ABBREVIATIONS

HVAC

ACH	AIR CHANGES PER HOUR
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AFR	ABOVE FINISHED ROOF
AL	ALUMINUM
ADJ	ADJUSTABLE
AMB	AMBIENT
APPROX	APPROXIMATE
ATC	AUTOMATIC TEMPERATURE CONTROL
AUTO	AUTOMATIC
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSE POWER
BLDG	BUILDING
BOD	BOTTOM OF DUCT
BOG	BOTTOM OF GRILLE
BOT EL	BOTTOM ELEVATION
BOU	BOTTOM OF UNIT
BTU/HR	BRITISH THERMAL UNITS PER HOUR
BTUH	BRITISH THERMAL UNITS PER HOUR
BC	BACKWARD CURVED
BAS	BUILDING AUTOMATION SYSTEM
CFM	CUBIC FEET OF AIR PER MINUTE
CHKP	CONCRETE HOUSE KEEPING PAD
COND	CONDENSATE
CONN	CONNECTION
CONT	CONTINUATION
COP	COEFFICIENT OF PERFORMANCE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
DX	DIRECT EXPANSION
DB	DRY BULB
EFF	EFFICIENCY
EC	ELECTRONICALLY COMMUTATED
E	EXISTING
EA	EACH/ EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EG/EAG	EXHAUST GRILLE
EL	ELEVATION
ER	EXHAUST REGISTER
ESP	EXTERNAL STATIC PRESSURE
EQUIP	EQUIPMENT
EXH	EXHAUST
EXIST	EXISTING
FC	FORWARD CURVED
FPI	FINS PER INCH
FD	FIRE DAMPER
FLR	FLOOR
GBD	GRAVITY BACKDRAFT DAMPER
HP	HORSEPOWER
HVAC	HEATING, VENTILATION & AIR CONDITIONING
HSPF	HEATING SEASONAL PERFORMANCE SECTOR
HGRH	HOT GAS RE-HEAT
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTUH
MCA	MINIMUM CIRCUIT AMPACITY
MD	MOTORIZED DAMPER
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MER	MECHANICAL EQUIPMENT ROOM
MECH	MECHANICAL
MIN	MINIMUM
MFR	MANUFACTURER
MOP	MAX OVERCURRENT PROTECTION
MTD	MOUNTED
NA	NOT APPLICABLE
NK	NECK
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
NFA	NET FREE AREA
NTS	NOT TO SCALE
OEM	ORIGINAL EQUIPMENT MANUFACTURER
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
OPNG	OPENING
PD	PRESSURE DROP
PS-1	PRESSURE SENSOR
RG	RETURN GRILLE
RM	ROOM
RR	RETURN REGISTER
RO	ROOF OPENING
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RFS	RECOMMENDED FUSE SIZE
SCAV	SUPPLY CONSTANT AIR VOLUME
SCH	SCHEDULE
SG	SUPPLY GRILLE
SH	SHOWER HEAD
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SCR	SILICON CONTROLLED RECTIFIER
SR	SUPPLY REGISTER
SS	STAINLESS STEEL
TAB	TESTING, ADJUSTING AND BALANCING
TOD	TOP OF DUCT
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
VD	MANUAL VOLUME DAMPER
WC	WATER COLUMN / WATER CLOSET
W/OVRD	WITH OVERRIDE
WB	WET BULB
W/	WITH

EQUIPMENT

ACCU	AIR COOLED CONDENSING UNIT
AC	AIR CONDITIONING UNIT
CUH	CABINET UNIT HEATER
RTU	PACKAGED ROOFTOP AIR HANDLING UNIT
EF	EXHAUST FAN

QUANTITY DESIGNATION

EF-1

EQUIPMENT DESIGNATION (EXHAUST FAN)

LOUVER FACE SIZE

24X24 CDA

CEILING DIFFUSER TYPE (TYPE A SHOWN)

MISCELLANEOUS SYMBOLS

T — THERMOSTAT/TEMPERATURE SENSOR

EXISTING TO DEMOLISH WORK INTERFACE

EXISTING TO NEW WORK INTERFACE

TO BE DEMOLISHED

DUCTWORK SYMBOLS

SUPPLY AIR

RETURN OR EXHAUST AIR

12" X 12"

DUCT, DIRECTION OF FLOW, SIZE

DUCT SECTION, SUPPLY

DUCT SECTION, EXHAUST

DUCT SECTION, RETURN

DROP (D)

CHANGE OF ELEVATION RISE (R),

FLEXIBLE CONNECTION

FLEXIBLE DUCT

MITERED ELBOW W/ TURNING VANES

DUCT ELBOW DOWN. SUPPLY SHOWN

DUCT ELBOW UP, SUPPLY SHOWN

VOLUME DAMPER

SUPPLY REGISTER OR GRILLE

EXHAUST REGISTER OR GRILLE

RETURN REGISTER OR GRILLE

FOUR WAY BLOW SUPPLY DIFFUSER / REGISTER

THREE WAY BLOW SUPPLY DIFFUSER / REGISTER

1.0 S.F.

100 CFM

DOOR LOUVER, SIZE

U — DOOR UNDERCUT

DUCTWORK WITH INTERNAL INSULATION

M — MOTORIZED DAMPER (ELECTRIC)

GBD — GRAVITY BACKDRAFT DAMPER

FD (#) — FIRE DAMPER W/ ACCESS DOOR

(#) DESIGNATES FIRE WALL RATING

TWO WAY BLOW SUPPLY DIFFUSER

ONE WAY BLOW SUPPLY DIFFUSER

NEW DUCTWORK/EQUIPMENT

NEW DUCTWORK/EQUIPMENT

HIDDEN DUCTWORK/EQUIPMENT

DESIGN HEATING AND COOLING CRITERIA

OUTDOOR AMBIENT DESIGN CONDITIONS:
WEATHER STATION: NEW YORK STEWARD, NY, USA; CLIMATE ZONE: 5A
RTU-1; ACCU-1: SUMMER: DB 90.2 °F; WB 72.2 °F (0.4% COOLING); WINTER: DB 3.5 °F (99.6% HEATING);
RTU-2: SUMMER: DB 80.2 °F; WB 75 °F (0.4% DEHUMIDIFICATION); WINTER: DB 0°F
INTERIOR DESIGN CONDITIONS:
SUMMER: DB 75 °F; 50 RH; WINTER: 70 °F

2020 ENERGY CONSERVATION CODE OF NYS COMPLIANCE STATEMENT

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THE PLANS AND SPECIFICATIONS UNDER THIS CONTRACT ARE IN COMPLIANCE WITH THE 2020 ENERGY CONSERVATION CODE OF NYS.

SCOPE OF WORK

SPSCOPE OF WORK INCLUDES:
A) INSTALLATION OF A NEW CENTRAL HVAC SYSTEM CONSISTING OF A CONSTANT VOLUME ROOFTOP PACKAGED HEAT PUMP UNIT FOR ADMINISTRATIVE SPACES AND A 100% OUTSIDE AIR ROOFTOP PACKAGED AIR HANDLING UNIT FOR LABORATORY, INCLUDING DUCTWORK, AND RELATED EQUIPMENT, ACCESSORIES AND AUXILIARIES FOR A COMPLETE INSTALLATION.

B) INSTALLATION OF A DX SPLIT SYSTEM FOR COOLING ELECTRICAL AND SCADA ROOMS.

C) INSTALLATION OF TOILET EXHAUST FAN, LABORATORY HOOD AND GENERAL EXHAUST FAN SERVING LABORATORY.

D) INSTALLATION OF WALL CABINET UNIT HEATER IN MAIN ENTRANCE.

E) INSTALLATION OF BUILDING AUTOMATION SYSTEM (BAS), LOCAL CONTROLLERS AND DEVICES FOR INSTALLED HVAC EQUIPMENT PART OF THIS CONTRACT.

CODES, PERMITS AND INSPECTIONS

1. ALL WORK SHALL MEET OR EXCEED THE REQUIREMENTS OF THE 2020 BUILDING CODE AND SUB-CODES OF NEW YORK STATE, AND OTHER AUTHORITIES EXERCISING JURISDICTION OF THE WORK OF THIS PROJECT.
2. ANY PORTION OF WORK WHICH IS NOT SUBJECT TO THE APPROVAL OF AN AUTHORITY HAVING JURISDICTION SHALL BE PROVIDED IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
3. THE CONTRACTOR SHALL BE LICENSED IN THE LOCAL JURISDICTION PRIOR TO BIDDING THE PROJECT. CONTRACTOR TO CONTACT CITY/TOWNSHIP TO VERIFY UPDATED LICENSED TO VERIFY THEY ARE UP TO DATE.
4. CONTRACTOR SHALL FILE AND OBTAIN ALL PERMITS REQUIRED FOR THE WORK. REFERENCE NOTE 7 ON SHEET G-02.
5. INSPECTIONS SHALL VERIFY THE INSTALLED HVAC SYSTEM FOR THE CORRECT TYPE AND SIZE, CONTROLS, INSULATION, MINIMUM EFFICIENCY AS REQUIRED BY THE CODE, APPROVED PLANS AND SPECIFICATIONS.
6. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE AVAILABLE ON THE JOB SITE AT THE TIME OF INSPECTION.
7. UPON NEAR COMPLETION OF WORK, ENGINEER SHALL CONDUCT A FIELD OBSERVATION WALKTHROUGH AND SUBMIT A PUNCHLIST REPORT LISTING ALL FIELD WORK MISSED OR NOT IN COMPLIANCE WITH SCOPE OF WORK. CONTRACTOR IS RESPONSIBLE FOR COMPLETING ALL WORK LISTED IN THE PUNCHLIST REPORT.
8. CONTRACTOR SHALL PROVIDE THE OWNER WITH ALL NECESSARY OPERATION AND MAINTENANCE MANUALS, SHOP DRAWINGS, WIRING DIAGRAMS AND WARRANTY PAPERWORK UPON COMPLETION OF PROJECT.

CONSTRUCTION NOTES

1. ALL INSTALLATION AND WORK SHALL BE PERFORMED IN A NEAT, WORKMAN-LIKE MANNER SO AS NOT TO DAMAGE ANY SURFACES, EQUIPMENT, OR MATERIALS.
2. BEFORE PROCEEDING WITH ANY WORK IN OCCUPIED OR USED AREAS, THE CONTRACTOR SHALL APPLY TO THE OWNER OF BUILDING FACILITY ENGINEERS FOR PERMISSION TO ENTER SUCH AREAS. THE CONTRACTOR IS OBLIGED TO PERFORM HIS WORK ONLY AT THE TIME OR TIMES DESIGNATED BY THE OWNER OR BUILDING FACILITY ENGINEERS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR THE WORK PERFORMED AFTER HOURS OR ON OFF-DAYS WITHOUT PRIOR WRITTEN APPROVAL.
3. THE CONTRACTOR SHALL REPAIR WALLS, CEILING, FLOORS, ETC., THAT ARE REQUIRED TO BE PENETRATED, OR OTHERWISE DISTURBED. THE REPAIRS SHALL BE WITH MATERIALS AND FINISHES TO MATCH EXISTING. FIRE WALL PENETRATIONS SHALL BE SEALED WITH SUITABLE MATERIALS TO PRESERVE FIRE WALL INTEGRITY. THIS WORK SHALL BE PROVIDED UNDER THE GENERAL CONTRACT AND COORDINATED UNDER THE HVAC CONTRACT.
4. THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECT FOR ANY MISCELLANEOUS FINISH REPAIRS CAUSED BY MECHANICAL WORK.
5. EXISTING ROOF SHALL BE PROTECTED DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING AND SEALING ANY WORK ON AND/OR THROUGH THE ROOF.
6. THE CONTRACTOR SHALL LOCATE EQUIPMENT WHICH MUST BE SERVICED, OPERATED OR MAINTAINED IN FULLY ACCESSIBLE POSITIONS. FURNISH ACCESS DOORS AS REQUIRED FOR BETTER ACCESSIBILITY. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ALLOW FOR ACCESSIBILITY, BUT CHANGES OF MAGNITUDE WHICH INVOLVE EXTRA COSTS SHALL NOT BE MADE WITHOUT WRITTEN APPROVAL.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR THE FAILURE OF ANY DUCTWORK SYSTEM OR EQUIPMENT TO FUNCTION PROPERLY UPON COMPLETION OF HIS WORK UPON SAID SYSTEM OR EQUIPMENT.
8. PATCH EXISTING PENETRATIONS THROUGH WALLS AND FLOORS THAT RESULTED FROM DEMOLITION OF EXISTING DUCTWORK, PIPING AND EQUIPMENT. THIS WORK SHALL BE PROVIDED UNDER THE GENERAL CONTRACT AND COORDINATED UNDER THE HVAC CONTRACT.

GENERAL NOTES

1. NOT ALL ABBREVIATIONS, LINE TYPES, OR SYMBOLS MAY APPEAR ON THESE CONTRACT DOCUMENTS.
2. DRAWINGS SHALL BE CONSIDERED DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE EQUIPMENT'S GENERAL ARRANGEMENT CAPACITY, SIZE AND APPROXIMATE LOCATION. DRAWINGS SHALL NOT BE SCALED OR MANIPULATED. WHILE THE DRAWINGS ARE GENERALLY TO SCALE AND ARE AS ACCURATE AS THE SCALE WILL PERMIT, DIMENSIONS SHALL BE CONFIRMED IN THE FIELD.
3. THE SITE, LOCATION, AND ROUTING OF SYSTEMS INDICATED TO HAVE NEW CONNECTIONS MADE TO THEM ARE SHOWN AS ACCURATELY AS FIELD CONDITIONS PERMIT ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE PLANS. CONTRACTOR SHALL VISIT THE SITE AND THOROUGHLY EXAMINE THE CONTRACT DRAWINGS. ALL EXISTING CONDITIONS SHALL BE EXAMINED AND THEIR EXACT LOCATIONS VERIFIED. THE CONTRACTOR SHALL REPORT, IN WRITING, TO THE ENGINEER ANY CONDITIONS WHICH MAY PRESENT A CONFLICT AND/OR COORDINATION ISSUE WITH INSTALLATION OF REQUIRED EQUIPMENT. THE ENGINEER WILL ISSUE WRITTEN INSTRUCTIONS IF WARRANTED. NO CONSIDERATION OR ALLOWANCE WILL BE GRANTED FOR FAILURE TO INVESTIGATE CONDITIONS OR MISUNDERSTANDINGS OF THE CONTRACTUAL REQUIREMENTS. IT IS THE INTENT OF THIS CONTRACT THAT THE CONTRACTOR BE RESPONSIBLE TO MAKE ANY AND ALL ADJUSTMENTS IN CONSTRUCTION NECESSARY TO SUIT EXISTING DIMENSIONS OR ELEVATIONS , AT NO CHANGE IN CONTRACT PRICE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. ANY DISCREPANCIES OR ERRORS IN CONTRACT DOCUMENTS (DRAWINGS AND SPECIFICATIONS) SHALL BE REPORTED TO THE ENGINEER OF RECORD PROMPTLY. NO CHANGES IN THE CONTRACT DOCUMENTS ARE PERMISSIBLE WITHOUT THE CONCENT OF THE ENGINEER OF RECORD.
5. COORDINATE WITH OTHER TRADES TO AVOID INTERFERENCE AMONG MECHANICAL, ELECTRICAL, ARCHITECTURAL AND STRUCTURAL, PLUMBING, ETC. PROVIDE NECESSARY OFFSETS IN PIPING, DUCTWORK AND FITTINGS ETC., REQUIRED TO PROPERLY INSTALL WORK WITHOUT INTERFERENCES.
6. THE MANUFACTURERS AND MODEL NUMBERS LISTED ON THE SCHEDULES AND DETAILS ARE THE BASIS OF DESIGN FOR THIS PROJECT.
7. ELECTRICAL POWER PROVISIONS FOR MECHANICAL EQUIPMENT ARE BASED ON BASIS OF DESIGN EQUIPMENT AS INDICATED IN MECHANICAL SCHEDULES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING ELECTRICAL RATINGS FROM CERTIFIED SHOP DRAWINGS OF EQUIPMENT AND SHALL COORDINATE WITH ELECTRICAL CONTRACTOR FOR REQUIRED OVERCURRENT PROTECTION REQUIREMENTS.
8. EQUIPMENT SIZES AND LOCATIONS ARE APPROXIMATE. ACTUAL DIMENSIONS TO BE DETERMINED BY EQUIPMENT FURNISHED.
9. FINAL SIZES OF FLOOR OPENINGS, WALL OPENINGS, ROOF OPENINGS, DUCT PLENUMS, DUCT TRANSITIONS AND PIPING CONNECTIONS TO EQUIPMENT SHALL BE DETERMINED BY EQUIPMENT FURNISHED.
10. WHERE PIPES OR DUCTS PENETRATE THROUGH EXISTING FLOORS, WALLS, OR SLABS, CORE DRILL OR SAW CUT PENETRATION. THIS WORK SHALL BE PROVIDED UNDER THE GENERAL CONTRACT AND COORDINATED UNDER THE HVAC CONTRACT.
11. PROVIDE PIPE SLEEVES AND MECHANICAL SEALS FOR ALL PIPING AND CONTAINMENT CONDUIT PENETRATIONS THRU CONCRETE OR MASONRY CONSTRUCTION INCLUDING BUT NOT LIMITED TO WALLS, FLOORS, ROOFS, PADS,UNDERGROUND STRUCTURES EXCEPT WHERE OTHERWISE NOTED.
12. ALL DUCT DIMENSIONS ARE CLEAR DIMENSIONS TO INSIDE OF DUCT. DIMENSIONS TO DUCTS FROM FLOOR OR WALL SHALL BE TO THE OUTSIDE OF DUCT. WHERE INTERNAL INSULATION IS REQUIRED, THE DUCT SIZE SHALL BE INCREASED TO GIVE CLEAR INSIDE DIMENSIONS.
13. VOLUME DAMPERS SHOWN OR DESCRIBED ON THE DRAWINGS ARE IN ADDITION TO OPPOSED BLADE DAMPERS PROVIDED WITH REGISTERS.
14. FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED.
15. HEATING AND COOLING SYSTEM DESIGN LOADS FOR THE PURPOSE OF SIZING SYSTEMS AND EQUIPMENT WAS DETERMINED IN ACCORDANCE WITH ANSI/ASHRAE/ACCA STANDARD 183. CALCULATION REPORTS ARE AVAILABLE UPON REQUEST.
16. REFER TO CODE COMPLIANCE DRAWINGS UNDER GENERAL DRAWING CATEGORY FOR ADDITIONAL DESIGN INFORMATION REQUIRED UNDER THIS CONTRACT.

MECHANICAL REQUIREMENTS

1. ALL DUCTWORK SHALL COMPLY WITH ALL REQUIREMENTS OF THE SMACNA – DUCT CONSTRUCTION STANDARDS, METAL & FLEXIBLE, LATEST EDITION. REFER TO SPECIFICATION 23 31 13 FOR CONTINUATION.
2. DUCTS AND PIPING SHALL BE THERMALLY INSULATED AS PER C403.11.1 AND C403.11.3 OF 2020 ENERGY CONSERVATION CODE OF NYS. REFER TO SPECIFICATION SECTIONS 23 07 13 AND 23 07 19 FOR INSULATION TYPE AND THICKNESS.
3. DUCTS AND PIPING FINAL EXACT ROUTING TO BE DETERMINED BY FIELD CONDITIONS. AVOID PIPING ROUTING ABOVE EXISTING ELECTRICAL EQUIPMENT. WHEN ROUTING OF ANY PIPE/DUCT ABOVE ELECTRICAL EQUIPMENT IS UNAVOIDABLE, IT SHALL BE 6 FEET OR MORE ABOVE ELECTRICAL EQUIPMENT BE PROVIDED WITH PROTECTION BY CONTRACTOR TO AVOID DAMAGE TO THE ELECTRICAL EQUIPMENT FROM CONDENSATION, LEAKS, OR BREAKS IN SUCH SYSTEMS.
4. OUTSIDE AIR INTAKE OPENING LOCATIONS AND MINIMUM DISTANCES FROM NEARBY OPENINGS AND STRUCTURES SHALL COMPLY WITH 2020 NYSMC 401.4.
5. EXHAUST AIR DISCHARGE LOCATIONS AND MINIMUM DISTANCES FROM NEARBY OPENINGS AND STRUCTURES SHALL COMPLY WITH 2020 NYSMC 501.3.
6. SMOKE DUCT DETECTORS SHALL BE INSTALLED IN RETURN AIR SYSTEMS WITH A DESIGN CAPACITY OVER 2000 CFM UPSTREAM OF ANY FILTERS, EXHAUST AIR AND OUTDOOR AIR CONNECTIONS AND DECONTAMINATION EQUIPMENT AS PER 2020 NYCMC 606.2.1.
7. DUCTS PENETRATIONS AND AIR TRANSFER OPENINGS IN FIRE- RESISTANCE RATED ASSEMBLIES SHALL MEET REQUIREMENTS FOR SMOKE, FIRE OR COMBINATION DAMPERS RATINGS, LOCATIONS AND ACCESS AS PER 2020 NYSMC 607.
8. APPROVED FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT DUCT AND PIPING CONNECTIONS TO MOTOR OPERATED EQUIPMENT.
9. ALL EQUIPMENT, DUCTWORK AND PIPING SHALL BE SUPPORTED IN AN APPROVED MANNER FROM THE BUILDING STRUCTURE ABOVE BY THE INSTALLATION OF APPROVED HANGERS / SUPPORTS. CONTRACTOR SHALL VERIFY LOCATIONS OF PRESTRESSED STRAINS IN EXISTING CONCRETE TEE'S PRIOR TO ANCHOR INSTALLATION FOR STEEL FRAME AND HVAC DUCT HANGERS. REFER TO SPECIFICATION SECTION 23 05 29 FOR CONTINUATION.
10. DUCT COLLARS AND PIPE ESCUTCHEONS SHALL BE PROVIDED AT ALL EXPOSED PENETRATIONS OF FLOOR, WALLS AND CEILINGS.
11. ALL PIPING, DUCTWORK PENETRATING ALL WALLS, CEILINGS, FLOORS, ROOFS, ETC. SHALL BE FIRE STOPPED. ALL DUCTWORK PENETRATING FIRE RATED WALLS SHALL BE EQUIPPED WITH FIRE DAMPER RATED HIGHER THAN WALL. CONTRACTOR TO PROVIDE ACCESSIBLE DOOR (24"x24" MINIMUM UNLESS NOTED) ADJACENT TO FIRE DAMPER.
12. PROVIDE ACCESS PANELS WHETHER INDICATED OR NOT FOR ACCESS TO CONCEALED VALVES, DAMPERS, OR OTHER EQUIPMENT FURNISHED UNDER THIS CONTRACT WHERE NO OTHER MEANS OF ACCESS IS PROVIDED. PANEL SHALL BE OF TYPE TO MAINTAIN FIRE RATING OF STRUCTURE AND SIZED FOR CLEAR SERVICE ACCESS.
13. ALL EXPOSED HANGER RODS AND MISCELLANEOUS SUPPORTS SHALL BE GALVANIZED STEEL OR PLATED, INCLUDING CRAWLSPACE AND EXTERIOR INSTALLATION, UNLESS NOTED OTHERWISE.
14. INSTALL ALL EQUIPMENT AND MATERIAL IN ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS. MAINTAIN CLEARANCES FOR CLEARANCE ACCESS TO MAINTAIN AND SERVICE EQUIPMENT, VALVES AND CONTROL. FURNISH AND INSTALL REQUIRED AUXILIARY ITEMS TO PROVIDE A COMPLETE INSTALLATION. ANY CONFLICTS WITH INSTALLATION AND MANUFACTURER RECOMMENDATIONS SHALL BE REPORTED TO ENGINEER.
15. A PERMANENT FACTORY-APPLIED NAMEPLATE(S) SHALL BE AFFIXED TO APPLIANCES ON WHICH SHALL APPEAR IN LEGIBLE LETTERING, THE MANUFACTURER'S NAME OR TRADEMARK, THE MODEL NUMBER, SERIAL NUMBER AND THE SEAL OR MARK OF THE APPROVED AGENCY. IN ADDITION, LABEL SHALL INCLUDE THE INFORMATION REQUIRED AS PER 2020 NYSMC 301.9.
16. ELECTRICAL WIRING, CONTROLS AND CONNECTIONS TO EQUIPMENT AND APPLIANCES SHALL BE IN ACCORDANCE WITH NFPA 70.
17. MOTOR OPERATED EQUIPMENT SHALL BE ISOLATED FROM THE BUILDING STRUCTURE BY THE INSTALLATION OF APPROVED VIBRATION ISOLATORS.
18. THE CONTRACTOR IS RESPONSIBLE FOR TESTING, ADJUSTING AND BALANCING (TAB) ALL MECHANICAL EQUIPMENT INDICATED IN THE MECHANICAL DRAWINGS. REFER TO SPECIFICATION SECTION 23 05 93 FOR REFERENCE STANDARDS, REQUIRED SUBMITTALS AND GENERAL EXECUTION REQUIREMENTS.
19. THERMOSTATS SHALL BE LOCATED 4' 10" ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
20. MECHANICAL CONTRACTOR SHALL PROVIDE CONTROLS FOR ALL NEW HVAC EQUIPMENT AND TIE INTO NEW BUILDING AUTOMATION SYSTEM (BAS) AS SHOWN ON CONSTRUCTION DRAWINGS AND SPECIFICATIONS . THE MECHANICAL CONTRACTOR SHALL CARRY ALL FEES FOR NEW CONTROLS IN THEIR BID. THE MECHANICAL CONTRACTOR SHALL INSTALL ALL CONTROL ACTUATORS, DAMPERS, SENSORS, ETC. MECHANICAL CONTRACTOR SHALL PROVIDE ALL LOW VOLTAGE CONTROL WIRING FOR PROJECT. ALL LOW VOLTAGE WIRING TO BE INSTALLED IN EMT CONDUIT FOR INDOOR INSTALLATION. INSTALL IN RIGID STEEL CONDUIT FOR ANY EXTERIOR CONDUIT. SEE ELECTRICAL SPECIFICATIONS FOR REQUIREMENTS.
21. THERMOSTATS SHALL BE LOCATED 4' 10" ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
22. MECHANICAL CONTRACTOR SHALL PROVIDE CONTROLS FOR ALL NEW HVAC EQUIPMENT AND TIE INTO NEW BUILDING AUTOMATION SYSTEM (BAS) AS SHOWN ON CONSTRUCTION DRAWINGS AND SPECIFICATIONS. THE MECHANICAL CONTRACTOR SHALL CARRY ALL FEES FOR NEW CONTROLS IN THEIR BID. THE MECHANICAL CONTRACTOR SHALL INSTALL ALL CONTROL ACTUATORS, DAMPERS, SENSORS, ETC. MECHANICAL CONTRACTOR SHALL PROVIDE ALL LOW VOLTAGE CONTROL WIRING FOR PROJECT. ALL LOW VOLTAGE WIRING TO BE INSTALLED IN EMT CONDUIT FOR INDOOR INSTALLATION. INSTALL IN RIGID STEEL CONDUIT FOR ANY EXTERIOR CONDUIT. SEE ELECTRICAL SPECIFICATIONS FOR REQUIREMENTS.
23. CONDENSATE PIPING SHALL MAINTAIN A HORIZONTAL SLOPE IN THE DIRECTION OF DISCHARGE OF NOT LESS THAN ONE-EIGHTH UNIT VERTICAL IN 12 UNITS HORIZONTAL (1-PERCENT SLOPE) AND SHALL BE CONFIGURED TO PERMIT THE CLEARING OF BLOCKAGES AND PERFORMANCE OF MAINTENANCE WITHOUT REQUIRING THE DRAIN LINE TO BE CUT.
24. CONDENSATE DRAINS SHALL BE TRAPPED AS REQUIRED BY THE EQUIPMENT OR APPLIANCE MANUFACTURER. DUCTLESS MINI-SPLIT EQUIPMENT SHALL BE PROVIDED WITH AN IN-LINE CHECK VALVE LOCATED IN THE DRAIN LINE OR TRAP AS PER 2020 NYSPC 134.2.4
25. ALL CONDENSATE PIPING SHALL BE INSULATED.
26. REFRIGERANT PIPING CROSSING AN OPEN SPACE THAT AFFORDS PASSAGEWAY SHALL BE NOT LESS THAN 7 FEET 3 INCHES (2210 MM) ABOVE THE FLOOR UNLESS THE PIPING IS LOCATED AGAINST THE CEILING OF SUCH SPACE AS PER 2020 NYSMC 1107.2

ARCADIS

LEGAL ENTITY:
ARCADIS OF NEW YORK, INC.

CONSULTANTS

SEALS

STATE OF NEW YORK · ALEJANDRO D'SOLA · 107868 · LICENSED PROFESSIONAL ENGINEER

8/30/2024

ORANGE COUNY, NEW YORK

CITY OF NEWBURGH

WASTEWATER TREATMENT PLANT (WWTP) ADMIN BUILDING RENOVATION

BID NUMBER 7.24

ARCADIS PROJ. NO. 30183827

NO.	DATE	ISSUED FOR	BY

DATE: SEPTEMBER 2024
PROJECT NO.: 30183827
FILE NAME:
DESIGNED BY: A. DSOLA
DRAWN BY: L. BANGARU
CHECKED BY: V. VITALE

SHEET TITLE

HVAC

ABBREVIATIONS, LEGEND AND NOTES

SCALE: NOT TO SCALE

H-1

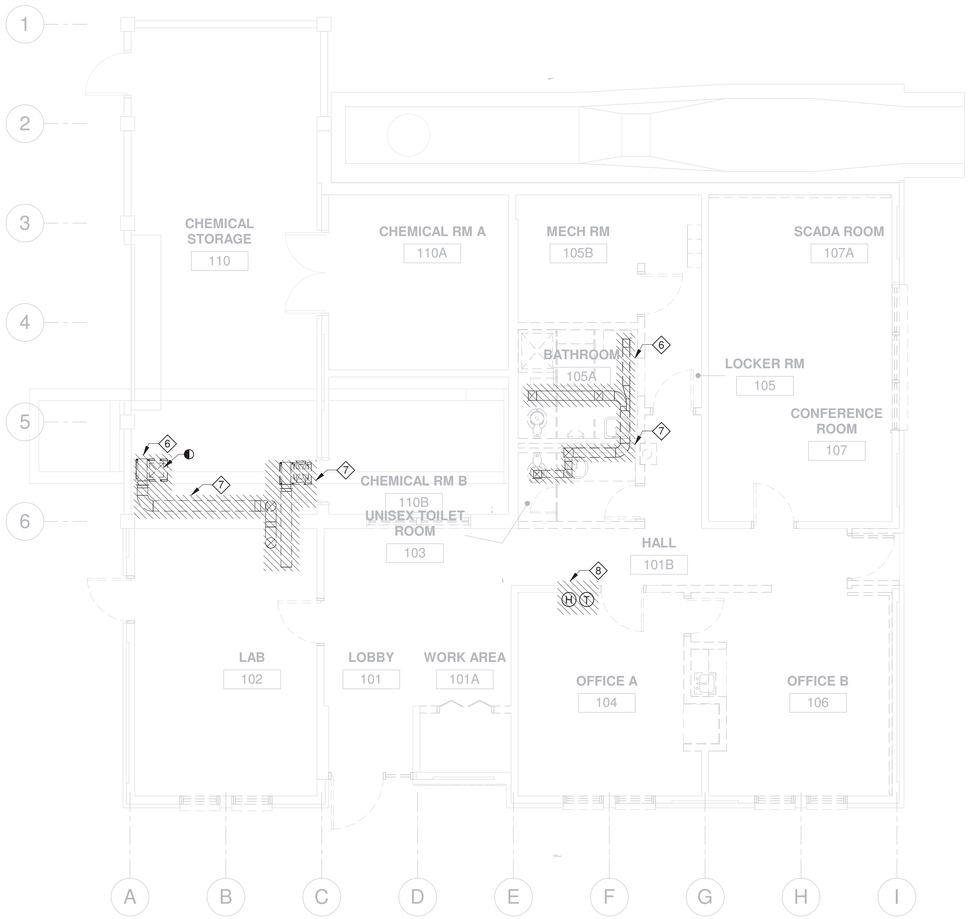
SHEET 28 OF 51

GENERAL DEMOLITION NOTES

1. CONTRACTOR SHALL VISIT THE PREMISES TO DETERMINE EXISTING CONDITIONS AND COMPARE SAME WITH CONTRACT DRAWINGS AND SPECIFICATIONS. CONTRACTOR IS TO ENSURE ALL CONDITIONS HAVE BEEN THOROUGHLY EXAMINED PRIOR TO THE SUBMISSION OF A BID PROPOSAL FOR DEMOLITION. NO ALLOWANCE WILL BE MADE FOR FAILURE TO COMPLY WITH THESE REQUIREMENTS AND A BID PROPOSAL SHALL BE CONSTRUED AS EVIDENCE HE HAS DONE SO.
2. ANY EXISTING EQUIPMENT, DUCTWORK, AC UNITS. ETC. WHICH IS NOT SHOWN TO BE REMOVED BUT INTERFERES WITH THE NEW CONSTRUCTION IS TO BE REMOVED BY CONTRACTOR AT NO ADDITIONAL COST.
3. CONTRACTOR, PRIOR TO THE REMOVAL AND DEMOLITION WORK IS TO INFORM OWNER OF THE ITEMS BEING REMOVED TO DETERMINE IF THE OWNER WOULD LIKE TO TAKE POSSESSION OF IT.
4. SHOULD ANY QUESTION ARISE AS TO WHETHER OR NOT ANY PIPING, EQUIPMENT OR OTHER ITEM SHOULD BE REMOVED, OR REMAIN AS PRESENTLY INSTALLED, THE CONTRACTOR SHALL REQUEST, IN WRITING. CLARIFICATION FROM THE ARCHITECT ENGINEER.
5. ANY DEMOLITION OF EXISTING EQUIPMENT SHALL INCLUDE THE REMOVAL OF THEIR RELATED CONTROLS AND CONTROL WIRING, SUPPORTS, DUCTWORK, PIPING, ALL CORRESPONDING ACCESSORIES AND PARTS AND ELECTRICAL POWER SUPPLY.
6. REMOVAL SHALL INCLUDE TAKING FROM THE PREMISES AND DISPOSAL OF REMOVED ITEMS TO THE LOCATION INDICATED THE OWNER OR BUILDING. UNLESS OTHERWISE NOTED
7. CONTRACTOR SHALL CAP ALL REMAINING DUCTS, AT ALL POINTS OF DISCONNECTION. AIRTIGHT.
8. DEMOLITION AND OTHER WORK WHICH CREATES DIRT AND/OR DISTURBING NOISE MUST BE PERFORMED AT THE TIME AND MANNER DIRECTED BY THE OWNER OR BUILDING FACILITY. THE DELIVERY, HANDLING AND INSTALLING OF MATERIALS, EQUIPMENT AND DEBRIS MUST ARRANGED TO AVOID ANY INCONVENIENCE AND ANNOYANCE TO THE BUILDING AND OPERATION. CLEANING MUST BE CONTROLLED TO PREVENT DIRT AND FROM INFILTRATING INTO ADJACENT AREAS. WELDING OR BURNING MUST BE PERFORMED ONLY DURING TIMES SPECIFICALLY APPROVED BY THE FACILITIES AND MAINTENANCE ENGINEERS
9. ALL RETURN AIR DUCT OPENINGS SHALL BE COVERED WITH TEMPORARY FILTER DURING THE DEMOLITION.

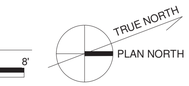
SHEET NOTES

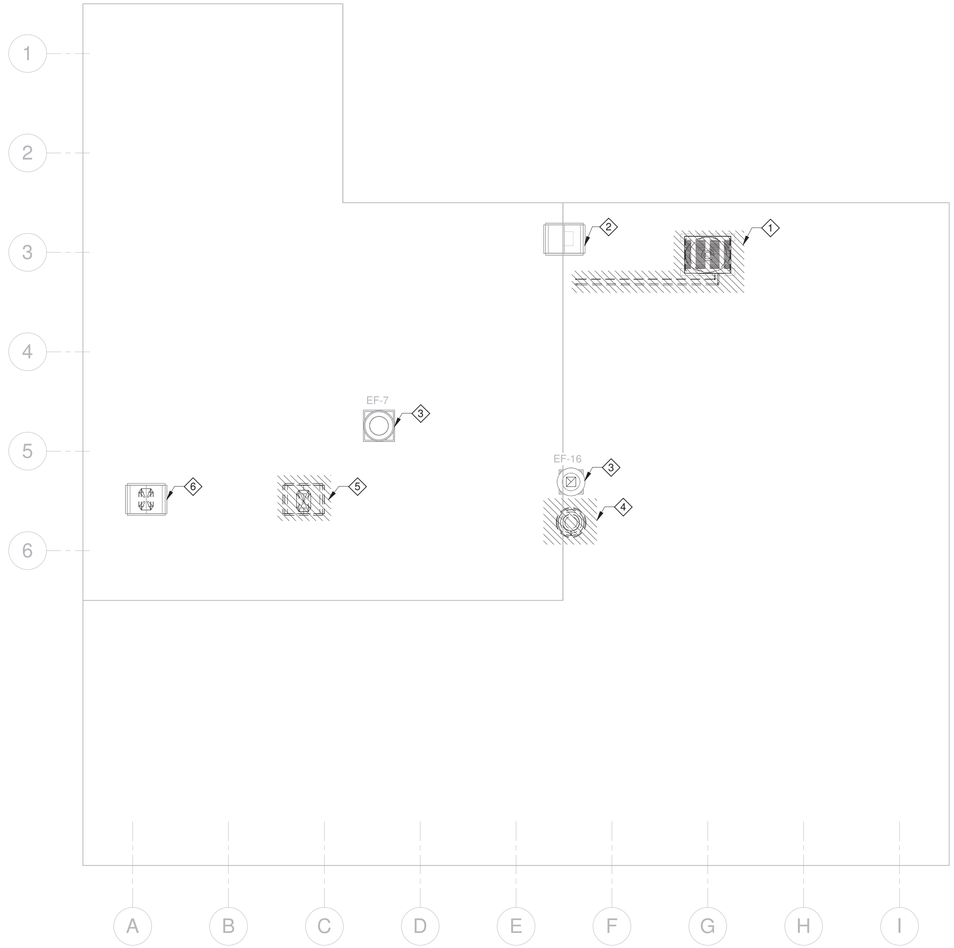
1. REMOVE EXISTING AIR-COOLED CONDENSING UNIT AND ASSOCIATED SUPPORTS, PIPING CONNECTIONS, CONTROLS, AND ELECTRICAL CONNECTIONS. PRIOR TO REMOVAL RECLAIM ALL REFRIGERANT AND PROPERLY DISPOSE OF IT IN ACCORDANCE WITH FEDERAL, STATE, LOCAL, AND EPA REGULATIONS.
2. EXISTING FRESH AIR INTAKE: REFER TO ARCHITECTURAL / ELECTRICAL PLANS.
3. EXISTING EXHAUST FAN TO REMAIN. PROTECT FAN DURING CONSTRUCTION.
4. REMOVE EXISTING ROOFTOP FAN AND ASSOCIATED CONDUIT, POWER WIRING, AND CONTROL. TEMPORARILY CAP EXISTING SUPPORT CURB AND SEAL WEATHERTIGHT UNTIL INSTALLATION OF NEW EXHAUST FAN. SEE NEW WORK FOR CONTINUATION.
5. REMOVE OUTSIDE INTAKE AIR HOOD. CAP EXISTING SUPPORT CURB AND FLASH AND SEAL ROOF WEATHERTIGHT TO MATCH EXISTING. REFER TO DETAIL #7 IN SHEET H-53. ALL ROOFWORK SHALL MAINTAIN EXISTING WARRANTY.
6. EXISTING EXHAUST AIR HOOD ON ROOF TO REMAIN. SEE NEW WORK FOR CONTINUATION.
7. REMOVE EXISTING DUCTWORK, FANS, ASSOCIATED SUPPORTS, CONDUIT, POWER WIRING, AND CONTROLS ENTIRELY.
8. REMOVE EXISTING HVAC SYSTEM'S CONTROL DEVICES, ASSOCIATED CONDUITS, CONTROL WIRING THROUGHOUT THE FACILITY. CONTRACTOR TO VERIFY IN THE FIELD.



FIRST FLOOR PLAN

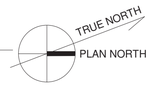
SCALE: 3/16" = 1'-0"





ROOF LEVEL

SCALE: 3/16" = 1'-0"



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107868
LICENSED PROFESSIONAL ENGINEER

8/30/2024

ORANGE COUNY, NEW YORK

CITY OF NEWBURGH

WASTEWATER TREATMENT PLANT (WWTP) ADMIN BUILDING RENOVATION

BID NUMBER 7.24

ARCADIS PROJ. NO. 30183827

NO.	DATE	ISSUED FOR	BY

DATE:	SEPTEMBER 2024
PROJECT NO.:	30183827
FILE NAME:	
DESIGNED BY:	A. DSOLA
DRAWN BY:	L. BANGARU
CHECKED BY:	V. VITALE

SHEET TITLE

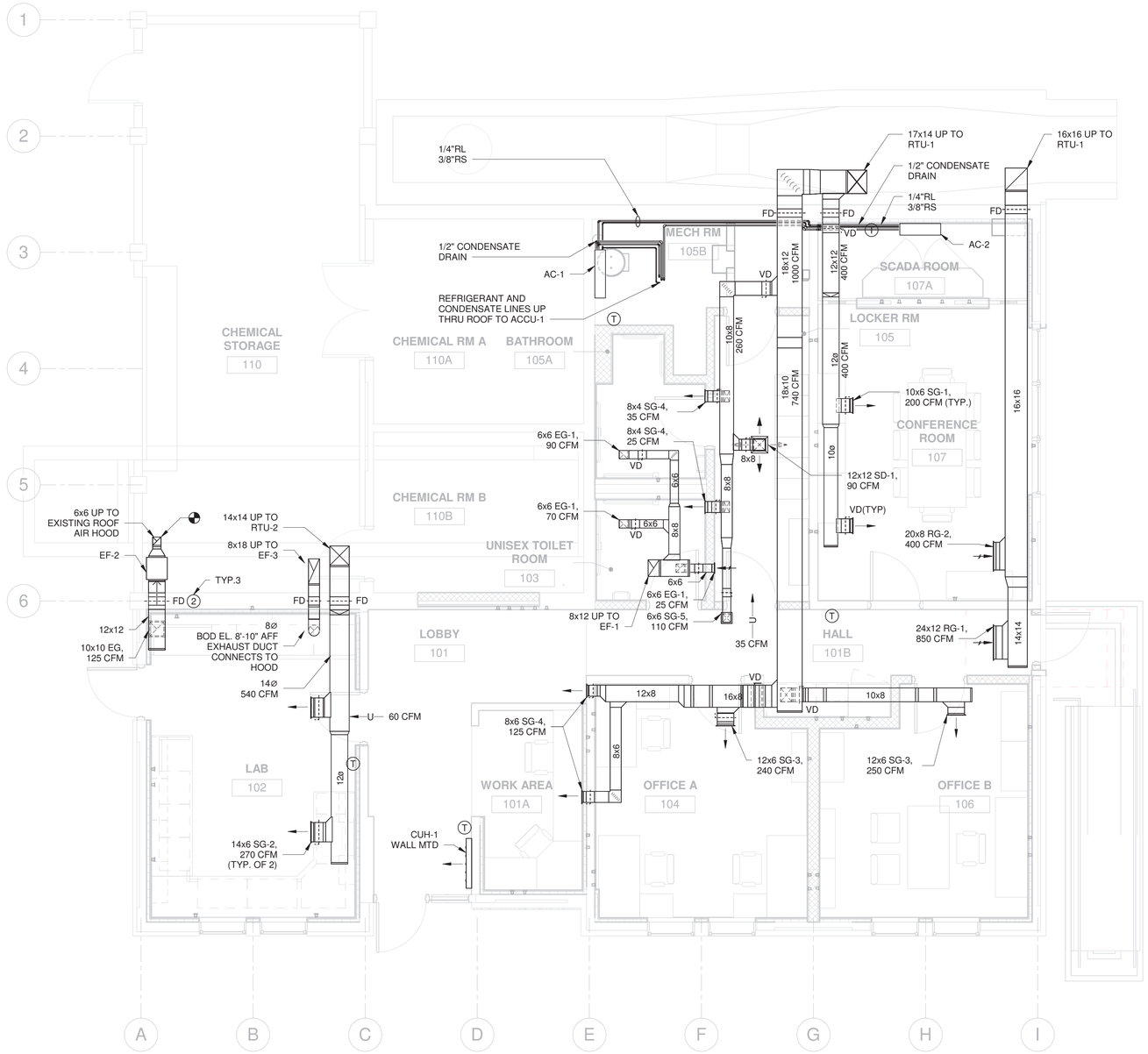
HVAC

DEMOLITION PLANS

SCALE: 3/16" = 1'-0"

H-2

SHEET 29 OF 51



FIRST FLOOR PLAN

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

0' 2' 4' 8'

TRUE NORTH

PLAN NORTH

Autodesk Docs://AUS-30183827-Newburgh WPCP Admin Bldg Rehab/H-3D-WPCP_R22.rvt

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SHEET TITLE

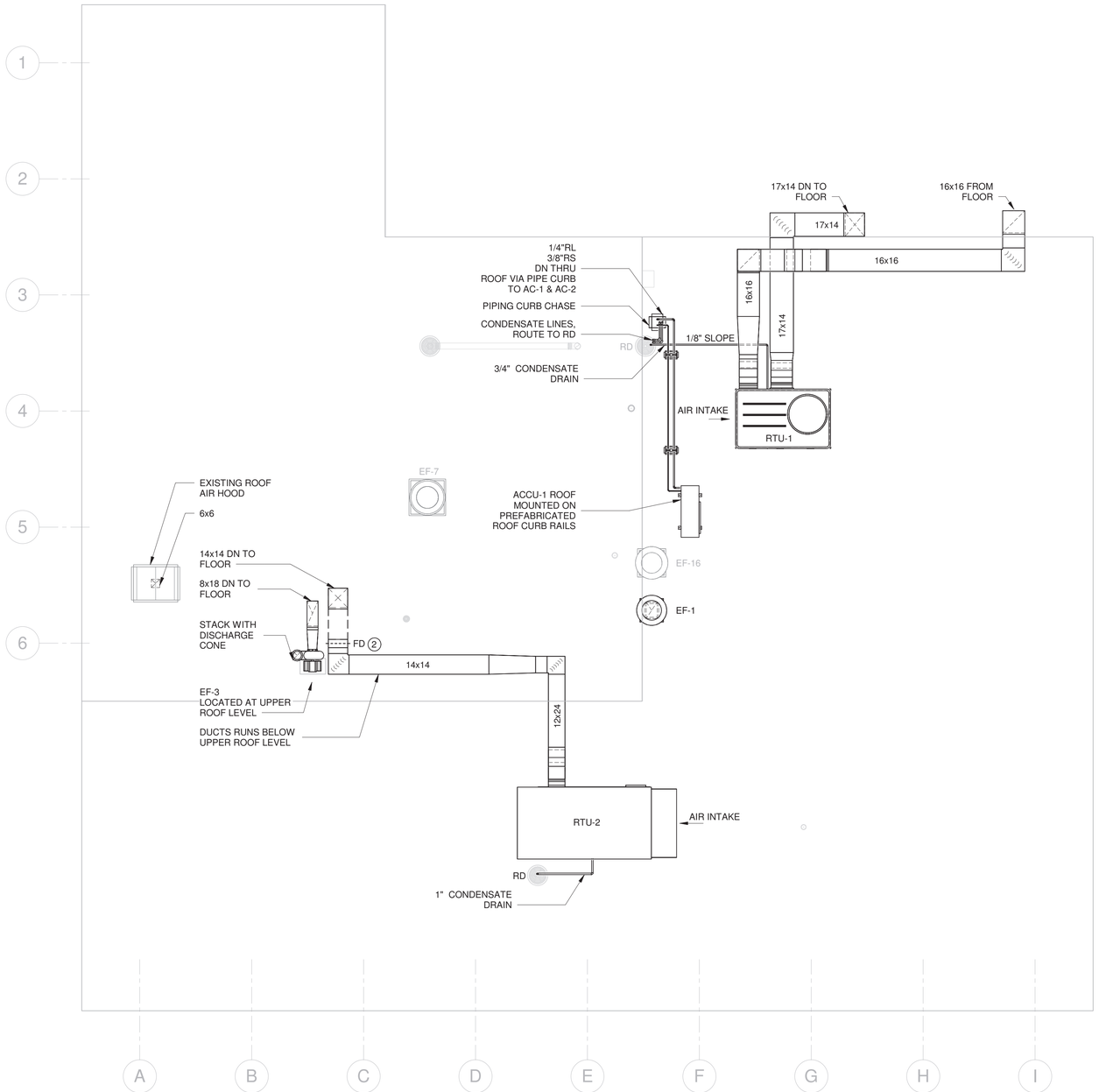
HVAC

FIRST FLOOR PLAN

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

H-10

SHEET 30 OF 51



ROOF PLAN

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

0' 2' 4' 8'

TRUE NORTH

PLAN NORTH

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FILE NAME:

DESIGNED BY: A. DSOLA

DRAWN BY: L. BANGARU

CHECKED BY: V. VITALE

SHEET TITLE

HVAC

ROOF PLAN

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

H-11

SHEET 31 OF 51

DIFFUSER, GRILLE AND REGISTER SCHEDULE

MARK NO.	LOCATION	TYPE	SIZE (IN) (WXH)	AIR FLOW (CFM)	DEFLECTION PATTERN	MFR	MODEL	NOTES
EG-1	RESTROM 105A	LOUVERED RETURN	6X6	70	0°	ANEMOSTAT	35	1, 2
EG-1	UNISEX 103, LOCKER RM 105	LOUVERED RETURN	6X6	50	0°	ANEMOSTAT	35	1, 2
RG-1	HALL 101B	LOUVERED RETURN	24X12	760	0°	ANEMOSTAT	35	1, 2
RG-2	CONF RM 107	LOUVERED RETURN	20X8	400	0°	ANEMOSTAT	35	1, 2
SD-1	LOCKER RM 105	ARCHIT DIFFUSER	12X12	90	-	ANEMOSTAT	Z	1, 2
SG-1	CONF RM 107	DOUBLE DEFLECTION GRILLE	10X6	200	0°	ANEMOSTAT	20	1, 2
SG-2	LAB 102	DOUBLE DEFLECTION GRILLE	14X6	270	22.5°	ANEMOSTAT	20	1, 2
SG-3	OFFICE A 104	DOUBLE DEFLECTION GRILLE	12X6	240	22.5°	ANEMOSTAT	20	1, 2
SG-3	OFFICE B 106	DOUBLE DEFLECTION GRILLE	12X6	250	22.5°	ANEMOSTAT	20	1, 2
SG-4	UNISEX 103	DOUBLE DEFLECTION GRILLE	8X4	25	0°	ANEMOSTAT	20	1, 2
SG-4	RESTRM 105A	DOUBLE DEFLECTION GRILLE	8X4	35	0°	ANEMOSTAT	20	1, 2
SG-6	LOBBY 101	DOUBLE DEFLECTION GRILLE	8X6	125	0°	ANEMOSTAT	20	1, 2
SG-6	WORK AREA 101A	DOUBLE DEFLECTION GRILLE	8X6	125	45°	ANEMOSTAT	20	1, 2
SG-5	HALL 101B	DOUBLE DEFLECTION GRILLE	6X6	110	45°	ANEMOSTAT	20	1, 2

NOTES:
1. INSTALL PER MFR INSTRUCTIONS
2. SPECIFICATION SECTION 23 31 13

ELECTRIC CABINET UNIT HEATER SCHEDULE

MARK NO.	LOCATION	TYPE	HEAT CAPACITY (MBH)	ELECTRICAL DATA			FAN CFM	TEMP RISE (°F)	THROW (FT)	MOUNTING HEIGHT (AFF)	WEIGHT (LB)	MFR	MODEL	NOTES
				AMPS	KW	V/PH/HZ								
CUH-1	VESTIBULE	FAN-FORCED WALL HEATER, SURFACE MOUNTED	5.1	7.2	1.5	208/1/60	160	30	13'7"	8" MIN	20	STEELPRO	AWFA1508C24	1-6

NOTES:
1. INSTALL PER MFR INSTRUCTIONS.
2. REFER TO SPECIFICATION SECTION 23 82 39.43
3. MANUAL RESET THERMAL SAFETY CUTOUT
4. BUILT-IN DISCONNECT, AUTOMATIC FAN DELAY.
5. SURFACE MOUNTED.
6. CORDINATE FINAL COLOR SELECTION WITH ARCHITECT.
7. BACNET THERMOSTAT.

FAN SCHEDULE

MARK NO.	LOCATION	SERVICE	TYPE	DRIVE TYPE	AIRFLOW (CFM)	ESP (IN WG)	FAN SPEED (RPM)	MOTOR DATA				WEIGHT (LB)	MFR	MODEL	NOTES
								HP	BHP	RPM	V/PH/HZ				
EF-1	ROOF	TOILET/LOCKER ROOMS EXHAUST	CENTRIFUGAL - DOWNBLAST	DIRECT	185	0.5	1346	1/4	0.07	1725	115/60/1	43	GREENHECK	G-097-VG	1-6
EF-2	CHEMICAL STORAGE ROOM	LAB 102	IN-LINE	DIRECT	125	0.75	1563	1/4	0.11	1725	115/60/1	62	GREENHECK	SQ-97-VG	1-2, 6-9,13
EF-3	UPPER ROOF	LAB 102 HOOD EXHAUST	CENTRIFUGAL	DIRECT	475	1.00	1705	1/2	0.37	1725	208/60/3	5.96	PLASTEC VENTILATION	P20ST4P033	6, 10-12,13

NOTES:
1. MOTOR - VARI-GREEN EC MOTOR WITH DIAL ONLY CONTROL - DIAL FOR BALANCING.
2. SWITCH, NEMA-1, TOGGLE; JUNCTION BOX MOUNTED & WIRED.
3. BAROMETRIC DAMPER, GRAVITY OPERATED, NOT COATED
4. BIRDSCREEN: STAINLESS STEEL.
5. STANDARD CURB CAP SIZE - 19 SQUARE.
6. FLOW RATES INDICATED HEREIN CORRESPOND TO SYSTEM'S TERMINAL AIR FLOWS AGREGATES INDICATED IN SHEET H-51. FINAL UNIT SELECTION SHALL ACCOUNT FOR FOR SYSTEM DUCT LEAKAGE AND SYSTEM BALANCED ACCORDINGLY TO MEET DESIGN SPACE AIR FLOWS.
7. COATED WITH INDUSTRIAL EPOXY, LIGHT GRAY (EXCEPT WHEEL); COMPOSITE WHEEL MATERIAL
8. INLET/OUTLET COMPANION FLANGE
9. BAROMETRIC DAMPER, INLINE, GRAVITY OPERATED
10. ROOF MOUNTED ON OEM POLYPROPYLENE WEATHER HOOD / PEDESTAL.
11. PROVIDE OEM DISCHARGE STACK, NOZZLE, BACK DRAFT DAMPER AND COUPLINGS FOR COMPLETE INSTALLATION OF FAN ASSEMBLY.
12. PROVIDE OEM FACTORY MOUNTED VFD AND CONTROLS.
13. PROVIDE VIBRATOR ISOLATORS AS RECOMMMENDED BY MANUFACTURER

REFRIGERANT CONCENTRATION LIMIT (RCL) CALCULATIONS

REFRIGERANT: R-410A
REFRIGERANT CONCENTRATION LIMIT RCL (LB/MCF)= 26
(NYSMC 1103.1, TABLE 1103.1; ANSI/ASHRAE STANDARD 34-2016)

REF. SYSTEMS WITH MORE THAN 6.6 POUNDS (3.0 KG) OF REFRIGERANT)

SYSTEM	PRE-CHARGED (LBS)	FIELD CHARGE (LBS, EST.)	TOTAL CHARGE (LBS, EST.)	MIN. ALLOWED ROOM VOLUME (CF). NOTE 1
ACCU-1	6.8	0	6.8	262

NOTE 1: TOTAL SYSTEM REFRIGERANT GHARGE (LBS) / RCL (LBS/MCF) X 1000
(NON-INSTITUTIONAL OCCUPANCY)

NYSMC 1104.4.1 NONCOMMUNICATING SPACES:
VOLUME OF THE SMALLEST, ENCLOSED OCCUPIED SPACE BY SYSTEM

SYSTEM ROOM	AREA (SF)	CEILING HEIGHT (FT)	ROOM VOLUME (CF)	COMPLIES?
ACCU-1 SCADA Room	57	8	456	YES

DUCTLESS SPLIT HEAT PUMP SYSTEM SCHEDULE

INDOOR UNIT	OUTDOOR UNIT	INDOOR UNIT LOCATION	OUTDOOR UNIT LOCATION	REFRIGERANT TYPE	REFRIGERANT CHARGE (LBS)	COOLING PERFORMANCE					HEATING PERFORMANCE		INDOOR SECTION							OUTDOOR SECTION							NOTES
						NOMINAL COOLING CAPACITY (MBH)	TOTAL COOLING CAPACITY (MBH)	SENSIBLE COOLING CAPACITY (MBH)	COOLING EAT DB/WB (°F)	COOLING EFF SEER	NOMINAL HEATING CAPACITY (MBH)	HEATING COP @ 47°F (HSPF)	PEAK AIR FLOW (CFM)	TYPE	ELECTRICAL DATA		WEIGHT (LBS)	MFGR	MODEL	V/PH	ELECTRICAL DATA			WEIGHT (LBS)	MFR	MODEL	
															MCA	MOP					MCA	RFS	MOCP				
AC-1	ACCU-1	SCADA 107A	ROOF	R-410A	6.8	12.0	9.2	7.5	75.6/60.9	20.0	13.0	9.8	417	FLOOR-STANDING TYPE (EXPOSED)	NA	NA	33	TRANE/MITSUBISHI	NTXFKS12A112AA	208/230/1	22.1	25	25	137	TRANE/MITSUBISHI	NTXMMX24A132AA	1-8
AC-2		ELEC. ROOM 105B	ROOF	R-410A		12.0	9.2	8.3	75.6/60.9	20.0	14.4	9.8	448	WALL MOUNTED	NA	NA	26	TRANE/MITSUBISHI	MSZ-EF12NAB-U1								1-8

NOTES:
1. DISCONNECT PROVIDED UNDER ELECTRICAL WORK.
2. INDOOR UNIT IS POWERED FROM OUTDOOR UNIT.
3. WIRELESS REMOTE CONTROLLERS. PROVIDE CONTROL INTERFACE FOR BAS CONNECTION.
4. DRAIN PAN SENSOR SS610, WIRED TO SHUTDOWN UNIT FOR HIGH CONDENSATE.
5. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB).
6. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB).
7. INSTALL OUTDOOR UNIT OVER ROOF RAILS FOR SUPPORT. REFER TO DETAIL 1 IN SHEET H-54.
8. CONDENSATE PUMP BLUE DIAMOND (ADV) MINI CONDENSATE PUMP W/ RESERVOIR & SENSOR 208/230V.

PACKAGED ROOFTOP AIR HANDLING UNIT SCHEDULE

MARK NO.	LOCATION	SERVICE	COOLING DATA						HEATING DATA (HEAT PUMP)					HEATING DATA (OTHER)				SUPPLY FAN DATA							CONDENSER		FILTERS		COMPRESSOR			POWER				EER , [SEER]	WEIGHT (LB)	DIMENSIONS (H/W/L) (FT)	MFR	MODEL	NOTES
			REFRIGERANT TYPE	NOMINAL TONNAGE	TOTAL/ SENSIBLE NET CAPACITIES (MBH)	COIL ROW/FPI	EAT DB/WB (°F)	LAT DB/WB (°F)	AMBIENT DB/WB (°F)	OUTPUT (MBH)	AMBIENT (°F)	EAT (°F)	LAT (°F)	COP @ 47° F (HSPF)	TYPE	CAPACITY	HEAT OUTPUT (MBH)	TEMP. RISE (°F)	DRIVE TYPE	TOTAL AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	ESP (IN WG)	QTY	HP PER MOTOR	BHP PER MOTOR	MOTOR SPEED (RPM)	FAN TYPE	FAN DIA QTY.	THICKNESS (IN)	MERV RATING	QTY	TYPE	FLA (AMPS)	MCA (AMPS)	MOP (AMPS)	MFS (AMPS)	V/PH/HZ					
RTU-1	ROOF	OFFICE SPACE	R-410A	4	44.75 / 35.14	3/16	74.7 / 62	52.63 / 51.28	90.2 / 72.2	19.99	3.5	60.2	72.4	8.2	ELECTRIC	12 KW	40.98	25.67	FC CENTRIFUGAL / VARIABLE DIRECT	1470	230	0.80	1	1	0.60	1016	PROPELLER / DIRECT	1	2	13	1	SCROLL	-	30.0	30.0	-	460/3/60	12.3, [14.3]	818	3.41/3.69/5.82	TRANE	WSC048H4R EA	1-7, 14
RTU-2	ROOF	LAB	R-410A	3	42.7 / 16.8	4/12	79.4/75	55 / 52	79.4/75	-	-	-			ELECTRIC	15 KW	51.2	87	BC CENTRIFUGAL / VARIABLE DIRECT	545	545	0.7	1	1	0.11	1888	PROPELLER / DIRECT	1	2 / 4	8 & 14	1	SCROLL	21.4	26.7	-	30.0	460/3/60	13.6 [15.7]	1428	4.58/4.33/9.91	TRANE	OABD036F4	1-5, 7, 8-14

NOTES:
1. DISCONNECT PROVIDED UNDER ELECTRICAL WORK. NO THROUGH-THE-BASE PROVISIONS. PROVIDE UNPOWERED CONVENIENCE OUTLET.
2. PROVIDE HORIZONTAL DISCHARGE ROOF VIBRATION ISOLATION CURB.
3. CONDENSER COIL PROTECTION WITH HAIL GUARD.
4. PROVIDE UNIT WITH HINGED ACCESS DOORS FOR FILTER/ EVAPORATOR, SUPPLY FAN/HEAT AND THE COMPRESSOR/ CONTROL ACCESS.
5. BLACK EPOXY PRE-COATED /CORROSION INHIBITING COATING EXTERIOR, INTERIOR & CONDENSER COILS OPTION.
6. PROVIDE RAIN HOOD/MANUAL OUTSIDE DAMPER 0-50% ADJ.
7. PROVIDE BACNET COMMUNICATION INTERFACE, SYSTEM MONITORING CONTROLS AND ROOM SENSOR W/ TEMP.ADJ. W/OVRD. REFER TO CONTROLS DRAWING.
8. HOT GAS RE-HEAT: MODULATING
9. DIGITAL SCROLL COMPRESSOR
10. CONDENSER: AIR COOLED VARIABLE SPEED HEADPRESSURE LOW AMBIENT CONTROL.
11. ELECTRIC HEAT: SCR MODULATING
12. 2-POSITION OUTDOOR DAMPER - CLASS 1A
13. REFER TO SPECIFICATION SECTION 237413 FOR ADDITIONAL REQUIREMENTS.
14. FLOW RATES INDICATED HEREIN CORRESPOND TO SYSTEM'S TERMINAL AIR FLOWS AGREGATES INDICATED IN SHEET H-51. FINAL UNIT SELECTION SHALL ACCOUNT FOR FOR SYSTEM DUCT LEAKAGE AND SYSTEM BALANCED ACCORDINGLY TO MEET DESIGN SPACE AIR FLOWS.

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SHEET TITLE
HVAC
SCHEDULES I

SCALE: NOT TO SCALE

H-50
SHEET 32 OF 51

VENTILATION SCHEDULE

NEW YORK STATE MECHANICAL CODE 2020, SECTION 403

Ventilation Zone Name / Space Name	OCCUPANCY CLASSIFICATION	DEFAULT OCCUPANT DENSITY	People Outdoor Air Rate	Area Outdoor Air Rate	EXHAUST AIRFLOW RATE	Air Distribution Effectiveness	Supply Air (Provided)	Min Exhaust Air	Space Floor Area	# OCCUPANTS		Breathing Zone Outdoor Air	Space Outdoor Air	Primary Outdoor Air Fraction	Space Ventilation Efficiency	Outdoor Air Intake Flow Rate Min.
	TABLE 403.3.1.1	#/1000 FT2	CFM/person (Rp)	CFM/sqft (Ra)	CFM/SQFT [CFM/WC] (CFM/SH)	(Ez)	CFM	CFM	Sqft (Az)	(Pz, Default)	(Pz, design)	CFM (Vbz)	(Voz)	(Zp)	(Evz)	(Vot)
RTU-1 & EF-1 (403.3.1.1.2.3 Mul. Zone Recirc. Systems); System Diversity (D) = 1; Constant Volume																
LOCKER ROOM 105	EDUCATION - LOCKER/DRESSING ROOMS	0	0.00	0.00	0.25	1.00	90	25	99.0	0.0	0.0	0	0	**0.00**	**1.000**	
RESTROOM 105A	PUBLIC SPACES - TOILET ROOMS	0	0.00	0.00	[70]+(20)	1.00	35	90	46.0	0.0	0.0	0	0	**0.00**	**1.000**	
UNISEX 103	PUBLIC SPACES - TOILET ROOMS	0	0.00	0.00	[70]	1.00	25	70	40.0	0.0	0.0	0	0	**0.00**	**1.000**	
HALL 101B	CORRIDORS	0	0.00	0.06	-	0.80	110		130.7	0.0	0.0	8	10	**0.09**	**1.000**	
OFFICE A 104	OFFICES - OFFICE SPACES	5	5.00	0.06	-	0.80	240		172.0	0.9	3.0	25	32	**0.13**	**1.000**	
OFFICE B 106	OFFICES - OFFICE SPACES	5	5.00	0.06	-	0.80	250		165.0	0.8	3.0	25	31	**0.12**	**1.000**	
WORK AREA 101A	OFFICES - OFFICE SPACES	5	5.00	0.06	-	0.80	125		68.0	0.3	2.0	14	18	**0.14**	**1.000**	
CONFERENCE ROOM 107	OFFICES - CONFERENCE ROOMS	50	5.00	0.06	-	0.80	400		226.0	11.3	11.4	71	88	**0.22**	**0.929**	
LOBBY 101	OFFICES - MAIN ENTRY LOBBIES	10	5.00	0.06	-	0.80	125		145.0	1.5	2.0	19	23	**0.19**	**0.963**	
						SYSTEM TOTALS (RTU-1 & EF-1)	**1400**	**185**	**1092**		**21**	**161**	**202**	**0.22**	**0.929**	**174**
RTU-2 - CAV SYSTEM & EF-3, 4 (403.3.1.1.2.2 100-Percent Outdoor Air Systems), Constant Volume																
LAB 102	EDUCATION - SCIENCE LABORATORIES	25	10.00	0.18	1.00	0.8	540	242	242.0	6.1	6.1	105	131	-	-	**131**

SUMMARY:

RTU-1 & EF-1:

403.3.1.1.2.3.2 - System Ventilation Efficiency Ev @ Zp Max Zone **0.930** **(TABLE 403.3.1.1.2.3.2)**

403.3.1.1.2.3.3 - Uncorrected Outdoor Air Intake Flow Rate (Vou) **161 CFM**

403.3.1.1.2.3.4 - Outdoor Air Intake Flow Rate: Vot = Vou/Ev **174 CFM**

Outdoor Air Intake Flow Rate Provided **245 CFM**

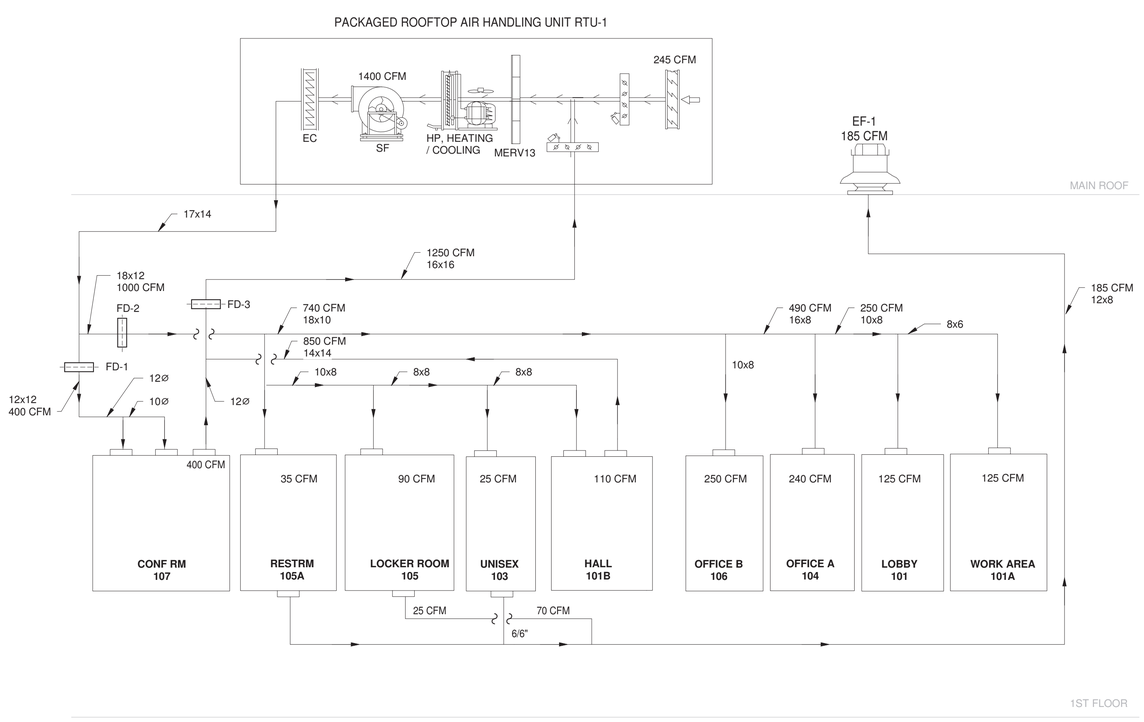
Exhaust Air Rate Provided **185 CFM**

RTU-2 & EF-2, 3:

403.3.1.1.2.2 100-Percent Outdoor Air Systems (Vot) **131 CFM**

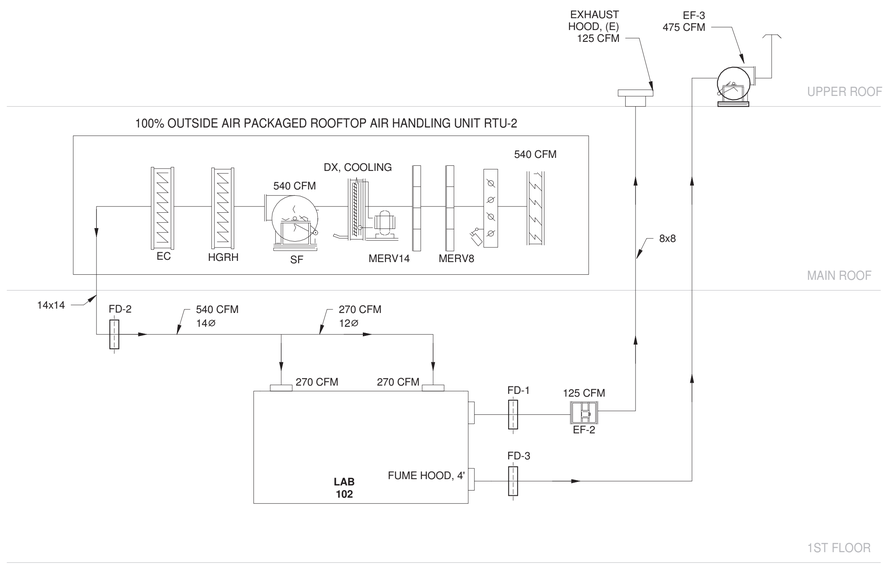
Outdoor Air Intake Flow Rate provided **540 CFM**

Exhaust Air Rate Provided **600 CFM**



1 H-51 AIR RISER DIAGRAM - RTU-1 / EF-1

SCALE: NTS



2 H-51 AIR RISER DIAGRAM - RTU-2 / EF-2, EF-3

SCALE: NOT TO SCALE

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AIR RISER DIAGRAMS / VENTILATION SCHEDULE

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H-51

SHEET 33 OF 51

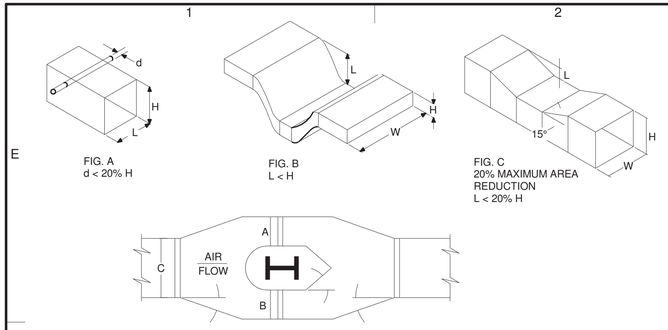


FIG. A
d < 20% H

FIG. B
L < H

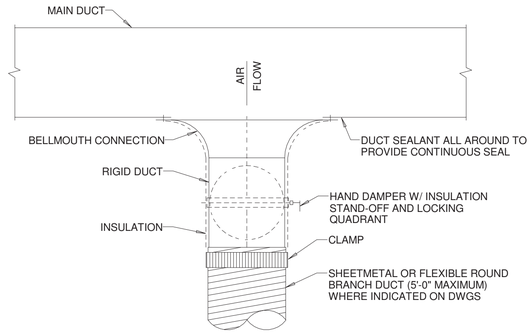
FIG. C
20% MAXIMUM AREA REDUCTION
L < 20% H

INDICATED ANGLES MUST BE < 30°.

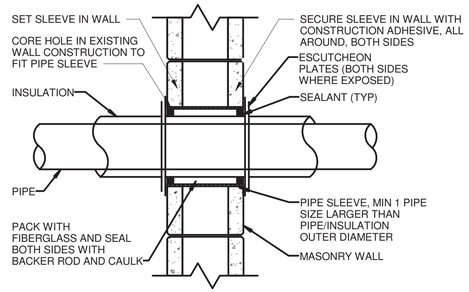
(USED WHEN OBSTRUCTION EXCEEDS 20% OF SECTION AREA AND OFFSETS AROUND ARE NOT POSSIBLE)

PROVIDE ONE OF THE ABOVE WHERE OBSTRUCTIONS OCCUR.

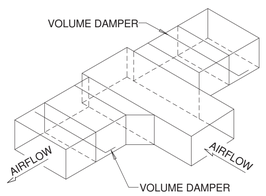
1 DUCT OBSTRUCTIONS
H-52 SCALE: NOT TO SCALE



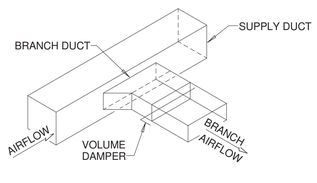
2 BELLMOUTH BRANCH DUCT TAKE-OFF
H-52 SCALE: NOT TO SCALE



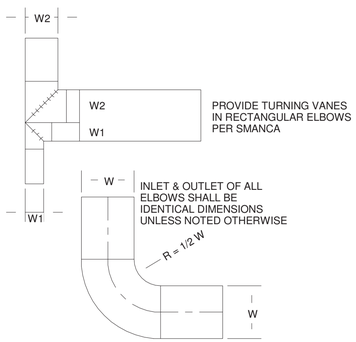
3 PIPE SLEEVE THRU INTERIOR MASONRY WALL
H-52 SCALE: NOT TO SCALE

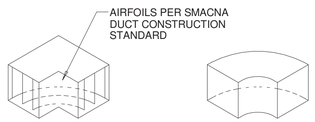


DIVERTING TEE DETAIL



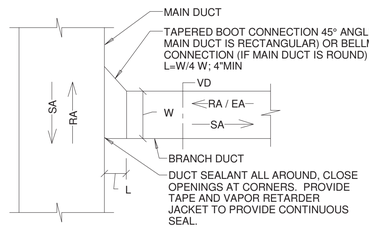
BRANCH TAKE-OFF DETAIL





ELBOW WITH TURNING VANES DETAIL

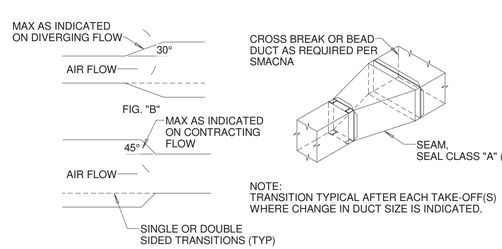
ELBOW DETAIL



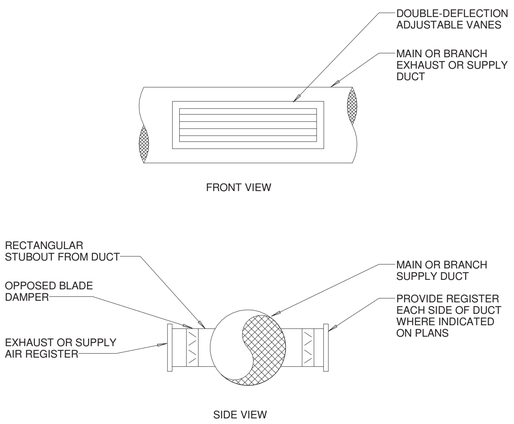
4 TYPICAL DUCTWORK
H-52 SCALE: NOT TO SCALE

5 DUCT ASSEMBLY RESTRICTIONS
H-52 SCALE: NOT TO SCALE

6 DUCT BRANCH TAKE-OFF
H-52 SCALE: NOT TO SCALE



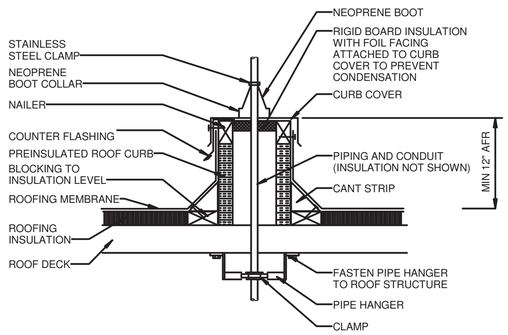
7 DUCT TRANSITION
H-52 SCALE: NOT TO SCALE



FRONT VIEW

SIDE VIEW

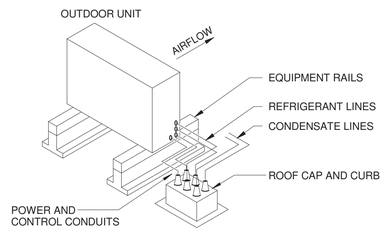
8 EXPOSED ROUND DUCT WITH REGISTER DETAIL
H-52 SCALE: NOT TO SCALE



NOTES:

1. PATE TYPE CURB ASSEMBLY PROVIDED BY MECHANICAL CONTRACTOR. INSTALLATION BY GENERAL/ROOFING CONTRACTOR.
2. FASTEN CURB TO ROOF PER MANUFACTURER'S REQUIREMENTS.

9 PIPING THRU FLAT ROOF - NEOPRENE BOOT TYPE
H-52 SCALE: NOT TO SCALE



10 SPLIT SYSTEM OUTDOOR UNIT
H-52 SCALE: NOT TO SCALE

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8/30/2024

ORANGE COUNY, NEW YORK

CITY OF NEWBURGH

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BID NUMBER 7.24

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NO.	DATE	ISSUED FOR	BY

DATE: SEPTEMBER 2024

PROJECT NO.: 30183827

FILE NAME:

DESIGNED BY: A. DSOLA

DRAWN BY: L. BANGARU

CHECKED BY: V. VITALE

SHEET TITLE

HVAC

DETAILS 1

SCALE: NOT TO SCALE

H-52

SHEET 34 OF 51

Autodesk Docs://AUS-30183827-Newburgh WPCP Admin Bldg Rehab/H-3D-WPCP_R22.rvt

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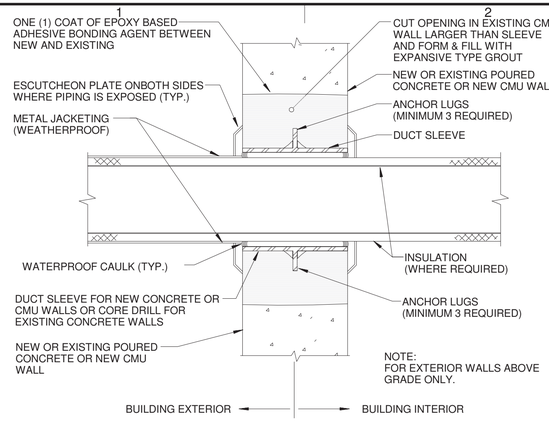
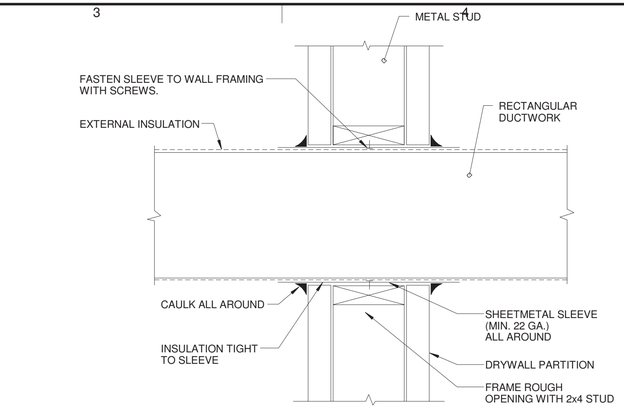


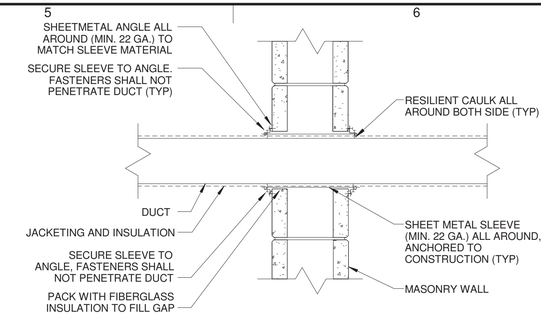
1 H-53 DUCT PENETRATION EXTERIOR WALL ABOVE GRADE

SCALE: NOT TO SCALE



2 H-53 DUCT PENETRATION GYP BOARD WALL (CONCEALED)

SCALE: NOT TO SCALE

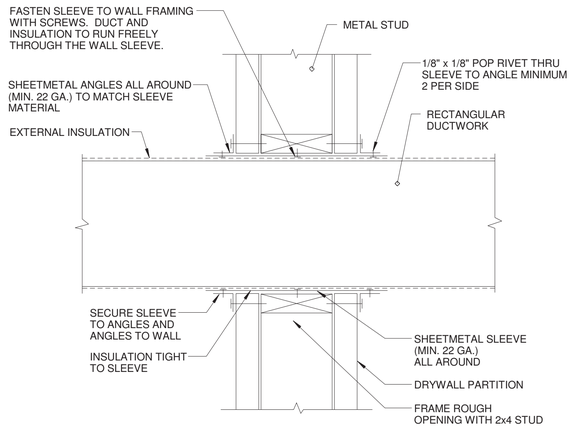


NOTES:

1. CENTER DUCT IN OPENING AND KEEP SPACE CLEAR OF ANY FOREIGN MATERIAL.
2. PROVIDE AT ALL DUCT PENETRATIONS THROUGH FULL HEIGHT WALLS UNLESS NOTED OTHERWISE

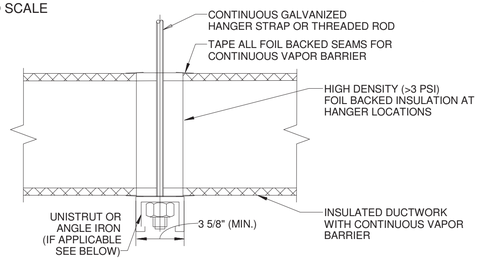
3 H-53 DUCT SLEEVE THRU MASONARY WALL

SCALE: NOT TO SCALE



4 H-53 DUCT PENETRATION GYP BOARD WALL (EXPOSED)

SCALE: NOT TO SCALE



NOTES:

1. CONTINUOUS GALVANIZED HANGER STRAP.
2. FOR CROSS SECTIONAL AREA OF MORE THAN 8 SQ FT, DUCT SHALL BE REINFORCED BY ANGLES ON ALL FOUR SIDES, COORDINATE HANGER AND REINFORCING LOCATIONS.
3. SUPPORTS AND DUCT REINFORCEMENT SHALL BE SPACED AND SIZED AS PER SMACNA.
4. CONTRACTOR SHALL DETAIL AND CONSTRUCT HANGER WITH ZERO DUCT PENETRATIONS.
5. HANGER SUPPORTS SHOWN SHALL ALSO BE USED FOR UNINSULATED, NON-CONDENSING RECTANGULAR DUCTWORK

5 H-53 RECTANGULAR DUCT HANGER SUPPORT

SCALE: NOT TO SCALE

FIG. A

SHOWS SUPPLEMENTAL FASTENER LOCATIONS

FIG. A -SUGGESTED SIZING

DUCT SIZE	BAND
18"x12" 24"x20"	1 1/2"x16 GA 1"x1/8"

TABLE 4-4

DUCT GAGE	ALLOWABLE LOAD PER FASTENER *
28, 26	25 lb
24, 22, 20	35 lb
18, 16	50 lb

DEVIATION PERMITTED BY OTHER ANALYSIS. X=1", Y=2"; ADD OTHERS TO ACCOMMODATE LOAD. MINIMUM OF 3 ON 24" WIDTH AND UP. ADD ALONG SIDES NEAREST ANCHORS.

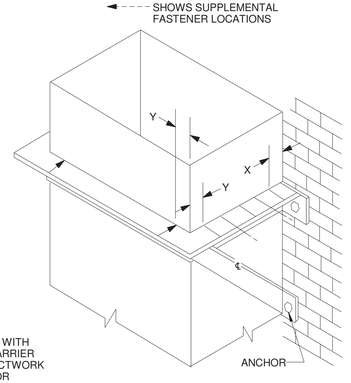
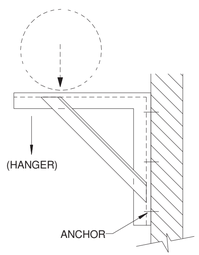


FIG. B



SEE KNEE BRACKET TABLES IN THE ROUND INDUSTRIAL STDS.

FIG. B -SUGGESTED SIZING

DUCT SIZE	ANGLE
30" x 12"	1" x 1" x 1/8"
36" x 18"	1" x 1" x 1/8"
42" x 24"	1 1/4" x 1 1/4" x 1/8"
48" x 30"	1 1/4" x 1 1/4" x 1/8"

NOTES:

1. BRACKETS ARE SIZED FOR 12 FEET OF DUCT, MAXIMUM.
2. LOCATE DUCTS AGAINST WALL OR MAXIMUM OF 2" AWAY FROM WALL.
3. EACH WALL ANCHOR SHALL SATISFY THE FOLLOWING CRITERIA UNLESS OTHER ANALYSIS IS MADE:

   A. TENSILE LOAD = 3/8 x DUCT WEIGHT; SAFETY FACTOR 4.
   B. SHEAR LOAD x 1/2 x DUCT WEIGHT; SAFETY FACTOR 4.

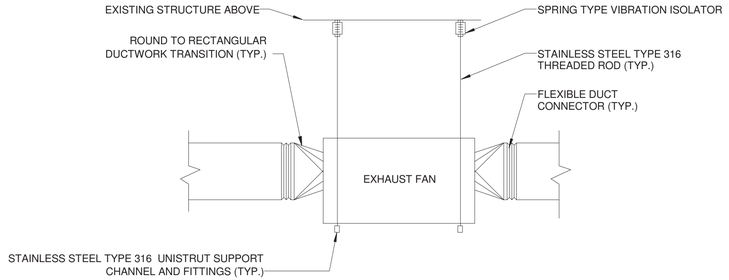
6 H-53 WALL SUPPORTED DUCTWORK DETAIL

SCALE: NOT TO SCALE

CONTRACTOR SHALL VERIFY LOCATIONS OF PRESTRESSED STRAINS IN EXISTING CONCRETE TEE'S PRIOR TO ANCHOR INSTALLATION FOR STEEL FRAME AND HVAC DUCT HANGERS

7 H-53 UNINSULATED ROUND DUCT HANGER SUPPORT

SCALE: NOT TO SCALE



8 H-53 SUSPENDED INLINE EXHAUST AIR FAN

SCALE: NOT TO SCALE

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DESIGNED BY: A. DSOLA

DRAWN BY: L. BANGARU

CHECKED BY: V. VITALE

SHEET TITLE

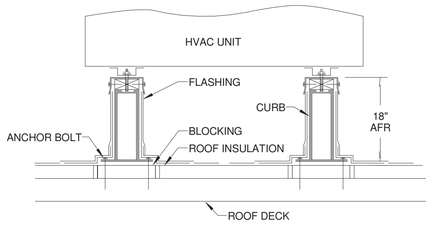
HVAC

DETAILS 2

SCALE: NOT TO SCALE

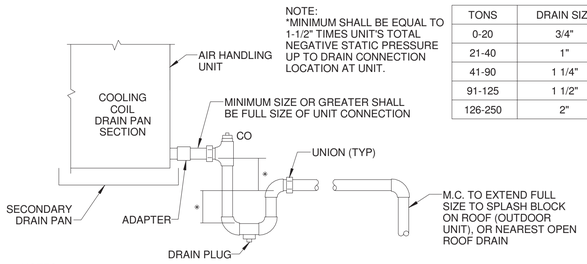
H-53

SHEET 35 OF 51



1. ANCHOR SECURELY PER MANUFACTURERS INSTALLATION GUIDE.
2. VERIFY SPACING WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.
3. RE-FLASH AND PATCH ROOF WATER TIGHT.

1 ROOFTOP HVAC UNIT SUPPORT
H-54 SCALE: NOT TO SCALE

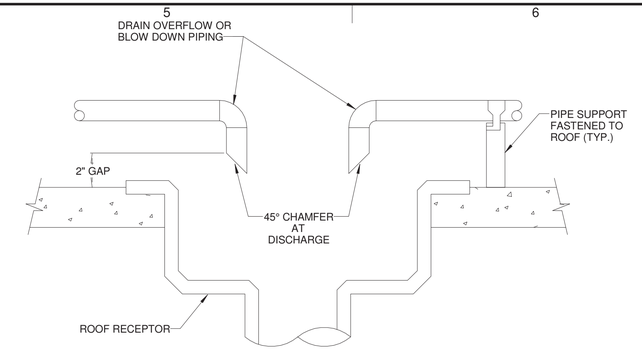


NOTE:
*MINIMUM SHALL BE EQUAL TO 1-1/2" TIMES UNIT'S TOTAL NEGATIVE STATIC PRESSURE UP TO DRAIN CONNECTION LOCATION AT UNIT.

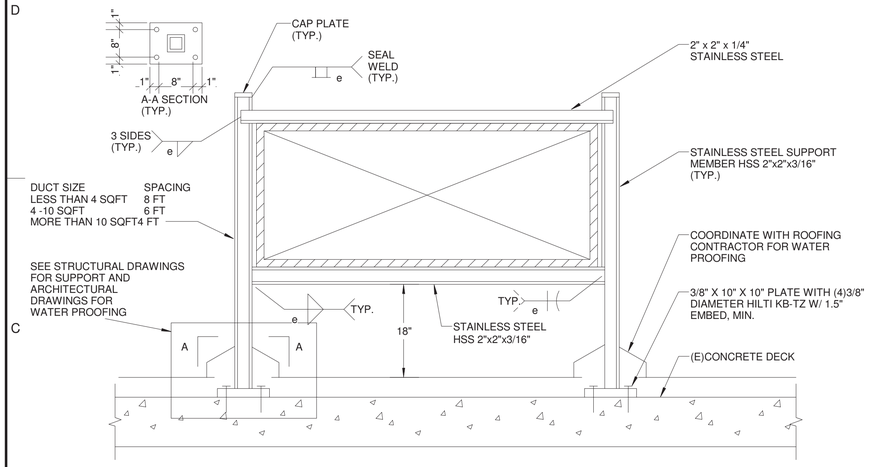
TONS	DRAIN SIZE
0-20	3/4"
21-40	1"
41-90	1 1/4"
91-125	1 1/2"
126-250	2"

NOTES:
1. ALL INTERIOR CONDENSATE DRAIN PIPING SHALL BE INSULATED .

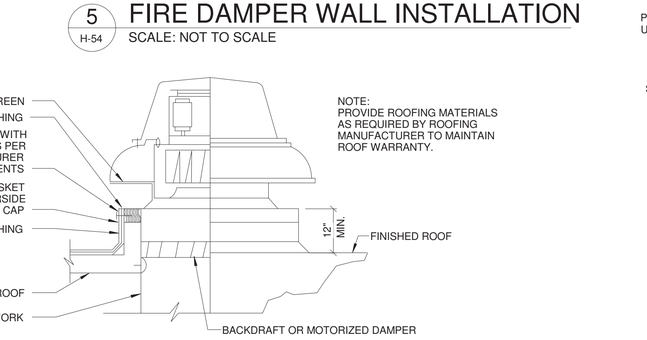
2 CONDENSATE DRAIN TRAP
H-54 SCALE: NOT TO SCALE



3 ROOF RECEPTOR
H-54 SCALE: NOT TO SCALE

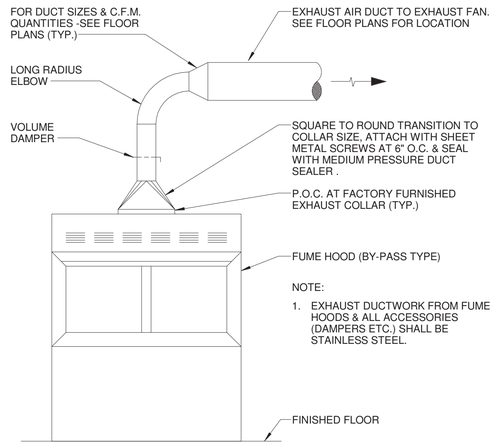


4 HEAVY DUTY SUPPORT AT ROOF FOR RECTANGULAR DUCTWORK (SECURED TO ROOF)
H-54 SCALE: NOT TO SCALE



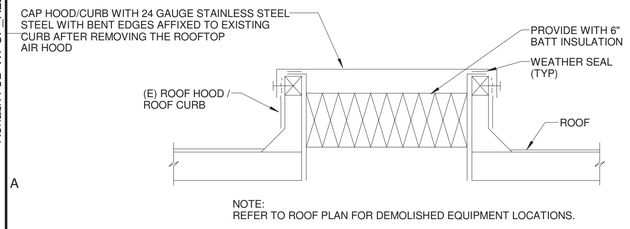
NOTES:
1. GENERAL ARRANGEMENT SHOWN. INSTALL ALL FIRE DAMPERS IN STRICT ACCORDANCE WITH ALL CONDITIONS OF THEIR LISTING, THE MANUFACTURERS' INSTALLATION INSTRUCTIONS AND AUTHORITIES HAVING JURISDICTION. SEE SPECIFICATIONS.
2. WHERE FIRE DAMPER IS TO BE MOUNTED WITHIN EXISTING WALL OR FLOOR, CUT OPENING AS REQUIRED TO MAINTAIN CLEARANCES STIPULATED BY THE MANUFACTURER BETWEEN WALL AND SLEEVE.
3. ACCESS DOORS SHALL BE AS LARGE AS POSSIBLE, UP TO 18"x12" MAXIMUM. LOCATE ON MOST ACCESSIBLE SIDE OF DAMPER.
4. GAUGE OF SHEETMETAL SLEEVE, MOUNTING ANGLES, METHOD OF ATTACHMENT, ETC. AS PER CONDITIONS OF LISTING AND AS DIRECTED BY FIRE DAMPER MANUFACTURER.

5 FIRE DAMPER WALL INSTALLATION
H-54 SCALE: NOT TO SCALE



NOTE:
1. EXHAUST DUCTWORK FROM FUME HOODS & ALL ACCESSORIES (DAMPERS ETC.) SHALL BE STAINLESS STEEL.

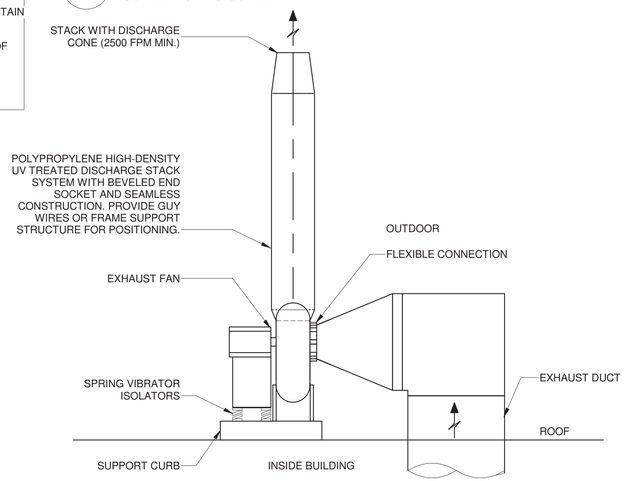
6 SINGLE DUCT FUME HOOD CONNECTION
H-54 SCALE: NOT TO SCALE



NOTE:
REFER TO ROOF PLAN FOR DEMOLISHED EQUIPMENT LOCATIONS.

7 EXISTING CURB CAP DETAIL
H-54 SCALE: NOT TO SCALE

8 DOWNBLAST EXHAUST FAN AND DUCT INSTALLATION
H-54 SCALE: NOT TO SCALE



9 HOOD EXHAUST FAN & STACK
H-54 SCALE: NOT TO SCALE

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DRAWN BY: L. BANGARU
CHECKED BY: V. VITALE

SHEET TITLE

HVAC

DETAILS 3

SCALE: NOT TO SCALE

H-54

SHEET 36 OF 51

CONTROL ABBREVIATIONS AND SYMBOLS

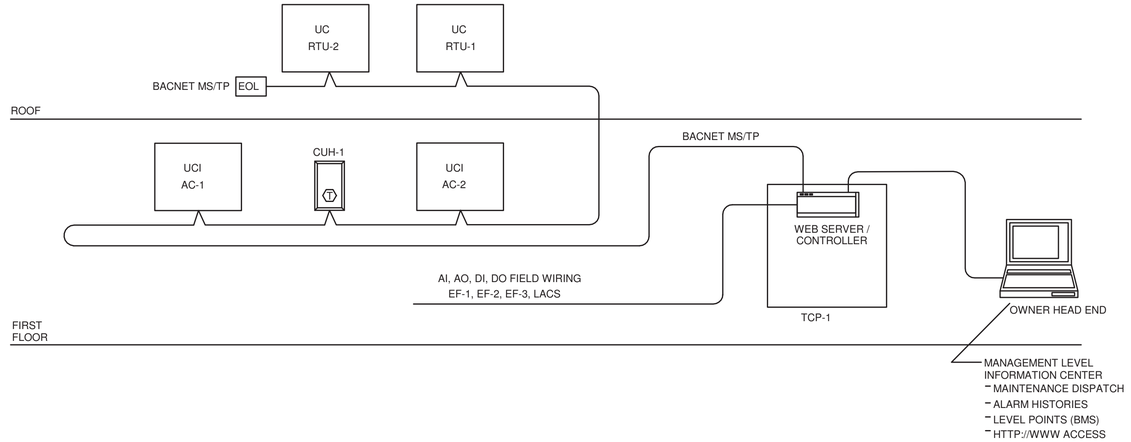
ADJ	ADJUSTABLE
AI	ANALOG INPUT
AO	ANALOG OUTPUT
AUX	AUXILARY
AV	ANALOG VALUE
BAS	BUILDING AUTOMATION SYSTEM
CP	CONTROL PANEL
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DV	DIGITAL VALUE
EOL	END OF LINE
HMI	HUMAN MACHINE INTERFACE
LACS	LABORATORY AIRFLOW CONTROL SYSTEM
OEM	ORIGINAL EQUIPMENT MANUFACTURER
SCR	SILICON CONTROLLED RECTIFIER
TCP	DIRECT DIGITAL CONTROL PANEL
UC	UNIT CONTROLLER (OEM)
UCI	UNIT CONTROLLER INTERFACE

CT — CURRENT TRANSMITTER
M — MOTOR/ACTUATOR
SENSOR/TRANSMITTER
SENSOR WITH CONTACT/RELAY
H L — AIR DIFFERENTIAL PRESSURE SENSOR/TRANMITTER
DAMPER
FILTER
T — ZONE/ROOM THERMOSTAT

FAN
MS — MOTOR STARTER
VFD — VARIABLE FREQUENCY DRIVE
HP — HEAT PUMP
DX REFRIGERANT COIL
ELECTRIC COIL
H G R H — HOT GAS RE-HEAT

GENERAL BUILDING CONTROL NOTES

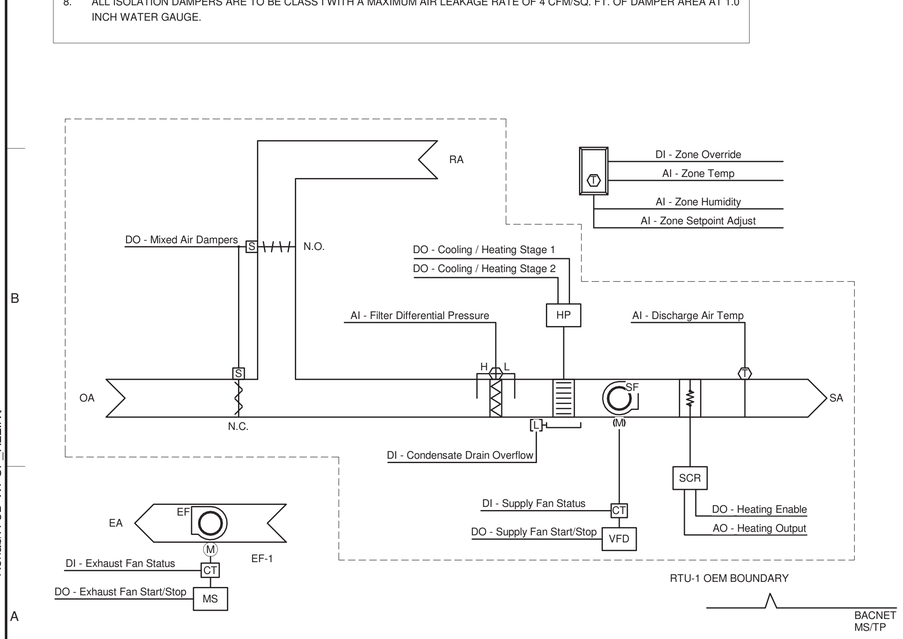
1. BMS SHALL BE FULLY COMPLIANT WITH HTML5 GRAPHICAL USER INTERFACE FOR OPERATOR AND USER ACCESS, OPERATION, AND TROUBLESHOOTING. ALL GRAPHICS, ALARMS, AND PERFORMANCE TRENDS SHALL BE ACCESSIBLE THROUGH A WEB BROWSER
2. THE CONTROL SYSTEMS SERVING THIS BUILDING SHALL BE BASED ON DISTRIBUTED SYSTEMS, CONTROL PANELS, MONITORING PANELS AND HMIs ASSOCIATED WITH MECHANICAL SYSTEM PLATFORMS AS DESCRIBED ON THESE CONTROL DRAWINGS AND IN THE PROJECT SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR INTEGRATING ALL MONITORING AND CONTROL POINTS TO PROVIDE AND COMMISSION COMPLETE AND FUNCTIONAL SYSTEMS. THIS MAY INCLUDE POINTS AND/OR SEQUENCING NOT EXPLICITLY SHOWN IN THE ABOVE REFERENCED DOCUMENTS.
3. ALL OEM EQUIPMENT SHALL HAVE SEPARATE UNIT MOUNTED CONTROLS WITH A BACNET/MSTP BASED DDC UNIT CONTROLLER (UC) THAT COMMUNICATES WITH THE HEAD END. MONITORING POINTS AND ADJUSTABLE CONTROL POINTS SHALL BE DISPLAYED AT THE HEAD END.
4. SYSTEM SHALL ALLOW FOR ADDITIONAL HMI'S VIA PORTABLE LAPTOP(S) CONNECTED TO CAT6 COMMUNICATION TERMINALS.
5. ALL EQUIPMENT NOT INDICATED SHALL OPERATE PER A STAND ALONE CONTROLLER OR LOCALLY THRU A THERMOSTAT / SWITCH.
6. THE SEQUENCE OF OPERATION LISTED ON THESE PLANS IS FULLY ADJUSTABLE. EACH SEQUENCE SHALL BE PROGRAMMED FOR A DISCRETE DAILY SCHEDULE (7 DAYS PER WEEK) WITH A UPS PROVIDING 10 HOURS (MINIMUM) OF SAVED MEMORY DURING THE EVENT OF A LOSS OF POWER.
7. THE HVAC SYSTEM SHALL CALCULATE THE OPTIMAL START TIMES BY TRENDING TEMPERATURE AND WEATHER DATA TO MINIMIZE WARM-UP/COOL DOWN PERIODS DURING SCHEDULED SWITCHES FROM UNOCCUPIED TO OCCUPIED MODES.
8. ALL ISOLATION DAMPERS ARE TO BE CLASS I WITH A MAXIMUM AIR LEAKAGE RATE OF 4 CFM/SQ. FT. OF DAMPER AREA AT 1.0 INCH WATER GAUGE.



1 BAS ARCHITECTURE

H-55

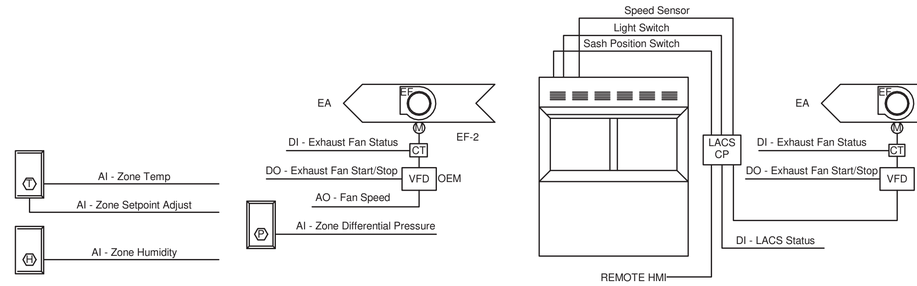
SCALE: NTS

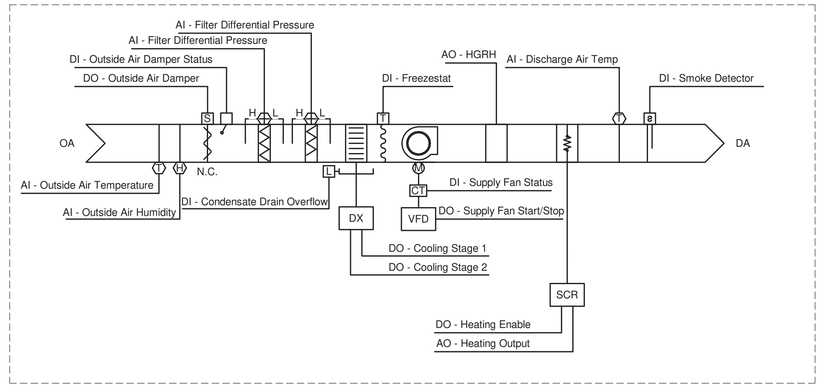


2 RTU-1 / EF-1 - CONTROLS SCHEMATIC

H-55

SCALE: NTS





3 RTU-2 / EF-2, EF-3, LACS - CONTROLS SCHEMATIC

H-55

SCALE: NOT TO SCALE

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CITY OF NEWBURGH

WASTEWATER TREATMENT PLANT (WWTP) ADMIN BUILDING RENOVATION

BID NUMBER 7.24

ARCADIS PROJ. NO. 30183827

NO.	DATE	ISSUED FOR	BY

DATE:	SEPTEMBER 2024
PROJECT NO.:	30183827
FILE NAME:	
DESIGNED BY:	A. DSOLA
DRAWN BY:	L. BANGARU
CHECKED BY:	V. VITALE

SHEET TITLE

HVAC

CONTROL DIAGRAM

SCALE: NOT TO SCALE

H-55

SHEET 37 OF 51