MECHANICAL LEGEND

DUCTWORK

	NEW DUCTWORK
	EXISTING DUCTWORK
	EXISTING DUCTWORK TO BE REMOVED
	RETURN AIR OR MAKE-UP AIR
	EXHAUST AIR
	SUPPLY AIR
	SUPPLY AIR OR OUTSIDE AIR DUCT/DIFFUSER
	RETURN AIR DUCT/ GRILLE
	EXHAUST AIR DUCT/ GRILLE
	CHAMFER CONNECTION WITH VOLUME DAMPER
	BELLMOUTH CONNECTION WITH VOLUME DAMPER
	FLEXIBLE DUCT
	RECTANGLE TO ROUND TRANSITION
VD	VOLUME DAMPER
	CAP DUCT
	DIRECTION OF FLOW
	BREAK LINE
	CONCENTRIC REDUCER/INCREASER
	ECCENTRIC REDUCER/INCREASER
	FLEXIBLE CONNECTION
	RISE IN DUCT
FD/AD	FIRE DAMPER WITH ACCESS DOOR
	DUCTWORK ROOF SUPPORT
	CONTROL DAMPER
D	DAMPER NUMBER
	MOTORIZED CONTROL DAMPER

DEVICES

CO2	CO2 SENSOR
DPS	DIFFERENTIAL PRESSURE SENSOR
SD	DUCT MOUNTED SMOKE DETECTOR
FS	FLOW SENSOR
FZ	FREEZESTAT
H	HUMIDISTAT
PG	PRESSURE GAUGE
SD	SMOKE DETECTOR
TS	TEMPERATURE SENSOR
T	THERMOSTAT

MISC. DRAWING SYMBOLS

8	CONSTRUCTION NOTE
8	DEMOLITION NOTE
1	REVISION NOTE
X/XX	EQUIPMENT TYPE / EQUIPMENT NUMBER
X/XX	DETAIL NUMBER / REFERENCED DRAWING
X/XX	SECTION NUMBER / REFERENCED DRAWING
	POINT OF CONNECTION NEW TO EXISTING
	EXTENT OF DEMOLITION
EX.	EXISTING TO REMAIN
(R)	EXISTING TO BE REMOVED
(ER)	EXISTING TO BE RELOCATED
(F)	FUTURE
(N)	NEW
⌀	SQUARE FOOT
ø	DIAMETER

PIPING

XXX	
C	CONDENSATE DRAIN
CHS	CHILLED WATER SUPPLY
CHR	CHILLED WATER RETURN
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
HWS	HEATING HOT WATER SUPPLY
HWR	HEATING HOT WATER RETURN
LPC	LOW PRESSURE STEAM CONDENSATE
LPS	LOW PRESSURE STEAM
MPS	MEDIUM PRESSURE STEAM
MPS	MEDIUM PRESSURE STEAM CONDENSATE
R	REFRIGERANT
RD	REFRIGERANT DISCHARGE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
STM	STEAM
V	VENT

	NEW PIPE
	EXISTING PIPE
	EXISTING PIPE TO BE REMOVED
H	AIR VENT HIGH CAPACITY
L	AIR VENT LOW CAPACITY
	AUTOMATIC CONTROL 2-WAY VALVE
	AUTOMATIC CONTROL 3-WAY VALVE
	AUTOMATIC CONTROL BUTTERFLY VALVE
	BALANCING VALVE
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	GAS COCK
	GATE VALVE
	GLOBE VALVE
	GLOBE STYLE CHECK VALVE
	RELIEF VALVE
	TRIPLE DUTY VALVE
	SOLENOID VALVE
	WYE STRAINER W/ BLOWDOWN VALVE AND HOSE END CONNECTION
	WYE STRAINER
	BREAK LINE
	DIRECTION OF FLOW
	CAP PIPE
	FLANGED CONNECTION
	FLEXIBLE CONNECTION
	INSERTION PLUG FOR TEMPERATURE/PRESSURE GAUGE
	PIPE BRANCH OFF BOTTOM
	PIPE DROP
	PIPE RISE
	REDUCER/INCREASER CONCENTRIC
	REDUCER/INCREASER ECCENTRIC
	UNION
PG	PRESSURE GAUGE W/ ISOLATION VALVE
	PUMP
	SUCTION DIFFUSER W/ DRAIN VALVE AND HOSE END CONNECTION
T	THERMOMETER W/ THERMOWELL

EQUIPMENT

	VARIABLE AIR VOLUME BOX
	VARIABLE AIR VOLUME BOX WITH REHEAT COIL
	FAN
	PUMP
	AIR FLOW STATION

ABBREVIATIONS

AD	ACCESS DOOR
AFCS	AIR FLOW CONTROL STATION
AFF	ABOVE FINISHED FLOOR
AFS	AIR FLOW MONITOR STATION
AHU	AIR HANDING UNIT
AS	AIR SEPARATOR
ASC	AIR SCOOP
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CONDENSATE DRAIN
CC	COOLING COIL
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CO	CLEAN OUT
CONN	CONNECTION
CSF	CHEMICAL SHOT FEEDER
CU	CONDENSER UNIT
CUH	CABINET UNIT HEATER
CV	COEFFICIENT, VALVE FLOW
CVB	CONSTANT VOLUME BOX
DB	DRY BULB TEMPERATURE
DEG	DEGREES (FAHRENHEIT)
DIA	DIAMETER
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ELEV	ELEVATION
ER	EXHAUST REGISTER
ERU	ENERGY RECOVERY UNIT
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXH	EXHAUST
EXT	EXPANSION TANK
F	FAHRENHEIT
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FMS	FACILITIES MANAGEMENT SYSTEM
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPI	FINS PER INCH
FPU	FAN POWERED UNIT
FSD	FIRE SMOKE DAMPER
FT	FIN TUBE RADIATION
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
HZ	HERTZ
IN.WG.	INCHES WATER GAUGE
LAT	LEAVING AIR TEMPERATURE
LD	LINEAR DIFFUSR
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
MBH	THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MOD	MOTORIZED OPERATED DAMPER
MUA	MAKE UP AIR
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NK	NECK
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
PH	PHASE
PSI	POUNDS PER SQUARE INCH
RA	RETURN AIR
RAD	RADIATION
RCVD	REMOTE CONTROLLED VOLUME DAMPER
RF	RETURN FAN
RG	RETURN GRILLE
RH	REHEAT COIL
RR	RETURN REGISTER
SA	SOUND ATTENUATOR
SCD	SMOKE CONTROL DAMPER
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SG	SUPPLY GRILLE
SP	STATIC PRESSURE
SR	SUPPLY REGISTER
TEMP	TEMPORARY
TG	TRANSFER GRILLE
UH	UNIT HEATER
UV	UNIT VENTILATOR
V	VOLTS
VAV	VARIABLE AIR VOLUME BOX
VD	VOLUME DAMPER
VF	VERIFY IN FIELD
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
WB	WET BULB TEMPERATURE
WMS	WIRE MESH SCREEN

NOTE: THIS IS A GENERAL MECHANICAL LEGEND, ALL SYMBOLS, ABBREVIATIONS AND LINE DESIGNATIONS MAY NOT APPEAR ON THE DRAWINGS. SEE EQUIPMENT SCHEDULES FOR EQUIPMENT DESIGNATIONS.

GENERAL NOTES

ALL OF THE FOLLOWING NOTES ARE GENERAL AND SOME MAY NOT APPLY TO THIS SPECIFIC PROJECT.

1. THE SUBMISSION OF A PROPOSAL BY THE CONTRACTOR IS NOTIFICATION THAT THE CONTRACTOR HAS TOTALLY FAMILIARIZED HIMSELF WITH THE CONTRACT DOCUMENTS AND EXISTING SITE CONDITIONS AND HAS AGREED TO PROVIDE THE NECESSARY LABOR AND MATERIAL FOR THE COMPLETE INSTALLATION OF EACH SYSTEM IN A NEAT AND WORKMANLIKE MANNER IN ACCORDANCE WITH ALL AUTHORITIES HAVING JURISDICTION.
2. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, SIZES, CLEARANCES AND LOCATIONS PRIOR TO THE START OF CONSTRUCTION AND ADVISE THE ENGINEER AND THE OWNER OF ANY DISCREPANCIES BEFORE PERFORMING THE WORK.
3. THE DRAWINGS INDICATE ARRANGEMENTS AND APPROXIMATE SIZES AND RELATIVE LOCATIONS OF PRINCIPLE APPARATUS, EQUIPMENT, DEVICES AND SERVICES TO BE PROVIDED. DRAWINGS ARE DIAGRAMMATIC AND ARE A GRAPHIC REPRESENTATION OF THE CONTRACT REQUIREMENTS TO BEST AVAILABLE STANDARDS AT THE SCALE INDICATED.
4. LAYOUT OF EQUIPMENT INDICATED ON THE DRAWINGS SHALL BE CHECKED AND COMPARED AGAINST ALL DRAWINGS AND SPECIFICATIONS OF ALL TRADES AND EXACT LOCATIONS DETERMINED USING APPROVED SHOP DRAWINGS OF SUCH EQUIPMENT. WHERE PHYSICAL INTERFERENCE OCCURS, CONSULT WITH ENGINEER AND PREPARE DATED, DIMENSIONED DRAWINGS COORDINATED WITH ALL OTHER TRADES. OBTAIN WRITTEN APPROVAL OF THE ENGINEER FOR SUCH DRAWINGS AND DISTRIBUTE SAME AS REQUIRED.
5. CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER AND ALL OTHER CONTRACTORS. CONTRACTOR SHALL ALSO SCHEDULE HIS WORK IN ACCORDANCE WITH THE CONSTRUCTION SCHEDULE SO THAT ALL OF HIS WORK CAN BE INSTALLED WITHOUT DELAYING THE PROJECT.
6. ALL WORK SHALL COMPLY AND BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE CODES, THE UNIFORM CONSTRUCTION CODE STATUTE, THE APPLICABLE INTERNATIONAL CODES (E.G. THE INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL BUILDING CODE) AS AMENDED AND ADOPTED BY THE LOCAL JURISDICTION, AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES AND REGULATIONS (CURRENT EDITIONS), THE NATIONAL ELECTRIC CODE, BUILDING STANDARDS, NFPA AND ALL OTHER AGENCIES AND AUTHORITIES HAVING JURISDICTION. REFER TO THE CODES AND STANDARDS TABLE FOR VERSIONS OF CODES.
7. CONTRACTOR SHALL SECURE AND PAY ALL FEES AND PERMITS PERTAINING TO THE CONTRACT. GIVE ALL NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENTAL TAXES, FEES, AND COSTS; FILE NECESSARY PLANS AND OBTAIN APPROVALS OF ALL GOVERNMENT DEPARTMENTS HAVING JURISDICTION; OBTAIN CERTIFICATES OF INSPECTION FROM AN NFPA APPROVED AGENCY FOR THE WORK AND DELIVER THE SAME TO THE OWNER WITH REQUEST FOR FINAL PAYMENT.
8. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURERS' WRITTEN INSTRUCTIONS.
9. ANY ITEM DEEMED NECESSARY OR RECOMMENDED, OR REQUIRED BY CODE, BY THIS TRADE CONTRACTOR TO ACHIEVE THE FUNCTION SHOWN, BUT NOT INDICATED HEREIN, SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO BIDDING IN WRITTEN "RFI" FORMAT. FAILURE TO IDENTIFY ITEMS DEEMED NECESSARY PRIOR TO BIDDING SHALL INDICATE TO THE ENGINEER AND OWNER THAT SAID ITEMS ARE INCLUDED IN THE CONTRACT PRICE.
10. ANY EXISTING POTENTIALLY HAZARDOUS MATERIALS ENCOUNTERED IN THE COURSE OF THE WORK SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER FOR REMOVAL AND DISPOSAL.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR WORKMEN'S IDENTIFICATION AND BADGING, SAFETY AND FIRE PROTECTION, BARRICADES, WARNING SIGNS, TRASH REMOVAL, CUTTING AND PATCHING.
12. SMOKING AT THE JOB SITE IS NOT ALLOWED.
13. ALL WORK AND SCHEDULING TO BE COORDINATED WITH OWNER. CONTRACTOR SHALL SCHEDULE ALL SHUTDOWNS THAT AFFECT UTILITIES AND PORTIONS OF THE BUILDING THAT MUST REMAIN IN OPERATION BY THE OWNER. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RIGGING, HANDLING AND PROTECTION OF MATERIALS. ALL EQUIPMENT AND MATERIALS SHALL BE NEW AND WITHOUT BLEMISH OR DEFECT.
15. CONTRACTOR SHALL PROVIDE LABOR TO RECEIVE, UNLOAD, STORE, PROTECT AND TRANSFER TO POINT OF INSTALLATION OF OWNER FURNISHED ITEMS.
16. FLAMMABLE MATERIALS MAY NOT BE STORED OR ALLOWED TO REMAIN OVERNIGHT WITHIN THE BUILDING. THIS INCLUDES, BUT IS NOT LIMITED TO, PAINTS, THINNERS, CLEANING AND RESTORATION PRODUCTS, RAGS OR BRUSHES, AND ANY TOOL THAT IS CAPABLE OF PRODUCING FLAME. SAWDUST, SCRAP LUMBER, SOAKED RAGS, AND OTHER FLAMMABLE CONSTRUCTION DEBRIS MUST BE COLLECTED AT THE END OF EACH DAY AND DISPOSED OF PROPERLY OUTSIDE OF THE BUILDING.
17. MAINTAIN SUITABLE FIRE PROTECTION EQUIPMENT AT BUILDING SITE. AT MINIMUM, TYPE ABC FIRE EXTINGUISHERS SHALL BE PROVIDED WHERE WORK IS BEING PERFORMED WITH OPEN FLAME OR USING FLAMMABLE MATERIALS AND AN ADDITIONAL FIRE EXTINGUISHER SHALL BE PROVIDED TO THE WORKER PERFORMING THE WORK. TRAIN ALL WORKERS IN THE USE OF FIRE PROTECTION EQUIPMENT.
18. ALL FIRE SAFETY REQUIREMENTS LISTED ABOVE ARE TO BE CONSIDERED MINIMUMS. CONTRACTOR IS RESPONSIBLE FOR TAKING OTHER MEASURES DEEMED NECESSARY BY THE CONTRACTOR TO PROTECT THE BUILDING.
19. CONTRACTOR SHALL SUBMIT SCHEDULE OF SUBMITTALS PRIOR TO SUBMITTING ANY SHOP DRAWINGS. THIS SCHEDULE SHALL IDENTIFY ALL PRODUCT DATA, DRAWINGS, ETC TO BE SUBMITTED FOR THIS PROJECT, INCLUDING THE ANTICIPATED DATE OF EACH SUBMISSION. CONTRACTOR SHALL SUBMIT (6) SETS OF SHOP DRAWINGS AND EQUIPMENT CUTS TO THE ENGINEER FOR APPROVAL PRIOR TO PURCHASING EQUIPMENT OR STARTING ANY WORK. CONTRACTOR SHALL SUBMIT (3) PRINTS AND (1) REPRODUCIBLE OF ALL PIPING, DUCTWORK, FIRE PROTECTION, CONDUIT, AND CABLE TRAY FIELD INSTALLATION DRAWINGS FOR EACH SYSTEM TO BE INSTALLED. ANY WORK INSTALLED OR EQUIPMENT PURCHASED PRIOR TO RECEIPT OF ENGINEER-APPROVED SHOP DRAWINGS THAT REQUIRES CHANGES SHALL BE REPLACED AT THE EXPENSE OF THE CONTRACTOR.
20. SUBMIT CATALOG INFORMATION, FACTORY ASSEMBLY DRAWINGS AND FIELD INSTALLATION DRAWINGS AS REQUIRED FOR A COMPLETE EXPLANATION AND DESCRIPTION OF ALL ITEMS TO BE PROVIDED. THE CONTRACTOR SHALL REVIEW AND APPROVE ALL SHOP DRAWINGS. NO SUBMISSION WILL BE ACCEPTED WITHOUT THE SIGNED APPROVAL OF THE CONTRACTOR. THE CONTRACTOR SHALL CHECK AND VERIFY ALL FIELD MEASUREMENTS.
21. INSTALLED SYSTEMS SHALL OPERATE UNDER ALL CONDITIONS OF LOAD WITHOUT SOUND OR VIBRATION THAT IS OBJECTIONABLE TO THE ENGINEER OR OWNER. OBJECTIONABLE SOUND OR VIBRATION CONDITIONS SHALL BE CORRECTED IN AN APPROVED MANNER BY THE CONTRACTOR AT HIS EXPENSE.
22. FURNISH ACCESS DOORS AS REQUIRED FOR OPERATION AND MAINTENANCE OF CONCEALED EQUIPMENT, VALVES, CONTROLS, DAMPERS, ETC. ALL ACCESS DOORS SHALL BE COORDINATED WITH THE OWNER AND SHALL MATCH THE FIRE RATING OF THE PENETRATION AS REQUIRED.
23. ALL WORK FURNISHED UNDER THE CONTRACT SHALL BE GUARANTEED AGAINST ANY AND ALL DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE. ANY DEFECTS OF WORKMANSHIP OR MATERIALS DEVELOPING DURING THIS PERIOD SHALL BE REMEDIED AND ANY DEFECTIVE MATERIAL SHALL BE REPLACED WITHOUT ADDITIONAL COST TO THE OWNER.
24. CONTRACTOR SHALL NOTIFY ENGINEER OF ESTIMATED DATE OF COMPLETION OF ROUGH-IN WORK AND DATE OF BOTH WALL AND CEILING INSTALLATION. NOTIFICATION SHALL BE A MINIMUM OF ONE WEEK PRIOR TO DATE TO ENABLE ENGINEER TO SCHEDULE PRELIMINARY PUNCHLIST INSPECTION. CONTRACTOR SHALL SIMILARLY NOTIFY ENGINEER OF COMPLETION OF ALL WORK, INDICATING THE CONTRACTOR IS READY FOR THE ENGINEER TO PERFORM THE FINAL PUNCHLIST INSPECTION.
25. UPON COMPLETION OF ALL UNFINISHED OR FAULTY WORK NOTED IN ENGINEER'S FINAL PUNCHLIST, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER IN WRITING A LETTER OF COMPLETION CERTIFYING THAT ALL PUNCHLIST ITEMS HAVE BEEN COMPLETED AND ALL AS-BUILT PLANS, MANUALS, ETC. HAVE BEEN SUBMITTED.
26. ALL CHANGES MADE BY THE CONTRACTOR WHICH ARE NOT APPROVED BY THE DESIGN ENGINEER SHALL BE DONE AT THE LIABILITY OF THE CONTRACTOR.
27. CONTRACTOR SHALL RESTORE EXISTING SYSTEMS, DEVICES, FINISHES, ETC. DAMAGED OR ALTERED BY WORK TO ACCEPTABLE CONDITION AS DETERMINED BY THE OWNER OR ENGINEER.
28. EXISTING WORK THAT IS TO BE REMOVED SHALL BE TURNED OVER TO THE OWNER OR DISPOSED OF AT THE OWNER'S DIRECTION. ALL WORK TO BE DISPOSED OF SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE PROMPTLY REMOVED FROM THE SITE. ALL EQUIPMENT TO BE TURNED OVER TO THE OWNER SHALL BE DELIVERED TO ON SITE CENTRAL RECEIVING LOCATION DESIGNATED BY THE OWNER.
29. PROVIDE ALL NECESSARY REMOVAL OF EXISTING CEILING TILES AND REINSTALLATION OF CEILING TILES OR REPLACEMENT AS NEEDED TO ACCOMPLISH NEW WORK. PERFORM ALL NECESSARY CEILING WORK INCLUDING BUT NOT LIMITED TO REMOVAL, REINSTALLATION AND PROVIDING NEW CEILING TILES, CEILING GRID, T-BARS SUPPORTS, AND ALL APPURTENANCES.
30. GENERAL MECHANICAL NOTES PERTAIN TO ALL MECHANICAL DRAWINGS.
31. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN-LIKE MANNER.
32. REFERENCE ARCHITECTURAL, ELECTRICAL, PLUMBING AND STRUCTURAL DRAWINGS FOR COORDINATION.
33. PERFORM ALL RIGGING REQUIRED TO COMPLETE ALL WORK UNDER THIS CONTRACT. IF REQUIRED, THE CONTRACTOR SHALL DISASSEMBLE EQUIPMENT OR ITEMS FOR RIGGING AND/OR ACCESS INTO THE BUILDING. AFTER RIGGING IS COMPLETE, THE CONTRACTOR SHALL REASSEMBLE THE EQUIPMENT OR ITEMS.
34. THE CONTRACTOR SHALL REVIEW THE SITE AND ALL CLEARANCES TO VERIFY THE NEW EQUIPMENT CAN BE INSTALLED IN THE LOCATION SHOWN ON DRAWINGS. PROVIDE ANY NECESSARY SHIPPING SPLITS ON UNITS TO ALLOW THEM TO BE INSTALLED IN THE LOCATION SHOWN. REMOVE ANY NECESSARY OBSTRUCTIONS TO ALLOW FOR INSTALLATION OF EQUIPMENT AND REPAIR/REPLACE ONCE INSTALLATION IS COMPLETE.
35. PROVIDE MANUFACTURER DESIGNATED CLEARANCES FOR EQUIPMENT MAINTENANCE AND REPAIR.
36. MECHANICAL CONTRACTOR SHALL COORDINATE RELOCATION OF SPRINKLER AND PIPING WITH SPRINKLER CONTRACTOR AS REQUIRED FOR INSTALLATION OF NEW HVAC EQUIPMENT AND DUCTWORK.

GENERAL DEMOLITION NOTES

ALL OF THE FOLLOWING NOTES ARE GENERAL AND SOME MAY NOT APPLY TO THIS SPECIFIC PROJECT.

1. DEMOLITION/RELOCATIONS: EACH TRADE CONTRACTOR SHALL BE RESPONSIBLE FOR DEMOLITION AND RELOCATIONS OF SERVICES, EQUIPMENT AND MATERIAL RELATING TO THEIR RESPECTIVE TRADE.
2. THE CONTRACTOR SHALL REMOVE ALL WORK AS NOTED ON THE DRAWINGS. WHERE IT IS NOTED TO REMOVE EXISTING EQUIPMENT, DUCTWORK AND PIPING, ALL ASSOCIATED VALVES, FITTINGS, HANGERS, SUPPORTS, INSULATION, CONTROLS, ELECTRICAL WORK, AND APPURTENANCES SHALL ALSO BE REMOVED. ADEQUATELY SUPPORT EXISTING DUCTWORK AND PIPING TO REMAIN. PROVIDE TEMPORARY CAPS ON EXISTING PIPING ENDS/DUCT OPENINGS WHERE SYSTEMS WILL REMAIN IN SERVICE PRIOR TO INSTALLATION OF NEW WORK. CAP AND SEAL EXISTING OPENINGS WHERE NOT REUSED AND PATCH INSULATION TO MATCH EXISTING. THE CONTRACTOR SHALL RELOCATE EXISTING WORK AS REQUIRED TO INSTALL NEW WORK.
3. WHERE EXISTING WALLS, FLOORS OR CEILINGS ARE REMOVED, ALL HVAC SHALL BE PROTECTED FROM DAMAGE AND SUPPORTED AS REQUIRED. REPAIR ANY DAMAGE TO EXISTING TO REMAIN EQUIPMENT.
4. PRIOR TO DEMOLITION, THE CONTRACTOR SHALL REVIEW WITH THE OWNER ALL MATERIALS TO BE REMOVED. SHOULD THE OWNER OPT TO KEEP ANY MATERIALS, THE CONTRACTOR SHALL REMOVE AND DELIVER THE PARTS TO THE OWNER ON THE SITE WHERE DIRECTED. OTHERWISE, ALL DEMOLISHED OR REMOVED MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR, SHALL BE REMOVED FROM THE SITE, AND BE DISPOSED OF IN A LEGAL MANNER.
5. DEMOLITION SHALL INCLUDE REMOVAL OF ALL PARTS AND PIECES IN THEIR ENTIRETY BACK TO THE POINTS INDICATED OR IF NOT INDICATED BACK TO THEIR POINT OF SOURCE. WHERE CONDITIONS PROHIBIT TOTAL REMOVAL OF THE WORK, THE REMAINING PORTION SHALL BE CUT FLUSH WITH THE SURROUNDING SURFACE (CAPPED OR TERMINATED AS NOTED) BE REFINISHED IN AN APPROVED MANNER.
6. MAINTAIN EXISTING UTILITIES INDICATED OR WHERE REQUIRED TO REMAIN, KEEP IN SERVICE, AND PROTECT AGAINST DAMAGE DURING DEMOLITION OPERATIONS. DO NOT INTERRUPT EXISTING UTILITIES SERVING OCCUPIED OR USED FACILITIES, EXCEPT WHEN SCHEDULED WITH THE OWNER.
7. DO NOT REMOVE EXISTING STRUCTURAL WORK. DO NOT REMOVE OPERATIONAL ELEMENTS AND SAFETY-RELATED COMPONENTS IN A MANNER RESULTING IN A REDUCTION OF CAPACITIES TO PERFORM IN THE MANNER INTENDED OR RESULTING IN DECREASED OPERATIONAL LIFE, INCREASED MAINTENANCE, OR DECREASED SAFETY.
8. REMOVALS, DISCONNECTIONS, AND RELOCATIONS SHALL BE PERFORMED BY WORKMEN SKILLED IN THE TRADE INVOLVED AND SHALL BE PERFORMED BY A CONTRACTOR LICENSED IN THE TRADE INVOLVED. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ACCEPTED TRADE PRACTICES.
9. PROVIDE ADEQUATE TEMPORARY SUPPORT FOR WORK TO REMAIN TO PREVENT FAILURE. DO NOT ENDANGER OTHER WORK.
10. PROTECTION: PROVIDE ADEQUATE PROTECTION WHERE REQUIRED FOR THE PRESENT BUILDING AND ITS CONTENTS. TEMPORARY DUSTPROOF BARRIERS AND BARRICADES SHALL BE ERECTED WHERE REQUIRED FOR PROTECTION OF PERSONNEL. PROTECTION FROM DUST AND DIRT, FOR SECURITY, FIRE AND WEATHER PROTECTIVE REASONS. CONTRACTOR SHALL TAKE EVERY PRECAUTION BY NOT EMPLOYING FIRE DEPARTMENT TYPE HOSES AND PORTABLE FIRE EXTINGUISHERS AS REQUIRED BY OSHA AND/OR THE OWNER'S INSURANCE UNDERWRITER, COMPLY WITH GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.
11. ALL EXISTING EQUIPMENT REQUIRED TO BE REUSED SHALL BE CLEANED, IN ALL INSTANCES WHERE CONTRACTOR FINDS THAT EXISTING EQUIPMENT IS DEFECTIVE TO THE POINT WHERE IT CANNOT BE PROPERLY RESTORED AND WILL NOT OPERATE PROPERLY, THEY SHALL REPORT THE SPECIFIC INSTRUMENTS OR EQUIPMENT TO THE DESIGN PROFESSIONAL FOR DIRECTIONS.
12. EXTREME CARE SHALL BE EXERCISED FOR ALL EXISTING ITEMS THAT ARE TO REMAIN IN SERVICE UNTIL NEW ITEMS ARE INSTALLED FOR THEIR SAME SERVICE. ALL SHUTDOWNS OF ANY SYSTEM SHALL BE COORDINATED WITH THE OWNER.
13. ALL WORK TO BE DEMOLISHED REQUIRING DISRUPTION TO EXISTING AREAS ON FLOORS ABOVE, BELOW, OR ADJACENT TO THE CONTRACT AREA; EACH CONTRACTOR SHALL SCHEDULE EACH DISRUPTION WITH THE OWNER. WHERE DEMOLITION WORK WILL REQUIRE TEMPORARY REMOVAL OF EXISTING PIPING WHICH ARE TO REMAIN, THE OWNER SHALL DIRECT AND DEFINE PROCEDURES. NO WORK SHALL PROCEED WITHOUT OWNER'S AUTHORIZATION.
14. REMOVE AND REROUTE BY OFFSETTING AS REQUIRED ANY EXISTING PIPING RISERS, STACKS OR LATERAL PIPING TO REMAIN IN SERVICE AND BECOME EXPOSED DUE TO NEW FLOOR PLAN AND OR NEW CEILING LAYOUT.
15. WHERE DRAWINGS INDICATE THE DEMOLITION OF PIPING OR DUCTWORK, THE CONTRACTOR SHALL REMOVE ALL ABANDONED HANGERS AND SUPPORTS. PIPING AND/OR DUCTWORK SHALL BE CAPPED AND INSULATED WITH MATERIALS TO MATCH EXISTING.
16. THE CONTRACTOR SHALL REPAIR ALL PENETRATIONS OF ROOFS, WALLS AND FLOORS TO MATCH EXISTING OF WHICH ITEMS HAVE BEEN DEMOLISHED.
17. UNLESS NOTED OTHERWISE, THE CONTRACTOR SHALL REMOVE EQUIPMENT PADS/CURBS/ SUPPORTS FOR ALL FLOOR OR ROOF MOUNTED EQUIPMENT INDICATED TO BE REMOVED. REPAIR FLOORS AND ROOFS AS REQUIRED TO MATCH EXISTING. REMOVE HANGERS AND SUPPORTS FOR ALL SUSPENDED EQUIPMENT INDICATED TO BE REMOVED.
18. WHERE EQUIPMENT IS INDICATED TO BE REMOVED, THE CONTRACTOR SHALL REMOVE ALL DISCONNECTS, DRIVES, STARTERS, CONTACTORS, SWITCHES, CONTROLLERS, SENSORS, ACTUATORS, ETC. REMOVE EQUIPMENT POWER FEED WIRING AND CONDUIT COMPLETE BACK TO DISTRIBUTION PANEL. ALL CONTROLS CONDUIT, WIRING AND/OR PNEUMATIC TUBING SHALL BE REMOVED BACK TO A REASONABLE EXTENT.

GENERAL CONSTRUCTION NOTES

ALL OF THE FOLLOWING NOTES ARE GENERAL AND SOME MAY NOT APPLY TO THIS SPECIFIC PROJECT.

1. THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING COORDINATION OF ALL TRADES, INCLUDING, BUT NOT LIMITED TO: DUCTS, PIPING, CONDUIT, EQUIPMENT, FIXTURES, STRUCTURE, FRAMING AND ANY ITEMS PENETRATING THE CEILING AND ROOF. THE CONTRACTOR SHALL INCUR ALL EXPENSES RELATED TO A LACK OF COORDINATION BETWEEN TRADES.
2. ALL MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND SHOW DESIGN INTENT ONLY. THE EXACT LOCATION AND SIZES OF ALL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR AND COORDINATED WITH THE DESIGN PROFESSIONAL AND ALL OTHER TRADES. DUCTWORK AND PIPING SHALL BE SET UP AND DOWN AND OFFSET AS REQUIRED TO SUIT FIELD CONDITIONS.
3. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL CONTRACT DOCUMENTS RELATED TO THIS PROJECT. THERE MAY BE WORK REQUIRED OF THIS TRADE SHOWN ON OTHER TRADE DRAWINGS.
4. THE CONTRACTOR TO PROVIDE A FUNCTIONAL INSTALLATION AS INTENDED BY THE DESIGN PROFESSIONAL.
5. MECHANICAL CONTRACTOR SHALL ENSURE MINIMUM NEC CLEARANCES IN FRONT OF ALL ELECTRICAL PANELS AND GEAR.
6. ALL FLOOR MOUNTED HVAC EQUIPMENT SHALL BE INSTALLED ON 4" HIGH REINFORCED CONCRETE HOUSEKEEPING PADS PROVIDED BY THE G.C. UNLESS NOTED OTHERWISE. HOUSEKEEPING PAD SHALL BE MINIMUM 4" LARGER THAN EQUIPMENT ON ALL SIDES. UNLESS OTHERWISE REQUIRED BY EQUIPMENT MANUFACTURER.
7. MECHANICAL SCHEDULES DO NOT NECESSARILY INDICATE EQUIPMENT QUANTITIES.
8. MECHANICAL CONTRACTOR SHALL PROVIDE FLEXIBLE CONNECTIONS AT ALL DUCTWORK-TO-EQUIPMENT CONNECTIONS.
9. FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" FROM POINT OF RIGID DUCT CONNECTION TO AIR TERMINAL. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEVIATIONS FROM THE CONTRACT DRAWINGS THAT ARE NOT APPROVED BY THE DESIGN PROFESSIONAL.
10. MECHANICAL CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL WALL MOUNTED THERMOSTATS AND HUMIDISTATS WITH THE DESIGN PROFESSIONAL AND/OR OWNER.
11. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION, MOUNTING STYLE AND FINISH OF ALL GRILLES, REGISTERS, DIFFUSERS, ETC. WITH THE DESIGN PROFESSIONAL.
12. ALL SUSPENDED AND FLOOR MOUNTED EQUIPMENT SHALL BE FURNISHED WITH VIBRATION ISOLATION AS PER MECHANICAL SPECIFICATIONS.
13. DUCT MOUNTED SMOKE DETECTORS ARE FURNISHED BY THE ELECTRICAL CONTRACTOR AND INSTALLED BY THE MECHANICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL CONTROL WIRING FROM THE SMOKE DETECTOR'S ON-BOARD RELAY(S) TO THE EQUIPMENT CONTROLLERS/STARTERS/VFD'S FOR SHUTTING DOWN THE ASSOCIATED MECHANICAL EQUIPMENT AND ACTIVATION OF REQUIRED FIRE/SMOKE DAMPERS. THE SMOKE

GENERAL SPECIFICATIONS

1. GENERAL

   REFER TO GENERAL NOTES, GENERAL DEMOLITION NOTES AND GENERAL CONSTRUCTION NOTES FOR ADDITIONAL REQUIREMENTS.

2. SCOPE OF WORK

   A. THE SCOPE OF WORK TO BE PERFORMED UNDER THIS CONTRACT SHALL CONSIST OF FURNISHING ALL LABOR AND FURNISHING AND INSTALLING ALL MATERIAL, EQUIPMENT, AND APPURTENANCES FOR THE MECHANICAL WORK ASSOCIATED WITH THE REVISIONS AS INDICATED ON THE DRAWINGS & SPECIFIED HEREIN, INCLUDING:
   - GAS FIRED ROOFTOP UNITS
   - INTERIOR AND EXTERIOR DUCTWORK (EXPOSED AND CONCEALED)
   - EXHAUST FAN AND DUCTWORK
   - NEW AND RELOCATED VAV BOXES
   - PIPING, VALVES AND HYDRONIC SPECIALTIES
   - DUCT AND PIPE INSULATION
   - EXTENSION OF EXISTING CONTROL SYSTEM
   - BALANCING OF AIR AND WATER SYSTEMS
   - RESISTANCE TO STEAM HUMIDIFIER WITH DUCT MOUNTED DISPERSION UNITS
   - SPLIT SYSTEM ENVIRONMENTAL CONTROL UNIT

   B. THE CONTRACTOR SHALL SUBMIT A PROPOSED SEQUENCE OF CONSTRUCTION PRIOR TO PERFORMING ANY WORK. THE SEQUENCE OF CONSTRUCTION WILL BE REVIEWED BY THE OWNER FOR THEIR COMMENTS.

3. CONCURRENT WORK BY THE OWNER

   A. THE OWNER RESERVES THE RIGHT TO HAVE OTHER CONTRACTORS PERFORM WORK IN OTHER AREAS OF THE COMPLEX SIMULTANEOUSLY WHILE THIS CONTRACTOR IS ENGAGED TO DO WORK. THIS CONTRACTOR AND THEIR PERSONNEL SHALL COOPERATE AND COORDINATE THE WORK TO BE PERFORMED WITH ALL OTHER CONTRACTORS WITH WHO THEY COMES IN CONTACT. IN NO WAY SHALL THIS CONTRACTOR INTERFERE WITH THE PROGRESS OF THE WORK.

4. DEFINITIONS

   THE WORD 'PROVIDE' WHEN USED IN THE SPECIFICATION AND DRAWINGS SHALL MEAN 'FURNISH AND INSTALL'.

5. VISIT THE SITE

   A. VISIT THE SITE AND VERIFY ALL CONDITIONS BEFORE SUBMITTING A PROPOSAL FOR THE WORK.

   B. THE CONTRACTOR SHALL CAREFULLY EXAMINE ALL DRAWINGS, SPECIFICATIONS, CONTRACT DOCUMENTS, AND THE SITE BEFORE SUBMITTING PROPOSAL FOR THIS WORK. THEY SHALL COMPARE THE SITE WITH DRAWINGS, SPECIFICATIONS, AND CONTRACT DOCUMENTS FOR ALL OTHER BRANCHES OF THE WORK AND INCLUDE IN THEIR BID ALL NECESSARY WORK TO COMPLETE THE INSTALLATION OF THE SYSTEMS DESCRIBED HEREIN.

6. COORDINATION

   A. THE SCHEDULING OF ANY WORK AFFECTING EXISTING INSTALLATIONS OR FACILITIES, SHALL BE COORDINATED WITH THE OWNERS' REPRESENTATIVE. SHUT-DOWN OF UTILITIES OR EQUIPMENT AFFECTING OPERATIONS OF ANY EXISTING PART OF THE BUILDING WILL NOT BE PERMITTED EXCEPT AS PROVIDED BELOW. ANY PREMIUM TIME OR ADDITIONAL COST TO COMPLY SHALL BE AT THE EXPENSE OF THE CONTRACTOR AND CONSIDERED TO BE INCLUDED IN THE BID. SHUT-DOWN OF ANY OPERATING FACILITY OR SERVICES INCLUDING PLUMBING, REFRIGERATION, HEATING, AIR CONDITIONING, ELECTRICAL, OR OTHER INSTALLATIONS SHALL BE PRECEDED BY A WRITTEN REQUEST AT LEAST SEVEN CALENDAR DAYS PRIOR TO THE SHUT-DOWN.

   B. ALL REQUIRED SHUT-DOWNS UNLESS OTHERWISE INSTRUCTED, SHALL BE DURING NIGHTS, HOLIDAYS, OR ON WEEKENDS. ANY TESTS WHICH ARE TO BE CARRIED OUT ON THE BUILDING FACILITIES AND ANY CONNECTIONS TO BE MADE IN THE BUILDING FACILITY WHICH WOULD INVOLVE A CHANGE IN THE SYSTEM OR LIABILITY TO THE SYSTEM OR INVOLVE A SHUT-DOWN IN LIGHT OR POWER, THE CONTRACTOR SHALL NOT PROCEED WITH SUCH OPERATIONS UNTIL HE HAS RECEIVED WRITTEN PERMISSION FROM THE OWNER.

   C. FABRICATE AND PREFAB AS MUCH OF THE NEW WORK AS POSSIBLE IN ORDER THAT ANY REQUIRED SHUT-DOWNS WILL BE KEPT AT A MINIMUM.

7. GUARANTEE

   GUARANTEE ALL MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER.

8. SHOP DRAWINGS

   SUBMIT TO OWNER, FOR APPROVAL, SHOP DRAWINGS OF ALL EQUIPMENT, MATERIALS, AND ACCESSORIES, INCLUDING:
   - GAS FIRED ROOFTOP UNITS
   - CURBS AND EQUIPMENT SUPPORTS
   - FANS AND VENTILATORS
   - DAMPERS
   - SHEET METAL DUCTWORK
   - VAV BOXES
   - AIR TERMINAL DEVICES
   - AIR-HANDLING UNIT CASING
   - REHEAT COIL
   - SOUND ATTENUATOR
   - ELECTRIC TO STEAM HUMIDIFIER AND DISPERSION UNITS
   - PIPING, VALVES AND HYDRONIC SPECIALTIES
   - STEAM UNIT HEATER
   - ENVIRONMENTAL CONTROL UNIT
   - AUTOMATIC TEMPERATURE CONTROLS
   - BALANCING REPORT
   - PRESSURE TEST

9. AS-BUILT DRAWINGS

   THE CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF THE WORK PERFORMED. AT THE COMPLETION OF THE INSTALLATION, EACH TRADE WILL INCORPORATE ALL FIELD CHANGES ON THE AUTOCAD DATA BASE AND SUBMIT THREE (3) SETS OF PLOTTED PRINTS & A DATA DISK FOR RECORD PURPOSES.

10. PROTECTION

    A. CONTRACTOR SHALL PROPERLY PROTECT ALL WORK AND EQUIPMENT TO PREVENT OBSTRUCTION, DAMAGE, OR LOSS. ALL CONDUIT OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING INSTALLATION. ALL EQUIPMENT SHALL BE TIGHTLY COVERED WITH APPROVED MATERIAL AND PROTECTED AGAINST DIRT, WATER OR MECHANICAL INJURY. AT FINAL COMPLETION, ALL WORK SHALL BE THOROUGHLY CLEANED AND DELIVERED IN PERFECT, UNBLEMISHED CONDITION.

    B. PROVIDE BARRICADES AND LIGHTS (IF REQUIRED) AROUND ALL WORK AREAS TO PROTECT PEDESTRIAN TRAFFIC AND TO PREVENT UNAUTHORIZED PEDESTRIAN ACCESS. PROTECTION SHALL MEET THE REQUIREMENTS OF THE LOCAL AND STATE REGULATIONS AND GOVERNMENT BODIES.

    C. ALL DAMAGE TO THE BUILDINGS, THEIR MECHANICAL AND ELECTRICAL SYSTEMS OR SURROUNDINGS, RESULTING FROM CONTRACTOR'S FAILURE TO ADEQUATELY PROTECT THE WORK, SHALL BE REPAIRED OR REPLACED AS DIRECTED, AT NO ADDITIONAL COST OWNER, INCLUDING ANY WORK DAMAGED IN ORDER TO MAKE GOOD SUCH DEFECTS.

11. DEMOLITION – REFER TO GENERAL DEMOLITION NOTES

12. RIGGING

    A. THE CONTRACTOR SHALL PERFORM ALL RIGGING REQUIRED TO COMPLETE ALL WORK UNDER THIS CONTRACT.

    B. THE CONTRACTOR SHALL PROVIDE REQUIRED TEMPORARY SUPPORTS, EQUIPMENT, ETC. REQUIRED FOR THE RIGGING OPERATIONS AND REMOVE SAME AFTER THE RIGGING IS COMPLETED.

    C. DISCONNECT AND REMOVE ANY PIPING, EQUIPMENT, LIGHT FIXTURES, ETC. REQUIRED TO INSTALL THE NEW WORK AND REINSTALL SAME AFTER THE WORK IS COMPLETED.

    D. PROTECT ALL FINISHED FLOOR SURFACES DURING THE RIGGING OPERATIONS.

13. CUTTING AND PATCHING

    A. THE CONTRACTOR SHALL PERFORM ANY CUTTING AND PATCHING REQUIRED FOR THE INSTALLATION OF THE WORK.

    B. ALL HOLES FOR THE NEW PIPING AND CONDUIT SHALL BE CORE BORED.

    C. ALL PATCHING SHALL BE DONE TO MATCH THE ADJOINING SURFACES IN MATERIALS, TEXTURE, AND FINISH.

    D. THE CONTRACTOR SHALL PATCH AND SEAL ALL WALLS, FLOORS, AND CEILING (DRYWALL, LAY-IN, ETC.) WHERE EXISTING ITEMS SUCH AS PIPING, HANGERS, SUPPORTS, ETC. ARE REMOVED UNDER THIS CONTRACT.

    E. CONTRACTOR SHALL LEAVE THEIR WORK AT ALL TIMES IN A SAFE AND CLEAN CONDITION READY FOR OPERATION.

14. SLEEVES

    A. THE CONTRACTOR SHALL PROVIDE SLEEVES FOR ALL NEW PIPING THROUGH WALLS AND FLOORS.

    B. PIPE SLEEVES SHALL BE SCHEDULE 40 STEEL PIPE. SLEEVES SHALL BE ONE INCH (1") LARGER THAN THE DIAMETER OF THE PIPING OR INSULATED PIPING.

    C. SLEEVES THROUGH FLOORS SHALL EXTEND 1" ABOVE THE FINISHED FLOOR SURFACE.

    Q.

15. FIRE RATED SEALANT

    A. UNLESS OTHERWISE INDICATED, THE CONTRACTOR SHALL IN ALL LOCATIONS NEW AND EXISTING CAULK THE SPACE BETWEEN THE SLEEVES AND THE PIPING (INSULATED OR NON-INSULATED) WITH UL APPROVED FIRESTOP SEALANTS AS MANUFACTURED BY HILTI CORPORATION, JOHNS MANVILLE, 3M, OR STI (SPECIFIED TECHNOLOGIES, INC.). SEALANT SHALL BE INTUMESCENT AND TESTED FOR USE IN UL TESTED SYSTEMS FOR FIRE AND SMOKE.

    B. ALL PRODUCTS SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURER'S INSTRUCTIONS. SUBMIT CAULK MANUFACTURER'S PRODUCT DATA FOR APPROVAL.

16. BOLTS

    BOLT STUDS AND NUTS SHALL BE USED FOR ALL FLANGES AND FOR FLANGED EQUIPMENT CONNECTIONS. BOLT-STUDS AND HEX-NUTS SHALL BE MADE OF CARBON STEEL BOLTING ASTM A-325

17. WELDING

    A. ALL WELDING, SHOP OR FIELD, SHALL BE DONE BY A CERTIFIED LICENSED WELDER FOLLOWING STANDARD PRACTICES ESTABLISHED BY THE AMERICAN WELDING SOCIETY.

    B. DURING ALL FIELD WELDING A FIRE WATCH SHALL BE MAINTAINED DURING THE ENTIRE WELDING PROCEDURE AND FOR 1 HOUR AFTER END OF PROCEDURE.

18. MISCELLANEOUS STEEL WORK

    A. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY MISCELLANEOUS STEEL REQUIRED FOR THE INSTALLATION OF THE WORK UNDER THIS CONTRACT. WORK SHALL INCLUDE BUT NOT BE LIMITED TO SUPPORTS FOR PIPING, CLOSED CIRCUIT COOLER, ETC.

    B. UNLESS OTHERWISE INDICATED, ALL STRUCTURAL STEEL SHALL BE ASTM-A36 WITH HOT DIPPED GALVANIZED FINISH. WELDS SHALL BE FINISHED WITH TWO (2) COATS OF ZINC RICH PAINT.

19. RESTRICTIONS ON EARLY USE OF HVAC EQUIPMENT

    A. THE HVAC EQUIPMENT PROVIDED UNDER THIS CONTRACT SHALL NOT BE OPERATED PRIOR TO THE COMPLETION OF CONSTRUCTION OF THE BUILDING FOR REASONS OTHER THAN TESTING AND BALANCING OF THE SYSTEMS, UNLESS SPECIFICALLY DIRECTED AND/OR APPROVED BY THE OWNER. THIS SPECIFICALLY PROHIBITS USE OF PERMANENT EQUIPMENT FOR THE PURPOSES OF VENTILATING, HEATING AND DEHUMIDIFYING THE BUILDING WHILE UNDER CONSTRUCTION.

    B. SHOULD A CONTRACTOR CHOOSE TO USE ANY COMPONENT OF THE PERMANENT HVAC SYSTEM (I.E. CONDENSING UNITS, PUMPS, AIR HANDLERS, AIR CONDITIONERS, ETC.) FOR PURPOSES OTHER THAN STATED ABOVE, THEY SHALL ASSUME FULL RESPONSIBILITY FOR REPLACING OR REPAIRING ANY EQUIPMENT MATERIAL OR FINISHES, DAMAGED AS A RESULT OF THE USE AND PAY ALL COSTS ASSOCIATED WITH THE ACTION REQUIRED TO MAKE THE EQUIPMENT 'LIKE NEW' CONDITIONS AT THE END OF THE PROJECT. THIS INCLUDES CLEANING OF DUCTS AND COILS, PROVIDE MERV 9 FILTERS IN THE AIR HANDLING EQUIPMENT DURING OPERATION, REPLACEMENT OF MOTORS, EXTENSION OF WARRANTIES, PAYMENT OF DESIGN PROFESSIONAL FEES REQUIRED TO INVESTIGATE AND ENFORCE THIS REQUIREMENT, AND THE CORRECTION OF ANY OTHER DETRIMENTAL CONDITIONS WHICH IS DETERMINED BY THE DESIGN PROFESSIONALS TO BE RELATED TO THE EARLY USE OF THE EQUIPMENT. PROVIDE FILTERS AT UNIT TURNOVER WITH MERV RATINGS AS SCHEDULED.

    C. SHOULD THE EARLY USE OF EQUIPMENT RESULT IN MANUFACTURER'S WARRANTY BEING VOID, THE CONTRACTOR SHALL ASSUME THE COST OF FURNISHING AN EQUIVALENT WARRANTY TO THE OWNER.

    D. SHOULD FAN MOTORS BE OPERATED DURING CONSTRUCTION, ANY MOTOR DETERMINED BY OWNER OR DESIGN PROFESSIONAL TO BE EXPOSED TO AIRBORNE CONSTRUCTION DUST, SUCH AS GENERATED BY DRYWALL SANDING, SHALL BE INSPECTED BY AN INDEPENDENT 3RD PARTY FOR DAMAGE. THE COSTS OF ALL REQUIRED CORRECTIVE ACTIONS SHALL BE BORNE BY THE CONTRACTOR RESPONSIBLE FOR THE OPERATION OF THE EQUIPMENT.

20. ELECTRICAL TECHNICAL PROVISIONS FOR MECHANICAL WORK

    ALL ELECTRICAL WORK ASSOCIATED WITH THE PROJECT SHALL BE BY ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL COORDINATE REQUIREMENTS AND SCHEDULE WITH THE ELECTRICAL CONTRACTOR.

21. IDENTIFICATION

    A. ALL PIPING SYSTEMS SHALL BE LABELED TO COMPLY WITH OSHA AND ANSI/ASME A13.1-2007 COLOR CODE STANDARDS FOR THE IDENTIFICATION OF SYSTEMS.

    B. THE MARKING SYSTEM SHALL IDENTIFY THE CONTENTS, SIZE, DIRECTION OF FLOW, AND OPERATING CHARACTERISTICS (I.E. PRESSURE AND/OR TEMPERATURE).

    C. ALL VALVES AND CONTROLS SHALL BE LABELED USING PLASTIC I.D. TAGS SECURELY CONNECTED TO THE SPECIFIC ITEM USING BRASS CHAIN OR 'S' HOOKS. THE CONTRACTOR SHALL PROVIDE A LIST OF EACH TAGGED ITEM AND ITS FUNCTION AND A VALVE CHART IN THE MAIN MECHANICAL ROOM.

    D. ALL EQUIPMENT MUST BE IDENTIFIED USING PHENOLIC NAMEPLATES AND LABELED IN ACCORDANCE WITH THE NOMENCLATURE USED ON THE DRAWINGS AND COMPATIBLE WITH THE MIMS SYSTEM.

    E. LABELS SHALL BE PUNCHED AND ATTACHED TO EQUIPMENT WITH MECHANICAL FASTENERS.

22. CLEANING AND FINAL CLEANUP

    A. CONTRACTOR SHALL, AT ALL TIMES, KEEP THE PREMISES FREE OF ALL WASTE OR SURPLUS MATERIALS, RUBBISH, AND DEBRIS WHICH IS CAUSED BY THEIR EMPLOYEES OR RESULTING FROM THEIR WORK. ALL AREAS SHALL BE BROOM SWEPT CLEAN AT THE END OF EACH WORK DAY.

    B. AFTER ALL EQUIPMENT HAS BEEN INSTALLED, CONTRACTOR SHALL REMOVE ALL STICKERS, RUST STAINS, LABELS, TEMPORARY COVERS, ETC.

    C. ALL FOREIGN MATTER SHALL BE BLOWN OUT OR FLUSHED OUT OF ALL DEVICES, CONDUITS, ETC.

    D. IDENTIFICATION PLATES ON ALL EQUIPMENT SHALL BE FREE OF PAINT AND SHALL BE POLISHED.

    E. CONTRACTOR SHALL CLEAN ALL CONDUIT, TUBING, EQUIPMENT, ETC. AT THE COMPLETION OF THEIR CONTRACT AND ALL WORK SHALL BE TURNED OVER TO THE OWNER CLEAN AND IN PERFECT CONDITION, READY FOR SATISFACTORY SERVICE.

    F. DURING THE PROGRESS OF THE WORK, CONTRACTOR SHALL REMOVE ALL OF THEIR RUBBISH, CRATING AND PACKING MATERIALS, METAL SCRAP, AND ANY AND ALL DEBRIS FROM THE BUILDING, NOT ALLOWING IT TO ACCUMULATE AND CAUSE FIRE AND ACCIDENT HAZARDS.

23. INSTRUCTIONS TO OWNER, OPERATING MANUALS, CATALOGS

    A. THE CONTRACTOR SHALL FURNISH THREE SETS OF PRINTED OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS, MAINTENANCE SERVICE SCHEDULES AND WIRING DIAGRAMS OF ALL CONTROL SYSTEMS. MOUNT AN ADDITIONAL COMPLETE SET OF OPERATING INSTRUCTIONS AND MAINTENANCE SERVICE SCHEDULES IN A METAL FRAME WITH A GLASS FRONT AND LOCATE IT ON THE WALL NEAR THE EQUIPMENT AS DIRECTED.

    B. THREE COPIES OF MANUFACTURER'S SPARE PARTS LIST COVERING EACH ITEM OF EQUIPMENT SHALL BE FURNISHED, OMITTING DUPLICATES.

    C. THE CONTRACTOR SHALL FURNISH THREE SETS OF BINDERS INCLUDING ALL CATALOG CUTS AND SHOP DRAWINGS OF EQUIPMENT INSTALLED. ALL SHOP DRAWINGS SHALL BE AS APPROVED BY THE ENGINEER. IN ADDITION, THREE SETS OF RECORD DRAWINGS SHALL BE FURNISHED SHOWING ALL WORK AS ACTUALLY INSTALLED WITH DIMENSIONS FROM FIXED LOCATIONS INCLUDING ANY UNDERGROUND SITE WORK, PIPES, DUCTS, CONDUITS, AND MANHOLES.

    D. THE CONTRACTOR SHALL FURNISH ONE SET OF ALL OF THE ABOVE IN ELECTRONIC FORMAT.

    E. THE CONTRACTOR SHALL GIVE INSTRUCTIONS TO THE OWNER'S PERSONNEL WHO WILL OPERATE THE EQUIPMENT. SUCH INSTRUCTION TO COVER A PERIOD OF NOT LESS THAN EIGHT (8) HOURS. EQUIPMENT MANUFACTURER'S REPRESENTATIVES SHALL BE PRESENT DURING THE INSTRUCTION PERIOD. ADDITIONAL TIME, IF REQUIRED, SHALL BE SPENT TO FULLY PREPARE THE OWNER TO OPERATE AND MAINTAIN THE MECHANICAL AND ELECTRICAL SYSTEMS. INSTRUCTION DAYS ARE TO BE SCHEDULED BY THE ENGINEER.

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General Notes
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4. Contractor must notify Architect/ Engineer at once if hidden existing conditions encountered require design modifications.

Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

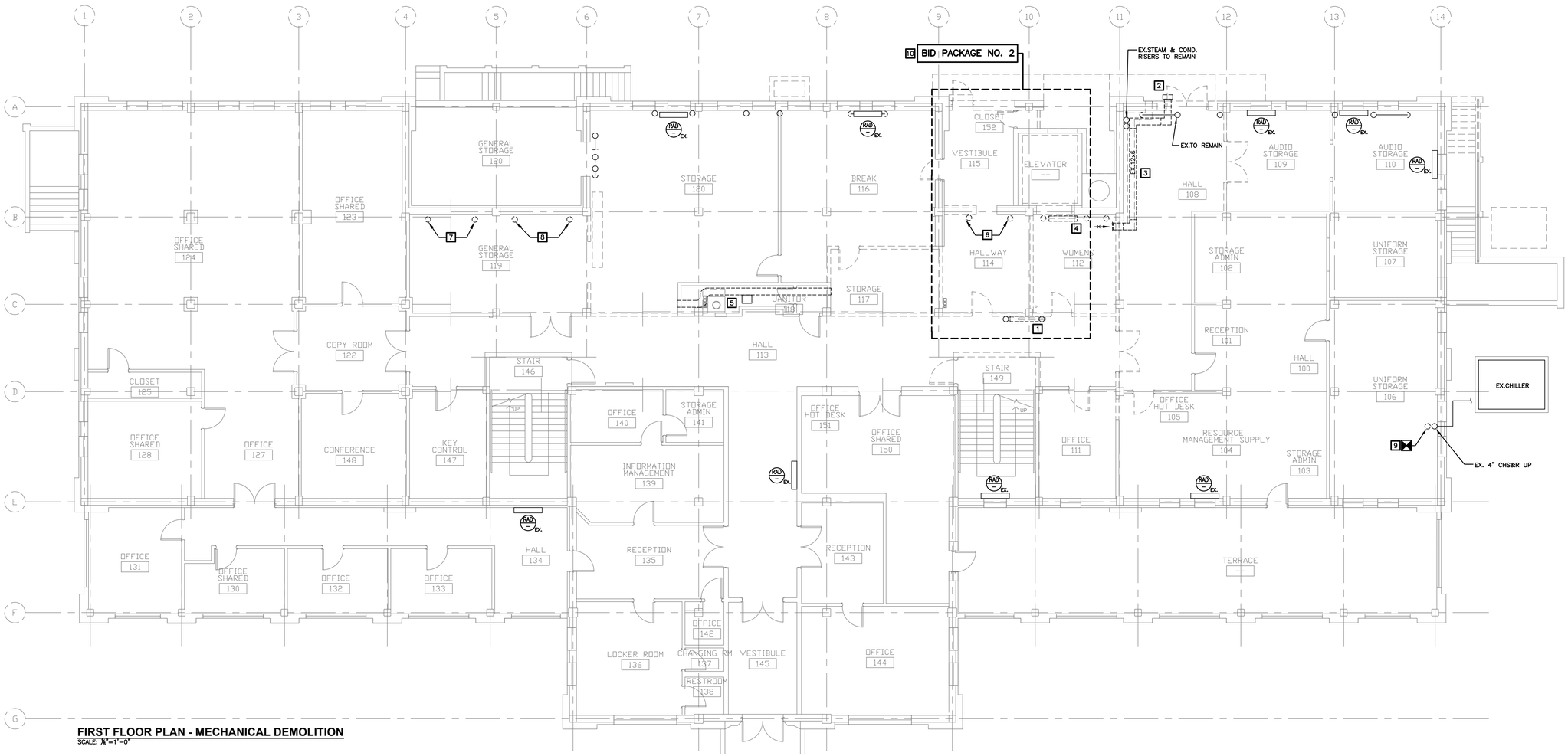
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Specifications

M001



FIRST FLOOR PLAN - MECHANICAL DEMOLITION

SCALE: ⅛"=1'-0"

MECHANICAL DEMOLITION NOTES

1. REMOVE EX. RADIATOR, CAP STEAM AND CONDENSATE PIPING NEAR MAINS ON FLOOR BELOW. RADIATOR TO BE RELOCATED TO NEW LOBBY 112. REFER TO NEW WORK PLAN.
2. DISCONNECT & REMOVE EX. EXHAUST FAN.
3. REMOVE EXHAUST DUCT, REGISTERS AND ALL HANGERS & SUPPORTS.
4. REMOVE EXISTING RADIATOR AND CAP PIPING NEAR MAINS ON FLOOR BELOW. REMOVE STEAM AND CONDENSATE RISERS TO RADIATOR ON 3RD FLOOR.
5. REMOVE EXISTING EXHAUST FAN AND ALL DUCTWORK, REGISTERS, HANGERS AND APPURTENANCES IN SHAFT SPACE.
6. REMOVE EXISTING STEAM AND CONDENSATE RISERS TO RADIATOR ON 2ND FLOOR. RADIATOR ON 2ND FLOOR TO REMAIN.
7. REMOVE STEAM AND CONDENSATE PIPING TO RADIATORS ON 2ND AND 3RD FLOORS AND CAP IN BASEMENT. PATCH HOLES IN FLOOR.
8. REMOVE STEAM AND CONDENSATE PIPING TO RADIATORS ON 2ND AND 3RD FLOORS TO BELOW 2ND FLOOR SLAB (PIPING TO BE EXTENDED TO NEW RADIATOR LOCATION).
9. EXISTING 4" RISER TO BE OFFSET, TO BE FLUSH AGAINST WALL. REINSULATE PIPING AND PROVIDE PAINTABLE PVC JACKETING.
10. COORDINATE REMOVALS AND EQUIPMENT RELOCATION ASSOCIATED WITH BID PACKAGE 2 WITH WORK OF BID PACKAGE 1 ON UPPER FLOORS. EXISTING SYSTEM TO REMAIN FUNCTIONAL IF THERE IS AN INTERIM PERIOD BETWEEN EXECUTION OF BID PACKAGES.

GENERAL CUTTING AND PATCHING NOTES

1. GENERAL CUTTING AND PATCHING NOTES PERTAIN TO ALL DRAWINGS.
2. ALL CUTTING AND PATCHING SHALL BE PERFORMED BY THE CONTRACTOR. ALL HOLES SHALL BE CORE BORED. ALL FLOORS, BLACKTOP, WALKS, CURBS, ETC. SHALL BE SAW CUT. PROVIDE ALL CUTTING AND PATCHING REQUIRED FOR WORK PERFORMED UNDER THIS CONTRACT. NO HOLES MAY BE CUT OR DRILLED IN STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL OF OWNER'S REPRESENTATIVE. CUTTING SHALL BE DONE BY MECHANICS SKILLED IN THEIR RESPECTIVE TRADES.
3. CONTRACTOR SHALL PATCH WALLS WHERE EXISTING DEVICES HAVE BEEN REMOVED. MATCH EXISTING FINISH AND TEXTURE.
4. NO CUTTING THAT MAY IMPAIR THE STRENGTH OF THE BUILDING CONSTRUCTION SHALL BE DONE. NO HOLES MAY BE DRILLED IN OR ATTACHMENTS WELDED TO THE BEAMS OR OTHER STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL FROM THE OWNER'S REPRESENTATIVE. ALL WORK SHALL BE DONE BY MECHANICS SKILLED IN THEIR TRADE.
5. ALL PATCHING SHALL BE DONE IN A MANNER TO MATCH APPEARANCES AND QUALITY OF EXISTING SURFACES.
6. UNLESS OTHERWISE INDICATED, THE CONTRACTOR SHALL PATCH AND SEAL ALL WALLS, FLOORS, CEILINGS (DRYWALL, PLASTER, LAY–IN CEILINGS, ETC.) SOFFITS, ETC. WHERE EXISTING ITEMS SUCH AS CONDUIT, RACEWAYS, HANGERS, SUPPORTS, ETC. ARE REMOVED OR NEW WORK IS INSTALLED UNDER THIS CONTRACT. AL PATCHING SHALL BE PERFORMED WITH EQUIVALENT MATERIALS AND FINISHES AND SHALL MATCH ADJOINING SURFACES IN BOTH TEXTURE AND FINISH.
7. REMOVE AND REPLACE EXISTING CEILING SYSTEM TILES AND GRIDS AS REQUIRED TO INSTALL THE NEW WORK. REPAIR AS NECESSARY AND USE NEW GRIDS AND TILES TO MATCH THE EXISTING.
8. ALL EXISTING LIGHTING CONTROL DEVICE WALL OPENINGS SHALL BE PATCHED WERE REMOVED AND/OR REPLACED. ALL NEW DEVICE HEIGHTS TO COMPLY WITH ADA. EXISTING BACKBOXES, IF RE–USED, SHALL BE LOWERED,

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PRELIMINARY
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Key Plan

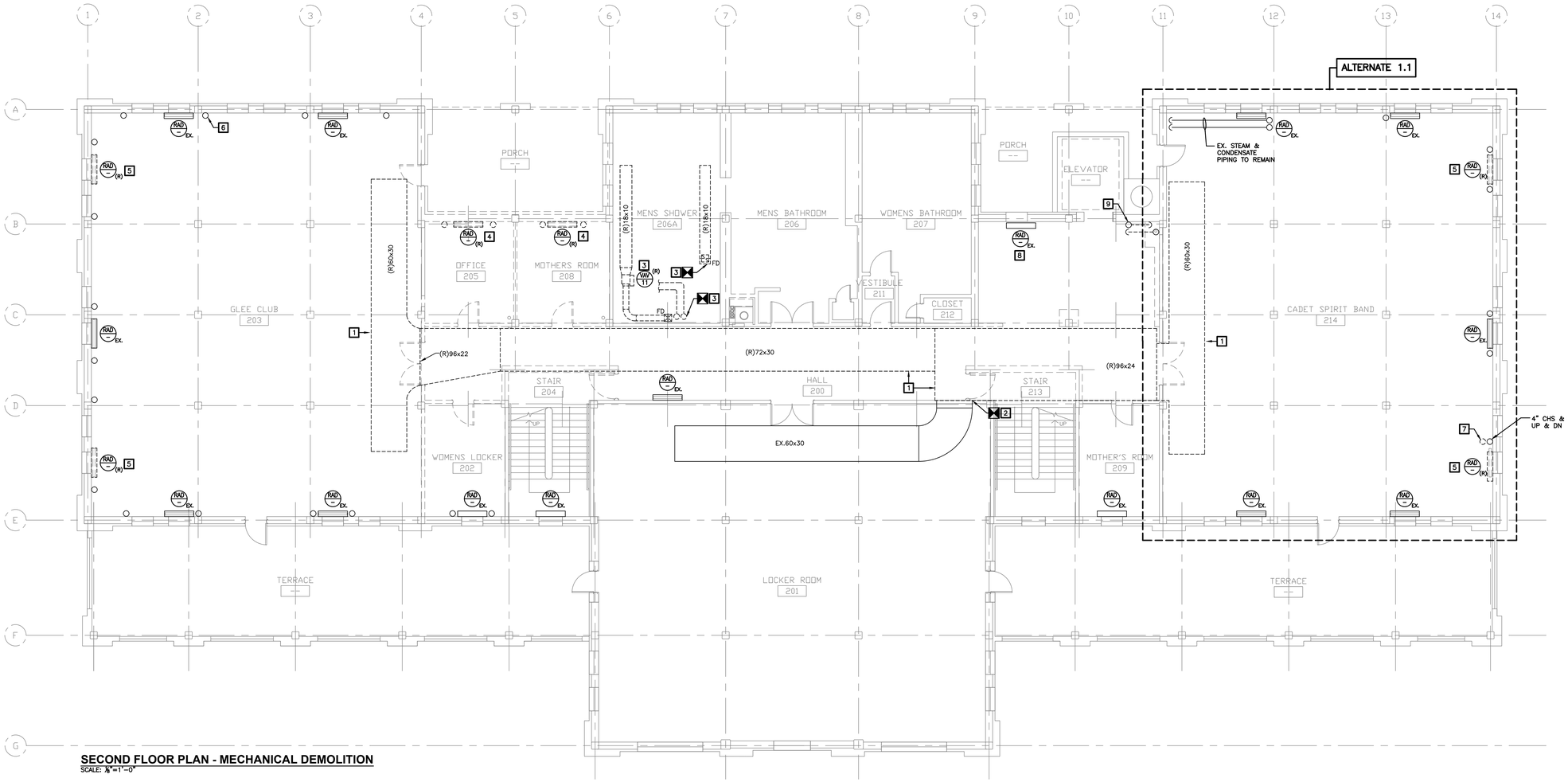
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
First Floor Plan
Mechanical Demolition

M101



SECOND FLOOR PLAN - MECHANICAL DEMOLITION

SCALE: ⅛"=1'-0"

MECHANICAL DEMOLITION NOTES

1. REMOVE EXISTING DUCTWORK, INCLUDING ALL HANGERS, SUPPORTS, AND OTHER ACCESSORIES TO POINT INDICATED ON PLAN.
2. CAP EXISTING DUCTWORK AT WALL/FLOOR PENETRATION.
3. REMOVE EXISTING DUCTWORK, VAV BOX AND PIPING SERVING RECORDING STUDIO. VAV BOX TO BE RELOCATED TO 3RD FLOOR. PATCH EXISTING FLOOR OPENINGS.
4. REMOVE EXISTING RADIATOR AND RISER PIPING TO 3RD FLOOR, CAP PIPING ON FLOOR BELOW.
5. REMOVE EXISTING RADIATOR AND CAP PIPING ON FLOOR BELOW. RISER TO 3RD FLOOR TO REMAIN.
6. REMOVE EXISTING BOWED 3/4" CONDENSATE RISER TO 3RD FLOOR AND REPLACE WITH STRAIGHT PIPE.
7. EXISTING 4" RISER TO BE OFFSET TO BE FLUSH AGAINST WALL.
8. EX. RADIATOR TO REMAIN. REFER TO NEW WORK PLANS FOR NEW PIPING.
9. REMOVE EXISTING STEAM AND CONDENSATE PIPING TO FLOOR ABOVE.

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Key Plan

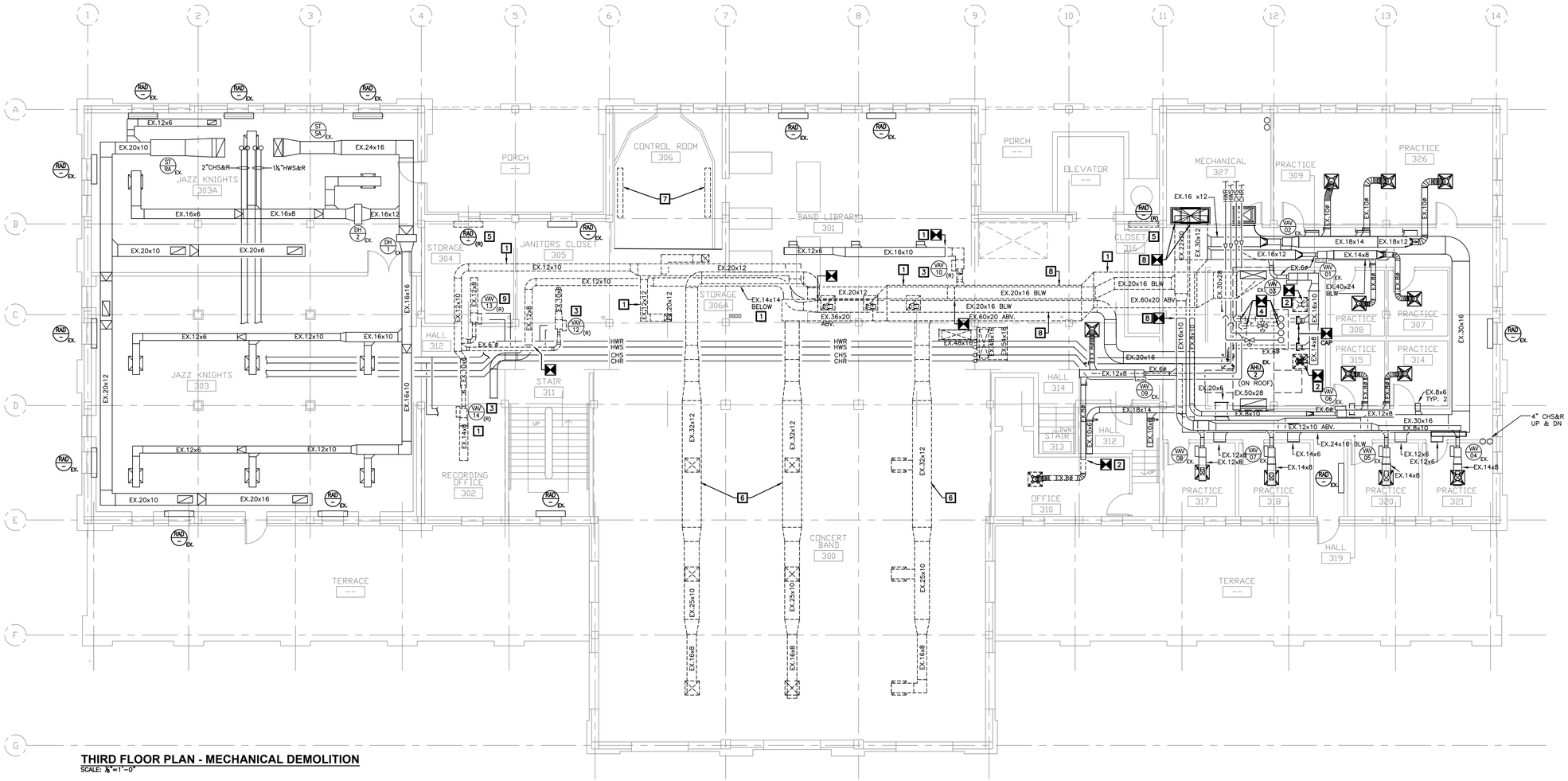
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Second Floor Plan
Mechanical Demolition

M102



THIRD FLOOR PLAN - MECHANICAL DEMOLITION

SCALE: ⅛"=1'-0"

MECHANICAL DEMOLITION NOTES

1. REMOVE EXISTING DUCTWORK, INCLUDING ASSOCIATED VAV BOX, ALL HANGERS, SUPPORTS, AND OTHER ACCESSORIES TO POINT INDICATED ON PLAN.
2. REMOVE EXISTING DUCTWORK INCLUDING AIR DEVICES, ALL HANGERS, SUPPORTS, AND OTHER ACCESSORIES TO POINT INDICATED ON PLAN.
3. EXISTING VAV BOX TO BE REMOVED AND RELOCATED.
4. REMOVE AND CAP EXISTING CHS&R PIPING. REMOVAL SHALL INCLUDE ASSOCIATED VALVES, STRAINER, HANGERS, SUPPORTS, AND OTHER ACCESSORIES TO POINT INDICATED ON PLAN.
5. REMOVE EXISTING RADIATOR, REMOVE PIPING AND CAP BELOW SECOND FLOOR.
6. REMOVE EXISTING DUCTWORK, DIFFUSERS, SOUND TRAPS, AND ALL HANGERS AND SUPPORTS. EXISTING PIPING TO REMAIN.
7. REMOVE EXISTING FLOOR REGISTERS; EXISTING DUCTWORK BELOW TO BE REMOVED. BLANK OFF FLOOR REGISTERS AND RE-INSTALL.
8. REMOVE AND RE-INSTALL EXISTING DUCTWORK AS REQUIRED FOR INSTALLATION OF NEW DUCTWORK AND PIPING ABOVE.
9. EXISTING VAV BOX TO BE REMOVED. TURN OVER TO OWNER FOR BUILDING STOCK.

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Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

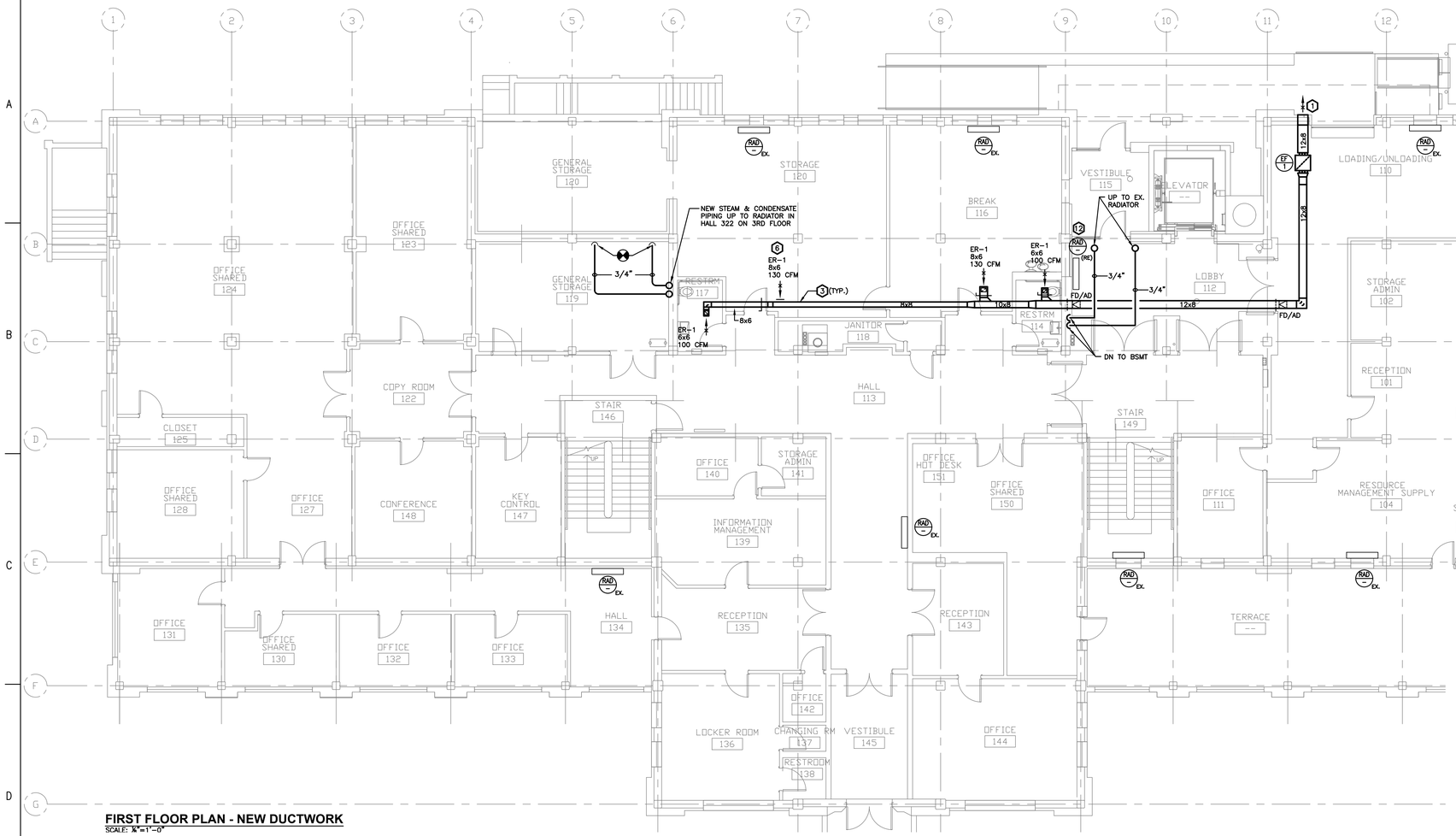
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

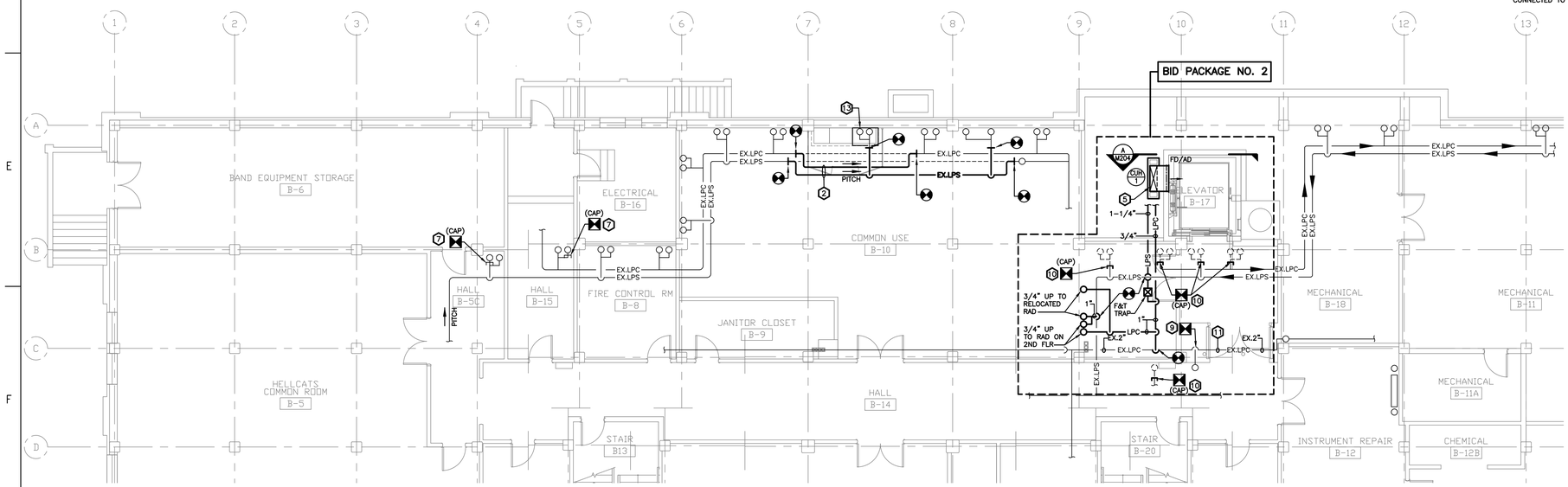
Drawing Title:
Third Floor Plan
Mechanical Demolition

M103



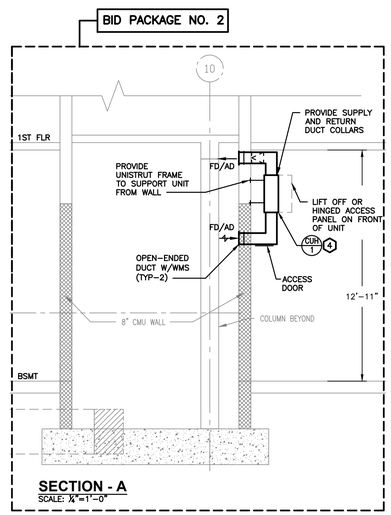
FIRST FLOOR PLAN - NEW DUCTWORK

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



PARTIAL BASEMENT FLOOR PLAN - PIPING RELOCATION

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



SECTION - A

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

MECHANICAL CONSTRUCTION NOTES

1. 16x16 BRICK VENT (DARK BRONZE FINISH) WITH ALUMINUM INSECT SCREEN, EXTENDED DUCT SLEEVE AND MOTOR OPERATED DAMPER. CONFIRM FINISH WITH ARCHITECTURAL DWGS.
2. RELOCATE EXISTING STEAM AND CONDENSATE PIPING TO PROVIDE CODE REQUIRED CLEARANCES AT NEW SWITCHGEAR.
3. HOLD DUCTWORK TIGHT TO UNDERSIDE OF BEAM.
4. MOUNT NEW STEAM UNIT HEATER AS HIGH AS POSSIBLE. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES FOR SERVICE AND MAINTENANCE.
5. PROVIDE FULL SIZE SHEETMETAL DUCT AT THE DISCHARGE AND INLET OF THE UNIT AND TERMINATE WITH OPEN-ENDED DUCT WITH WIRE MESHED SCREEN. REFER TO SECTION A.
6. MOUNT REGISTER ON SIDE OF DUCT.
7. CAP STEAM AND CONDENSATE PIPING TO 2ND AND 3RD FLOORS.
8. OFFSET EXISTING 4" CHILLED WATER PIPING ON FIRST FLOOR SO BOTH PIPES ARE AGAINST WALL. RE-INSULATE PIPING AND PROVIDE PAINTABLE PVC JACKET.
9. REMOVE EXISTING CONDENSATE RISER UP TO FIRST FLOOR AND CAP CLOSE TO RETURN MAIN.
10. REMOVE EXISTING STEAM AND CONDENSATE PIPING TO FIRST FLOOR AND CAP CLOSE TO MAIN.
11. EXISTING CONDENSATE PIPING TO REMAIN; NEW TRENCH TO BE CONSTRUCTED. RE-SUPPORT PIPING FROM FLOOR. PROVIDE NEW INSULATION AND JACKETING.
12. PROVIDE NEW RADIATOR CONTROL VALVE AND STEAM TRAP. REFER TO DETAIL ON DWG. M501.
13. PROVIDE DRIP PAN WHERE EXISTING PIPING IS LOCATED OVER NEW SWITCHGEAR. PAN SHALL BE CONSTRUCTED OF GALVANIZED 18 GAUGE SHEET METAL WITH 1-1/2" TURNED UP HEMMED SIDES WITH ALL JOINTS AND SEAMS SEALED WATER TIGHT. PROVIDE CHANNEL OR ANGLE STEEL REINFORCEMENT AS NECESSARY. SUPPORT PAN WITH UNISTRUT TRAPEZE HANGERS AND RODS CONNECTED TO THE BUILDING STRUCTURE.

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Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

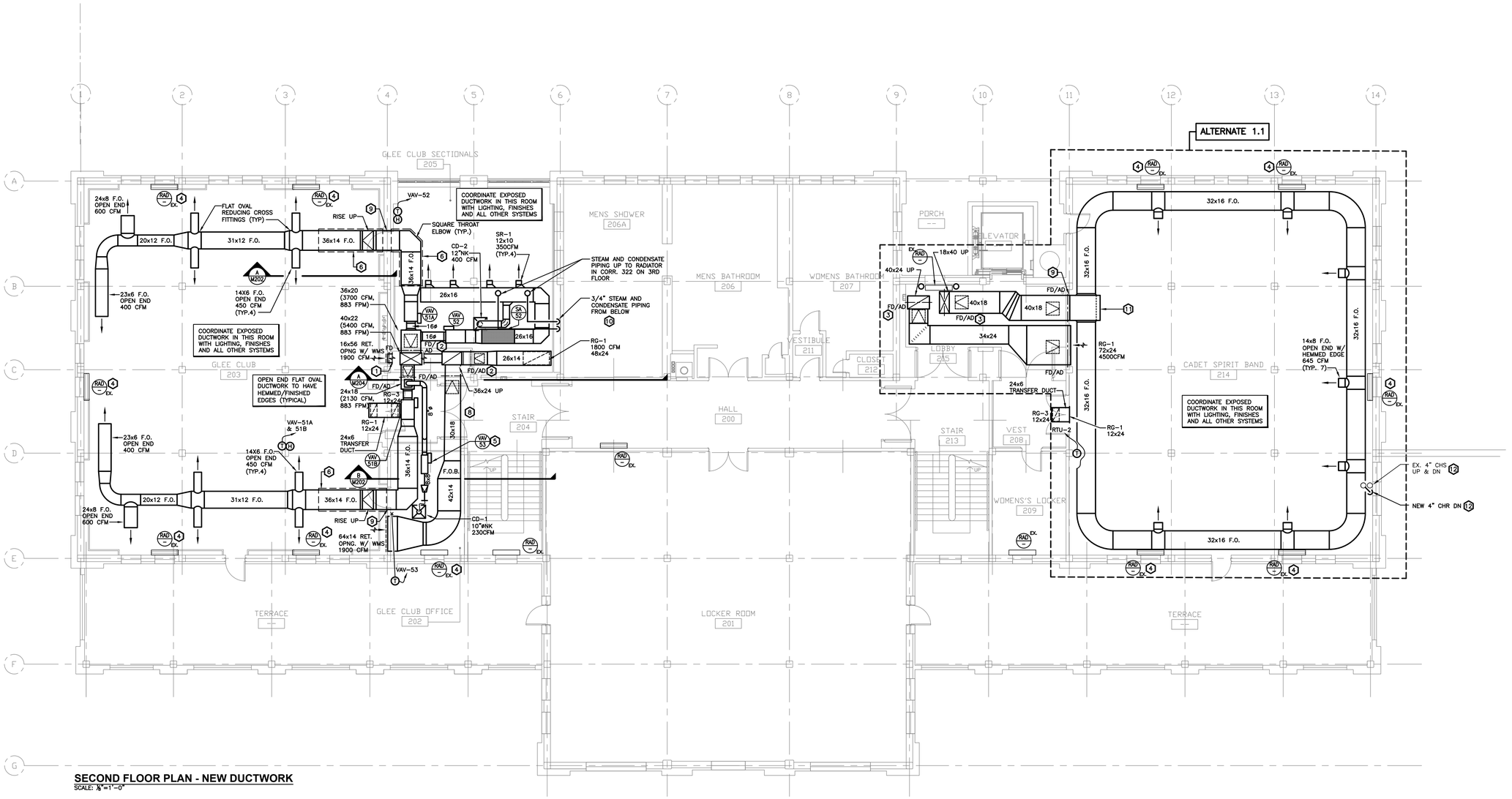
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Partial Basement Floor Plan
Piping Relocation &
First Floor Plan
New Ductwork

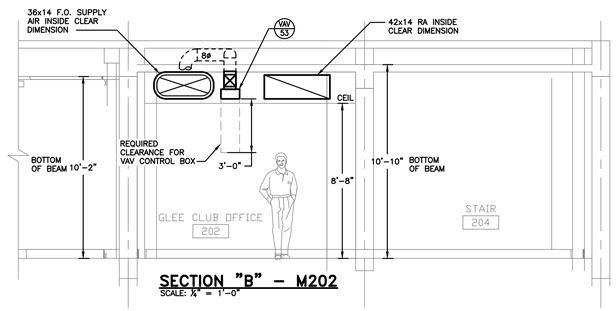
M201



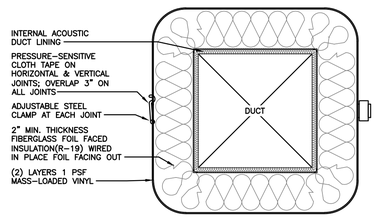
SECOND FLOOR PLAN - NEW DUCTWORK
SCALE: ⅛"=1'-0"

MECHANICAL CONSTRUCTION NOTES

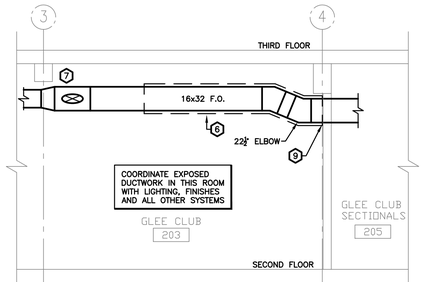
1. RETURN DUCT RUNS BELOW SUPPLY DUCT, REFER TO SECTION.
2. PROVIDE ACCESS DOORS IN DUCTWORK AT FIRE DAMPERS.
3. MOUNT FIRE DAMPERS AT BASE OF SHAFT. PROVIDE ACCESS DOORS/PANELS.
4. PROVIDE NEW RADIATOR CONTROL VALVE AND STEAM TRAP FOR EXISTING RADIATOR. REFER TO DETAIL ON DWG. M501.
5. MOUNT VAV BOX WITH CONTROL PANEL FACING DOWN.
6. DUCTWORK LAGGED WITH 2" INSULATION AND 2 SHEETS WEIGHTED VINYL – REFER TO DETAIL.
7. OFFSET DUCTWORK TO BE TIGHT TO STRUCTURE.
8. DUCTWORK ENCLOSED WITH FIRE RATED CONSTRUCTION.
9. FILL ANNULAR SPACE BETWEEN DUCT AND WALL WITH ACOUSTICAL SEALANT (TYP FOR ALL PENETRATIONS IN GLEE CLUB AND SECTIONALS ROOM)
10. EXTEND STEAM AND CONDENSATE PIPING TO EX. RADIATOR ON 3RD FLOOR.
11. OFFSET FLAT OVAL DUCTWORK CLOSE TO STRUCTURE; REFER TO DETAIL SECTIONS FOR 3RD FLOOR CONCERT BAND IN DWG. M303.
12. RE-INSULATE PIPING AND PROVIDE PAINTABLE PVC JACKET.



SECTION "B" – M202
SCALE: ¼" = 1'-0"



MASS LOADED VINYL DUCT WRAP DETAIL
N.T.S.



SECTION "A" – LAGGED DUCTWORK
SCALE: ¼" = 1'-0"

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Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

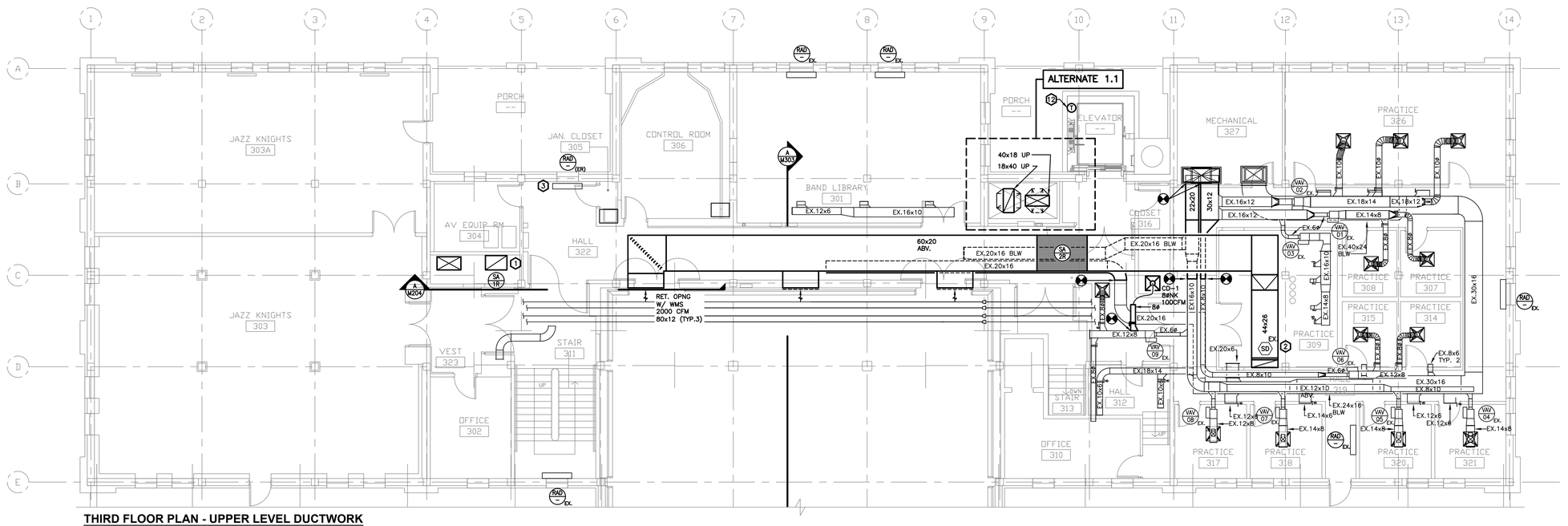
Key Plan

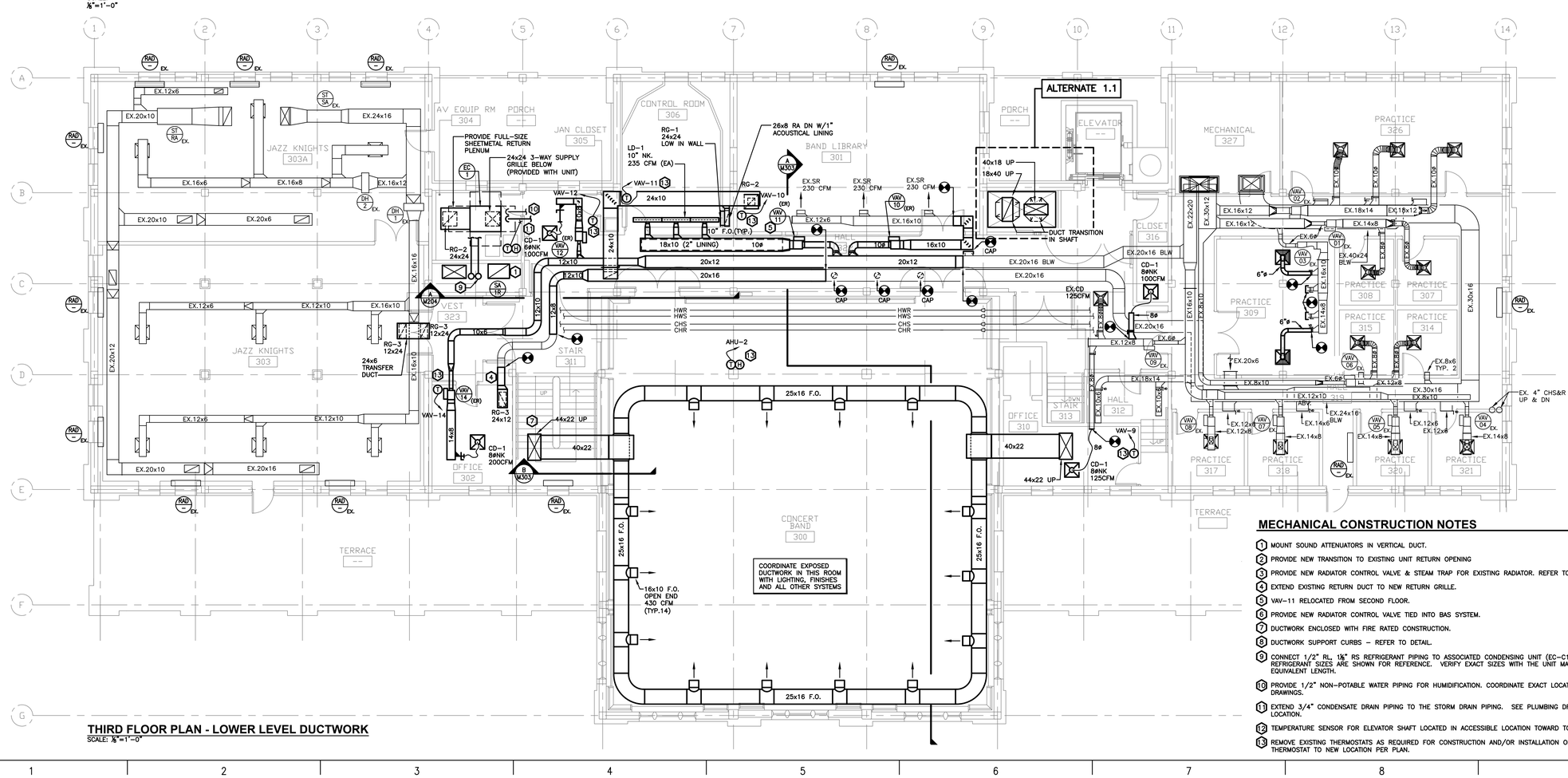
EGNER HALL BUILDING 685
U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Second Floor Plan
New Ductwork & Sections

M202





MECHANICAL CONSTRUCTION NOTES

1. MOUNT SOUND ATTENUATORS IN VERTICAL DUCT.
2. PROVIDE NEW TRANSITION TO EXISTING UNIT RETURN OPENING
3. PROVIDE NEW RADIATOR CONTROL VALVE & STEAM TRAP FOR EXISTING RADIATOR. REFER TO DETAIL ON DWG. M501.
4. EXTEND EXISTING RETURN DUCT TO NEW RETURN GRILLE.
5. VAV-11 RELOCATED FROM SECOND FLOOR.
6. PROVIDE NEW RADIATOR CONTROL VALVE TIED INTO BAS SYSTEM.
7. DUCTWORK ENCLOSED WITH FIRE RATED CONSTRUCTION.
8. DUCTWORK SUPPORT CURBS – REFER TO DETAIL.
9. CONNECT 1/2" RL, 1⅛" RS REFRIGERANT PIPING TO ASSOCIATED CONDENSING UNIT (EC-C1) ON ROOF. REFRIGERANT SIZES ARE SHOWN FOR REFERENCE. VERIFY EXACT SIZES WITH THE UNIT MANUFACTURER BASED ON EQUIVALENT LENGTH.
10. PROVIDE 1/2" NON-POTABLE WATER PIPING FOR HUMIDIFICATION. COORDINATE EXACT LOCATION WITH THE PLUMBING DRAWINGS.
11. EXTEND 3/4" CONDENSATE DRAIN PIPING TO THE STORM DRAIN PIPING. SEE PLUMBING DRAWINGS FOR EXACT LOCATION.
12. TEMPERATURE SENSOR FOR ELEVATOR SHAFT LOCATED IN ACCESSIBLE LOCATION TOWARD TOP OF SHAFT.
13. REMOVE EXISTING THERMOSTATS AS REQUIRED FOR CONSTRUCTION AND/OR INSTALLATION OF NEW FINISHES. RELOCATE THERMOSTAT TO NEW LOCATION PER PLAN.

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PRELIMINARY
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Key Plan

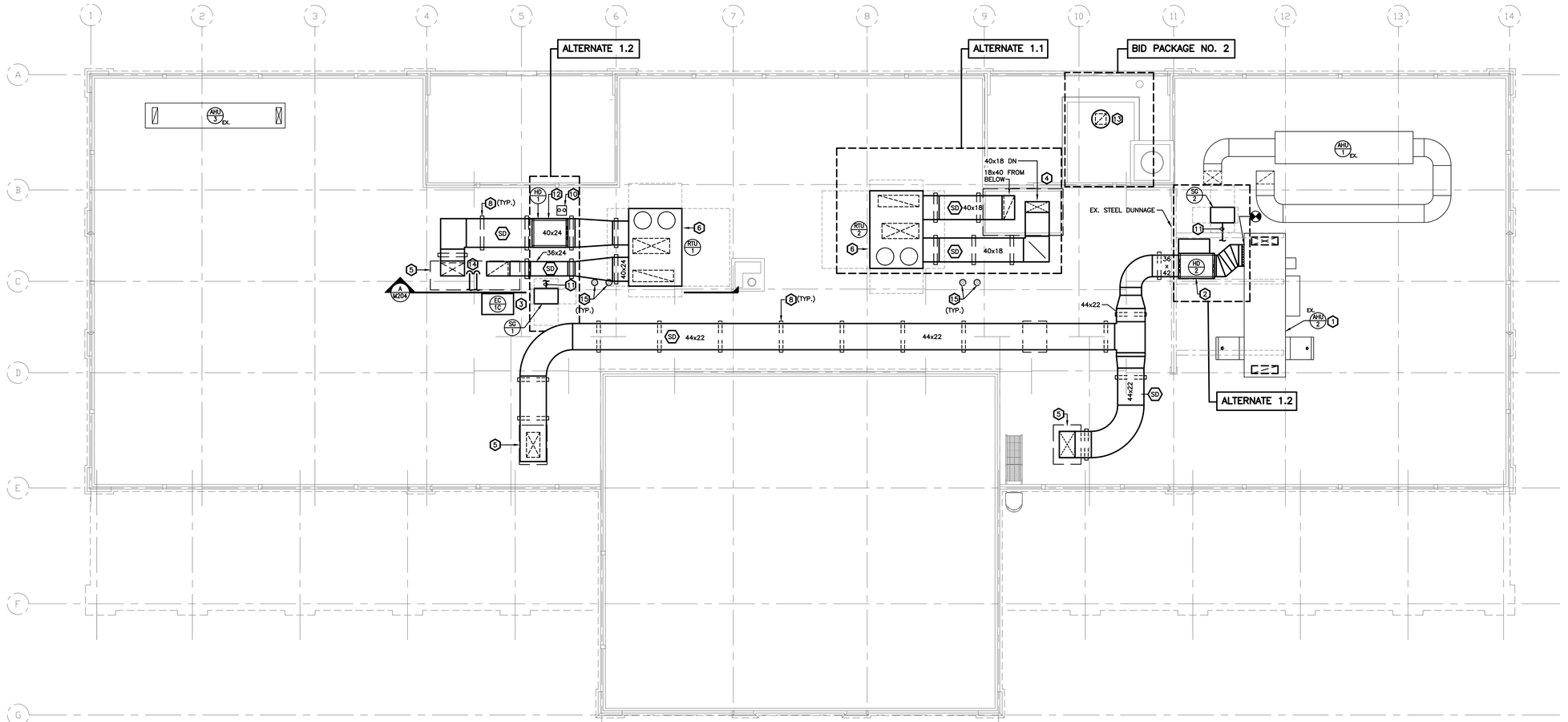
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Third Floor Plan
Lower Level Ductwork &
Upper Level Ductwork

M203

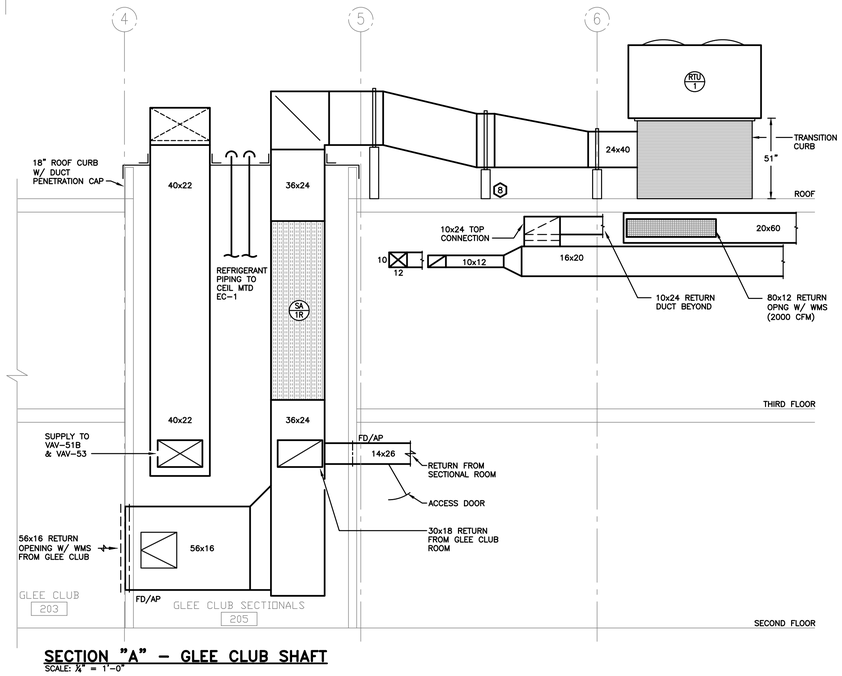


ROOF PLAN - NEW DUCTWORK

SCALE: ⅛"=1'-0"

MECHANICAL CONSTRUCTION NOTES

1. MODIFY EXISTING AHU-2 SUPPLY PLENUM FOR SIDE DISCHARGE. PROVIDE NEW ACCESS DOORS ON OPPOSITE SIDE OF UNIT. PROVIDE NEW INSULATED FLOOR PANEL TO BLOCK EXISTING DISCHARGE OPENING.
2. NEW 45"H x 36"W x 60L" DOUBLE WALL AHU CASING WITH STAINLESS STEEL LINER MOUNTED ON 24" HIGH CURB. PROVIDE NEW HEATING COIL (2 ROWS, 11 FPI). FIELD INSTALL HUMIDIFIER DISPERSION UNIT IN CASING. PROVIDE SERVICE CORRIDOR TO HOUSE COIL PIPING AND CONTROL VALVES.
3. CONDENSING UNIT MOUNTED ON EQUIPMENT SUPPORT RAILS.
4. PROVIDE 18" HIGH ROOF CURB (APPROXIMATELY 12'-8" x 3'-6" VERIFY IN FIELD) FOR DUCTWORK AND PIPING PENETRATIONS.
5. PROVIDE 18" HIGH ROOF CURB (APPROXIMATELY 12'-0" x 6'-0" TO MATCH EX. SHAFT OPENING) FOR DUCTWORK PENETRATIONS.
6. PROVIDE HORIZONTAL PLENUM TRANSITION CURB TO SUPPORT NEW ROOFTOP UNITS. PROVIDE PLATFORMS, RAILINGS AND LADDERS AS REQUIRED FOR SAFE MAINTENANCE ACCESS. – REFER TO ARCHITECTURAL DRAWINGS.
7. NOT USED.
8. DUCTWORK SUPPORT CURBS – REFER TO DETAIL.
9. NOT USED.
10. PROVIDE 16" x 16" x 18" CURB WITH PIPE PORTAL FOR STEAM AND CONDENSATE PIPING TO HD-1.
11. HEAT TRACE STEAM CONDENSATE AND DRAIN PIPING WITHIN STEAM GENERATOR ENCLOSURE, CURBS AND AT CASING SECTION.
12. NEW 40"W x 24"Wx 60L" DOUBLE WALL AHU CASING WITH STAINLESS STEEL LINER MOUNTED IN SUPPLY DUCTWORK ON 24" HIGH CURB. FIELD INSTALL HUMIDIFIER DISPERSION UNIT IN CASING.
13. GREENHECK GRSR MODEL 12 GRAVITY VENTILATOR FOR ELEVATOR SHAFT VENTILATION. PROVIDE 16" CURB WITH DAMPER TRAY AND DAMPER WITH 120 V ACTUATOR. DAMPER TO OPEN WHEN TEMPERATURE IN SHAFT RISES ABOVE SETPOINT. COORDINATE LOCATION WITH HOIST BEAMS.
14. REFRIGERANT PIPING FROM EC-1C DOWN TO ITS ASSOCIATED CEILING MOUNTED INDOOR UNIT.
15. APPROXIMATE LOCATION OF ROOF DRAINS/OVERFLOWS. COORDINATE INSTALLATION OF NEW ROOF CURB AND DUCT SUPPORT SUCH THAT NO BLOCKAGE OCCURS OF THE FLOW PATH OF THE RAINWATER INTO THE ROOF DRAIN.



SECTION "A" – GLEE CLUB SHAFT

SCALE: ¼" = 1'-0"

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0	Bid and Permit	07-06-2022

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Not For Construction

Key Plan

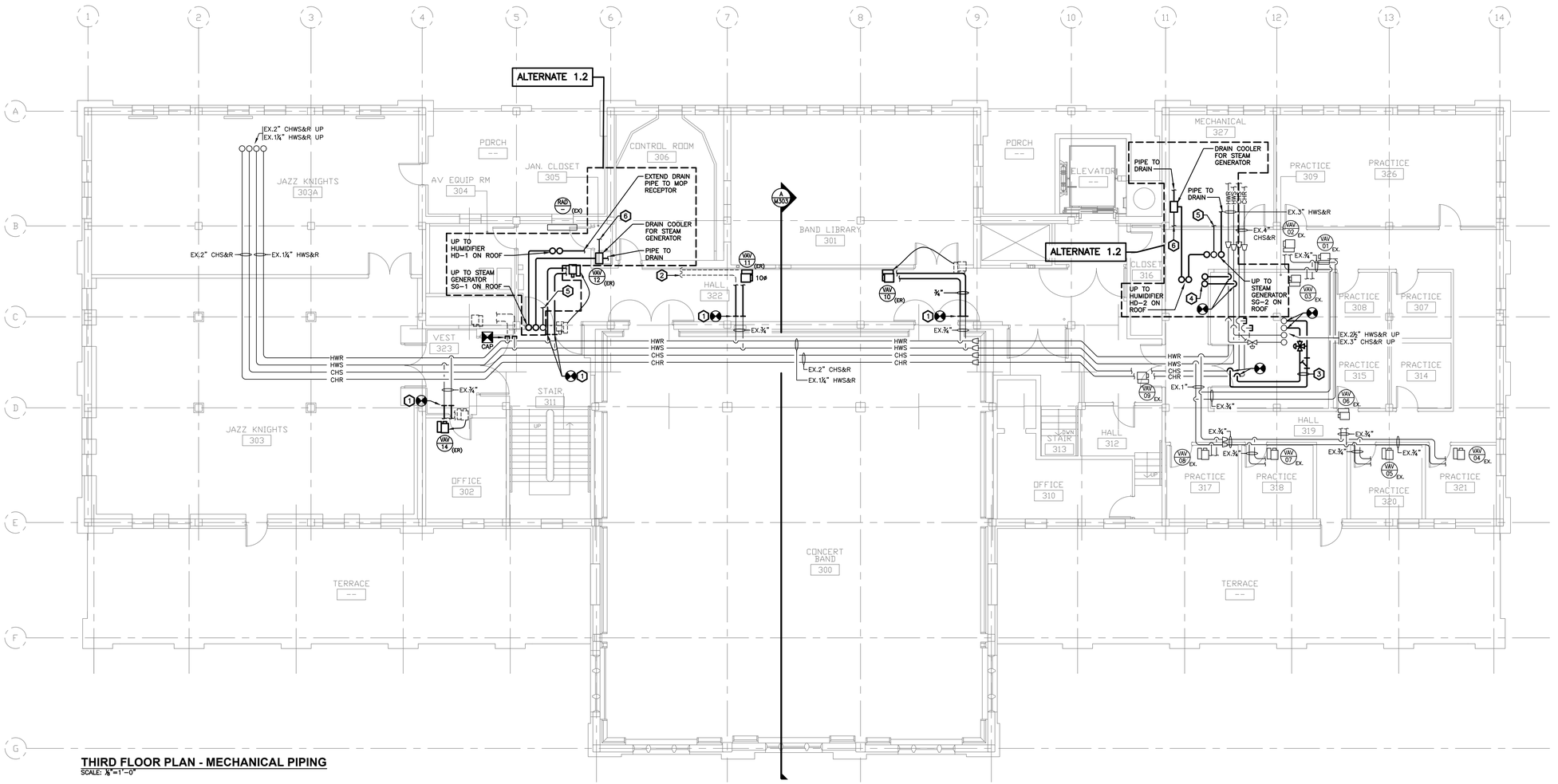
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Roof Plan
New Ductwork & Section

M204

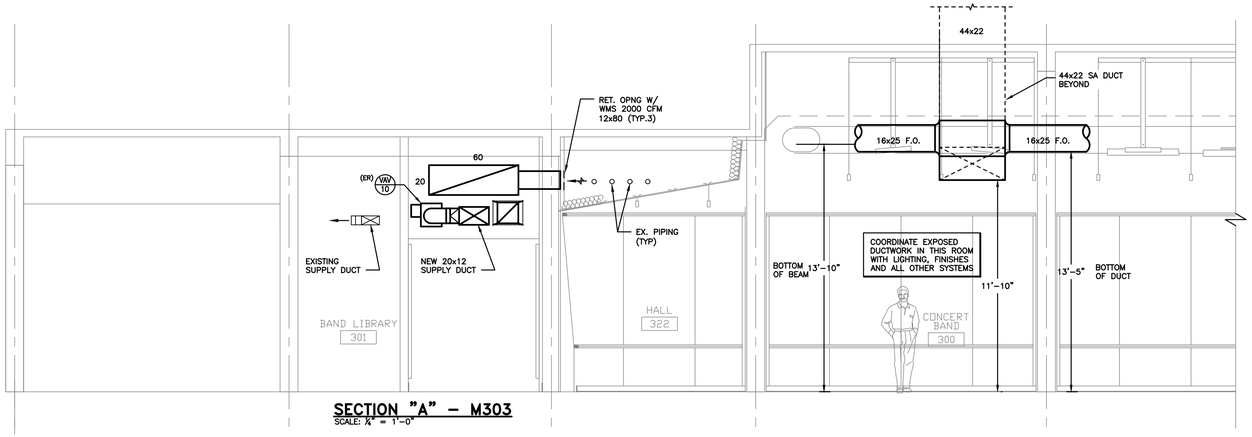


THIRD FLOOR PLAN - MECHANICAL PIPING

SCALE: ⅛"=1'-0"

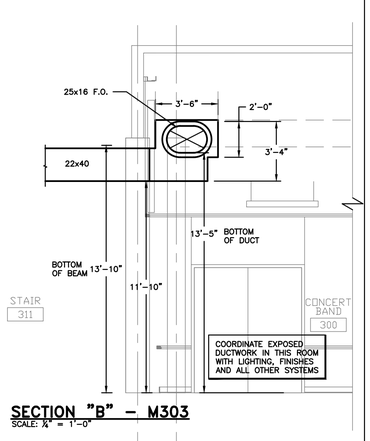
MECHANICAL CONSTRUCTION NOTES

1. REMOVE BRANCH PIPING TO EXISTING VAV BOX TO POINT INDICATED OR AS REQUIRED FOR INSTALLATION OF NEW WORK. EXTEND PIPING TO RELOCATED VAV BOX, AS SHOWN.
2. REMOVE PIPING FROM THIRD FLOOR TO SECOND FLOOR. CAP REMAINING PIPING ABOVE SECOND FLOOR CEILING AND MARK AS ABANDONED.
3. REMOVE PIPING IN AREA INDICATED TO ALLOW FOR INSTALLATION OF NEW DUCTWORK. REINSTALL PIPING ONCE DUCTWORK IS IN PLACE.
4. NEW HWS & R PIPING UP TO DEHUMIDIFICATION COIL FOR EXISTING AHU-2 ON ROOF. LOCATE CONTROL VALVE, STRAINER, ISOLATION VALVE, ETC. IN SERVICE CORRIDOR ON ROOF. COORDINATE WITH NEW RETURN DUCTWORK.
5. SOFT WATER TO STEAM GENERATOR. REFER TO PLBG. DWGS.
6. DOMESTIC WATER TO DRAIN COOLER. REFER TO PLBG. DWGS.



SECTION "A" – M303

SCALE: ¼" = 1'-0"



SECTION "B" – M303

SCALE: ¼" = 1'-0"

NOTE:
CONDITION AT CADET SPIRIT BAND, ROOM 214, IS SIMILAR

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Key Plan

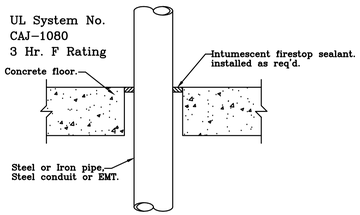
EGNER HALL BUILDING 685

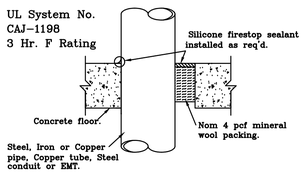
U.S. MILITARY ACADEMY
West Point, New York

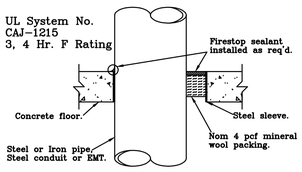
Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

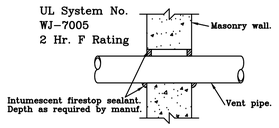
Drawing Title:
Third Floor Plan
Piping & Sections

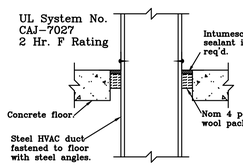
M 303

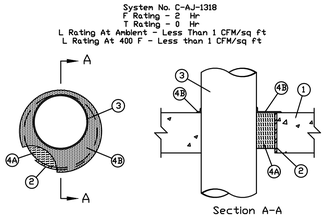








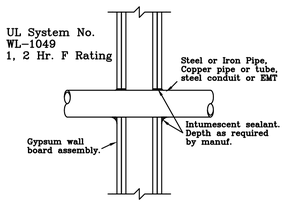


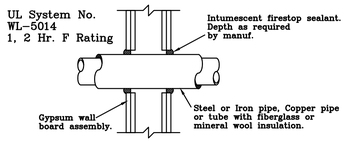


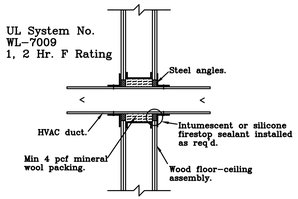
1 FLOOR OR WALL ASSEMBLY
2 METALLIC SLEEVE
3 THROUGH PENETRANTS
4 FIRESTOP SYSTEM
4A PACKING MATERIAL
4B FILL, VOID OR CAVITY MATERIAL – SPRAY – SPECSEAL AS200 ELASTOMERIC SPRAY

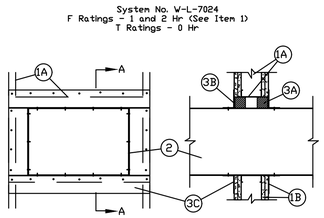
CONCRETE FLOOR OR WALL PENETRATION FIRE-STOP ASSEMBLY DETAILS FOR PIPING AND DUCTWORK

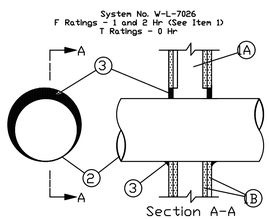
N.T.S.

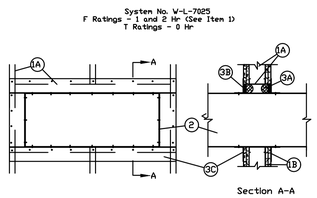


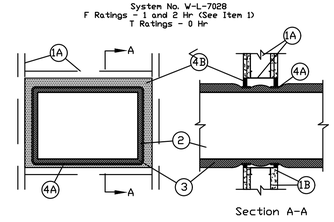












1 WALL ASSEMBLY
1A STUDS
1B WALLBOARD, GYPSUM
2 STEEL DUCT
3 FIRESTOP SYSTEM
3A PACKING MATERIAL
3B FILL, VOID OR CAVITY MATERIAL – SEALANT – SPECSEAL SERIES 100 SEALANT
3C RETAINING ANGLES

1 WALL ASSEMBLY
1A STUDS
1B WALLBOARD, GYPSUM
2 STEEL DUCT
3 FIRESTOP SYSTEM
3A PACKING MATERIAL
3B FILL, VOID OR CAVITY MATERIAL – SEALANT – SPECSEAL ELASTOMETRIC SPRAY
3C RETAINING ANGLES

1 WALL ASSEMBLY
1A STUDS
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2 STEEL DUCT
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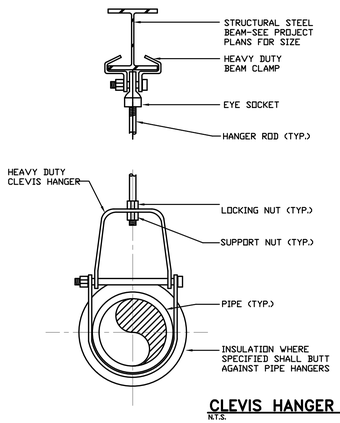
3A PACKING MATERIAL
3B FILL, VOID OR CAVITY MATERIAL – SEALANT – SPECSEAL SERIES 100 SEALANT

1 WALL ASSEMBLY
1A STUDS
1B WALLBOARD, GYPSUM
2 STEEL DUCT
3 FIRESTOP SYSTEM
3B FILL, VOID OR CAVITY MATERIAL – SEALANT – SPECSEAL SERIES 100 SEALANT

GYPSUM BOARD PARTITION PENETRATION FIRE-STOP ASSEMBLY DETAILS FOR PIPING AND DUCTWORK

N.T.S.

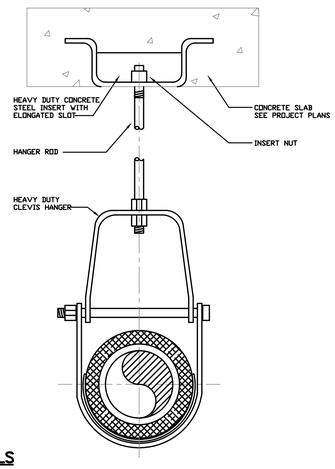
HANGER ROD SCHEDULE			
PIPE SIZE	ROD SIZE	PIPE SIZE	ROD SIZE
UP TO 2"	3/8" DIA.	4" THRU 5"	5/8" DIA.
2-1/2" THRU 3"	1/2" DIA.	6" THRU 12"	7/8" DIA.



CLEVIS HANGER DETAILS

N.T.S.

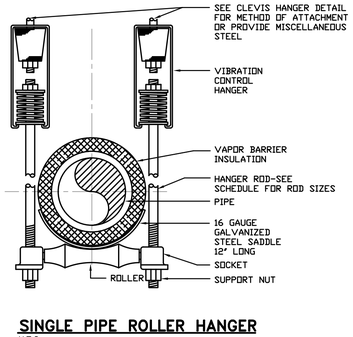
CONCRETE INSERT



HANGER ROD SPACING												
PIPE SIZE	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"
MAX. ALLOWABLE SPACING	7'	8'	9'	10'	11'	12'	14'	16'	17'	19'	22'	23' *

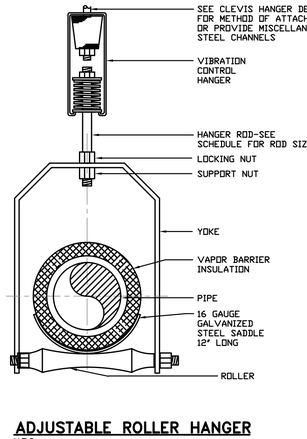
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST PIPE ON TRAPEZE.

* REFER TO STRUCTURAL DRAWINGS FOR 12" PIPE SUPPORT DETAILS AT WAFFLE SLAB. SUPPORT SPACING NOT TO EXCEED 4'-0" O.C.



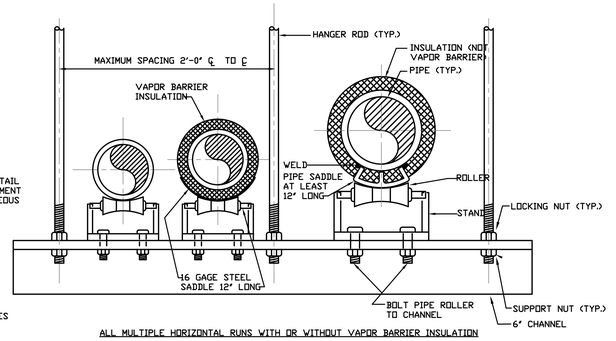
SINGLE PIPE ROLLER HANGER

N.T.S.



ADJUSTABLE ROLLER HANGER

N.T.S.



ALL MULTIPLE HORIZONTAL RUNS WITH OR WITHOUT VAPOR BARRIER INSULATION

TRAPEZE HANGER DETAIL

N.T.S.

NOTE:
PROVIDE CALCIUM SILICATE INSULATION AT ALL SADDLE LOCATIONS OF THICKNESS EQUAL TO ADJACENT PIPE INSULATION WHERE VAPOR BARRIER COVERING IS SPECIFIED.

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South Norwalk, CT 06854
203.299.0830 www.theatreprojects.com

General Notes
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2. Contractor shall inform Architect/ Engineer of any discrepancies on drawings before construction begins.
3. No existing service may be cut without Architect/Engineers's consent. Any existing service severed or damaged shall be replaced at no cost to owner.
4. Contractor must notify Architect/ Engineer at once if hidden existing conditions encountered require design modifications.

Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

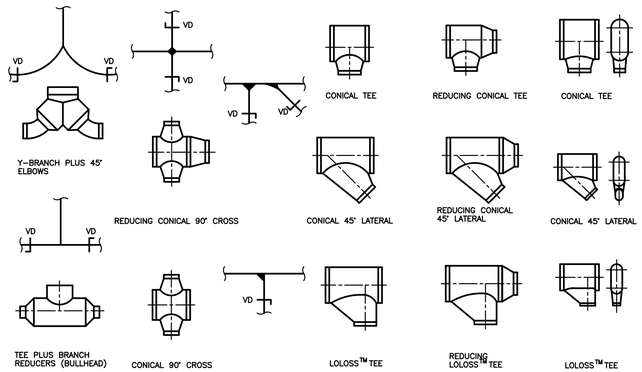
Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Details

M500

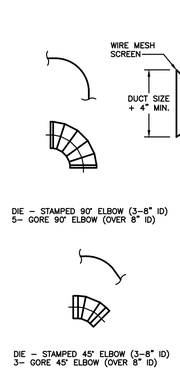
MISCELLANEOUS DUCT DETAILS

N.T.S.

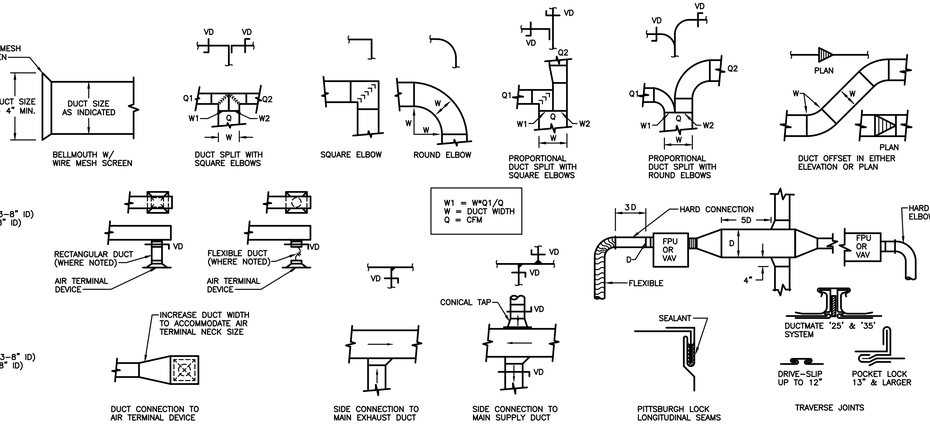


ROUND & FLAT OVAL DUCT

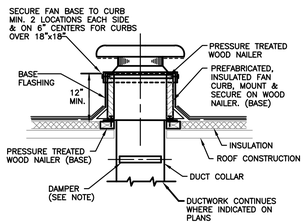
ROUND & FLAT OVAL DUCT



ROUND DUCT



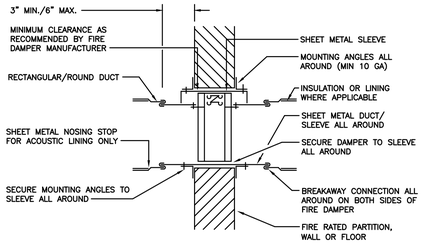
RECTANGULAR DUCT



VENT HOOD DETAIL

N.T.S.

NOTES:
PROVIDE MOTOR OPERATED DAMPER.

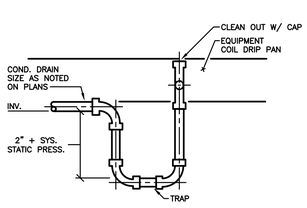


FIRE DAMPER – (TYPE–B)

N.T.S.

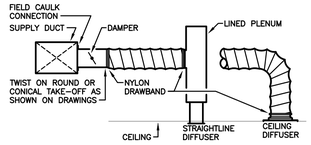
NOTES:

1. INSTALL ALL FIRE DAMPERS IN STRICT ACCORDANCE WITH ALL INSTALLATION PROCEDURES REQUIRED BY UL AS FURNISHED BY DAMPER MANUFACTURER
2. FLOOR AND WALL INSTALLATIONS SIMILAR.
3. ACCESS DOORS SHALL BE AS LARGE AS POSSIBLE UP TO 18"x12" MAXIMUM. LOCATE ACCESS DOORS ON MOST ACCESSIBLE SIDE.
4. GAUGE OF SHEET METAL SLEEVE, MOUNTING ANGLES, METHOD OF ATTACHMENT, ETC. SHALL BE AS DIRECTED BY THE MANUFACTURER.
5. EXTERNAL INSULATION IS REQUIRED FROM BREAKAWAY CONNECTION TO WALL WHEN DUCTWORK IS ACOUSTICALLY LINED.
6. SEAL ANNULAR SPACE BETWEEN SLEEVE AND WALL OR FLOOR WITH FIRE STOP MATERIALS.



CONDENSATE DRAIN DETAIL

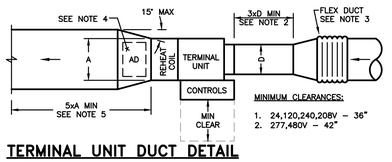
N.T.S.



SUPPLY AIR BOOT CONNECTION

N.T.S.

NOTES:
INNER LINER OF FLEX DUCT CONNECTIONS TO BE BANDED AND OUTER LAYER SEALED WITH TAPE (OR SECOND BAND).

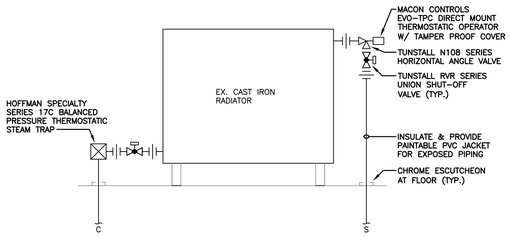


TERMINAL UNIT DUCT DETAIL

N.T.S.

DETAIL NOTES:

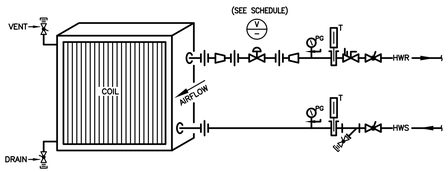
1. INSTALLATIONS NOT IN COMPLIANCE WITH DETAIL SHALL BE CORRECTED BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
2. PROVIDE A MINIMUM OF 3 DUCT DIAMETERS STRAIGHT DUCT AT INLET OF TERMINAL UNIT PRIOR TO ANY FLEX, TRANSITIONS, ELBOWS OR TAPS.
3. WHERE DUCT TO INLET OF TERMINAL UNIT IS INDICATED TO BE LARGER THAN TERMINAL UNIT INLET. PROVIDE FLEX TO MATCH SIZE OF LARGER DUCT WITH TRANSITION TO INLET AFTER FLEX. REFER TO SPECIFICATIONS FOR MAX LENGTH OF FLEX.
4. PROVIDE ACCESS DOOR IN UNDERSIDE OF DUCT, DOWNSTREAM OF TERMINAL UNITS WITH HOT WATER REHEAT COILS. DO NOT PROVIDE ACCESS DOOR DOWNSTREAM OF TERMINAL UNITS WITH ELECTRIC REHEAT COILS.
5. PROVIDE 5xA (WIDTH OF THE TERMINAL UNIT) OF STRAIGHT DUCT PRIOR TO ANY TAKE–OFFS OR ELBOWS.



CAST IRON STEAM RADIATOR PIPING

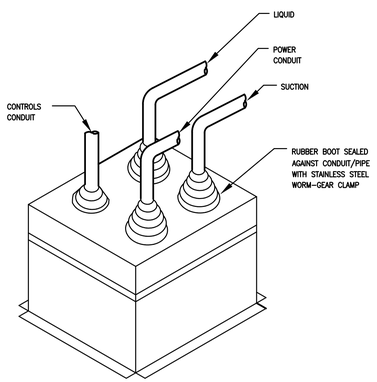
N.T.S.

NOTE: TYPICAL FOR EXISTING AND RELOCATED RADIATORS IN AREA OF WORK. CLEAN AND REPAINT RADIATORS IN COLOR AS DIRECTED BY ARCHITECT.



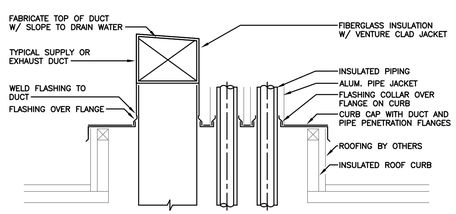
HEATING COIL PIPING DIAGRAM

N.T.S.



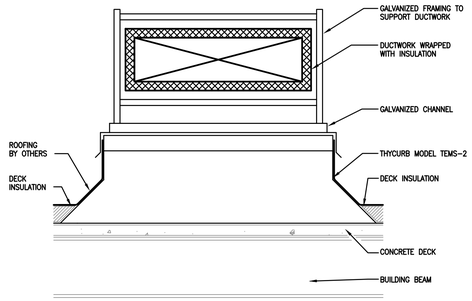
REFRIGERANT PIPING PORTAL DETAIL

N.T.S.



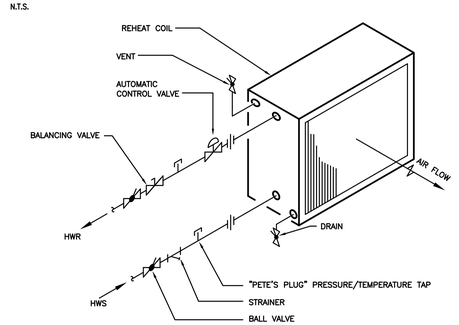
DUCT/PIPE PENETRATION THROUGH ROOF CURB

N.T.S.



DUCT SUPPORT DETAIL

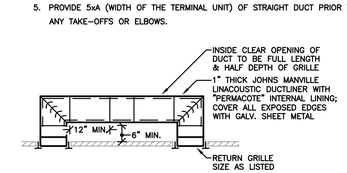
N.T.S.



TYPICAL REHEAT COIL PIPING DIAGRAM

N.T.S.

NOTE:
APPLIES TO VAV HOT WATER COILS.

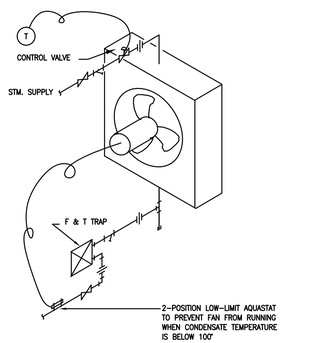


TRANSFER DUCT W/ LINED ELBOWS

N.T.S.

NOTE:

1. PAINT INTERIOR OF DUCT BLACK.
2. COORDINATE WITH NEW AND EXISTING ADJACENT DUCTWORK AND BUILDING STRUCTURE.
3. RETURN GRILLE MAY BE MOUNTED IN WALL WHERE THERE IS NO CEILING (CADET SPIRIT BAND ROOM 214)



STEAM CABINET UNIT HEATER PIPING DIAGRAM

N.T.S.

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Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Details

M501

CHILLED WATER & HOT WATER (40°F THROUGH 210°F) VALVE SCHEDULE (2" & SMALLER)

SERVICE	VALVE TYPE	RATING	BODY & BONNET	BALL & STEM	SEAT & PACKING SEALS	LATCH-LOCK LEVER & NUT	DISC HOLDER	DISC	PACKING	BRAND	MODEL OR FIGURE NO.
SHUTOFF	THREADED BALL	600 PSI CWP, 150 PSI STEAM	2-PIECE, BRONZE	316 STAINLESS STEEL	MPTFE	STAINLESS STEEL	N/A	N/A	N/A	APOLLO VALVES	77C-24(SIZE)-27-SERIES
SHUTOFF-GAUGE & INSTRUMENT ISOLATION	THREADED BALL	600 PSI CWP, 150 PSI STEAM	2-PIECE, BRONZE	316 STAINLESS STEEL	MPTFE	STAINLESS STEEL	N/A	N/A	N/A	APOLLO VALVES	77C-14(SIZE)-27 SERIES
LOW POINT DRAIN & HIGH POINT VENT	THREADED BALL	600 PSI CWP	2-PIECE, BRONZE	316 STAINLESS STEEL	RPTFE	STAINLESS STEEL	N/A	N/A	N/A	APOLLO VALVES	70-100(SIZE)-HC-27 SERIES
MODULATING (BYPASS)	THREADED GLOBE	ANSI CLASS 150	BRONZE ASTM B-62 OR BRONZE ASTM B-16	N/A	N/A	N/A	BRONZE ASTM B-62 OR BRONZE ASTM B-16	PTFE (15% GLASS FILLED)	PTFE	CRANE ENERGY FLOW SOLUTIONS	7TF
CHECK (SMALLER THAN 2")	THREADED SWING CHECK W/ THREADED CAP	ANSI CLASS 150	BRONZE ASTM B-62/B-61	N/A	N/A	N/A	BRONZE ASTM B-62 OR BRONZE ASTM B-16	PTFE (15% GLASS FILLED)	N/A	CRANE ENERGY FLOW SOLUTIONS	141TF
CHECK (2")	FLANGED HIGH PERFORMANCE CHECK	ANSI CLASS 150	LUG STYLE, ASTM A216 CARBON STEEL	SS	SS Gr.CF8M TYPE 316	N/A	N/A	SS Gr.CF8M TYPE 316 & SS SPRING	N/A	TITAN SILENT CHECK GLOBE TYPE	CV51-CS
BALANCING	THREADED END MANUAL BALANCING	300 PSI	AMETAL		EPDM		N/A	N/A	N/A	VICTAULIC TOUR & ANDERSON	787

DUCTWORK SCHEDULE

DUCT TYPE	SYSTEM	MATERIAL	PRESSURE CLASS	SEAL CLASS	LEAK CLASS
A	CONCEALED SUPPLY DUCTWORK UPSTREAM OF AIR TERMINALS	DOUBLE WALL WITH PERFORATED LINING AND 1" INSULATION	4"	A	6
B	CONCEALED SUPPLY DUCTWORK DOWNSTREAM OF AIR TERMINALS	DOUBLE WALL WITH PERFORATED LINING AND 1" INSULATION	2"	A	6
C	EXPOSED SUPPLY DUCTWORK UPSTREAM OF AIR TERMINALS	DOUBLE WALL GALVANEALED WITH PERFORATED LINING AND 1" FIBERGLASS INSULATION	4"	A	6
D	EXPOSED SUPPLY DUCTWORK DOWNSTREAM OF AIR TERMINALS	DOUBLE WALL GALVANEALED WITH PERFORATED LINING AND 1" FIBERGLASS INSULATION	2"	A	6
E	EXTERIOR SUPPLY DUCTWORK	DOUBLE WALL GALVANIZED WITH PERFORATED LINER AND 3" FIBERGLASS INSULATION	4"	A	6
F	CONCEALED RETURN DUCTWORK	GALVANIZED WITH PERFORATED LINER AND 1" INSULATION	-2"	A	6
G	EXPOSED RETURN DUCTWORK	DOUBLE WALL GALVANEALED WITH PERFORATED LINER AND 1" INSULATION	-2"	A	6
H	EXTERIOR RETURN DUCTWORK	DOUBLE WALL GALVANIZED WITH PERFORATED LINER AND 3" FIBERGLASS INSULATION	-2"	A	6
J	TOILET/GENERAL EXHAUST (ALL OTHER SYSTEMS)	GALVANIZED	-2"	A	6

HVAC THERMAL INSULATION SCHEDULE

DESCRIPTION	INSULATION TYPE	THICKNESS	COVERING/JACKET	HEAT TRACE
CONCEALED SUPPLY DUCTWORK (UNLESS OTHERWISE NOTED)	DOUBLE WALL WITH PERFORATED LINING AND INSULATION JOHNS MANVILLE SPIRAL G TYPE 125	1"	FSK	NO
EXPOSED SUPPLY DUCTWORK	DOUBLE WALL WITH PERFORATED LINING AND INSULATION JOHNS MANVILLE SPIRAL G TYPE 125	1"	GALVANEALED FOR PAINTING	NO
CONCEALED RETURN DUCTWORK	DOUBLE WALL WITH PERFORATED LINING AND INSULATION JOHNS MANVILLE SPIRAL G TYPE 125	1"	N/A	NO
EXPOSED RETURN DUCTWORK	DOUBLE WALL WITH PERFORATED LINING AND INSULATION JOHNS MANVILLE SPIRAL G TYPE 125	1"	GALVANEALED FOR PAINTING	NO
EXTERIOR SUPPLY AND RETURN DUCTWORK	DOUBLE WALL WITH PERORATED LINING AND INSULATION JOHNS MANVILLE SPIRAL G TYPE 125	3"	VENTURECLAD 1577W	NO
HEATING WATER PIPING	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	2"	ASJ	NO
EXTERIOR HEATING WATER PIPNG	OWENS CORNING FOAMGLASS	1"	CHILDERS ALUMINUM	NO
EXTERIOR STEAM PIPING	OWENS CORNING FOAMGLASS	1"	CHILDERS ALUMINUM	NO
EXTERIOR STEAM CONDENSATE PIPING	OWENS CORNING FOAMGLASS	1"	CHILDERS ALUMINUM	YES
REFRIGERANT AND CONDENSATE PIPING	ELASTOMERIC	½"	APPLY 2 COATS UV RESISTANT FINISH ON PIPING EXPOSED TO ATMOSPHERE	
RELIEF, VENTS, DRAINS AND MISC. PIPING (ABOVE 150 DEGREES F.)	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	2"	ASJ	NO

AIR TERMINAL DEVICE SCHEDULE

TAG	DESCRIPTION
CD-1	TITUS OMNI CEILING DIFFUSER, STEEL CONSTRUCTKION FOR LAY-IN TEE APPLICATION, WITH 24x24 MODULE SIZE. FINISH IN #26 WHITE. DISCHARGE PATTERN AND ROUND NECK SIZE AS INDICATED ON DRAWINGS. DIFFUSER TO BE HARD DUCTED.
CD-2	TITUS OMNI CEILING DIFFUSER, STEEL CONSTRUCTION FOR GWB CEILING APPLICATION, WITH 24x24 MODULE SIZE. FINISH IN #26 WHITE. DISCHARGE PATTERN AND ROUND NECK SIZE AS INDICATED ON DRAWINGS. DIFFUSER TO BE HARD DUCTED.
SR-1	TITUS MODEL 272FS "AEROBLADE" SUPPLY GRILL WITH INDIVIDUALLY ADJUSTABLE BLADES, ALUMINUM CONSTRUCTION, FASTENING TYPE C CONCEALED SCREW FOR SURFACE MOUNT APPLICATION, FINISH IN #26 WHITE. SIZE INDICATED ON DRAWINGS. 3/4" FRONT BLADE SPACING, 3/4" REAR BLADE SPACING, DOUBLE DEFLECTION, INDIVIDUALLY ADJUSTABLE BLADES, AND FINISH IN #26 WHITE.
LD-1	LINEAR DIFFUSER – TITUS FL-30-1-66-HT. 12' LENGTH, 3" SLOT, HIGH THROW PATTERN CONTROLLER WITH (3) 4FT. INSULATED PLENUMS WITH 10" INLETS. (TITUS MFI-10-1-10-66-HT) BORDER 66 FOR TAPE AND SPACKLE MOUNTING. PROVIDE HARD CEILING MOUNTING CLIPS.
RG-1	TITUS MODEL 350 RETURN GRILLE WITH 35 DEGREE DEFLECTION, FASTENER TYPE C CONCEALED SCREW FOR SURFACE MOUNT APPLICATION, FINISH IN #26 WHITE. SIZE AS INDICATED ON DRAWINGS. 3/4" BLADE SPACING, STEEL CONSTRUCTION WITH FRAME. PAINT INSIDE OF DUCTWORK BLACK.
RG-2	TITUS MODEL 350 RETURN GRILLE WITH 35 DEGREE DEFLECTION, 22x22 MODULE SIZE FOR LAY-IN CEILING APPLICATION, FINISH IN #26 WHITE. 3/4" BLADE SPACING, STEEL CONSTRUCTION WITH FRAME. PAINT INSIDE OF DUCTWORK BLACK.
RG-3	TITUS MODEL 350 RETURN REGISTER WITH 35 DEGREE DEFLECTION, 22x12 MODULE SIZE FOR LAY-IN CEILING APPLICATION, FINISH IN #26 WHITE. SIZE AS INDICATED ON DRAWINGS. 3/4" BLADE SPACING, STEEL CONSTRUCTION WITH FRAME. PAINT INSIDE OF DUCTWORK BLACK. PROVIDE ADDITIONAL CEILING GRID SECTION AS REQUIRED FOR MOUNTING.
ER-1	TITUS MODEL 350RL EXHAUST REGISTER, STEEL CONSTRUCTION, ¾" BLADE SPACING AND 35° FIXED DEFLECTION, BORDER TYPE FOR SURFACE MOUNTING APPLICATON. FINISH IN #26 WHITE. SIZE INDICATED ON DRAWINGS.

HUMIDIFIER SCHEDULE (HD #, SG #)

TAG		HD-1/SG-1	HD-2/SG-2
RTU / AHU NO.		RTU-1	AHU-2
LOCATION		ROOF	ROOF
HUMIDIFIER - HG	AIRFLOW (CFM)	3360	3600
	DUCT SIZE (WxL)	40x24	36x44
	VELOCITY (FPM)	504	343
	INLET DB/RH	95.2/14%	73.8°/20%
	DISCHARGE DB/RH	96/19%	75°/46.9%
	LOAD (LBS/HR)	33.9	60
	LOAD + LOSS (LBS/HR)	35.3	61.2
	DISPERSION UNIT FACE DIMENSIONS	40"x12"	36"x30"
	TUBE QTYxSPACING	2x24" O.C.	3x12" O.C.
	NON-WETTING DISTANCE	6"	10"
	NOTES	HEADERS INSIDE DUCT, TRAP INSIDE DUCT. CONNECTIONS AT SAME END, PERIMETER NOT BLANKED OFF, 316 STAINLESS STEEL COMPONENTS	HEADERS INSIDE DUCT, TRAP INSIDE DUCT. CONNECTIONS AT SAME END, PERIMETER NOT BLANKED OFF, 316 STAINLESS STEEL COMPONENTS
	MODEL	DRISTEEM RAPID-SORB 2"	DRISTEEM RAPID-SORB 2"
STEAM GENERATOR - SG	RATED CAPACITY (LBS/HR)	33.91	61.2
	WATER TYPE	SOFTENED/TREATED WATER	SOFTENED/TREATED WATER
	ENERGY SOURCE	RESISTANCE TO STEAM	RESISTANCE TO STEAM
	VOLTAGE	208/3/60	208/3/60
	MAX AMPS	33.3	66.6
	MODEL	DRISTEEM RX-42-1	DRISTEEM RX-63-2
	OPTIONS	CLIMATE CONTROLLED OUTDOOR ENCLOSURE	CLIMATE CONTROLLED OUTDOOR ENCLOSURE

ALTERNATE 1.2

SOUND ATTENUATOR SCHEDULE (SA #)

NOTE: ATTENUATOR SELECTION PENDING FINAL ANALYSIS BY ACOUSTIC CONSULTANT.

UNIT NUMBER	SERVICE	LOCATION	SIZE, WxHxL (IN.)	AIRFLOW (CFM)	VELOCITY (FPM)	PRESSURE DROP (IN. W.G.)	INSERTION LOSS (dB)								GENERATED NOISE (dB) (INCLUDES AREA CORRECTION FACTOR)								MANUFACTURER: VIBRACOUSTICS OR EQUAL
							63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000 HZ	63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000 HZ	
SA-2R	CONCERT BAND ROOM RETURN	IN CORRIDOR CEILING	60"x20"x 84"	6000	720	0.10	12	17	25	43	44	32	20	13	50	43	43	44	43	36	24	26	RD-MV-F5
SA-52	GLEE CLUB SECTIONAL SUPPLY	SECTIONAL ROOM CEILING	26"x16"x60"	1800	623	0.09	4	10	19	26	29	22	16	12	51	39	35	33	35	32	22	26	RD-MV-F3
SA-1R	GLEE CLUB RETURN	VERTICAL IN SHAFT	36"x24"x 120"	5400	900	0.23	14	22	41	46	59	36	22	10	52	46	45	44	44	38	28	30	RD-MV-F1

ENVIRONMENTAL CONTROL SYSTEM (EC #, EC #C)

SYSTEM NO.		EC-1 (EVAPORATOR) EC-1C (CONDENSER)
NOMINAL CAPACITY (TONS)		5.0
SERVICE		3RD FLR A/V EQUIPMENT ROOM
CONFIGURATION		FAN COIL W/ SEPARATE AIR COOLED CONDENSING UNIT
INDOOR CASSETTE - SUPPLY FAN	FANS (QTY)	1
	AIR VOLUME AT LOW SPEED (CFM)	2710
	EXTERNAL/TOTAL STATIC PRESSURE IN. W.G.	0.50
	MOTOR HP	3.5
INDOOR CASSETTE - DX COIL	FACE AREA (TOTAL) SQ. FT.	5.6
	FACE VELOCITY (FPM)	485
	ROWS	4
	ENTERING AIR (DEG F/RH %)	70.0/53.3
	TOTAL COOLING CAPACITY (MBH)	56.3
	SENSIBLE COOLING CAPACITY (MBH)	46.1
INDOOR CASSETTE - REHEAT COIL	TYPE	ELECTRIC
	STAGES	–
	CAPACITY INPUT (KW)	2.8
INDOOR CASSETTE - HUMIDIFIER	TYPE	STEAM GENERATING
	CAPACITY (LBS/HR)	8.0
INDOOR CASSETTE - AIR FILTER	SIZE INCHES	4 INCH
	EFFICIENCY	MERV 8
INDOOR CASSETTE - ELECTRICAL	VOLTS/PH/HZ	208/3/60
	FLA	44.8
	WSA	56.0
	OPD	60
CONDENSING UNIT - PERFORMANCE	COIL FACE AREA (SQ FT)	10.5
	COIL ROWS	3
	FAN MOTOR (HP)	0.50
	FAN CAPACITY AT 0" EXTERNAL STATIC (CFM)	4200
CONDENSING UNIT - ELECTRICAL	VOLTS/PH/HZ	208/3/60
	FLA	24.5
	WSA	30.2
	OPD	50
MANUFACTURER/MODEL		LIEBERT MT060E EVAPORATOR LIEBERT PFD067AL CONDENSER
FEATURES/ ACCESSORIES	MICROPROCESSOR CONTROL	
	COMMON ALARM AND REMOTE ON/OFF	
	SYSTEM AUTO RESTART	
	UNIT ALARMS AND CUSTOM ALARMS (SEE CONTROL DIAGRAM & SEQUENCE OF OPERATIONS	
	REFRIGERANT LINE SETS (OR REFRIGERANT PIPING BY CONTRACTOR)	
	HOT GAS BYPASS	
	QUIET LINE CONDENSING UNIT	
	STEAM GENERATING HUMIDIFIER	
	HOT GAS REHEAT	
	DISCONNECT SWITCH (NON-LOCKING)	
	CONDENSATE PUMP	
	SUPPLY GRILLE	
	FILTER FRAME AND RETURN DUCT FLANGE	

STEAM UNIT HEATER SCHEDULE (CUH #)

UH NO.	ROOM SERVED	CAPACITY (MBH)	CFM (HIGH/LOW	RPM	CONDENSATE RATE #HR (50 PSIG STM)	MOTOR HP	MOTOR V/PH/HZ	TYPE	MANUFACTURER & MODEL NO.
CUH-1	ELEV. SHAFT	22.6	230/185	1050	23.4	1/15	115/1/60	WALL	VULCAN W-1070-06

NOTES:
1. PROVIDE INLET AND OUTLET DUCT COLLARS.
2. PROVIDE LINE VOLTAGE THERMOSTAT.
3. PROVIDE DISCONNECT SWITCH.
4. PROVIDE WALL MOUNTING BRACKETS.

ROOFTOP UNIT SCHEDULE (RTU #)

ALTERNATE 1.1

		RTU-1	RTU-2
RTU SYSTEMS NUMBER		RTU-1	RTU-2
LOCATION		ROOF	ROOF
AREA SERVED		GLEE CLUB	SPIRIT BAND
NOMINAL TONS		17.5	15.0
OUTSIDE AIR (CFM)		1600	1500
SUPPLY FAN	AIRFLOW (CFM)	5700	4500
	E.S.P. (IN. W.G.)	1.93	1.94
	FAN RPM	1137	1106
	ACT. BHP/MAX. BHP	3.82/7.5	3.08/5.25
DX COOLING	CONDENSER EAT DB (DEG. F)	95	95
	ENTERING AIR DB/WB (DEG. F)	80.9/67.3	81.7/68.0
	LEAVING AIR DB/WB (DEG. F)	56.4/55.7	57.1/56.3
	TOTAL COOLING CAPACITY (MBH)	195.6	167.5
	SENSIBLE COOLING CAPACITY (MBH)	143.1	119.4
	EER (MINIMUM)	10.8	10.8
	INTEGRATED EFFICIENCY (IEER)	14.4	14.6
	REFRIGERANT	R-410A	R-410A
NAT GAS FURNACE	HEATING INPUT (MBH)	400	400
	HEATING OUTPUT (MBH)	324	324
	STAGES	MODULATING 2.85:1	MODULATING 2.85:1
	TEMP. RISE RANGE (DEG F)	30-65	35-65
	HEATING CFM	5700	4500
	EAT (DEG F)	40	40
	LAT	115.6	106.7
FILTER	SIZE (IN.)	(6)20"x25"x4"	(6)20"x25"X4"
	TYPE	MERV 13	MERV 13
ACCESSORIES (FACTORY INSTALLED)		FOUR STAGE COOLING	
		HOT GAS REHEAT WITH DEHUMIDIFICATION CYCLE	
		DUAL ENTHAPLY ECONOMIZER W/ BAROMETRIC RELIEF AND FACTORY INSTALLED MODULATING POWER EXHAUST	
		HIGH STATIC BLOWER	
		4" PLEATED FILTERS	
		DIRTY FILTER INDICATOR SWITCH	
		BAS CONTROLLER WITH BACNet MS/TP, MODBUS AND N2 COMMUNICATION CARD	
		5 YEAR WARRANTY ON COMPRESSORS, 15 YEAR WARRANTY ON STAINLESS STEEL TUBULAR HEAT EXCHANGERS	
ELEC.	INPUT POWER VOLTAGE/PHASE/HERTZ	208/3/60	208/3/60
	MIN. CIRCUIT AMPACITY	112.1	96.6
	MAX OVERCURRENT PROTECTION	125	110
MANUFACTURER & MODEL NO		YORK/JOHNSON AD18T30Q2T1CTS44E1	YORK/JOHNSON AD15T30Q2T1CTS44E1

EXISTING AIR HANDLING UNIT SCHEDULE (AHU #, EX.)

		AHU-2 (EX)
DESIGNATION		AHU-2 (EX)
LOCATION		ROOF
AREA SERVED		REHEARSAL HALL
MANUFACTURER & MODEL NO		YORK XTO-48x69
OUTSIDE AIR (CFM)		2000
SUPPLY FAN	AIRFLOW (CFM)	6000
	E.S.P. (IN. W.G.)	2.00
	FAN MODEL	PLENUM
	FAN RPM	1863
	FAN TYPE/CLASS	PL-EPFN/II
	FAN BHP/MOTOR HP	6.27/10.0
	MOTOR TYPE	TECO ODP PREM. EFF
	VOLTAGE/PHASE/HERTZ	208/3/60
	FAN FLA	25.9
	MCA	32.4
	MOCP	50.0
COOLING COIL	ENTERING AIR DB/WB (DEG. F)	82.4/68.8
	LEAVING AIR DB/WB (DEG. F)	51.3/51.3
	TOTAL COOLING CAPACITY (MBH)	304.0
	SENSIBLE COOLING CAPACITY (MBH)	196.0
	AIR PRESSURE DROP	1.14
	COIL ROWS/FPI	12/11
	EWT/LWT (DEG. F)	40.0/51.3
	FLUID FLOW (GPM)	60.0
	FLUID P.D.	17.9
PRE-HEAT COIL	HEATING CAPACITY (MBH)	144.0
	ENTERING AIR DB (DEG. F)	35.4
	LEAVING AIR DB (DEG. F)	57.3
	COIL (ROWS/FPI)	1/11
	AIR PRESSURE DROP	0.04
	FLUID FLOW	5.0
	FLUID P.D.	0.70
FILTER	PRE-FILTER	2" PLEATED MERV 8
	PRIMARY FILTER	N/A
REMARKS		MODIFY UNIT FOR SIDE DISCHARGE ARRANGEMENT, PROVIDE NEW CURB MOUNTED, DOUBLE WALL CASING SECTION WITH STAINLESS STEEL LINING FOR NEW HEATING COIL AND SPACE FOR FIELD INSTALLATION OF STEAM HUMIDIFIER. MODIFY SEQUENCE OF OPERATIONS TO INCLUDE HUMIDIFICATION AND DEHUMIDIFICATION CYCLES

VARIABLE AIR VOLUME BOX SCHEDULE W/ELEC HEAT (VAV #)

VAV NUMBER	ROOM SERVED	MAX AIRFLOW (CFM)	MIN AIRFLOW (CFM)	INLET/DISCHARGE S.P. (IN. W.G.)	MAX NC LEVELS		ELECTRIC HEATING COIL					MANUFACTURER, MODEL NO. & BOX SIZE
					RAD	DIS	HEATING MAX AIRFLOW (CFM)	EAT/LAT (DEG. F)	HEATING LOAD (MBH)	KW	V/PH/Hz	
VAV-51A	GLEE CLUB WEST	1900	760	0.6"/0.25"	13	12	760	55/94.5	33.42	9.5	208/3/60	TITUS DESV 16 W/ SILENCER
VAV-51B	GLEE CLUB EAST	1900	760	0.6"/0.25"	13	12	760	55/94.5	32.42	9.5	208/3/60	TITUS DESV 16 W/ SILENCER
VAV-52	GLEE CLUB SECTIONAL	1800	720	0.6"/0.25"	11	11	720	55/96.7	32.42	9.5	208/3/60	TITUS DESV 16 W/ SILENCER
VAV-53	GLEE CLUB OFFICE	230	100	0.6"/0.25"	14	18	140	55/88.9	5.13	1.5	208/3/60	TITUS DESV 5 W/ SILENCER

EXISTING / RELOCATED VARIABLE AIR VOLUME BOX SCHEDULE (VAV (EX.), VAV (ER))

VAV NUMBER	ROOM SERVED	MAX AIRFLOW (CFM)	MIN AIRFLOW (CFM)	INLET/DISCHARGE S.P. (IN. W.G.)	HOT WATER HEATING COIL (40% PROPYLENE GLYCOL)					MANUFACTURER, MODEL NO. & BOX SIZE
					HEATING MAX AIRFLOW (CFM)	EAT/LAT (DEG. F)	WATER FLOW (GPM) @ 180°F EWT	WPD (FT. WG.)	COIL ROWS	
(EX.)VAV-09	3RD FLR OFFICE, HALLWAY, CLOSET	350	175	1.0" / 0.3"	175	55/90	1.1	–	1	TITUS DESV 06 INLET SIZE
(ER)VAV-10	BAND LIBRARY	700	350	1.0" / 0.3"	350	55/90	1.1	–	1	TITUS DESV 10 INLET SIZE
(ER)VAV-11	CONTROL ROOM	700	350	1.0" / 0.3"	350	55/90	1.1	–	1	TITUS DESV 10 INLET SIZE
(ER)VAV-12	HALLWAY 322	100	50	1.0" / 0.3"	50	55/90	0.6	–	1	TITUS DESV 06 INLET SIZE
(ER)VAV-14	OFFICE 302	200	100	1.0" / 0.3"	100	55/90	0.6	–	1	TITUS DESV 06 INLET SIZE

HOT WATER COIL SCHEDULE (HC #)

NUMBER	UNIT SERVED	AIRFLOW				FINS PER INCH/ROWS	S.P. (IN. W.G.)	FINNED HEIGHTx LENGTH	GPM @ 180° WATER	WATER PRESSURE DROP (FT)	MANUFACTURER & MODEL NO.
		CFM	EAT (DEG. F)	LAT (DEG. F)	MBH						
HC-2	EX. AHU-2	6000	55.0	97.6	270	8/2	0.38	42"x29"	27.4	5.1	YORK

FAN SCHEDULE (EF #)

NO.	SERVICE	LOCATION	AIRFLOW (CFM)	S.P. (IN. W.P.)	RPM	OPERATING HP	MOTOR HP	ELECTRICAL			ACCESSORIES	MANUFACTURER & MODEL NO.
								V	PH	HZ		
EF-1	1ST FLOOR RESTROOMS	IN-LINE	460	0.75	1893	1/6	0.25	120	1	60	VIBRATION ISOLATION KIT	GREENHECK BCF-106

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General Notes
1. All dimensions and existing conditions shall be checked and verified by contractor at the site prior to proceeding with the work.
2. Contractor shall inform Architect/ Engineer of any discrepancies on drawings before construction begins.
3. No existing service may be cut without Architect/Engineers's consent. Any existing service severed or damaged shall be replaced at no cost to owner.
4. Contractor must notify Architect/ Engineer at once if hidden existing conditions encountered require design modifications.

Issue	Issued For	Date
0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

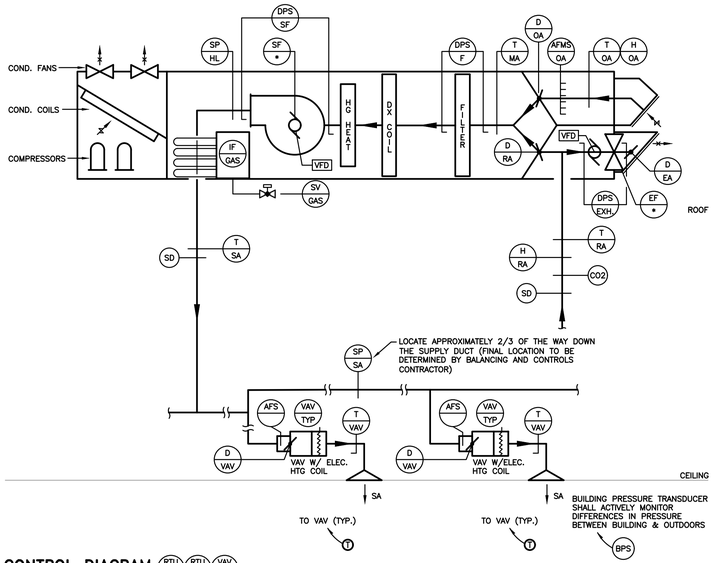
EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Schedules

M600



CONTROL DIAGRAM

RTU 1 RTU 2 VAV X

N.T.S.

SEQUENCE OF OPERATIONS

THE DIRECT DIGITAL AND AUTOMATIC TEMPERATURE AND AIRFLOW CONTROLS SHALL BE AN EXTENSION OF THE EXISTING ATC SYSTEM FOR THE BUILDING AS DESCRIBED IN THE SPECIFICATIONS.

INTERFACE HVAC SYSTEM CONTROLS WITH BUILDING AUTOMATION SYSTEM AS DESCRIBED IN SEQUENCE OF OPERATIONS. CONTRACTOR SHALL COORDINATE REQUIREMENTS WITH OWNER.

THE BUILDING AUTOMATION SYSTEM (BAS) WILL INTERFACE WITH THE ROOFTOP UNIT THROUGH THE BACNET PROTOCOL. ALL MONITORING AND CONTROL SHALL BE ACCOMPLISHED USING SOFTWARE POINTS THROUGH THIS INTERFACE.

A. SYSTEM INOPERATIVE – WHEN THE SYSTEM IS INDEXED TO INOPERATIVE, THE SUPPLY FAN, SF, STOPS AND POWER EXHAUST FAN EF, STOPS; OUTSIDE AIR DAMPER, D–OA, AND RELIEF AIR DAMPER, D–EA, CLOSES; RETURN AIR DAMPER, D–RA OPENS; DX COOLING IS DISABLED; GAS HEATING IS DISABLED.

B. SYSTEM OPERATIVE – WHEN THE SYSTEM IS INDEXED TO OPERATIVE, THE SUPPLY FAN, SF, SHALL START THROUGH ITS RESPECTIVE VFD; OUTSIDE AIR DAMPER, D–OA PARTIALLY OPENS TO MINIMUM POSITION; RETURN AIR DAMPER PARTIALLY CLOSES AND UNIT OPERATES ON ITS PRODUCT INTEGRATED CONTROLS. ASSOCIATED RESTROOM EXHAUST FAN DAMPER, D OPENS AND FAN STARTS.

C. ROOFTOP UNITS RTU–1 N & RTU–2

1. BUILDING AUTOMATION SYSTEM INTERFACE:

   THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER MORNING WARM–UP / PRE–COOL, OCCUPIED / UNOCCUPIED AND HEAT / COOL MODES. IF COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

2. EMERGENCY STOP:

   THE UNIT SHALL BE ELECTRICALLY INTERLOCKED TO THE FIRE ALARM SYSTEM. WHEN PRODUCTS OF COMBUSTION ARE DETECTED, ALL FANS SHALL STOP, HEATING AND COOLING SHALL DE–ENERGIZE AND DAMPERS SHALL RETURN TO THEIR FAIL SAFE POSITION. UNIT SHALL REMAIN IN THIS STATE UNTIL ALARM CONDITION HAS BEEN CLEARED AT THE FIRE ALARM SYSTEM AND THE UNIT IS MANUALLY RESET AT THE BAS.

3A. OCCUPIED MODE (RTU–1)

   DURING OCCUPIED PERIODS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER SHALL OPEN TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. THE UNIT CONTROLLER SHALL CONTROL THE SUPPLY FAN SPEED TO MAINTAIN THE CURRENT DUCT STATIC PRESSURE SETPOINT (ADJ.). THE DX COOLING SHALL STAGE AND GAS HEAT SHALL MODULATE TO MAINTAIN THE CURRENT DISCHARGE AIR TEMPERATURE SETPOINT. IF ECONOMIZING IS ENABLED THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE CURRENT DISCHARGE AIR TEMPERATURE SETPOINT.

   THE OUTSIDE AIR DAMPER AND RETURN AIR DAMPER SHALL MODULATE AS NECESSARY TO MAINTAIN THE OUTSIDE AIR INTAKE CFM SETPOINT. THIS CONTROL SCHEME SHALL BE OVERRIDDEN BY THE AIRSIDE ECONOMIZER WHEN REQUIRED. IF THE MIXED AIR TEMPERATURE FALLS BELOW THE MIXED AIR MINIMUM SETPOINT OF 45 DEG F (ADJ.), THE OUTSIDE AIR DAMPER SHALL MODULATE CLOSED AND THE RETURN AIR DAMPER OPEN AS NECESSARY TO MAINTAIN SETPOINT.

3B. DURING OCCUPIED PERIODS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER SHALL OPEN TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. THE UNIT CONTROLLER SHALL CONTROL THE SUPPLY FAN SPEED TO MAINTAIN THE SPACE TEMPERATURE SETPOINT. THE DX COOLING SHALL STAGE AND GAS HEAT SHALL MODULATE TO MAINTAIN THE CURRENT DISCHARGE AIR TEMPERATURE SETPOINT. IF ECONOMIZING IS ENABLED THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN THE CURRENT DISCHARGE AIR TEMPERATURE SETPOINT.

   THE OUTSIDE AIR DAMPER AND RETURN AIR DAMPER SHALL MODULATE AS NECESSARY TO MAINTAIN THE OUTSIDE AIR INTAKE CFM SETPOINT. THIS CONTROL SCHEME SHALL BE OVERRIDDEN BY THE AIRSIDE ECONOMIZER WHEN REQUIRED. IF THE MIXED AIR TEMPERATURE FALLS BELOW THE MIXED AIR MINIMUM SETPOINT OF 45 DEG F (ADJ.), THE OUTSIDE AIR DAMPER SHALL MODULATE CLOSED AND THE RETURN AIR DAMPER OPEN AS NECESSARY TO MAINTAIN SETPOINT.

3. UNOCCUPIED MODE:

   a. WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT OF 65.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL START, THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND THE GAS HEAT SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED HEATING SETPOINT OF 65.0 DEG. F (ADJ.) PLUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP AND THE GAS HEAT SHALL BE DISABLED.

   b. WHEN THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED COOLING SETPOINT OF 80.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL START, THE OUTSIDE AIR DAMPER SHALL OPEN IF ECONOMIZING IS ENABLED AND REMAIN CLOSED IF ECONOMIZING IS DISABLED AND THE DX COOLING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED COOLING SETPOINT OF 80.0 DEG. F (ADJ.) MINUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP, THE DX COOLING SHALL BE DISABLED AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

4. OPTIMAL START:

   THE BAS SHALL MONITOR THE SCHEDULED OCCUPIED TIME, OCCUPIED SPACE SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL START OCCURS.

5. MORNING WARM–UP MODE:

   DURING OPTIMAL START, IF THE AVERAGE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT A MORNING WARM–UP MODE SHALL BE ACTIVATED. WHEN MORNING WARM–UP IS INITIATED THE UNIT SHALL ENABLE THE HEATING AND SUPPLY FAN. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED. WHEN THE AVERAGE SPACE TEMPERATURE REACHES THE OCCUPIED HEATING SETPOINT (ADJ.), THE UNIT SHALL TRANSITION TO THE OCCUPIED MODE.

6. PRE–COOL MODE:

   DURING OPTIMAL START, IF THE AVERAGE SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT, PRE–COOL MODE SHALL BE ACTIVATED. WHEN PRE–COOL IS INITIATED THE UNIT SHALL ENABLE THE FAN AND COOLING OR ECONOMIZER. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED, UNLESS ECONOMIZING. WHEN THE AVERAGE SPACE TEMPERATURE REACHES OCCUPIED COOLING SETPOINT (ADJ.), THE UNIT SHALL TRANSITION TO THE OCCUPIED MODE.

7. OCCUPIED BYPASS (UNOCCUPIED OVERRIDE):

   MODE USED TO TEMPORARILY PLACE THE UNIT INTO THE OCCUPIED OPERATION. OCCUPANTS SHALL BE ABLE TO OVERRIDE THE UNOCCUPIED MODE FROM THE SPACE THERMOSTAT. THE OVERRIDE SHALL LAST FOR 2 HOURS (ADJ.). DURING THE OVERRIDE THE UNIT SHALL OPERATE IN OCCUPIED MODE.

8. COOLING MODE:

   THE UNIT CONTROLLER SHALL USE THE DISCHARGE AIR TEMPERATURE SENSOR AND DISCHARGE AIR TEMPERATURE COOLING SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR COOLING. DISCHARGE AIR SETPOINT SHALL BE MAINTAINED BY MODULATING THE ECONOMIZER OR STAGING THE DX COOLING AS REQUIRED TO MAINTAIN THE DISCHARGE AIR SETPOINT.

9. HEATING MODE:

   DURING UNOCCUPIED HEATING OR MORNING WARM–UP MODE, THE UNIT HEAT REQUEST WILL BE COMMUNICATED TO THE SYSTEM VAVS PRIOR TO COMMENCING HEATING OPERATION TO ALLOW VAV UNITS TO OPEN. THE VFD SHALL BE COMMANDED TO 100% AND THE HEAT WILL BE STAGED ON AND OFF TO SATISFY THE ZONE TEMPERATURE SETPOINT. DURING OCCUPIED CHANGEOVER HEATING, THE UNIT CONTROLLER SHALL MODULATE THE GAS HEAT TO MAINTAIN THE DISCHARGE AIR HEATING SETPOINT.

10. DEHUMIDIFICATION:

   a. FACTORY INSTALLED HOT GAS REHEAT SHALL ALLOW APPLICATION OF DEHUMIDIFICATION. DEHUMIDIFICATION SHALL BE ALLOWED ONLY WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 40.0 DEG. F (ADJ.) AND BELOW 100.0 DEG. F (ADJ.), THERE IS NO CALL FOR HEATING, AND THE COOLING DEMAND IS LESS THAN 50% OF THE UNIT COOLING CAPACITY. THE ECONOMIZER OUTSIDE AIR DAMPER SHALL DRIVE TO MINIMUM POSITION DURING DEHUMIDIFICATION.

   b. WHEN THE RELATIVE HUMIDITY IN THE CONTROLLED SPACE (AS MEASURED BY THE SENSOR ASSIGNED TO SPACE HUMIDITY SENSING) RISES ABOVE THE SPACE HUMIDITY SETPOINT, COMPRESSORS AND THE SUPPLY FAN SHALL ENERGIZE TO REDUCE THE HUMIDITY IN THE SPACE. ALL COMPRESSORS SHALL STAGED UP DURING ACTIVE DEHUMIDIFICATION. DURING DEHUMIDIFICATION MODE, VALVES SHALL MODULATE TO ALLOW REFRIGERANT TO FLOW THROUGH BOTH THE CONDENSER COIL AND THE REHEAT COIL AS NECESSARY TO MAINTAIN THE SUPPLY AIR REHEAT SETPOINT. WHEN NO REHEAT IS REQUIRED ALL REFRIGERANT SHALL FLOW THROUGH THE CONDESER COIL.

11. ECONOMIZER:

   a. THE SUPPLY AIR SENSOR SHALL MEASURE THE DRY BULB TEMPERATURE OF THE AIR LEAVING THE EVAPORATOR COIL WHILE ECONOMIZING. WHEN ECONOMIZING IS ENABLED AND THE UNIT IS OPERATING IN THE COOLING MODE, THE ECONOMIZER OUTSIDE AIR DAMPER SHALL BE MODULATED BETWEEN ITS MINIMUM POSITION AND 100% TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE ECONOMIZER DAMPER SHALL MODULATE TOWARD MINIMUM POSITION IN THE EVENT THE MIXED AIR TEMPERATURE FALLS BELOW THE LOW LIMIT TEMPERATURE SETTING. COMPRESSORS SHALL BE DELAYED FROM OPERATING UNTIL THE ECONOMIZER HAS OPENED TO 100%.

   b. COMPARATIVE ENTHALPY:

      OUTSIDE AIR (OA) ENTHALPY SHALL BE COMPARED WITH RETURN AIR (RA) ENTHALPY POINT. THE ECONOMIZER SHALL ENABLE WHEN OA ENTHALPY IS LESS THAN RA ENTHALPY – 3.0 BTU/LB. THE ECONOMIZER SHALL DISABLE WHEN OA ENTHALPY IS GREATER THAN RA ENTHALPY.

12. DEMAND CONTROL VENTILATION (DCV):

   a. IF THE RETURN CO2 LEVEL IS GREATER THAN OR EQUAL TO THE DESIGN MINIMUM CO2 SETPOINT, THE OUTDOOR AIR DAMPER SHALL OPEN TO THE DESIGN MINIMUM OUTDOOR AIR DAMPER SETPOINT. IF THERE IS A CALL FOR ECONOMIZER COOLING, THE DAMPER MAY BE OPENED FURTHER TO SATISFY THE COOLING REQUEST.

   b. IF THE RETURN CO2 LEVEL IS LESS THAN OR EQUAL TO THE DCV MINIMUM CO2 SETPOINT, THE OUTDOOR AIR DAMPER SHALL CLOSE TO THE DCV MINIMUM OUTDOOR AIR DAMPER SETPOINT. IF THERE IS A CALL FOR ECONOMIZER COOLING, THE DAMPER MAY BE OPENED FURTHER TO SATISFY THE COOLING REQUEST.

   c. IF THE RETURN CO2 LEVEL IS GREATER THAN THE DCV MINIMUM CO2 SETPOINT AND LESS THAN THE DESIGN MINIMUM CO2 SETPOINT, THE OUTDOOR AIR DAMPER POSITION SHALL BE MODULATED PROPORTIONALLY TO THE SPACE CO2 LEVEL RELATIVE TO A TARGET POSITION BETWEEN THE DCV MINIMUM CO2 SETPOINT AND THE DESIGN MINIMUM CO2 SETPOINT. IF THERE IS A CALL FOR ECONOMIZER COOLING, THE DAMPER MAY BE OPENED FURTHER TO SATISFY THE COOLING REQUEST.

13. SUPPLY FAN:

   THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE AND CYCLED ON DURING THE UNOCCUPIED MODE. A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FAN. IF THE SWITCH DOES NOT OPEN WITHIN 40 SECONDS AFTER A REQUEST FOR FAN OPERATION A FAN FAILURE ALARM SHALL BE ANNUNCIATED AT THE BAS, THE UNIT SHALL STOP, REQUIRING A MANUAL RESET.

14. SUPPLY DUCT STATIC PRESSURE CONTROL:

   a. DURING THE OCCUPIED MODE THE UNIT CONTROLLER SHALL MODULATE THE OUTPUT TO THE VFD AS REQUIRED TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT OF 1.5 INCHES OF W.C. (ADJ.). IF THE DUCT STATIC PRESSURE FALLS BELOW 1.3 INCHES OF W.C. (ADJ.) THE UNIT CONTROLLER SHALL INCREASE THE OUTPUT TO THE VFD TO MAINTAIN SETPOINT. IF THE DUCT STATIC PRESSURE RISES ABOVE 1.7 INCHES OF W.C. (ADJ.) THE UNIT CONTROLLER SHALL DECREASE THE OUTPUT TO THE VFD TO MAINTAIN SETPOINT. UPON A CALL FOR HEATING OR COOLING IN THE UNOCCUPIED MODE THE UNIT CONTROLLER SHALL MODULATE THE SPEED OF THE VFD TO 100%.

   b. THE SUPPLY STATIC PRESSURE SETPOINT SHALL BE RESET BASED ON VAV BOX DAMPER POSITION. IF NO VAV BOX IS GREATER THEN 85% (ADJ.) OPEN, DECREASE THE SUPPLY AIR STATIC PRESSURE UNTIL AT LEAST ONE (1) VAV BOX IS GREATER THAN 85% (ADJ.) OPEN. IF A VAV BOX IS GREATER THAN 95% (ADJ.) OPEN, INCREASE THE STATIC PRESSURE SETPOINT UNTIL ALL VAV BOXES ARE BELOW 95% (ADJ.) OPEN. THE STATIC PRESSURE SETPOINT SHALL OPERATE WITHIN USER DEFINED HIGH AND LOW LIMITS.

   c. IF FOR ANY REASON THE SUPPLY AIR PRESSURE EXCEEDS THE SUPPLY AIR PRESSURE HIGH LIMIT, THE SUPPLY FAN SHALL SHUT DOWN. THE UNIT SHALL BE ALLOWED TO RESTART THREE TIMES AFTER A 15 MINUTE OFF PERIOD. IF THE OVERPRESSURIZATION CONDITION OCCURS ON THE FOURTH RESTART, THE UNIT SHALL SHUT DOWN AND A MANUAL RESET DIAGNOSTIC IS DISPLAYED AT THE REMOTE PANEL AND/OR THE BAS SYSTEM.

15. BUILDING PRESSURE CONTROL:

   A DIFFERENTIAL PRESSURE TRANSDUCER SHALL ACTIVELY MONITOR THE DIFFERENCE IN PRESSURE BETWEEN THE BUILDING (INDOORS) AND OUTDOORS. IF THE BUILDING PRESSURE INCREASES ABOVE THE DIFFERENTIAL PRESSURE SETPOINT, THE UNIT CONTROLLER SHALL TURN ON THE EXHAUST FAN AND MODULATE THE EXHAUST FAN DAMPER TO CONTROL BUILDING PRESSURE TO THE DIFFERENTIAL PRESSURE SETPOINT. IF THE BUILDING PRESSURE DECREASES BELOW THE DIFFERENTIAL PRESSURE SETPOINT, THE CONTROLLER SHALL DEACTIVATE THE EXHAUST FAN AND CLOSE THE EXHAUST DAMPER.

16. EXHAUST FAN STATUS:

   A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FAN. IF THE SWITCH IS DETECTED TO BE OPEN FOR 40 CONSECUTIVE SECONDS AFTER A REQUEST FOR EXHAUST FAN OPERATION A FAN FAILURE ALARM SHALL BE ANNUNCIATED AT THE BAS AND THE EXHAUST FAN SHALL STOP. A MANUAL RESET SHALL BE REQUIRED.

17. FILTER STATUS:

   A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES FOR 2 MINUTES AFTER A REQUEST FOR FAN OPERATION A DIRTY FILTER ALARM SHALL BE ANNUNCIATED AT THE BAS.

D. VARIABLE AIR VOLUME BOXES (VAV) W/ ELECTRIC REHEAT (RTU–1 ONLY)

1. BUILDING AUTOMATION SYSTEM INTERFACE:

   THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED AND UNOCCUPIED COMMANDS. THE BAS MAY ALSO SEND A HEAT/COOL MODE, PRIORITY SHUTDOWN COMMANDS, SPACE TEMPERATURE AND/OR SPACE TEMPERATURE SETPOINT. IF COMMUNICATION IS LOST WITH THE BAS, THE VAV CONTROLLER SHALL OPERATE USING ITS LOCAL SETPOINTS.

2. OCCUPANCY MODE:

   THE OCCUPANCY MODE SHALL BE COMMUNICATED TO THE VAV. VALID OCCUPANCY MODES FOR THE VAV SHALL BE:

   a. OCCUPIED:

      NORMAL OPERATING MODE FOR OCCUPIED SPACES OR DAYTIME OPERATION. WHEN THE UNIT IS IN THE OCCUPIED MODE THE VAV SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE OCCUPIED HEATING OR COOLING SETPOINT. APPLICABLE VENTILATION AND AIRFLOW SETPOINTS SHALL BE ENFORCED. THE OCCUPIED MODE SHALL BE THE DEFAULT MODE OF THE VAV.

   b. UNOCCUPIED:

      NORMAL OPERATING MODE FOR UNOCCUPIED SPACES OR NIGHTTIME OPERATION. WHEN THE UNIT IS IN UNOCCUPIED MODE THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE STORED UNOCCUPIED HEATING OR COOLING SETPOINT REGARDLESS OF THE PRESENCE OF A HARDWIRED OR COMMUNICATED SETPOINT. WHEN THE SPACE TEMPERATURE EXCEEDS THE ACTIVE UNOCCUPIED SETPOINT THE VAV SHALL MODULATE FULLY CLOSED.

   c. OCCUPIED BYPASS (UNOCCUPIED OVERRIDE):

      MODE USED TO TEMPORARILY PLACE THE UNIT INTO THE OCCUPIED OPERATION. TENANTS SHALL BE ABLE TO OVERRIDE THE UNOCCUPIED MODE FROM THE ASSOCIATED TOUCH SCREEN PANEL LOCATED AT THE MAIN ENTRANCE. THE OVERRIDE SHALL LAST FOR 2 HOURS (ADJ.). DURING THE OVERRIDE THE UNIT SHALL OPERATE IN OCCUPIED MODE.

3. HEAT/COOL MODE:

   THE HEAT/COOL MODE SHALL BE SET BY A COMMUNICATED VALUE OR AUTOMATICALLY BY THE VAV. IN STANDALONE OR AUTO MODE THE VAV SHALL COMPARE THE PRIMARY AIR TEMPERATURE WITH THE CONFIGURED AUTO CHANGEOVER SETPOINT TO DETERMINE IF THE AIR IS "HOT" OR "COLD". HEATING MODE IT IMPLIES THE PRIMARY AIR TEMPERATURE IS HOT. COOLING MODE IT IMPLIES THE PRIMARY AIR TEMPERATURE IS COLD.

4. HEAT/COOL SETPOINTS:

   THE SPACE TEMPERATURE SETPOINT SHALL BE DETERMINED EITHER BY A LOCAL (E.G., THUMBWHEEL) SETPOINT, THE VAV DEFAULT SETPOINT OR A COMMUNICATED VALUE. THE VAV SHALL USE THE LOCALLY STORED DEFAULT SETPOINTS WHEN NEITHER A LOCAL SETPOINT NOR COMMUNICATED SETPOINT IS PRESENT. IF BOTH A LOCAL SETPOINT AND COMMUNICATED SETPOINT EXIST, THE VAV SHALL USE THE COMMUNICATED VALUE.

SETPOINT	DEFAULT VALUE
OCCUPIED HEATING SETPOINT	68.0 DEG. F (ADJ.)
UNOCCUPIED HEATING SETPOINT	65.0 DEG. F (ADJ.)
OCCUPIED COOLING SETPOINT	75.0 DEG. F (ADJ.)
UNOCCUPIED COOLING SETPOINT	80.0 DEG. F (ADJ.)
OCCUPIED MIN HEATING AIRFLOW SETPOINT	SEE VAV SCHEDULE
OCCUPIED MAX HEATING AIRFLOW SETPOINT	SEE VAV SCHEDULE
OCCUPIED MIN COOLING AIRFLOW SETPOINT	SEE VAV SCHEDULE
OCCUPIED MAX COOLING AIRFLOW SETPOINT	SEE VAV SCHEDULE

5. COOLING MODE:

   WHEN THE UNIT IS IN COOLING MODE, THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE COOLING SETPOINT BY MODULATING THE AIRFLOW BETWEEN THE ACTIVE COOLING MINIMUM AIRFLOW SETPOINT TO THE MAXIMUM COOLING AIRFLOW SETPOINT. THE VAV SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE COOLING SETPOINT TO DETERMINE THE REQUESTED COOLING CAPACITY OF THE UNIT. THE OUTPUTS WILL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED COOLING CAPACITY.

6. REHEAT CONTROL:

   THE REHEAT SHALL BE ENABLED WHEN THE SPACE TEMPERATURE DROPS BELOW THE ACTIVE HEATING SETPOINT AND THE MINIMUM AIRFLOW REQUIREMENTS ARE MET. DURING REHEAT THE VAV SHALL OPERATE AS FOLLOWS:

   a. SILICON CONTROLLED RECTIFIER (SCR):

      IF THE SPACE TEMPERATURE IS AT THE HEATING SETPOINT, THE ELECTRIC HEATER SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT WHILE THE VAV OPERATES AT ITS MINIMUM HEATING AIRFLOW SETPOINT. IF THE DISCHARGE AIR TEMPERATURE REACHES THE DESIGN HEATING DISCHARGE AIR TEMPERATURE SETPOINT (ADJ.), THE VAV SHALL MODULATE AIRFLOW BETWEEN THE MINIMUM HEATING AIRFLOW SETPOINT AND THE MAXIMUM HEATING AIRFLOW SETPOINT AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT, WHILE THE ELECTRIC HEATER MODULATES TO MAINTAIN DISCHARGE AIR TEMPERATURE AT THE DESIGN HEATING DISCHARGE AIR TEMPERATURE SETPOINT. IF THE AIRFLOW REACHES THE MAXIMUM HEATING AIRFLOW SETPOINT, THE VAV SHALL MODULATE THE ELECTRIC HEATER AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT, WHILE THE VAV OPERATES AT ITS MAXIMUM HEATING AIRFLOW SETPOINT.

   b. SPACE SENSOR FAILURE:

      IF THERE IS A FAULT WITH THE OPERATION OF THE ZONE SENSOR AN ALARM SHALL BE ANNUNCIATED AT THE BAS. SPACE SENSOR FAILURE SHALL CAUSE THE VAV TO DRIVE THE DAMPER TO MINIMUM AIR FLOW IF THE VAV IS IN THE OCCUPIED MODE, OR DRIVE IT CLOSED IF THE VAV IS IN THE UNOCCUPIED MODE.

7. DEMAND CONTROL VENTILATION:

   EACH VAV BOX SERVING THE GLEE CLUB ROOM AND SECTIONAL ROOM SHALL BE PROVIDED WITH COMBINATION SPACE TEMPERATURE AND CARBON DIOXIDE SENSORS. IF THE CO2 LEVEL RISES ABOVE THE SETPOINT OF 330 PPM (ADJ.) ABOVE THE OUTSIDE AIR CO2 LEVEL, THE VAV BOX CFM SETPOINT SHALL BE INCREASED UNTIL THE SPACE CO2 LEVEL IS AT SETPOINT. IF THE CO2 LEVEL FALLS BELOW SETPOINT, THE VAV BOX SHALL BE RELEASED TO SPACE TEMPERATURE CONTROL. IF THE VAV BOX IS AT MAXIMUM CFM AND THE CO2 LEVEL IS STILL ABOVE SETPOINT, THE BMS SHALL INCREASE THE OUTSIDE CFM SETPOINT OF THE RTU INCREMENTALLY UNTIL THE SPACE CO2 LEVEL REACHES SETPOINT. THE RTU OUTSIDE AIR SHALL BE PLACED UNDER NORMAL CONTROL WHEN THE CO5 LEVEL FALLS BELOW SETPOINT.

E. SAFETY CONTROLS (REFER TO ROOFTOP UNIT SPECIFICATIONS FOR ADDITIONAL BAS AND SAFETY MONITORING AND CONTROL)

1. MONITOR AND RELAY THE FOLLOWING THROUGH THE BAS:

   - RTU FANS COMMAND STATUS (ON/OFF)
   - RTU SUPPLY/RETURN AIR TEMPERATURE (°F)
   - RTU SUPPLY/RETURN AIR TEMPERATURE SETPOINT (°F)
   - COMMAND TEMPERATURE STATUS;
   - COOLING STATUS;
   - HEATING STATUS;
   - FAN AIRFLOW RATES;
   - ECONOMIZER STATUS;
   - MIXED AIR TEMPERATURE;
   - RETURN AIR TEMPERATURE;
   - RETURN AIR HUMIDITY;
   - DAMPER POSITIONS;
   - FILTER PRESSURE SWITCH;
   - HOT GAS BYPASS STATUS;
   - CARBON DIOXIDE SENSOR;
   - DIFFERENT PRESSURE SWITCHES (DPS);
   - STATIC PRESSURE SUPPLY AIR.

2. MONITOR AND RELAY THE FOLLOWING ALARMS THROUGH THE BAS:

   - RTU HIGH COOLING SUPPLY AIR TEMPERATURE (60°F, ADJUSTABLE)
   - RTU LOW SUPPLY AIR TEMPERATURE (45°F, ADJUSTABLE)
   - RTU HIGH RETURN AIR TEMPERATURE (85°F, ADJUSTABLE)
   - RTU GENERAL ALARMS & PREVIOUSLY NOTED ALARMS;
   - LOW/HIGH PRESSURE ALARM;
   - LOW STATIC ALARM;
   - HIGH STATIC ALARM;
   - CONDENSATE OVERFLOW ALARM;
   - HI/LOW VOLTAGE ALARM;
   - ITEMIZED FAULT CODE LISTING REASON FOR SHUTDOWN FAULT;

3. ACTIVATION OF DUCT MOUNTED SUPPLY AND RETURN AIR SMOKE DETECTORS, SD, SHALL RENDER THE SYSTEM INOPERATIVE AND SIGNAL AN ALARM TO THE BUILDING FIRE ALARM SYSTEM.

4. DIFFERENTIAL PRESSURE SWITCHES, DPS, SHALL SIGNAL THE BAS ON HIGH DIFFERENTIAL PRESSURE ACROSS THE FILTERS.

5. UPON A SIGNAL FROM THE BUILDING FIRE ALARM SYSTEM, THE SYSTEM SHALL BECOME INOPERATIVE.

6. STATUS OF AIRFLOWS, SPACE TEMPERATURES AND DAMPER POSITIONS OF VAV'S SHALL BE MONITORED BY THE BAS.

7. UPON ACTIVATION OF DUCT MOUNTED SMOKE DETECTOR THE VAV BOXES ARE RENDERED INOPERATIVE AND THE BUILDING FIRE ALARM SYSTEM IS SIGNALED.

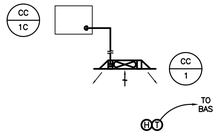
8. WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 SHALL BE PROVIDED TO SHUT OFF EQUIPMENT AND SEND AN ALARM TO THE BAS IN THE EVENT THE PRIMARY DRAIN LINE IS BLOCKED. THE DEVICE SHALL BE INSTALLED IN THE EQUIPMENT SUPPLIED DRAIN PAN. LOCATED AT A POINT HIGHER THAN THE PRIMARY DRAIN CONNECTION AND BELOW THE OVERFLOW RIM OF SUCH PAN.

9. STATUS OF VAV BOXES, PRIMARY AIR FLOW, ELECTRICAL COIL, AND SUPPLY AIR TEMPERATURE SHALL BE MONITORED BY BAS.

10. IF DUCT STATIC HI LIMIT SENSOR TRIPS, UNIT SHALL BE SHUT DOWN AND AN ALARM SENT TO BAS SYSTEM.

11. ALL SAFETY DEVICES SHALL BE HARDWIRED TO THE STARTERS OF THE SYSTEM'S COMPONENT EQUIPMENT.

12. ALL SAFETY DEVICES SHALL BE MONITORED BY THE BAS.



ENVIRONMENTAL CONTROL SYSTEM – CONTROL DIAGRAM AND SEQUENCE OF OPERATIONS

N.T.S.

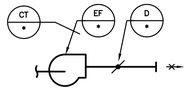
THE PRECISION TEMPERATURE AND HUMIDITY CONTROL UNIT, CC–1/CC–1C SHALL OPERATE THROUGH INDEPENDENT CONTROLS PROVIDED WITH THE SYSTEMS AND SHALL BE MONITORED BY THE BUILDING AUTOMATION SYSTEMS.

SAFETIES

PROVIDE SEPARATE TEMPERATURE AND HUMIDITY SENSOR TO MONITOR THE SPACE TEMPERATURE THROUGH THE BUILDING AUTOMATION SYSTEM. ON A RISE IN SPACE TEMPERATURE ABOVE 75 DEGREES F. (ADJUSTABLE), OR A DROP IN SPACE TEMPERATURE BELOW 70 DEGREE F. (ADJUSTABLE), SIGNAL AN ALARM THROUGH THE BUILDING AUTOMATION SYSTEM. ON A RISE IN SPACE HUMIDITY ABOVE 60% RH (ADJUSTABLE) OR A DROP IN SPACE HUMIDITY BELOW 40% RH (ADJUSTABLE), SIGNAL AN ALARM THROUGH THE FMS.

PROVIDE A GENERAL FAULT ALARM CONTACT AND CONNECT TO THE GENERAL FAULT ALARM CONTACT ON THE UNIT CONTROL PANEL. ON A GENERAL FAULT SIGNAL FROM THE UNIT, SIGNAL AN ALARM TO THE FMS. THE SYSTEM SHALL BE CONFIGURED TO ACTIVATE THE GENERAL ALARM FOR ANY OF THE FOLLOWING CONDITIONS:

- HIGH TEMPERATURE
- LOW TEMPERATURE
- HIGH HUMIDITY
- LOW HUMIDITY
- HIGH WATER ALARM – LOCKOUT UNIT OPERATION
- HIGH HEAD PRESSURE
- LOSS OF POWER
- COMPRESSOR SHORT CYCLE
- HUMIDIFIER PROBLEMS
- FILTER CLOG
- WATER DETECTED



EXHAUST FAN EF 1

N.T.S.

SEQUENCE OF OPERATIONS

THE EXHAUST FANS SHALL OPERATE THROUGH NEW DIRECT DIGITAL CONTROLS AND NETWORK CONTROL UNITS CONNECTED TO THE EXISTING BUILDING AUTOMATION SYSTEM.

WHEN THE EXHAUST FAN IS INDEXED TO OPERATIVE BY THE TIMECLOCK ROUTINE, THE DAMPER SHALL OPEN AND THE FAN SHALL START.

WHEN THE EXHAUST FAN IS INDEXED TO INOPERATIVE, THE FAN SHALL STOP AND THE DAMPER SHALL CLOSE.

MONITOR THE STATUS OF THE FAN THROUGH A CURRENT TRANSMITTER.

ON A DROP IN CURRENT AS MEASURED BY CURRENT TRANSMITTER, CT–*, WHEN THE FAN IS INDEXED TO OPERATIVE, SIGNAL AN ALARM AT THE BUILDING AUTOMATION SYSTEM WORKSTATION.

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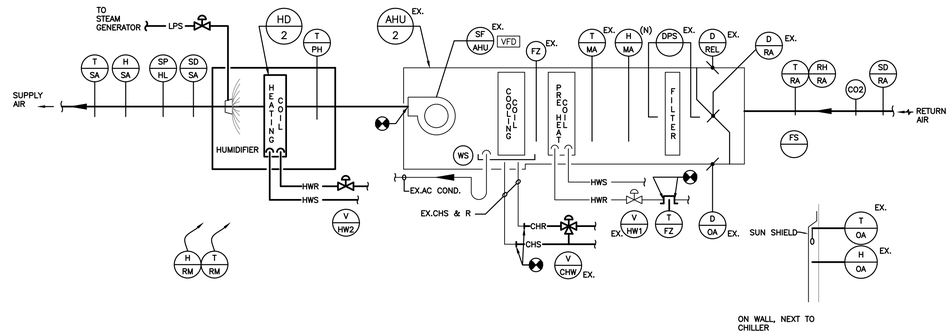


AIR HANDLING UNIT – 2 CONTROL DIAGRAM (AHU 2)

N.T.S.

SEQUENCE OF OPERATIONS

AIR HANDLING UNIT AND ASSOCIATED RETURN FAN AND REHEAT COIL SHALL OPERATE THROUGH NEW DIRECT DIGITAL CONTROLS AND NETWORK CONTROL UNITS CONNECTED TO THE EXISTING BUILDING AUTOMATION SYSTEM. AUTOMATIC TEMPERATURE CONTROLS (ATC) SHALL BE AN EXTENSION OF THE EXISTING SYSTEM. THE BUILDING AUTOMATION SYSTEM (BAS) WILL MONITOR AND CONTROL ALL EQUIPMENT. EQUIPMENT SCHEDULES (OCCUPIED AND UNOCCUPIED MODE) AND SETPOINTS WILL BE PROGRAMMED AT THE BAS AND WILL BE ADJUSTABLE. REFER TO SPECIFICATIONS FOR ADDITIONAL ATC WORK.

SPACE TEMPERATURE SENSORS, T–S, WILL BE PROVIDED WHERE INDICATED. SPACE TEMPERATURE SENSORS WILL HAVE LIMITED ADJUSTMENT. OCCUPANTS WILL BE PROVIDED WITH A PROGRAMMED SET RANGE OF TEMPERATURE CONTROL, +/– 3 DEGREES F (ADJUSTABLE) FROM THE BAS SETPOINT. HVAC OVERRIDE BUTTON SHALL BE PROVIDED WITH EACH TEMPERATURE SENSOR. HVAC OVERRIDE SHALL TAKE SYSTEM FROM UNOCCUPIED MODE AND PLACE INTO OCCUPIED MODE FOR 2–HOURS (ADJUSTABLE).

CONTROLS CONTRACTOR TO COORDINATE WORK WILL ELECTRICAL CONTRACTOR TO INTERFACE WITH OCCUPANCY SENSORS WHERE NECESSARY.

A. SYSTEM INOPERATIVE – WHEN THE SYSTEM IS INDEXED TO INOPERATIVE, THE SUPPLY FAN, SF–AHU, STOPS AND RETURN FAN, RF–1, STOPS; OUTSIDE AIR DAMPER, D–OA, AND RELIEF AIR DAMPERS, D–REL1 & D–REL2, CLOSES; RETURN AIR DAMPER, D–RA OPENS; CHILLED WATER CONTROL VALVE, V–CHW, CLOSES AND COOLING IS DISABLED; HEATING HOT WATER CONTROL VALVE, V–HW, CLOSES AND HEATING IS DISABLED.

B. SYSTEM OPERATIVE – SYSTEM SHALL BE SCHEDULED INTO OCCUPIED AND UNOCCUPIED MODE BY THE BAS. TEMPERATURE SETPOINT WILL BE SET AT THE BAS. WHEN THE SYSTEM IS INDEXED TO OPERATIVE, THE SUPPLY FAN, SF–AHU, SHALL SOFT START THROUGH ITS RESPECTIVE VFD; OUTSIDE AIR DAMPER, D–OA PARTIALLY OPENS TO MINIMUM POSITION; RETURN AIR DAMPER PARTIALLY CLOSES. THE SUPPLY FAN WILL RUN CONTINUOUSLY IN OCCUPIED MODE.

THE SYSTEM OPERATES AS FOLLOWS:

1. ECONOMIZER MODE: ON A RISE IN SUPPLY AIR TEMPERATURE ABOVE 59 DEGREES F (ADJUSTABLE) AS SENSED BY TEMPERATURE SENSOR, T–SA, AND WHEN CONDITIONS PERMIT ECONOMIZER COOLING, ENTHALPY CONTROLLER SHALL COMPARE RETURN AIR AND OUTSIDE AIR CONDITIONS AND MODULATE OUTSIDE AIR DAMPER, D–OA, OPEN AS RETURN AIR DAMPER, D–RA, PROPORTIONALLY CLOSES AND RELIEF AIR DAMPERS, D–REL1 & D–REL2, PROPORTIONALLY OPEN. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER, D–OA MODULATES TO ITS MINIMUM POSITION AND RETURN AIR DAMPER, D–RA PROPORTIONALLY OPENS AND RELIEF AIR DAMPERS, D–REL1 & D–REL2, CLOSE.
2. COOLING MODE: ON AN INCREASE IN SPACE TEMPERATURE ABOVE THE OCCUPIED COOLING MODE SETPOINT (75 DEGREES F, ADJUSTABLE) AS SENSED AND AVERAGED BY ROOM TEMPERATURE SENSORS T–S, AND WHEN CHILLED WATER IS AVAILABLE, CHILLED WATER CONTROL VALVE, V–CHW, SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE AS SENSED BY T–SA OF 55 DEGREES F (ADJUSTABLE). SUPPLY FAN MOTOR SPEED SHALL BE MODULATED BY ITS VFD TO MAINTAIN THE SPACE TEMPERATURE SETPOINT (ADJUSTABLE). ECONOMIZER COOLING WILL BE UTILIZED IF THE SPACE REQUIRES COOLING AND CHILLED WATER IS NOT AVAILABLE.
3. HEATING MODE: ON A DECREASE IN SPACE TEMPERATURE BELOW THE OCCUPIED HEATING MODE SETPOINT (70 DEGREES F, ADJUSTABLE) AS SENSED AND AVERAGED BY ROOM TEMPERATURE SENSORS T–1, AND WHEN HEATING HOT WATER IS AVAILABLE, HEATING HOT WATER CONTROL VALVE, V–HW, SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE AS SENSED BY T–SA OF 85 DEGREES F (ADJUSTABLE). SUPPLY FAN MOTOR SPEED SHALL BE MODULATED BY ITS VFD TO MAINTAIN THE SPACE TEMPERATURE SETPOINT (ADJUSTABLE).
4. DISCHARGE AIR TEMPERATURE RESET: THE DISCHARGE SUPPLY AIR TEMPERATURE COOLING SETPOINT SHALL BE RESET DOWN FROM 59 TO 55 DEGREES F (ADJUSTABLE) PRIOR TO INCREASING THE SPEED OF SUPPLY FAN MOTOR FROM ITS SET MINIMUM SPEED. THE DISCHARGE SUPPLY AIR TEMPERATURE HEATING SETPOINT SHALL BE RESET UP FROM 80 TO 85 DEGREES F (ADJUSTABLE) PRIOR TO INCREASING THE SPEED OF THE SUPPLY FAN MOTOR FROM ITS SET MINIMUM SPEED.
5. CARBON DIOXIDE SENSOR: OUTSIDE AIR MINIMUM SET POINT SHALL BE BASED ON CO2 LEVELS AS SENSED BY RETURN AIR CO2 SENSOR. MAINTAIN A MINIMUM CO2 LEVEL OF LESS THAN 900 PPM (ADJUSTABLE) OR AS SELECTED. MAXIMUM OUTSIDE AIR QUANTITY WHEN NOT IN THE ECONOMIZER MODE OF OPERATION SHALL BE AS SCHEDULED.
6. RETURN FAN: RETURN FAN RF–1 WILL BE ENABLED AND SHALL SOFT START THROUGH ITS RESPECTIVE VFD AND MODULATE TO MAINTAIN BUILDING PRESSURE AS SENSED BY BUILDING PRESSURE SENSOR, BPS. RETURN AIR DAMPER, D–RA, AND RELIEF AIR DAMPERS, D–REL1 & D–REL2, SHALL PROPORTIONALLY CLOSE AND OPEN AS REQUIRED TO MAINTAIN BUILDING PRESSURE.
7. MORNING WARM–UP: WHEN THE SYSTEM IS INDEXED TO WARM–UP MODE, THE SUPPLY FAN SOFT–STARTS THROUGH RESPECTIVE VFD, OUTSIDE AIR DAMPER, D–OA AND RELIEF AIR DAMPERS, D–REL1 & D–REL2 ARE CLOSED, RETURN AIR DAMPER D–RA IS OPEN, RETURN FAN RF–1 IS DISABLED. SUPPLY AIR TEMPERATURE SENSOR T–SA IS BY–PASSED UNTIL RETURN AIR TEMPERATURE AS SENSED BY T–RA REACHES 70°F (ADJUSTABLE) OR AS SELECTED AT WHICH TIME THE SYSTEM IS INDEXED TO OPERATIVE MODE. REHEAT COILS IN DUCTWORK SHALL BE DISABLED DURING MORNING WARM–UP.
8. COOL DOWN MODE: WHEN THE SYSTEM IS INDEXED TO COOL–DOWN MODE, THE SUPPLY FAN SOFT–STARTS THROUGH RESPECTIVE VFD, OUTSIDE AIR DAMPER, D–OA AND RELIEF AIR DAMPERS, D–REL1 & D–REL2 ARE CLOSED, RETURN AIR DAMPER D–RA IS OPEN, RETURN FAN RF–1 IS DISABLED. COOLING SHALL ENABLE TO MAINTAIN SUPPLY AIR SETPOINT OF 55°F AS SENSED BY T–SA. WHEN RETURN AIR TEMPERATURE IS 75°F (ADJUSTABLE) OR AS SENSED BY T–RA, THE SYSTEM IS INDEXED TO OPERATIVE MODE. REHEAT COILS IN DUCTWORK SHALL BE DISABLED DURING COOL DOWN MODE.
9. SUPPLY & RETURN FAN VARIABLE SPEED DRIVE CONTROL: WHEN THE SYSTEM IS INDEXED INTO OPERATION AND THE FAN IS INDEXED ON, THE FAN SHALL SOFT START THROUGH ITS RESPECTIVE VFD TO A MINIMUM SPEED AS RECOMMENDED BY THE MANUFACTURER AND AS NEEDED FOR PROPER SYSTEM BALANCING AND OPERATION. THE FANS SHALL VARY SPEED IN ACCORDANCE WITH THESE SEQUENCES OF CONTROL.
10. OPTIMAL START: ADAPTIVE OPTIMAL START SHALL DETERMINE THE TIME UNIT WILL COMMENCE COOLING (OR HEATING OR HEATING FOR MORNING WARM–UP) DURING THE UNOCCUPIED MODE TO ENSURE OCCUPIED SPACE REACHES THE SET POINT IN TIME FOR OCCUPIED MODE.
11. TEMPERATURE CONTROLS: TEMPERATURE CONTROLS SHALL HAVE SETPOINT OVERLAP RESTRICTIONS.
12. OCCUPIED/UNOCCUPIED MODE: AIR HANDLING UNIT IS INDEXED FOR OCCUPIED/UNOCCUPIED OPERATION BY EXISTING BUILDING AUTOMATION SYSTEM.

    a. DURING THE UNOCCUPIED MODE, THE AIR HANDLING UNIT, SHALL BE INDEXED TO INOPERATIVE. THE SYSTEM SHALL CONTINUE TO MONITOR SPACE TEMPERATURE.

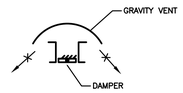
    b. ON A DROP IN SPACE TEMPERATURE BELOW 65 DEGREES (ADJUSTABLE) THE SYSTEM SHALL BE INDEXED TO OPERATIVE EXCEPT AS FOLLOWS:
    (1) OUTSIDE AIR DAMPER, D–OA, SHALL REMAIN CLOSED;
    (2) COOLING SHALL REMAIN DISABLED;
    (3) SPACE TEMPERATURE SENSOR SETPOINT SHALL BE RESET TO 65 DEGREES (ADJUSTABLE) FOR HEATING.
    (4) REHEAT COILS IN DUCTWORK SHALL BE DISABLED DURING UNOCCUPIED MODE. ALL HEATING BY AHU HEATING HOT WATER COIL DURING UNOCCUPIED MODE.

    c. ON A RISE IN SPACE TEMPERATURE ABOVE 80 DEGREES (ADJUSTABLE) THE SYSTEM SHALL BE INDEXED TO OPERATIVE EXCEPT AS FOLLOWS:
    (1) OUTSIDE AIR DAMPER, D–OA, SHALL REMAIN CLOSED, EXCEPT AS COMMANDED BY THE ENTHALPY ECONOMIZER ROUTINE;
    (2) SPACE TEMPERATURE SENSOR SETPOINTS SHALL BE RESET TO 80 DEGREES (ADJUSTABLE) FOR COOLING.
    (3) REHEAT COILS IN DUCTWORK SHALL BE DISABLED.

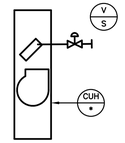
C. REHEAT COIL OPERATION: ON A DECREASE IN SPACE TEMPERATURE BELOW THE OCCUPIED HEATING MODE SETPOINT (70°F ADJUSTABLE), AS SENSED BY THE ROOM TEMPERATURE SENSOR ON THE LOWER LEVEL OF THE LINK, T–S, AND WHEN HEATING HOT WATER IS AVAILABLE, HEATING HOT WATER CONTROL VALVE, V–HW, SHALL MODULATE TO OPEN TO MAINTAIN THE SPACE SETPOINT TEMPERATURE. THE SUPPLY AIR TEMPERATURE AS SENSED BY THE TEMPERATURE SENSOR DOWNSTREAM OF THE REHEAT COIL SHALL NOT EXCEED 95 DEGREES F (ADJUSTABLE).

D. SAFETY CONTROLS, MONITORING, AND ALARMS

1. MONITOR AND RELAY THE FOLLOWING THROUGH THE BAS:
   - AHU FAN COMMAND STATUS (ON/OFF, SPEED);
   - SUPPLY/RETURN AIR TEMPERATURE (°F);
   - SUPPLY/RETURN AIR TEMPERATURE SETPOINT (°F);
   - RETURN FAN COMMAND STATUS (ON/OFF, SPEED);
   - COMMAND TEMPERATURE STATUS;
   - COOLING STATUS, VALVE POSITION;
   - HEATING STATUS, VALVE POSITION;
   - ECONOMIZER STATUS;
   - DAMPER POSITIONS;
   - MIXED AIR TEMPERATURE;
   - RETURN AIR TEMPERATURE AND HUMIDITY;
   - OUTSIDE AIR TEMPERATURE AND HUMIDITY;
   - REHEAT COIL STATUS AND VALVE POSITION.
2. MONITOR AND RELAY THE FOLLOWING ALARMS THROUGH THE BAS:
   - AHU HIGH COOLING SUPPLY AIR TEMPERATURE (62°F, ADJUSTABLE)
   - AHU LOW SUPPLY AIR TEMPERATURE (45°F, ADJUSTABLE)
   - AHU HIGH RETURN AIR TEMPERATURE (85°F, ADJUSTABLE)
   - AHU GENERAL ALARMS & PREVIOUSLY NOTED ALARMS;
   - LOW PRESSURE SENSOR ALARM;
   - HIGH PRESSURE SWITCH ALARM;
   - CONDENSATE OVERFLOW ALARM;
   - COIL FREEZE ALARM;
   - ITEMIZED FAULT CODE LISTING REASON FOR SHUTDOWN FAULT;
3. A CONTACT MODULE FROM THE FIRE ALARM SYSTEM IS HARDWIRED TO SHUT DOWN THE SUPPLY AND RETURN FANS AND RENDER THE SYSTEM INOPERATIVE IF PRODUCTS OF COMBUSTION ARE SENSED BY A SMOKE DETECTOR.
4. UPON A SIGNAL FROM THE BUILDING FIRE ALARM SYSTEM, THE SYSTEM SHALL BECOME INOPERATIVE.
5. ACTIVATION OF DUCT MOUNTED SUPPLY OR RETURN AIR SMOKE DETECTORS, SD, SHALL RENDER THE SYSTEM INOPERATIVE AND SIGNAL AN ALARM TO THE BUILDING FIRE ALARM SYSTEM.
6. DIFFERENTIAL PRESSURE SWITCHES, DPS, SHALL SIGNAL THE BAS ON HIGH DIFFERENTIAL PRESSURE ACROSS THE FILTERS.
7. WATER LEVEL DETECTION DEVICE CONFORMING TO UL 508 SHALL BE PROVIDED TO SHUT OFF EQUIPMENT AND SEND AN ALARM TO THE BAS IN THE EVENT THE PRIMARY DRAIN LINE IS BLOCKED. THE DEVICE SHALL BE INSTALLED IN THE EQUIPMENT SUPPLIED DRAIN PAN, LOCATED AT A POINT HIGHER THAN THE PRIMARY DRAIN CONNECTION AND BELOW THE OVERFLOW RIM OF SUCH PAN.
8. ON A RISE IN SUPPLY DUCT STATIC PRESSURE ABOVE 2.0"W.G. (ADJUSTABLE) AS SENSED BY THE HIGH LIMIT STATIC PRESSURE PROBE, SP–HL, SYSTEM SHALL SHUT DOWN AND SEND AN ALARM TO THE BAS.
9. A MANUAL RESET FREEZESTAT (40°F, MANUALLY ADJUSTABLE) WHEN TRIGGERED, OPENS THE HEATING COIL VALVE, OPENS THE COOLING COIL VALVE, DE–ENERGIZE THE SUPPLY AND RETURN FANS, CLOSES THE OUTDOOR AIR DAMPER, CLOSES THE RELIEF AIR DAMPERS, OPENS THE RETURN AIR DAMPER, ENERGIZES THE ASSOCIATED HEATING AND CHILLED WATER PUMPS IF NOT ALREADY IN OPERATION, AND SENDS AN ALARM TO THE BAS. WHEN THE FREEZESTAT IS MANUALLY RESET THE FANS RESTART.
10. ON A FALL IN RETURN WATER TEMPERATURE BELOW 40°F (ADJUSTABLE) AS SENSED BY IMMERSION TEMPERATURE SENSOR, T–FZ, OPENS THE HEATING COIL VALVE, OPENS THE COOLING COIL VALVE, DE–ENERGIZE THE SUPPLY AND RETURN FANS, CLOSES THE OUTDOOR AIR DAMPER, CLOSES THE RELIEF AIR DAMPERS, OPENS THE RETURN AIR DAMPER, ENERGIZES THE ASSOCIATED HEATING AND CHILLED WATER PUMPS IF NOT ALREADY IN OPERATION, AND SENDS AN ALARM TO THE BAS. WHEN THE UNIT IS MANUALLY RESET THE FANS RESTART.
11. ALL SAFETY DEVICES SHALL BE HARDWIRED TO THE STARTERS OF THE SYSTEM'S COMPONENT EQUIPMENT.
12. ALL SAFETY DEVICES SHALL BE MONITORED BY THE BAS.



T TEMPERATURE SENSOR TO BE LOCATED IN ELEVATOR SHAFT TO CONTROL DAMPER AND UNIT HEATER OPERATION



ELEVATOR SHAFT VENTILATION AND TEMPERATURE CONTROL DIAGRAM

N.T.S.

SEQUENCE OF OPERATIONS

1. ON AN INCREASE IN ELEVATOR SHAFT TEMPERATURE ABOVE 95°F (ADJUSTABLE) AS SENSED BY TEMPERATURE SENSOR, T, CONTROL DAMPER SHALL OPEN.
2. ON A DECREASE IN TEMPERATURE IN THE ELEVATOR SHAFT BELOW 70°F (ADJUSTABLE) AS SENSED BY TEMPERATURE SENSOR, T, CONTROL DAMPER SHALL CLOSE.
3. ON A FURTHER DECREASE IN TEMPERATURE IN THE ELEVATOR SHAFT AND WHEN OUTDOOR AIR TEMPERATURE IS BELOW 45°F (ADJUSTABLE), CABINET UNIT HEATER SHALL BE ENABLED BY THE BMS.
4. ON A DECREASE IN SPACE TEMPERATURE AS SENSED BY TEMPERATURE SENSOR, THE STEAM CONTROL VALVE, V SHALL OPEN. WHEN CONDENSATE REACHES SETPOINT, AS SENSED BY AQUASTAT SUPPLIED WITH CABINET UNIT HEATER, FAN SHALL START.
5. MONITOR THE SPACE TEMPERATURE THROUGH THE BUILDING AUTOMATION SYSTEM. PROVIDE ADDITIONAL TEMPERATURE SENSORS AS REQUIRED FOR MONITORING.
6. ALL SETPOINTS SHALL BE ADJUSTABLE, HOWEVER MAXIMUM SETPOINT SHALL NOT BE HIGHER THAN PERMITTED BY ENERGY CODE (60 DEGREES).
7. CONTROL DAMPER AND CABINET UNIT HEATER SHALL BE MONITORED AND CONTROLLED BY BAS. ALL SETPOINTS SHALL BE ADJUSTABLE THROUGH THE BAS.

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0	Bid and Permit	07-06-2022

PRELIMINARY
Not For Construction

Key Plan

EGNER HALL BUILDING 685

U.S. MILITARY ACADEMY
West Point, New York

Project No.: 11300 (DJVI # 2115)
Date: July 6, 2022

Drawing Title:
Controls Diagram & Sequence of Operations

M801

SEQUENCE OF CONTROL

A. GENERAL

1. THE SYSTEM SHALL OPERATE THROUGH INTEGRAL CONTROLS, NEW NETWORK CONTROL UNITS AND THE EXISTING BUILDING AUTOMATION SYSTEM (BAS).
2. THE BAS SHALL MONITOR SPACE HUMIDITY. REFER TO MECHANICAL PLAN FOR LOCATIONS OF HUMIDITY SENSORS. NOTE: SENSORS SHALL BE PROVIDED BY BAS CONTROL CONTRACTOR AND USED FOR CONTROL OF CENTRAL SYSTEM HUMIDIFICATION.

B. SYSTEM INOPERATIVE

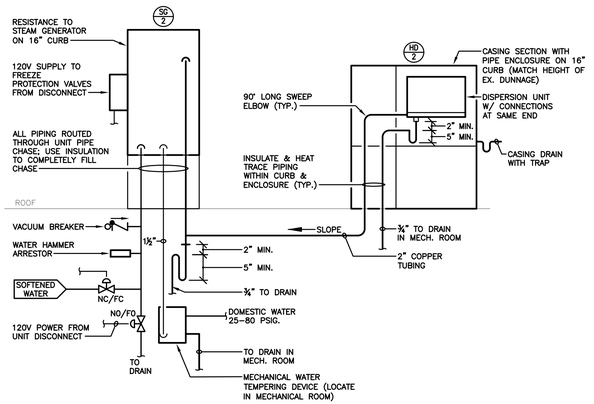
1. THE HUMIDIFIER SHALL BE INDEXED TO OPERATIVE WHEN THE AIR HANDLING UNIT IS ENABLED.
2. WHEN THE SYSTEM IS INDEXED TO INOPERATIVE, CONTROL VALVE SHALL CLOSE.

C. SYSTEM OPERATIVE

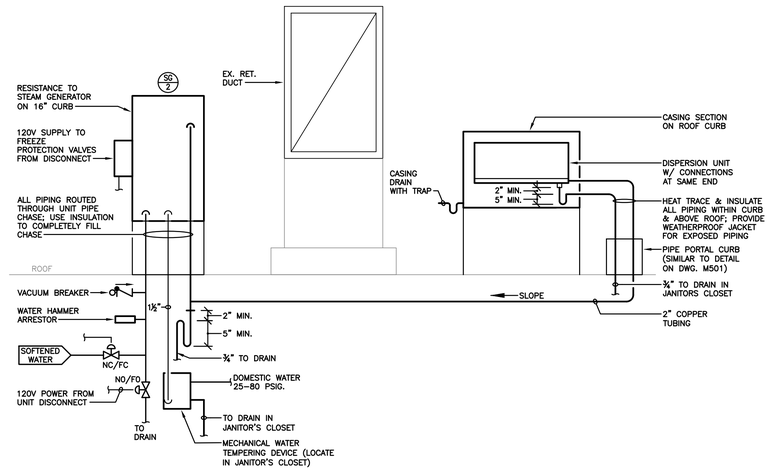
1. FOR THE PURPOSES OF CONTROLLING CENTRAL HUMIDIFICATION, THE SYSTEM SHALL USE AN AVERAGE HUMIDITY FROM SENSORS IN ROOMS SERVED TO RESET SUPPLY AIR HUMIDITY SETPOINT ON INTEGRAL CONTROLLER. DUCT MOUNTED HUMIDITY SENSOR, H, SETPOINT SHALL BE RESET AS REQUIRE TO MAINTAIN SPACE HUMIDITY LEVELS BETWEEN 40% AND 50% RH.
2. WHEN THE SYSTEM IS INDEXED TO OPERATIVE, AND ON A DROP IN DUCT HUMIDITY BELOW SETPOINT, STEAM GENERATOR SHALL BE ACTIVATED.

D. SAFETIES AND MONITORING

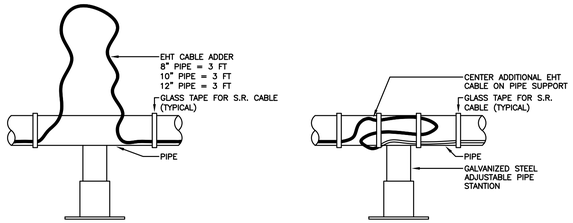
1. THE BAS SHALL MONITOR CENTRAL SUPPLY AIR HUMIDITY BY SEPARATE DUCT MOUNTED SENSOR, H (BAS).
2. PROVIDE A DUCT MOUNTED FLOW SWITCH TO DISABLE HUMIDIFIER ON LOSS OF AIR FLOW.
3. PROVIDE A HIGH LIMIT SWITCH TO DISABLE HUMIDIFIER IF HUMIDITY LEVEL EXCEEDS SETPOINT.



EXISTING AHU–2 HUMIDIFIER PIPING DIAGRAM
N.T.S.

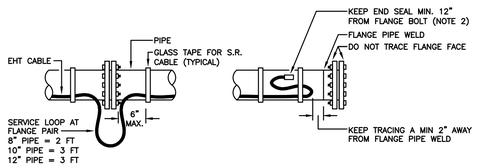


RTU–1 HUMIDIFIER PIPING DIAGRAM
N.T.S.



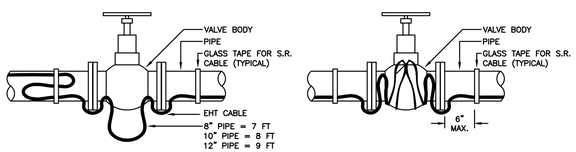
TYPICAL PIPE SUPPORT ELECTRIC HEAT TRACE INSTALLATION
N.T.S.

NOTES:
1. THE DETAIL SHOWS THE GENERAL INSTALLATION METHOD.
2. FOR THE MINIMUM BEND RADIUS OF S.R. CABLE. REFER TO MANUFACTURERS INSTRUCTIONS.



ELECTRIC HEAT TRACING AT PIPE FLANGE
N.T.S.

NOTES:
1. THE DETAIL BELOW SHOWS THE GENERAL INSTALLATION METHOD.
2. FOR THE MINIMUM BEND RADIUS OF S.R. AND M.I. CABLE. REFER TO MANUFACTURERS INSTRUCTIONS.



ELECTRIC HEAT TRACING AT VALVE INSTALLATION
N.T.S.

NOTES:
1. THE DETAIL SHOWS THE GENERAL INSTALLATION METHOD. THE ELECTRIC HEAT TRACING CABLE INSTALLATION WILL LOOK DIFFERENT FOR DIFFERENT VALVE SHAPES AND ELECTRIC HEAT TRACING CABLE LENGTHS.
2. FOR THE MINIMUM BEND RADIUS OF S.R. CABLE, REFER TO MANUFACTURERS INSTRUCTIONS.
3. FOR PIPES WITH MORE THAN ONE PASS OF ELECTRIC HEAT TRACING CABLE, APPLY THE FULL VALVE ADDER FOR EACH PASS OF ELECTRIC HEAT TRACING CABLE ON EACH VALVE.
   EXAMPLE: A 10" NPS PIPE THAT HAS TWO PASSES OF ELECTRIC HEAT TRACING CABLE WOULD REQUIRE 8' (2.4M) PER PASS OF ELECTRIC HEAT TRACING CABLE ON EACH 150# VALVE.
4. FOR SOME APPLICATIONS IT MAY BE PHYSICALLY IMPOSSIBLE TO INSTALL ALL THE RECOMMENDED ELECTRIC HEAT TRACING CABLE ON THE VALVE BODY. IN THIS CASE, USE UP THE REMAINING ELECTRIC HEAT TRACING CABLE ON THE PIPE TO EITHER SIDE OF THE VALVE.

HEAT TRACE SPECIFICATIONS

1. INSTALL HEAT TRACE ON ALL EXTERIOR PIPING AND AS SHOWN AND AS NOTED ON THE MECHANICAL DRAWINGS.
2. CONTRACTOR SHALL VERIFY CABLE WATTAGE WITH MANUFACTURER AND SUBMIT CALCULATIONS TO ENGINEER FOR REVIEW.
3. INSTALL HEATING CABLE PRIOR TO INSULATING PIPING SYSTEMS.
4. SELECT CABLE LENGTHS AND WATTAGE TO MAINTAIN 40°F FLUID IN PIPE FOR FREEZE PROTECTION, WITH AN OUTDOOR AMBIENT AT 0°F.
5. PROVIDE SYSTEM WITH NECESSARY STAND–OFF AND CABLE TIE KITS.
6. MECHANICAL CONTRACTOR TO FURNISH AND INSTALL HEAT TRACE SYSTEM. ELECTRICAL CONTRACTOR TO PROVIDE POWER. COORDINATE INSTALL WITH ELECTRICAL CONTRACTOR.
7. APPROVED MANUFACTURER IS RAYCHEM OR APPROVED EQUAL.
8. PROVIDE THE FOLLOWING COMPONENTS (MODEL NUMBERS ARE FOR A RAYCHEM SYSTEM):
   - BRAIDED SELF REGULATING CABLE: XL–CR.
   - WATT PER LINEAR FOOT: 3 WATTS AS REQUIRED
   - VOLTAGE: 120 VOLT/SINGLE PHASE
   - POWER CONNECTION KITS: RAYCLIC–PC
   - SPLICES: RAYCLIC–S
   - TEES: RAYCLIC–T
   - END SEAL KITS: RAYCLIC–E
   - LIGHTED END SEAL: RAYCLIC–LE
   - BINDING TAPE: GT–66
   - ALUMINUM TAPE: AT–180
   - INDICATING STRIP PIPE LABEL: ETL
   - CONTROLLERS:
     a) DIGITRACE 910 CONTROLLER WITH AMBIENT SENSING RTD–200 FOR SINGLE CIRCUIT SYSTEMS.
     b) DIGITRACE 920 WITH AMBIENT SENSING RTD–200 FOR SYSTEMS BETWEEN 2 AND 8 CIRCUITS.
     c) DIGITRACE ACS–30 WITH AMBIENT SENSING RTD–200 FOR SYSTEMS ABOVE 8 CIRCUITS.
     d) CONTROLLER IS TO BE SIZED TO ALLOW FOR EXTRA CONTROL POINTS, FOR 25% GROWTH.
9. HEAT TRACE CONTROLLERS TO BE TIED INTO BAS SYSTEM TO PROVIDE STATUS AND ALARM SIGNALS.

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