1-11 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
369	1	3	VAV P1-12 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
370	1	3	VAV P1-13 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
371	1	3	VAV P1-14 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
372	1	3	VAV P1-15 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
373	1	3	VAV P1-16 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
374	1	3	VAV P1-17 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
375	1	3	VAV P1-18 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
376	1	3	VAV P1-19 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
377	1	3	VAV P1-21 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
378	1	3	VAV P1-22 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
379	1	3	VAV P1-23 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
380	1	3	VAV P1-24 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
381	1	3	VAV P1-25 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
382	1	3	VAV P1-26 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
383	1	3	VAV P1-27 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
384	1	3	VAV P1-28 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
385	1	3	VAV P1-29 HWV	3.10	4.00	1.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
386	1	3	VAV P1-30 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
387	1	3	VAV P1-31 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
388	1	3	VAV P1-32 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
389	1	3	VAV P1-33 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
390	1	3	VAV P1-34 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
391	1	3	VAV P1-35 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
392	1	3	VAV P2-01 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
393	1	3	VAV P2-02 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
394	1	3	VAV P2-03 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
395	1	3	VAV P2-04 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
396	1	3	VAV P2-05 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
397	1	3	VAV P2-06 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
398	1	3	VAV P2-07 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
399	1	3	VAV P2-08 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
400	1	3	VAV P2-09 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

Delta Controls
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-18
JOB NUMBER:
J-2304001

	From Project Specifications			Valve Type and Actuator Specifications																								Ordering Data				
																			2 WAY		3 WAY												
																			2VDC FAIL		2VDC FAIL												
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
401	1	3	VAV P2-10 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
402	1	3	VAV P2-11 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
403	1	3	VAV P2-12 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
404	1	3	VAV P2-13 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
405	1	3	VAV P2-14 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
406	1	3	VAV P2-15 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
407	1	3	VAV P2-16 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
408	1	3	VAV P2-17 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
409	1	3	VAV P2-18 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
410	1	3	VAV P2-19 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
411	1	3	VAV P2-20 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
412	1	3	VAV P2-21 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
413	1	3	VAV P2-22 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
414	1	3	VAV P2-23 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
415	1	3	VAV P2-24 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
416	1	3	VAV P2-25 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
417	1	3	VAV Q1-01 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
418	1	3	VAV Q1-02 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
419	1	3	VAV Q1-03 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
420	1	3	VAV Q1-04 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
421	1	3	VAV Q1-05 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
422	1	3	VAV Q1-06 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
423	1	3	VAV Q1-07 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
424	1	3	VAV Q1-08 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
425	1	3	VAV Q1-09 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
426	1	3	VAV Q1-10 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
427	1	3	VAV Q1-11 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
428	1	3	VAV Q1-13 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
429	1	3	VAV Q1-14 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
430	1	3	VAV Q1-15 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
431	1	3	VAV Q2-01 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
432	1	3	VAV Q2-02 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
433	1	3	VAV Q2-03 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
434	1	3	VAV Q2-04 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
435	1	3	VAV Q2-05 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
436	1	3	VAV Q2-06 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
437	1	3	VAV Q2-07 HWV	2.90	4.00	1.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
438	1	3	VAV Q2-08 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
439	1	3	VAV Q2-09 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
440	1	3	VAV Q2-10 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
441	1	3	VAV Q2-11 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
442	1	3	VAV Q2-12 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
443	1	3	VAV Q2-13 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
444	1	3	VAV Q2-14 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
445	1	3	VAV Q2-15 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
446	1	3	VAV Q2-16 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
447	1	3	VAV Q2-17 HWV	0.60	4.00	0.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
448	1	3	VAV R1-01 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
449	1	3	VAV R1-02 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
450	1	3	VAV R1-03 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-19
JOB NUMBER:
J-2304001

	From Project Specifications											Valve Type and Actuator Specifications																						Ordering Data				
																						2 WAY				3 WAY											
																						2VDC FAIL				2VDC FAIL											
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
451	1	3	VAV R1-04 HWV	1.40	4.00	0.70		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
452	1	3	VAV R1-05 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
453	1	3	VAV R1-07 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
454	1	3	VAV R1-08 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
455	1	3	VAV R1-09 HWV	3.30	4.00	1.65		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
456	1	3	VAV R1-10 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
457	1	3	VAV R1-11 HWV	1.60	4.00	0.80		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
458	1	3	VAV R1-12 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
459	1	3	VAV R1-13 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
460	1	3	VAV R1-14 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
461	1	3	VAV R2-01 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
462	1	3	VAV R2-02 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
463	1	3	VAV R2-03 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
464	1	3	VAV R2-04 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
465	1	3	VAV R2-05 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
466	1	3	VAV R2-06 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
467	1	3	VAV R2-07 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
468	1	3	VAV R2-08 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
469	1	3	VAV R2-09 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
470	1	3	VAV R2-10 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
471	1	3	VAV R2-11 HWV	2.30	4.00	1.15		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
472	1	3	VAV R2-12 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
473	1	3	VAV R2-13 HWV	2.70	4.00	1.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
474	1	3	VAV S1-01 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
475	1	3	VAV S1-02 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
476	1	3	VAV S1-03 HWV	1.20	4.00	0.60		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
477	1	3	VAV S1-04 HWV	0.70	4.00	0.35		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
478	1	3	VAV S1-05 HWV	2.80	4.00	1.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
479	1	3	VAV S1-06 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
480	1	3	VAV S1-07 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
481	1	3	VAV S1-08 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
482	1	3	VAV S1-09 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
483	1	3	VAV S1-10 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
484	1	3	VAV S1-11 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
485	1	3	VAV S1-12 HWV	2.80	4.00	1.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
486	1	3	VAV S1-13 HWV	2.50	4.00	1.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
487	1	3	VAV S1-14 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
488	1	3	VAV S1-15 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
489	1	3	VAV S1-16 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
490	1	3	VAV S1-17 HWV	2.60	4.00	1.30		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
491	1	3	VAV S1-18 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
492	1	3	VAV S1-19 HWV	0.40	4.00	0.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
493	1	3	VAV E-T1-01 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
494	1	3	VAV E-T1-02 HWV	1.50	4.00	0.75		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
495	1	3	VAV E-T1-03 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
496	1	3	VAV E-T1-04 HWV	0.20	4.00	0.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
497	1	3	VAV E-T1-05 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
498	1	3	VAV E-T1-06 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
499	1	3	VAV E-T1-07 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
500	1	3	VAV T1-08 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-20
JOB NUMBER:
J-2304001

	From Project Specifications			Valve Type and Actuator Specifications																										Ordering Data				
																				2 WAY		3 WAY											
																				2VDC FAIL		2VDC FAIL											
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
501	1	3	VAV T1-09 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
502	1	3	VAV T1-10 HWV	1.90	4.00	0.95		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
503	1	3	VAV T1-11 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
504	1	3	VAV T1-12 HWV	2.00	4.00	1.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
505	1	3	VAV T1-13 HWV	1.70	4.00	0.85		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
506	1	3	VAV T1-14 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
507	1	3	VAV AA1-01 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
508	1	3	VAV AA1-02 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
509	1	3	VAV AA1-03 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
510	1	3	VAV AA1-04 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
511	1	3	VAV AA1-05 HWV	3.00	4.00	1.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
512	1	3	VAV AA1-06 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
513	1	3	VAV AA1-07 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
514	1	3	VAV AA1-08 HWV	2.20	4.00	1.10		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
515	1	3	VAV AA1-09 HWV	0.80	4.00	0.40		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
516	1	3	VAV AA1-10 HWV	0.90	4.00	0.45		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
517	1	3	VAV AA1-11 HWV	1.00	4.00	0.50		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
518	1	3	VAV AA1-12 HWV	4.00	4.00	2.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
519	1	3	VAV AA1-13 HWV	4.00	4.00	2.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
520	1	3	VAV AA1-14 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
521	1	3	VAV AA1-15 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
522	1	3	VAV AA1-16 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
523	1	3	VAV AA1-17 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
524	1	3	VAV AA1-18 HWV	2.10	4.00	1.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
525	1	3	VAV AA1-19 HWV	0.50	4.00	0.25		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
526	1	3	VAV AA1-20 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
527	1	3	VAV AA1-21 HWV	4.00	4.00	2.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
528	1	3	VAV AA1-22 HWV	4.00	4.00	2.00		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
529	1	3	VAV AA1-23 HWV	2.40	4.00	1.20		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
530	1	3	VAV AA1-24 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
531	1	3	VAV AA1-25 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
532	1	3	VAV AA1-26 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
533	1	3	VAV AA1-27 HWV	0.10	4.00	0.05		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
534	1	3	VAV AA1-28 HWV	1.80	4.00	0.90		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
535	1	3	VAV AA1-29 HWV	1.10	4.00	0.55		75.0	0.5		0	X			X				X				X								CQB24-SR-R			
536	1	3	CUH E-CH-A1 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X											
537	1	3	CUH CH-A2 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
538	1	3	CUH CH-A3 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X											
539	1	3	CUH CH-A4 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
540	1	3	CUH CH-A5 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
541	1	3	CUH CH-A6 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
542	1	3	CUH CH-A7 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X											
543	1	3	CUH CH-A8 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
544	1	3	CUH CH-A9 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
545	1	3	CUH CH-E1 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
546	1	3	CUH CH-E2 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X											
547	1	3	CUH CH-F1 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X											
548	1	3	CUH E-CH-J1 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X											
549	1	3	CUH CH-J2 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X											
550	1	3	CUH E-CH-J3 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X											

PHASE 3 VALVE SCHEDULE (11 OF 16)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-21
JOB NUMBER:
J-2304001

	From Project Specifications								Valve Type and Actuator Specifications																					Ordering Data				
																				2 WAY	3 WAY												
																				2VDC FAIL		2VDC FAIL										
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
551	1	3	CUH E-CH-K1 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
552	1	3	CUH E-CH-M1 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X										
553	1	3	CUH E-CH-M2 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X										
554	1	3	CUH CH-M3 HWV	1.30	4.00	0.65		200.0	0.5			X				X	X			X			X										
555	1	3	CUH CH-M4 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X										
556	1	3	CUH CH-M5 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X										
557	1	3	CUH E-CH-M6 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
558	1	3	CUH E-CH-M7 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
559	1	3	CUH E-CH-M8 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
560	1	3	CUH E-CH-M9 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
561	1	3	CUH E-CH-M10 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
562	1	3	CUH E-CH-M11 HWV	2.00	4.00	1.00		200.0	0.5			X				X	X			X			X										
563	1	3	CUH CH-N1 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X										
564	1	3	CUH CH-N2 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X										
565	1	3	CUH CH-Q1 HWV	2.50	4.00	1.25		200.0	0.5			X				X	X			X			X										
566	1	3	CUH CH-Q2 HWV	2.50	4.00	1.25		200.0	0.5		0	X				X	X			X			X										
567	1	3	CUH E-CH-R1 HWV	2.00	4.00	1.00		200.0	0.5		0	X				X	X			X			X										
568	1	3	CUH CH-R2 HWV	2.50	4.00	1.25		200.0	0.5		0	X				X	X			X			X										
569	1	3	CUH CH-R3 HWV	2.50	4.00	1.25		200.0	0.5		0	X				X	X			X			X										
570	1	3	CUH CH-AA1 HWV	2.50	4.00	1.25		200.0	0.5		0	X				X	X			X			X										
571	1	3	CV-D1 HWV	0.30	4.00	0.15		200.0	0.5		0	X			X																		
572	1	3	CV-D2 HWV	0.30	4.00	0.15		200.0	0.5			X			X																		
573	1	3	CV-D3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
574	1	3	CV-D4 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
575	1	3	CV-D5 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
576	1	3	CV-D6 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
577	1	3	CV-D7 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
578	1	3	CV-D8 HWV	0.30	4.00	0.15		200.0	0.5			X			X																		
579	1	3	CV-D9 HWV	0.30	4.00	0.15		200.0	0.5			X			X																		
580	1	3	CV-E1 HWV	0.50	4.00	0.25		200.0	0.5			X			X																		
581	1	3	CV-F1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
582	1	3	CV-F2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
583	1	3	CV-F3 HWV	0.50	4.00	0.25		200.0	0.5			X			X																		
584	1	3	CV-F4 HWV	0.50	4.00	0.25		200.0	0.5			X			X																		
585	1	3	CV-F5 HWV	0.50	4.00	0.25		200.0	0.5			X			X																		
586	1	3	CV-F6 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
587	1	3	CV-F7 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
588	1	3	E-CV-H1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
589	1	3	E-CV-H2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
590	1	3	CV-H3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
591	1	3	CV-H4 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
592	1	3	CV-H5 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
593	1	3	E-CV-H6 HWV	0.70	4.00	0.35		200.0	0.5			X			X																		
594	1	3	E-CV-H7 HWV	0.70	4.00	0.35		200.0	0.5			X			X																		
595	1	3	CV-J1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
596	1	3	CV-J2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
597	1	3	E-CV-L1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
598	1	3	E-CV-L2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
599	1	3	CV-L3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		
600	1	3	CV-M1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																		

Delta Controls
Temperature Control Services
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LEBANON, INDIANA 46052
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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-22
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																						Ordering Data				
																				2 WAY	3 WAY																
																				2VDC FAIL		2VDC FAIL														
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn .	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
601	1	3	CV-M2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
602	1	3	CV-M3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
603	1	3	CV-M4 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
604	1	3	E-CV-M5 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
605	1	3	E-CV-M6 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
606	1	3	E-CV-M7 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
607	1	3	CV-M8 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
608	1	3	CV-M9 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
609	1	3	E-CV-N1 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
610	1	3	CV-N2 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
611	1	3	E-CV-N3 HWV	0.30	4.00	0.15		200.0	0.5			X			X																			
612	1	3	CV-N4 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
613	1	3	CV-N5 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
614	1	3	CV-P1 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
615	1	3	CV-P2 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
616	1	3	CV-P3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
617	1	3	CV-P4 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
618	1	3	E-CV-P5 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
619	1	3	CV-P6 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
620	1	3	CV-P7 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
621	1	3	CV-P8 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
622	1	3	CV-P9 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
623	1	3	CV-Q1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
624	1	3	CV-Q2 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
625	1	3	E-CV-R1 HWV	0.30	4.00	0.15		200.0	0.5			X			X																			
626	1	3	E-CV-R2 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
627	1	3	E-CV-R3 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
628	1	3	E-CV-R4 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
629	1	3	E-CV-R5 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
630	1	3	E-CV-R6 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
631	1	3	E-CV-R7 HWV	0.70	4.00	0.35		200.0	0.5			X			X																			
632	1	3	E-CV-S1 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
633	1	3	E-CV-S2 HWV	0.30	4.00	0.15		200.0	0.5			X			X																			
634	1	3	E-CV-S3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
635	1	3	CV-AA1 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
636	1	3	CV-AA2 HWV	0.50	4.00	0.25		200.0	0.5			X			X																			
637	1	3	CV-AA3 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
638	1	3	CV-AA4 HWV	0.20	4.00	0.10		200.0	0.5			X			X																			
639	1	3	AHU-A2 PHV	30.00	4.00	15.00		200.0				X			X					X	X		X		X									
640	1	3	AHU-A2 CWV	73.00	4.00	36.50		200.0				X			X					X	X			X		X								
641	1	3	AHU-A2 RHV	13.00	4.00	6.50		200.0				X			X					X	X		X		X									
642	1	3	AHU-C1 PHV	6.00	4.00	3.00		200.0				X			X					X	X		X		X									
643	1	3	AHU-C1 CWV	22.00	4.00	11.00		200.0				X			X					X	X			X		X								
644	1	3	AHU-C2 PHV	51.00	4.00	25.50		200.0				X			X					X	X		X		X									
645	1	3	AHU-C2 CWV	167.00	4.00	83.50		200.0				X			X					X	X			X		X								
646	1	3	AHU-C2 RHV	35.00	4.00	17.50		200.0				X			X					X	X		X		X									
647	1	3	AHU-C3 PHV	28.00	4.00	14.00		200.0				X			X					X	X		X		X									
648	1	3	AHU-C3 CWV	122.00	4.00	61.00		200.0				X			X					X	X			X		X								
649	1	3	AHU-C3 RHV	25.00	4.00	12.50		200.0				X			X					X	X		X		X									
650	1	3	AHU-C5 PHV	45.00	4.00	22.50		200.0				X			X					X	X		X		X									

PHASE 3 VALVE SCHEDULE (13 OF 16)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-23
JOB NUMBER:
J-2304001

	From Project Specifications											Valve Type and Actuator Specifications																				Ordering Data				
																						2 WAY		3 WAY												
																						2VDC FAIL		2VDC FAIL												
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
651	1	3	AHU-C5 CWV	178.00	4.00	89.00		200.0				X			X				X	X			X		X									
652	1	3	AHU-J1 PHV	21.00	4.00	10.50		200.0				X			X				X	X		X		X										
653	1	3	AHU-J1 CWV	98.00	4.00	49.00		200.0				X			X				X	X			X		X									
654	1	3	AHU-J2 PHV	16.00	4.00	8.00		200.0				X			X				X	X		X		X										
655	1	3	AHU-J2 CWV	74.00	4.00	37.00		200.0				X			X				X	X			X		X									
656	1	3	AHU-J3 PHV	42.00	4.00	21.00		200.0				X			X				X	X		X		X										
657	1	3	AHU-J3 CWV	73.00	4.00	36.50		200.0				X			X				X	X			X		X									
658	1	3	AHU-K6 PHV	18.00	4.00	9.00		200.0				X			X				X	X		X		X										
659	1	3	AHU-K6 CWV	23.00	4.00	11.50		200.0				X			X				X	X			X		X									
660	1	3	AHU-K6 RHV	10.00	4.00	5.00		200.0				X			X				X	X		X		X										
661	1	3	AHU-M1 PHV	34.00	4.00	17.00		200.0				X			X				X	X		X		X										
662	1	3	AHU-M1 CWV	107.00	4.00	53.50		200.0				X			X				X	X			X		X									
663	1	3	AHU-M2 PHV	40.00	4.00	20.00		200.0			0	X			X				X	X		X		X										
664	1	3	AHU-M2 CWV	208.00	4.00	104.00		200.0			0	X			X				X	X			X		X									
665	1	3	AHU-M2 RHV	72.00	4.00	36.00		200.0			0	X			X				X	X		X		X										
666	1	3	AHU-AA1 PHV	25.00	4.00	12.50		200.0				X			X				X	X							X		X					
667	1	3	AHU-AA1 CWV	117.00	4.00	58.50		200.0				X			X				X	X						X		X						
668	1	3	E-AHU-A1 PHV	62.00	4.00	31.00	3.0	200.0				X			X				X	X		X		X										
669	1	3	E-AHU-A1 CWV	182.00	4.00	91.00	4.0	200.0				X			X				X	X			X		X									
670	1	3	E-AHU-A1 HWV	72.00	4.00	36.00	3.0	200.0				X			X				X	X		X		X										
671	1	3	E-AHU-B1 HWV	33.00	4.00	16.50	2.0	200.0				X			X				X	X		X		X										
672	1	3	E-AHU-B1 CWV	199.00	4.00	99.50	4.0	200.0				X			X				X	X			X		X									
673	1	3	E-AHU-C4 PHV	50.00	4.00	25.00	2.5	200.0				X			X				X	X		X		X										
674	1	3	E-AHU-C4 CWV	497.00	4.00	248.50	4.0	200.0				X			X				X	X			X		X									
675	1	3	E-AHU-C4 HWV	40.00	4.00	20.00	2.0	200.0				X			X				X	X		X		X										
676	1	3	E-AHU-D1 HWV	25.00	4.00	12.50	?	200.0				X			X				X	X		X		X										
677	1	3	E-AHU-D1 CWV	150.00	4.00	75.00	?	200.0				X			X				X	X			X		X									
678	1	3	E-AHU-D2 HWV	19.00	4.00	9.50	?	200.0				X			X				X	X		X		X										
679	1	3	E-AHU-D2 CWV	125.00	4.00	62.50	?	200.0				X			X				X	X			X		X									
680	1	3	E-AHU-E1 HWV	13.00	4.00	6.50	1.3	200.0				X			X				X	X		X		X										
681	1	3	E-AHU-E1 CWV	95.00	4.00	47.50	3.0	200.0				X			X				X	X			X		X									
682	1	3	E-AHU-E2 HWV	19.00	4.00	9.50	1.3	200.0				X			X				X	X		X		X										
683	1	3	E-AHU-E2 CWV	139.00	4.00	69.50	4.0	200.0				X			X				X	X			X		X									
684	1	3	E-AHU-E3 HWV	6.00	4.00	3.00	1.3	200.0				X			X				X	X		X		X										
685	1	3	E-AHU-E3 CWV	64.00	4.00	32.00	3.0	200.0				X			X				X	X			X		X									
686	1	3	E-AHU-F1 HWV	14.00	4.00	7.00	1.5	200.0				X			X				X	X		X		X										
687	1	3	E-AHU-F1 CWV	153.00	4.00	76.50	4.0	200.0				X			X				X	X			X		X									
688	1	3	E-AHU-H1 HWV	26.00	4.00	13.00	?	200.0				X			X				X	X		X		X										
689	1	3	E-AHU-H1 CWV	171.00	4.00	85.50	?	200.0				X			X				X	X			X		X									
690	1	3	E-AHU-H2 HWV	18.00	4.00	9.00	?	200.0				X			X				X	X		X		X										
691	1	3	E-AHU-H2 CWV	121.00	4.00	60.50	?	200.0				X			X				X	X			X		X									
692	1	3	E-AHU-K1 HWV	43.00	4.00	21.50	?	200.0				X			X				X	X		X		X										
693	1	3	E-AHU-K1 CWV	89.00	4.00	44.50	?	200.0				X			X				X	X			X		X									
694	1	3	E-AHU-K2 HWV	43.00	4.00	21.50	?	200.0				X			X				X	X		X		X										
695	1	3	E-AHU-K2 CWV	89.00	4.00	44.50	?	200.0				X			X				X	X			X		X									
696	1	3	E-AHU-K3 HWV	43.00	4.00	21.50	?	200.0				X			X				X	X		X		X										
697	1	3	E-AHU-K3 CWV	89.00	4.00	44.50	?	200.0				X			X				X	X			X		X									
698	1	3	E-AHU-K4 HWV	43.00	4.00	21.50	?	200.0				X			X				X	X		X		X										
699	1	3	E-AHU-K4 CWV	89.00	4.00	44.50	?	200.0				X			X				X	X			X		X									
700	1	3	E-AHU-K5 HWV	43.00	4.00	21.50	?	200.0				X			X				X	X		X		X										

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-24
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																					Ordering Data				
																				2 WAY			3 WAY												
																				2VDC FAIL			2VDC FAIL											
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
701	1	3	E-AHU-K5 CWV	89.00	4.00	44.50	?	200.0				X			X				X	X			X		X									
702	1	3	E-AHU-N1 HWV	25.00	4.00	12.50	2.0	200.0				X			X				X	X								X		X				
703	1	3	E-AHU-N1 CWV	114.00	4.00	57.00	3.0	200.0				X			X				X	X						X		X						
704	1	3	E-AHU-N2 HWV	35.00	4.00	17.50	2.0	200.0				X			X				X	X		X		X										
705	1	3	E-AHU-N2 CWV	160.00	4.00	80.00	3.0	200.0				X			X				X	X			X		X									
706	1	3	E-AHU-P1 HWV	37.00	4.00	18.50	2.5	200.0				X			X				X	X		X		X										
707	1	3	E-AHU-P1 CWV	171.50	4.00	85.75	4.0	200.0				X			X				X	X			X		X									
708	1	3	E-AHU-P2 HWV	45.00	4.00	22.50	2.5	200.0				X			X				X	X		X		X										
709	1	3	E-AHU-P2 CWV	214.00	4.00	107.00	4.0	200.0				X			X				X	X			X		X									
710	1	3	E-AHU-Q1 PHV	50.00	4.00	25.00	2.5	200.0				X			X				X	X								X		X				
711	1	3	E-AHU-Q1 CWV	232.00	4.00	116.00	4.0	200.0				X			X				X	X						X		X						
712	1	3	E-AHU-Q1 HWV	19.00	4.00	9.50	2.0	200.0				X			X				X	X								X		X				
713	1	3	E-AHU-Q2 PHV	57.00	4.00	28.50	2.5	200.0				X			X				X	X		X		X										
714	1	3	E-AHU-Q2 CWV	255.00	4.00	127.50	4.0	200.0				X			X				X	X			X		X									
715	1	3	E-AHU-Q2 HWV	22.00	4.00	11.00	2.0	200.0				X			X				X	X		X		X										
716	1	3	E-AHU-R1 PHV	50.00	4.00	25.00	2.5	200.0				X			X				X	X		X		X										
717	1	3	E-AHU-R1 CWV	232.00	4.00	116.00	4.0	200.0				X			X				X	X			X		X									
718	1	3	E-AHU-R1 HWV	19.00	4.00	9.50	2.0	200.0				X			X				X	X		X		X										
719	1	3	E-AHU-R2 PHV	47.00	4.00	23.50	2.5	200.0				X			X				X	X		X		X										
720	1	3	E-AHU-R2CWV	219.00	4.00	109.50	4.0	200.0				X			X				X	X			X		X									
721	1	3	E-AHU-R2 HWV	18.00	4.00	9.00	2.0	200.0				X			X				X	X		X		X										
722	1	3	E-AHU-S1 HWV	56.80	4.00	28.40	?	200.0				X			X				X	X		X		X										
723	1	3	E-AHU-S1 CWV	154.00	4.00	77.00	?	200.0				X			X				X	X			X		X									
724	1	3	E-AHU-T1 PHV	40.00	4.00	20.00	2.5	200.0				X			X				X	X								X		X				
725	1	3	E-AHU-T1 CWV	179.00	4.00	89.50	4.0	200.0				X			X				X	X						X		X						
726	1	3	E-AHU-T1 HWV	11.00	4.00	5.50	1.3	200.0				X			X				X	X								X		X				
727	1	3	PUH-A1 HWV	4.40	4.00	2.20		200.0				X				X	X			X			X		X									
728	1	3	PUH-A2 HWV	6.10	4.00	3.05		200.0				X				X	X			X			X		X									
729	1	3	PUH-E1 HWV	1.80	4.00	0.90		200.0				X				X	X			X			X		X									
730	1	3	PUH-E2 HWV	1.80	4.00	0.90		200.0				X				X	X			X			X		X									
731	1	3	PUH-F1 HWV	1.80	4.00	0.90		200.0				X				X	X			X			X		X									
732	1	3	E-PUH-G1 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
733	1	3	E-PUH-G2 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
734	1	3	PUH-K1 HWV	4.40	4.00	2.20		200.0				X				X	X			X			X		X									
735	1	3	PUH-K2 HWV	4.40	4.00	2.20		200.0				X				X	X			X			X		X									
736	1	3	E-PUH-K3 HWV	2.00	4.00	1.00		200.0				X				X	X			X			X		X									
737	1	3	PUH-M1 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
738	1	3	PUH-N1 HWV	5.30	4.00	2.65		200.0				X				X	X			X			X		X									
739	1	3	PUH-N2 HWV	5.30	4.00	2.65		200.0				X				X	X			X			X		X									
740	1	3	PUH-Q1 HWV	6.10	4.00	3.05		200.0				X				X	X			X			X		X									
741	1	3	PUH-Q2 HWV	6.10	4.00	3.05		200.0				X				X	X			X			X		X									
742	1	3	PUH-S1 HWV	1.80	4.00	0.90		200.0				X				X	X			X			X		X									
743	1	3	PUH-T1 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
744	1	3	PUH-W1 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
745	1	3	PUH-AA1 HWV	3.50	4.00	1.75		200.0				X				X	X			X			X		X									
746	1	3	NAT VAV 101A	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X								B218B	TR24-3-T + NO			New Actuator Only
747	1	3	NAT VAV 101B	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X								B218B	TR24-3-T + NO			New Actuator Only
748	1	3	NAT VAV 102	2.70	4.00	1.35	0.8	75.0			200	X			X			X					X								B211B	TR24-3-T + NO			New Actuator Only
749	1	3	NAT VAV 103	1.20	4.00	0.60	0.8	75.0			200	X			X			X					X								B209B	TR24-3-T + NO			New Actuator Only
750	1	3	NAT VAV 104	1.20	4.00	0.60	0.8	75.0			200	X			X			X					X								B209B	TR24-3-T + NO			New Actuator Only

Delta Controls
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LEBANON, INDIANA 46052
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E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-25
JOB NUMBER:
J-2304001

	From Project Specifications										Valve Type and Actuator Specifications																		Ordering Data				
																				2 WAY		3 WAY											
																				2VDC FAIL		2VDC FAIL										
Reference	Quantity	Building / Phase	Valve Tag	Flow (GPM)	TargetPressure Drop (PSI)	Target Cv Rating	Pipe Size (in.)	Required Close-off Pressure (PSI)	Valve Size (in.)	Valve Cv	Actual Pressure drop (PSI)	Ball	Globe	Butterfly	24 VAC	120 VAC	On-Off	Tri-State	Modulating	Spring Rtn.	Switches	OPEN	CLOSED	OPEN	CLOSED	B TO AB OPEN	A TO AB OPEN	B TO AB OPEN	A TO AB OPEN	Valve #	Actuator #	Clip Position	Data Sheet	Notes
751	1	3	NAT VAV 105	2.70	4.00	1.35	0.8	75.0			200	X			X			X					X						B211B	TR24-3-T + NO			New Actuator Only
752	1	3	NAT VAV 106	2.70	4.00	1.35	0.8	75.0			200	X			X			X					X						B211B	TR24-3-T + NO			New Actuator Only
753	1	3	NAT VAV 108	8.10	4.00	4.05	1.0	75.0			200	X			X			X					X						B213B	TR24-3-T + NO			New Actuator Only
754	1	3	NAT VAV 112	3.30	4.00	1.65	1.0	75.0			200	X			X			X					X						B211B	TR24-3-T + NO			New Actuator Only
755	1	3	NAT VAV 113	1.20	4.00	0.60	0.8	75.0			200	X			X			X					X						B209B	TR24-3-T + NO			New Actuator Only
756	1	3	NAT VAV 114	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
757	1	3	NAT VAV 116	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
758	1	3	NAT VAV 117 (118)	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
759	1	3	NAT VAV 122	5.40	4.00	2.70	1.0	75.0			200	X			X			X					X						B213B	TR24-3-T + NO			New Actuator Only
760	1	3	NAT VAV 127	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
761	1	3	NAT VAV 132	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
762	1	3	NAT VAV 133	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
763	1	3	NAT VAV 135	1.20	4.00	0.60	0.8	75.0			200	X			X			X					X						B209B	TR24-3-T + NO			New Actuator Only
764	1	3	NAT VAV 138	12.20	4.00	6.10	1.5	75.0			200	X			X			X					X						B218B	TR24-3-T + NO			New Actuator Only
765	1	3	NAT AHU-1 CWV	152.00	4.00	76.00	4.0	200.0	3.0		150				X				X	X			X		X				HDP-200-05-L	GMB24-MFTX1 US + NC/FC P-10001			New Actuator Only
766	1	3	NAT AHU-1 HWV	109.00	4.00	54.50	3.0	200.0	3.0		150				X				X	X		X		X					HDP-160-05-L	GMB24-MFTX1 US + NO/FO P-10001			New Actuator Only
767	1	3	NAT AHU-2 CWV	152.00	4.00	76.00	4.0	200.0	3.0		150				X				X	X			X		X				HDP-200-05-L	GMB24-MFTX1 US + NC/FC P-10001			New Actuator Only
768	1	3	NAT AHU-2 HWV	109.00	4.00	54.50	3.0	200.0	3.0		150				X				X	X		X		X					HDP-160-05-L	GMB24-MFTX1 US + NO/FO P-10001			New Actuator Only
769	1	3	NAT AHU-3 CWV	166.00	4.00	83.00	4.0	200.0	4.0		150				X				X	X			X		X				EDP-210-05-L	SY3-24P-150 + NC/FC P-10001			New Actuator Only
770	1	3	NAT AHU-3 HWSV	58.00	4.00	29.00	2.5	200.0	2.0		150				X				X	X		X		X					HDP-125-05-L	AF24-MFT + NO/FO P-10001			New Actuator Only
771	1	3	NAT AHU-3 HWRV	71.00	4.00	35.50	2.5	200.0	2.0		150				X				X	X		X		X					HDP-125-05-L	AF24-MFT + NO/FO P-10001			New Actuator Only
772	1	3	NAT V-1 PHWS		4.00	0.00	10.0		10.0		50			X	X				X				X		X				F7250HSU	SY4-24 SR CONFIG X13			New Actuator Only
773	1	3	RHC-1 HWV	2.00	4.00	1.00	0.8	200.0			200	X			X				X				X						B210B	LR24-SR-2.0			New Actuator Only
774	1	3	RHC-2 HWV	4.00	4.00	2.00	0.8	200.0			200	X			X				X								X		B312B	LR24-SR-2.0			New Actuator Only
775	1	3	RHC-1 HWV	6.00	4.00	3.00	1.0	200.0			200	X			X				X								X		B312B	LR24-SR-2.0			New Actuator Only
776	1	3	RHC-2 HWV	1.50	4.00	0.75	0.8	200.0			200	X			X				X			X							B209B	LR24-SR-2.0			New Actuator Only
777	1	3	RHC-1 HWV	2.00	4.00	1.00	0.8	200.0			200	X			X				X			X							B210B	LR24-SR-2.0			New Actuator Only
778	1	3	CC-1 CHWV	38.00	4.00	19.00	2.0	200.0			200	X			X				X			X							B230B	LR24-SR-2.0			New Actuator Only
779	1	3	E BLDG EOL CW BYP		4.00	0.00						X			X				X														No Size Information Found
780	1	3	E BLDG EOL HW BYP		4.00	0.00						X			X				X														No Size Information Found
781	1	3	W BLDG EOL CW BYP		4.00	0.00						X			X				X														No Size Information Found
782	1	3	W BLDG EOL HW BYP		4.00	0.00						X			X				X														No Size Information Found
783	1	3	JELCC EOL CW BYP		4.00	0.00						X			X				X														No Size Information Found
784	1	3	JELCC EOL HW BYP		4.00	0.00						X			X				X														No Size Information Found

Delta Controls
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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-26
JOB NUMBER:
J-2304001

CONTROL DAMPERS

		SIZE		DAMPER	DAMPER OPTONS										SLEEVE				ACTUATOR						TAGGING	INSTALLATIO	NOTES
Item#	Qty	A - Width or D - Diameter	B - Height	Model Number	Frame (std = no flanges) Std,FF,RF,DF, or T-flange	* Blade Action = P=Parallel or O=Opposed	Linkage Std = Concealed Exp = Exposed	Blade Seals Standard = Y	Jamb Seals Standard = Y	Bearings Std=Y or TB=Vertical Blades	Extended Shaft = EXT Jackshafting = JS	SP100 End Switch	Switch Location = IN or OUT	Side Plate (Optional - Used for Ext Mnt Act & SP100 only)	Sleeve Length	Gage (20 ga Std for SD's)	Enclosure C,CR,CO	Material Galv (Std),SS,AL	* Pneumatic = P Electric = 120V, 24V, MOD	Actuator Model	External Mount	Internal Mount	Qty of Act per damper	Fail Position Std is Closed = C Open = O	Tag	Data Sheet	Notes
1	1	60"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-A1		New Act Only
2	1	48"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-A2		New Act Only
3	1	48	DIA	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-B1		New Act Only
4	1	16'	24"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-C1		New Act Only
5	1	15'	60"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-C2		New Act Only
6	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-C1		New Act Only
7	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-C2		New Actuator + Damper
8	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-C3		New Act Only
9	1	190"	22"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-C4		New Act Only
10	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-C5		New Act Only
11	1	56"	40"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-C6		New Actuator + Damper
12	1	56"	40"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-C7		New Actuator + Damper
13	1	120"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-D1		New Act Only
14	1	72"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-D2		New Act Only
15	1	60"	36"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-D1		New Actuator + Damper
16	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-D2		New Actuator + Damper
17	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-D3		New Actuator + Damper
18	1	44"	24"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-E1		New Act Only
19	1	44"	24"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-E2		New Act Only
20	1	56"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-E3		New Act Only
21	1	56"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-E4		New Act Only
22	1	56"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-E5		New Act Only
23	1	44"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-F1		New Act Only
24	1	44"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-F2		New Act Only
25	1	44"	28"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-F3		New Act Only
26	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-H1		New Actuator + Damper
27	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-H2		New Actuator + Damper
28	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-H3		New Actuator + Damper
29	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-H4		New Actuator + Damper
30	1	36"	60"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-J1		New Act Only
31	1	36"	60"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-J2		New Act Only
32	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	25 Mod		O		1	C	E-RH-J1		New Act Only
33	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-J2		New Actuator + Damper
34	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-J3		New Act Only
35	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K1		New Act Only
36	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K2		New Act Only
37	1	48"	48"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K3		New Act Only
38	1	48"	48"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K4		New Act Only
39	1	48"	48"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K5		New Act Only
40	1	48"	48"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K6		New Act Only
41	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K7		New Act Only
42	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-K8		New Act Only
43	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-L1		New Actuator + Damper
44	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-L2		New Actuator + Damper
45	1	80"	30"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	IH-M1		May not be a Ctrl. Dpr. - no act.
46	1	72	30	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-M2		New Act Only
47	1	24"	24"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-M1		New Act Only
48	1	24"	24"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-M2		New Act Only
49	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-N1		New Act Only
50	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-N2		New Act Only

Delta Controls
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-27
JOB NUMBER:
J-2304001

CONTROL DAMPERS

		SIZE		DAMPER	DAMPER OPTONS										SLEEVE				ACTUATOR						TAGGING	INSTALLATION	NOTES
Item#	Qty	A - Width or D - Diameter	B - Height	Model Number	Frame (std = no flanges) Std,FF,RF,DF, or T-flange	* Blade Action = P=Parallel or O=Opposed	Linkage Std = Concealed Exp = Exposed	Blade Seals Standard = Y	Jamb Seals Standard = Y	Bearings Std=Y or TB=Vertical Blades	Extended Shaft = EXT Jackshafting = JS	SP100 End Switch	Switch Location = IN or OUT	Side Plate (Optional - Used for Ext Mnt Act & SP100 only)	Sleeve Length	Gage (20 ga Std for SD's)	Enclosure C,CR,CO	Material Galv (Std), SS,AL	* Pneumatic = P Electric = 120V, 24V, MOD	Actuator Model	External Mount	Internal Mount	Qty of Act per damper	Fail Position Std is Closed = C Open = O	Tag	Data Sheet	Notes
51	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-N3		New Actuator + Damper
52	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-P1		New Act Only
53	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-P2		New Act Only
54	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-P3		New Actuator + Damper
55	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-P4		New Actuator + Damper
56	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-Q1		New Act Only
57	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-Q2		New Act Only
58	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-Q3		New Actuator + Damper
59	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-R1		New Actuator + Damper
60	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-R2		New Act Only
61	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-R3		New Actuator + Damper
62	1	42"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-R4		New Actuator + Damper
63	1	48"	48"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-IH-S1		New Act Only
64	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-S1		New Act Only
65	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-S2		New Act Only
66	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-S3		New Act Only
67	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T1		New Act Only
68	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T2		New Act Only
69	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T3		New Act Only
70	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T4		New Act Only
71	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T5		New Act Only
72	1	36"	36"	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	E-RH-T6		New Act Only
73	1	34"	24"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	IH-W1		New Actuator + Damper
74	1	18"	DIA		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	IH-W2		New Actuator + Damper
75	1	30"	30"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-AA1		New Actuator + Damper
76	1	36"	32"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-AA2		New Actuator + Damper
77	1	48"	36"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	RH-AA3		New Actuator + Damper
78	1	30"	30"		STD	P	STD	Y	Y	STD				Y				STD	24 Mod		O		1	C	IH-AA4		New Actuator + Damper
79	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q2 HOOD ISO DPR 1		New Act Only
80	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q2 HOOD ISO DPR 2		New Act Only
81	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q3 HOOD ISO DPR 1		New Act Only
82	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q3 HOOD ISO DPR 2		New Act Only
83	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q4 HOOD ISO DPR 1		New Act Only
84	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q4 HOOD ISO DPR 2		New Act Only
85	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q5 HOOD ISO DPR 1		New Act Only
86	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q5 HOOD ISO DPR 2		New Act Only
87	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q6 HOOD ISO DPR 1		New Act Only
88	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q6 HOOD ISO DPR 2		New Act Only
89	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q11 HOOD ISO DPR 1		New Act Only
90	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q11 HOOD ISO DPR 2		New Act Only
91	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q13 HOOD ISO DPR 1		New Act Only
92	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q13 HOOD ISO DPR 2		New Act Only
93	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q20 HOOD ISO DPR 1		New Act Only
94	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q20 HOOD ISO DPR 2		New Act Only
95	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q21 HOOD ISO DPR 1		New Act Only
96	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q21 HOOD ISO DPR 2		New Act Only
97	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q22 HOOD ISO DPR 1		New Act Only
98	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q22 HOOD ISO DPR 2		New Act Only
99	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q24 HOOD ISO DPR 1		New Act Only
100	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q24 HOOD ISO DPR 2		New Act Only

Delta Controls

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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-28
JOB NUMBER:
J-2304001

CONTROL DAMPERS

		SIZE		DAMPER	DAMPER OPTONS										SLEEVE				ACTUATOR						TAGGING	INSTALLATIO	NOTES
Item#	Qty	A - Width or D - Diameter	B - Height	Model Number	Frame (std = no flanges) Std,FF,RF,DF,or T-flange	* Blade Action = P=Parallel or O=Opposed	Linkage Std = Concealed Exp = Exposed	Blade Seals Standard = Y	Jamb Seals Standard = Y	Bearings Std=Y or TB=Vertical Blades	Extended Shaft = EXT Jackshafting = JS	SP100 End Switch	Switch Location = IN or OUT	Side Plate (Optional - Used for Ext Mnt Act & SP100 only)	Sleeve Length	Gage (20 ga Std for SD's)	Enclosure C,CR,CO	Material Galv (Std),SS,AL	* Pneumatic = P Electric = 120V, 24V, MOD	Actuator Model	External Mount	Internal Mount	Qty of Act per damper	Fail Position Std is Closed = C Open = O	Tag	Data Sheet	Notes
101	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q25 HOOD ISO DPR 1		New Act Only
102	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q25 HOOD ISO DPR 2		New Act Only
103	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q26 HOOD ISO DPR 1		New Act Only
104	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q26 HOOD ISO DPR 2		New Act Only
105	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q27 HOOD ISO DPR 1		New Act Only
106	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q27 HOOD ISO DPR 2		New Act Only
107	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q28 HOOD ISO DPR 1		New Act Only
108	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q28 HOOD ISO DPR 2		New Act Only
109	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q29 HOOD ISO DPR 1		New Act Only
110	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-Q29 HOOD ISO DPR 2		New Act Only
111	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R6 HOOD ISO DPR 1		New Act Only
112	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R6 HOOD ISO DPR 2		New Act Only
113	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R8 HOOD ISO DPR 1		New Act Only
114	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R8 HOOD ISO DPR 2		New Act Only
115	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R9 HOOD ISO DPR 1		New Act Only
116	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R9 HOOD ISO DPR 2		New Act Only
117	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R12 HOOD ISO DPR 1		New Act Only
118	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R12 HOOD ISO DPR 2		New Act Only
119	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R13 HOOD ISO DPR 1		New Act Only
120	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R13 HOOD ISO DPR 2		New Act Only
121	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R15 HOOD ISO DPR 1		New Act Only
122	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R15 HOOD ISO DPR 2		New Act Only
123	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R16 HOOD ISO DPR 1		New Act Only
124	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R16 HOOD ISO DPR 2		New Act Only
125	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R19 HOOD ISO DPR 1		New Act Only
126	1	?	?	ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC	TFB24	O		1		EF-R19 HOOD ISO DPR 2		New Act Only
127	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-A2 OAD		New Act w/ End Sw + Damper
128	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-AA1 OAD		New Actuator + Damper
129	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-AA1 RAD		New Actuator + Damper
130	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C1 OAD		New Actuator + Damper
131	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C1 RAD		New Actuator + Damper
132	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J1 OAD		New Actuator + Damper
133	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J1 RAD		New Actuator + Damper
134	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J2 OAD		New Actuator + Damper
135	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J2 RAD		New Actuator + Damper
136	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J3 OAD		New Actuator + Damper
137	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-J3 RAD		New Actuator + Damper
138	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C3 OAD		New Act w/ End Sw + Damper
139	1			EBO	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C3 FBD		New Act Only
140	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C2 OAD		New Act w/ End Sw + Damper
141	1			EBO	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C2 FBD		New Act Only
142	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C5 OAD		New Actuator + Damper
143	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C5 RAD		New Actuator + Damper
144	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C5 ISO		New Act w/ End Sw Only
145	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K6 OAD		New Actuator + Damper
146	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K6 RAD		New Actuator + Damper
147	1			EBO	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K6 FBD		New Act Only
148	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-M1 OAD		New Actuator + Damper
149	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-M1 RAD		New Actuator + Damper
150	1			EBO	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-M1 FBD		New Act Only

PHASE 3 DAMPER SCHEDULE (3 OF 5)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-29
JOB NUMBER:
J-2304001

CONTROL DAMPERS

		SIZE		DAMPER	DAMPER OPTONS										SLEEVE				ACTUATOR						TAGGING	INSTALLATIO	NOTES
Item#	Qty	A - Width or D - Diameter	B - Height	Model Number	Frame (std = no flanges) Std,FF,RF, DF, or T-flange	* Blade Action = P=Parallel or O=Opposed	LinKage Std = Concealed Exp = Exposed	Blade Seals Standard = Y	Jamb Seals Standard = Y	Bearings Std=Y or TB=Vertical Blades	Extended Shaft = EXT Jackshafting = JS	SP100 End Switch	Switch Location = IN or OUT	Side Plate (Optional - Used for Ext Mnt Act & SP100 only)	Sleeve Length	Gage (20 ga Std for SD's)	Enclosure C,CR,CO	Material Galv (Std),SS,AL	* Pneumatic = P Electric = 120V, 24V, MOD	Actuator Model	External Mount	Internal Mount	Qty of Act per damper	Fail Position Std is Closed = C Open = O	Tag	Data Sheet	Notes
151	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-M2 OAD		New Actuator + Damper
152	1			NEW	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-M2 RAD		New Actuator + Damper
153	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C4 OAD		New Act Only
154	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C4 MIN OAD		New Act Only
155	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-C4 RAD		New Act Only
156	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-A1 OAD		New Act Only
157	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-A1 MIN OAD		New Act Only
158	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-A1 RAD		New Act Only
159	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-B1 OAD		New Act Only
160	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-B1 MIN OAD		New Act Only
161	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-B1 RAD		New Act Only
162	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-D1 OAD		New Act Only
163	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-D1 RAD		New Act Only
164	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-D2 OAD		New Act Only
165	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-D2 RAD		New Act Only
166	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E1 OAD		New Act Only
167	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E1 MIN OAD		New Act Only
168	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E1 RAD		New Act Only
169	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E2 OAD		New Act Only
170	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E2 MIN OAD		New Act Only
171	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E2 RAD		New Act Only
172	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E3 OAD		New Act Only
173	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-E3 RAD		New Act Only
174	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-F1 OAD		New Act Only
175	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-F1 MIN OAD		New Act Only
176	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-F1 RAD		New Act Only
177	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H1 OAD		New Act Only
178	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H1 MIN OAD		New Act Only
179	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H1 RAD		New Act Only
180	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H2 OAD		New Act Only
181	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H2 MIN OAD		New Act Only
182	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-H2 RAD		New Act Only
183	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K1 OAD		New Act Only
184	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K1 RAD		New Act Only
185	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K2 OAD		New Act Only
186	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K2 RAD		New Act Only
187	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K3 OAD		New Act Only
188	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K3 RAD		New Act Only
189	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K4 OAD		New Act Only
190	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K4 RAD		New Act Only
191	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC		O		1		AHU-K4 OA INTAKE		New Act Only
192	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K5 OAD		New Act Only
193	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-K5 RAD		New Act Only
194	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-N1 OAD		New Act Only
195	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-N1 RAD		New Act Only
196	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-N2 OAD		New Act Only
197	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-N2 RAD		New Act Only
198	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-P1 OAD		New Act Only
199	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-P1 RAD		New Act Only
200	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-P2 OAD		New Act Only

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-30
JOB NUMBER:
J-2304001

CONTROL DAMPERS

		SIZE		DAMPER	DAMPER OPTONS										SLEEVE				ACTUATOR						TAGGING	INSTALLATIO	NOTES
Item#	Qty	A - Width or D - Diameter	B - Height	Model Number	Frame (std = no flanges) Std,FF, RF, DF, or T-flange	* Blade Action = P=Parallel or O=Opposed	Linkage Std = Concealed Exp = Exposed	Blade Seals Standard = Y	Jamb Seals Standard = Y	Bearings Std=Y or TB=Vertical Blades	Extended Shaft = EXT Jackshafting = JS	SP100 End Switch	Switch Location = IN or OUT	Side Plate (Optional - Used for Ext Mnt Act & SP100 only)	Sleeve Length	Gage (20 ga Std for SD's)	Enclosure C,CR,CO	Material Galv (Std),SS,AL	* Pneumatic = P Electric = 120V, 24V, MOD	Actuator Model	External Mount	Internal Mount	Qty of Act per damper	Fail Position Std is Closed = C Open = O	Tag	Data Sheet	Notes
201	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-P2 RAD		New Act Only
202	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-Q1 OAD		New Act Only
203	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-Q1 RAD		New Act Only
204	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-Q2 OAD		New Act Only
205	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-Q2 RAD		New Act Only
206	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-R1 OAD		New Act Only
207	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-R1 RAD		New Act Only
208	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-R2 OAD		New Act Only
209	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-R2 RAD		New Act Only
210	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-S1 OAD		New Act Only
211	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-S1 MIN OAD		New Act Only
212	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-S1 RAD		New Act Only
213	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-T1 OAD		New Act Only
214	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		AHU-T1 RAD		New Act Only
215	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC		O		1		NAT AHU-1 EAD		New Act w/ End Sw Only
216	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-1 RECIRC DPR		New Act Only
217	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-1 FBD		New Act Only
218	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-1 OAD		New Act Only
219	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC		O		1		NAT AHU-2 EAD		New Act w/ End Sw Only
220	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-2 RECIRC DPR		New Act Only
221	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-2 FBD		New Act Only
222	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-2 OAD		New Act Only
223	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 VAC		O		1		NAT AHU-3 EAD		New Act w/ End Sw Only
224	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-3 FBD		New Act Only
225	1			ETR	STD	P	STD	Y	Y	STD				Y				STD	24 MOD		O		1		NAT AHU-3 MAD		New Act Only

PHASE 3 DAMPER SCHEDULE (5 OF 5)

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-31
JOB NUMBER:
J-2304001

AHU SCHEDULE

IDENTITY DATA					SUPPLY FAN DATA					SUPPLY FAN ELECTRICAL				PREHEAT COIL DATA			COOLING COIL DATA			REHEAT COIL DATA			MIN OA (%)	NOTES
MARK	MANUF	MODEL	LOCATION	AREA SERVED	AIRFLOW (CFM)	RPM	MOTOR QTY	MOTOR HP EACH	MOTOR BHP EACH	VOLTS (V)	PH	FREQ (HZ)	FLA (A)	AIRFLOW (CFM)	FLOW (GPM)	VALVE	AIRFLOW (CFM)	FLOW (GPM)	VALVE	AIRFLOW (CFM)	FLOW (GPM)	VALVE		
AHU-A2	TRANE	CSAA012	2ND FLOOR MECH ROOM	WEIGHT ROOM LOCKERS	6,000	1,843	1	7.5	5.7	460	3	60	9.8	6,000	30	2P	6,000	73	2	6,000	13	2	100	
AHU-C1	TRANE	CSAA008	TUNNEL MECH ROOM	CAFETERIA SUPPORT	3,600	2,110	1	5.0	3.2	460	3	60	6.7	2,340	6	2P	3,600	22	2	-	-	-	30	
AHU-C2	TRANE	CSAA035	TUNNEL MECH ROOM	KITCHEN MAKEUP AIR	13,700	1,982	2	7.5	6.7	460	3	60	9.8	13,700	51	2P	13,700	167	2	13,700	35	2	100	
AHU-C3	TRANE	CSAA025	TUNNEL MECH ROOM	SERVING LINE	10,000	1,586	1	10.0	8.7	460	3	60	12.5	6,500	28	2P	10,000	122	2	10,000	25	2	100	
AHU-C5	TRANE	CSAA050	TUNNEL MECH ROOM	CAFETERIA	24,750	1,408	2	15.0	11.0	460	3	60	21.0	25,000	45	2P	25,000	178	2	-	-	-	40	
AHU-J1	TRANE	CSAA030	PENTHOUSE NEAR CENTRAL PLANT	PERFORMING ARTS	15,500	1,421	1	15.0	13.2	460	3	60	21.0	10,075	21	2	15,000	98	2	-	-	-	30	
AHU-J2	TRANE	CSAA025	PENTHOUSE NEAR CENTRAL PLANT	PERFORMING ARTS	12,200	1,720	1	15.0	10.6	460	3	60	18.5	7,930	16	2	12,200	74	2	-	-	-	25	
AHU-J3	MARCRAFT	CUSTOM	ROOFTOP	STUDENT SERVICES	9,000	1,775	1	10.0	8.2	460	3	60	14.0	9,000	42	2P	9,000	73	2	-	-	-	50	
AHU-K6	TRANE	CSAA008	2ND FLOOR MECH ROOM	LOCKER ROOMS	3,100	2,372	1	5.0	3.2	460	3	60	6.7	3,200	18	2P	3,200	23	2	3,200	10	2	50	
AHU-M1	TRANE	CSAA035	PENTHOUSE	LOCKER ROOMS	15,000	1,710	2	7.5	6.9	460	3	60	9.4	12,000	34	2	15,000	107	2	-	-	-	50	
AHU-M2	TRANE	CSAA050	PENTHOUSE	SOUTH GYM	25,000	1,458	2	15.0	12.1	460	3	60	21.0	25,000	40	2P	25,000	208	2	25,000	72	2	25	
AHU-AA1	TRANE	CSAA040	PENTHOUSE	PERFORMING ARTS ADDITION	19,000	1,861	2	10.0	8.5	460	3	60	12.5	11,500	25	2P	19,000	117	2	-	-	-	40	

1 - Preheat Coil is integral face / bypass
* Valve nomenclature: 2 = Two Way, 3 = Three Way, 2P = Two Way Pumped, 3P = Three Way Pumped.

EXISTING AIR HANDLING UNIT SCHEDULE

MARK	EXISTING TRANE MODEL #	LOCATION	AREA SERVED	CONFIGURATION	MOTOR HP	REPLACE MOTOR?	AIRFLOW (CFM)	NEW AIRFLOW (CFM)	PREHEAT COIL NEW FLOW (GPM)	PREHEAT COIL NEW VALVE	HEATING COIL NEW FLOW (GPM)	HEATING COIL NEW VALVE	COOLING COIL NEW FLOW (GPM)	COOLING COIL NEW VALVE	EXISTING MIN. OCC. AIRFLOW (%)	NEW MIN. OCC. AIRFLOW (%)	NOTES
E-AHU-A1	MCCA035	2ND FLOOR MECH ROOM	WEIGHT ROOM	VAV PHC-CC-2HC	20	YES	13,700	13,700	62.0	2P	72.0	2	182.0	2	100%	50%	
E-AHU-B1	MCCA040	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	40	NO	21,400	17,000	-	-	33.0	2P	199.0	2	35%	35%	
E-AHU-C4	MCCA040	TUNNEL MECH ROOM	CLASSROOMS	VAV 2HC-CC	40	YES	23,100	20,000	50.0	2P	40.0	2	497.0	2	35%	35%	
E-AHU-D1	MCCA035	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	25	YES	16,200	16,200	-	-	25.0	2P	150.0	2	35%	35%	
E-AHU-D2	MCCA030	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	25	YES	14,000	14,000	-	-	19.0	2P	125.0	2	30%	30%	
E-AHU-E1	MCCA025	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	20	YES	11,510	9,500	-	-	13.0	2P	95.0	2	25%	30%	
E-AHU-E2	MCCA035	TUNNEL MECH ROOM	LIBRARY	VAV HC-CC	25	NO	16,960	17,000	-	-	19.0	2P	139.0	2	25%	30%	
E-AHU-E3	MCCA017	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	15	YES	8,360	6,000	-	-	6.0	2P	64.0	2	20%	30%	
E-AHU-F1	MCCA035	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	30	YES	18,180	13,000	-	-	14.0	2P	153.0	2	20%	35%	
E-AHU-G1	MCCA040	2ND FLOOR MECH ROOM	AUDITORIUM	CONSTANT HC-CC	20	NO	19,000	19,000	-	-	63.0	2P	179.0	2	40%	40%	1
E-AHU-G2	MCCA040	2ND FLOOR MECH ROOM	AUDITORIUM	CONSTANT HC-CC	20	NO	20,900	20,900	-	-	65.0	2P	188.0	2	40%	40%	1
E-AHU-G3	MCCA030	2ND FLOOR MECH ROOM	STUDENT COMMONS	CONSTANT HC-CC	15	NO	15,000	15,000	-	-	42.0	2P	113.0	2	40%	40%	1
E-AHU-G4	MCCA030	2ND FLOOR MECH ROOM	LECTURE 1ST & 2ND	VAV HC-CC	25	NO	14,625	14,625	-	-	16.0	2P	123.0	2	40%	40%	1
E-AHU-G5	MCCA021	2ND FLOOR MECH ROOM	WEST STAGE	VAV HC-CC	15	NO	10,400	10,400	-	-	22.0	2P	77.0	2	40%	40%	1
E-AHU-G6	MCCA030	SCENE SHOP MEZZANINE	EAST STAGE	VAV HC-CC	15	NO	13,300	13,300	-	-	28.0	2P	99.0	2	40%	40%	1
E-AHU-H1	MCCA040	TUNNEL MECH ROOM	CLASSRM & HEALTH CTR	VAV HC-CC	30	YES	19,400	16,000	-	-	26.0	2P	171.0	2	30%	30%	
E-AHU-H2	MCCA030	TUNNEL MECH ROOM	CLASSROOMS	VAV HC-CC	25	YES	13,500	13,500	-	-	18.0	2P	121.0	2	30%	30%	
E-AHU-K1	MCCA030	PENTHOUSE	MAIN GYM	VAV HC-CC	15	YES	15,000	15,000	-	-	43.0	2	89.0	2	25%	25%	
E-AHU-K2	MCCA030	PENTHOUSE	MAIN GYM	VAV HC-CC	15	YES	15,000	15,000	-	-	43.0	2	89.0	2	25%	25%	
E-AHU-K3	MCCA030	PENTHOUSE	MAIN GYM	VAV HC-CC	15	YES	15,000	15,000	-	-	43.0	2	89.0	2	25%	25%	
E-AHU-K4	MCCA030	PENTHOUSE	MAIN GYM	VAV HC-CC	15	YES	15,000	15,000	-	-	43.0	2	89.0	2	25%	25%	
E-AHU-K5	MCCA030	PENTHOUSE	MAIN GYM	VAV HC-CC	15	YES	15,000	15,000	-	-	43.0	2	89.0	2	25%	25%	
E-AHU-N1	MCCA025	PENTHOUSE	ART	VAV HC-CC	20	YES	12,300	13,000	-	-	25.0	3P	114.0	3	40%	40%	
E-AHU-N2	MCCA035	PENTHOUSE	CLASSROOMS	VAV HC-CC	30	YES	17,200	13,500	-	-	35.0	2P	160.0	2	40%	40%	
E-AHU-P1	MCCA040	PENTHOUSE	ADMINISTRATION	VAV HC-CC	30	YES	18,500	18,200	-	-	37.0	2P	171.5	2	40%	40%	
E-AHU-P2	MCCA050	PENTHOUSE	CLASSROOMS	VAV HC-CC	40	YES	22,800	17,200	-	-	45.0	2P	214.0	2	40%	40%	
E-AHU-Q1	MCCA035	PENTHOUSE	CLASSROOMS	VAV PHC-CC-HC	30	NO	17,400	15,000	50.0	2P	19.0	3	232.0	3	85%	35%	
E-AHU-Q2	MCCA040	PENTHOUSE	SCIENCE LABS	VAV PHC-CC-HC	30	YES	19,800	17,500	57.0	2P	22.0	2	255.0	2	85%	85%	
E-AHU-R1	MCCA035	PENTHOUSE	CLASSROOMS	VAV PHC-CC-HC	30	YES	17,400	14,000	50.0	2P	19.0	2	232.0	2	85%	35%	
E-AHU-R2	MCCA035	PENTHOUSE	CLASSROOMS	VAV PHC-CC-HC	30	YES	16,500	13,500	47.0	2P	18.0	2	219.0	2	85%	35%	
E-AHU-S1	MCCA040	2ND FLOOR MECH ROOM	PERF. ARTS CLASS	VAV HC-CC	30	NO	20,000	20,000	-	-	56.8	2P	154.0	2	30%	30%	
E-AHU-T1	MCCA025	PENTHOUSE	ROTC	VAV PHC-HC-CC	20	NO	13,020	12,000	40.0	2P	11.0	3	179.0	3	30%	30%	
NAT AHU-1	ETR	NATATORIUM	NATATORIUM	VAV ERU	25	NO	33,600	?	-	-	109.0	2	152.0	2	SEE SOO	SEE SOO	2
NAT AHU-2	ETR	NATATORIUM	NATATORIUM	VAV ERU	25	NO	33,600	?	-	-	109.0	2	152.0	2	SEE SOO	SEE SOO	2
NAT AHU-3	ETR	NATATORIUM	NATATORIUM	VAV ERU	40	NO	25,000	?	71.0	2	58.0	2	166.0	2	SEE SOO	SEE SOO	2

1 - Information only, AHUs installed in Phase 2. No Phase 3 scope for these units.
2 - Nadatorium AHUs will be provided with new VFDs and all BAS controls.
* Valve nomenclature: 2 = Two Way, 3 = Three Way, 2P = Two Way Pumped, 3P = Three Way Pumped.

PHASE 3 NEW AND EXISTING AHU SCHEDULES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES

DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS

DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-32
JOB NUMBER:
J-2304001

HYDRONIC CONVECTOR SCHEDULE

IDENTITY DATA				TYPE	HEATING DATA		CONTROLLED FROM	NOTES
MARK	MANUF	MODEL	ENCLOSURE MODEL		CAPACITY (BTUH)	FLOW (GPM)		
CV-D1	TRANE	SW	38"L / 26" H / 6" D	SURFACE	2,500	0.3	VAV D2-01	NEW
CV-D2	TRANE	SW	38"L / 26" H / 6" D	SURFACE	2,500	0.3	VAV D2-06	NEW
CV-D3	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV D2-08	NEW
CV-D4	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV D2-09	NEW
CV-D5	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV D1-15	NEW
CV-D6	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV D1-09	NEW
CV-D7	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV D2-05	NEW
CV-D8	TRANE	SW	44"L / 24" H / 4" D	SURFACE	2,900	0.3	VAV D2-10	NEW
CV-D9	TRANE	SW	44"L / 24" H / 4" D	SURFACE	2,900	0.3	VAV D2-14	NEW
CV-E1	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV E3-04	NEW
CV-F1	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV F1-03	NEW
CV-F2	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV F1-01	NEW
CV-F3	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV F1-08	NEW
CV-F4	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV F1-09	NEW
CV-F5	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV E3-03	NEW
CV-F6	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV F1-21	NEW
CV-F7	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV F1-19	NEW
E-CV-H1	EXIST	-	-	RECESSED	2,100	0.2	VAV H1-13	ETR
E-CV-H2	EXIST	-	-	RECESSED	2,100	0.2	VAV H1-14	ETR
CV-H3	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV H1-09	NEW
CV-H4	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV H1-04	NEW
CV-H5	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV H1-01	NEW
E-CV-H6	EXIST	-	-	SURFACE	6,900	0.7	VAV H1-24	ETR
E-CV-H7	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV H1-25	ETR
CV-J1	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV J2-08	NEW
CV-J2	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV J2-09	NEW
E-CV-L1	EXIST	-	-	RECESSED	2,100	0.2	VAV S1-18	ETR
E-CV-L2	EXIST	-	-	RECESSED	2,100	0.2	VAV S1-01	ETR
CV-L3	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV J1-20	NEW
CV-M1	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV M1-04	NEW
CV-M2	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV J1-06	NEW
CV-M3	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV M1-02	NEW
CV-M4	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV M1-03	NEW
E-CV-M5	EXIST	T6	-	RECESSED	2,100	0.2	AHU-K6	ETR
E-CV-M6	EXIST	T4	-	RECESSED	2,100	0.2	AHU-K6	ETR
E-CV-M7	EXIST	T3	-	RECESSED	2,100	0.2	AHU-K6	ETR
CV-M8	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV M1-07	NEW
E-CV-N1	EXIST	N2	-	SEMI-RECESSED	6,900	0.7	VAV B1-01	ETR
CV-N2	TRANE	SG	44"L / 26" H / 6" D	SEMI-RECESSED	4,600	0.5	VAV B1-03	NEW
E-CV-N3	EXIST	N5	-	RECESSED	3,100	0.3	VAV B1-02	ETR
CV-N4	TRANE	SG	44"L / 26" H / 6" D	SEMI-RECESSED	4,600	0.5	VAV N2-01	NEW
CV-N5	TRANE	SG	44"L / 26" H / 6" D	SEMI-RECESSED	4,600	0.5	VAV N2-04	NEW
CV-P1	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV P1-10	NEW
CV-P2	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV P1-11	NEW
CV-P3	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV P1-07	NEW
CV-P4	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV P1-28	NEW
E-CV-P5	EXIST	-	-	SURFACE	6,900	0.7	VAV P1-27	ETR
CV-P6	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV P2-02	NEW
CV-P7	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV P2-25	NEW
CV-P8	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV P2-01	NEW
CV-P9	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV P2-03	NEW
E-CV-Q1	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV Q1-12	ETR
CV-Q2	TRANE	RG	32"L / 24" H / 4" D	RECESSED	2,000	0.2	VAV Q2-10	NEW
E-CV-R1	EXIST	-	-	RECESSED	3,100	0.3	VAV R1-03	ETR
E-CV-R2	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV-R1-07	ETR
E-CV-R3	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV-R1-08	ETR
E-CV-R4	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV-R1-09	ETR
E-CV-R5	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV R2-09	ETR
E-CV-R6	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV R2-04	ETR
E-CV-R7	EXIST	-	-	SEMI-RECESSED	6,900	0.7	VAV R2-08	ETR
E-CV-S1	EXIST	-	-	RECESSED	2,100	0.2	VAV S1-05	ETR
E-CV-S2	EXIST	-	-	RECESSED	3,100	0.3	VAV S1-17	ETR
E-CV-S3	EXIST	-	-	RECESSED	2,100	0.2	VAV S1-16	ETR
CV-AA1	TRANE	SG	44"L / 26" H / 6" D	SURFACE	4,600	0.5	VAV AA1-07	NEW
CV-AA2	TRANE	SG	44"L / 26" H / 6" D	RECESSED	4,600	0.5	VAV AA1-05	NEW
CV-AA3	TRANE	RG	32"L / 24" H / 4" D	SURFACE	2,000	0.2	VAV AA1-03	NEW
CV-AA4	TRANE	RG	32"L / 24" H / 4" D	SEMI-RECESSED	2,000	0.2	VAV AA1-04	NEW

PUMP SCHEDULE

IDENTITY DATA				TYPE	FLUID DATA		MOTOR DATA		ELECTRICAL DATA			CONTROLLED FROM	NOTES
MARK	MANUF	MODEL	SYSTEM SERVED		FLUID TYPE	FLOW (GPM)	HP	SPEED (RPM)	VOLTS (V)	PH	FREQ (HZ)		
IP-A1	GRUNDFOS	UPS 50-80/2 F	HHW	INLINE CIRCULATOR	WATER	75	0.75	3,500	460	3	60	E-AHU-A1	
IP-A2	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	55	0.75	3,500	460	3	60	AHU-A2	
IP-B1	GRUNDFOS	UPS 50-80/2 F	HHW	INLINE CIRCULATOR	WATER	32	0.75	3,500	460	3	60	E-AHU-B1	
IP-C1	GRUNDFOS	UPS 32-80 F F	HHW	INLINE CIRCULATOR	WATER	5	0.50	3,500	460	3	60	AHU-C1	
IP-C2	GRUNDFOS	UPS 50-80/2 F	HHW	INLINE CIRCULATOR	WATER	75	0.75	3,500	460	3	60	AHU-C2	
IP-C3	GRUNDFOS	UPS 50-80/2 F	HHW	INLINE CIRCULATOR	WATER	65	0.75	3,500	460	3	60	AHU-C3	
IP-C4	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	50	0.75	3,500	460	3	60	E-AHU-C4	
IP-C5	GRUNDFOS	UPS 50-160 F	HHW	INLINE CIRCULATOR	WATER	150	3.00	3,500	460	3	60	AHU-C5	
IP-D1	GRUNDFOS	UPS 32-80 F	HHW	INLINE CIRCULATOR	WATER	25	0.50	3,500	460	3	60	E-AHU-D1	
E-IP-D2	EXISTING		HHW	INLINE CIRCULATOR	WATER	18	0.75	-	460	3	60	E-AHU-D2	
IP-E1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	13	0.75	3,500	460	3	60	E-AHU-E1	
IP-E2	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	19	0.75	3,500	460	3	60	E-AHU-E2	
IP-E3	GRUNDFOS	UPS 32-80 F	HHW	INLINE CIRCULATOR	WATER	10	0.50	3,500	460	3	60	E-AHU-E3	
IP-F1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	14	0.75	3,500	460	3	60	E-AHU-F1	
IP-H1	GRUNDFOS	UPS 32-80 F	HHW	INLINE CIRCULATOR	WATER	25	0.50	3,500	460	3	60	E-AHU-H1	
IP-H2	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	18	0.75	3,500	460	3	60	E-AHU-H2	
IP-J3	GRUNDFOS	UPS 32-160F	HHW	INLINE CIRCULATOR	WATER	40	0.75	3,500	460	3	60	AHU-J3	
IP-K6	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	20	0.75	3,500	460	3	60	AHU-K6	
IP-M1	GRUNDFOS	UPS 50-80/2 F	HHW	INLINE CIRCULATOR	WATER	34	0.75	3,500	460	3	60	AHU-M1	
IP-M2	GRUNDFOS	UPS 75-69 F	HHW	INLINE CIRCULATOR	WATER	130	1.50	3,500	460	3	60	AHU-M2	
E-IP-N1	EXISTING		HHW	INLINE CIRCULATOR	WATER	25	0.75	-	460	3	60	E-AHU-N1	
IP-N2	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	35	0.75	3,500	460	3	60	E-AHU-N2	
IP-P1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	37	0.75	3,500	460	3	60	E-AHU-P1	
E-IP-P2	EXISTING		HHW	INLINE CIRCULATOR	WATER	48	1.00	-	460	3	60	E-AHU-P2	
IP-Q1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	50	0.75	3,500	460	3	60	E-AHU-Q1	
E-IP-Q2	EXISTING		HHW	INLINE CIRCULATOR	WATER	57	1.00	-	460	3	60	E-AHU-Q2	
IP-R1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	50	0.75	3,500	460	3	60	E-AHU-R1	
IP-R2	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	47	0.75	3,500	460	3	60	E-AHU-R2	
IP-S1	GRUNDFOS	UPS 32-160 F	HHW	INLINE CIRCULATOR	WATER	57	0.75	3,500	460	3	60	E-AHU-S1	
IP-T1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	50	0.75	3,500	460	3	60	E-AHU-T1	
IP-AA1	GRUNDFOS	UPS 40-80/2 F	HHW	INLINE CIRCULATOR	WATER	50	0.50	3,500	460	3	60	AHU-AA1	

SPLIT SYSTEM SCHEDULE

IDENTITY DATA			CONTROL DATA			
MARK	MANUF	MODEL	LOCATION	SERVES	SPACE TEMP MONITORED FROM	NOTES
SS-B1	DAIKIN	FTKB09	D108C	IDF	VAV B1-03	
SS-B2	DAIKIN	FTKB09	C200	IDF	VAV C4-23	
SS-D1	DAIKIN	FTKB09	A115	IDF	VAV D2-02	
SS-E1	DAIKIN	FTKB09	A134	IDF	VAV E3-05	
SS-F1	DAIKIN	FTKB09	A226K	IDF	VAV E2-12	
SS-G1	DAIKIN	FTKB09	L106	AREA G STORAGE	VAV G4-01	Ph 1a, confirm complete
SS-H1	DAIKIN	FTKB09	L205	IDF	VAV H1-21	
SS-J1	DAIKIN	FTKB09	K112	IDF	VAV J2-07	
SS-J2	DAIKIN	FTKB09	D219A	IDF	VAV J2-12	
SS-L1	DAIKIN	FTKB09	F106	STORAGE	VAV S1-18	
SS-P1	DAIKIN	FTKB09	B108L	IDF	VAV P1-02	
SS-R1	DAIKIN	FTKB09	N110	IDF	VAV R1-08	
SS-Q1	DAIKIN	FTKB09	N123	SCIENCE PREP	VAV Q1-06	

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-33
JOB NUMBER:
J-2304001

VARIABLE FREQUENCY DRIVE (VFD) SCHEDULE

ITEM	DESIGNATION (FROM MECH. PLANS)	QUANTITY	UNIT LOCATION	UNIT SERVES	HP	VOLTAGE / PHASE	HZ	DISCONNECT	BYPASS	BACNET MS/TP	MODEL NUMBER	NOTES
1	AHU-A2	1	2ND FLOOR MECH ROOM	WEIGHT ROOM LOCKERS	7.5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
2	AHU-C1	1	TUNNEL MECH ROOM	CAFETERIA SUPPORT	5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
3	AHU-C2A	1	TUNNEL MECH ROOM	KITCHEN MAKEUP AIR	7.5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
4	AHU-C2B	1	TUNNEL MECH ROOM	KITCHEN MAKEUP AIR	7.5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
5	AHU-C3	1	TUNNEL MECH ROOM	SERVING LINE	10	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
6	AHU-C5A	1	TUNNEL MECH ROOM	CAFETERIA	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
7	AHU-C5B	1	TUNNEL MECH ROOM	CAFETERIA	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
8	AHU-J1	1	PENTHOUSE NEAR CENTRAL PLANT	PERFORMING ARTS	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
9	AHU-J2	1	PENTHOUSE NEAR CENTRAL PLANT	PERFORMING ARTS	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
10	AHU-J3	1	ROOFTOP	STUDENT SERVICES	10	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
11	AHU-K6	1	2ND FLOOR MECH ROOM	LOCKER ROOMS	5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	3
12	AHU-M1A	1	PENTHOUSE	LOCKER ROOMS	7.5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
13	AHU-M1B	1	PENTHOUSE	LOCKER ROOMS	7.5	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
14	AHU-M2A	1	PENTHOUSE	SOUTH GYM	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
15	AHU-M2B	1	PENTHOUSE	SOUTH GYM	15	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
16	AHU-AA1A	1	PENTHOUSE	PERFORMING ARTS ADDITION	10	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
17	AHU-AA1B	1	PENTHOUSE	PERFORMING ARTS ADDITION	10	460/3	60.0	Yes	Yes	Y	ABB ACH-580	1, 3
18	E-AHU-A1	1	2ND FLOOR MECH ROOM	WEIGHT ROOM	20	?	60.0	Yes	Yes	Y	ABB ACH-580	3
19	E-AHU-B1	1	TUNNEL MECH ROOM	CLASSROOMS	40	?	60.0	Yes	Yes	Y	ABB ACH-580	3
20	E-AHU-C4	1	TUNNEL MECH ROOM	CLASSROOMS	40	?	60.0	Yes	Yes	Y	ABB ACH-580	3
21	E-AHU-D1	1	TUNNEL MECH ROOM	CLASSROOMS	25	?	60.0	Yes	Yes	Y	ABB ACH-580	3
22	E-AHU-D2	1	TUNNEL MECH ROOM	CLASSROOMS	25	?	60.0	Yes	Yes	Y	ABB ACH-580	3
23	E-AHU-E1	1	TUNNEL MECH ROOM	CLASSROOMS	20	?	60.0	Yes	Yes	Y	ABB ACH-580	3
24	E-AHU-E2	1	TUNNEL MECH ROOM	LIBRARY	25	?	60.0	Yes	Yes	Y	ABB ACH-580	3
25	E-AHU-E3	1	TUNNEL MECH ROOM	CLASSROOMS	15	?	60.0	Yes	Yes	Y	ABB ACH-580	3
26	E-AHU-F1	1	TUNNEL MECH ROOM	CLASSROOMS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
27	E-AHU-H1	1	TUNNEL MECH ROOM	CLASSROOM & HEALTH CTR	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
28	E-AHU-H2	1	TUNNEL MECH ROOM	CLASSROOMS	25	?	60.0	Yes	Yes	Y	ABB ACH-580	3
29	E-AHU-K1	1	PENTHOUSE	MAIN GYM	15	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
30	E-AHU-K2	1	PENTHOUSE	MAIN GYM	15	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
31	E-AHU-K3	1	PENTHOUSE	MAIN GYM	15	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
32	E-AHU-K4	1	PENTHOUSE	MAIN GYM	15	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
33	E-AHU-K5	1	PENTHOUSE	MAIN GYM	15	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
34	E-AHU-N1	1	PENTHOUSE	ART	20	?	60.0	Yes	Yes	Y	ABB ACH-580	3
35	E-AHU-N2	1	PENTHOUSE	CLASSROOMS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
36	E-AHU-P1	1	PENTHOUSE	ADMINISTRATION	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
37	E-AHU-P2	1	PENTHOUSE	CLASSROOMS	40	?	60.0	Yes	Yes	Y	ABB ACH-580	3
38	E-AHU-Q1	1	PENTHOUSE	CLASSROOMS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
39	E-AHU-Q2	1	PENTHOUSE	SCIENCE LABS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
40	E-AHU-R1	1	PENTHOUSE	CLASSROOMS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
41	E-AHU-R2	1	PENTHOUSE	CLASSROOMS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
42	E-AHU-S1	1	2ND FLOOR MECH ROOM	PERF. ARTS CLASS	30	?	60.0	Yes	Yes	Y	ABB ACH-580	3
43	E-AHU-T1	1	PENTHOUSE	ROTC	20	?	60.0	Yes	Yes	Y	ABB ACH-580	3
44	NAT AHU-1	1	NATATORIUM	NATATORIUM	25	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
45	NAT AHU-2	1	NATATORIUM	NATATORIUM	25	?	60.0	Yes	Yes	Y	ABB ACH-580	2, 3
46	NAT AHU-3	1	NATATORIUM	NATATORIUM	40	?	60.0	Yes	Yes	Y	ABB ACH-580	3
47	EF-A11	1	E-AHU-A1 RELIEF	AREA A	40	208/3	60.0	Yes	Yes	Y	ABB ACH-580	4
48	EF-A12	1	E-AHU-A1 RELIEF	AREA A	40	208/3	60.0	Yes	Yes	Y	ABB ACH-580	4

*1 - Dual supply fans. Per the AE, each fan is to have individual VFDs.
*2 - Existing AHUs do not have VFDs, they are being added under Phase 3.
*3 - All new VFDs include BACNet MS/TP communication. Each drive should be connected to the MS/TP sub-net of the associated AHU's System Controller
*4 - New VFD includes BACNet MS/TP communication. Connect drive to the AHU-A2 MS/TP sub-net.

IDENTITY DATA			HEATING DATA			CONTROL	
MARK	MANUF	MODEL	BTUH/LF	TOTAL CAP. (BTUH)	FLOW (GPM)	CONTROLLED FROM	NOTES
RCP-K1	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-K2	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-K3	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-K4	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-K5	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-K6	ZEHNDER	LINEAR	362	2,896	0.19	AHU-K6	
RCP-M1	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M2	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M3	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M4	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M5	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M6	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M7	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M8	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M9	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M10	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M11	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M12	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M13	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M14	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M15	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M16	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M17	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M18	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M19	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M20	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M21	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M22	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M23	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M24	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M25	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M26	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	
RCP-M27	ZEHNDER	LINEAR	362	2,896	0.19	AHU-M1	

Delta Controls
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-34
JOB NUMBER:
J-2304001

Air Flow Station (AFMS) Schedule													
AFMS Designation	Qty	Serves	Width (in.)	Height (in.)	Area (Sq. Ft.)	Airflow Max (CFM)	Airflow Min (CFM)	Fan Diameter (in.)	Manuf	Model Number	# Probes	Cable Length (ft)	Notes
AFMS AHU-C1 OA	1	CAFETERIA SUPPORT			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-C2 OA	1	KITCHEN MAKEUP AIR			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-C3 OA	1	SERVING LINE			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-C5 OA	1	CAFETERIA			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-J1 OA	1	PERFORMING ARTS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-J2 OA	1	PERFORMING ARTS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-J3 OA	1	STUDENT SERVICES			0.00			--	Ebtron	GTC116-P + Transmitter		50	1
AFMS AHU-K6 OA	1	LOCKER ROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-M1 OA	1	LOCKER ROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-M2 OA	1	SOUTH GYM			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS AHU-AA1 OA	1	PERFORMING ARTS ADDITION			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-B1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-C4 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-D1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-D2 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-E1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-E2 OA	1	LIBRARY			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-E3 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-F1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-H1 OA	1	CLASSROOM & HEALTH CTR			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-H2 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-N1 OA	1	ART			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-N2 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-P1 OA	1	ADMINISTRATION			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-P2 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-Q1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-Q2 OA	1	SCIENCE LABS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-R1 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-R2 OA	1	CLASSROOMS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-S1 OA	1	PERF. ARTS CLASS			0.00			--	Ebtron	GTC116-P + Transmitter		50	2
AFMS E-AHU-T1 OA	1	ROTC			0.00			--	Ebtron	GTC116-P + Transmitter		50	2

NOTES:
1 - AFMS are to be located on intake of RTUs - no OA ductwork.
2 - AFMS are to be located in OA ductwork.

PHASE 3 AIR FLOW MEASURING STATION SCHEDULE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-35
JOB NUMBER:
J-2304001

EXHAUST FAN SCHEDULE

IDENTITY DATA				FAN DATA			ELECTRICAL DATA			UNIT CONTROL	CONTROLLED FROM	LAB HOOD INTERFACE	NOTES
ITEM	MARK	MANUF	SERVICES	FAN TYPE	DRIVE TYPE	AIRFLOW (CFM)	VOLTS (V)	PH	FREQ (HZ)				
1	EF-A1	GREENHECK	RECEIVING	DOWNBLAST CENTRIFUGAL	DIRECT	1,200	115	1	60	BAS	AHU-A2		4
2	EF-A2	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2,870	115	1	60	BAS	AHU-A2		4
3	EF-A3	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	800	115	1	60	BAS	AHU-A2		4
4	EF-A4	GREENHECK	SHOWERS	DOWNBLAST CENTRIFUGAL	DIRECT	480	115	1	60	BAS	AHU-A2		4
5	EF-A5	GREENHECK	LAUNDRY	DOWNBLAST CENTRIFUGAL	DIRECT	430	115	1	60	BAS	AHU-A2		4
6	EF-A6	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	520	115	1	60	BAS	AHU-A2		4
7	EF-A7	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2,840	115	1	60	BAS	AHU-A2		4
8	EF-A8	GREENHECK	SHOWERS	DOWNBLAST CENTRIFUGAL	DIRECT	480	115	1	60	BAS	AHU-A2		4
9	EF-A9	GREENHECK	RECEIVING	DOWNBLAST CENTRIFUGAL	DIRECT	1,000	115	1	60	BAS	AHU-A2		4
10	EF-A10	TJERLUND	DRYER	ROOF	DIRECT	900	120	1	60	FACTORY CTRLS	N/A		5
11	EF-A11	GREENHECK	E-AHU-A1 RELIEF	DOWNBLAST CENTRIFUGAL	DIRECT	6,850	208	3	60	PRESSURE CTRL	AHU-A1		1, 4
12	EF-A12	GREENHECK	E-AHU-A1 RELIEF	UTILITY SET	DIRECT	6,850	208	3	60	PRESSURE CTRL	AHU-A1		1, 4
13	EF-B1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1,080	115	1	60	BAS	AHU-B1		4
14	EF-B2	GREENHECK	DARK ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	BAS	AHU-B1		4
15	EF-B3	GREENHECK	CUST STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	650	115	1	60	BAS	AHU-B1		4
16	EF-B4	GREENHECK	CAFÉ STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	925	115	1	60	BAS	AHU-B1		4
17	EF-B5	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	BAS	AHU-B1		4
18	EF-B6	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	160	115	1	60	BAS	AHU-B1		4
19	EF-B7	NOT USED		-	-	-	-	-	-	-	-		
20	EF-B8	NOT USED		-	-	-	-	-	-	-	-		
21	EF-B9	S&P	DISH HOOD (76)			1,750					AHU-B1		4
22	EF-B10	GREENHECK	CUST	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-B1		4
23	EF-B11	TJERLUND	DRYER	INLINE	DIRECT	160	120	1	60	PRESSURE CTRL	N/A		5
24	EF-C1	S&P	KITCHEN HOOD (27)			2,000					AHU-C1		4
25	EF-C2	S&P	KITCHEN HOOD (40)			4,400					AHU-G1 (or C1?)		4
26	EF-C3	S&P	KITCHEN HOOD (51)			9,080					AHU-C1		4
27	EF-C4	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-C1		4
28	EF-C5	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1,400	115	1	60	BAS	AHU-C1		4
29	EF-C6	GREENHECK	WORKSHOP	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	TOGGLE	STANDALONE		2
30	EF-C7	GREENHECK	DRY STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	800	115	1	60	BAS	AHU-C1		4
31	EF-C8	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1,400	115	1	60	BAS	AHU-C1		4
32	EF-C9	GREENHECK	ELECTRICAL	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	THERMOSTAT	STANDALONE		3
33	EF-D1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	3,370	115	1	60	BAS	AHU-D1		4
34	EF-D2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	750	115	1	60	BAS	AHU-D1		4
35	EF-D3	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	500	115	1	60	BAS	AHU-P2		4
36	EF-E1	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1,250	115	1	60	BAS	AHU-E1		4
37	EF-E2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	500	115	1	60	BAS	AHU-E1		4
38	EF-E3	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	700	115	1	60	THERMOSTAT	STANDALONE		3
39	EF-E4	GREENHECK	ELEV MACHINE ROOM	SIDEWALL	DIRECT	800	115	1	60	THERMOSTAT	STANDALONE		3
40	EF-E5	GREENHECK	WORKROOM	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	TOGGLE	STANDALONE		2
41	EF-E6	GREENHECK	WORKROOM	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	TOGGLE	STANDALONE		2
42	EF-E7	GREENHECK	WORKROOM	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	TOGGLE	STANDALONE		2
43	EF-F1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	BAS	AHU-E1		4
44	EF-F2	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	THERMOSTAT	STANDALONE		3
45	EF-F3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1,050	115	1	60	BAS	AHU-E1		4
46	EF-F4	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	550	115	1	60	BAS	AHU-E1		4
47	EF-F5	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	125	115	1	60	THERMOSTAT	STANDALONE		3
48	EF-F6	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	125	115	1	60	BAS	AHU-E1		4
49	EF-F7	GREENHECK	IDF ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	150	115	1	60	THERMOSTAT	STANDALONE		3
50	EF-G1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	500	115	1	60	BAS	AHU-G5		4, 8

*1 - FAN EQUIPPED WITH A VFD FOR BALANCING.
*2 - CONTROL VIA A TOGGLE SWITCH, NO BAS INTERFACE.
*3 - CONTROL VIA A LINE VOLTAGE THERMOSTAT. NO BAS INTERFACE.
*4 - CONTROL VIA BAS.
*5 - FAN PROVIDED WITH FACTORY PRESSURE AND/OR TEMPERATURE CONTROLS. NO BAS INTERFACE.
*6 - LAB HOOD INTERFACE FANS WILL INCLUDE (1) FIELD RELAY, (1) TRANSFORMER, AND (2) ISOLATION DAMPER ACUTATORS PER SYSTEM.
FANS ARE BAS CONTROLLED. ISOLATION DAMPERS ARE MANUALLY CONTROLLED FROM THE HOOD-MOUNTED SWITCH.
PREVIOUS BAS DESIGN INDICATES 28 LAB HOODS, ONLY 24 HOODS IDENTIFIED ON CURRENT DESIGN.
*7 - THREE PHASE FANS ASSUME DIRECT CONTROL WITHOUT A MAGNETIC STARTER. CONTROL VIA FIELD MOUNT DRY CONTACT INPUT RELAY WHICH IN TURN CONTROLS A 3-PHASE FIELD RELAY.
*8 - SHOWN FOR REFERENCE ONLY. FANS INSTALLED UNDER PREVIOUS PHASE. NO SCOPE IN PHASE 3 PROJECT.

PHASE 3 EXHAUST FAN SCHEDULE (1 OF 4)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-36
JOB NUMBER:
J-2304001

EXHAUST FAN SCHEDULE

IDENTITY DATA				FAN DATA			ELECTRICAL DATA						
ITEM	MARK	MANUF	SERVICES	FAN TYPE	DRIVE TYPE	AIRFLOW (CFM)	VOLTS (V)	PH	FREQ (HZ)	UNIT CONTROL	CONTROLLED FROM	LAB HOOD INTERFACE	NOTES
51	EF-G2	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	700	115	1	60	BAS	AHU-G2		4, 8
52	EF-G3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	525	115	1	60	BAS	AHU-G5		4, 8
53	EF-G4	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	BAS	AHU-G2		4, 8
54	EF-G5	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	THERMOSTAT	STANDALONE		3
55	EF-G6	GREENHECK	CUST	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-G2		4, 8
56	EF-G7	GREENHECK	SPOTLIGHT	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	THERMOSTAT	STANDALONE		3
57	EF-G8	GREENHECK	SCENE SHOP	DOWNBLAST CENTRIFUGAL	DIRECT	1,080	115	1	60	BAS	AHU-G2		4, 8
58	EF-H1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	550	115	1	60	BAS	AHU-H1		4
59	EF-H2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	475	115	1	60	BAS	AHU-H1		4
60	EF-H3	GREENHECK	CONCESSION	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	THERMOSTAT	STANDALONE		3
61	EF-H4	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1,790	115	1	60	BAS	AHU-H1		4
62	EF-H5	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	2,180	115	1	60	BAS	AHU-H1		4
63	EF-H6	GREENHECK	CONCESSION	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	THERMOSTAT	STANDALONE		3
64	EF-H7	TJERLUND	DRYER	INLINE	DIRECT	160	120	1	60	PRESSURE CTRL	N/A		4
65	EF-H8	NOT USED		-	-	-	-	-	-	-	-		
66	EF-J1	GREENHECK	ELEC + CUST OFFICE	DOWNBLAST CENTRIFUGAL	DIRECT	625	115	1	60	BAS	AHU-J1		4
67	EF-J2	GREENHECK	SCENE STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	800	115	1	60	BAS	AHU-J1		4
68	EF-J3	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	325	115	1	60	BAS	AHU-J1		4
69	EF-J4	GREENHECK	DRESSING ROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	BAS	AHU-J1 (or G1?)		4
70	EF-J5	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1,400	115	1	60	BAS	AHU-J1		4
71	EF-J6	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1,100	115	1	60	BAS	AHU-J1		4
72	EF-J7	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	BAS	AHU-J1		4
74	EF-J9	TJERLUND	DRYER	INLINE	DIRECT	160	120	1	60	PRESSURE CTRL	N/A		5
75	EF-J10	TJERLUND	DRYER	INLINE	DIRECT	160	120	1	60	PRESSURE CTRL	N/A		5
76	EF-K1	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2,650	115	1	60	BAS	AHU-K1		4
77	EF-K2	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	1,100	115	1	60	BAS	AHU-K6		4
78	EF-K3	GREENHECK	GYM STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	360	115	1	60	BAS	AHU-K6		4
79	EF-K4	NOT USED		-	-	-	-	-	-	-	-		
80	EF-K5	NOT USED		-	-	-	-	-	-	-	-		
81	EF-K6	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-K6		4
82	EF-K7	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	160	115	1	60	THERMOSTAT	STANDALONE		3
83	EF-K8	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	3,000	115	1	60	THERMOSTAT	STANDALONE		3
84	EF-K9	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	THERMOSTAT	STANDALONE		3
85	EF-L1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1,720	115	1	60	BAS	AHU-M1		4
86	EF-L2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	BAS	AHU-M1		4
87	EF-L3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	THERMOSTAT	STANDALONE		3
88	E-EF-M1	SEE PH. 2	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	800	115	1	60	BAS	AHU-K6		4
89	EF-M2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	575	120	1	60	BAS	AHU-K6		4
90	EF-M3	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2,400	115	1	60	BAS	AHU-S1		4
91	EF-M4	GREENHECK	RR/SHOWER	DOWNBLAST CENTRIFUGAL	DIRECT	650	115	1	60	BAS	AHU-K6		4
92	EF-M5	GREENHECK	RR/SHOWER	DOWNBLAST CENTRIFUGAL	DIRECT	1,275	115	1	60	BAS	AHU-K6		4
93	EF-M6	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	3,700	115	1	60	BAS	AHU-K6 (or S1?)		4
94	EF-M7	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	430	115	1	60	THERMOSTAT	STANDALONE		3
95	EF-M8	GREENHECK	LOCKER RR	DOWNBLAST CENTRIFUGAL	DIRECT	900	115	1	60	BAS	AHU-K6		4
96	EF-M9	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	1,350	115	1	60	BAS	AHU-K6		4
97	EF-M10	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2,300	115	1	60	BAS	AHU-K6		4
98	EF-M11	GREENHECK	LOCKER ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	1,800	115	1	60	BAS	AHU-K6		4
99	EF-M12	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	900	115	1	60	BAS	AHU-K6		4
100	EF-M13	GREENHECK	RR/SHOWER	DOWNBLAST CENTRIFUGAL	DIRECT	900	115	1	60	BAS	AHU-K6		4

*1 - FAN EQUIPPED WITH A VFD FOR BALANCING.
*2 - CONTROL VIA A TOGGLE SWITCH, NO BAS INTERFACE.
*3 - CONTROL VIA A LINE VOLTAGE THERMOSTAT. NO BAS INTERFACE.
*4 - CONTROL VIA BAS.
*5 - FAN PROVIDED WITH FACTORY PRESSURE AND/OR TEMPERATURE CONTROLS. NO BAS INTERFACE.
*6 - LAB HOOD INTERFACE FANS WILL INCLUDE (1) FIELD RELAY, (1) TRANSFORMER, AND (2) ISOLATION DAMPER ACUTATORS PER SYSTEM.
FANS ARE BAS CONTROLLED. ISOLATION DAMPERS ARE MANUALLY CONTROLLED FROM THE HOOD-MOUNTED SWITCH.
PREVIOUS BAS DESIGN INDICATES 28 LAB HOODS, ONLY 24 HOODS IDENTIFIED ON CURRENT DESIGN.
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*8 - SHOWN FOR REFERENCE ONLY. FANS INSTALLED UNDER PREVIOUS PHASE. NO SCOPE IN PHASE 3 PROJECT.

PHASE 3 EXHAUST FAN SCHEDULE (2 OF 4)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-37
JOB NUMBER:
J-2304001

EXHAUST FAN SCHEDULE

IDENTITY DATA				FAN DATA			ELECTRICAL DATA			UNIT CONTROL	CONTROLLED FROM	LAB HOOD INTERFACE	NOTES
ITEM	MARK	MANUF	SERVICES	FAN TYPE	DRIVE TYPE	AIRFLOW (CFM)	VOLTS (V)	PH	FREQ (HZ)				
101	EF-M14	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	500	115	1	60	BAS	AHU-K6		4
102	EF-M15	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	120	115	1	60	BAS	AHU-K6		4
103	EF-M16	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	310	115	1	60	BAS	AHU-K6		4
104	EF-M17	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	BAS	AHU-K6		4
105	EF-M18	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	1600	115	1	60	THERMOSTAT	STANDALONE		3
106	EF-N1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	3200	115	1	60	BAS	AHU-N1		4
107	EF-N2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	BAS	AHU-N1		4
108	EF-N3	GREENHECK	ART	DOWNBLAST CENTRIFUGAL	DIRECT	750	115	1	60	BAS	AHU-N1		4
109	EF-N4	NOT USED		-	-	-	-	-	-	-	-		
110	EF-N5	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	750	115	1	60	THERMOSTAT	STANDALONE		3
111	EF-N6	GREENHECK	CERAMICS	DOWNBLAST CENTRIFUGAL	DIRECT	2550	115	1	60	BAS	AHU-N1		4
112	EF-N7	GREENHECK	PAINT SPRAY BOOTH	UPBLAST CENTRIFUGAL	DIRECT	775	115	1	60	TOGGLE	STANDALONE		2
113	EF-N8	GREENHECK	KILN HOOD	UPBLAST CENTRIFUGAL	DIRECT	1500	115	1	60	TOGGLE	STANDALONE		2
114	EF-N9	GREENHECK	ELEV MACHINE	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	THERMOSTAT	STANDALONE		3
115	EF-N10	GREENHECK	STORAGE/ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	440	115	1	60	BAS	AHU-N1		4
116	EF-N11	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	160	115	1	60	THERMOSTAT	STANDALONE		3
117	EF-N12	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	BAS	AHU-N1		4
118	EF-N13	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	8000	208	3	60	THERMOSTAT	STANDALONE		3, 7
119	EF-N14	GREENHECK	SOLDERING HOOD	DOWNBLAST CENTRIFUGAL	DIRECT	1200	115	1	60	BAS	AHU-N1		4
120	EF-N15	GREENHECK	IDF ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	THERMOSTAT	STANDALONE		3
121	EF-P1	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	800	115	1	60	BAS	AHU-C5		4
122	EF-P2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	BAS	AHU-C5		4
123	EF-P3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-C5		4
124	EF-P4	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	BAS	AHU-C5		4
125	EF-P5	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	BAS	AHU-C5		4
126	EF-P6	GREENHECK	WORKROOM	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	TOGGLE	STANDALONE		2
127	EF-P7	GREENHECK	IDF / ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	THERMOSTAT	STANDALONE		3
128	EF-P8	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	THERMOSTAT	STANDALONE		2
129	EF-P9	GREENHECK	PAINTING CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	BAS	AHU-B1		3
130	EF-Q1	GREENHECK	ELEV MACHINE	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	THERMOSTAT	STANDALONE		3
131	EF-Q2	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
132	EF-Q3	GREENHECK	CHEMISTRY LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1500	115	1	60	BAS	AHU-Q1	Y	4, 6
133	EF-Q4	GREENHECK	CHEMISTRY LAB	DOWNBLAST CENTRIFUGAL	DIRECT	2500	115	1	60	BAS	AHU-Q1	Y	4, 6
134	EF-Q5	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
135	EF-Q6	GREENHECK	ZOOLOGY LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1500	115	1	60	BAS	AHU-R2	Y	4, 6
136	EF-Q7	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	650	115	1	60	BAS	AHU-R2		4
137	EF-Q8	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	500	115	1	60	BAS	AHU-R2		4
138	EF-Q9	GREENHECK	GREENHOUSE	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	THERMOSTAT	STANDALONE		3
139	EF-Q10	GREENHECK	LAB PREP	DOWNBLAST CENTRIFUGAL	DIRECT	300	115	1	60	BAS	AHU-R2		4
140	EF-Q11	GREENHECK	CHEMISTRY LAB	DOWNBLAST CENTRIFUGAL	DIRECT	2350	115	1	60	BAS	AHU-Q1	Y	4, 6
141	EF-Q12	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	375	115	1	60	BAS	AHU-Q1		4
142	EF-Q13	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
143	EF-Q14	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	175	115	1	60	BAS	AHU-R2		4
144	EF-Q15	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	8000	208	3	60	THERMOSTAT	STANDALONE		3, 7
145	EF-Q16	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	660	115	1	60	BAS	AHU-Q1		4
146	EF-Q17	TJERLUND	DRYER	INLINE	DIRECT	160	120	1	60	PRESSURE CTRL	N/A		5
147	EF-Q18	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	760	115	1	60	THERMOSTAT	STANDALONE		3
148	EF-Q19	GREENHECK	IDF ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	THERMOSTAT	STANDALONE		3
149	EF-Q20	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q1 (or R2?)	Y	4, 6
150	EF-Q21	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6

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PHASE 3 EXHAUST FAN SCHEDULE (3 OF 4)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-38
JOB NUMBER:
J-2304001

EXHAUST FAN SCHEDULE

IDENTITY DATA				FAN DATA			ELECTRICAL DATA			UNIT CONTROL	CONTROLLED FROM	LAB HOOD INTERFACE	NOTES
ITEM	MARK	MANUF	SERVICES	FAN TYPE	DRIVE TYPE	AIRFLOW (CFM)	VOLTS (V)	PH	FREQ (HZ)				
151	EF-Q22	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
152	EF-Q23	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	380	115	1	60	BAS	AHU-Q1		4
153	EF-Q24	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q1	Y	4, 6
154	EF-Q25	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
155	EF-Q26	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q2	Y	4, 6
156	EF-Q27	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q2	Y	4, 6
157	EF-Q28	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q2	Y	4, 6
158	EF-Q29	GREENHECK	SCIENCE LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q2	Y	4, 6
159	EF-Q30	GREENHECK	LAB PREP	DOWNBLAST CENTRIFUGAL	DIRECT	700	115	1	60	BAS	AHU-Q2		4
160	EF-R1	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	1000	115	1	60	THERMOSTAT	STANDALONE		3
161	EF-R2	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1000	115	1	60	BAS	AHU-Q1		4
162	EF-R3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	580	115	1	60	BAS	AHU-Q1		4
163	EF-R4	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	340	115	1	60	BAS	AHU-Q1		4
164	EF-R5	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1000	115	1	60	BAS	AHU-Q1		4
165	EF-R6	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
166	EF-R7	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	1200	115	1	60	BAS	AHU-R2		4
167	EF-R8	GREENHECK	SCIENCE LAB	DOWNBLAST CENTRIFUGAL	DIRECT	150	115	1	60	BAS	AHU-R2	Y	4, 6
168	EF-R9	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
169	EF-R10	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	150	115	1	60	THERMOSTAT	STANDALONE		3
170	EF-R11	GREENHECK	IDF	DOWNBLAST CENTRIFUGAL	DIRECT	220	115	1	60	THERMOSTAT	STANDALONE		3
171	EF-R12	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2	Y	4, 6
172	EF-R13	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q1	Y	4, 6
173	EF-R14	GREENHECK	SCIENCE CLASS	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-R2		4
174	EF-R15	GREENHECK	CHEMISTRY LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1500	115	1	60	BAS	AHU-R2	Y	4, 6
175	EF-R16	GREENHECK	SCIENCE LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1250	115	1	60	BAS	AHU-Q1	Y	4, 6
176	EF-R17	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	250	115	1	60	BAS	AHU-Q1		4
177	EF-R18	NOT USED		-	-	-	-	-	-	-	-		
178	EF-R19	GREENHECK	SCIENCE LAB	DOWNBLAST CENTRIFUGAL	DIRECT	1500	115	1	60	BAS	AHU-R2	Y	4, 6
179	EF-S1	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	1200	115	1	60	THERMOSTAT	STANDALONE		3
180	EF-S2	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	410	115	1	60	BAS	AHU-S1		4
181	EF-S3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	190	115	1	60	BAS	AHU-S1		4
182	EF-S4	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2600	115	1	60	THERMOSTAT	STANDALONE		3
183	EF-S5	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	600	115	1	60	THERMOSTAT	STANDALONE		4
184	EF-S6	GREENHECK	STORAGE/MECH	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	BAS	AHU-S1		4
185	EF-T1	GREENHECK	ELEC	DOWNBLAST CENTRIFUGAL	DIRECT	280	115	1	60	THERMOSTAT	STANDALONE		3
186	EF-T2	GREENHECK	DANCE	DOWNBLAST CENTRIFUGAL	DIRECT	2400	115	1	60	BAS	AHU-T1		4
187	EF-T3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	650	115	1	60	BAS	AHU-T1		4
188	E-EF-T4	SEE PH. 2	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	100	115	1	60	BAS	AHU-T1		4
189	EF-15	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2600	115	1	60	THERMOSTAT	STANDALONE		3
190	EF-W1	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	THERMOSTAT	STANDALONE		3
191	EF-AA1	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	400	115	1	60	BAS	AHU-AA1		4
192	EF-AA2	GREENHECK	RESTROOMS	DOWNBLAST CENTRIFUGAL	DIRECT	1050	115	1	60	BAS	AHU-AA1		4
193	EF-AA3	GREENHECK	STORAGE	DOWNBLAST CENTRIFUGAL	DIRECT	200	115	1	60	BAS	AHU-AA1		4
194	EF-AA4	GREENHECK	MECH ROOM	DOWNBLAST CENTRIFUGAL	DIRECT	2600	115	1	60	THERMOSTAT	STANDALONE		3

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FANS ARE BAS CONTROLLED. ISOLATION DAMPERS ARE MANUALLY CONTROLLED FROM THE HOOD-MOUNTED SWITCH.
PREVIOUS BAS DESIGN INDICATES 28 LAB HOODS, ONLY 24 HOODS IDENTIFIED ON CURRENT DESIGN.
*7 - THREE PHASE FANS ASSUME DIRECT CONTROL WITHOUT A MAGNETIC STARTER. CONTROL VIA FIELD MOUNT DRY CONTACT INPUT RELAY WHICH IN TURN CONTROLS A 3-PHASE FIELD RELAY.
*8 - SHOWN FOR REFERENCE ONLY. FANS INSTALLED UNDER PREVIOUS PHASE. NO SCOPE IN PHASE 3 PROJECT.

PHASE 3 EXHAUST FAN SCHEDULE (4 OF 4)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-39
JOB NUMBER:
J-2304001

INTAKE / RELIEF HOOD SCHEDULE

IDENTITY DATA					HOOD DATA	THROAT DATA				CONTROLLED FROM	NOTES
ITEM	MARK	TYPE	MANUF	MODEL	AIRFLOW (CFM)	VELOCITY (FPM)	DIMENSIONS L	W	DIA		
1	E-IH-A1	PENTHOUSE	EXISTING	EXISTING	14,000	933	60"	36"	-	AHU-A2	1
2	E-IH-A2	PENTHOUSE	EXISTING	EXISTING	7,000	580	48"	36"	-	AHU-A2	1
3	E-RH-B1	HOOD	EXISTING	EXISTING	10,000	780	-	-	48"	AHU-B1	1
4	E-IH-C1	PENTHOUSE	EXISTING	EXISTING	25,000	780	16"	24"	-	AHU-B1	1
5	E-IH-C2	PENTHOUSE	EXISTING	EXISTING	50,000	670	15"	60"	-	AHU-B1	1
6	E-RH-C1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-C2	1
7	RH-C2	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-C2	2
8	E-RH-C3	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-C2	1
9	E-RH-C4	PENTHOUSE	EXISTING	EXISTING	15,000	800	190"	22"	-	AHU-C2	1
10	E-RH-C5	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-C2	1
11	RH-C6	PENTHOUSE	GREENHECK	WRH	12,500	800	56"	40"	-	AHU-C2	2
12	RH-C7	PENTHOUSE	GREENHECK	WRH	12,500	800	56"	40"	-	AHU-C2	2
13	E-IH-D1	PENTHOUSE	EXISTING	EXISTING	16,000	533	120"	36"	-	AHU-D2	1
14	E-IH-D2	PENTHOUSE	EXISTING	EXISTING	14,000	775	72"	36"	-	AHU-D2	1
15	RH-D1	PENTHOUSE	WRH	WRH	10,000	667	60"	36"	-	AHU-D2	2
16	RH-D2	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-D2	2
17	RH-D3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-D1	2
18	E-RH-E1	PENTHOUSE	EXISTING	EXISTING	5,500	750	44"	24"	-	AHU-E2	1
19	E-RH-E2	PENTHOUSE	EXISTING	EXISTING	5,500	750	44"	24"	-	AHU-E2	1
20	E-RH-E3	PENTHOUSE	EXISTING	EXISTING	8,000	735	56"	28"	-	AHU-E2	1
21	E-RH-E4	PENTHOUSE	EXISTING	EXISTING	8,000	735	56"	28"	-	AHU-E2	1
22	E-RH-E5	PENTHOUSE	EXISTING	EXISTING	8,000	735	56"	28"	-	AHU-E2	1
23	E-RH-F1	PENTHOUSE	EXISTING	EXISTING	6,500	760	44"	28"	-	AHU-F1	1
24	E-RH-F2	PENTHOUSE	EXISTING	EXISTING	6,500	760	44"	28"	-	AHU-F1	1
25	E-RH-F3	PENTHOUSE	EXISTING	EXISTING	6,500	760	44"	28"	-	AHU-F1	1
26	RH-H1	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-H1	2
27	RH-H2	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-H2	2
28	RH-H3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-H2	2
29	RH-H4	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-H1	2
30	E-IH-J1	PENTHOUSE	EXISTING	EXISTING	15,000	800	36"	60"	-	AHU-J1	1
31	E-IH-J2	PENTHOUSE	EXISTING	EXISTING	16,000	800	36"	60"	-	AHU-J2	1
32	E-RH-J1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-J3	1
33	RH-J2	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-J1	2
34	E-RH-J3	EXISTING	EXISTING	EXISTING	7000	800	36"	36"	-	AHU-J2	1
35	E-RH-K1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-K2	1, 4
36	E-RH-K2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-K2	1, 4
37	E-RH-K3	HOOD	EXISTING	EXISTING	12,000	750	48"	48"	-	AHU-K2	1, 4
38	E-RH-K4	HOOD	EXISTING	EXISTING	12,000	750	48"	48"	-	AHU-K2	1, 4
39	E-RH-K5	HOOD	EXISTING	EXISTING	12,000	750	48"	48"	-	AHU-K2	1, 4
40	E-RH-K6	HOOD	EXISTING	EXISTING	12,000	750	48"	48"	-	AHU-K2	1, 4
41	E-RH-K7	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-K2	1, 4
42	E-RH-K8	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-K2	1, 4
43	E-RH-L1	HOOD	GREENHECK	GRSR-42	7,000	768	36"	36"	-	AHU-J1	2
44	RH-L2	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-J1	2
45	IH-M1	PENTHOUSE	GREENHECK	WRH	15,000	400	80"	30"	-	AHU-M2	3
46	E-IH-M2	PENTHOUSE	EXISTING	EXISTING	25,000	800	72	30	-	AHU-M2	1
47	E-RH-M1	HOOD	EXISTING	EXISTING	3,000	925	24"	24"	-	AHU-M1	1
48	E-RH-M2	HOOD	EXISTING	EXISTING	3,000	925	24"	24"	-	AHU-M1	1
49	E-RH-N1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-N2	1
50	E-RH-N2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-N2	1

INTAKE / RELIEF HOOD SCHEDULE

IDENTITY DATA					HOOD DATA	THROAT DATA				CONTROLLED FROM	NOTES
ITEM	MARK	TYPE	MANUF	MODEL	AIRFLOW (CFM)	VELOCITY (FPM)	DIMENSIONS L	W	DIA		
51	RH-N3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-N2	2
52	E-RH-P1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-P2	1
53	E-RH-P2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-P2	1
54	RH-P3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-P2	2
55	RH-P4	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-P2	2
56	E-RH-Q1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-Q2	1
57	E-RH-Q2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-Q2	1
58	RH-Q3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-Q2	2
59	RH-R1	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-R2	2
60	E-RH-R2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-R2	1
61	RH-R3	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-R2	2
62	RH-R4	HOOD	GREENHECK	GRSR-42	7,500	768	-	-	42"	AHU-R2	2
63	E-IH-S1	PENTHOUSE	EXISTING	EXISTING	18,500	1,100	48"	48"	-	AHU-M2	1
64	E-RH-S1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-S1	1
65	E-RH-S2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-S1	1
66	E-RH-S3	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-S1	1
67	E-RH-T1	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-T1	1
68	E-RH-T2	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-T1	1
69	E-RH-T3	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-M2	1
70	E-RH-T4	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-M2	1
71	E-RH-T5	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-M2	1
72	E-RH-T6	HOOD	EXISTING	EXISTING	7,000	800	36"	36"	-	AHU-M2	1
73	IH-W1	PENTHOUSE	GREENHECK	WIH	4,000	706	34"	24"	-	AHU-K6	2
74	IH-W2	HOOD	GREENHECK	GRSI-18	1,400	765	-	-	18"	AHU-K6	2
75	RH-AA1	PENTHOUSE	GREENHECK	WIH	19,000	774	68"	52"	-	AHU-AA1	2
78	IH-AA4	PENTHOUSE	GREENHECK	WIH	2,600	416	30"	30"	-	AHU-AA1	2

*1 - NEW ACTUATOR ONLY
*2 - NEW DAMPER & ACTUATOR
*3 - NO ACTUATOR REQUIRED PER MEP SCHEDULE
*4 - EXISTING DAMPERS HAVE PNEUMATIC ACTUATORS, NO EXISTING WIRING INFRASTRUCTURE

PHASE 3 INTAKE & RELIEF HOOD SCHEDULE

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-40
JOB NUMBER:
J-2304001

HYDRONIC PROP UNIT HEATER SCHEDULE

IDENTITY DATA				HEATING DATA	FAN DATA					ELECTRICAL DATA				CONTROLLED FROM	NOTES
MARK	MANUF	MODEL	LOCATION	FLOW (GPM)	AIRFLOW (CFM)	FAN TYPE	DRIVE	HP	RPM	VOLTS (V)	PH	FREQ (HZ)	FLA (A)		
PUH-A1	TRANE	UHS-060	Unit A Mech Rm	4.4	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-A1	1, 2
PUH-A2	TRANE	UHS-084	Loading Dock D115A	6.1	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	AHU-A1	1, 2
PUH-E1	TRANE	UHS-024	Unit E Mech Rm	1.8	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	AHU-E1	1, 2
PUH-E2	TRANE	UHS-024	Unit E Mech Rm	1.8	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	AHU-E1	1, 2
PUH-F1	TRANE	UHS-024	Unit F Mech Rm	1.8	450	PROP	DIRECT	16 W	1,550	115	1	60	1.0	AHU-F1	1, 2
E-PUH-G1	EXISTING		Unit G Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-G1	1, 2, 3
E-PUH-G2	EXISTING		Unit G Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-G1	1, 2, 3
PUH-K1	TRANE	UHS-060	Unit K Mech Rm	4.4	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-K1	1, 2
PUH-K2	TRANE	UHS-060	Unit K Mech Rm	4.4	900	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-K1	1, 2
E-PUH-K3	EXISTING			2.0	425	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-K3	1, 2, 3
PUH-M1	TRANE	UHS-048	Unit M Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-M1	1, 2
PUH-N1	TRANE	UHS-072	Unit N/P Mech Rm	5.3	1,100	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-N2	1, 2
PUH-N2	TRANE	UHS-072	Unit N/P Mech Rm	5.3	1,100	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-N2	1, 2
PUH-Q1	TRANE	UHS-084	Unit Q/R Mech Rm	6.1	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	AHU-Q1	1, 2
PUH-Q2	TRANE	UHS-084	Unit Q/R Mech Rm	6.1	1,400	PROP	DIRECT	0.1	1,000	115	1	60	2.8	AHU-Q1	1, 2
PUH-S1	TRANE	UHS-024	Unit S Mech Rm	1.8	450	PROP	DIRECT	0.1	1,000	115	1	60	1.0	AHU-S1	1, 2
PUH-T1	TRANE	UHS-048	Unit T Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-T1	1, 2
PUH-W1	TRANE	UHS-048	Unit K6 Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-K6	1, 2
PUH-AA1	TRANE	UHS-048	Unit AA Mech Rm	3.5	750	PROP	DIRECT	0.1	1,000	115	1	60	1.8	AHU-AA1	1, 2

1 - Use line voltage valve actuators (120 VAC). BAS will only enable system via field relay.
2 - Thermostat control. Thermostat by Manuf.
3 - Confirm which existing AHU is the closest and relocat control to that location.
4 - Similar control strategy for Cabinet Unit Heaters.

HYDRONIC CABINET UNIT HEATER SCHEDULE

IDENTITY DATA				HEATING DATA		VALVE	FAN DATA				ELECTRICAL DATA				CONTROLLED FROM	NOTES
MARK	MANUF	MODEL	ENCLOSURE MODEL	CAPACITY (BTUH)	FLOW (GPM)		AIRFLOW (CFM)	W	RPM	SPEEDS	VOLTS (V)	PH	FREQ (HZ)	FLA (A)		
E-CH-A1	EXIST	-	HORIZ. CABINET	34,700	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-A1	1, 2
CH-A2	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-A3	TRANE	FFD 030	HORIZ. CABINET	19,200	1.3	2 WAY	280	70.00	780	3	115	1	60	0.7	AHU-A1	1, 2
CH-A4	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-A5	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-A6	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-A7	TRANE	FFD 030	HORIZ. CABINET	19,200	1.3	2 WAY	280	70.00	780	3	115	1	60	0.7	AHU-A1	1, 2
CH-A8	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-A9	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-A1	1, 2
CH-E1	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV E1-05	1, 2
CH-E2	TRANE	FFD 030	HORIZ. CABINET	19,200	1.3	2 WAY	280	70.00	780	3	115	1	60	0.7	VAV E1-06	1, 2
CH-F1	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV E3-02	1, 2
E-CH-J1	EXIST	-	HORIZ. CABINET	34,700	2.0	2 WAY	-	-	-	-	115	1	60	-	VAV C1-03	1, 2
CH-J2	TRANE	FFD 030	HORIZ. CABINET	19,200	1.3	2 WAY	280	70.00	780	3	115	1	60	0.7	VAV J2-02	1, 2
E-CH-J3	EXIST	-	HORIZ. CABINET	34,700	2.0	2 WAY	-	-	-	-	115	1	60	-	VAV C1-01	1, 2
E-CH-K1	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	VAV J2-14	1, 2
E-CH-M1	EXIST - SEE PHASE 2			7,080	1.3	2 WAY	-	-	-	3	115	1	60	-	AHU-W1	1, 2
E-CH-M2	EXIST - SEE PHASE 2			7,080	1.3	2 WAY	-	-	-	3	115	1	60	-	AHU-W1	1, 2
CH-M3	TRANE	FFD 030	HORIZ. CABINET	19,200	1.3	2 WAY	280	70.00	780	3	115	1	60	0.7	AHU-K6	1, 2
CH-M4	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-K6	1, 2
CH-M5	TRANE	FFD 060	HORIZ. CABINET	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	AHU-K6	1, 2
E-CH-M6	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
E-CH-M7	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
E-CH-M8	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
E-CH-M9	EXIST	-	HORIZ. CABINET	34,700	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
E-CH-M10	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
E-CH-M11	EXIST	-	HORIZ. CABINET	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	AHU-K6	1, 2
CH-N1	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV N1-06	1, 2
CH-N2	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV N1-13	1, 2
CH-Q1	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV Q1-10	1, 2
CH-Q2	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV Q1-11	1, 2
E-CH-R1	EXIST	-	VERTICAL RECESSED	19,500	2.0	2 WAY	-	-	-	-	115	1	60	-	VAV R1-12	1, 2
CH-R2	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV R1-10	1, 2
CH-R3	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV R1-13	1, 2
CH-AA1	TRANE	FFH 060	VERTICAL RECESSED	37,400	2.5	2 WAY	544	110.00	780	3	115	1	60	1.2	VAV AA3-11	1, 2

1 - Use line voltage valve actuators (120 VAC). BAS will only enable system via field relay.
2 - Thermostat control. Thermostat by Manuf.
3 - Similar control strategy for Propeller Unit Heaters.

PHASE 3 CABINET UNIT HEATER AND PROPELLER UNIT HEATER SCHEDULES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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CONTRACT WITH: MSD Washington Township
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CONTRACT NO:

SHEET
SCH-41
JOB NUMBER:
J-2304001

CONSOLIDATED BILL OF MATERIAL WILL BE PROVIDED IN A FUTURE REVISION.

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Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY:___ DRAWN BY: BSS

CONTRACT NO:

SHEET
SCH-42
JOB NUMBER:
J-2304001

LABEL LIST WILL BE PROVIDED IN A FUTURE REVISION.

Delta Controls

Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS-BUILT

REVISIONS	
DATE	REMARKS

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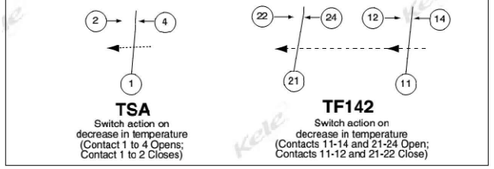
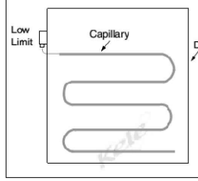
SHEET
SCH-43
JOB NUMBER:
J-2304001

WIRING

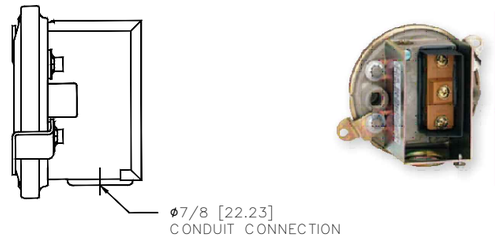


INSTALLATION

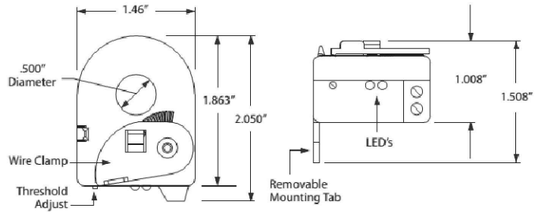


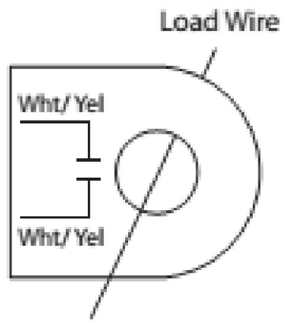
Install capillary element in a horizontal serpentine pattern across the duct on the downstream side of the coil so it is exposed to areas where low temperatures will occur. Do not kink or apply excessive force to the capillary element.

1000 TEMPERATURE, LOW LIMIT

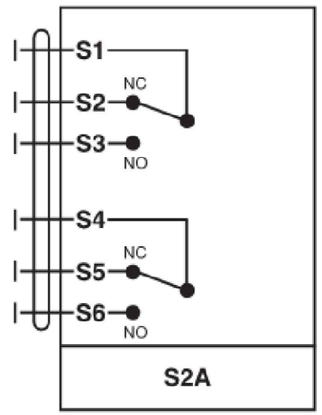


1200 PRESSURE, DUCT HIGH LIMIT



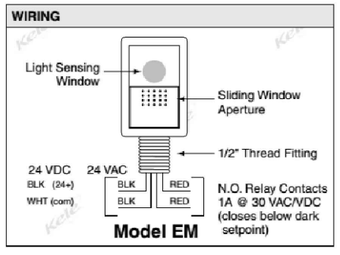


1400 CURRENT SWITCH, RIBXK SERIES

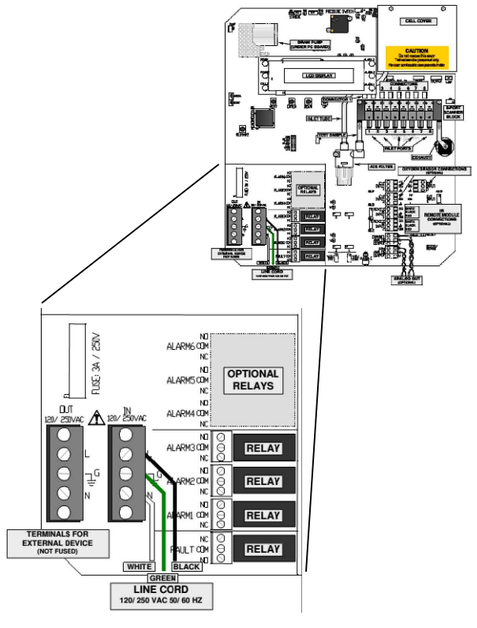


1801 AUXILIARY END SWITCH, BELIMO S2A

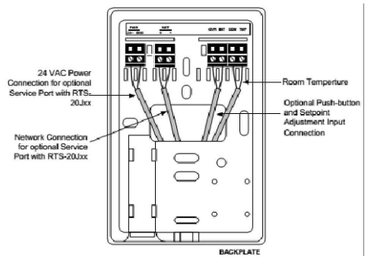
WIRING

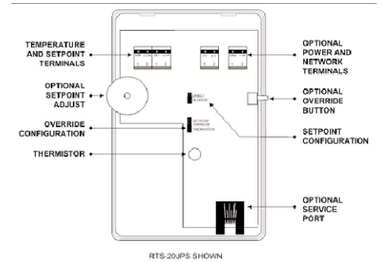


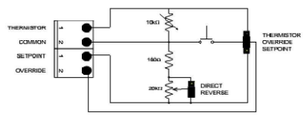
1900 PHOTOCELL, OUTDOOR, EM SERIES



1901 REFRIGERANT MONITOR, HALOGUARD







2000 TEMPERATURE, WALL MT, DELTA RTS-20

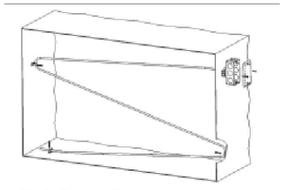


Fig 8: Flexible Sensor Horizontal Mount (Best for Vertical Stratification)

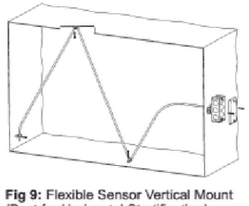


Fig 9: Flexible Sensor Vertical Mount (Best for Horizontal Stratification)

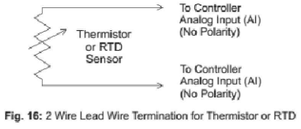


Fig. 16: 2 Wire Lead Wire Termination for Thermistor or RTD

2001 TEMPERATURE, DUCT AVERAGING

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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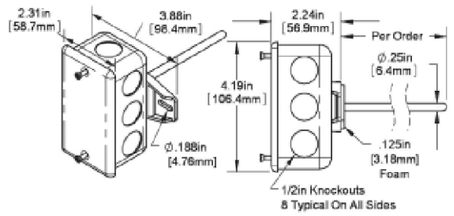


Fig 2: Duct Unit with J-Box (Standard)

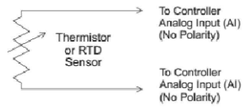


Fig. 16: 2 Wire Lead Wire Termination for Thermistor or RTD

2002 TEMPERATURE, DUCT PROBE

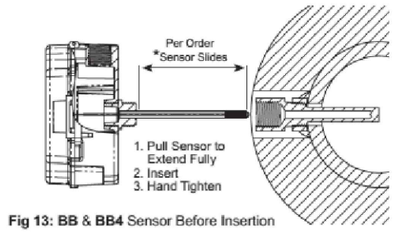


Fig 13: BB & BB4 Sensor Before Insertion

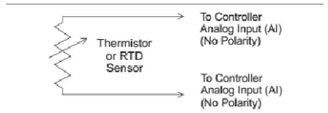


Fig. 16: 2 Wire Lead Wire Termination for Thermistor or RTD

2003 TEMPERATURE, IMMERSION

Table 3: Temperature Sensor Lead Wire Colors			
Thermistors		**Platinum RTDs - 2 Wire**	
1.8KΩ	Orange/Red	100Ω	Red/Red
2.2KΩ	Brown/White	1KΩ	Orange/Orange
3KΩ	Yellow/Black	**Nickel RTD**	
3.25KΩ	Brown/Green	1KΩ	Green/Green
3.3KΩ	Yellow/Brown	**Silicon RTD**	
10K-2Ω	Yellow/Yellow	2KΩ	Brown/Blue
10K-3Ω	Yellow/Red	**Platinum RTDs - 3 Wire**	
10K-3(11K)Ω	Yellow/Blue	100Ω	Red/Red/Black*
20KΩ	White/White	1KΩ	Orange/Orange/Black*
47KΩ	Yellow/Orange	*In the 3-Wire RTD sensors listed above, the two wires of similar color are connected together.	
50KΩ	White/Blue		
100KΩ	Yellow/White		

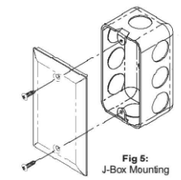


Fig 5:
J-Box Mounting

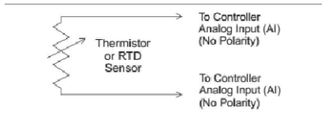


Fig. 16: 2 Wire Lead Wire Termination for Thermistor or RTD

2004 TEMPERATURE, WALL PLATE

Table 1: Humidity Transmitter with 0 to 10VDC Output		
Wire Color	**Purpose**	**Note**
Green	Humidity Output	0 to 10VDC, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Humidity Output
Red	Power	15 to 35VDC or 15 to 27VAC

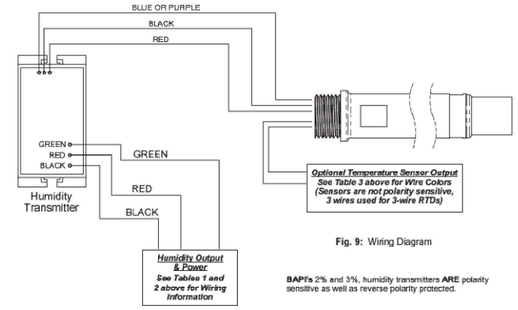


Fig. 9: Wiring Diagram

BAPI's 2% and 3%, humidity transmitters **ARE** polarity sensitive as well as reverse polarity protected.

2100 HUMIDITY / TEMPERATURE, OUTSIDE AIR

Table 1: Humidity Transmitter with 0 to 10VDC Output		
Wire Color	**Purpose**	**Note**
Green	Humidity Output	0 to 10VDC, To Analog Input of Controller
Black	GND (Common)	Ground for Power and Humidity Output
Red	Power	15 to 35VDC or 15 to 27VAC

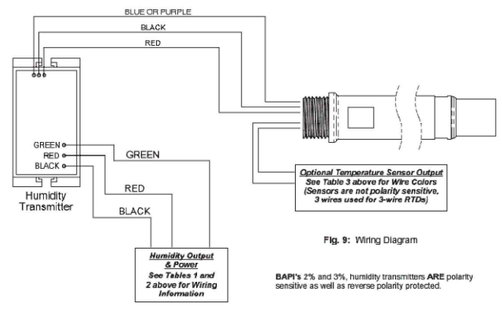


Fig. 9: Wiring Diagram

BAPI's 2% and 3%, humidity transmitters **ARE** polarity sensitive as well as reverse polarity protected.

2101 HUMIDITY / TEMPERATURE, DUCT

Table 1: EZ Pressure Sensor Termination	
Output Signal	**Power Terminal**
4 to 20 mA	7 to 40 VDC
0 to 5 VDC	7 to 40 VDC or 18 to 28 VAC
0 to 10 VDC	13 to 40 VDC or 18 to 28 VAC

Gnd/4-20mA Terminal	Voltage Output Terminal
4 to 20 mA Signal To Controller Analog Input	Not Used
To Controller Ground	0 to 5 VDC Signal To Controller Analog Input
To Controller Ground	0 to 10 VDC Signal To Controller Analog Inpu

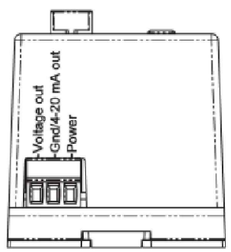
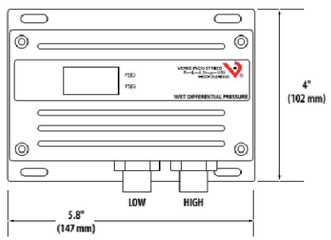
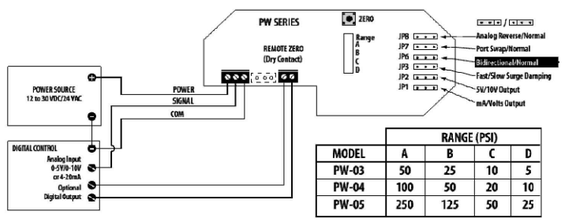


Fig. 7: Wiring terminations

2200 PRESSURE, ZPS DP STD RANGE
2201 PRESSURE, ZPS DP LOW RANGE





	RANGE (PSI)			
MODEL	**A**	**B**	**C**	**D**
PW-03	50	25	10	5
PW-04	100	50	20	10
PW-05	250	125	50	25

2202 PRESSURE, VERIS WET DP

Electrical connections to the Series 605 Transmitter are made to the two-screw terminal strip on the rear of the case. Polarity is indicated by + and – signs stamped on side. The schematic diagram of the Series 605 transmitter is illustrated in Figure B.

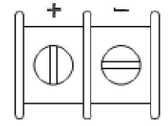


Figure A

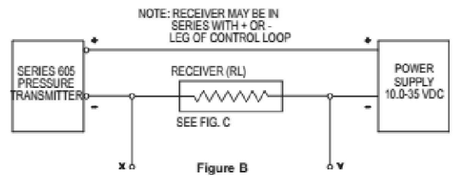


Figure B

2203 PRESSURE, DUCT DP, DWYER 605 SERIES

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

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DATE: 4/12/2023 CHK. BY: ___ DRAWN BY: BSS

CONTRACT NO:

SHEET
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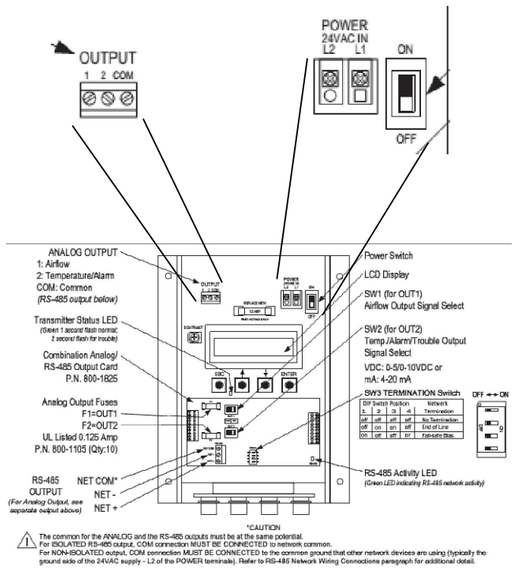
J–2304001



2300 FLOW, AFMS, EBTRON GOLD

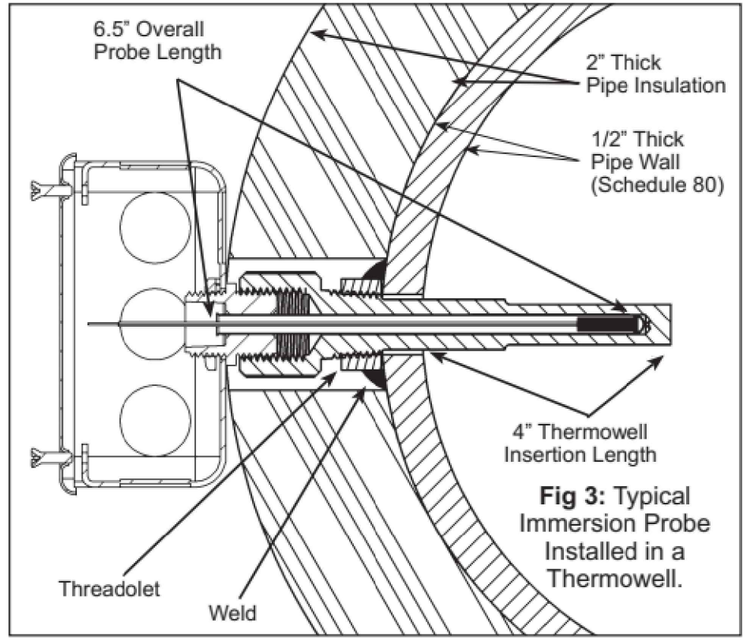


Fig 3: Typical Immersion Probe Installed in a Thermowell.

907 BAPI IMMERSION TEMPERATURE THERMOWELL

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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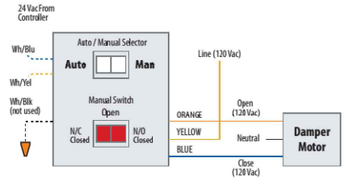
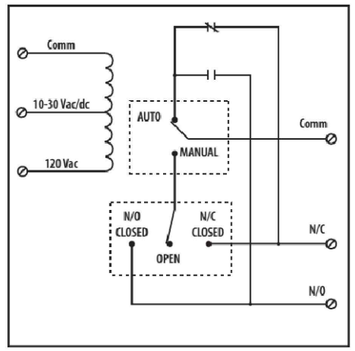
CONTRACT NO:

SHEET
INST-03
JOB NUMBER:
J-2304001

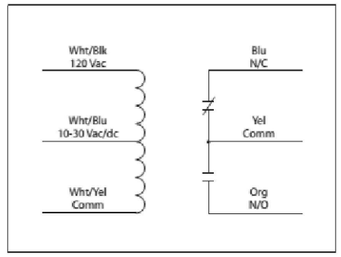




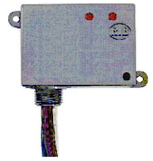
3000 RELAY, RIB PANEL–MOUNT MU1SC

Coil Voltage Input:
10-30 Vac/dc ; 120 Vac ; 50-60 Hz (RIBU1C)
10-30 Vac/dc ; 208-277 Vac ; 50-60 Hz (RIBH1C)
Drop Out = 2.1 Vac / 2.8 Vdc
Pull In = 9 Vac / 10 Vdc

Contact Ratings:
10 Amp Resistive @ 277 Vac
10 Amp Resistive @ 28 Vdc
480 VA Pilot Duty @ 240-277 Vac
480 VA Ballast @ 277 Vac
Not rated for Electronic Ballast
600 Watt Tungsten @ 120 Vac (N/O)
240 Watt Tungsten @ 120 Vac (N/C)
1/3 HP @ 120-240 Vac (N/O)
1/6 HP @ 120-240 Vac (N/C)
1/4 HP @ 277 Vac (N/O)
1/8 HP @ 277 Vac (N/C)

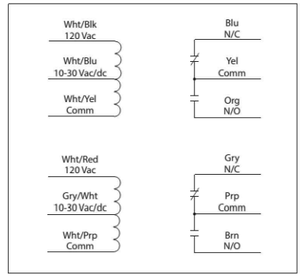


3001 RELAY, RIB FIELD–MOUNT RIBU1C

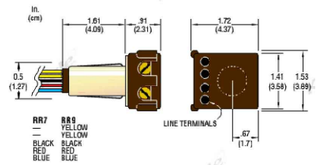


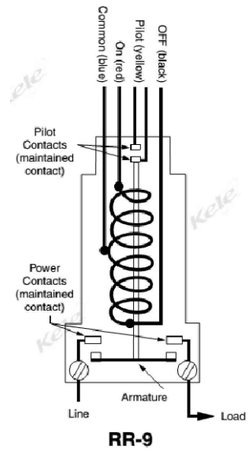
Coil Voltage Input:
10-30 Vac/dc ; 120 Vac ; 50-60 Hz (RIBU1C)
10-30 Vac/dc ; 208-277 Vac ; 50-60 Hz (RIBH1C)
Drop Out = 2.1 Vac / 2.8 Vdc
Pull In = 9 Vac / 10 Vdc

Contact Ratings:
10 Amp Resistive @ 277 Vac
10 Amp Resistive @ 28 Vdc
480 VA Pilot Duty @ 240-277 Vac
480 VA Ballast @ 277 Vac
Not rated for Electronic Ballast
600 Watt Tungsten @ 120 Vac (N/O)
240 Watt Tungsten @ 120 Vac (N/C)
1/3 HP @ 120-240 Vac (N/O)
1/6 HP @ 120-240 Vac (N/C)
1/4 HP @ 277 Vac (N/O)
1/8 HP @ 277 Vac (N/C)



3002 RELAY, RIB FIELD–MOUNT RIBU2C

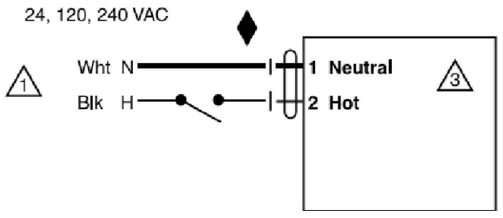




RR-9

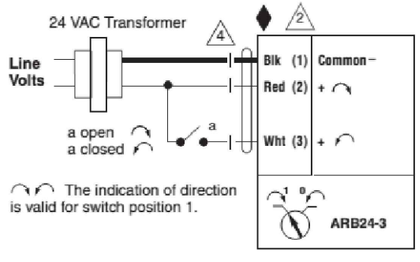
3100 RELAY, LIGHTING, LATCHING RR–9

1. Provide overload protection and disconnect as required.
2. ***CAUTION** Equipment Damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
3. No ground connection is required.



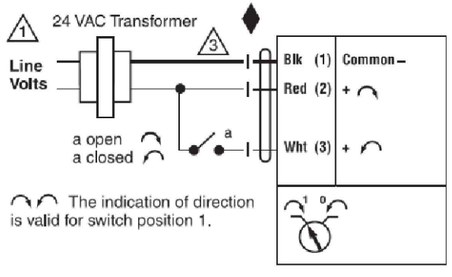
3200 BELIMO NFBUP–R ACT (ON–OFF)

2. ***CAUTION** Equipment damage!*
   Actuators may be connected in parallel.
   Power consumption and input impedance must be observed.
   For end position indication, interlock control, etc.,
4. Actuators may also be powered by 24 VDC.



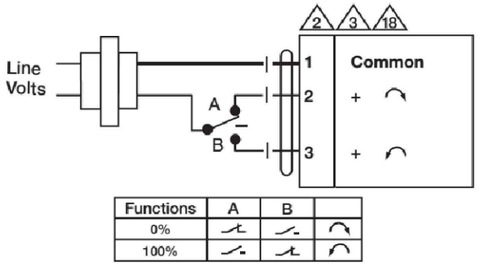
3201 BELIMO ARX24–3 ACT (ON–OFF, TS)

1. Provide overload protection and disconnect as required.
3. Actuators may also be powered by 24 VDC.



3202 BELIMO GRX24–3 ACT (ON–OFF, TS)

2. Actuators may be connected in parallel. Power consumption and input impedance must be observed.
3. Actuators may also be powered by 24 VDC.
18. Actuators with plenum rated cable do not have numbers on wires; use color codes instead.



Functions	A	B	
0%			
100%			

3203 BELIMO CQB24–3 ACT (TS)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
PHONE: 765.481.8510
E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

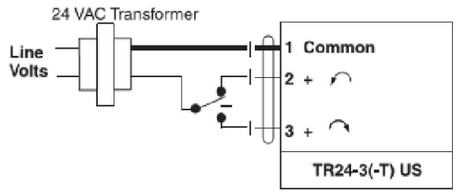
REVISIONS	
DATE	REMARKS

JOB TITLE: North Central High School
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

SHEET
INST–04
JOB NUMBER:
J–2304001

NOTE: TR24-3(-T) US cannot be wired in parallel with themselves or any other actuator.



3204 BELIMO TR24–3 ACT (ON–OFF, TS)

◆ Meets cULus requirements without the need of an electrical ground connection.

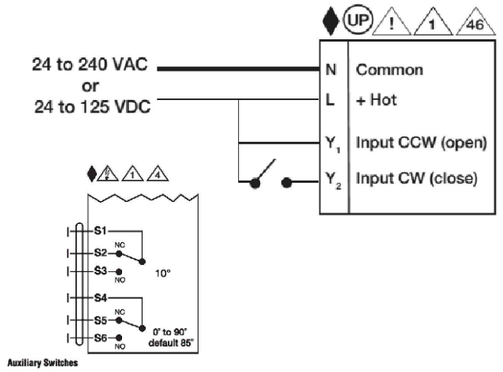
UP Universal Power Supply (UP) models can be supplied with 24 VAC up to 240 VAC, or 24 VDC up to 125 VDC.

⚠ Disconnect power.

1 Provide overload protection and disconnect as required.

4 Two built-in auxiliary switches (2x SPDT), for end position indication, interlock control, fan startup, etc.

46 Actuators may be controlled in parallel. Current draw and input impedance must be observed.

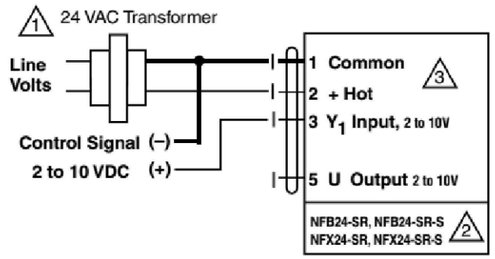


3205 BELIMO PRBUP–3–T ACT (ON–OFF, TS)

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

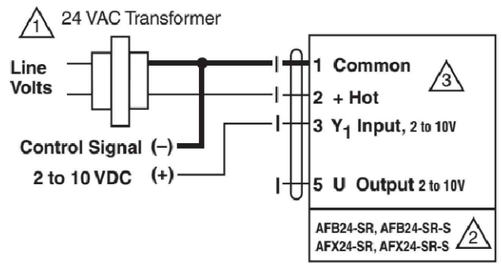


4200 BELIMO NFB24–SR ACT (2–10 VDC)

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

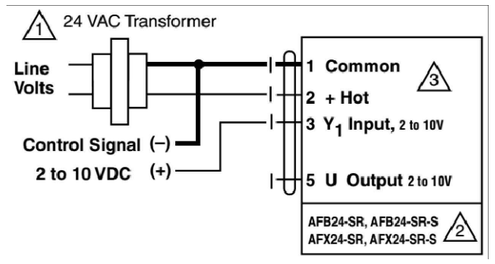


4201 BELIMO AFRB24–SR ACT (2–10 VDC)

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

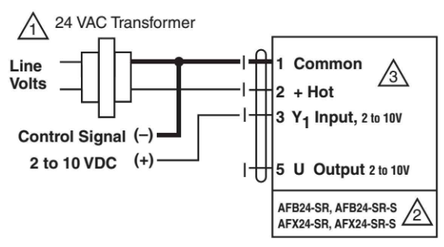


4202 BELIMO AFB24–SR ACT (2–10 VDC)

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.



4203 BELIMO AFRB24–SR ACT (2–10 VDC)
BELIMO AFRX24–SR ACT (2–10 VDC)

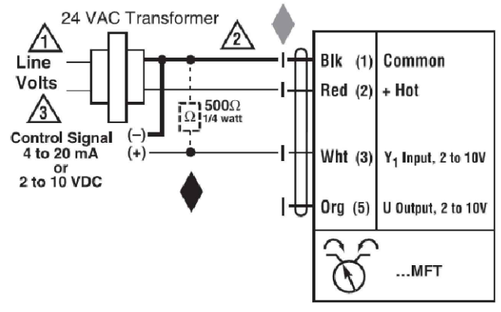
1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

◆ Meets UL requirements without the need of an electrical ground connection.

◆ The ZG-R01 500 Ω resistor may be used.



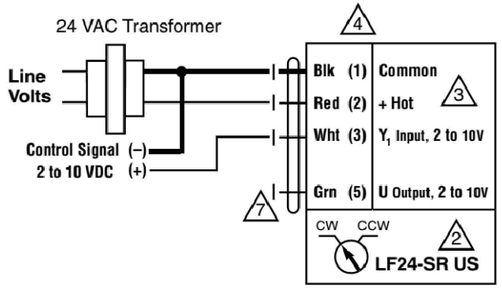
4204 BELIMO GKRX24–MFT ACT (2–10 VDC)

2 ***CAUTION** Equipment Damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

4 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

7 The LF24-SR-S US wire 5 is white.



4205 BELIMO LF24–SR ACT (2–10 VDC)

Delta Controls
Temperature Control Services
4240 W 50 S
LEBANON, INDIANA 46052
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E-MAIL: NATHAN@TCSBAS.COM

UPDATES	
DATE	REMARKS
04/06/2023	ADD 3.3
	ISSUED FOR CONST
	AS–BUILT

REVISIONS	
DATE	REMARKS

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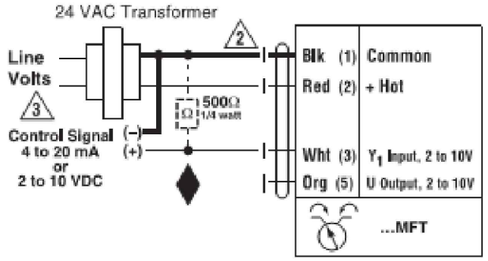
LOCATION: MSD Washington Township, Indianapolis, IN
ENGINEER: Temperature Control Services, LLC
CONTRACT WITH: MSD Washington Township
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

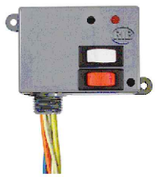
SHEET
INST–05
JOB NUMBER:
J–2304001

2 **CAUTION** *Equipment damage!*
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.

3 Actuators may also be powered by 24 VDC.

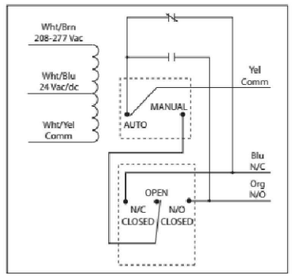


4206 BELIMO ARB24–MFT ACT (2–10 VDC)



Coil Voltage Input:
24 Vac/dc ; 120 Vac ; 50-60 Hz (RIB2401SBC)
24 Vac/dc ; 208-277 Vac ; 50-60 Hz (RIB2402SBC)
Drop Out = 2.1 Vac / 3.8 Vdc
Pull In = 18 Vac / 22 Vdc

Contact Ratings:
20 Amp Resistive @ 277 Vac
20 Amp Ballast @ 277 Vac (N/O)
10 Amp Ballast @ 277 Vac (N/C)
Not rated for Electronic Ballast
10 Amp Tungsten @ 120 Vac (N/O)
770 VA Pilot Duty @ 120 Vac
1,110 VA Pilot Duty @ 277 Vac
2 HP @ 277 Vac
1 HP @ 120 Vac



3104 RELAY, RIB FIELD–MOUNT RIB2401SBC

Delta Controls
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LEBANON, INDIANA 46052
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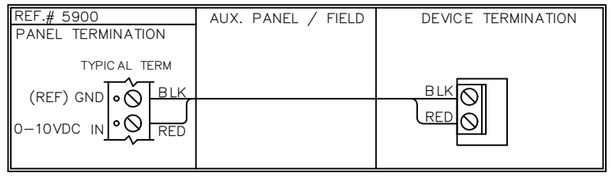
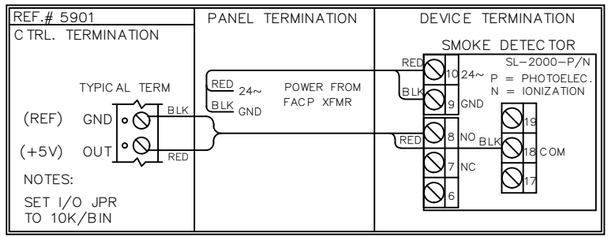
DATE: 4/12/2023 CHK. BY: ____ DRAWN BY: BSS

CONTRACT NO:

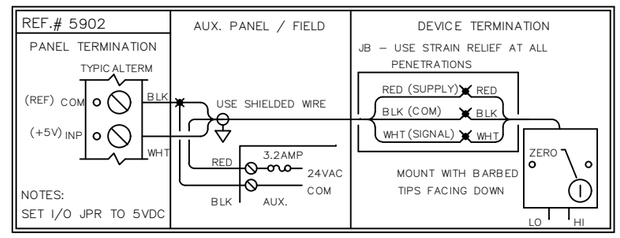
SHEET
INST–06
JOB NUMBER:
J–2304001



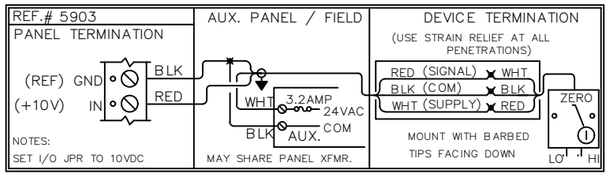
5900 DRY CONTACT INPUT (TO BAS)



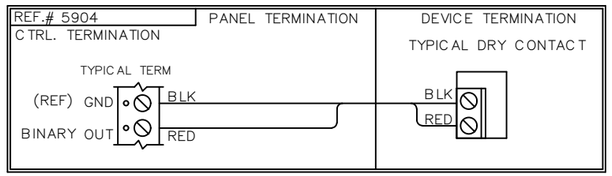
5901 SMOKE DETECTOR INPUT



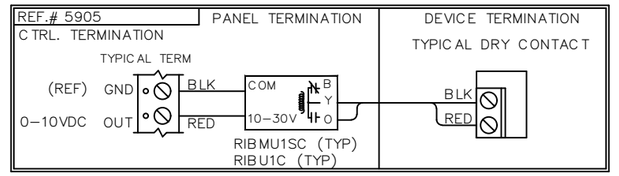
5902 0–5 VDC TRANSDUCER INPUT (TO BAS)



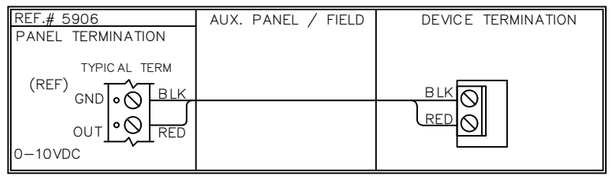
5903 0–10 VDC TRANSDUCER INPUT (TO BAS)



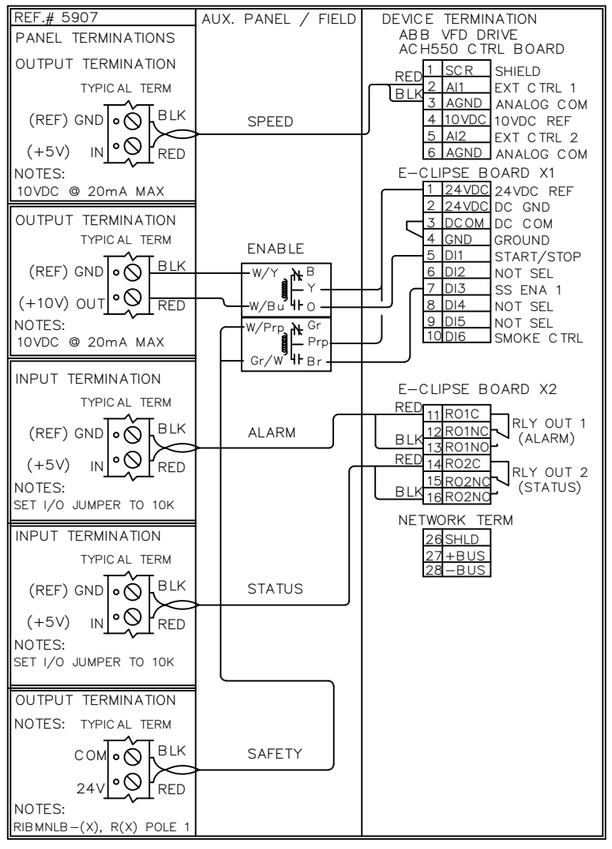
5904 PUMP / FAN ENABLE / DRY CONTACT (W/ BINARY OUT)



5905 PUMP / FAN ENABLE / DRY CONTACT (W/2–10VDC OUT)



5906 ANALOG OUTPUT (LEVEL / SPEED, ETC.)



5907 VFD CONNECTIONS, ABB ACH–550 DRIVE

NOTE:
– THE DETAILS ON THIS PAGE ARE PROVIDED AS GENERAL REPRESENTATIONS OF TYPICAL APPLICATIONS ONLY!
– WHENEVER POSSIBLE, ALWAYS FOLLOW THE ACTUAL MANUFACTURER'S INSTALLATION DETAILS.
– ACTUAL TERMINATIONS MAY DIFFER SUBSTANTIALLY FROM THESE DETAILS – USE WITH CAUTION!

INSTALLATION STANDARDS – TYPICAL THIRD–PARTY CONNECTIONS

Delta Controls
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LEBANON, INDIANA 46052
PHONE: 765.481.8510
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