CODE REFERENCES

FBC, BUILDING	FLORIDA BUILDING CODE, BUILDING, 2023 EIGHTH EDITION
FBC, EXISTING BUILDING	FLORIDA BUILDING CODE, EXISTING BUILDING, 2023 EIGHTH EDITION
FBC, MECHANICAL	FLORIDA BUILDING CODE, MECHANICAL, 2023 EIGHTH EDITION
FBC, FUEL GAS	FLORIDA BUILDING CODE, FUEL GAS, 2023 EIGHTH EDITION
FBC, EXISTING BUILDING	FLORIDA BUILDING CODE, 2023 EIGHTH EDITION
FBC, ENERGY	FLORIDA BUILDING CODE, 2023 EIGHTH EDITION
FFPC	FLORIDA FIRE PREVENTION CODE, 2023 EIGHTH EDITION
NFPA 13	STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, 2019 EDITION
NFPA 51B	STANDARD FOR FIRE PREVENTION DURING WELDING, CUTTING, AND OTHER HOT WORK, 2019 EDITION
NFPA 54	NATIONAL FUEL GAS CODE, 2021 EDITION
NFPA 70	NATIONAL ELECTRIC CODE, 2020 EDITION
NFPA 90A	STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS, 2021 EDITION
NFPA 101	LIFE SAFETY CODE, 2021 EDITION
NFPA 101A	GUIDE ON ALTERNATIVE APPROACHES TO LIFE SAFETY, 2019 EDITION

DESIGN CRITERIA

BUILDING TYPE	GROUP B, BUSINESS
CLIMATE ZONE	2A, LEON COUNTY, FLORIDA
OUTDOOR DESIGN CONDITIONS (SUMMER)	100°F DB, 80°F WB - BASED ON CURRENT UNIVERSITY STANDARD OUTDOOR AIR CONDITIONS.
OUTDOOR DESIGN CONDITIONS (WINTER)	25°F DB
INTERIOR DESIGN TEMPERATURES	72°F HEATING, 75°F COOLING
ENERGY COMPLIANCE METHOD	ENERGY TRADE OFF.
COMMISSIONING	THIS PROJECT PROJECT WILL BE COMMISSIONED. THE CONTRACTORS SHALL PROVIDE ALL REQUIRED PERSONNEL REQUIRED FOR CONSTRUCTION LEVEL COMMISSIONING OF INSTALLED HVAC SYSTEMS UPON COMPLETION OF THE PROJECT. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
SCOPE OF WORK	THE HVAC SCOPE OF WORK GENERALLY CONSISTS OF THE FOLLOWING: INSTALLATION OF NEW VARIABLE AIR VOLUME TERMINAL UNITS (VAV'S OR VTU'S) AND AIR HANDLING UNIT (AHU) TO SERVE THE PROPOSED RENOVATION AREAS.

CONTROLS SYMBOLS

DDC CONTROL PANEL - MAINTAIN A MINIMUM OF 36" CLEAR IN FRONT OF PANEL	DDC
DUCT MOUNTED SENSOR	AI
FAN OR PUMP	
AIRFLOW MONITORING STATION	AI — AFMS
VFD/AFD	OR VFD
DUCT MOUNTED SMOKE DETECTOR	OR
PREMIUM EFFICIENT MOTOR, UNO	M
MOTORIZED DAMPER	M OR
THERMOSTAT/ TEMPERATURE SENSOR WITH CONTROL WIRING	T
CURRENT SENSOR	CS
CURRENT/CONTACT RELAY	CR
ANALOG INPUT	AI
ANALOG OUTPUT	AO
DIGITAL INPUT	DI
DIGITAL OUTPUT	DO

PIPING SYMBOLS

CHECK VALVE	
PIPING UP	
PIPING DOWN	
END CAP	
CONTROL VALVE	3-WAY, 2-WAY
GATE VALVE	
BUTTERFLY VALVE	
BALL VALVE	
PUMP (SCHEMATIC)	
UNION	
FLEXIBLE CONNECTION (STAINLESS STEEL, UNO)	
DIRECTION OF FLOW	
CHILLED WATER SUPPLY & CHILLED WATER RETURN	CHWS / CHWR
HEATING HOT WATER SUPPLY & HEATING HOT WATER RETURN	HHWS / HHWR
CONDENSATE & PUMPED CONDENSATE	CD / PCD

ABBREVIATIONS & SYMBOLS

AC	AIR CONDITIONER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFR	ABOVE FINISHED ROOF
AFD	ADJUSTABLE FREQ. DRIVE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
BHP	BRAKE HORSE POWER
CD	CONDENSATE
CFM	CUBIC FEET PER MINUTE
CU	CONDENSING UNIT
DDC	DIRECT DIGITAL CONTROLS
DN	DOWN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
ESP	EXTERNAL STATIC PRESSURE
FLA	FULL LOAD AMPS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GPM	GALLONS PER MINUTE
kW	KILLOWATT
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MBH	THOUSANDS OF BTU'S PER HOUR
MCA	MINIMUM CIRCUIT AMPS
MOCP	MAXIMUM OVER CURRENT PROTECTION
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTDOOR AIR
PSI	POUNDS PER SQUARE INCH
PISG	PSI GAUGE
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
RG	RETURN GRILLE
RTU	ROOF TOP UNIT
SA	SUPPLY AIR
SG	SUPPLY GRILLE
TSP	TOTAL STATIC PRESSURE
UNO	UNLESS NOTED OTHERWISE
VAV	VARIABLE AIR VOLUME TERMINAL UNIT
VTU	VARIABLE VOLUME TERMINAL UNIT
	VAV AND VTU ARE USED INTERCHANGEABLY AND ARE THE SAME TYPE OF EQUIPMENT.
WP	WEATHER PROOF
ΔP	CHANGE IN PRESSURE
ΔT	CHANGE IN TEMPERATURE
SIM	SIMILAR
"CONNECT TO" SYMBOL	
"DEMOLISH TO" SYMBOL	
DEMOLISH EXISTING EQUIPMENT	
DIFFUSER TAG, NEW	TAG, A-100, CFM, 12x12, SIZE, IF SHOWN
DIFFUSER TAG, EXISTING	TAG, - 100, CFM

DUCT SYMBOLS

SUPPLY AIR DUCTWORK DOWN	X"xY"
SUPPLY AIR DUCTWORK UP	X"xY"
OUTSIDE AIR DUCTWORK DOWN	X"xY"
OUTSIDE AIR DUCTWORK UP	X"xY"
FLEXIBLE CANVAS CONNECTION	
RETURN AIR DUCTWORK UP	X"xY"
RETURN AIR DUCTWORK DOWN	X"xY"
EXHAUST AIR DUCTWORK UP	X"xY"
EXHAUST AIR DUCTWORK DOWN	X"xY"
FIRE DAMPER EX. - EXISTING	EX.
MECHANICAL EQUIPMENT WITH MAINTENANCE CLEARANCE	MECH. EQUIPMENT, MAINTENANCE CLEARANCE
MANUAL BALANCE DAMPER	
MOTORIZED DAMPER, REFER TO SPECIFICATIONS FOR VOLTAGE REQUIREMENTS	M
FLEXIBLE DUCTWORK	
SUPPLY AIR DIFFUSER	
RETURN AIR GRILLE	
EXHAUST AIR GRILLE	
DEMOLISH EXISTING DUCTWORK	

GENERAL HVAC NOTES

1	TOMAHAWK ENGINEERING AND CONSULTING, INC. SHALL NOT BE HELD RESPONSIBLE FOR ANY MISUSE AND/OR MISREPRESENTATION OF THIS SET OF DOCUMENTS.
2	THE CONTRACTOR ASSUMES RESPONSIBILITY FOR USE OF THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL MAKE HIMSELF AWARE OF PROJECT CONDITIONS AND OWNER REQUIREMENTS PRIOR TO PROCUREMENT OF EQUIPMENT AND SERVICES. CHANGES IN PROJECT COST WILL NOT BE GRANTED DUE TO FIELD CONFLICTS AND/OR PROJECT CONDITIONS.
3	THIS SET OF DRAWINGS AND SPECIFICATIONS SHALL NOT BE CONSIDERED A SET OF CONSTRUCTION DOCUMENTS UNLESS A SIGNATURE AND DATE ARE AFFIXED TO THE DRAWINGS AND SPECIFICATIONS BY THE ENGINEER IN RESPONSIBLE CHARGE FOR THE GIVEN DISCIPLINE.
4	CONFLICTS BETWEEN THIS SET OF DRAWINGS AND THE CONTRACT SPECIFICATIONS SHALL BE RESOLVED BY THE ENGINEER OF RECORD. THE CONTRACTOR DOES NOT HAVE THE AUTHORITY TO INTERPRET CONFLICTS AND RESOLVE ISSUES WITHOUT WRITTEN DIRECTION FROM THE ENGINEER OF RECORD.
5	ANY CONFLICTS IN THE FIELD OR WITHIN THESE DOCUMENTS SHALL BE RECORDED AND PROVIDED TO THE ENGINEER OF RECORD ON THE CONTRACTOR'S STANDARD LETTERHEAD. WRITTEN DIRECTION RESOLVING CONFLICT WILL BE ISSUED BY THE ENGINEER OF RECORD.
6	WHERE THE CONTRACTOR DEVIATES FROM THIS SET OF CONSTRUCTION DOCUMENTS AND RESUBMISSION OF REVISED DRAWINGS IS REQUIRED BY THE PERMITTING OFFICE/OFFICIAL, A MINIMUM CHARGE OF $750.00 PER AFFECTED DRAWING SHEET WILL BE BILLED TO THE CONTRACTOR. THE REVISED DRAWINGS WILL NOT BE PROVIDED AND/OR SUBMITTED TO THE PERMIT OFFICE UNTIL A PURCHASE ORDER OR SIGNED AGREEMENT IS ISSUED BY THE CONTRACTOR TO THE DESIGN PROFESSIONAL FOR WORK REQUIRED. THIS SHALL NOT APPLY TO UNFORESEEN CONDITIONS OR CHANGES REQUIRED FOR THE PROJECT THAT ARE NOT INITIATED BY THE CONTRACTOR.
7	DRAWINGS ARE SCHEMATIC IN NATURE. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES AND EXISTING EQUIPMENT (WHERE APPLICABLE) TO ENSURE EQUIPMENT FURNISHED WILL WORK FOR SPACES PROVIDED. FINAL DIMENSIONS OF DUCTWORK AND PIPING SHALL BE COORDINATED IN FIELD. THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR PROVIDING OFFSETS AND TRANSITIONS IN DUCTWORK AND PIPING TO FIT IN SPACES PROVIDED AND THESE ADDITIONAL OFFSETS AND TRANSITIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
8	DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA GUIDELINES AT TIME OF PROJECT PERMIT.
9	THERMOSTATS, HUMIDISTATS, TEMPERATURE SENSORS, HUMIDITY SENSORS, AND/OR OTHER DEVICES REQUIRING OCCUPANT ADJUSTMENT BUT LOCATED ON WALL SHALL BE MOUNTED 48" AFF, UNLESS NOTED OTHERWISE.
10	WHERE APPLICABLE AND AVAILABLE, ACTUAL EQUIPMENT DRAWINGS ARE USED FOR SYMBOLS ON PLAN VIEWS AND IN DETAILS. HOWEVER, SIMPLE BLOCK DIAGRAMS WITH ESTIMATED DIMENSIONS ARE ALSO USED FOR PLAN VIEWS. WHERE EQUIPMENT OR DEVICES ARE NOT LABELED, INDUSTRY STANDARD TERMINOLOGY AND SYMBOLOGY SHALL APPLY.
11	THESE GENERAL NOTES WORK IN CONJUNCTION WITH NOTES SHOWN ON PLAN VIEWS. THESE NOTES DO NOT SUPERCEDE NOTES SHOWN ON PLAN VIEW DRAWINGS. CONVERSELY, NOTES SHOWN ON PLAN VIEW DRAWINGS DO NOT SUPERCEDE THESE GENERAL NOTES.
12	REFER TO EQUIPMENT SCHEDULES FOR AIR AND WATER PRESSURE DROPS ASSOCIATED WITH COOLING AND HEATING COILS.
13	PROVIDE ACCESS PANELS IN DUCTWORK AND/OR BUILDING CONSTRUCTION WHERE REQUIRED FOR EQUIPMENT ACCESS AND SERVICE. PANELS SHALL BE SIZED TO SUIT EQUIPMENT SERVICED. WHERE PANELS WILL BE LOCATED IN FIRE RATED WALLS AND/OR PARTITIONS, THE ACCESS PANEL SHALL MEET THE RATING OF THE WALL. REFER TO ARCHITECTURAL DRAWINGS FOR RATINGS OF WALLS AND PARTITIONS.
14	UNLESS NOTED OTHERWISE, DUCTWORK, PIPING, VALVES, DAMPERS, AND ALL ASSOCIATED ANCILLARY HVAC DEVICES SHALL BE CONSTRUCTED IN ACCORDANCE WITH MECHANICAL SPECIFICATIONS. ALL EQUIPMENT INSTALLED AS PART OF THIS PROJECT SHALL BE NEW, UNLESS NOTED OTHERWISE, NO EXCEPTIONS.
15	PAINT DUCTWORK AND DAMPERS VISIBLE THRU REGISTERS FLAT BLACK PRIOR TO OWNER OCCUPANCY.
16	HVAC EQUIPMENT PROVIDED FROM THIRD PARTY MANUFACTURER SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS. WHERE CONFLICTS BETWEEN CONTRACT DOCUMENTS AND MANUFACTURER'S INSTRUCTION ARISE, THE MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL PREVAIL.
17	THE CONTRACTOR SHALL MAKE HIS OR HERSELF AWARE OF THE OWNER'S SCHEDULE AND BE PREPARED TO WORK AT NIGHT OR ON WEEKENDS TO COMPLETE WORK SHOWN IN THESE DOCUMENTS. INTERRUPTIONS TO OWNER'S NORMAL WORK SCHEDULE SHALL NOT BE MADE WITHOUT WRITTEN INSTRUCTION TO DO SO FROM OWNER'S REPRESENTATIVE.
18	FOR EQUIPMENT DEMOLISHED UNDER THIS CONTRACT, THE CONTRACTOR SHALL ALLOW THE OWNER FIRST REFUSAL OF DEMOLISHED EQUIPMENT. IF EQUIPMENT IS REFUSED, THE CONTRACTOR SHALL DISPOSE OF DEMOLISHED EQUIPMENT IN ACCORDANCE WITH THE AUTHORITY HAVING JURISDICTION. IN ADDITION, FOR EQUIPMENT INDICATED TO BE DEMOLISHED, THE CONTRACTOR SHALL ASSUME THAT THIS ALSO REQUIRES DEMOLITION OF ALL ASSOCIATED APPURTENANCES INCLUDING ELECTRICAL CONNECTIONS, CONTROLS CONNECTIONS, ETC.
19	CONTROLS COMPONENTS INDICATED TO BE DEMOLISHED SHALL ALSO INCLUDE CONTROL WIRING AND CONDUITS, REGARDLESS OF VOLTAGE. WHERE CONTROLS WIRING IS 120V AND ABOVE, A LICENSED ELECTRICAL CONTRACTOR SHALL BE PROCURED BY THE CONTROLS VENDOR TO PERFORM WORK.
20	THE CONTROLS VENDOR IS RESPONSIBLE FOR PROVIDING AND INSTALLING ALL CONTROL WIRING AND CONDUIT ASSOCIATED WITH THIS PROJECT, REGARDLESS OF VOLTAGE. WHERE CONTROL VOLTAGE IS 110V AND ABOVE, THE CONTROLS VENDOR SHALL PROCURE THE SERVICES OF A FLORIDA LICENSED ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL WIRING AND CONDUITS IN ACCORDANCE WITH NEC AND THE LOCAL AUTHORITY HAVING JURISDICTION.
21	WHERE THERE ARE CONFLICTS BETWEEN LIGHT SWITCHES AND THERMOSTAT/HUMIDISTAT LOCATIONS, THE LIGHT SWITCHES SHALL PREVAIL. MOUNT THERMOSTAT/HUMIDISTATS ADJACENT TO LIGHT SWITCHES.
22	AS REQUIRED BY BUILDING CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE TRANSITIONS AND EQUIVALENT SQUARE DUCT SIZES NEEDED TO FIT THRU JOISTS AND/OR WALL 2x4 SPACING WHERE ROUND IS SHOWN ON PLANS. THE CONTRACTOR SHALL PROVIDE THESE TRANSITIONS AND SQUARE DUCTS AT NO ADDITIONAL COST TO THE OWNER. COORDINATE WITH THE GC IN FIELD FOR JOIST AND WALL 2x4 REQUIREMENTS.
23	WHERE REQUIRED BY BUILDING CONSTRUCTION AND HEIGHT TO EQUIPMENT SERVED, THE CONTRACTOR SHALL PROVIDE HOISTING MECHANISMS AS WELL AS SCAFFOLDING WHERE REQUIRED TO INSTALL EQUIPMENT SHOWN WITHIN THESE CONTRACT DOCUMENTS. EQUIPMENT USED FOR THE INSTALLATION OF EQUIPMENT SHALL MEET ALL OSHA REQUIREMENTS.
24	PROVIDE MANUAL BALANCE DAMPERS FOR SUPPLY, RETURN, AND EXHAUST TAKE-OFFS TO REGISTERS WHETHER INDICATED OR NOT. WHERE DAMPERS WILL BE LOCATED ABOVE INACCESSIBLE CEILINGS, PROVIDE OPPOSED BLADE MANUAL BALANCE DAMPERS FROM REGISTER MANUFACTURER.

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ID:	REVISION:	DRAWN:	REVIEWED:	DATE:

Client: Florida State University
Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850-402-9340
Fax: 850-402-9659

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
COA # 29709
Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

RICHARD LINDBURG
PE#. 62829

WESLEY H. THIGPEN, JR. — LICENSE No. 65705 — STATE OF FLORIDA — EXPIRES 02-28-27 — PROFESSIONAL ENGINEER

Seal:
PE#: 65705
WESLEY THIGPEN, JR

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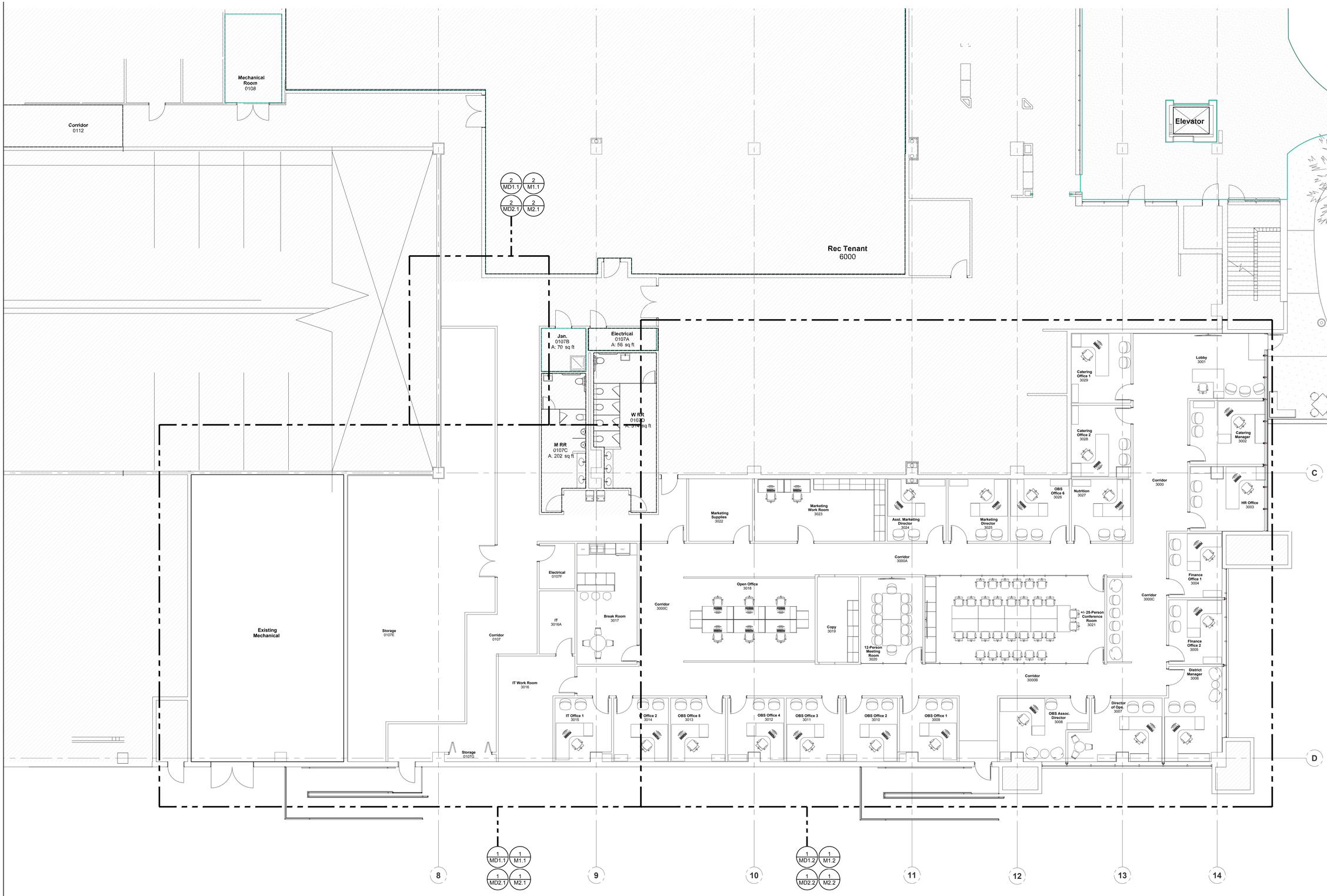
Description:
Legend & Notes - Mechanical

Sheet No.:
M0.1



1 Overall Floor Plan - Renovation - Mechanical

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

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Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850-402-3640
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Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

RICHARD LINDBURG
PE#: 62829

WESLEY H. THIGPEN, JR. LICENSE No. 65705 STATE OF FLORIDA EXPIRES 02-28-27 PROFESSIONAL ENGINEER

Seal: PE#: 65705
WESLEY THIGPEN, JR

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850.942.1718
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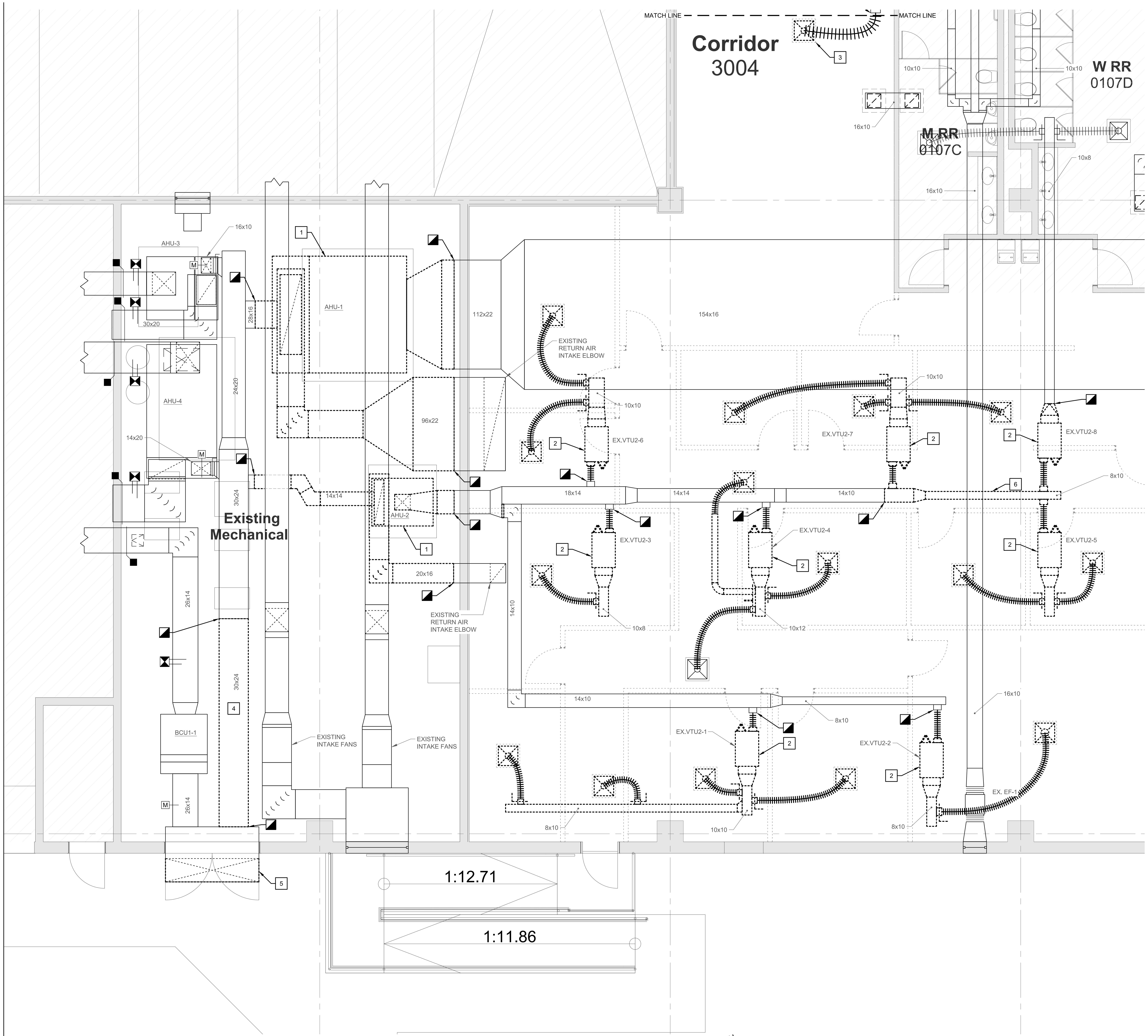
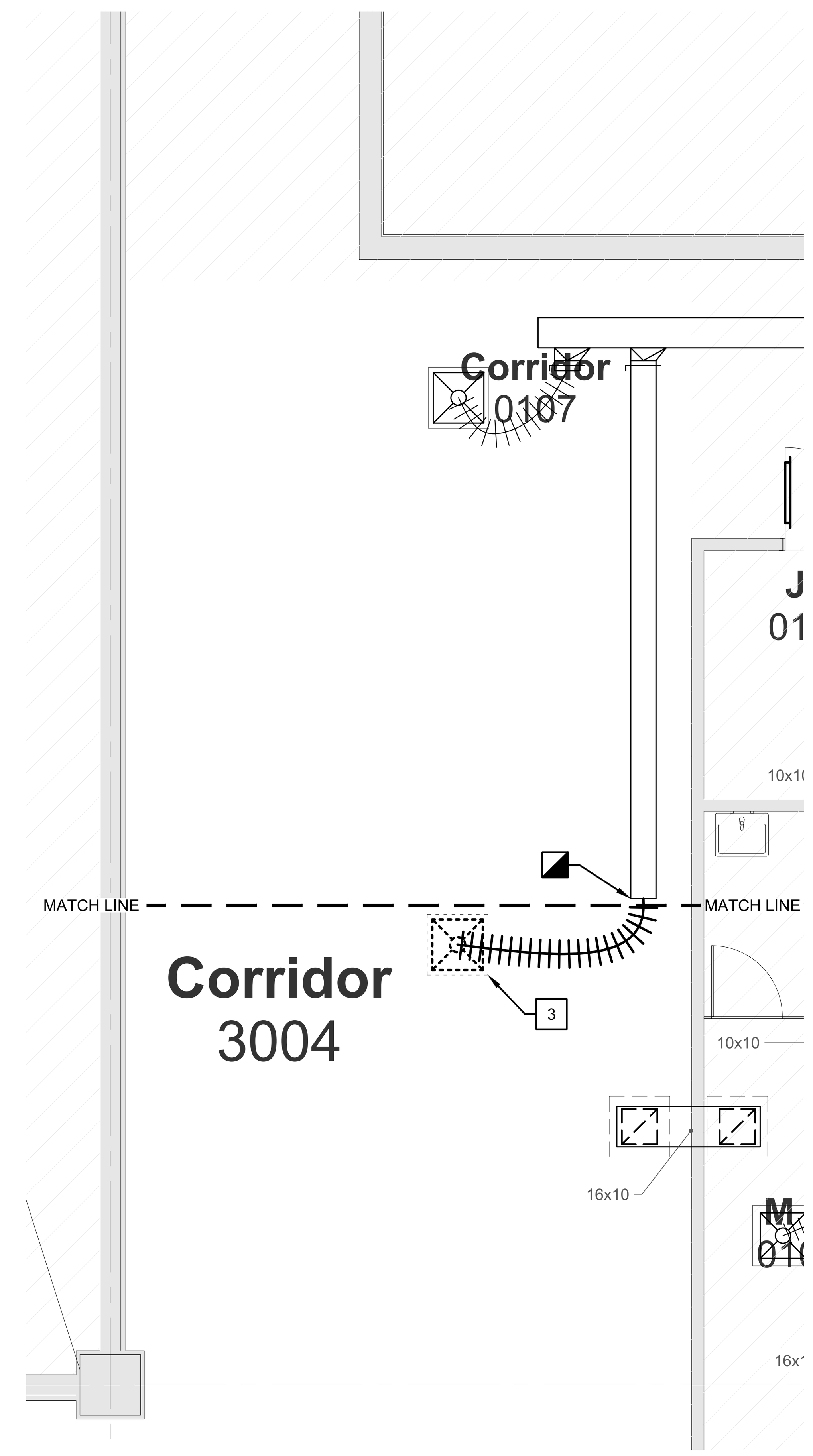
Description:
Overall Floor Plan - Renovation - Mechanical

Sheet No.:
M1.0



1 Partial Floor Plan - Demolition - Ductwork

SCALE: 1/4" = 1'-0"



2 Partial Floor Plan - Demolition - Ductwork

MATCH LINE A

SHEET DEMOLITION KEY NOTES:	
1	DEMOLISH EXISTING AHU AND ALL ASSOCIATED APPURTENANCES. DEMOLISH DUCTWORK TO POINTS INDICATED. PREPARE EXISTING DUCTWORK FOR NEW CONNECTION. REFER TO RENOVATION DRAWINGS FOR FURTHER INFORMATION.
2	DEMOLISH EXISTING TERMINAL UNIT AND ASSOCIATED APPURTENANCES TO POINT INDICATED. CAP AND SEAL EXISTING DUCTWORK THAT WILL NOT BE USED FOR NEW TERMINALS AIR AND VAPOR TIGHT.
3	REMOVE, CLEAN, AND STORE EXISTING REGISTER. REINSTALL AS INDICATED ON RENOVATION DRAWINGS.
4	DEMOLISH EXISTING OUTSIDE AIR DUCTWORK FROM OUTSIDE AIR LOUVER TO POINT INDICATED. PREPARE EXISTING DUCTWORK FOR NEW CONNECTION. REFER TO RENOVATION PLANS FOR FURTHER INFORMATION.
5	REMOVE EXISTING INSECT SCREEN AND CLEAN OUTSIDE AIR INTAKE DUCTWORK. REPLACE WITH EXPANDED METAL BIRD SCREEN.
6	DEMOLISH EXISTING SUPPLY AIR DUCTWORK BACK TO POINT INDICATED. CAP AND SEAL AIR AND VAPOR TIGHT.

SHEET NOTES:

1. EXISTING SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK THAT IS TO REMAIN SHALL BE CLEANED ACCORDING TO CURRENT UNIVERSITY STANDARDS. REFER TO RENOVATION PLANS AND SPECIFICATIONS FOR FURTHER INFORMATION.

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Job Title: Parking Garage 1 Remodeling - Phase 2

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
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Tomahawk Project #: 25042
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Phone: 850-402-3040
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Project #: 19370.42
Phase: 100% Construction Documents

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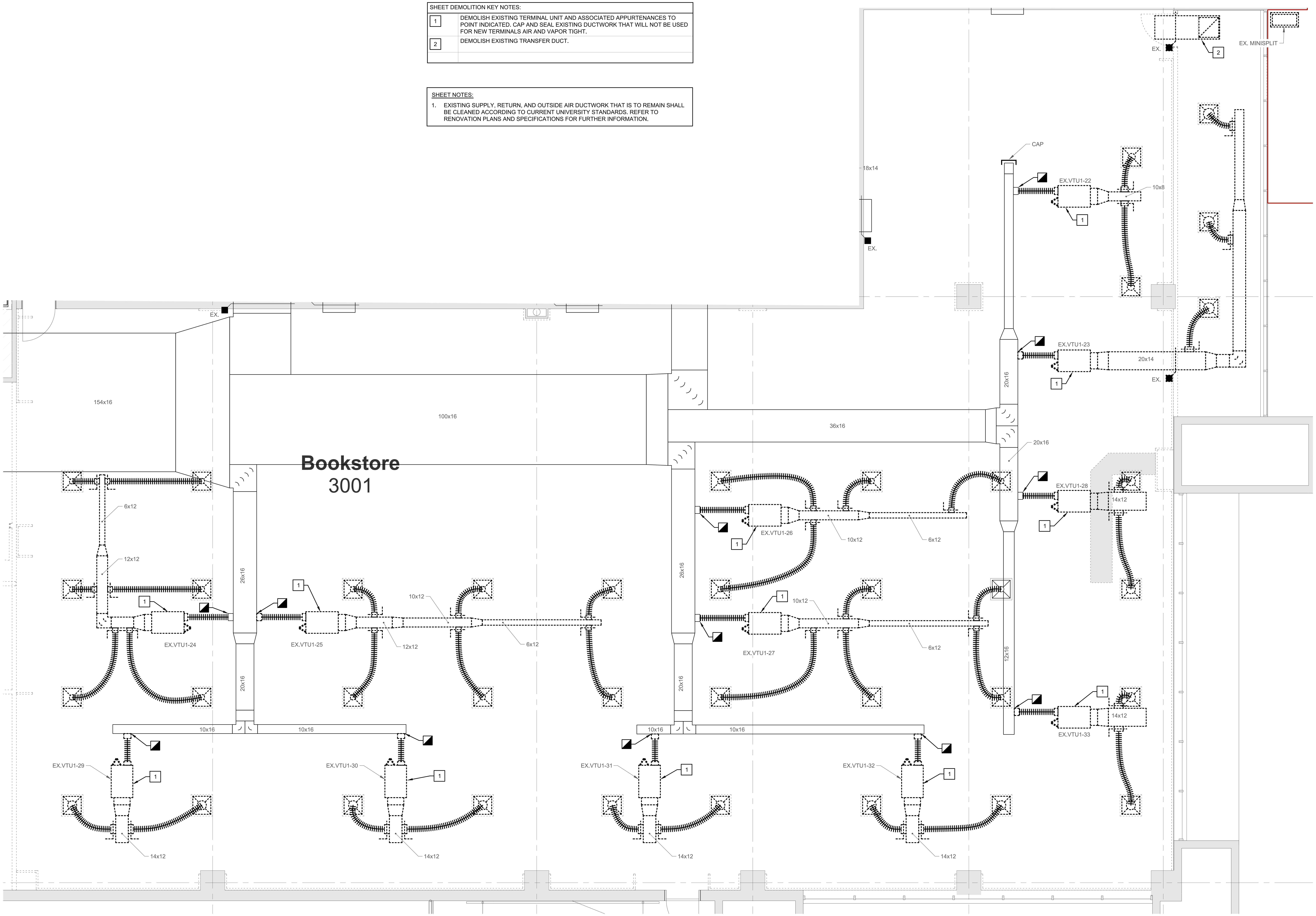
Description: Partial Floor Plan - Demolition - Ductwork

Sheet No.: MD1.1

SHEET DEMOLITION KEY NOTES:	
1	DEMOLISH EXISTING TERMINAL UNIT AND ASSOCIATED APPURTENANCES TO POINT INDICATED. CAP AND SEAL EXISTING DUCTWORK THAT WILL NOT BE USED FOR NEW TERMINALS AIR AND VAPOR TIGHT.
2	DEMOLISH EXISTING TRANSFER DUCT.

SHEET NOTES:

1. EXISTING SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK THAT IS TO REMAIN SHALL BE CLEANED ACCORDING TO CURRENT UNIVERSITY STANDARDS. REFER TO RENOVATION PLANS AND SPECIFICATIONS FOR FURTHER INFORMATION.



1 Partial Floor Plan - Demolition - Ductwork
SCALE: 1/4" = 1'-0"

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COA #: 29709
Tomahawk Project #: 25042

THIS ITEM HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY THE ENGINEER INDICATED HEREIN WITH THE DATE AS INDICATED IN THE TIME STAMP USING AN SHA CODE.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SHA AUTHENTICATION CODE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

Project #: 19370.42

Phase: 100% Construction Documents

Seal:
RICHARD LINDBURG
PE#: 62829

WESLEY H. THIGPEN JR.
LICENSE
No. 65705
STATE OF FLORIDA
EXPIRES 02-28-27
PROFESSIONAL ENGINEER

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WESLEY THIGPEN, JR

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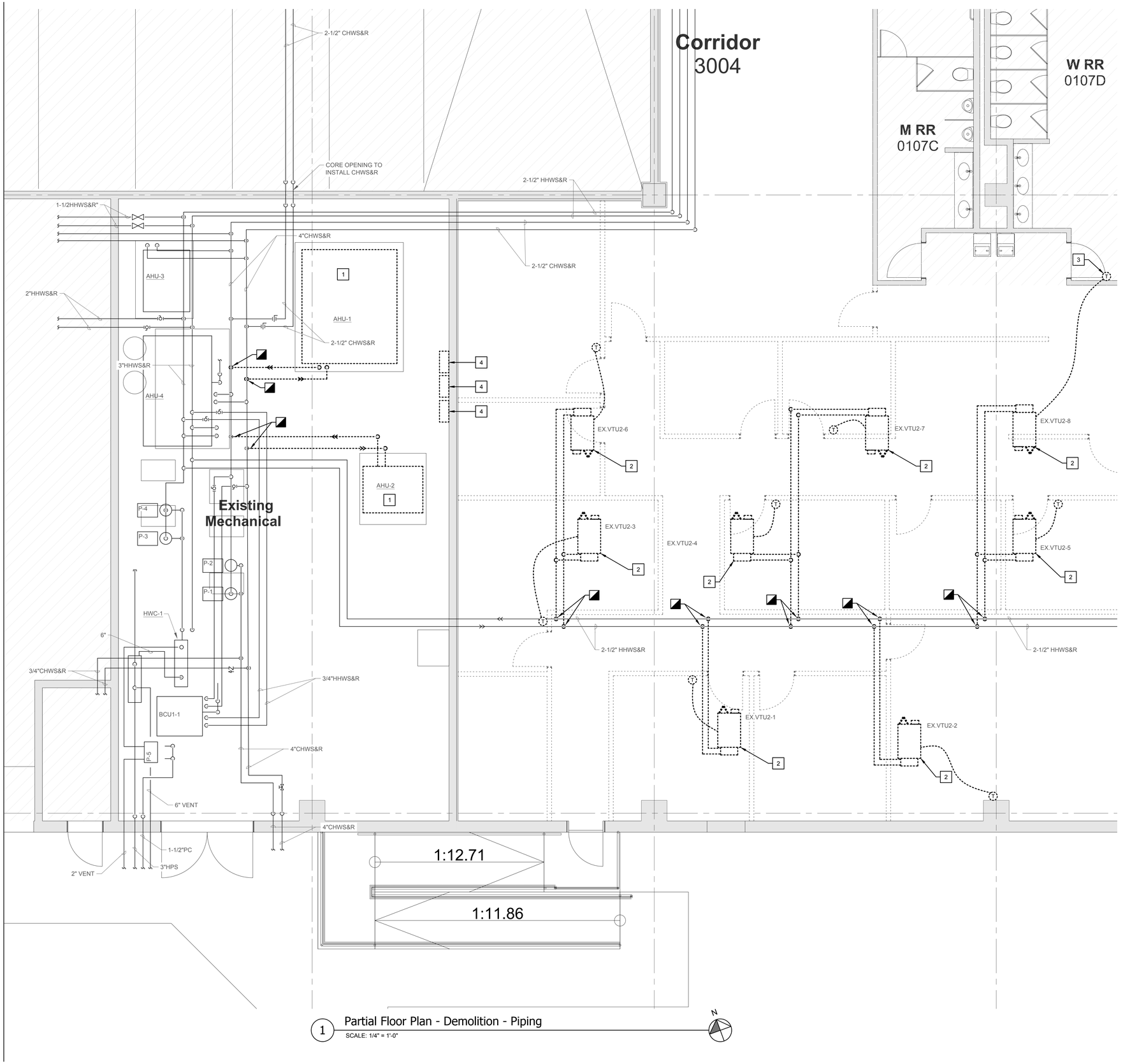
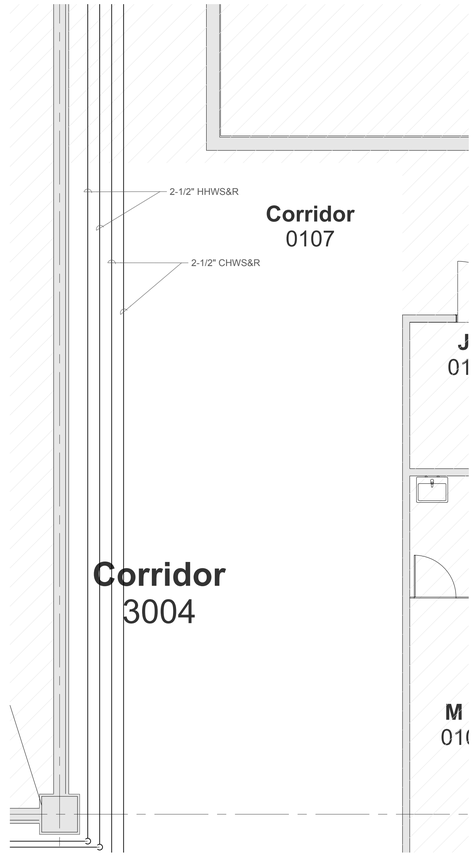
Description:
Partial Floor Plan - Demolition - Ductwork

Sheet No.:
MD1.2



1 Partial Floor Plan - Demolition - Piping

SCALE: 1/4" = 1'-0"



2 Partial Floor Plan - Demolition - Piping

SCALE: 1/4" = 1'-0"

SHEET DEMOLITION KEY NOTES:	
1	DEMOLISH EXISTING AIR HANDLING UNIT AND ALL ASSOCIATED APPURTENANCES. DEMOLISH PIPING TO POINTS INDICATED, CAP AND SEAL WATER AND VAPOR TIGHT.
2	DEMOLISH EXISTING TERMINAL UNIT, THERMOSTAT AND ASSOCIATED APPURTENANCES. DEMOLISH HEATING HOT WATER PIPING BACK TO POINTS INDICATED. CAP AND SEAL WATER AND VAPOR TIGHT. REFER TO RENOVATION DRAWINGS FOR FURTHER INFORMATION.
3	FIELD VERIFY EXACT LOCATION.
4	DEMOLISH EXISTING BAS CONTROLLER ENCLOSURES AND RELOCATE. WHERE REQUIRED, PROVIDE NEW PROGRAMMABLE LOGIC CONTROLLER(S) (PLC(S)) OR EXPANSION MODULES AS NEEDED. EXTEND EXISTING WIRING TO NEW LOCATION.THE EXISTING WIREWAY SHALL BE DEMOLISHED OR RELOCATED AS NEEDED TO REWORK NEW CONTROLS WIRING. WHERE THE WIREWAY IS DEMOLISHED, PROVIDE A NEW WIREWAY MEETING THE REQUIREMENTS OF THE NEW INSTALLATION. REFER TO SPECIFICATIONS AND CONTROLS DRAWINGS.
	AS PART OF DEMOLITION AND RELOCATION ACTIVITIES INDICATED ABOVE, THE CONTROLS VENDOR SHALL PROVIDE A POINT TO POINT CHECK OUT PRIOR TO DEMOLITION ACTIVITIES. POINTS SHALL BE VERIFIED AND WIRING SHALL BE IDENTIFIED. WIRING SHALL BE EXTENDED AND TERMINATED AT NEW CONTROLLERS AS INDICATED ON RENOVATION FLOOR PLANS. EXISTING PROGRAMMING SHALL BE MIGRATED TO NEW CONTROLLERS FOR EXISTING EQUIPMENT. FIELD VERIFY ALL EXISTING PROGRAMMING FOR EXISTING EQUIPMENT THAT WILL NOT BE MODIFIED AS A PART OF THIS PROJECT PRIOR TO MIGRATING TO NEW CONTROLLERS.

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ADVANCED SCHEM. DESIGN			-
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RICHARD LINDBURG
PE#: 62829

Seal: WESLEY H. THIGPEN JR. LICENSE No. 65705 STATE OF FLORIDA EXPIRES 02-28-27 PROFESSIONAL ENGINEER
PE#: 65705
WESLEY THIGPEN, JR

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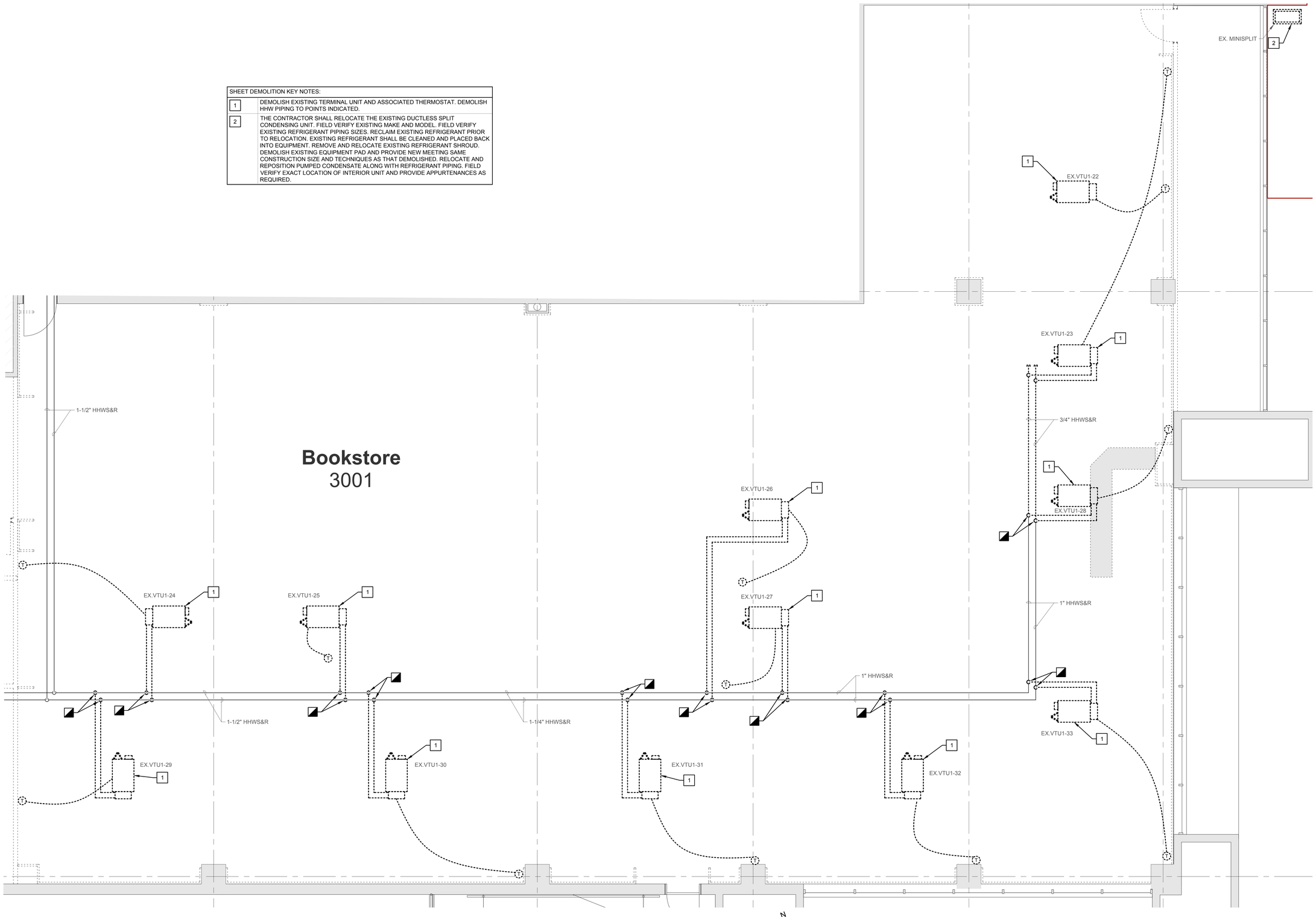
Tallahassee, Florida 32301
850.942.1718
www.think3d.net

Description:
Partial Floor Plan - Demolition - Piping

Sheet No.:
MD2.1

SHEET DEMOLITION KEY NOTES:	
1	DEMOLISH EXISTING TERMINAL UNIT AND ASSOCIATED THERMOSTAT. DEMOLISH HHW PIPING TO POINTS INDICATED.
2	THE CONTRACTOR SHALL RELOCATE THE EXISTING DUCTLESS SPLIT CONDENSING UNIT. FIELD VERIFY EXISTING MAKE AND MODEL. FIELD VERIFY EXISTING REFRIGERANT PIPING SIZES. RECLAIM EXISTING REFRIGERANT PRIOR TO RELOCATION. EXISTING REFRIGERANT SHALL BE CLEANED AND PLACED BACK INTO EQUIPMENT. REMOVE AND RELOCATE EXISTING REFRIGERANT SHROUD. DEMOLISH EXISTING EQUIPMENT PAD AND PROVIDE NEW MEETING SAME CONSTRUCTION SIZE AND TECHNIQUES AS THAT DEMOLISHED. RELOCATE AND REPOSITION PUMPED CONDENSATE ALONG WITH REFRIGERANT PIPING. FIELD VERIFY EXACT LOCATION OF INTERIOR UNIT AND PROVIDE APPURTENANCES AS REQUIRED.



1 Partial Floor Plan - Demolition - Piping
SCALE: 1/4" = 1'-0"

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PHASE:	DRAWN:	REVIEWED:	DATE:
CONCEPT SCHEM. DESIGN			-
ADVANCED SCHEM. DESIGN			-
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PERMIT DOCS.			
100% CONSTRUCTION DOCS.	DMM	WHT	03/09/2026

ID:	REVISION:	DRAWN:	REVIEWED:	DATE:

Client: Florida State University
Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850.402.9660
Fax: 850.402.9659
COA #: 29709
Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

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Sheet No.:
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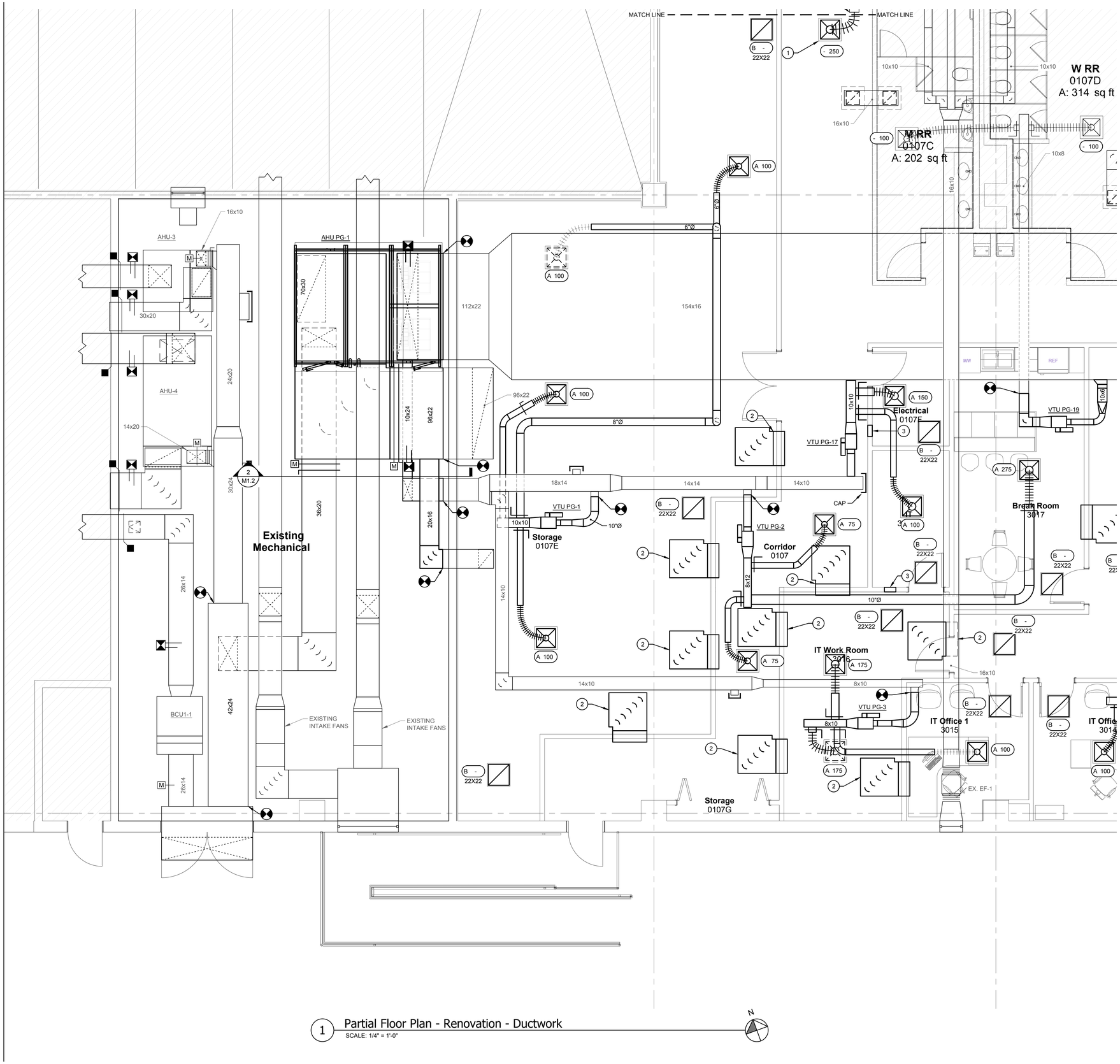
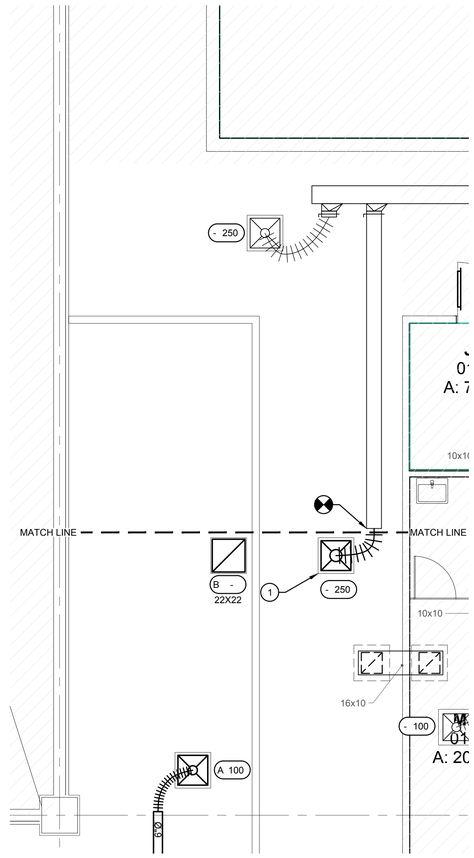


1 Partial Floor Plan - Renovation - Ductwork

SCALE: 1/4" = 1'-0"



2 Partial Floor Plan - Renovation - Ductwork

SCALE: 1/4" = 1'-0"

SHEET RENOVATION KEY NOTES:	
1	REINSTALL EXISTING DIFFUSER IN NEW LOCATION AS INDICATED. PROVIDE NEW FLEXIBLE CONNECTION.
2	PROVIDE A 36x20 RETURN AIR TRANSFER WITH 90° ELBOW.
3	PROVIDE A 12x12 RETURN AIR TRANSFER.

SHEET NOTES:

1. EXISTING DUCTWORK (SUPPLY, RETURN, AND OUTSIDE AIR) CONNECTED TO AHUPG-1 SHALL BE CLEANED ACCORDING TO CURRENT UNIVERSITY STANDARDS. REFER TO DUCT CLEANING SPECIFICATIONS FOR FURTHER INFORMATION.
2. DUCTWORK FOR UPS SPACE CONSTRUCTED UNDER SEPARATE CONTRACT HAS ALREADY BEEN CLEANED, NO FURTHER CLEANING REQUIRED. FIELD VERIFY CONNECTION POINTS AND CLEANING STOP POINT FROM PREVIOUS PROJECT.
3. WHERE TERMINALS ARE TO USE EXISTING TAPS, EXISTING TAP SIZES SHALL BE FIELD VERIFIED. WHERE EXISTING TAPS ARE SMALLER THAN TERMINAL UNITS, THE TAP SIZES SHALL BE ENLARGED TO INLET SIZE OF TERMINAL.

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ADVANCED SCHEM. DESIGN			-
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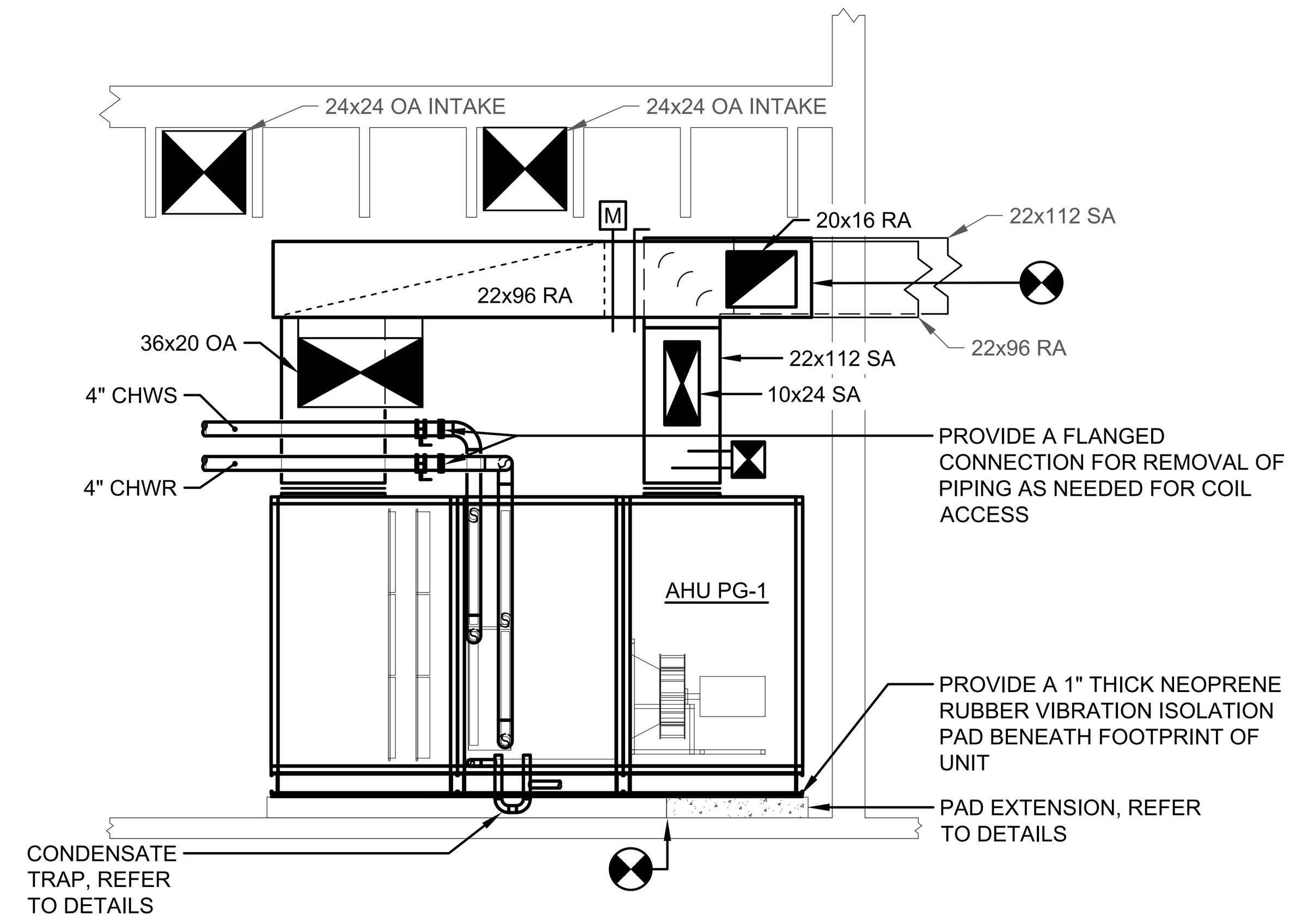
M1.1



2 AHU PG-1 Elevation - Mechanical

SCALE: 1/4" = 1'-0"

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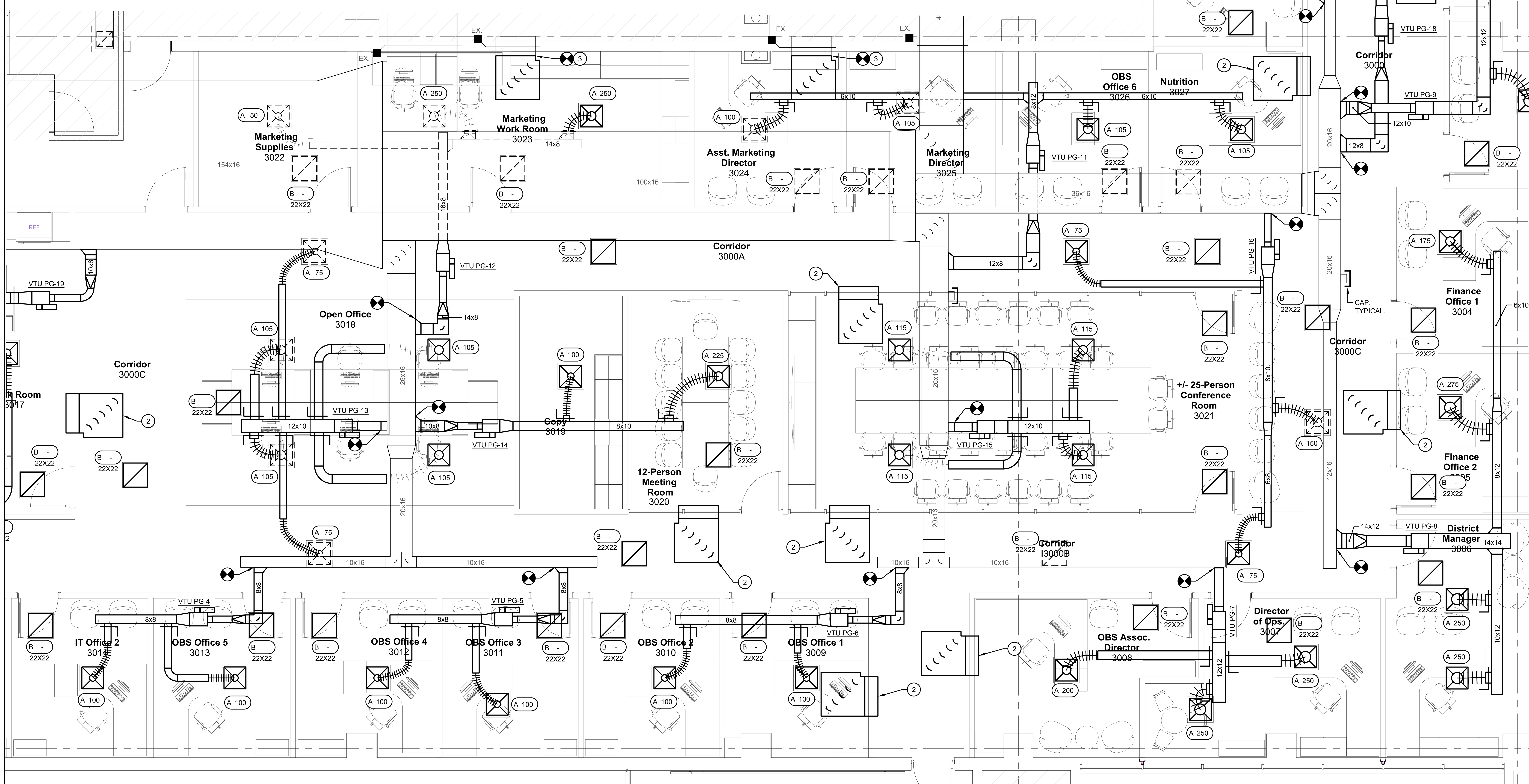
2. DUCTWORK FOR UPS SPACE CONSTRUCTED UNDER SEPARATE CONTRACT HAS ALREADY BEEN CLEANED, NO FURTHER CLEANING REQUIRED. FIELD VERIFY CONNECTION POINTS AND CLEANING STOP POINT FROM PREVIOUS PROJECT.
3. WHERE TERMINALS ARE TO USE EXISTING TAPS, EXISTING TAP SIZES SHALL BE FIELD VERIFIED. WHERE EXISTING TAPS ARE SMALLER THAN TERMINAL UNITS, THE TAP SIZES SHALL BE ENLARGED TO INLET SIZE OF TERMINAL.



1 Partial Floor Plan - Renovation - Ductwork

SCALE: 1/4" = 1'-0"

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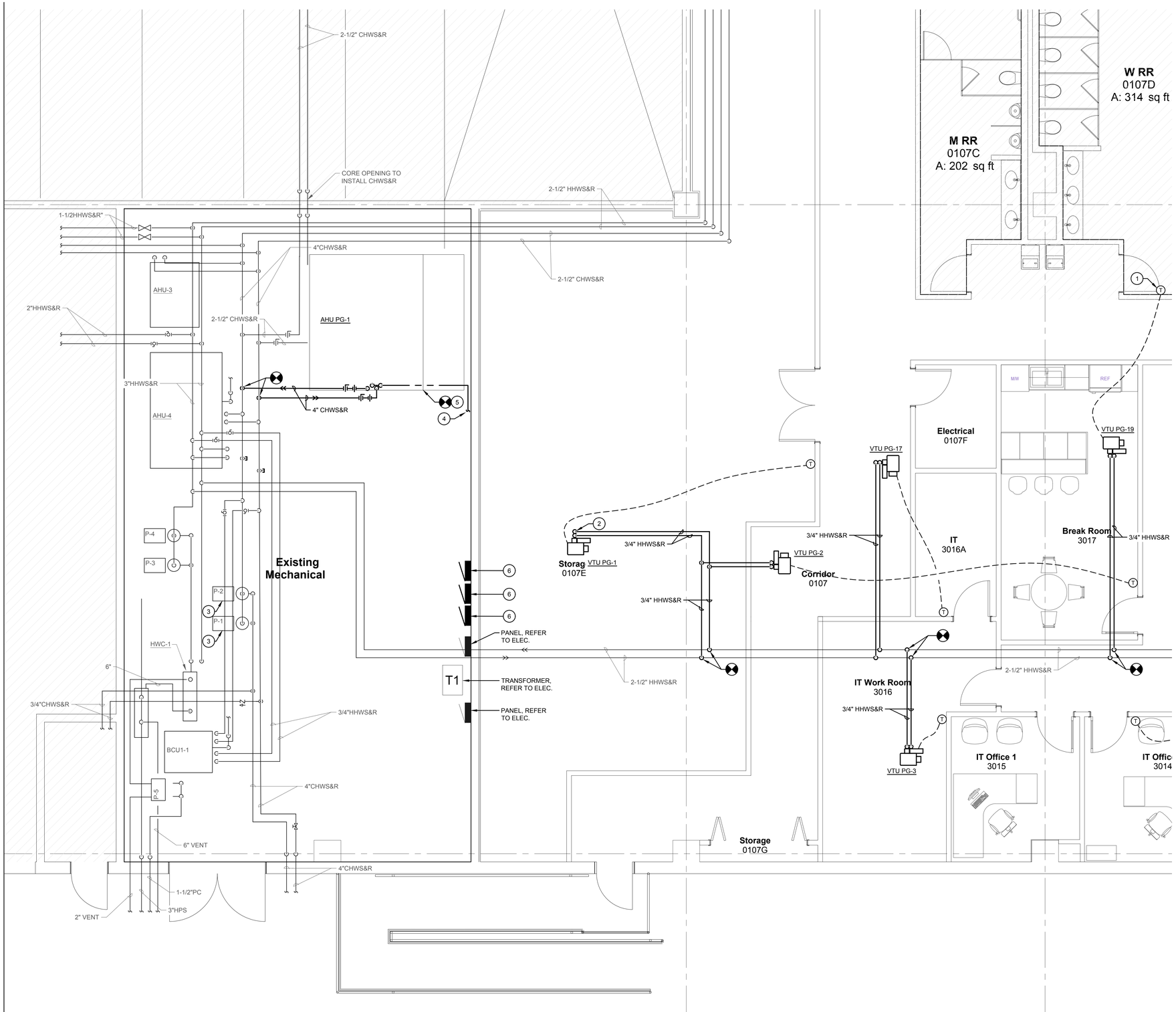

1 Partial Floor Plan - Renovation - Piping

SCALE: 1/4" = 1'-0"

SHEET RENOVATION KEY NOTES:	
1	PLACE IN SAME LOCATION AS PREVIOUS. FIELD VERIFY.
2	PROVIDE TERMINAL UNIT WITH 3-WAY MOTORIZED CONTROL VALVE.
3	MODIFY CONTROLS PROGRAM FOR EXISTING CHILLED WATER PUMPS. REFER TO CONTROLS DRAWINGS FOR FURTHER INFORMATION.
4	PROVIDE FULL LINE SIZE CONDENSATE WITH P-TRAP AND ROUTE TO NEAREST STORM DRAIN AND FLOOR DRAIN. REFER TO DETAILS FOR FURTHER INFORMATION. FIELD LOCATE EXISTING STORM AND SANITARY DRAINS.
5	EXTEND EXISTING CONCRETE HOUSEKEEPING PAD AS REQUIRED FOR NEW EQUIPMENT. REFER TO DETAILS SHEET FOR FURTHER INFORMATION.
6	RELOCATED BAS CONTROLLERS. REFER TO DEMOLITION DRAWINGS AND CONTROLS DRAWINGS FOR FURTHER INFORMATION.

SHEET NOTES:

1. ROUTE NEW HHWS&R AS HIGH AS POSSIBLE (IN BETWEEN JOIST SPACING). PROVIDE 1/2" MANUAL AND AUTOMATIC AIR VENTS AT HIGH POINTS OF PIPING, OR WHERE AIR TRAPS ARE CREATED DUE TO OFFSETS.
2. PIPING CONNECTIONS SHALL BE MADE TO THE HYDRONIC SYSTEM AS INDICATED. THE CONTRACTOR SHALL INCLUDE PIPE FREEZING OR OTHER METHODOLOGIES AS NEEDED TO MAKE CONNECTIONS AS INDICATED. COORDINATE WITH UNIVERSITY PERSONNEL TO LOCATE EXISTING ISOLATION VALVES FOR ISOLATION.
3. THE PIPING SYSTEM SHALL BE PRESSURE TESTED AS INDICATED IN CONTRACT SPECIFICATIONS AND AS REQUIRED BY THE FLORIDA BUILDING CODE.
4. PIPING SYSTEMS SHALL BE DRAINED, FLUSHED AND FILLED TO THE EXTENT REQUIRED TO PERFORM WORK AS INDICATED.
5. ONCE THE HYDRONIC SYSTEMS HAVE BEEN REFILLED, THE SYSTEMS SHALL BE SHOCKED WITH CHEMICAL TREATMENT AS REQUIRED BY UNIVERSITY STANDARDS. CONTACT THE UNIVERSITY PROJECT MANAGER FOR CURRENT WATER CHEMICAL TREATMENT VENDOR. REFER TO SPECIFICATIONS FOR BASIC WATER QUALITY REQUIREMENTS OF CLOSED LOOP SYSTEMS.

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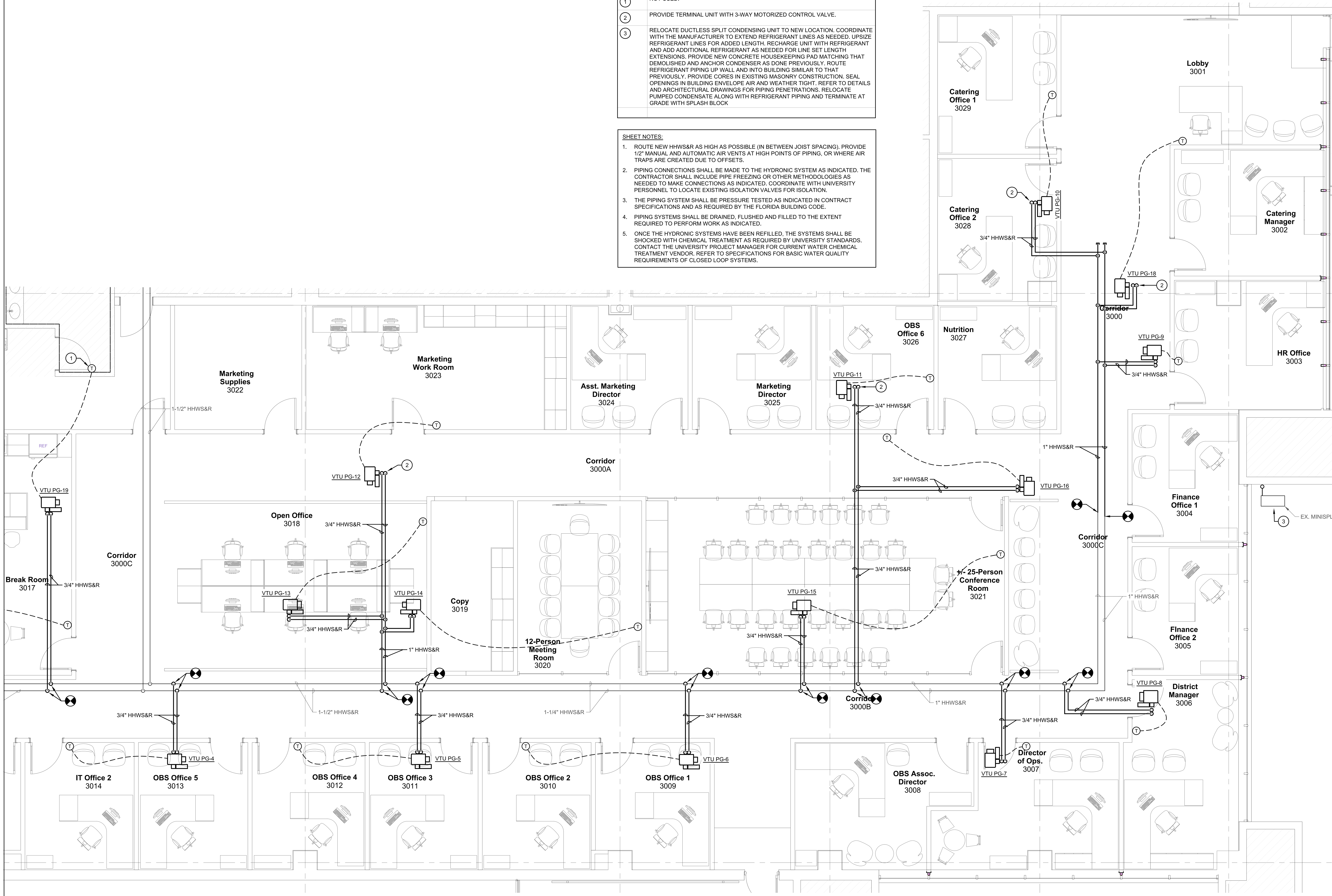
Sheet No.:
M2.1

SHEET RENOVATION KEY NOTES:

1	NOT USED.
2	PROVIDE TERMINAL UNIT WITH 3-WAY MOTORIZED CONTROL VALVE.
3	RELOCATE DUCTLESS SPLIT CONDENSING UNIT TO NEW LOCATION. COORDINATE WITH THE MANUFACTURER TO EXTEND REFRIGERANT LINES AS NEEDED. UPSIZE REFRIGERANT LINES FOR ADDED LENGTH. RECHARGE UNIT WITH REFRIGERANT AND ADD ADDITIONAL REFRIGERANT AS NEEDED FOR LINE SET LENGTH EXTENSIONS. PROVIDE NEW CONCRETE HOUSEKEEPING PAD MATCHING THAT DEMOLISHED AND ANCHOR CONDENSER AS DONE PREVIOUSLY. ROUTE REFRIGERANT PIPING UP WALL AND INTO BUILDING SIMILAR TO THAT PREVIOUSLY. PROVIDE CORES IN EXISTING MASONRY CONSTRUCTION. SEAL OPENINGS IN BUILDING ENVELOPE AIR AND WEATHER TIGHT. REFER TO DETAILS AND ARCHITECTURAL DRAWINGS FOR PIPING PENETRATIONS. RELOCATE PUMPED CONDENSATE ALONG WITH REFRIGERANT PIPING AND TERMINATE AT GRADE WITH SPLASH BLOCK

SHEET NOTES:

1. ROUTE NEW HHWS&R AS HIGH AS POSSIBLE (IN BETWEEN JOIST SPACING). PROVIDE 1/2" MANUAL AND AUTOMATIC AIR VENTS AT HIGH POINTS OF PIPING, OR WHERE AIR TRAPS ARE CREATED DUE TO OFFSETS.
2. PIPING CONNECTIONS SHALL BE MADE TO THE HYDRONIC SYSTEM AS INDICATED. THE CONTRACTOR SHALL INCLUDE PIPE FREEZING OR OTHER METHODOLOGIES AS NEEDED TO MAKE CONNECTIONS AS INDICATED. COORDINATE WITH UNIVERSITY PERSONNEL TO LOCATE EXISTING ISOLATION VALVES FOR ISOLATION.
3. THE PIPING SYSTEM SHALL BE PRESSURE TESTED AS INDICATED IN CONTRACT SPECIFICATIONS AND AS REQUIRED BY THE FLORIDA BUILDING CODE.
4. PIPING SYSTEMS SHALL BE DRAINED, FLUSHED AND FILLED TO THE EXTENT REQUIRED TO PERFORM WORK AS INDICATED.
5. ONCE THE HYDRONIC SYSTEMS HAVE BEEN REFILLED, THE SYSTEMS SHALL BE SHOCKED WITH CHEMICAL TREATMENT AS REQUIRED BY UNIVERSITY STANDARDS. CONTACT THE UNIVERSITY PROJECT MANAGER FOR CURRENT WATER CHEMICAL TREATMENT VENDOR. REFER TO SPECIFICATIONS FOR BASIC WATER QUALITY REQUIREMENTS OF CLOSED LOOP SYSTEMS.



1 Partial Floor Plan - Renovation - Piping
SCALE: 1/4" = 1'-0"

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Sheet No.:
M2.2

1. OPENING CLEARANCE
THE OPENING IN THE WALL OR FLOOR SHALL BE L ARGER T HAN T HE DAMPER/SLEEVE ASSEMBLY TO PERMIT INSTALLATION OR EXPANSION. THE OPENING SHALL BE A MINIMUM OF 1/8" PER FOOT LARGER THAN THE OVERALL SIZE OF THE DAMPER/SLEEVE ASSEMBLY. THE MAXIMUM OPENING SIZE SHALL NOT EXCEED 1/8" PER FOOT PLUS 2", NOR SHALL THE OPENING BE LESS THAN 1/4" LARGER THAN THE DAMPER/SLEEVE ASSEMBLY.

2. FASTENERS AND MULTIPLE SECTION ASSEMBLY
USE NO. 10 BOLTS OR SCREWS, 3/16" RIVETS, TACK WELDS OR SPOT WELDS AS DEPICTED IN FIGURE 2 AND SPACED AS FOLLOWS WHEN JOINING INDIVIDUAL DAMPERS TO MAKE MULTIPLE SECTION DAMPER ASSEMBLIES OR WHEN FASTENING DAMPER TO THE SLEEVE: VERTICAL MOUNT (IN WALL): ALL DAMPERS, 6" SPACING HORIZONTAL MOUNT (IN FLOOR): ALL DAMPERS, 6"SPACING MULTIPLE SECTION HORIZONTAL MOUNT DAMPERS REQUIRE A 14 GAGE THICK X 4-1/2" WIDE STEEL REINFORCING PLATE SANDWICHED BETWEEN THE DAMPER FRAMES WITH 1/2" LONG WELDS STAGGERED INTERMITTENTLY AND SPACED ON MAXIMUM 6" CENTERS. THE REINFORCING PLATE MUST BE THE SAME MATERIAL AS THE DAMPERS. THE LENGTH MUST BE EQUAL TO THE DAMPER WIDTH OF TWO OR MORE ADJOINING

DAMPER SECTIONS. REINFORCING PLATES ARE NOT REQUIRED FOR ASSEMBLIES CONSISTING OF TWO DAMPERS ATTACHED END-TO-END OR THREE DAMPERS ATTACHED SIDE-TO-SIDE AS DEPICTED IN FIGURE 5.

3. DAMPER SLEEVE
SLEEVE THICKNESS MUST BE EQUAL TO OR THICKER THAN THE DUCT CONNECTED TO IT. SLEEVE GAGE REQUIREMENTS ARE LISTED IN THE SMACNA FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE FOR HVAC SYSTEMS AND IN NFPA90A. IF A BREAKAWAY STYLE DUCT/SLEEVE CONNECTION IS NOT USED, THE SLEEVE SHALL BE A MINIMUM OF 16 GAGE FOR DAMPERS UP TO 36" WIDE BY 24" HIGH AND 14 GAGE FOR DAMPERS EXCEEDING 36" WIDE BY 24" DAMPER SLEEVE SHALL NOT EXTEND MORE THAN 6" BEYOND THE FIRE WALL OR PARTITION UNLESS DAMPER IS EQUIPPED WITH A FACTORY INSTALLED ACCESS DOOR. SLEEVE MAY EXTEND UP TO 16" BEYOND THE FIRE WALL OR PARTITION ON SIDES EQUIPPED WITH A FACTORY INSTALLED ACCESS DOOR. SLEEVE SHALL TERMINATE AT BOTH SIDES OF WALL WITHIN DIMENSIONS SHOWN.

4. DAMPER ORIENTATION
USE "AIR FLOW" AND "MOUNT WITH ARROW UP" LABELS ON DYNAMIC DIBD MODELS FOR PROPER DAMPER ORIENTATION. FOR STATIC IBD MODELS USE ONLY "MOUNT WITH ARROW UP" LABEL ON DAMPER FOR PROPER DAMPER ORIENTATION. STATIC AND DYNAMIC DAMPERS MUST BE INSTALLED WITH LEADING EDGE OF THE CLOSED BLADES WITHIN THE WALL OR FLOOR.

5. MOUNTING ANGLES
MOUNTING ANGLES SHALL BE A MINIMUM OF 1-1/2"X1-1/2"X 20 GAGE STEEL AND MUST BE ATTACHED ONLY TO THE SLEEVE. MOUNTING ANGLES MUST OVERLAP THE PARTITION A MINIMUM OF 1". DO NOT WELD OR FASTEN ANGLES TOGETHER AT CORNERS OF DAMPERS. RUSKIN FIRE DAMPERS MAY BE INSTALLED USING RUSKIN PFMA.

a. MOUNTING ANGLE FASTENERS
SLEEVE: #10 BOLTS OR SCREWS, 3/16" STEEL RIVETS OR 1/2" LONG WELDS.
MASONRY/WALL OR FLOOR: #10 SELF-TAPPING CONCRETE SCREWS.
WOOD/STEEL STUD WALL: #10 SCREWS

b. MOUNTING ANGLE FASTENER SPACING
FASTENERS SHALL BE SPACED AT 8" O.C.

6. DUCT/SLEEVE CONNECTIONS

a. BREAK-AWAY DUCT/SLEEVE CONNECTIONS
REFER TO FIGURE 4, A MAXIMUM OF TWO #10 SHEET METAL SCREWS ON EACH SIDE AND THE BOTTOM, LOCATED IN THE CENTER OF THE SLIP POCKET AND PENETRATING BOTH SIDES OF THE SLIP POCKET MAY BE USED. CONNECTIONS USING THESE SLIP JOINTS ON THE TOP AND BOTTOM WITH FLAT DRIVE SLIPS UP TO 20" LONG ON THE SIDES MAY ALSO BE USED.

b. ROUND AND OVAL BREAK-AWAY CONNECTIONS
ROUND AND FLAT OVAL BREAK-AWAY CONNECTIONS MUST USE EITHER A 4" WIDE DRAWBAND OR #10 SHEET METAL SCREWS SPACED EQUALLY AROUND THE CIRCUMFERENCE OF THE DUCT AS FOLLOWS:
- DUCT DIAMETERS 22" AND SMALLER – MAXIMUM 3 SCREWS.
- DUCT DIAMETERS OVER 22" AND INCLUDING 36" – MAXIMUM 5 SCREWS.
- DUCT DIAMETERS OVER 36" AND UP TO AND INCLUDING 191" TOTAL PERIMETER – MAXIMUM 8 SCREWS. FOR FLAT OVAL DUCTS, THE DIAMETER IS CONSIDERED THE LARGEST (MAJOR) DIMENSION OF THE DUCT.

NOTE: WHEN OPTIONAL SEALING OF THESE JOINTS IS DESIRED, THE FOLLOWING SEALANTS MAY BE APPLIED IN ACCORDANCE WITH THE SEALANT MANUFACTURER'S INSTRUCTIONS:
DESIGN POLYMERICS – DP 1010 PRECISION – PA2084T
HARDCAST, INC. – IRON GRIP 601 ECO DUCT SEAL 44-52

c. FLANGED BREAK-AWAY STYLE DUCT SLEEVE CONNECTIONS.
FLANGED CONNECTION SYSTEMS MANUFACTURED BY DUCTMATE, NEXUS OR WARD ARE APPROVED BREAK-AWAY CONNECTIONS WHEN INSTALLED AS REQUIRED.

TDC AND TDF ROLL-FORMED FLANGED CONNECTIONS USING 3/8" STEEL BOLTS AND NUTS, AND METAL CLEATS, AS TESTED BY SMACNA, ARE APPROVED BREAK-AWAY CONNECTIONS WHEN INSTALLED AS REQUIRED.

d. NON-BREAK-AWAY DUCT/SLEEVE CONNECTIONS
IF OTHER DUCT SLEEVE CONNECTIONS ARE USED, THE SLEEVE SHALL BE A MINIMUM OF 16 GAGE FOR DAMPERS UP TO 36" WIDE X 24" HIGH AND 14 GAGE FOR DAMPERS EXCEEDING 36" WIDE X 24" HIGH.

7. INSTALLATION AND MAINTENANCE
TO ENSURE OPTIMUM OPERATION AND PERFORMANCE, THE DAMPER MUST BE INSTALLED SO IT IS SQUARE AND FREE FROM RACKING. EACH FIRE DAMPER SHOULD BE MAINTAINED AND TESTED ON A REGULAR BASIS AND IN ACCORDANCE WITH THE LATEST EDITIONS OF NFPA 90A AND LOCAL CODES. CARE SHOULD BE EXERCISED TO ENSURE THAT SUCH TESTS ARE PERFORMED SAFELY AND DO NOT CAUSE SYSTEM DAMAGE.

PROVIDE ACCESS DOOR FOR RESETTING OF FUSIBLE LINK AS REQUIRED BY CONTRACT SPECIFICATIONS.

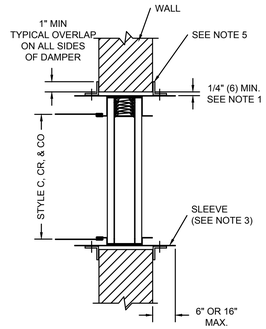


FIGURE 1

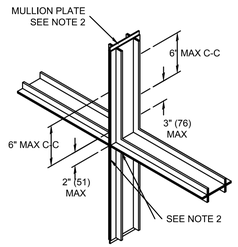


FIGURE 2

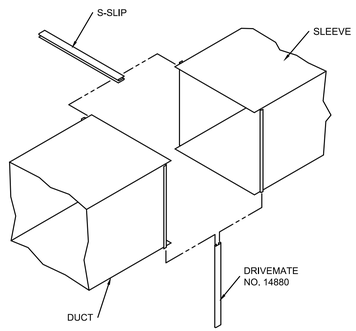


FIGURE 3

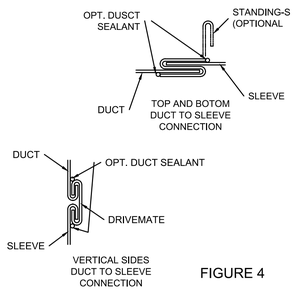
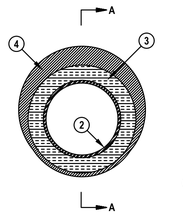


FIGURE 4

8 | FIRE RATED DUCTWORK PENETRATION DETAIL | SCALE: NONE



SECTION A-A

CAN/ULC S115
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4)
FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft
L Rating At 400 F — Less Than 1 CFM/Sq Ft
ANSI/UL1479 (ASTM E814)
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft
L Rating At 400 F — Less Than 1 CFM/Sq Ft

System No. W-L-5029

1. Wall Assembly — The 1, 2 or 3 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH rating and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in. (473 mm). The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper tube shall not exceed 4 in. (102 mm).
   D. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
3. Pipe Covering* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   The hourly T, FT, FTH Ratings of the firestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FTH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FTH Ratings when copper penetrants are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm).

3A. Pipe Covering* — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in item 3 above.
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.

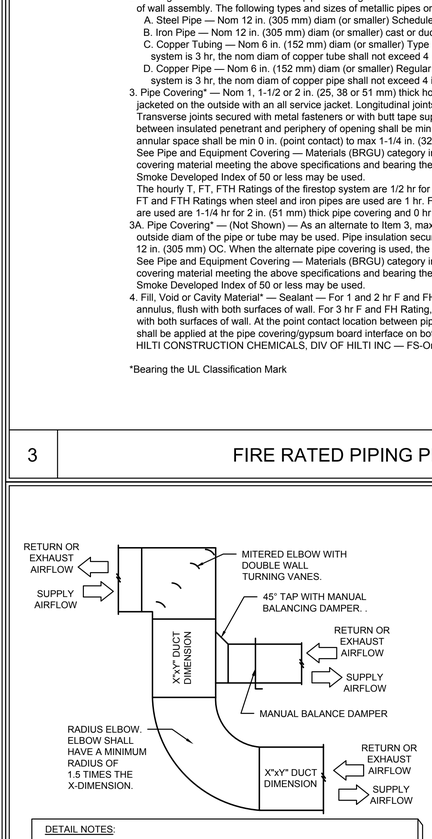
4. Fill, Void or Cavity Material* — Sealant — For 1 and 2 hr F and FH Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 3 hr F and FH Rating, min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant

*Bearing the UL Classification Mark

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

Hilti Firestop Systems

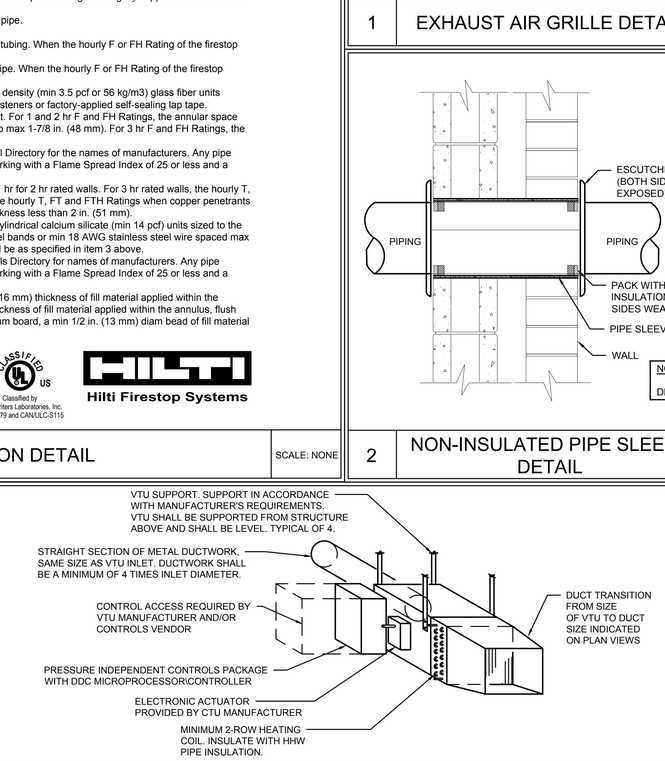
3 | FIRE RATED PIPING PENETRATION DETAIL | SCALE: NONE



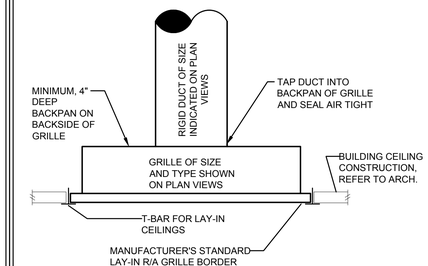
DETAIL NOTES:

1. PROVIDE ELBOW TYPE (MITERED OR RADIUS) AS INDICATED ON PLAN VIEWS.
2. DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF SMACNA GUIDELINES AT THE TIME OF PERMIT.

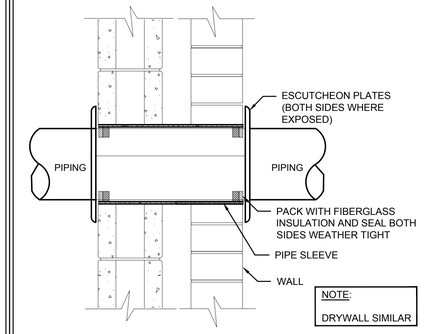
5 | TYPICAL DUCTWORK DETAIL | SCALE: NONE



4 | TYPICAL VTU INSTALLATION DETAIL | SCALE: NONE



1 | EXHAUST AIR GRILLE DETAIL | SCALE: NONE



2 | NON-INSULATED PIPE SLEEVE DETAIL | SCALE: NONE

PHASE:	DRAWN:	REVIEWED:	DATE:
CONCEPT SCHEM. DESIGN			
ADVANCED SCHEM. DESIGN			-
DESIGN DEVELOP. DOCS.	DMM	WHT	-
75% CONSTRUCTION DOCS.	DMM	WHT	12/16/2025
PERMIT DOCS.			
100% CONSTRUCTION DOCS.	DMM	WHT	03/06/2026

ID:	REVISION:	DRAWN:	REVIEWED:	DATE:

Client: Florida State University
Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850-402-3659
Fax: 850-402-3659

Consultant: TOMAHAWK Engineering & Consulting, Inc.
COA # 29709
Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

RICHARD LINDBURG
PE#: 62829

Seal: WESLEY H. THIGPEN JR. LICENSE No. 65705 STATE OF FLORIDA EXPIRES 02-28-27 PROFESSIONAL ENGINEER
PE#: 65705
WESLEY THIGPEN, JR

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Architects Lewis + Whitlock
206 West Virginia St.
Tallahassee, Florida 32301
850.942.1718
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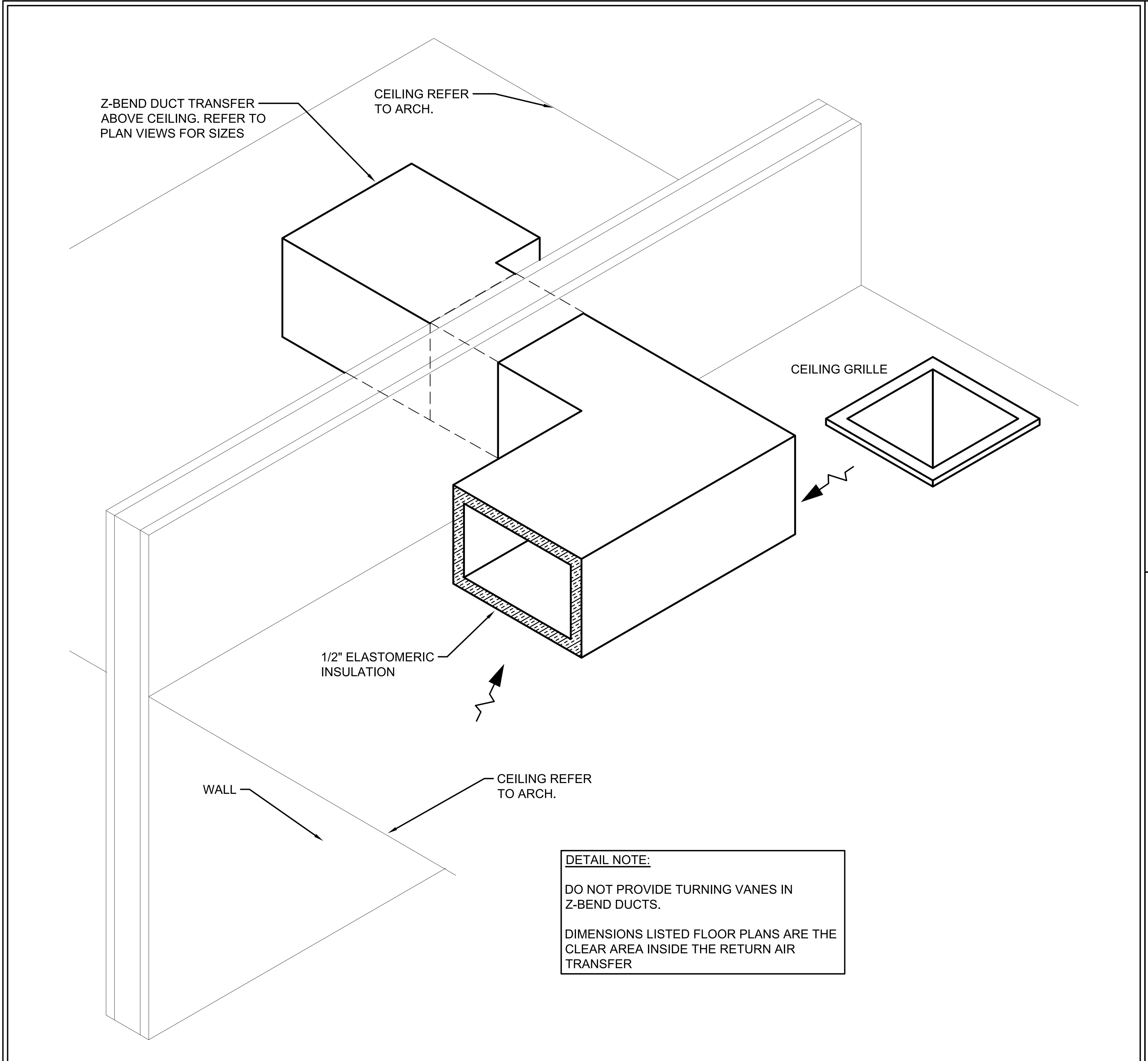
Description:
Details - Mechanical

Sheet No.:
M5.1

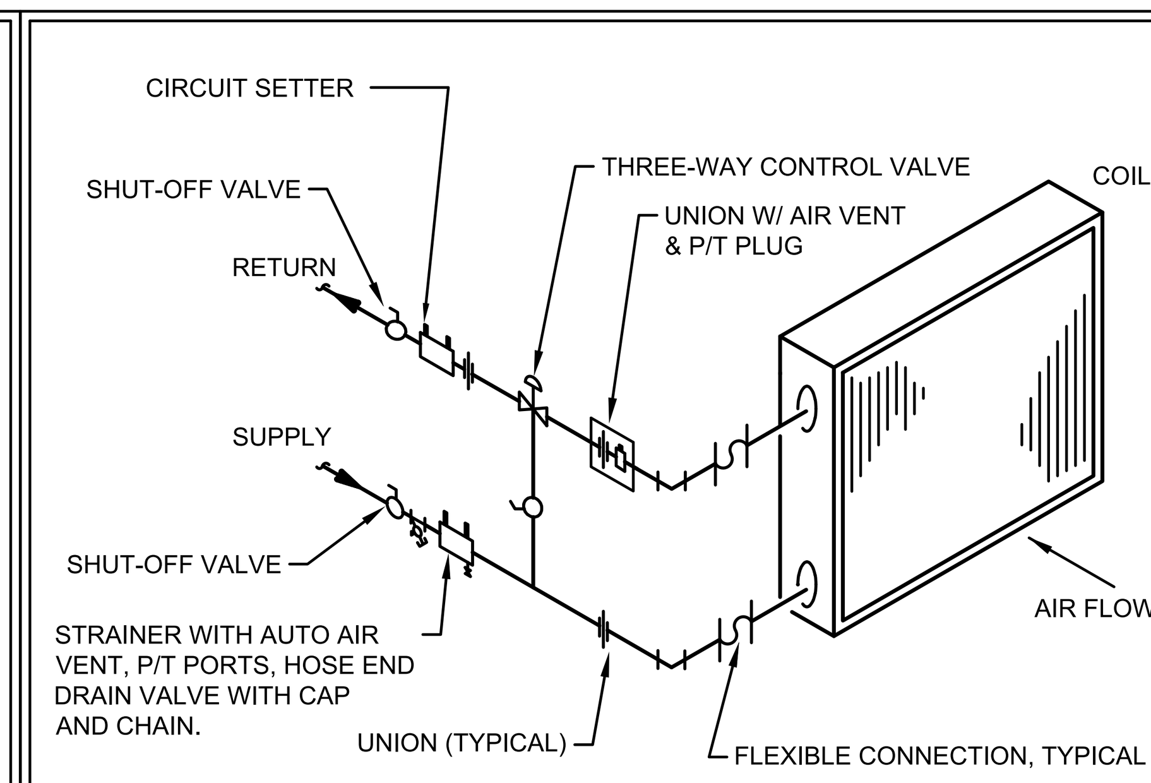


DETAIL NOTE:

DO NOT PROVIDE TURNING VANES IN Z-BEND DUCTS.

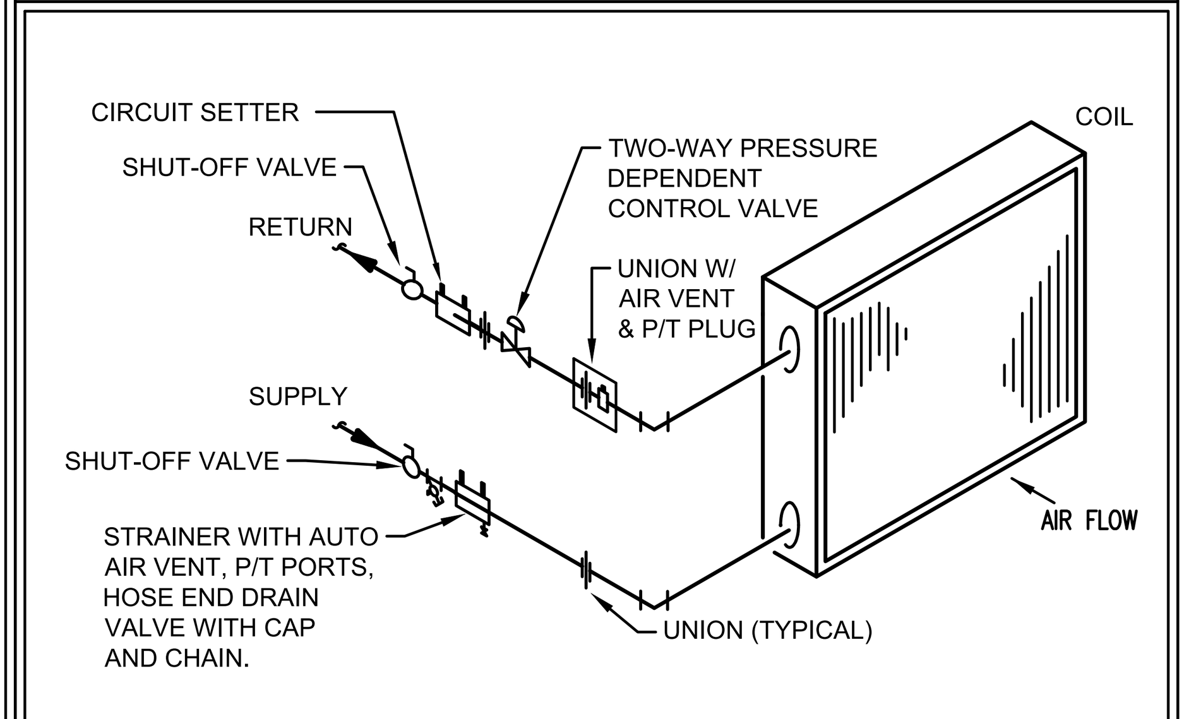
DIMENSIONS LISTED FLOOR PLANS ARE THE CLEAR AREA INSIDE THE RETURN AIR TRANSFER

5	Z-BEND RETURN AIR PLENUM	SCALE: NONE



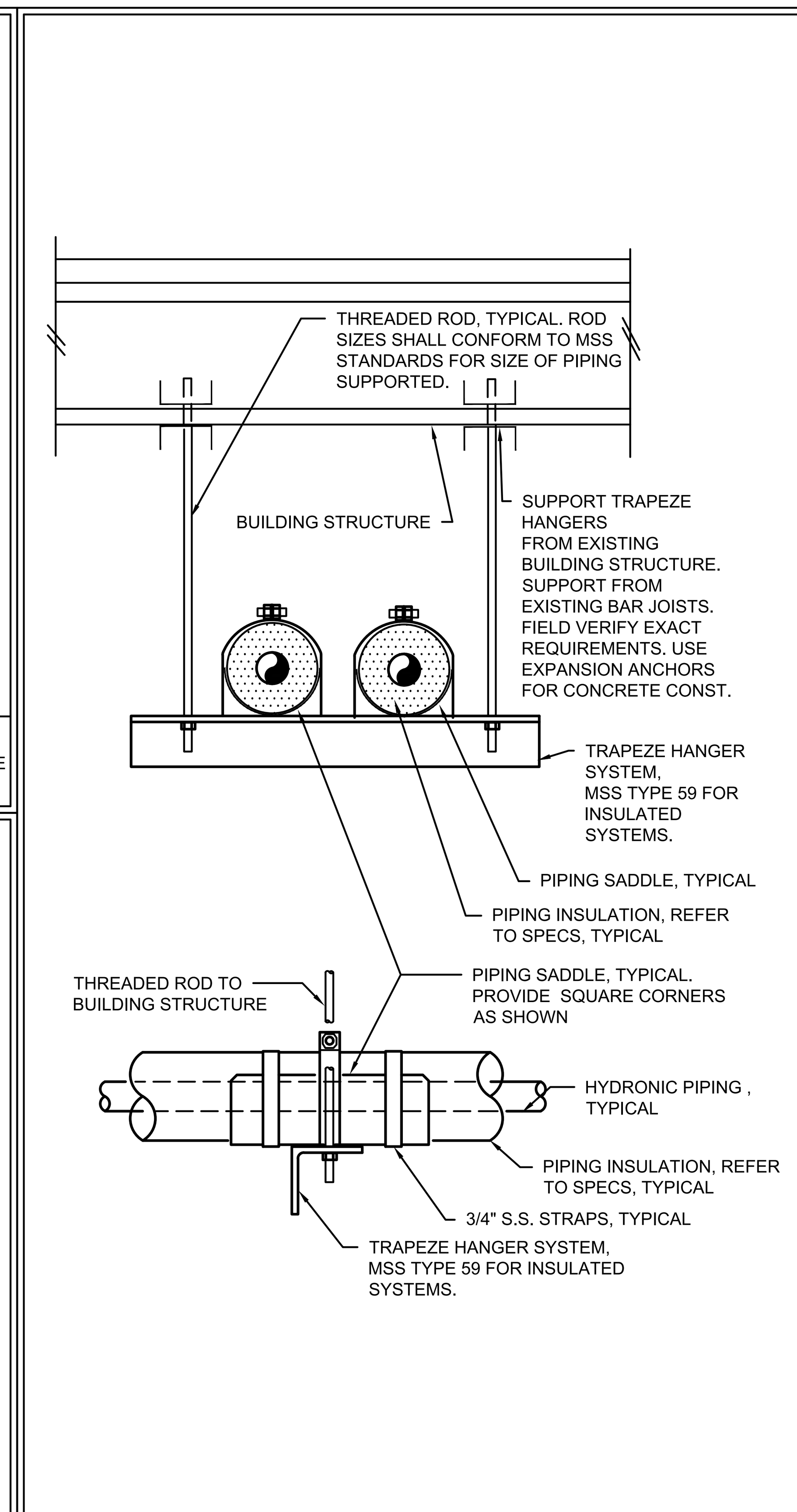
NOTES:
1. PROVIDE 4"Ø OF STRAIGHT PIPE ON BOTH SIDES OF BALANCING VALVE.
2. ALL COMPONENTS FULL LINE SIZE UNLESS NOTED OTHERWISE.
3. LOCATE UNIONS TO ALLOW FOR COIL PULL.
4. AUTO FLOW VALVES NOT ALLOWED.
5. ALL PIPING COMPONENTS SHALL BE INDIVIDUAL. DO NOT COMBINE ISOLATION VALVES WITH STRAINER, ETC.

5	TERMINAL REHEAT 3-WAY COIL PIPE DETAIL	SCALE: NONE

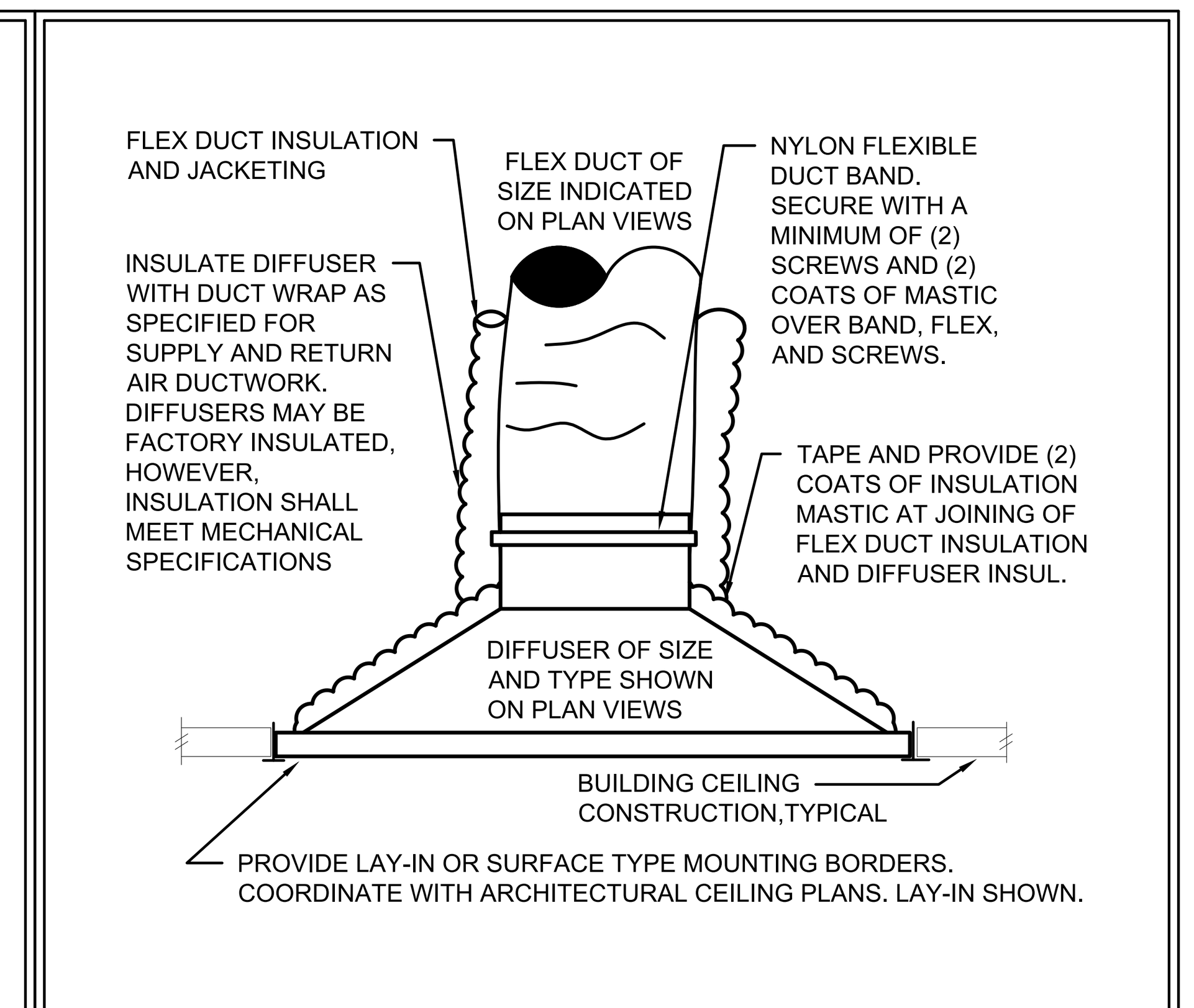


NOTES:
1. PROVIDE 4"Ø OF STRAIGHT PIPE ON BOTH SIDES OF BALANCING VALVE.
2. ALL COMPONENTS FULL LINE SIZE UNLESS NOTED OTHERWISE.
3. LOCATE UNIONS TO ALLOW FOR COIL PULL.
4. AUTO FLOW VALVES NOT ALLOWED.
5. ALL PIPING COMPONENTS SHALL BE INDIVIDUAL. DO NOT COMBINE ISOLATION VALVES WITH STRAINER, ETC.

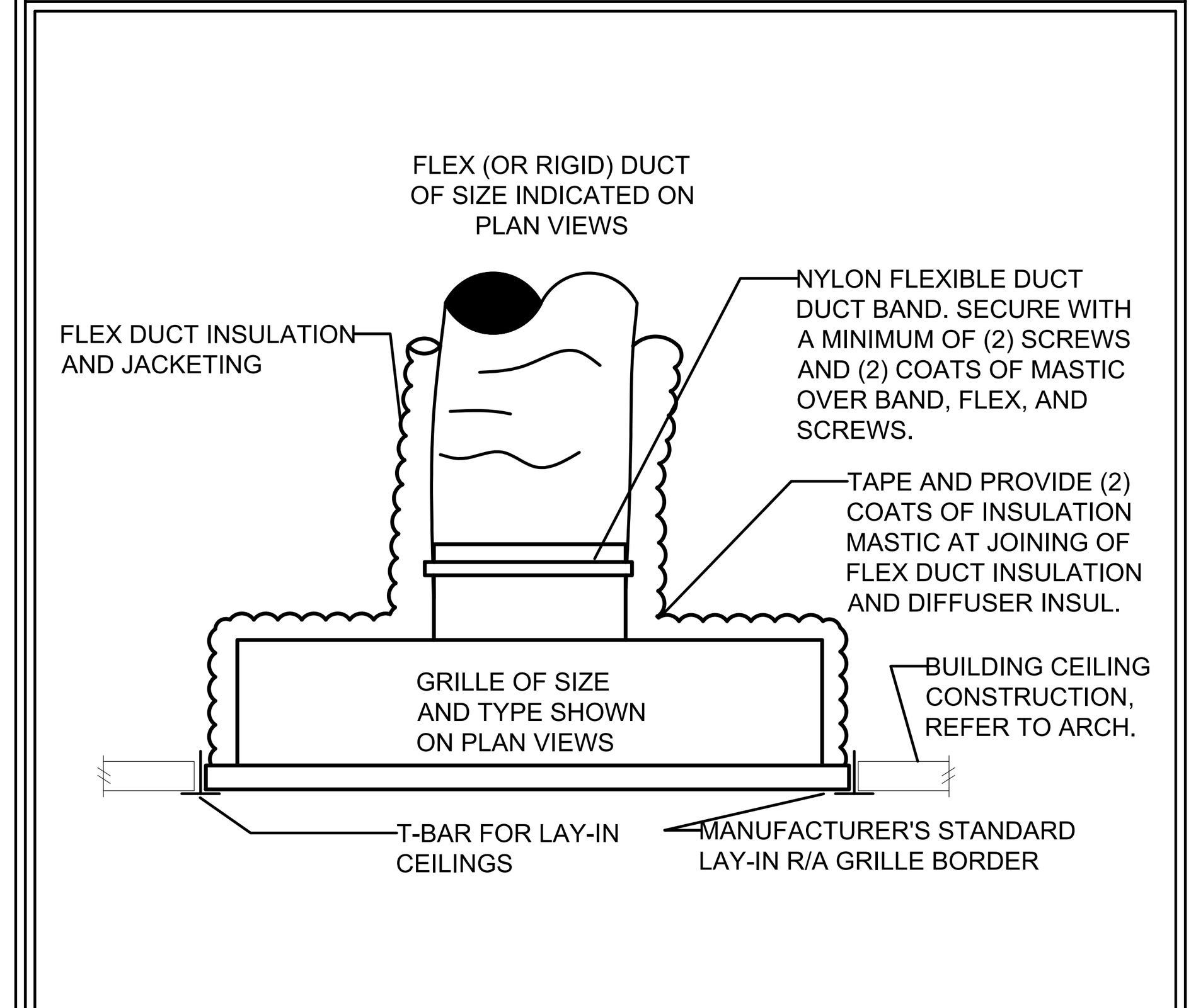
4	TERMINAL REHEAT 2-WAY COIL PIPING DIAGRAM	SCALE: NONE



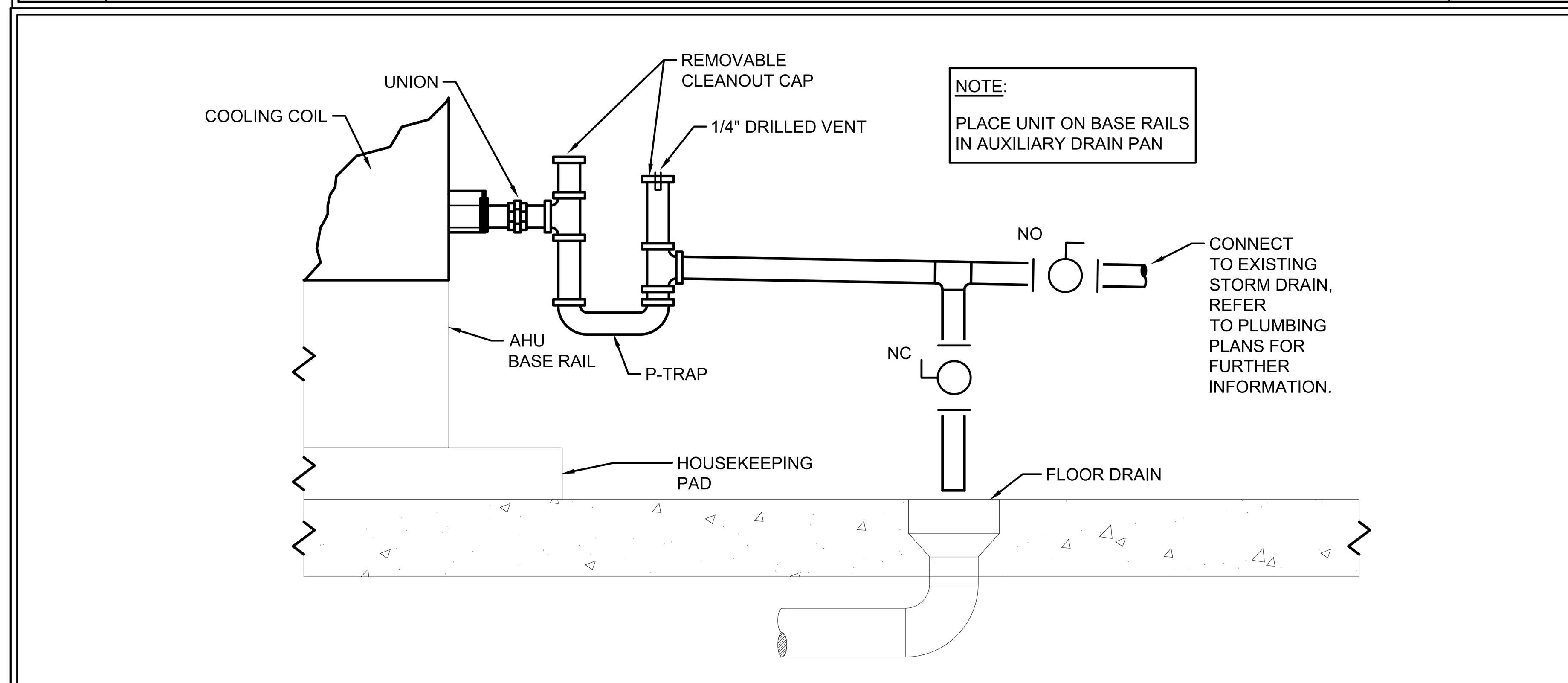
3	HORIZONTAL PIPING SUPPORT DETAIL	SCALE: NONE



1	LAY IN DIFFUSER DETAIL	SCALE: NONE



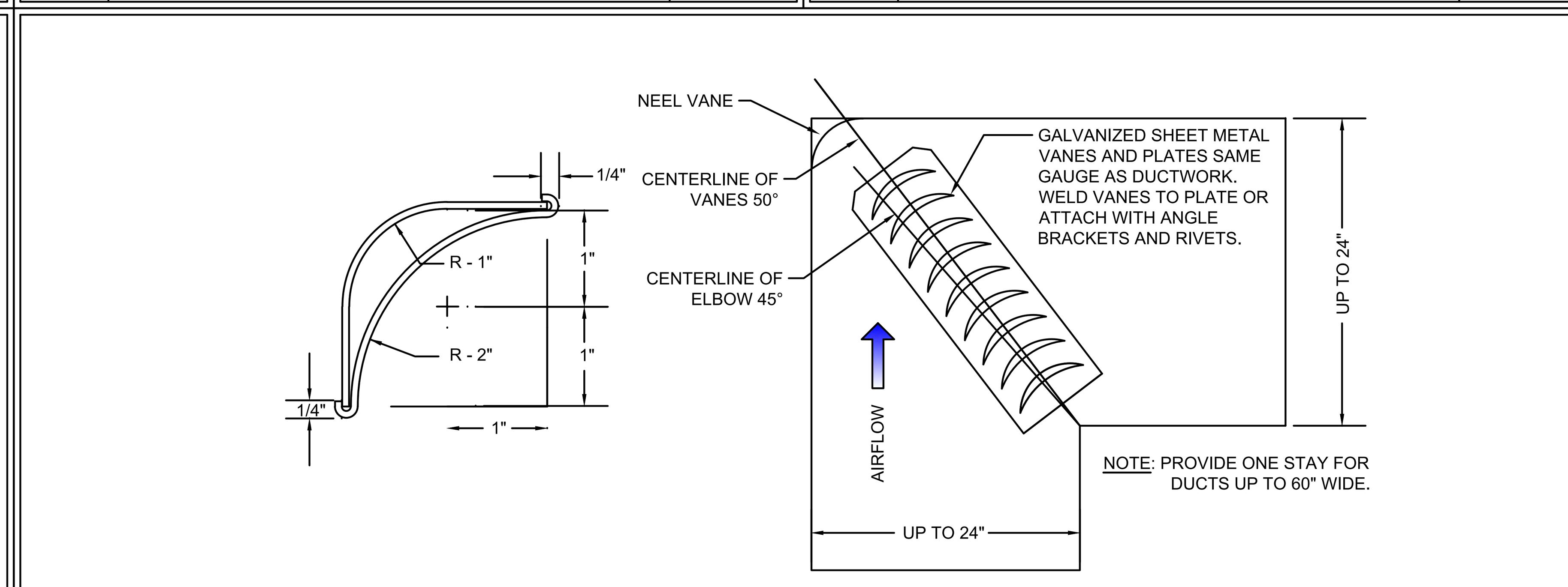
2	RETURN AIR GRILLE DETAIL	SCALE: NONE



NOTE:

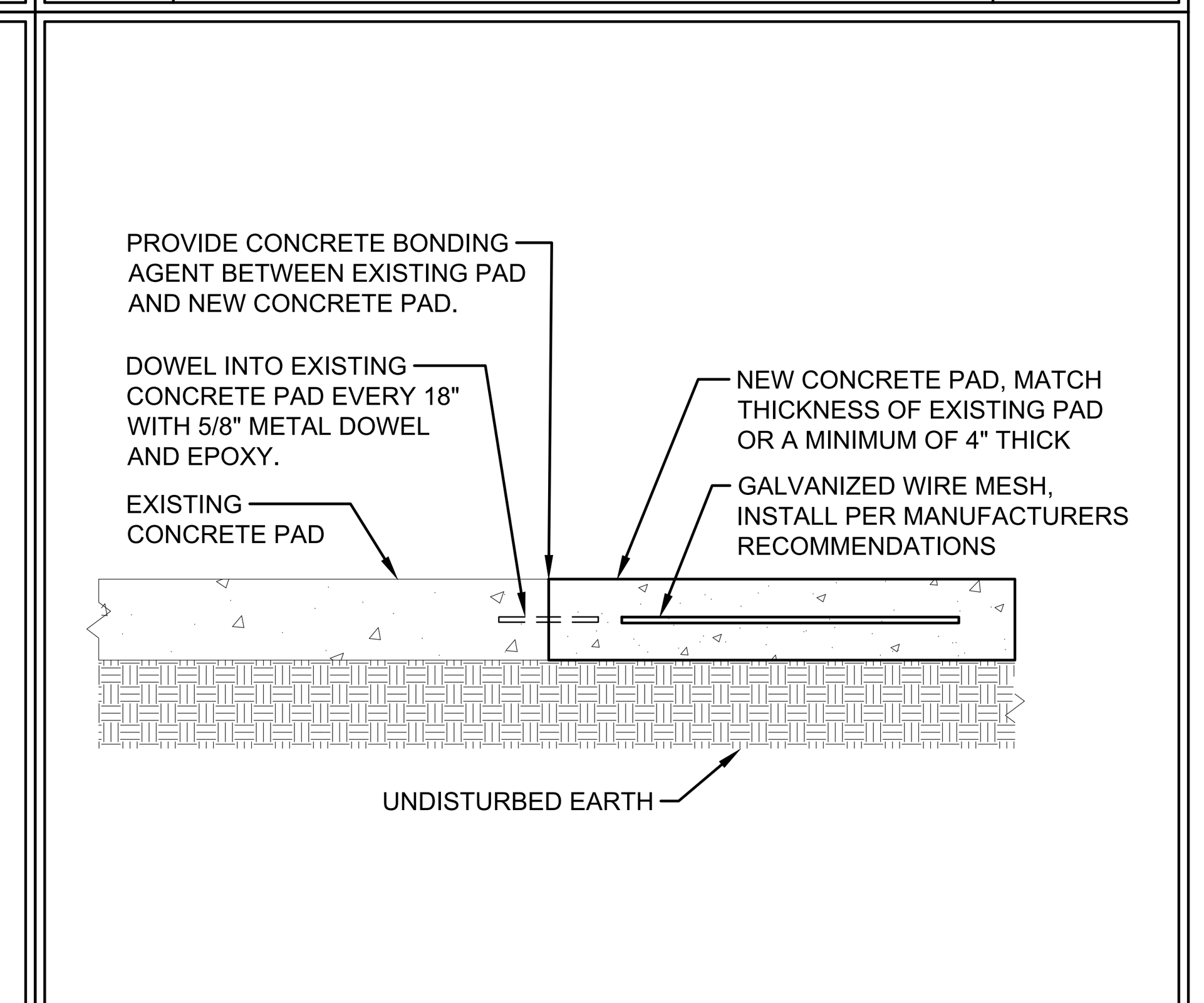
PLACE UNIT ON BASE RAILS IN AUXILIARY DRAIN PAN

8	AHU CONDENSATE DRAIN	SCALE: NONE



NOTE: PROVIDE VANES WITH PRE-ASSEMBLED RUNNERS

7	TURNING VANE DETAIL	SCALE: NONE



6	CONCRETE SLAB EXTENSION DETAIL	SCALE: NONE

PHASE:	DRAWN:	REVIEWED:	DATE:	ID:	REVISION:	DRAWN:	REVIEWED:	DATE:
CONCEPT SCHEM. DESIGN								
ADVANCED SCHEM. DESIGN								
DESIGN DEVELOP. DOCS.	DMM		-					
75% CONSTRUCTION DOCS.	DMM	WHT	12/16/2025					
PERMIT DOCS.								
100% CONSTRUCTION DOCS.	DMM	WHT	03/06/2026					

Client: Florida State University
Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850-402-3040
Fax: 850-402-9659
COA #: 29709
Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

RICHARD LINDBURG
PE#: 62829

Seal: WESLEY H. THIGPEN, JR. LICENSE No. 65705 STATE OF FLORIDA EXPIRES 02-28-27 PROFESSIONAL ENGINEER
PE#: 65705
WESLEY THIGPEN, JR

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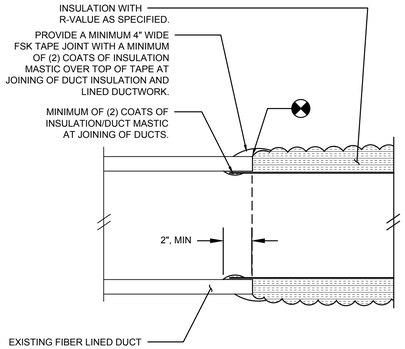
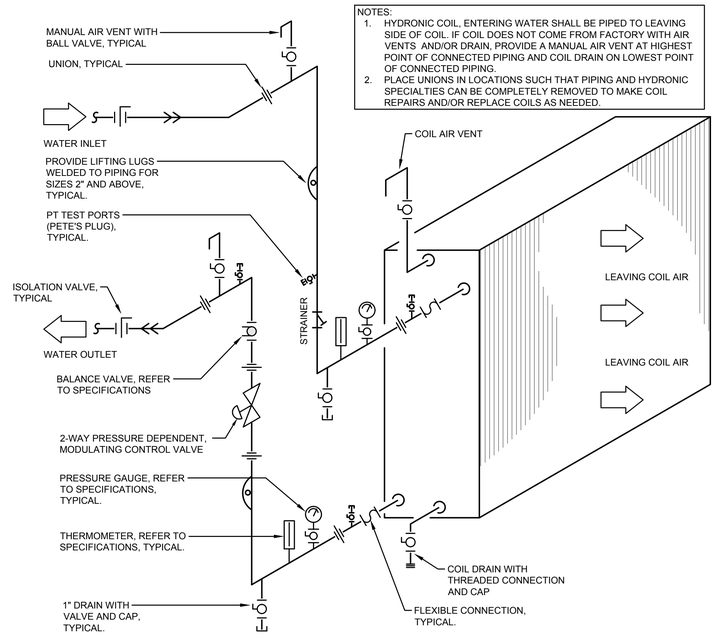
Description:
Details - Mechanical

Sheet No.:
M5.2



2	LINED TO UNLINED DUCT DETAIL	SCALE: NONE



1	TWO-WAY VALVE COIL PIPING DETAIL	SCALE: NONE

ID:	REVISION:	DRAWN:	REVIEWED:	DATE:

PHASE:	DRAWN:	REVIEWED:	DATE:
CONCEPT SCHEM. DESIGN			-
ADVANCED SCHEM. DESIGN			-
DESIGN DEVELOP. DOCS.	DMM	WHT	12/16/2025
75% CONSTRUCTION DOCS.			
PERMIT DOCS.			
100% CONSTRUCTION DOCS.	DMM	WHT	03/06/2026

Client: Florida State University
Tallahassee, Florida

Job Title: Parking Garage 1 Remodeling - Phase 2

1940 Buford Boulevard
Tallahassee, FL 32308
Phone: 850.402.9840
Fax: 850.402.9859

Consultant: TOMAHAWK ENGINEERING & CONSULTING, INC.
COA # 29709
Tomahawk Project #: 25042

Project #: 19370.42
Phase: 100% Construction Documents

RICHARD LINDBURG
PE#: 62829

Seal: WESLEY H. THIGPEN, JR. LICENSE No. 65705 STATE OF FLORIDA EXPIRES 02-28-27 PROFESSIONAL ENGINEER
PE#: 65705
WESLEY THIGPEN, JR

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206 West Virginia St.
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Description:
Details - Mechanical

Sheet No.:
M5.3

AIR HANDLING UNIT SCHEDULE

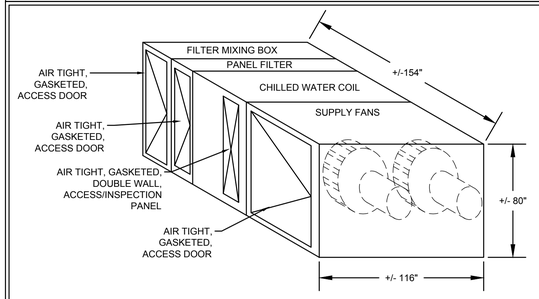
EQUIPMENT NO.	NEW/ EXISTING	SIZE/MODEL NUMBER	COMPONENTS	TOTAL CFM	DESIGN CFM	OUTSIDE AIR CFM	ESP	TSP	FAN SIZE/ TYPE	# OF FANS	MOTOR HP (EACH)	VOLTAGE / PHASE	COOLING COIL TOTAL COOLING	COOLING COIL SENS. COOLING	COOLING COIL ENT. AIR DB / WB	COOLING COIL LVG. AIR DB / WB	COOLING COIL ENT. / LVG. WATER	COOLING COIL WATER PRESS. DROP (FT HEAD)	CLG COIL GPM	COOLING COIL FACE VELOCITY (FPM)	CLG COIL # OF ROWS / FINS PER FOOT	COOLING COIL AIR PRESS. DROP (IN. WATER)	COOLING COIL WATER VELOCITY	PHC TOTAL HEATING	PHC ENT. AIR DB	PHC LVG. AIR DB	PHC ENT. / LVG. WATER	PHC WATER PRESS. DROP (FT HEAD)	PHC GPM	PHC FACE VELOCITY (FPM)	PHC # OF ROWS/FINS PER FOOT	PHC AIR PRESS. DROP (IN. WATER)	PHC WATER VELOCITY
AHU PG-1	NEW	CAH050	FMXB/FLT/CCL/FAN	20000	17600	4200	2.25"	5.04"	24.5"/PLN	2	20	460V / 3Ø	940.4 MBH	622.1 MBH	80.0°F/67.°F	51.6°F/51.4°F	44.0°F/60.1°F	16.20'	117.0	408	8/132	0.74"	3.80 FPS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

1. BASIS OF DESIGN: EQUAL TO DAIKIN. PROVIDE UNIT WITH MINIMUM SHIPPING SPLITS.
2. CONTRACTOR SHALL INCLUDE COST REQUIRED FOR FACTORY ASSISTANCE FOR BREAKDOWN AND INSTALLATION AND RECONSTRUCTION OF UNITS AS NEEDED.
3. PROVIDE VFD FOR FANS. PROVIDE (1) VFD PER FAN, REFER TO CONTROLS DRAWINGS AND SPECIFICATIONS FOR FURTHER INFORMATION.
4. PROVIDE DETACHABLE, 6" TALL, BASE RAILS FROM MANUFACTURER.
5. CHILLED WATER COOLING COILS WHOSE WATER VELOCITY THRU TUBES IS LESS THAN 2.15 FPS SHALL BE PROVIDED WITH TURBULATORS OR TURBOSPIRALS.
6. PROVIDE RIGHT/LEFT HAND CONFIGURATION BASED ON FLOOR PLANS AND ELEVATIONS. THE CONTRACTOR AND EQUIPMENT SUPPLIER ARE RESPONSIBLE FOR VERIFICATION OF UNIT HAND PRIOR TO ORDERING AND/OR SHIPPING. WRONG HAND WILL BE RETURNED AT CONTRACTOR/SUPPLIERS EXPENSE.
7. SUPPLY AIR FANS SHALL BE CLASS II, NO EXCEPTIONS. FANS AND MOTORS SHALL BE PROVIDED ON SPRING ISOLATED ASSEMBLIES.
8. FAN MOTORS SHALL BE PREMIUM EFFICIENT MOTORS, NO EXCEPTIONS.
9. CONDENSATE TRAPS SHALL BE PROVIDED AS DETAILED ON PRINTED INSTALLATION LITERATURE PROVIDED WITH THE AIR HANDLING UNIT. REFER TO MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS FOR PROPER TRAP CONSTRUCTION BASED ON STATIC PRESSURE AS INDICATED HEREIN.
10. PROVIDE UNIT WITH: STAINLESS STEEL DRAIN PANS SLOPED TO CONDENSATE DRAIN, STAINLESS STEEL COIL CASINGS, 2" FOAM (R-13) INSULATION IN THE PANELS, 18 GA. CASING, MINIMUM 1 YEAR WARRANTY FOR THE UNIT.
11. PRE-FILTERS IN COMBINATION FILTER SECTION TO BE 2" MERV 8 AND 4" MERV 13 FILTERS. FILTER PRESSURE DROPS SHALL BE THE FOLLOWING: TOTAL - 2" PRESSURE DROP, TOTAL, THRU BOTH FILTERS. PROVIDE FILTER SECTIONS WITH MAGNAHELIC GAUGES WITH PERMANENT MARKINGS AT THE CLEAN AND DIRTY CONDITIONS.
12. PROVIDE FAN SECTIONS WITH MARINE LIGHTS.

COMPONENT LEGEND FOR AIR HANDLING UNIT

MXB	- MIXING BOX	PLN	- PLENUM
FMXB	- MIXING BOX WITH FILTERS	SAC	- SMALL ACCESS
PHC	- PREHEAT COIL	MLAC	- MEDIUM/LARGE ACCESS
CCL	-COOLING COIL	LAC	- LARGE ACCESS
FAN	- FAN	XLAC	- EXTRA LARGE ACCESS
FLT	- FLAT FILTER	IFB	- INTERNAL FACE & BYPASS
PFL	- PRE-FILTERS	DIF	- DIFFUSER
FFL	- FINAL FILTERS	FLTA	- ANGLE FILTER SECTION
CCLT	- COOLING COIL & TURNING SECTION	TRN	- TURNING SECTION



1 AHU PG-1 MAXIMUM DIMENSIONS AND COMPONENTS

SCALE: NONE

THE AIR HANDLING UNIT FOR THIS PROJECT HAS BEEN PRE-PURCHASED BY THE UNIVERSITY. THE CONTRACTOR SHALL INCLUDE IN THEIR BIDS, STORAGE AND HANDLING OF THE AIR HANDLER WITH THE EQUIPMENT VENDOR. INCLUDE TRANSPORTATION FROM THE STORAGE OF THEIR SHOP TO THE PROJECT SITE, INSTALLATION, AND ALL OTHER REQUIREMENTS AS DETAILED OR SPECIFIED AS A PART OF THIS SET OF CONTRACT DOCUMENTS.

TERMINAL UNIT WITH HEATING HOT WATER REHEAT SCHEDULE

EQUIPMENT NO.	INLET SIZE	TOTAL CFM	MIN. COOLING CFM	MAX HEATING CFM	MIN. HEATING CFM	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	MBH	GPM	NC
VTU PG-1	6	400	120	400	200	55	95	180	150	8.7	0.6	-
VTU PG-2	8	425	130	425	210	55	95	180	150	9.1	0.6	-
VTU PG-3	6	450	135	450	225	55	95	180	150	9.8	0.7	-
VTU PG-4	6	200	60	200	100	55	95	180	150	4.3	0.5	-
VTU PG-5	6	200	60	200	100	55	95	180	150	4.3	0.5	-
VTU PG-6	6	200	60	200	100	55	95	180	150	4.3	0.5	-
VTU PG-7	8	700	210	700	350	55	95	180	150	15.2	1.0	-
VTU PG-8	10	950	285	950	475	55	95	180	150	20.6	1.4	-
VTU PG-9	8	600	180	600	300	55	95	180	150	13.0	0.9	-
VTU PG-10	6	220	66	220	110	55	95	180	150	4.8	0.5	-
VTU PG-11	8	415	125	415	210	55	95	180	150	9.1	0.6	-
VTU PG-12	8	550	165	550	275	55	95	180	150	11.9	0.8	-
VTU PG-13	8	570	171	570	285	55	95	180	150	12.4	0.8	-
VTU PG-14	6	325	97	325	162	55	95	180	150	7.0	0.5	-
VTU PG-15	8	460	138	460	230	55	95	180	150	10.0	0.7	-
VTU PG-16	6	300	90	300	150	55	95	180	150	6.5	0.5	-
VTU PG-17	8	250	60	250	125	55	95	180	150	5.4	0.5	-
VTU PG-18	6	375	113	375	188	55	95	180	150	8.2	0.5	-
VTU PG-19	6	200	60	200	100	55	95	180	150	4.3	0.5	-

NOTES:

1. BASIS OF DESIGN: PRICE, OR EQUAL.
2. PROVIDE ALL TERMINAL UNITS WITH AN APPLICATION SPECIFIC DDC CONTROLLER. PROVIDE ANY AND ALL COMPONENTS REQUIRED TO CONNECT TO BAS PANEL PROVIDED FOR ASSOCIATED AHU. UNITS SHALL BE POWERED THRU CONTROLS SYSTEMS WITH LOW VOLTAGE ELECTRICAL CHARACTERISTICS.
3. (-) INDICATES NC LEVEL OF 25 OR LESS.
4. MAXIMUM PRESSURE LOSS THRU UNIT AND COIL SHALL BE 0.5" STATIC PRESSURE.
5. PROVIDE TERMINAL UNITS WITH (2) ROW HEATING HOT WATER REHEAT COILS, CAPABLE OF PROVIDING BTUH AND AIR TEMPERATURES INDICATED.

DIFFUSER SCHEDULE

PLAN MARK	CFM	NECK SIZE	DESCRIPTION
A	0-100	6"Ø	SQUARE PLAQUE DIFFUSER, HIGH CAPACITY, ROUND INLET (OF SIZE INDICATED) ALUMINUM CONSTRUCTION. PROVIDE THROW PATTERN AS INDICATED. WHERE NO THROW PATTERN IS INDICATED, PROVIDE 4-WAY THROW. SHALL BE EQUAL TO PRICE MODEL ASPD. PROVIDE WITH INSULATED BACKPAN, MINIMUM, R-6 INSULATION WITH FOIL SCRIM VAPOR BARRIER.
	101-245	8"Ø	
	246-350	10"Ø	
	351-500	12"Ø	
	501-900	14"Ø	
B	REFER TO PLAN VIEWS FOR CFM AND SIZES		ALL ALUMINUM CONSTRUCTION RETURN AIR , WITH LOUVERED FACE AND 3/4" BLADE SPACING ON 45° ANGLE. PROVIDE LAY-IN TYPE BORDER WHERE LOCATED IN LAY-IN TYPE CEILINGS. PROVIDE WITH SURFACE MOUNTED BORDER WHERE LOCATED IN GYPSUM CEILINGS OR ON WALLS.

NOTES:

1. LAY-IN AND WALL MOUNTED DIFFUSERS AND GRILLES SHALL BE WHITE.
2. WHERE REQUIRED BY GYPSUM CEILINGS, PROVIDE WITH PLASTER RINGS OR OTHER APPURTENANCES AS REQUIRED.
3. INTERIORS OF DIFFUSERS AND GRILLES VISIBLE FROM THE FINISHED SPACE SHALL BE PAINTED FLAT BLACK.
4. UNLESS NOTED OTHERWISE, DIFFUSERS/GRILLES/REGISTERS SHALL BE ALL ALUMINUM CONSTRUCTION AND EQUAL TO PRICE.

DATE:	REVIEWED:	DRAWN:	REVISION:	ID:

PHASE:	DRAWN:	REVIEWED:	DATE:
CONCEPT SCHEM. DESIGN			-
ADVANCED SCHEM. DESIGN			-
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75% CONSTRUCTION DOCS.			
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Client: **Florida State University**
Tallahassee, Florida

Job Title: **Parking Garage 1 Remodeling - Phase 2**

Consultant:
TOMAHAWK ENGINEERING & CONSULTING, INC.
COA #: 29709
Tomahawk Project #: 25042

1940 Buford Boulevard
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Project #: **19370.42**
Phase: **100% Construction Documents**

RICHARD LINDBURG
PE#: 62829

Seal:
No. 65705
EXPIRES 02-28-27
PE#: 65705
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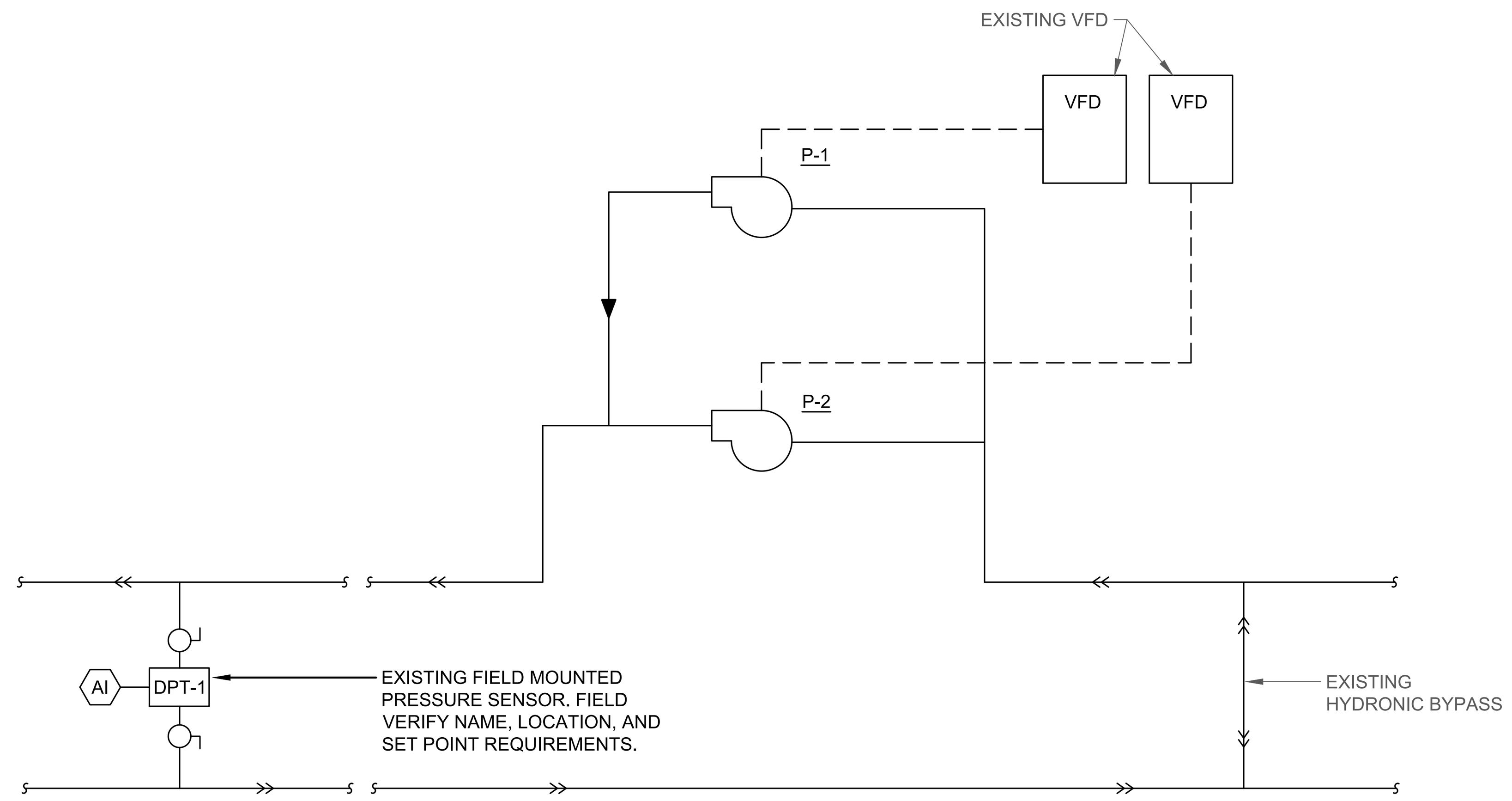
Description:
Schedules - Mechanical

Sheet No.:
M6.1



SEQUENCE OF OPERATIONS:

THE INTENT OF THIS DIAGRAM IS TO SHOW THE BASIC EXISTING CONFIGURATION OF THE CHILLED WATER PLANT FOR THE FSU PARKING GARAGE #1. THERE ARE TO BE NO HARDWARE CHANGES TO THE EXISTING PLANT. THE CONTROL VENDOR SHALL PROVIDE PROGRAMMING UPDATES AS INDICATED BELOW SUCH THAT ADDITIONAL WATER CAN BE SUPPLIED TO THE AIR HANDLING UNITS ASSOCIATED WITH THIS BUILDING DURING HIGH LOAD/DEMAND COOLING PERIODS.

THE CHILLED WATER PROGRAM SHALL BE MODIFIED AS INDICATED BELOW:

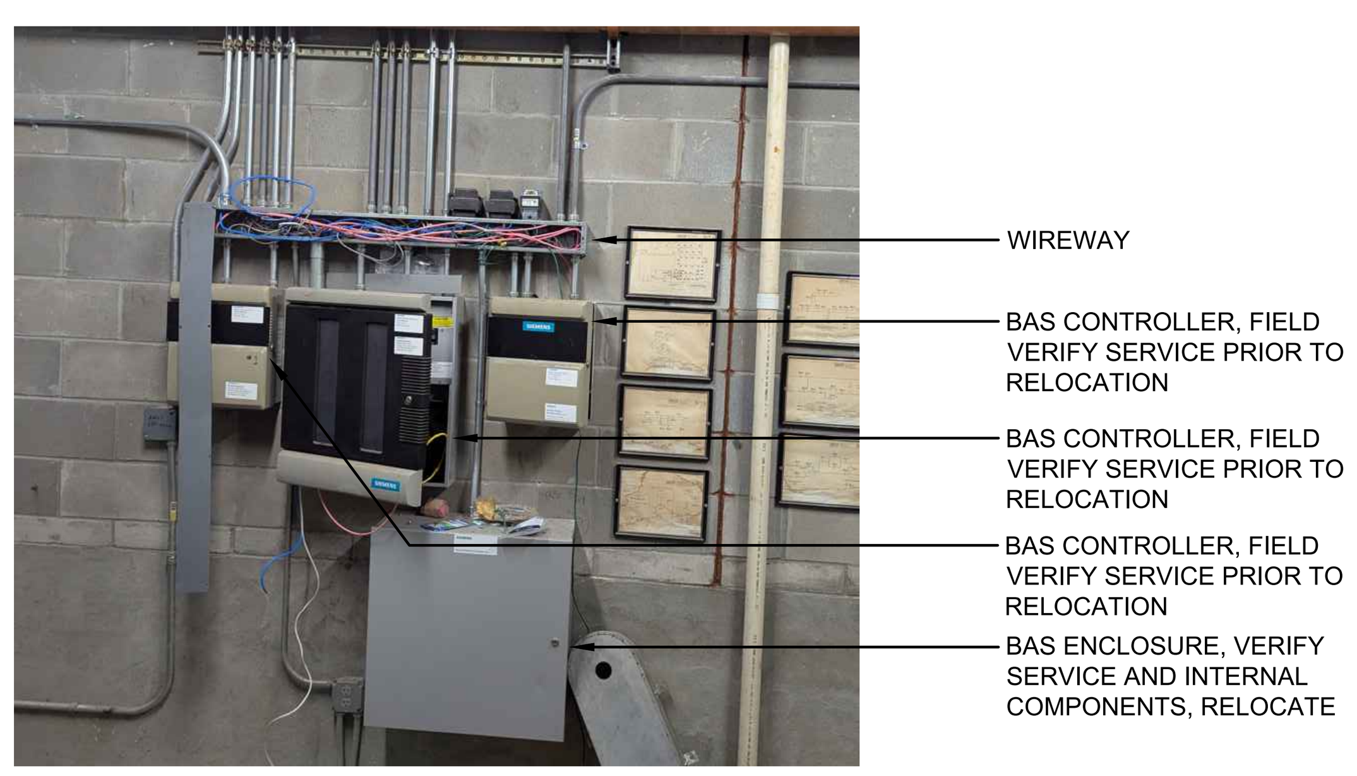
THE CHILLED WATER SYSTEM SHALL BE ENABLED AS CURRENTLY ENABLED. NO CHANGES REQUIRED.

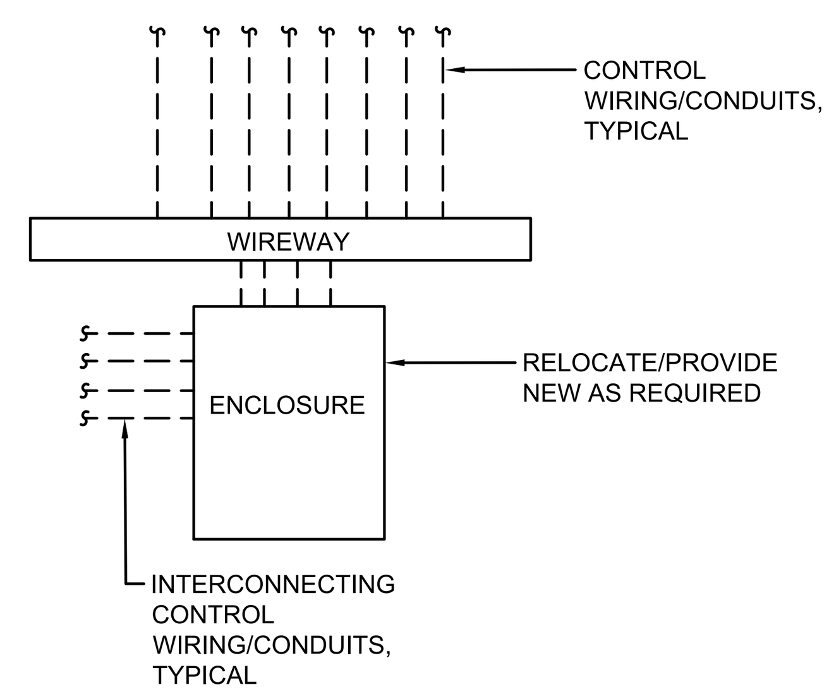
- ONCE ENABLED, THE LEAD CHILLED WATER PUMP SHALL START AND SLOWLY RAMP VFD SPEED AS REQUIRED TO SATISFY PRESSURE SET POINT AS SENSED BY THE EXISTING DIFFERENTIAL PRESSURE TRANSDUCER, DPT-1. VERIFY EXISTING SET POINT PRIOR TO MAKING ANY CHANGES.
  - WHERE THE LEAD PUMP HAS RAMPED TO 95% SPEED (57 HRTZ VFD) AND THE DIFFERENTIAL PRESSURE CONTINUES TO FALL FOR 10-MINNUTES, THE LAG PUMP SHALL BE ENABLED AND START.
  - ONCE THE LAG PUMP HAS BEEN STARTED, THE LEAD AND LAG PUMPS SHALL MODULATE AS REQUIRED TO MAINTAIN THE DIFFERENTIAL SET POINT.
  - ONCE COMMANDED ON, THE LAG PUMP SHALL OPERATE FOR A MINIMUM OF 30-MINUTES.
  - AFTER THE 30-MINUTE TIME OUT, WHERE BOTH PUMPS HAVE RAMPED TO BELOW 50% (30 HRTZ) FOR 15-MINUTES, THE LAG PUMP MAY BE DISABLED AND STOP.
  - THE LAG PUMP SHALL NOT BE ALLOWED TO START FOR 15-MINUTES.
- THE EXISTING LEAD/LAG CHILLED WATER PUMP ROTATION SEQUENCE SHALL REMAIN UNALTERED.

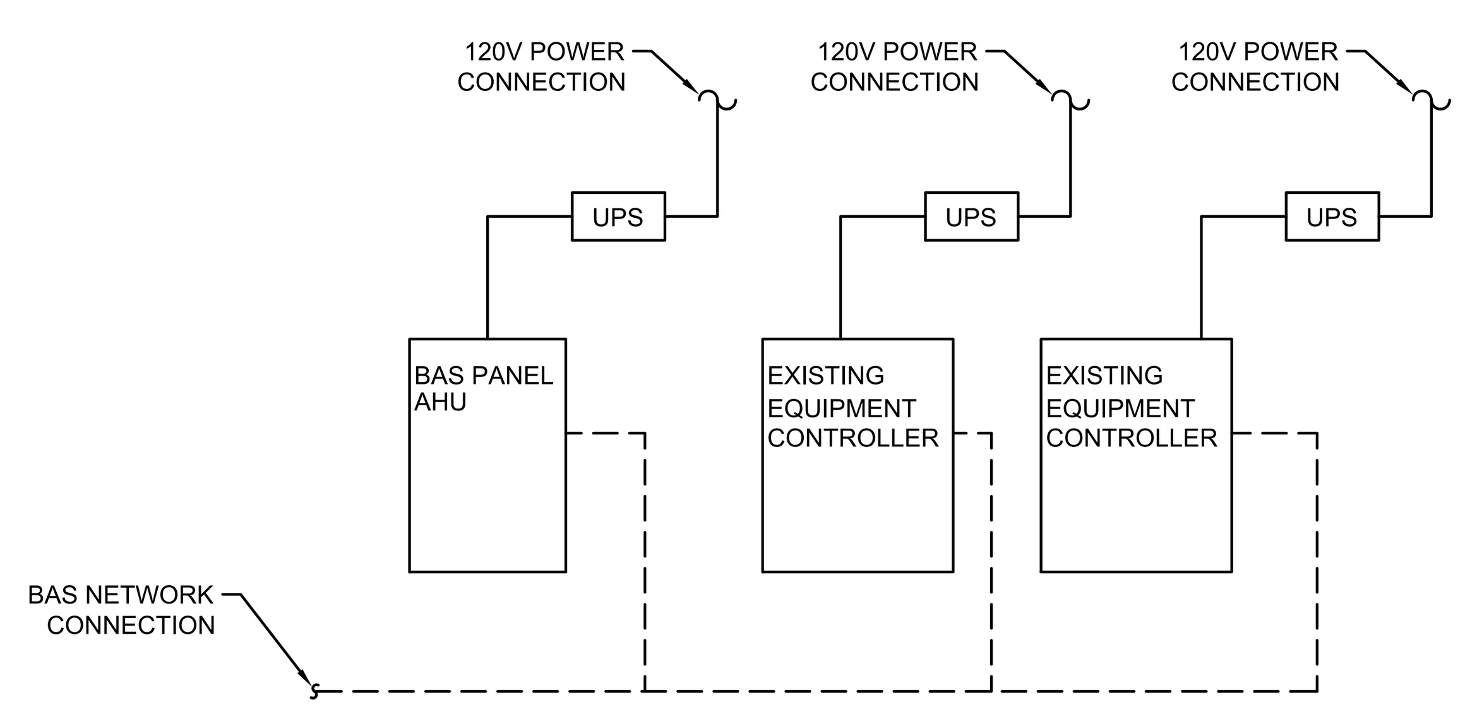
ALARMS:

ALL EXISTING ALARMS SHALL REMAIN UNALTERED.

2	EXISTING CHILLED WATER PUMP CONTROL MODIFICATIONS	SCALE: NONE



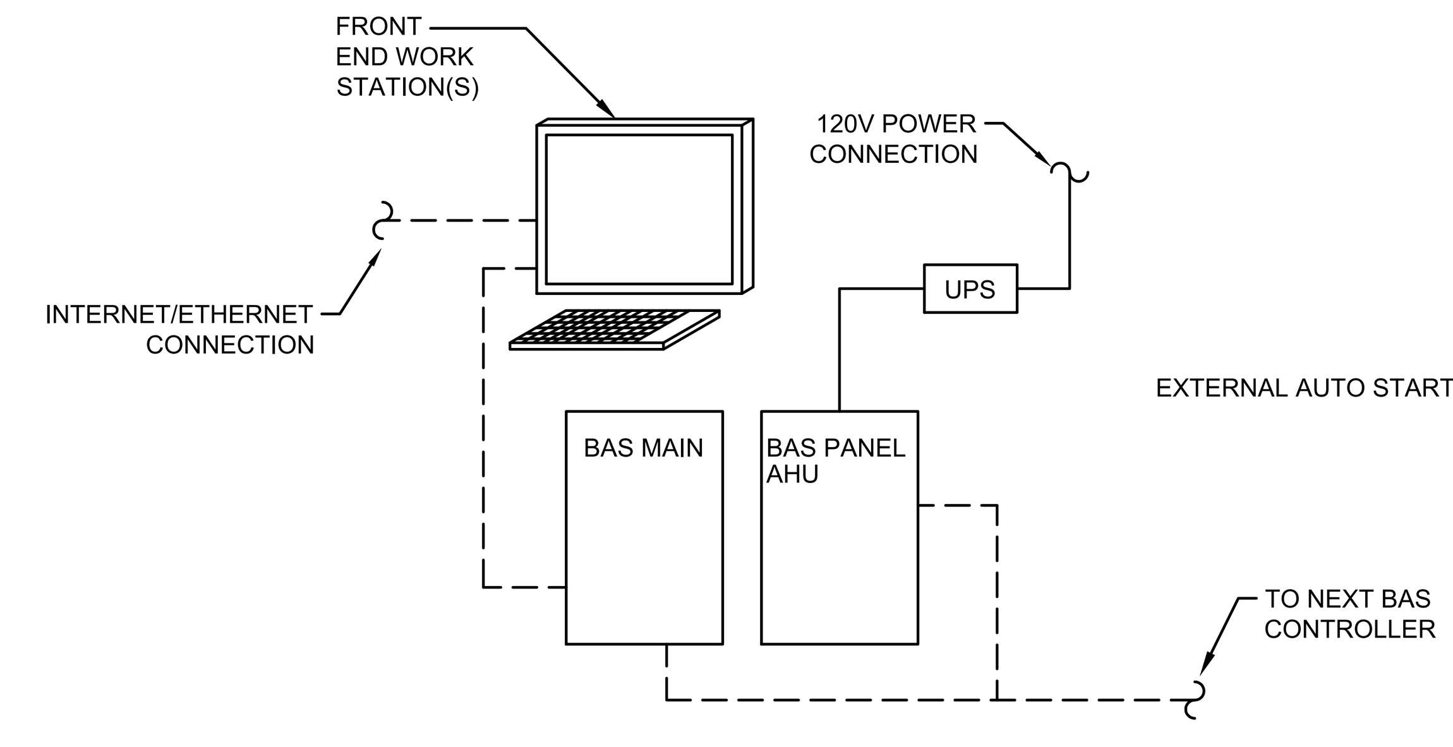




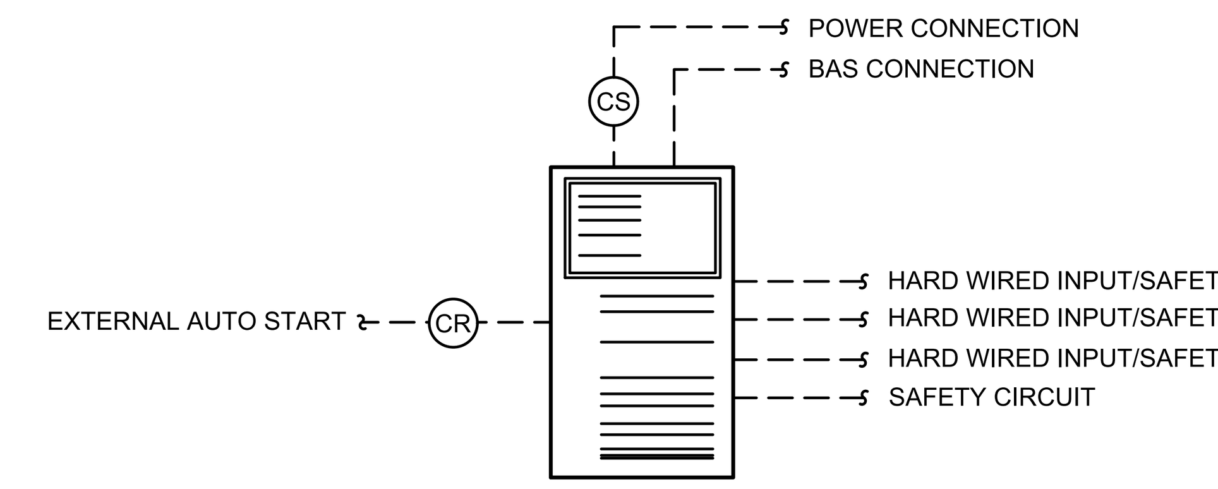
NOTES:

1. THE CONTROLS VENDOR SHALL VISIT THE SITE AND PROVIDE A POINT TO POINT CHECK OUT OF THE EXISTING CONTROLLERS AND CONTROL PANELS TO BE RELOCATED.
2. WIRING SHALL BE IDENTIFIED AND MIGRATED TO NEW CONTROLLER LOCATIONS AS INDICATED ON FLOOR PLANS AND THIS SHEET.
3. WHERE REQUIRED BY NEW BAS PROTOCOLS, THE CONTROLS VENDOR SHALL PROVIDE EXPANSION MODULES OR NEW CONTROLLERS TO CONTROL EXISTING EQUIPMENT AS THEY ARE CURRENTLY BEING CONTROLLED.
4. MIGRATE EXISTING PROGRAMS FOR EXISTING EQUIPMENT TO NEW CONTROLLERS OR EXISTING WHERE THEY ARE RELOCATED.
5. PROVIDE NEW WIREWAYS/ENCLOSURES AS NEEDED TO PERFORM WORK AS INDICATED.
6. AHUPG-1 SHALL BE PROVIDED WITH A NEW ENCLOSURE AND NEW CONTROL MODULE. CONNECT TO EXISTING BAS SYSTEM NETWORK.
7. PROVIDE INTERNET/ETHERNET CONNECTIONS AS REQUIRED.

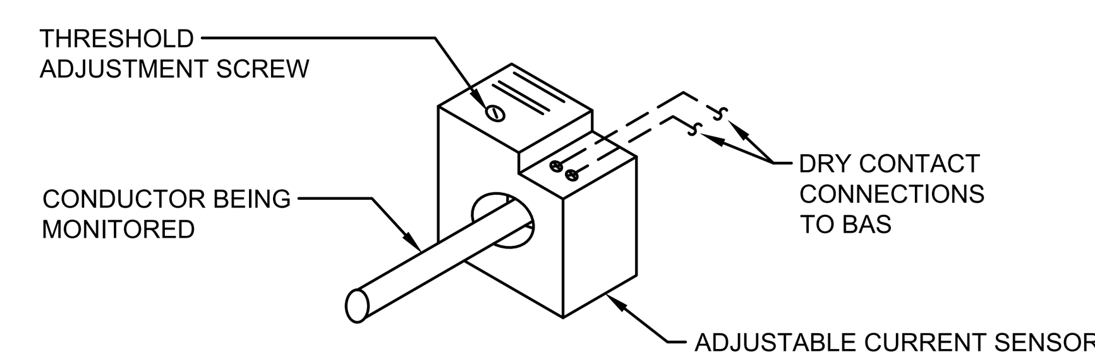
3	EXISTING & NEW BAS CONTROLLER REQUIREMENTS	SCALE: NONE



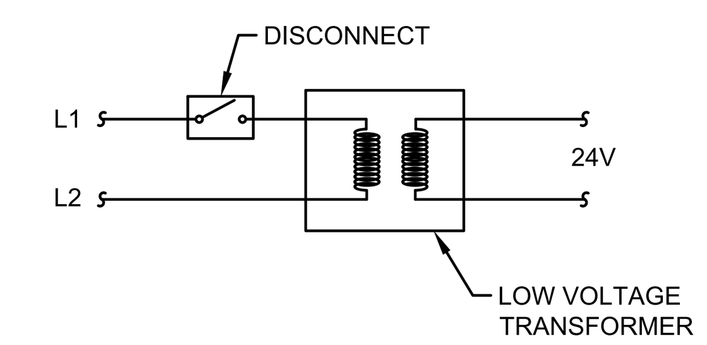
BASIC BAS ARCHITECTURE



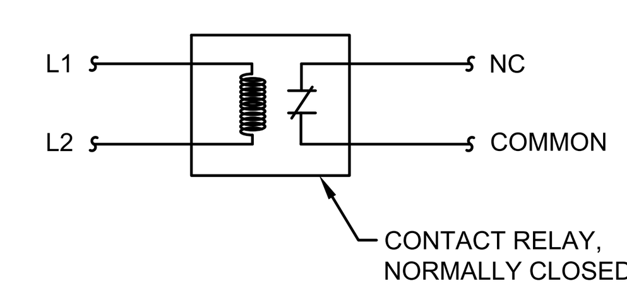
TYPICAL VFD WIRING REQUIREMENTS



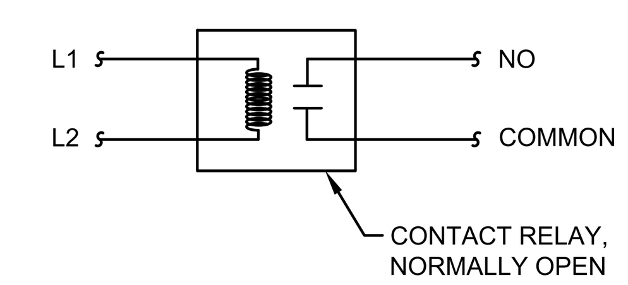
TYPICAL ADJUSTABLE CURRENT SENSOR



TYPICAL LOW VOLTAGE TRANSFORMER



TYPICAL NORMALLY CLOSED CONTACT RELAY



TYPICAL NORMALLY OPEN CONTACT RELAY

THE INTENT OF THESE DIAGRAMS IS TO SHOW GENERAL SYSTEM ARRANGEMENT AND COMPONENTS. THE SUCCESSFUL CONTROLS VENDOR SHALL PROVIDE ALL DEVICES, LABOR, CONDUIT, CONTROL PANELS, WIRING (REGARDLESS OF VOLTAGE), OR ANY OTHER COMPONENTS REQUIRED OR IMPLIED TO HAVE A FULLY COMPLETE AND FULLY FUNCTIONAL CONTROL SYSTEM.

THE VENDOR SHALL PROVIDE A CONTROL SYSTEM WITH FULLY WEB ENABLED ADDRESSABLE CONTROL PANELS. THE CONTROL NETWORK SHALL BE ACCESSIBLE VIA THE CONTROLS SYSTEM NETWORK AT THE FRONT END COMPUTER STATION OR STATIONS (UNIVERSITY CONTROLS PROTOCOL) AS WELL AS ANY ADDITIONAL COMPUTER REQUESTED BY OWNER PERSONNEL. GRAPHICS UPDATES SHALL BE PROVIDED AND SHALL ALSO BE SITE AND COMPONENT SPECIFIC AT THE FRONT END WORK STATION(S). THE GRAPHICS UPDATES SHALL MEET THE STANDARDS SET FORTH UNDER CURRENT CONTROLS PROTOCOL.

THE CONTROLS VENDOR SHALL WORK WITH THE TEST AND BALANCE AGENT AS REQUIRED TO SET ALL DIFFERENTIAL PRESSURE SENSORS AND STATIC PRESSURE SENSORS. SENSORS SHALL BE SET AS REQUIRED TO DELIVER CFM VALUES AND GPM VALUES FOUND WITHIN THESE DOCUMENTS.

THE CONTROLS VENDOR SHALL PROVIDE A POINT TO POINT CONTROLS CHECK OUT PRIOR UPON COMPLETION OF CONTROLS INSTALLATION.

DAMPER AND VALVE MOTOR VOLTAGES SHALL SUIT THE APPLICATION. PROVIDE 120/24 VOLT AS NEEDED.

THE CONTROLS VENDOR IS, HEREBY, DELEGATED TO PROVIDE THE WIRING DESIGN (REGARDLESS OF VOLTAGE) FOR THIS PROJECT. REFER TO ELECTRICAL DRAWINGS FOR PANELS PROVIDED WITH BAS CONNECTIONS/CIRCUITS. IT IS THE RESPONSIBILITY OF THE CONTROLS VENDOR TO PROVIDE ELECTRICAL WIRING AND CONDUITS FROM ELECTRICAL PANELS TO CONTROLS EQUIPMENT AND COMPONENTS, REGARDLESS OF VOLTAGE. WHERE VOLTAGES ARE ABOVE 24V, THE BAS VENDOR SHALL PROCURE THE SERVICES OF A LICENSED ELECTRICIAN TO INSTALL THE WIRING AS DESIGN BY THE BAS DELEGATED DESIGN ENGINEER.

ADJUSTABLE CURRENT SENSORS SHALL BE PROVIDED FOR BELT DRIVEN EQUIPMENT. SET SENSORS FOR BELT BROKEN, BELT LOOSE, AND NORMAL OPERATION. PROVIDE ALARM BELT BROKEN OR BELT LOOSE CONDITIONS.

PROVIDE LOW VOLTAGE TRANSFORMERS FOR LOW VOLTAGE APPLICATIONS. PROVIDE TRANSFORMERS WITH DISCONNECTING MEANS. PROVIDE WITH VOLT AMPS TO SUIT APPLICATION AND WIRING LENGTHS OF FIELD INSTALLED DEVICES.

ALL SET POINTS ASSOCIATED WITH THIS CONTROL SYSTEM SHALL BE FULLY ADJUSTABLE AND SHALL BE FULLY TRENDABLE.

SPECIAL CONTROLS REQUIREMENTS:

1. THE CONTROLS VENDOR SHALL BE RESPONSIBLE FOR DEMOLITION OF CONTROLS WIRING AND ASSOCIATED EQUIPMENT.
2. VAV CONTROLLER APPLICATION PROTOCOL:
   - 2.1. IP (BACNET) 15523 - PREFERRED
   - 2.2. FLN 15233
3. VAV'S SHALL USE 0-10V ACTUATORS WITH 10KOHM SUPPLY SENSORS AND WALL MOUNTED SENSORS EQUAL TO SIEMENS MODEL QMX3.P44.

1	BASIC CONTROLS LAYOUT AND TYPICAL COMPONENTS	SCALE: NONE

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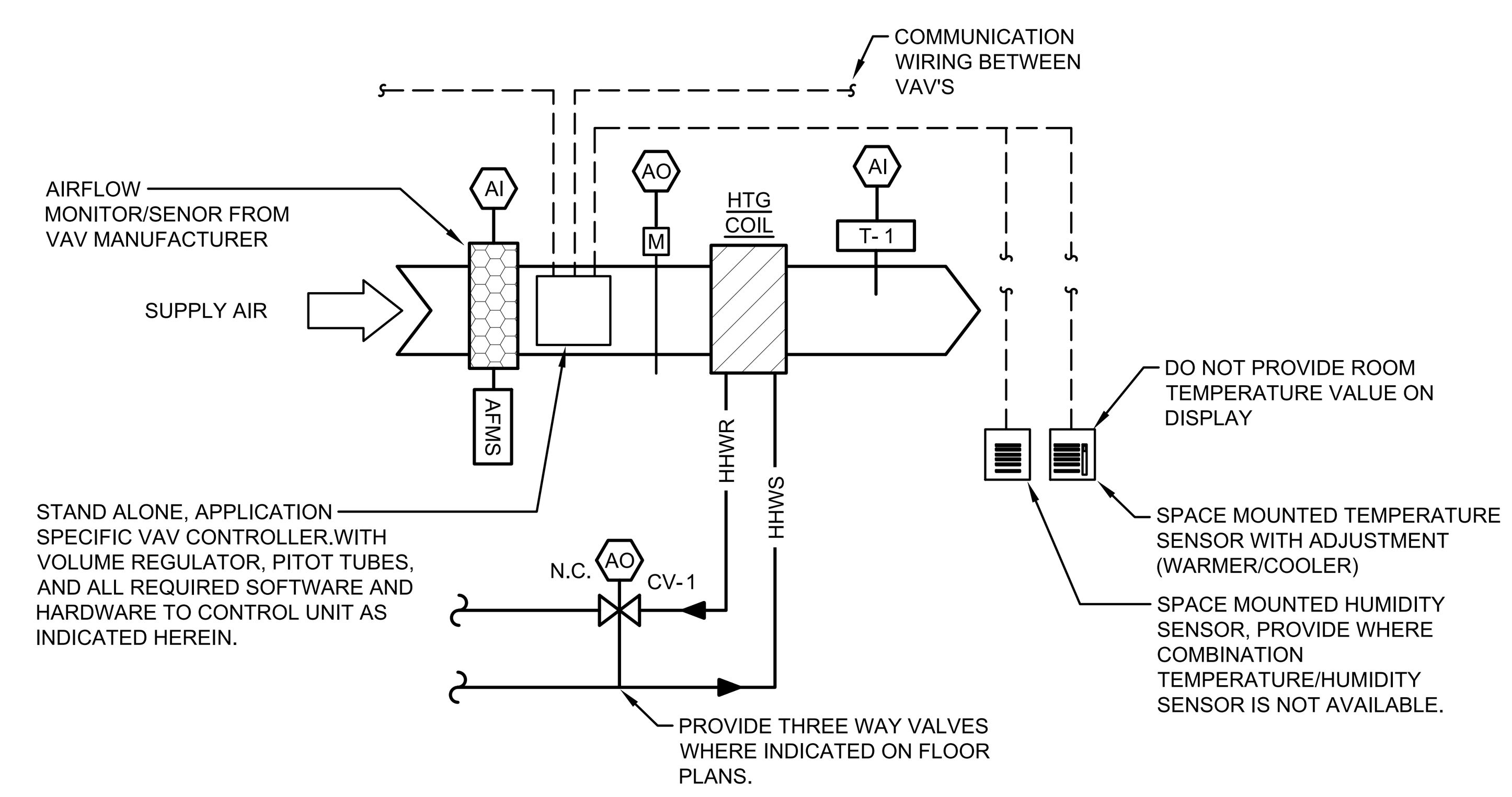
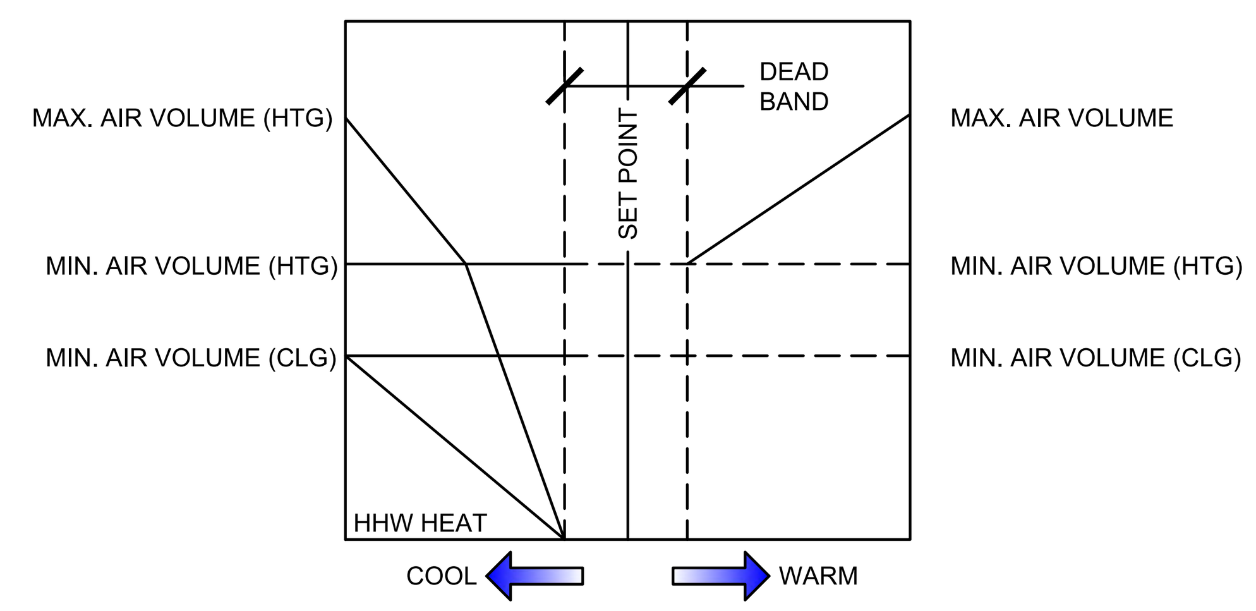




VAV SEQUENCE OF OPERATIONS:

THE VAV SHALL BE CONNECTED TO BAS PANEL ASSOCIATED WITH THEIR RESPECTIVE EXISTING AIR HANDLERS.

THE VAV SHALL BE ENABLED BY THE BAS CONTROL SYSTEM. ONCE THE VAV HAS BEEN ENABLED, THE FOLLOWING SHALL OCCUR:

THE BAS SHALL CONTINUOUSLY MONITOR THE SPACE TEMPERATURE VIA THE SPACE MOUNTED TEMPERATURE SENSOR.

THE VAV SHALL BE IN THE SAME MODE (OCCUPIED/UNOCCUPIED & HEATING/COOLING). REFER TO AHU CONTROLS FOR FURTHER INFORMATION.

COOLING MODE:

DURING COOLING MODE, THE VAV SHALL MODULATE ITS VOLUME DAMPER BETWEEN THE MAXIMUM OPEN AND MINIMUM COOLING POSITION AS REQUIRED TO PROVIDE THE SCHEDULED AIRFLOW VOLUMES AND MAINTAIN SPACE TEMPERATURE. UPON A FALL IN SPACE TEMPERATURE, THE VAV SHALL MODULATE ITS VOLUME DAMPER TO SATISFY THE SPACE TEMPERATURE SET POINT TOWARD MINIMUM POSITION. THE MINIMUM COOLING DAMPER POSITION SHALL BE SET AS INDICATED BY THE VAV SCHEDULE. IF SPACE TEMPERATURE CONTINUES TO FALL BELOW SET POINT AND THE DAMPER IS AT THE MINIMUM COOLING POSITION, THE HEATING HOT WATER CONTROL VALVE SHALL MODULATE OPEN AND CLOSED TO SATISFY TEMPERATURE SET POINT.

HEATING MODE:

DURING HEATING MODE, THE VAV SHALL MODULATE ITS AIR VOLUME DAMPER TO THE MINIMUM HEATING POSITION. THE HEATING HOT WATER CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE SET POINT.

WHERE THE VAV IS AT THE MINIMUM HEATING AIR FLOW AND THE CONTROL HHW CONTROL VALVE IS 100% OPEN AND THE SPACE TEMPERATURE CONTINUES TO FALL FOR 2-MINUTES, THE VAV SHALL MODULATE ITS AIR FLOW VOLUME DAMPER TO MAINTAIN SPACE TEMPERATURE. THE HEATING HOT WATER CONTROL VALVE SHALL REMAIN 100% OPEN. ONCE THE VAV IS AT THE MINIMUM HEATING CFM VALUE FOR ONE MINUTE, THE HEATING HOT WATER CONTROL VALVE SHALL BE ALLOWED TO MODULATE SPACE TEMPERATURE, ONCE AGAIN.

SET POINTS OCCUPIED:

COOLING: 72°F

HEATING: 70°F

SET POINTS UNOCCUPIED:

COOLING: 78°F

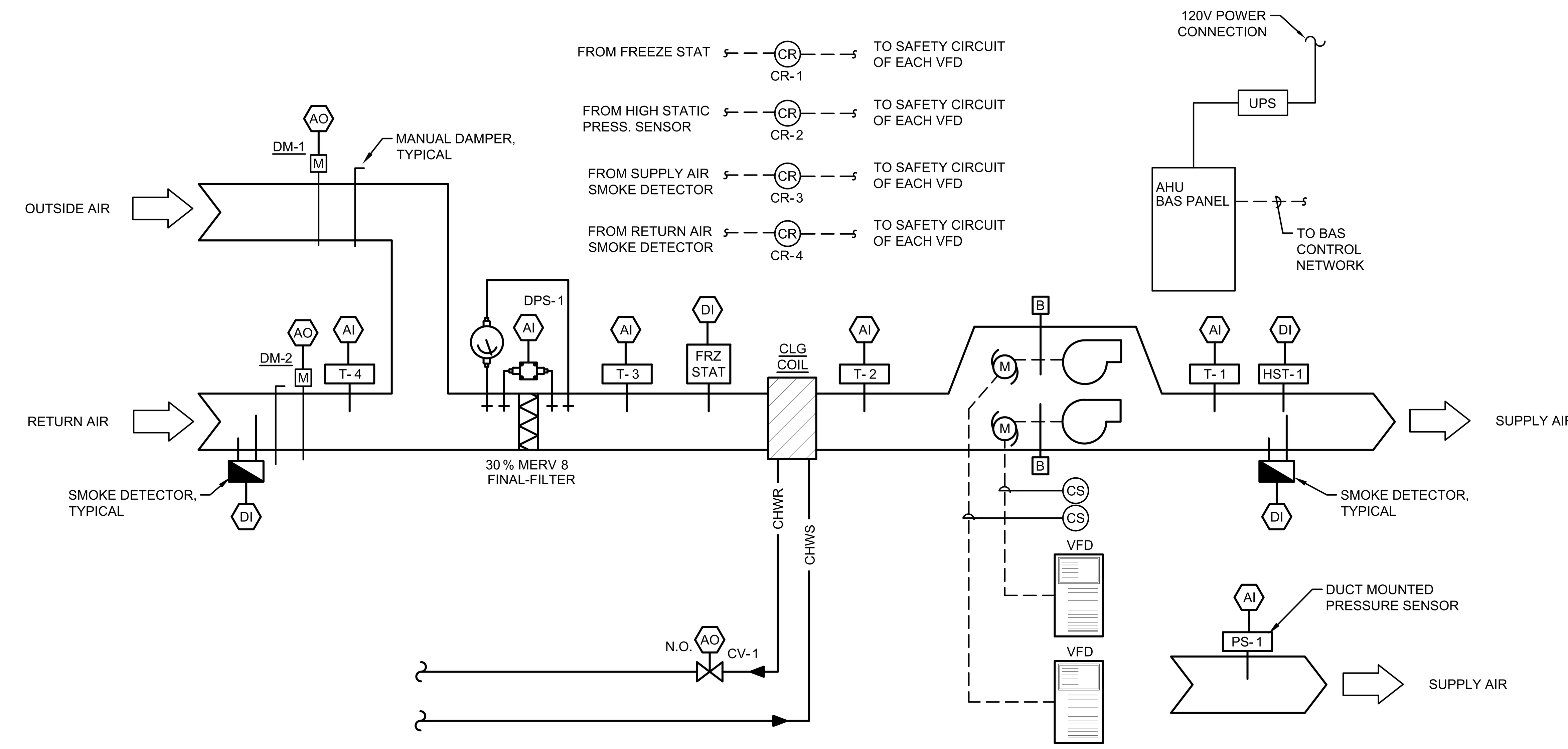
HEATING: 68°F

THE DISCHARGE AIR TEMPERATURE, T-1 SHALL BE MONITORED.

FOR BOTH HEATING AND COOLING MODES, PROVIDE OCCUPANT ADJUSTMENT UP 2°F AND DOWN 2°F.

NOTE: ***PROVIDE DEAD BAND IN ACCORDANCE WITH ASHRAE 90.1.***

2	VTU/VAV CONTROLS	SCALE: NONE



SEQUENCE OF OPERATIONS:

THE AIR HANDLING UNIT SHALL BE CONTROLLED BY THE BAS PANEL PROVIDED FOR THE UNIT AND LOCATED AS INDICATED ON PLAN VIEWS. THE CONTROLLER SHALL HAVE ENOUGH POINTS AND PROCESSING CAPACITY TO CONTROL THE AHU AS INDICATED HEREIN, AS WELL AS, ANY OTHER COMPONENTS ASSOCIATED WITH THE AHU. THE CONTROLLER SHALL BE TIED BACK INTO MAIN BAS CONTROLLER. PROVIDE ETHERNET PORT(S)/WIRING AS REQUIRED FOR THIS CONNECTION.

THE AHU SHALL HAVE (2) MODES OF OPERATION. THESE MODES SHALL BE OCCUPIED AND UNOCCUPIED. ONCE ENABLED, THE UNIT SHALL OPERATE AS FOLLOWS:

OCCUPIED MODE:
NOTE: THIS OCCUPIED/UNOCCUPIED TIME SCHEDULE IS A STARTING POINT AND SHALL BE VERIFIED WITH THE OWNER.
THE AHU SHALL BE IN OCCUPIED MODE FROM 5:00 AM TO 8:00 PM, MONDAY THRU FRIDAY. THE UNIT MAY BE TAKEN DOWN FOR MAINTENANCE PURPOSES AS NEEDED AT THE VFD OR AT THE BAS FRONT END WORK STATION. WHILE IN OCCUPIED MODE, THE FOLLOWING SHALL OCCUR:

- THE MOTORIZED DAMPERS, DM-1,AND DM-2 SHALL BE MODULATED FULLY OPEN. ONCE VERIFIED OPEN VIA POSITION INDICATION THRU THE DAMPER MOTOR TO THE BAS, THE SUPPLY AIR FANS SHALL START. THE FANS' VFD'S SHALL MODULATE AS REQUIRED TO MAINTAIN THE DESIRED STATIC PRESSURE SET POINT.
  - THE MOTORIZED CONTROL DAMPERS SHALL MODULATE BETWEEN MAXIMUM AND MINIMUM POSITION TO PROVIDE THE DESIRED FRESH AIR CFM VALUE AS SCHEDULED. SEE ADDITIONAL CONTROLS REQUIREMENTS BELOW.
- THE UNIT FANS SHALL MODULATE AS REQUIRED TO MAINTAIN STATIC PRESSURE SET POINT, PS-1. VERIFY SET POINT REQUIREMENTS WITH TAB AGENT.
- THE CHILLED WATER COIL VALVE, CV-1, SHALL MODULATE BETWEEN OPEN AND CLOSED TO MAINTAIN THE DESIRED OFF COIL TEMPERATURE OF 52°F AS SENSED BY T-2.
- FOR MIXED AIR TEMPERATURES LESS THAN 51°F AS SENSED BY T-3 FOR 15-MINUTES, THE CHILLED WATER VALVE SHALL BE MODULATED CLOSED AND THE UNIT WILL BE PLACED INTO HEATING MODE. ONCE PLACED INTO HEATING MODE, THE UNIT SHALL REMAIN IN HEATING MODE FOR A MINIMUM OF 15-MINUTES.
  - ONCE PLACED IN HEATING MODE, A SIGNAL SHALL BE SENT TO THE VARIABLE VOLUME TERMINAL UNITS ASSOCIATED WITH AHUPG-1. THE VTU'S SHALL BE PLACED INTO HEATING MODE ONCE THE AHU IS PLACED IN HEATING MODE, OTHERWISE THE VTU'S WILL BE IN COOLING MODE.
- FOR RETURN AIR AIR TEMPERATURES LESS THAN 65°F, AS SENSED BY T-4 FOR 20 MINUTES, THE UNIT SHALL BE PLACED INTO MORNING WARMUP. THE UNIT SHALL REMAIN IN MORNING WARMUP UNTIL THE RETURN AIR TEMPERATURE AS SENSED BY T-4 HAS BEEN MAINTAINED AT 65°F, OR HIGHER, FOR A MINIMUM OF 30-MINUTES.

UNOCCUPIED MODE:
NOTE: THIS OCCUPIED/UNOCCUPIED TIME SCHEDULE IS A STARTING POINT AND SHALL BE VERIFIED WITH THE OWNER.
THE AHU SHALL BE IN UNOCCUPIED MODE FROM 8:01 PM TO 4:59 AM, MONDAY THRU THURSDAY AND FROM 8:01 PM FRIDAY EVENING UNTIL 4:59 AM, MONDAY MORNING. THE UNIT MAY BE TAKEN DOWN FOR MAINTENANCE PURPOSES AS NEEDED AT THE VFD OR AT THE BAS FRONT END WORK STATION. WHILE IN UNOCCUPIED MODE, THE FOLLOWING SHALL OCCUR:

- THE UNIT SHALL BE OFF. THE OUTDOOR AIR MOTORIZED CONTROL DAMPER, DM-1, SHALL BE CLOSED. THE RETURN AIR DAMPER DM-2 SHALL BE FULLY OPEN.
- FOR HEATING, IF ANY OF THE SPACE MOUNTED TEMPERATURE SENSORS ASSOCIATED WITH ANY OF THE VARIABLE TERMINAL UNITS SENSES A SPACE TEMPERATURE BELOW SET POINT FOR 15-MINUTES, THE AHU SHALL BE STARTED AND OPERATE PER THE OCCUPIED SEQUENCE ABOVE. ONCE SET POINT HAS BEEN MET FOR 30-MINUTES (FOR ALL VTU ZONES), THE AHU SHALL BE ONCE AGAIN BE SHUT DOWN UNTIL OCCUPIED MODE OR UNTIL ANOTHER CALL FOR HEATING IS MADE.
- FOR COOLING, IF THE SPACE MOUNTED TEMPERATURE SENSORS ASSOCIATED WITH ANY OF THE VARIABLE TERMINAL UNITS SENSE A SPACE TEMPERATURE ABOVE SET POINT FOR 15-MINUTES, OR ANY OF THE SPACE MOUNTED RELATIVE HUMIDITY SENSORS SENSE A RELATIVE HUMIDITY ABOVE 65% FOR 15-MINUTES, THE UNIT SHALL BE STARTED AND OPERATE PER THE OCCUPIED SEQUENCE ABOVE. ONCE SET POINT HAS BEEN MET FOR 30-MINUTES (FOR ALL ZONES), THE UNIT SHALL BE ONCE AGAIN BE SHUT DOWN UNTIL OCCUPIED MODE OR UNTIL ANOTHER CALL FOR COOLING IS MADE.

OUTSIDE AIR VOLUME CONTROL (OCCUPIED AND UNOCCUPIED MODES):

OUTSIDE AIR SHALL BE CONTROLLED TO PROVIDE THE OUTSIDE AIR AS SCHEDULED ON SHEET M601. THE MAXIMUM AND MINIMUM DAMPER POSITIONS SHALL BE SET BY THE TEST AND BALANCE AGENT AND CONTROLS VENDOR FOR THE AIR HANDLING UNIT. THE OUTSIDE AIR VALUE FOR VFD MINIMUM SPEED SHALL BE SET BY MODULATING THE AIR HANDLER VFD'S TO 30% OPERATION AND SETTING RETURN AIR AND OUTSIDE AIR DAMPERS TO THE POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR VOLUME. THE OUTSIDE AIR VALUE FOR VFD MAXIMUM SPEED SHALL BE SET BY MODULATING THE FAN VFD'S TO 100% AND SETTING THE RETURN AIR AND OUTSIDE AIR DAMPERS SUCH THAT THE SCHEDULED OUTSIDE AIR IS PROVIDED. DAMPER POSITIONS SHALL BE SET AND MAINTAINED BY THE BAS AS REQUIRED. THE MANUAL DAMPERS INCLUDED SHALL BE USED AS REQUIRED TO ASSIST IN THE BALANCING PROCESS.

ANY TIME THAT THE AHU IS OFF, THE OUTSIDE AIR DAMPER, DM-1, SHALL BE CLOSED.

MONITORING POINTS:

1. T-1: DISCHARGE AIR TEMPERATURE.
2. T-3: MIXED AIR TEMPERATURE.
3. EACH OF THE AHU FANS SHALL BE MONITORED BY ITS CORRESPONDING CURRENT SENSOR (CS). IF AT ANY TIME A CALL FOR THE FAN HAS BEEN MADE AND THE FAN PROOF HAS NOT BEEN MADE, AN ALARM SHALL BE GENERATED TO THE BAS INDICATING A FAILED FAN WITH FAN NUMBER AND REASON FOR THE FAILURE.

THE AIR HANDLING UNIT SHALL HAVE THE FOLLOWING HARD-WIRED INTERLOCKS TO THE VFD THAT SHALL REQUIRE MANUAL RESET:

1. SMOKE DETECTOR
   1.1. UPON DETECTION OF SMOKE, THE UNIT SHALL BE SHUT DOWN AND A SUPERVISORY ALARM SHALL BE GENERATED TO THE FIRE ALARM SYSTEM.
2. FREEZE STAT
3. HIGH STATIC PRESSURE SENSOR

COIL FREEZE PROTECTION IS PROVIDED BY UNIVERSITY CONTROLS PERSONNEL FOR GLOBAL COMMAND TO ALL AIR HANDLING UNITS. THE CONTROLS VENDOR SHALL CONTACT THE UNIVERSITY PROJECT MANAGER AND UNIVERSITY BAS PERSONNEL FOR REQUIREMENTS OF COIL FREEZE PROTECTION.

1	AHU PG-1 CONTROLS	SCALE: NONE

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