MECHANICAL SYMBOLS - GENERAL

	NEW PIPING, DUCTWORK, OR EQUIPMENT
	NEW EQUIPMENT
	CONTINUATION FOR DUCTWORK OR PIPING
	POINT OF CONNECTION (OF NEW WORK TO EXISTING WORK)
	POINT OF DISCONNECTION (TO REMOVE AND PATCH EXISTING WORK)
(#)	DRAWING NOTE TAG
1	REVISION SYMBOL
A / B	SECTION DESIGNATION ON DRAWING WHERE SECTION IS CUT A – SECTION DESIGNATION B – DRAWING NO.
T	THERMOSTAT OR TEMPERATURE SENSOR TO BE WALL OR DUCT MOUNTED. REFER TO PLANS FOR LOCATION.
TC	TIME CLOCK
	THERMOSTAT/SENSOR WIRING FROM SENSING DEVICE TO CONTROLLED DEVICE
	STARTER / DISCONNECT SWITCH
	STARTER
	DISCONNECT

MECHANICAL SYMBOLS - DUCTWORK

18X12	DUCT SIZE (FIRST FIGURE INDICATES HORIZONTAL SIZE)
18ø	ROUND DUCT DIAMETER
	SUPPLY DUCT UP
	SUPPLY DUCT DOWN
	RETURN OR EXHAUST DUCT UP
	RETURN OR EXHAUST DUCT DOWN
	ACOUSTICAL LINING IN DUCT
	TRANSITION FROM RECTANGULAR TO ROUND OR OVAL DUCT
AD	ACCESS DOOR IN DUCT
R	SLOPING RISE IN DUCT IN DIRECTION OF ARROW
D	SLOPING DROP IN DUCT IN DIRECTION OF ARROW
	MITERED ELBOW WITH TURNING VANES
	RADIUS ELBOW (INNER RADIUS = WIDTH)
	DUCT SPLIT
	90° BRANCH TAP (USE 45° BOOT, OR CONICAL TAP FOR BRANCH SERVING A SINGLE DIFFUSER/REGISTER ONLY)
	45° BRANCH TAP
	SPLIT (SUPPLY) OR CONVERGENCE (RETURN/EXHAUST) RADIUS ELBOW TYPE
	SPLIT (SUPPLY) OR CONVERGENCE (RETURN/EXHAUST) MITERED ELBOW TYPE WITH TURNING VANES
	SPLIT (SUPPLY) OR CONVERGENCE (RETURN/EXHAUST) BULLHEAD TYPE
	OFFSET (WITH RADIUS ELBOWS)
	SUPPLY REGISTER
	RETURN OR EXHAUST REGISTER
VD	VOLUME DAMPER
FXC	FLEXIBLE CONNECTION
	FLEXIBLE DUCT
VD	BRANCH TAKEOFF TO CEILING DIFFUSER/REGISTER
	SUPPLY CEILING DIFFUSER (4–WAY BLOW)
CD–B(500)	DIFFUSER TYPE AND CFM (CUBIC FEET PER MINUTE). REFER TO SCHEDULE.
	RETURN CEILING GRILLE OR REGISTER
L	DOOR LOUVER
U	UNDERCUT DOOR
H C	COIL HC=HEATING COIL CC=COOLING COIL COIL PHC=PREHEAT COIL
# SQ.FT.	TRANSFER GRILLES ON BOTH SIDES OF WALL/PARTITION AND SQ. FT. OPENING SIZE
# SQ.FT.	TRANSFER OPENING IN WALL/PARTITION AND SQ. FT. OPENING SIZE
	CEILING MOUNTED INLINE EXHAUST FAN (WITH FLEX CONNECTION AT INLET & OUTLET)

MECHANICAL SYMBOL LIST - PIPING

	DIRECTION OF FLOW IN PIPE
	PITCH PIPE DOWN IN DIRECTION OF ARROW
	ELBOW TURNED UP
	ELBOW TURNED DOWN
	BOTTOM PIPE CONNECTION
	TOP PIPE CONNECTION
	BALL VALVE
	GATE VALVE
	GLOBE VALVE
	AUTOMATIC THREE–WAY CONTROL VALVE
	AUTOMATIC TWO–WAY CONTROL VALVE
	PRESSURE REDUCING VALVE
	PIPE GUIDE
	UNION
	CAPPED PIPE
	"Y" TYPE STRAINER WITH BLOW DOWN VALVE
	PIPE SLEEVE
CP	CONDENSATE PUMP (SEE SCHEDULES FOR TYPE)
CD	CONDENSATE DRAIN LINE (GRAVITY)
PD	PUMPED DRAIN LINE
RD	REFRIGERANT DISCHARGE
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION

NEW YORK STATE CODES & STANDARDS

- 2015 INTERNATIONAL BUILDING CODE
- 2015 INTERNATIONAL FIRE CODE
- 2015 INTERNATIONAL PLUMBING CODE
- 2015 INTERNATIONAL MECHANICAL CODE
- 2015 INTERNATIONAL FUEL GAS CODE
- 2017 NYS UNIFORM CODE SUPPLEMENT
- LOCAL FIRE DEPARTMENT/FIRE MARSHAL
- ALL OTHER LOCAL AUTHORITIES HAVING JURISDICTION

NEW YORK STATE ENERGY CODES

- 2015 INTERNATIONAL ENERGY CONSERVATION CODE
- 2013 ASHRAE 90.1
- 2016 SUPPLEMENT TO THE NEW YORK STATE ENERGY CONSERVATION CODE (REVISED AUGUST 2016)

LOCAL CODES

- NEW ROCHELLE MUNICIPAL CODE

REFERENCED STANDARDS

APPLICABLE REFERENCE STANDARDS SHALL BE AS REFERENCED BY ALL STATE AND LOCAL CODES. THE LIST BELOW IS FOR QUICK REFERENCE AND DOES NOT INCLUDE ALL APPLICABLE REFERENCE STANDARDS.

- 2013 NPFA 13 – STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
- 2013 NFPA 14 – STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS
- 2013 NFPA 20 – STANDARD FOR THE INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION
- 2014 NFPA 70 – NATIONAL ELECTRICAL CODE
- 2013 NFPA 72 – NATIONAL FIRE ALARM AND SIGNALING CODE

PROFESSIONAL STATEMENT

TO THE BEST OF OUR KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2016 SUPPLEMENT TO THE NEW YORK STATE ENERGY CONSERVATION CONSTRUCTION CODE.

MECHANICAL ABBREVIATIONS

AD	ACCESS DOOR
AHU	AIR HANDLING UNIT
ATC	AUTOMATIC TEMPERATURE CONTROL
B(500)	DIFFUSER TYPE – REFER TO SCHEDULE
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CV	CONSTANT VOLUME
E	EXISTING
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EWT	ENTER WATER TEMPERATURE
FXC	FLEXIBLE CONNECTION
FLA	FULL LOAD AMPS
GPM	GALLONS PER MINUTE
HP	HEAT PUMP
HZ	HERTZ
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
MBH	THOUSAND BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPS
NIC	NOT IN CONTRACT
NK	NECK SIZE
NTS	NOT TO SCALE
OAI	OUTSIDE AIR INTAKE
PH	PHASE
PSI	POUND PER SQUARE INCH
RF	RETURN FAN
TX	TOILET EXHAUST
TYP	TYPICAL
VN	VENT
V	VOLTS
VD	VOLUME DAMPER

MECHANICAL DRAWING LIST

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Revision	By	Appd	YYYY.MM.DD
ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15
Issued	By	Appd	YYYY.MM.DD

File Name: N/A	JMR	JMR	KF	-
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Client/Project

NEW ROCHELLE

1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

Title

MECHANICAL COVER PAGE

Project No.	Scale
191506465	NONE
Revision	Drawing No.
	M-001

MECHANICAL GENERAL NOTES

1. THESE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK AS WELL AS INDICATE GENERAL ARRANGEMENT OF EQUIPMENT, DUCTWORK AND PIPING. THE CONTRACTOR SHALL ADHERE TO THESE DRAWINGS AS CLOSELY AS POSSIBLE. HOWEVER, THE RIGHT IS RESERVED TO VARY THE RUNS OF DUCTWORK AND PIPING AND TO MAKE OFFSETS, WHERE NECESSARY, TO ACCOMMODATE CONDITIONS ARISING AT THE JOB SITE. THE CONTRACTOR SHALL PREPARE SHOP DRAWINGS TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL. NO WORK SHALL BE PERFORMED PRIOR TO RECEIPT OF EQUIPMENT, DUCTWORK, AND PIPING FABRICATION SHOP DRAWING APPROVAL.

2. THE DRAWINGS AND SPECIFICATIONS SHALL BE INTERPRETED SO AS TO REQUIRE THE MOST SUBSTANTIAL AND COMPREHENSIVE PERFORMANCE OF THE WORK, CONSISTENT WITH THE INTENT AND REQUIREMENTS OF THE CONTRACT DOCUMENTS, AND SUCH WORK SHALL BE PERFORMED BY THE CONTRACTOR WITHOUT EXTRA COST TO THE OWNER. IN THE CASE OF A DISCREPANCY WITHIN THE CONTRACT DOCUMENTS, THE WORST CASE OR HIGHEST COST SHALL APPLY FOR BIDDING PURPOSES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCY VIA RFI PRIOR TO PERFORMING THE ASSOCIATED WORK.

3. ANY MATERIAL, WORK, OR INCIDENTAL ACCESSORIES OR MINOR DETAILS NOT SHOWN BUT NECESSARY TO MAKE THE WORK COMPLETE IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SHOWN ON THE DRAWINGS, SHALL BE PROVIDED BY THE CONTRACTOR WITHOUT ADDITIONAL EXPENSE TO THE OWNER.

4. DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS. WHERE ACOUSTICALLY LINED DUCT IS SPECIFIED, OUTER DUCT DIMENSIONS SHALL BE INCREASED TO ACCOMMODATE LINING.

5. WHERE WORK IS INDICATED TO BE BY OTHER CONTRACTORS, FOR EXAMPLE: "BY GENERAL CONSTRUCTION CONTRACTOR", THIS WORK IS NOT IN THE HVAC/MECHANICAL CONTRACT. EACH CONTRACTOR WILL BE RESPONSIBLE FOR CLOSE COORDINATION WITH OTHER CONTRACTORS' WORK.

6. REFER TO APPROPRIATE SPECIFICATION SECTION FOR EQUIPMENT SELECTION PARAMETERS WHERE DRAWINGS DO NOT CONTAIN EQUIPMENT SCHEDULES.

7. FOR AIR SYSTEMS, THE MECHANICAL CONTRACTOR SHALL INCLUDE IN BID PRICING SUPPLYING AND INSTALLING BRANCH VOLUME DAMPERS FOR ALL SUPPLY, RETURN, AND EXHAUST BRANCH DUCTWORK, REGARDLESS IF VOLUME DAMPERS ARE NOT SHOWN IN CONTRACT DOCUMENTS. ALL VOLUME DAMPERS SHALL BE ADJUSTABLE HANDLE TYPE FOR LAY-IN ACCESSIBLE CEILING OR CABLE OPERATED FOR CONCEALED TYPE OF CEILING. ALL BRANCH DUCT VOLUME DAMPERS SERVING DIFFUSERS IN GYPSUM BOARD CEILINGS (OR OTHERWISE INACCESSIBLE) SHALL BE REMOTELY (CORD OR CABLE) OPERABLE THROUGH THE FACE OF THE DIFFUSER.

8. INSTALL THERMOSTATS, FAN SPEED CONTROLLERS, AND OTHER ROOM OCCUPANT ADJUSTABLE CONTROL DEVICES 4'-0" ABOVE FINISHED FLOOR OR AS DIRECTED OTHERWISE BY ARCHITECT. COORDINATE EXACT LOCATIONS WITH THE ARCHITECTURAL PLANS. DEVICE COLORS TO BE SELECTED BY THE ARCHITECT. MANUFACTURER'S LOGO SHALL NOT BE EXPOSED.

9. AC UNITS SHOWN ON DRAWINGS ARE SCHEMATIC. SEE AC UNIT DETAIL ON DETAIL SHEET FOR ACTUAL TYPICAL ARRANGEMENT REQUIRED.

10. WHERE PIPING CONNECTIONS FOR EQUIPMENT SUCH AS PUMPS, AC UNITS, COILS, ETC. DIFFER FROM THE LINE SIZE PIPING, IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO FURNISH AND INSTALL THE NECESSARY REDUCER/EXPANDER FITTINGS TO ENABLE CONNECTION BETWEEN THE PIPING SYSTEM AND THE EQUIPMENT.

11. SOME PRESSURE AND TEMPERATURE GAUGES ARE SCHEMATICALLY SHOWN ON THE PLANS AND DETAILS. REFER TO THE SPECIFICATIONS FOR EXACT TYPES AND LOCATIONS.

12. PROVIDE UL 555 COMPLIANT FIRE DAMPERS AT ALL DUCT PENETRATIONS THROUGH FIRE RATED WALLS AND FLOORS, REGARDLESS IF FIRE DAMPERS ARE NOT SHOWN IN CONTRACT DOCUMENTS. PROVIDE 1-1/2 HOUR RATED FIRE DAMPERS AT WALLS/FLOORS WITH 2 HOUR OR LESS RATING. PROVIDE 3 HOUR RATED FIRE DAMPERS AT WALLS/FLOORS WITH 3 HOUR OR MORE RATING. PROVIDE ACCESS DOORS IN DUCTWORK, 18"x18" UNLESS OTHERWISE NOTED. COORDINATE WITH GENERAL CONTRACTOR FOR LOCATIONS AND SIZES OF ACCESS DOORS IN GENERAL CONSTRUCTION.

13. PROVIDE COMBINATION FIRE/SMOKE DAMPERS AT ALL DUCT PENETRATIONS THROUGH FIRE AND SMOKE RATED WALLS AND FLOORS, REGARDLESS IF FIRE DAMPERS ARE NOT SHOWN IN CONTRACT DOCUMENTS. ALL COMBINATION FIRE/SMOKE DAMPERS SHALL BE PROVIDED WITH AN END SWITCH FOR STATUS SIGNAL TO THE BMS AND FIRE SMOKE CONTROL PANEL. PROVIDE ACCESS DOORS IN DUCTWORK, 18"x18" UNLESS OTHERWISE NOTED. COORDINATE WITH GENERAL CONTRACTOR FOR LOCATIONS AND SIZES OF ACCESS DOORS IN GENERAL CONSTRUCTION.

14. PROVIDE FIRESTOPPING FOR ALL DUCT AND PIPE PENETRATIONS THROUGH FIRE RATED PARTITIONS.

15. THE MECHANICAL CONTRACTOR SHALL INCLUDE IN BID PRICING SUPPLYING AND INSTALLING THERMOSTATS FOR ANY EQUIPMENT THAT REQUIRES CONTROL, SUCH AS VAV BOXES, FCU, FANS, HEATERS, FINNED TUBE RADIATION, RTU'S, ETC., REGARDLESS IF THERMOSTATS ARE NOT SHOWN IN CONTRACT DOCUMENTS. ALL THERMOSTATS SHALL BE DIRECT DIGITAL PROGRAMMABLE TYPE, UNLESS OTHERWISE NOTED. PROVIDE ONE THERMOSTAT FOR EACH FAN COIL UNIT, FAN UNIT, VAV, FPB, ENTRANCE HEATER, BASEBOARD RADIATION, ETC. THERMOSTAT LOCATIONS SHALL BE AS SHOWN ON PLANS AND/OR WHERE DIRECTED AND APPROVED BY THE ARCHITECT AND ENGINEER.

16. ALL DUCTWORK AND PIPING REQUIRING FIRE RATING AND WHERE SHOWN ON PLANS SHALL BE PROVIDED WITH A 2-HOUR FIRE RATED ENCLOSURE (PROVIDED UNDER ANOTHER SECTION OF THE SPECIFICATIONS).

17. BORDER TYPES AND METHOD OF ATTACHMENT FOR ALL DIFFUSERS, GRILLES, AND REGISTERS SHALL BE COORDINATED WITH THE ARCHITECTURAL CEILING DETAILS AND SPECIFICATIONS.

18. REFER TO SPECIFICATIONS FOR ACOUSTIC LINING REQUIREMENTS NOT SHOWN ON THE DRAWINGS.

19. PROVIDE ALL REQUIRED PIPE TAPPING FOR WATER TREATMENT SYSTEMS.

20. FOR WATER SYSTEMS: THE MECHANICAL CONTRACTOR SHALL INCLUDE IN BID PRICING SUPPLYING AND INSTALLING BALL TYPE SHUT-OFF VALVES AND

MECHANICAL GENERAL NOTES (CONTINUED)

SEPARATE BALANCING VALVE FOR ALL BRANCH PIPING REGARDLESS IF VALVES ARE NOT SHOWN IN CONTRACT DOCUMENTS. ALL SHUT-OFF VALVES SHALL BE FULL PORT AND PRESSURE RATED FOR SYSTEM PRESSURE. THE BALANCING VALVE SHALL BE SIMILAR TO B&G CIRCUIT SETTER PLUS CALIBRATED BALANCE VALVE, UNLESS OTHERWISE NOTED.

21. THE MECHANICAL CONTRACTOR SHALL INCLUDE IN BID PRICING SUPPLYING AND INSTALLING SECONDARY DRAIN PANS FOR ALL AIR CONDITIONING CEILING HUNG EQUIPMENT REGARDLESS IF DRAIN PANS ARE NOT SHOWN IN CONTRACT DOCUMENTS. REFER TO DETAIL FOR INSTALLATION OF DRAIN PANS. IF NO DETAIL IS SHOWN, CONTRACTOR MUST REQUEST DRAIN PAN DETAIL THRU RFI PROCESS DURING BIDDING.

22. THE MECHANICAL CONTRACTOR SHALL INCLUDE IN BID PRICING SUPPLYING AND INSTALLING CONDENSATE PIPING FOR ALL COOLING TYPE EQUIPMENT REGARDLESS IF CONDENSATE PIPING IS NOT SHOWN IN CONTRACT DOCUMENTS. ALL CONDENSATE PIPING SHALL BE INSULATED AND ROUTED TO NEAREST DRAIN OR JANITORS CLOSET. IF NO CONDENSATE PIPING IS SHOWN, CONTRACTOR MUST REQUEST CONDENSATE PIPING ROUTING THRU RFI PROCESS DURING BIDDING.

23. GENERAL NOTES, SYMBOLS, ABBREVIATIONS, AND DETAILS ARE APPLICABLE TO ALL HVAC/MECHANICAL DRAWINGS.

24. RELOCATE EXISTING WORK THAT INTERFERES WITH WORK OF THIS CONTRACT.

25. COORDINATE THIS WORK WITH THAT OF OTHER TRADES.

26. DIMENSIONS SHOWN ON PLAN ARE HORIZONTAL. DIMENSIONS SHOWN IN ELEVATION ARE VERTICAL, EXCEPT IN WAY OF STRUCTURAL STEEL, DIMENSIONS ARE MEASURED PERPENDICULAR TO FLANGE.

27. PRODUCT INSTALLATION SHALL ADHERE TO MANUFACTURERS' RECOMMENDATIONS.

28. PROVIDE ACCESS PANELS IN DUCTWORK IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS FOR ALL CONCEALED EQUIPMENT THAT REQUIRES PERIODIC SERVICE, INCLUDING AIR CONDITIONING UNITS, FANS, CONDENSATE PUMPS, FIRE DAMPERS, COMBINATION FIRE/SMOKE DAMPERS, AND DUCT MOUNTED SMOKE DETECTORS. COORDINATE WITH GENERAL CONTRACTOR FOR LOCATIONS AND SIZES OF ACCESS DOORS IN GENERAL CONSTRUCTION.

29. PROVIDE HANGERS, INSERTS, ANCHORS, SUPPLEMENTAL STEEL & SUPPORTS AS REQUIRED TO SUPPORT DUCTWORK, PIPING AND EQUIPMENT FROM STRUCTURE.

30. SCHEDULE WORK OF THIS SECTION TO AVOID INTERFERING WITH EXISTING OPERATIONS IN THE FACILITY.

31. COORDINATE ALL ROOF PENETRATIONS WITH THE WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE ALL ROOF PENETRATION LOCATIONS WITH THE OWNER/LANDLORD. NOTIFY THE OWNER/LANDLORD PRIOR TO STARTING WORK AND VERIFY COMPLIANCE WITH BOND AND WARRANTY OF THE ROOF.

32. RUN DUCTS AND PIPING CONCEALED, UNLESS OTHERWISE SPECIFIED, AND CLEAR OF CEILING INSERTS.

33. PROVIDE CLEARANCE IN FRONT OF ALL ELECTRIC CONTROL PANELS PER N.E.C. AND EQUIPMENT MANUFACTURERS' REQUIREMENTS.

34. ALL MOTOR STARTERS FOR HVAC EQUIPMENT SHALL BE FURNISHED BY THE MECHANICAL CONTRACTOR AND INSTALLED/WIRED BY THE ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.

35. ALL DISCONNECT SWITCHES FOR HVAC EQUIPMENT SHALL BE FURNISHED, INSTALLED, AND WIRED BY THE ELECTRICAL CONTRACTOR, UNLESS INTEGRAL TO HVAC EQUIPMENT OR OTHERWISE NOTED.

36. USE FLAT TRANSVERSE SEAM FOR DUCTWORK WHERE SPACE AVAILABLE DICTATES.

37. BRANCH DUCTS TO INDIVIDUAL DIFFUSERS AND REGISTERS SHALL BE THE SAME SIZE AS THE DIFFUSER OR REGISTER NECK, UNLESS OTHERWISE NOTED.

38. ALL DUCTWORK AND PIPING SHALL BE INSTALLED TIGHT TO BOTTOM OF STRUCTURAL MEMBERS UNLESS OTHERWISE NOTED OR ABSOLUTELY REQUIRED BY FIELD CONDITIONS.

39. DO NOT INSTALL DUCTWORK OR PIPING DIRECTLY UNDER AND PARALLEL TO THE WEB OF STRUCTURAL MEMBERS. OFFSET IN ORDER TO ALLOW FUTURE DUCTWORK AND PIPING TO CROSS OVER IN BETWEEN STRUCTURAL MEMBERS.

40. BRANCH DUCTS TO INDIVIDUAL DIFFUSERS AND REGISTERS SHALL BE PROVIDED WITH VOLUME DAMPERS, WHETHER OR NOT THE VOLUME DAMPERS ARE SHOWN ON PLAN.

41. VOLUME DAMPERS LOCATED ABOVE INACCESSIBLE CEILINGS SHALL BE CABLE OPERATED TYPE, WITH CABLE OPERATORS LOCATED IN ACCESSIBLE LOCATIONS AND CLEARLY LABELED FOR DIFFUSER OR REGISTER SERVED.

42. UNLESS OTHERWISE NOTED, ALL EXPOSED DUCTWORK IN FINISHED SPACES SHALL BE SPIRAL ROUND OR FLAT OVAL TYPE, WITH SOLID OUTER WALL, PERFORATED INNER WALL, AND 1 INCH THICK INTERSTITIAL ACOUSTICAL LINING.

43. CONDENSATE DRAIN (CD) AND CONDENSATE PUMP DISCHARGE (PD) PIPING SHALL BE RIGID COPPER, TYPE L, MINIMUM 3/4" NOMINAL PIPE SIZE, BRAZED OR SOLDERED, WITH 1" INSULATION, UNLESS OTHERWISE NOTED ON DRAWINGS.

44. NEW AND EXISTING PERMANENT HVAC AIR EQUIPMENT MAY BE USED BY CONTRACTORS DURING CONSTRUCTION FOR TEMPORARY HEATING, COOLING, AND VENTILATION, ONLY UNDER THE FOLLOWING CONDITIONS:
    - 44.1. CONTRACTOR TO PROVIDE TEMPORARY FILTERS IN EACH UNIT DURING CONSTRUCTION, WHICH SHALL BE REPLACED WITH NEW CLEAN FILTERS AFTER GENERAL CONSTRUCTION IS COMPLETED.
    - 44.2. CONTRACTOR TO PROVIDE FILTER FABRIC AT ALL RETURN AND EXHAUST REGISTERS, GRILLES, AND OPENINGS DURING CONSTRUCTION.
    - 44.3. THE WARRANTY PERIOD FOR ALL EQUIPMENT SHALL NOT BEGIN UNTIL CONSTRUCTION IS COMPLETED. IF THE EQUIPMENT MANUFACTURER'S WARRANTY PERIOD BEGINS WHILE THE UNIT USED DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH EXTENDING THE WARRANTY TO PROVIDE THE FULL PERIOD OF COVERAGE TO THE OWNER.
    - 44.4. IF NEW PERMANENT HVAC AIR EQUIPMENT INSTALLED UNDER THIS PROJECT WILL NOT BE OPERATED BY THE CONTRACTOR DURING CONSTRUCTION, ALL OPEN OR INCOMPLETE DUCTWORK SHALL BE CAPPED AIRTIGHT WITH WITH HEAVY POLYETHYLENE PLASTIC. AFTER

MECHANICAL GENERAL NOTES (CONTINUED)

THE INSTALLATION OF DUCTWORK, REGISTERS, GRILLES, AND DIFFUSERS, THE CONTRACTOR SHALL BLANK OFF ALL REGISTERS, GRILLES, AND DIFFUSERS WITH HEAVY POLYETHYLENE PLASTIC AND TAPE AIR TIGHT, IN AREAS THAT ARE UNDER CONSTRUCTION, UNTIL WORK IS COMPLETE IN THOSE AREAS.

- 44.5. IF THE ABOVE CONDITIONS ARE NOT MET, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY NECESSARY TEMPORARY HEATING, COOLING, AND VENTILATION EQUIPMENT, DUCTWORK, CONTROLS, PIPING, AND POWER AT HIS OWN EXPENSE.
- 44.6. IF PERMANENT HVAC EQUIPMENT IS USED DURING CONSTRUCTION BUT NOT PROPERLY PROTECTED AS DESCRIBED ABOVE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING OUT DUST AND DEBRIS FROM DUCTWORK AND EQUIPMENT, AS WELL AS ANY NECESSARY REPAIR OR REPLACEMENT OF DAMAGED EQUIPMENT AT HIS OWN EXPENSE.
- 44.7. WHEN GENERAL CONSTRUCTION IS COMPLETE, VACUUM CLEAN ALL DIFFUSERS, REGISTERS, GRILLES, AND HVAC EQUIPMENT IN THE PROJECT AREA OR SERVING THE PROJECT AREA. REMOVE ANY CONSTRUCTION DEBRIS.

MECHANICAL DEMOLITION NOTES

1. DEMOLITION NOTES, SYMBOL LIST, AND DETAILS ARE APPLICABLE TO ALL HVAC/MECHANICAL DRAWINGS.

2. ALL PIPING IN WALLS AND FLOORS NOT TO BE REUSED WILL BE PLUGGED OR CAPPED, AND CUTTING AND PATCHING WILL BE PERFORMED TO RESTORE SURFACE TO ORIGINAL CONDITION BY THIS CONTRACTOR.

3. AFTER REMOVING PIPE THROUGH THE FLOOR SLABS, PACK OPENING WITH APPROVED FIRE-RATED PACKING.

4. THE CONTRACTOR SHALL INCLUDE IN HIS PRICE ALL COSTS ASSOCIATED WITH REMOVALS AND RELOCATIONS OF HVAC WORK AS DESCRIBED ON THE DRAWINGS AND IN THE SPECIFICATIONS WITH ALLOWANCES FOR EXPECTED OR UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN OPENED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION WILL BE ACCEPTED, EXCEPT IN CERTAIN CASES CONSIDERED JUSTIFIABLE BY THE OWNER/ENGINEER.

5. THE CONTRACTOR SHALL PERFORM DEMOLITION AND REMOVAL WORK WITH MINIMUM INTERFERENCE WITH FUNCTIONING HVAC SYSTEMS. ALL AFFECTED SYSTEMS SHALL BE RECONNECTED AND RESTORED.

6. DEMOLITION AND REMOVAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER. THE CONTRACTOR SHALL PATCH, REPAIR, OR OTHERWISE RESTORE ANY DAMAGED INTERIOR OR EXTERIOR BUILDING SURFACE TO ITS ORIGINAL CONDITION.

7. THE CONTRACTOR SHALL REMOVE ALL DUCT AND PIPING SUPPORTS, ETC. FROM PARTITIONS THAT ARE TO BE REMOVED. WHERE THE REMOVAL OF THESE ITEMS DISRUPTS EXISTING PIPING THAT IS TO REMAIN, THE CONTRACTOR SHALL INSTALL AND PROVIDE BYPASS CONNECTIONS NECESSARY.

8. ALL PIPING WHICH BECOMES EXPOSED DURING THE ALTERATION WORK SHALL BE REAVED AND REROUTED CONCEALED BEHIND FINISHED SURFACES.

9. PORTIONS OF PIPING AND DUCTWORK TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK, BUT WHICH ARE REQUIRED TO REMAIN ACTIVE, SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED, AND RECONNECTED.

10. THE CONTRACTOR SHALL NOTIFY THE OWNER AT THE APPROPRIATE TIME OF THE PROJECTED DEMOLITION AND PHASING SCHEDULE, SO THAT REMOVAL OR RELOCATION OF AFFECTED UTILITIES MAY BE CARRIED OUT IN COORDINATION WITH THE PROJECT REQUIREMENTS.

11. ALL EXISTING MATERIAL AND EQUIPMENT IN USABLE CONDITION, WHICH IS TO BE REMOVED UNDER THIS CONTRACT, SHALL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE DISPOSED OF BY THE HVAC CONTRACTOR, AS DIRECTED BY THE OWNER.

12. ARRANGE TO WORK CONTINUOUSLY, INCLUDING OVER TIME, IF REQUIRED, TO ASSURE THAT SYSTEMS WILL BE SHUT DOWN ONLY DURING THE TIME ACTUALLY REQUIRED TO MAKE THE NECESSARY CONNECTIONS TO THE EXISTING SYSTEMS.

13. THE SHUTDOWN OF EXISTING BUILDING HVAC SERVICES SHALL BE COORDINATED WITH WITH THE OWNER. MAKE ARRANGEMENTS AT LEAST FIVE (5) BUSINESS DAYS PRIOR TO A SHUTDOWN.

14. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REQUIREMENTS.

15. WHERE THE DEMOLITION OF EXISTING PNEUMATIC CONTROL EQUIPMENT, THERMOSTATS, OR TUBING IS INDICATED IN THE PLANS, THE CONTRACTOR SHALL CAP THE ENDS OF ALL EXISTING TO REMAIN PNEUMATIC LINES AIRTIGHT UNLESS OTHERWISE NOTED. IF ADDITIONAL PNEUMATIC LINES OR DEVICES ARE DISCOVERED BY THE CONTRACTOR INSIDE WALLS OR ABOVE CEILINGS DURING DEMOLITION, THE CONTRACTOR SHALL INFORM THE DESIGN TEAM PRIOR TO REMOVAL OF THESE LINES OR DEVICES.

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ISSUED FOR BID	JMR	KF	2020.01.15
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	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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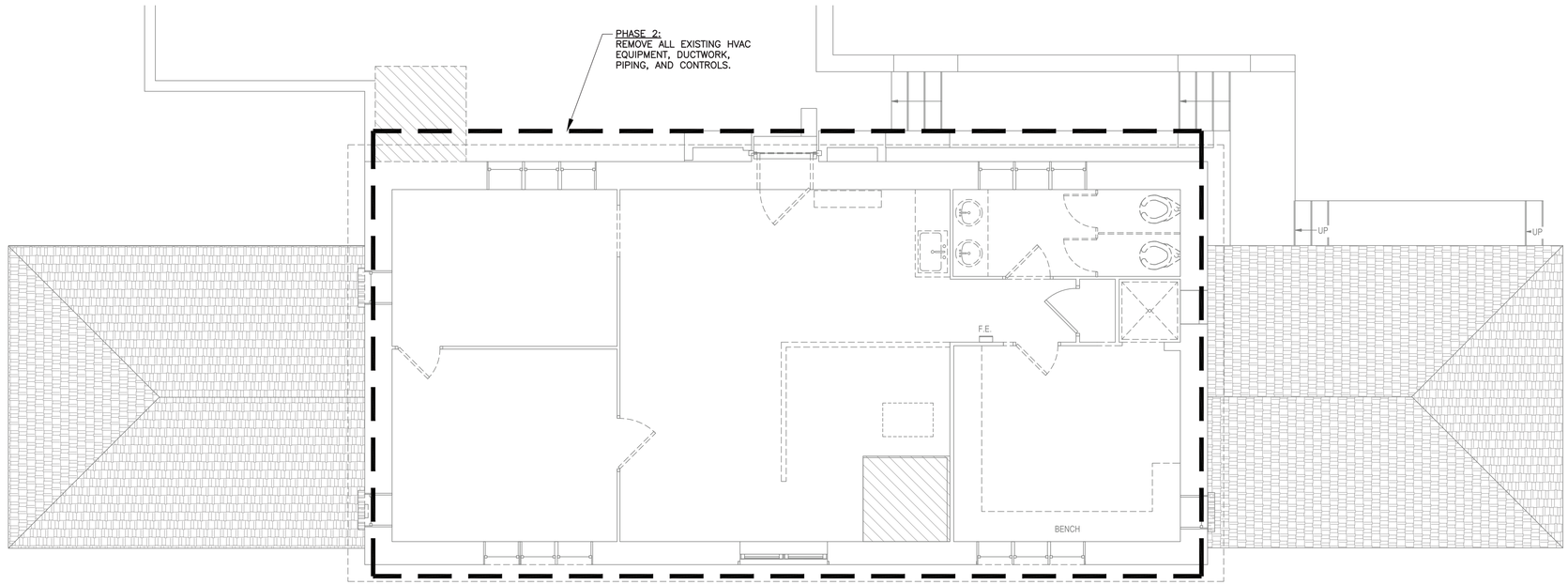
1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

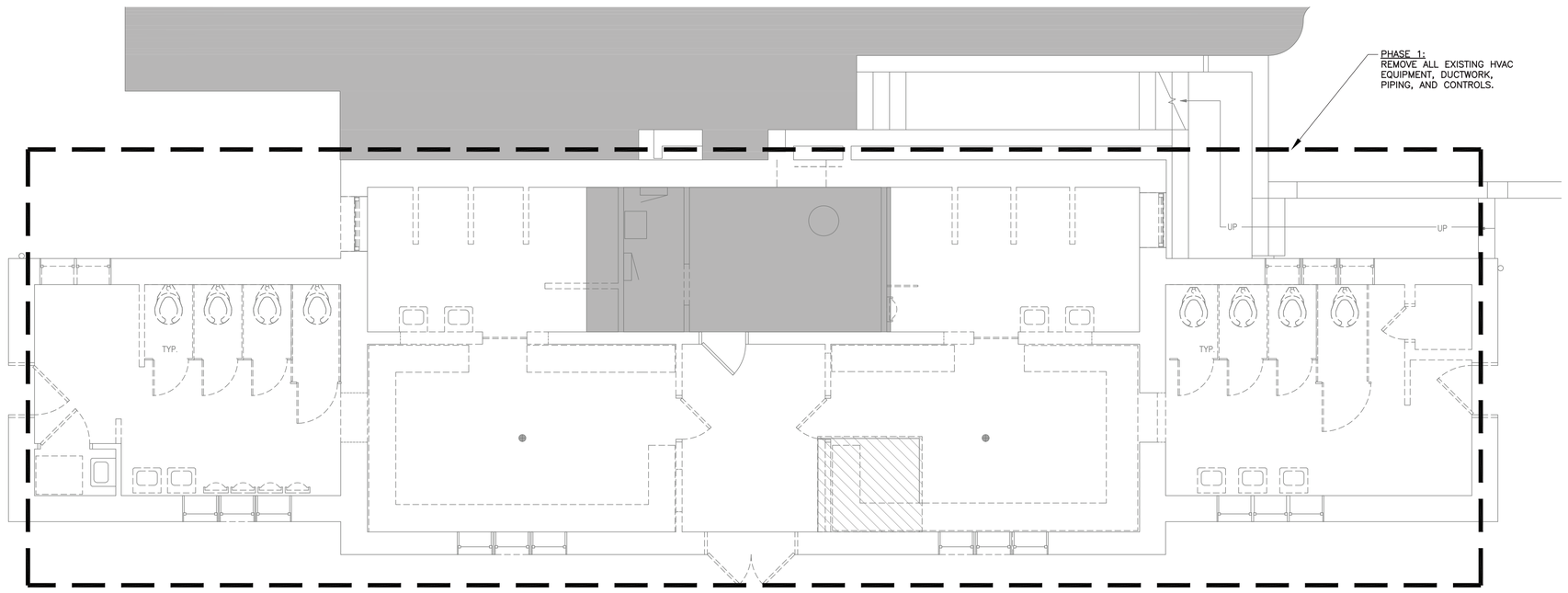
Title

MECHANICAL GENERAL NOTES

Project No.	Scale
191506465	NONE
Revision	Drawing No.
	M-002



2 MECHANICAL FIRST FLOOR DEMOLITION PLAN - PHASE 2
SCALE: 1/4"=1'-0"



1 MECHANICAL GROUND FLOOR DEMOLITION PLAN - PHASE 1
SCALE: 1/4 "=1'-0"

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Revision	By	Appd	YYYY.MM.DD
ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15

Issued	By	Appd	YYYY.MM.DD
File Name: N/A	JMR	JMR	KF	-
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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STATE OF NEW YORK
JEREMY MICHAEL REISS
090231
LICENSED PROFESSIONAL ENGINEER

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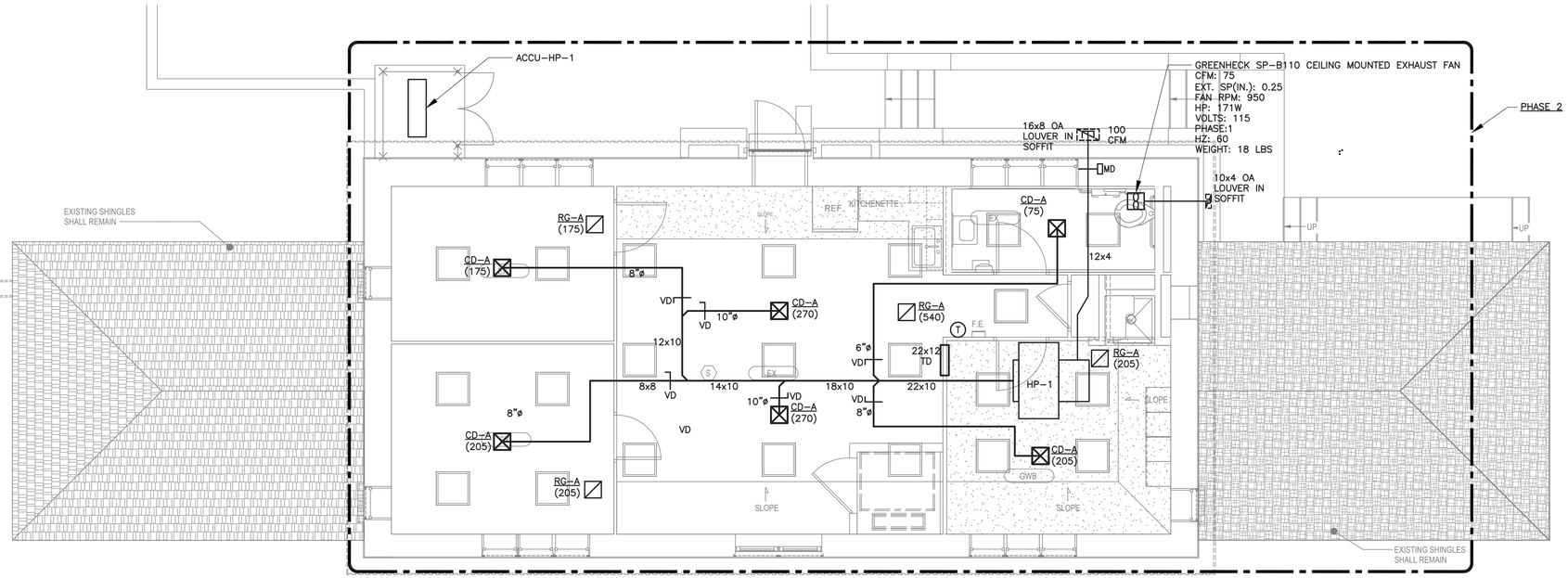
NEW ROCHELLE

1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

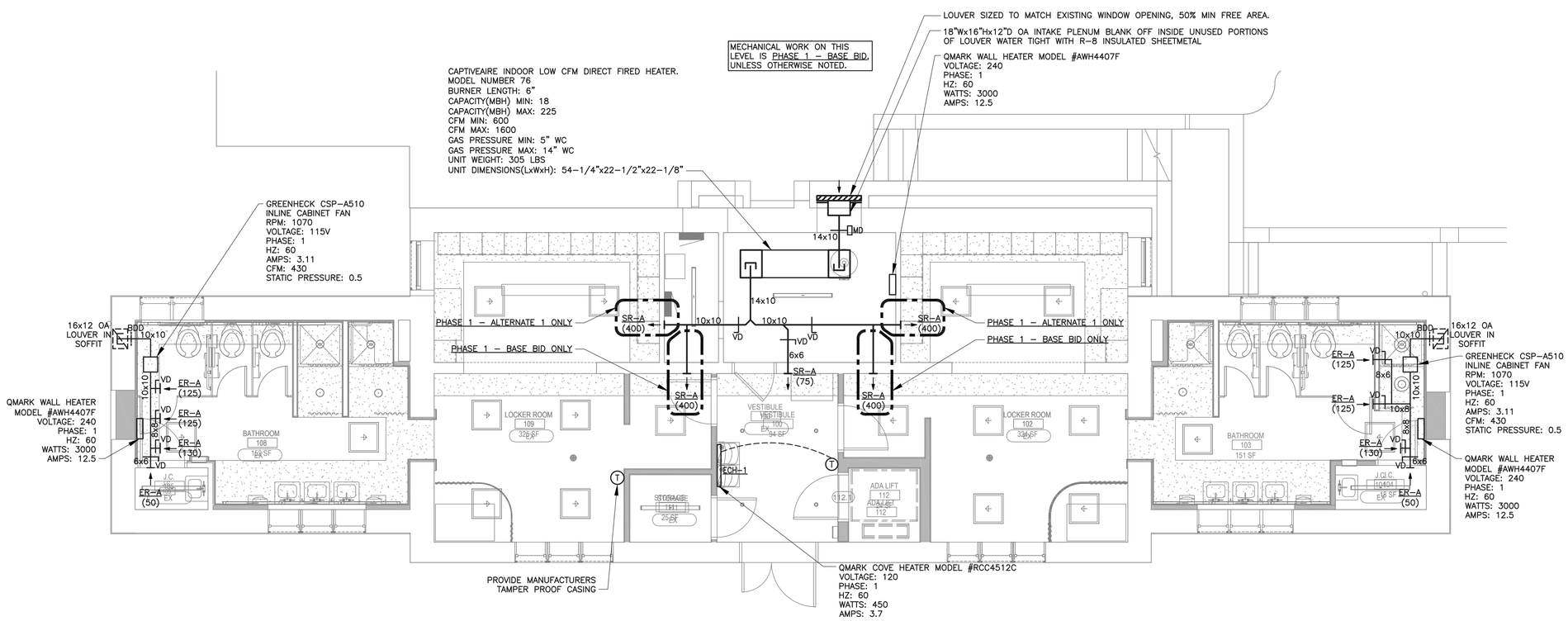
Title
MECHANICAL GROUND & FIRST FLOOR DEMOLITION PLANS

Project No.	Scale
191506465	AS NOTED
Revision	Drawing No.
	MD-101



2 MECHANICAL FIRST FLOOR PLAN - PHASE 2

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



1 MECHANICAL GROUND FLOOR PLAN - PHASE 1

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

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MECHANICAL GROUND & FIRST FLOOR PLANS

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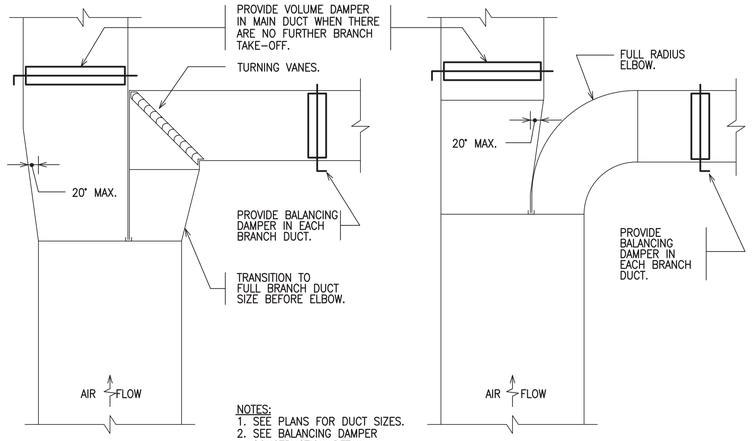
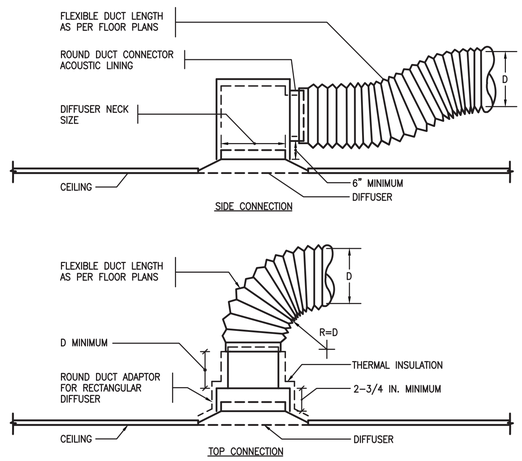
ORIGINAL SHEET - ARCH D



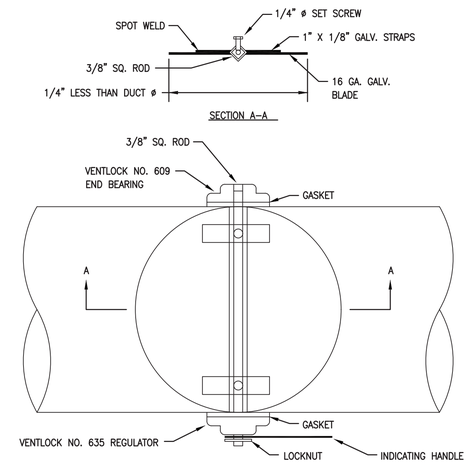
DETAIL OF SUPPLY AIR DUCT NECK CONNECTIONS (WITH VOLUME DAMPERS)

NOT TO SCALE



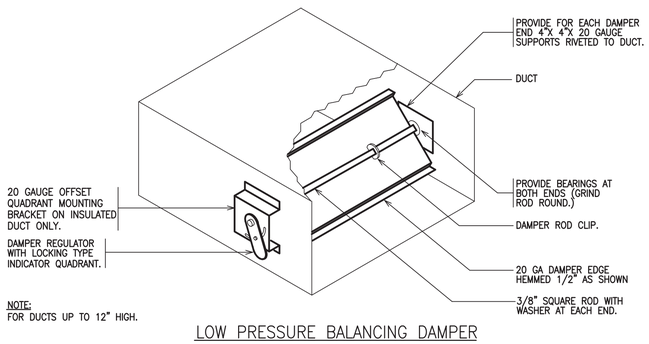
DIFFUSER CONNECTION DETAIL

NOT TO SCALE



ROUND VOLUME DAMPER - UP TO 14 IN. DIAMETER, LOW PRESSURE

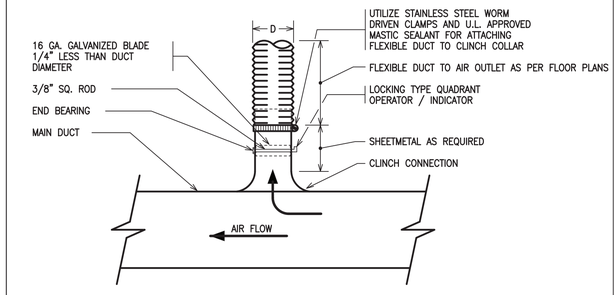
NOT TO SCALE



NOTE:
FOR DUCTS UP TO 12" HIGH.

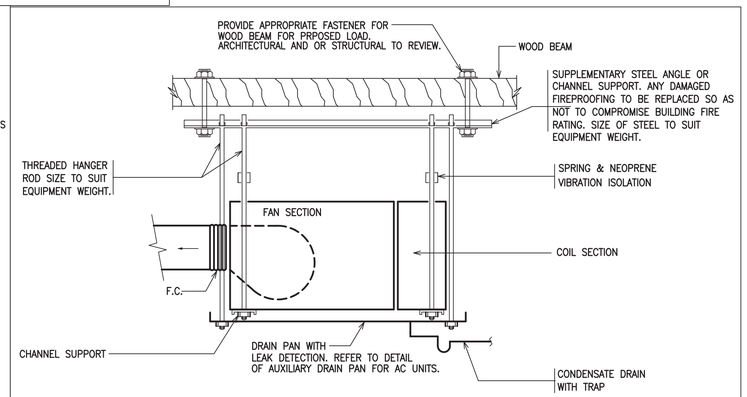
LOW PRESSURE BALANCING DAMPER

NOT TO SCALE



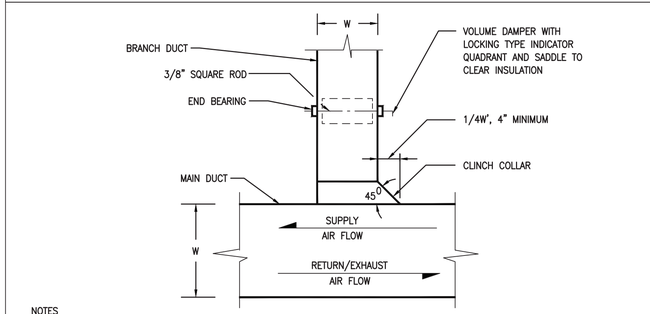
CIRCULAR BRANCH CONNECTION TO SINGLE AIR OUTLET

NOT TO SCALE



HANGING DETAIL HVAC EQUIPMENT

NOT TO SCALE

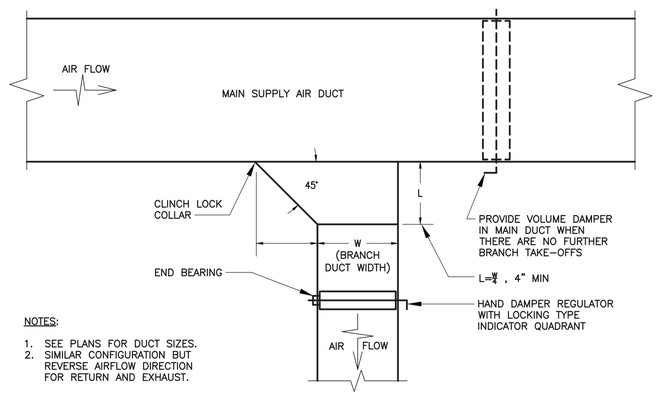


NOTES

1. FURNISH THIS TYPE CONNECTION WHEN SINGLE LINE DUCTWORK IS INDICATED FOR LOW PRESSURE BRANCHES WITH LESS THAN 700 CFM AND MEDIUM PRESSURE BRANCHES WITH LESS THAN 1000 CFM.
2. NOT TO BE USED AS SUBSTITUTE FOR ELBOW

RECTANGULAR DUCT ANGULAR TAP WITH VOLUME DAMPER

NOT TO SCALE

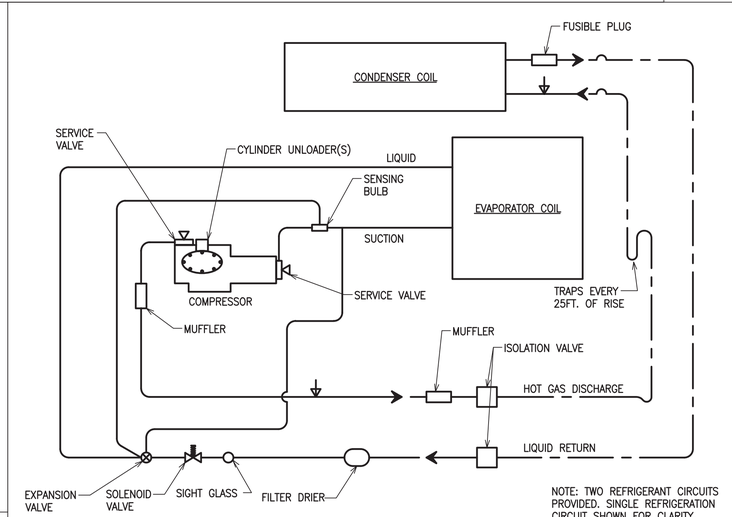


NOTES:

1. SEE PLANS FOR DUCT SIZES.
2. SIMILAR CONFIGURATION BUT REVERSE AIRFLOW DIRECTION FOR RETURN AND EXHAUST.

TYPICAL DETAIL OF RECTANGULAR SUPPLY AIR DUCT TAP (WITH VOLUME DAMPER)

NOT TO SCALE



REFRIGERANT PIPING SCHEMATIC

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MECHANICAL DETAILS

Project No.	Scale
191506465	NONE

Revision

Drawing No.

M-201

DX SPLIT HEAT PUMP OUTDOOR AIR-COOLED CONDENSING UNIT SCHEDULE

DESIGNATION	CONNECTED INDOOR UNIT(S)	CONFIGURATION	AIR CONDITIONING DATA							HEAT PUMP DATA								REFRIG TYPE	NO. OF COMP.	NO. OF REFRIG. CKTS.	CAPACITY CONTROL	NO. OF FANS	ELECTRICAL DATA							DIMENSIONS			WEIGHT (LBS)	PIPE CONNECTION SIZES		MANUFACTURER	MODEL	REMARKS
			NOMINAL COOLING CAPACITY (TONS)	NOMINAL COOLING CAPACITY (MBH)	HIGH AMBIENT LIMIT FOR COOLING DB (°F)	LOW AMBIENT LIMIT FOR COOLING DB (°F)	SEER AT AHRI COND.	DESIGN AMBIENT TEMP. DB (°F)	COOLING CAPACITY AT DESIGN CONDITIONS (MBH)	NOMINAL HEATING CAPACITY (MBH)	HIGH AMBIENT LIMIT FOR HEATING WB (°F)	LOW AMBIENT LIMIT FOR HEATING WB (°F)	HSPF AT AHRI COND.	DESIGN AMBIENT TEMP. DB (°F)	DESIGN AMBIENT TEMP. WB (°F)	HEATING CAPACITY AT DESIGN CONDITIONS (MBH)					ELEC. FEED #1							HEIGHT (IN)	WIDTH (IN)	LENGTH OR DEPTH (IN)		REFRIG. SUCTION (IN)	REFRIG. LIQUID (IN)			
																						VOLTS	PH	Hz	MCA	MOP	DISC. BY E.C. OR MANUF.	EMER. PWR. (Y/N)									
ACCU-HP1	HP-1	HORIZ. DISCHARGE	3	36	115	0	19.1	95	36	38	59	-4	9.9	0	-0.7	19	R-410A	1	1	MODULATING	1	208	1	60	25	31	E.C.	N	52.7	41.3	14	214	5/8	3/8	MITSUBISHI	PUZ-A36NKA7-BS	SEE NOTES BELOW

NOTES:
1. PROVIDE REFRIGERANT PIPE SIZES AND ACCESSORIES PER MANUFACTURER'S RECOMMENDATIONS.
2. PROVIDE MANUFACTURER'S LOW AMBIENT COOLING KIT.

DX SPLIT HEAT PUMP INDOOR UNIT SCHEDULE

DESIGNATION	CONNECTED TO CONDENSING UNIT	CONFIGURATION	REFRIG.	NOMINAL COOLING CAPACITY (TONS)	NOMINAL COOLING CAPACITY (MBH)	NOMINAL HEATING CAPACITY (MBH)	AIR CONDITIONING DATA AT DESIGN COND.				HEAT PUMP DATA AT DESIGN COND.		SUPPLY FAN DATA			ELECTRICAL DATA							FILTERS	MANUFACTURER	MODEL	REMARKS
							TOTAL COOLING (MBH)	SENSIBLE COOLING (MBH)	EAT DB (°F)	EAT WB (°F)	HEATING (MBH)	EAT DB (°F)	SUPPLY AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	ESP (IN WC)	VOLTS	PH	Hz	MCA	MOCP	DISC. BY E.C. OR MANUF.	EMER. PWR.				
HP-1	ACCU-HP1	HORIZ. DUCTED CONCEALED	R-410A	3	36	38	36	29	80	67	19	65	1,200	100	0.60	208	1	60	3.3	POWERED FROM ACCU	E.C.	N	MERV-8	MITUBISHI	PEAD-A36AA7	SEE NOTES BELOW

NOTES:
1. PROVIDE REFRIGERANT PIPE SIZES AND ACCESSORIES PER MANUFACTURER'S RECOMMENDATIONS.
2. PROVIDE THE FOLLOWING FACTORY OPTIONS:
   2.1. WALL-MOUNTED CONTROLLER WITH BUILT-IN TEMPERATURE SENSOR, MITSUBISHI TYPE PAR, HARD-WIRED, WITH INFARED OCCUPANCY SENSOR.
   2.2. FILTER BOX ACCESSORY WITH FACTORY SUPPLIED MERV-8 FILTER.
3. PROVIDE THE FOLLOWING FIELD ACCESSORIES FOR CEILING CONCEALED UNITS:
   3.1. GALVANIZED STEEL EXTERNAL DRIP PAN BELOW AC UNIT, EXTENDING 3" BEYOND EQUIPMENT ON ALL SIDES.
   3.2. LEAK DETECTOR IN DRIP PAN, HARDWIRED TO SHUT DOWN THE UNIT.

REGISTER, GRILLE, AND DIFFUSER SCHEDULE

DESIGNATION	SERVICE	TYPE	NOMINAL OVERALL DIMENSION (IN)	NECK SIZE (IN)	CFM RANGE	CONFIGURATION	BORDER TYPE	MATERIAL OF CONSTRUCTION	EQUALIZING GRID IN NECK	OPPOSED BLADE DAMPER IN NECK	FILTER RACK	FINISH COLOR	MANUF.	MODEL	REMARKS
CD-A	SUPPLY	CEILING DIFFUSER	24x24	6"DIA	0-100	PLAQUE-STYLE, 4-WAY THROW	LAY-IN	STEEL	YES	NO	NO	WHITE	TITUS	OMNI	SEE NOTES BELOW
				8"DIA	101-175										
				10"DIA	176-350										
				12"DIA	351-550										
				14"DIA	551-750										
RG-A	RETURN	CEILING GRILLE	24x24	24x24	0-2000	LOUVERED FACE, 1/2" BLADE SPACING, 35° FIXED DEFLECTION	LAY-IN	STEEL	NO	NO	NO	WHITE	TITUS	355RL	SEE NOTES BELOW
ER-A	EXHAUST	CEILING/SIDEWALL REGISTER	RE: PLAN	6x6	0-100	LOUVERED FACE, 1/2" BLADE	LAY-IN OR SURFACE	ALUMINUM	NO	NO	NO	WHITE	TITUS	355FL	SEE NOTES
				8x6	101-130										
SR-A	SUPPLY	CEILING/SIDEWALL REGISTER	RE: PLAN	RE: PLAN	RE: PLAN	INDIVIDUALLY ADJUSTABLE BLADES, 3/4" BLADE SPACING, DOUBLE DEFLECTION	LAY-IN OR SURFACE MOUNTED	STEEL	NO	YES	NO	WHITE	TITUS	300RL	SEE NOTES BELOW

NOTES:
1. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS.
2. ALL FINISH COLORS ARE SUBJECT TO APPROVAL BY THE ARCHITECT. SUBMIT COLOR CHART FOR REVIEW.
3. COORDINATE BORDER TYPES WITH ARCHITECTURAL CEILING SPECIFICATIONS.
4. RG-A:
   4.1. PROVIDE FACTORY FURNISHED LIGHT SHIELD FOR EACH GRILLE, MATTE BLACK FINISH FOR INTERNAL SURFACES.

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MECHANICAL SCHEDULES

Project No.	Scale
191506465	NONE
Revision	Drawing No.
	M-301

MECHANICAL SPECIFICATIONS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. INSTALL ALL NEW WORK IN A NEAT WORKMANLIKE MANNER READILY ACCESSIBLE FOR OPERATION, MAINTENANCE, AND REPAIR.

B. CODES, PERMITS AND INSPECTIONS:

1. ALL REQUIREMENTS OF THE BUILDING DEPARTMENT, BUILDING MANAGEMENT, AND ALL AUTHORITIES HAVING JURISDICTION, AND ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK, SHALL BE INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS. CONTRACTOR IS TO INFORM ENGINEER OF ANY EXISTING WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE BY THIS CONTRACTOR AND AT NO EXPENSE TO THE OWNER.

2. THIS CONTRACTOR SHALL OBTAIN ALL EQUIPMENT APPROVALS AS REQUIRED BY STATE AND LOCAL AUTHORITIES. PERMITS SHALL BE TURNED OVER TO OWNER AT JOB COMPLETION.

C. SITE VERIFICATION:

1. PRIOR TO SUBMISSION OF THE BID, THIS CONTRACTOR SHALL VISIT THE JOB SITE TO ASCERTAIN THE ACTUAL FIELD CONDITIONS AS THEY RELATE TO THE WORK INDICATED ON THE DRAWINGS AND DESCRIBED HEREIN. DISCREPANCIES, IF ANY, SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION PRIOR TO SUBMISSION OF THE BID, AND IF NOT RESOLVED TO SATISFACTION, SHALL BE SUBMITTED AS A WRITTEN QUALIFICATION OF THE BID. SUBMISSION OF A BID SHALL BE EVIDENCE THAT SITE VERIFICATION HAS BEEN PERFORMED AS DESCRIBED ABOVE.

D. CONTRACT DOCUMENTS:

1. PRIOR TO SUBMISSION OF A FORMAL BID, THIS CONTRACTOR SHALL REVIEW ALL DRAWINGS OF THE ENTIRE PROJECT INCLUDING GENERAL CONSTRUCTION, DEMOLITION, ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND SPRINKLER AND SHALL INCLUDE ANY WORK REQUIRED IN THE BID WHICH IS INDICATED OR IMPLIED TO BE PERFORMED BY THIS TRADE IN OTHER SECTIONS OF THE WORK.

2. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF WORK AND APPROXIMATE LOCATION OF EQUIPMENT. REFER TO ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS AND COORDINATE FINAL LOCATIONS OF DIFFUSERS, GRILLES, REGISTERS, THERMOSTATS, SENSORS, SWITCHES AND ANY WALL MOUNTED DEVICES. ALL WORK SHALL BE COORDINATED WITH OTHER TRADES TO AVOID CONFLICT.

3. IF A CONFLICT OCCURS IN THE SPECIFICATIONS AND/OR ON THE DRAWINGS, THE MORE STRINGENT SITUATION SHALL APPLY.

E. GUARANTEE:

1. ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF THIS WORK. FINAL ACCEPTANCE SHALL BE DEFINED AS THE TIME AT WHICH THE MECHANICAL WORK IS TAKEN OVER AND ACCEPTED BY THE OWNER, AND IS UNDER CARE, CUSTODY, AND CONTROL OF THE OWNER. ENGAGE THE SERVICES OF VARIOUS MANUFACTURERS SUPPLYING THE EQUIPMENT FOR THE PROPER STARTUP AND OPERATION OF ALL SYSTEMS INSTALLED. INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND SERVICING OF THE SYSTEM.

2. THE CONTRACTOR SHALL GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN THE GUARANTEE PERIOD. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL INCLUDE RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THIS CONTRACTOR.

3. THIS CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE AND OPERATION OF ALL SYSTEMS UNTIL THE FINAL ACCEPTANCE OF THE WORK.

4. ALL AIR CONDITIONING UNIT COMPRESSORS AND REFRIGERATION COMPONENTS SHALL HAVE A 5–YEAR WARRANTY.

F. THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A201, LATEST EDITION, OR AS REQUIRED BY THE ARCHITECT'S DOCUMENTS, AND/OR THE STRUCTURAL ENGINEER'S DOCUMENTS, AS APPLICABLE, ARE PART OF THIS CONTRACT.

G. DEFINITIONS:

1. MECHANICAL CONTRACTOR, 'THIS CONTRACTOR' – THE PARTY OR PARTIES HAVE BEEN DULY AWARDED THE CONTRACT FOR AND ARE THEREBY MADE RESPONSIBLE FOR THE MECHANICAL WORK AS DESCRIBED HEREIN.

2. 'THIS CONTRACT', 'THE CONTRACT' – THE AGREEMENT COVERING THE WORK TO BE PERFORMED BY THIS CONTRACTOR.

3. 'APPROVED', 'EQUAL', 'SATISFACTORY', 'ACCEPTED', 'ACCEPTABLE', 'EQUIVALENT' – SUITABLE FOR USE ON THE PROJECT, AS DETERMINED BY THE ENGINEER BASED ON DOCUMENTS PRESENTED FOR SUCH DETERMINATION.

4. 'THESE SPECIFICATIONS', 'THIS SECTION, PART, DIVISION' (OF THE SPECIFICATION) – THE DOCUMENT SPECIFYING THE WORK TO BE PERFORMED BY 'THIS CONTRACTOR'.

5. 'THE MECHANICAL WORK', 'THIS WORK' – ALL LABOR MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES, AND OTHER ITEMS REQUIRED FOR A PROPER AND COMPLETE INSTALLATION BY THE MECHANICAL CONTRACTOR.

6. 'ARCHITECT', 'ENGINEER', 'OWNER'S REPRESENTATIVE' – THE PARTY OR PARTIES RESPONSIBLE FOR INTERPRETING, ACCEPTING AND OTHERWISE RULING ON THE PERFORMANCE UNDER THIS CONTRACT.

7. 'FURNISH' – PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE WITH EVERY NECESSARY APPURTENANCE AND SUPPORT, ALL AS PART OF THE MECHANICAL WORK.

8. 'INSTALL' – UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING INSTALLATION AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT, ALL AS PART OF THE MECHANICAL WORK.

9. 'PROVIDE' – 'FURNISH' AND 'INSTALL'.

10. 'NEW' – MANUFACTURED WITHIN THE PAST TWO YEARS AND NEVER BEFORE USED.

11. 'RELOCATE' – MOVE EXISTING EQUIPMENT AND ALL ACCESSORIES AS REQUIRED.

12. 'REMOVE' – DISMANTLE AND CART AWAY FROM SITE INCLUDING ALL RELATED ACCESSORIES. ALL ITEMS SHALL BE LEGALLY DISPOSED OF. ALL OTHER EQUIPMENT AND OPERATIONS IN ANY WAY AFFECTED BY THE REMOVAL IS TO REMAIN IN FULL OPERATION. PROVIDE ALL NECESSARY COMPONENTS TO MAINTAIN SUCH OPERATION.

1.02 SCOPE OF WORK

A. PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND CONTRACTOR'S SERVICES NECESSARY FOR COMPLETE, SAFE INSTALLATION OF ALL MECHANICAL WORK. THE SCOPE OF WORK SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:

1. DEMOLITION AND REMOVAL OF ITEMS AS REQUIRED.

2. DUCTWORK AND DUCTWORK ACCESSORIES.

3. AIR DISTRIBUTION SYSTEM (AIR OUTLETS, ETC.).

4. PIPING AND PIPING ACCESSORIES INCLUDING ALL VALVING.

5. EQUIPMENT, INCLUDING BUT NOT LIMITED TO, PUMPS, AIR CONDITIONING UNITS, FANS, ETC.

6. INSULATION OF PIPING AND DUCTWORK.

7. SOUND LINING.

8. AUTOMATIC TEMPERATURE CONTROLS.

9. TESTING AND BALANCING.

10. CUTTING AND PATCHING.

11. SHOP DRAWINGS.

12. AS–BUILT DRAWINGS.

13. OPERATING AND MAINTENANCE MANUALS.

14. FULL COORDINATION WITH OTHER TRADES.

15. WARRANTY AND GUARANTY.

16. PHASING AS REQUIRED BY OWNER, CONSTRUCTION MANAGER, GENERAL CONTRACTOR, OR BUILDING MANAGEMENT.

17. PREMIUM TIME FOR WORK TO BE PERFORMED AFTER–HOURS AS REQUIRED BY BUILDING MANAGEMENT AND/OR OWNER.

18. FILING AND PERMITS.

19. FULL TESTING AND STARTUP OF ALL SYSTEMS.

20. COMMISSIONING.

B. SECURE CERTIFICATES, PAY ALL FEES AND CHARGES FOR ALL WORK INSTALLED, CERTIFYING COMPLIANCE WITH ALL AUTHORITIES. CONTRACTOR TO COORDINATE WITH OWNER FOR REQUIRED SPECIAL INSPECTIONS AND OBTAIN ALL APPROVALS. DELIVER CERTIFICATES TO OWNER FOR SIGNING BEFORE FILING.

C. THE DRAWINGS AND SPECIFICATIONS SHALL BE INTERPRETED SO AS TO REQUIRE THE MOST SUBSTANTIAL AND COMPREHENSIVE PERFORMANCE OF THE WORK, CONSISTENT WITH THE INTENT AND REQUIREMENTS OF THE CONTRACT DOCUMENTS, AND SUCH WORK SHALL BE PERFORMED BY THE CONTRACTOR WITHOUT EXTRA COST TO THE OWNER. IN THE CASE OF A DISCREPANCY WITHIN THE CONTRACT DOCUMENTS, THE WORST CASE OR HIGHEST COST SHALL APPLY FOR BIDDING PURPOSES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCY VIA RFI PRIOR TO PERFORMING THE ASSOCIATED WORK.

1.03 COORDINATION WITH BUILDING MANAGEMENT

A. THIS CONTRACTOR IS TO OBTAIN A COPY OF THE BUILDING RULES AND REGULATIONS PRIOR TO BID SUBMISSION TO DETERMINE THE REQUIREMENTS AND THE EXTENT OF PREMIUM TIME WORK REQUIRED BY THE BUILDING.

B. THIS CONTRACTOR IS RESPONSIBLE FOR ADHERING TO THE BUILDING OWNER'S RULES AND REGULATIONS. ANY DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND THE BUILDING RULES AND REGULATIONS SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT/ENGINEER FOR REVIEW WITH BID SUBMISSION.

D. COORDINATE WITH BUILDING OWNER FOR ANY SERVICE INTERRUPTION OF EXISTING SYSTEMS AND GIVE NOTICE AS REQUIRED BY BUILDING RULES AND REGULATIONS, OR CONTRACTOR TO PROVIDE A MINIMUM OF TWO (2) DAYS NOTICE PRIOR TO ANY WORK BEING PERFORMED, WHICHEVER IS THE MORE STRINGENT. CONTRACTOR IS TO PERFORM WORK ON PREMIUM TIME, IF SO DIRECTED BY BUILDING OWNER, SO AS NOT TO DISTURB EXISTING TENANTS ON OTHER FLOORS.

1.04 SHOP DRAWINGS

A. SUBMIT SHOP DRAWINGS CERTIFIED BY ALL TRADES THAT COORDINATION HAS BEEN COMPLETED. SUBMIT ALL CERTIFIED EQUIPMENT CUTS WITH CONSTRUCTION WIRING DIAGRAMS AND AUTOMATIC TEMPERATURE CONTROL REQUIREMENTS. SHOP DRAWINGS SUBMISSION SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:

1. DUCTWORK – PROVIDE DUCT SHOP STANDARDS AND LEAKAGE TEST CERTIFICATION, AS REQUIRED, AND 3/8 SCALE DUCT LAYOUT.

2. PIPING LAYOUT AND APPURTENANCES – PROVIDE PIPING, VALVING, CHEMICAL TREATMENT, SHOP STANDARDS AND 3/8 SCALE PIPING LAYOUT WITH ALL VALVING.

3. INSULATION FOR DUCTWORK AND PIPING.

4. EQUIPMENT CATALOG CUTS FOR ALL ITEMS TO BE UTILIZED ON PROJECT (FANS, PUMPS, AC UNITS, ETC.).

5. AIR OUTLETS (DIFFUSERS, REGISTERS, GRILLES, ETC.).

6. AUTOMATIC TEMPERATURE CONTROL DIAGRAMS, DEVICES AND SEQUENCE OF OPERATION.

7. CERTIFIED AIR BALANCING REPORT.

8. AS–BUILT DRAWINGS AT PROJECT COMPLETION OF THE INSTALLED CONDITION OF WORK.

B. ALL SHOP DRAWINGS SHALL BE SUBMITTED AS PDF FILES. SPECIFIC JOB REQUIREMENTS MAY BE MORE STRINGENT AND CONTRACTOR IS RESPONSIBLE TO OBTAIN REQUIREMENTS FROM OWNER, CONSTRUCTION MANAGER, GENERAL CONTRACTOR, OR ARCHITECT.

C. THE CONTRACTOR SHALL INCLUDE IN THE BID SKETCHING TIME FOR ANY REVISIONS REQUIRED DUE TO THE ENGINEER'S REVIEW OF SHOP DRAWINGS FOR EQUIPMENT, DUCTWORK AND PIPING LAYOUTS.

1.05 MAINTENANCE MANUALS

A. SUBMIT FOUR (4) LOOSE–LEAF BOUND OPERATING AND MAINTENANCE MANUALS WITH INDEX AND INDEX TABS. IN ADDITION, SUBMIT FOUR (4) PDF COPIES OF THE COMPLETE MANUALS ON CD'S. INCLUDE THE FOLLOWING:

1. OPERATING AND MAINTENANCE INSTRUCTIONS ON ALL SYSTEMS.

2. MANUFACTURERS' CATALOG CUTS ON ALL EQUIPMENT.

3. AUTOMATIC TEMPERATURE CONTROL SYSTEMS WITH SEQUENCE OF OPERATIONS, CATALOG CUTS OF ALL DEVICES AND POINT–TO–POINT WIRING DIAGRAMS.

4. CERTIFIED FINAL AIR AND WATER BALANCING REPORT.

5. DUCT AND PIPING AS–BUILT DRAWINGS WITH VALVE CHART AND KEY PLAN DRAWINGS INSERTED IN BINDER.

6. ALL ITEMS SUBMITTED FOR REVIEW IN SHOP DRAWING SECTION.

1.06 AS–BUILT DRAWINGS

A. CONTRACTOR SHALL MAINTAIN RECORD DRAWING PRINTS ON JOB SITE AND RECORD, AT TIME OF OCCURRENCE, DEVIATIONS FROM CONTRACT DOCUMENTS DUE TO FIELD COORDINATION, BULLETINS, OR ADDENDA.

B. CONTRACTOR SHALL REVISE SHOP DRAWINGS TO CONFORM TO RECORD DRAWINGS AND SUBMIT AS–BUILT CONDITION (PIPING AND DUCTWORK) DRAWINGS UPON COMPLETION OF THE PROJECT. FINAL SUBMISSION OF REPRODUCIBLE AS–BUILT DRAWINGS ARE TO BE SIGNED AND CERTIFIED BY THE INSTALLING CONTRACTOR THAT THIS IS THE AS–BUILT CONDITION OF THE WORK.

C. ALSO PROVIDE FOUR (4) COPIES OF ALL AS–BUILT DRAWINGS AS PDF AND AUTOCAD FILES ON CD'S.

1.07 SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

A. THIS CONTRACTOR SHALL PROVIDE AS AN ADD ALTERNATE PRICE, A FULL ONE YEAR SERVICE AND WARRANTY OF ALL MECHANICAL COMPONENTS AND SYSTEMS, WITH PRICES FOR YEARS 2, 3 AND 4 FOLLOWING THIS FIRST YEAR. AT THE TIME OF ACCEPTANCE OF PROJECT, THE TENANT OR OWNER'S REPRESENTATIVE WILL DECIDE TO ACCEPT WHICH ALTERNATE, IF ANY.

1.08 SUBSTITUTIONS

A. NO SUBSTITUTE MATERIAL OR MANUFACTURER OF EQUIPMENT SHALL BE PERMITTED WITHOUT A FORMAL WRITTEN SUBMITTAL TO THE ENGINEER WHICH INCLUDES ALL DIMENSIONAL, PERFORMANCE AND MATERIAL SPECIFICATIONS. ANY CHANGES IN LAYOUT, ELECTRICAL CHARACTERISTICS, STRUCTURAL REQUIREMENTS, OR DESIGN DUE TO THE USE OF A SUBSTITUTION SHALL BE SUBMITTED TO THE ENGINEER AS PART OF THIS PROPOSAL. THE CONTRACTOR TAKES FULL RESPONSIBILITY FOR THE SUBSTITUTION AND ALL CHANGES RESULTING FROM SUBSTITUTION. ALL ITEMS SHALL BE SUBMITTED FOR REVIEW IN CONJUNCTION WITH THE SUBMITTAL OF THE SUBSTITUTION. ANY SUBSTITUTION MUST BE SUBMITTED WITH AN EXPLANATION AS TO WHY A SUBSTITUTION IS BEING UTILIZED. IF THE SUBSTITUTED ITEM DEVIATES FROM THE SPECIFIED ITEM, THOSE DEVIATIONS ARE TO BE IDENTIFIED ON A LINE–BY–LINE BASIS. IF THE SUBSTITUTE IS BEING UTILIZED FOR FINANCIAL REASONS, THE ASSOCIATED CREDIT MUST BE SIMULTANEOUSLY SUBMITTED.

B. ALL SUBSTITUTED EQUIPMENT SHALL CONFORM TO SPACE REQUIREMENTS AND PERFORMANCE REQUIREMENTS SHOWN ON CONTRACT DOCUMENTS. CONTRACTOR SHALL REPLACE ANY EQUIPMENT THAT DOES NOT MEET THESE REQUIREMENTS AT HIS OWN EXPENSE. ANY MODIFICATIONS TO ASSOCIATED SYSTEMS OR ADDITIONAL COSTS ATTRIBUTED TO THIS SUBSTITUTION SHALL BE AT THIS CONTRACTOR'S EXPENSE.

C. CONTRACTOR SHALL SUBMIT BID BASED ON SPECIFIED ITEMS AND SHALL SUPPLY AS AN ALTERNATE PRICE ANY SUBSTITUTIONS.

1.09 ACCESS DOORS IN GENERAL CONSTRUCTION

A. THIS CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL A PLAN INDICATING THE SIZE AND LOCATION OF ALL ACCESS DOORS REQUIRED FOR OPERATION AND MAINTENANCE OF ALL CONCEALED EQUIPMENT, DEVICES, VALVES, DAMPERS AND CONTROLS. CONTRACTOR SHALL ARRANGE FOR FURNISHING AND INSTALLATION OF ALL ACCESS DOORS IN FINISHED CONSTRUCTION AND INCLUDE COSTS IN THE BID. ACCESS DOORS SHALL BE OF ADEQUATE SIZE TO PROVIDE ACCESS TO CONCEALED ITEMS FOR OPERATION AND MAINTENANCE, WITH A MINIMUM SIZE OF 18" X 18".

1.10 DEMOLITION, REMOVAL AND RELOCATION

A. REMOVAL, TEMPORARY CONNECTIONS AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE INSTALLATION OF THE NEW SYSTEMS. ALL EXISTING CONDITIONS ARE NOT TO BE COMPLETELY DETAILED ON THE DRAWINGS. THE CON–TRACTOR SHALL SURVEY THE SITE AND MAKE ALL NECESSARY CHANGES REQUIRED BASED ON EXISTING CONDITIONS FOR PROPER INSTALLATION OF NEW WORK.

B. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT, AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW SYSTEM.

C. EQUIPMENT REQUIRED TO BE TEMPORARILY DISCONNECTED AND RELOCATED SHALL BE CAREFULLY REMOVED, STORED, CLEANED, REINSTALLED, RECONNECTED, AND MADE OPERATIONAL.

D. ALL EXISTING WORK NOT INDICATED FOR DEMOLITION SHALL BE PROTECTED FROM DAMAGE. WHERE EXISTING WORK TO REMAIN IS DAMAGED OR DISTURBED, THE CONTRACTOR SHALL REPAIR OR REPLACE TO OWNER'S AND BUILDING MANAGER'S SATISFACTION AT NO COST TO THE OWNER OR BUILDING MANAGEMENT.

E. GENERAL CONTRACTOR REMOVE ALL CEILING IN AREAS WHERE NEW DUCTWORK OR PIPING IS TO BE INSTALLED OR EXISTING IS ALTERED, AS PER ARCHITECT'S INSTRUCTIONS.

F. ALL NECESSARY CUTTING AND PATCHING TO ACCOMMODATE THE NEW HVAC WORK SHALL BE PERFORMED BY THIS CONTRACTOR AND COORDINATED WITH BUILDING MANAGEMENT SO AS TO MINIMIZE DISRUPTION OF EXISTING TENANTS AND SERVICES. RESTORE ALL ITEMS TO MATCH EXISTING CONDITIONS.

G. ALL EXISTING MATERIAL AND EQUIPMENT TO BE REMOVED UNDER THIS CONTRACT WILL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE LEGALLY DISPOSED OF BY THIS CONTRACTOR AS DIRECTED BY THE ARCHITECT OR OWNER. REFRIGERATION CONTAINED IN EXISTING EQUIPMENT TO BE REMOVED SHALL BE RECLAIMED OR LEGALLY DISPOSED OF IN ACCORDANCE WITH EPA REQUIREMENTS AND ASHRAE.

H. PROVIDE FOR LEGAL REMOVAL AND DISPOSAL OF ALL RUBBISH AND DEBRIS FROM THE BUILDING AND SITE. COORDINATE ALL DEMOLITION AND REMOVALS WITH BUILDING MANAGEMENT.

1.11 CONNECTION TO EXISTING WORK

A. PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING MANAGEMENT. INSTALL ISOLATION VALVES AT POINT OF CONNECTION TO THE EXISTING PIPING. INSTALL ISOLATION DAMPERS AT CONNECTION TO EXISTING DUCTWORK. PROVIDE TEMPORARY DUCTWORK AND PIPING CONNECTIONS AS REQUIRED TO MINIMIZE SHUTDOWN TIME.

B. CONNECT NEW WORK TO EXISTING WORK IN A NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT AND BUILDING MANAGER.

C. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES.

1.12 CHASING, CHOPPING OR CORE DRILLING

A. PRIOR TO ANY CHASING, CHOPPING, OR CORE DRILLING BEING PERFORMED, THIS CONTRACTOR SHALL FIELD INVESTIGATE EXISTING CONDITIONS AND COORDINATE WITH ALL APPROPRIATE TRADES AND BUILDING MANAGEMENT TO ENSURE THAT WORK WILL BE IN HARMONY WITH OTHER WORK AND NOT AFFECT ANY EXISTING BUILDING SYSTEMS. THIS WORK MUST BE APPROVED BY BUILDING MANAGEMENT PRIOR TO PROCEEDING.

1.13 SYSTEM STARTUP, TESTING, COMMISSIONING, DEMONSTRATION, AND TRAINING

A. STARTUP, TESTING, AND COMMISSIONING OF THE SYSTEM BY THIS CONTRACTOR SHALL BE SCHEDULED BEFORE THE SPACE IS OCCUPIED LEAVING ENOUGH TIME TO CORRECT THE SYSTEM'S DEFICIENCIES AND AFTER SHOP DRAWING ACCEPTANCE.

B. THIS TESTING SHALL TAKE PLACE AFTER HAVING SATISFACTORILY MET THE REQUIREMENTS OF SHOP DRAWING ACCEPTANCE.

C. UPON SUCCESSFUL COMPLETION OF SYSTEM STARTUP, TESTING, AND COMMISSIONING, THE CONTRACTOR SHALL SUBMIT A STATEMENT STATING THAT THE FULL OPERATION OF ALL SYSTEMS, FUNCTIONS AND ALARMS HAS BEEN DEMONSTRATED AND ARE OPERATIONAL AS WELL AS A LISTING OF ALL SYSTEMS, ALARMS AND FUNCTIONS THAT HAVE BEEN COMMISSIONED.

D. AFTER CONTRACTOR IS SATSFIED THAT THE SYSTEM IS FULLY OPERATIONAL, A COMPLETE DEMONSTRATION AND TESTING OF THE SYSTEM OPERATING FUNCTIONS AND ALARMS SHALL BE PERFORMED BY THIS CONTRACTOR IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE, ENGINEER, AND BUILDING ENGINEER.

E. ALL ITEMS SHALL BE SUBMITTED FOR REVIEW AND ACCEPTANCE TO THE OWNER, OWNER'S REPRESENTATIVE AND ENGINEER BEFORE FINAL ACCEPTANCE CAN TAKE PLACE.

F. AFTER FINAL ACCEPTANCE, THIS CONTRACTOR SHALL PROVIDE TRAINING TO THE OWNER'S AND/OR LANDLORD'S PERSONNEL FOR ALL MECHANCIAL SYSTEMS INSTALLED AND/OR MODIFIED UNDER THIS RPOJECT. IF CONTRACTOR'S PERSONNEL CANNOT PROVIDE COMPREHENSIVE TRAINING FOR SPECIFIC EQUIPMENT TYPES, CONTRACTOR SHALL HIRE QUALIFIED MANUFACTURER'S REPRESENTATIVES TO PERFORM THIS TRAINING AT NO ADDITIONAL COST TO THE OWNER. INCLUDE AN ALLOW FOR A MINIMUM OF (8) HOURS OF TRAINING AND (2) SEPARATE TRIPS.

PART 2 – PRODUCTS/APPLICATIONS

2.01 DUCTWORK AND ACCESSORIES

A. ALL DUCTWORK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE, LATEST EDITION, SMACNA HVAC AIR DUCT LEAKAGE TEST MANUAL, LATEST EDITION, NFPA 90A LATEST EDITION, AND ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES. THE MOST STRINGENT REQUIREMENT OF ANY CODES SHALL APPLY.

I. PROVIDE ALL SUPPORTING AND HANGING DEVICES IN ACCORDANCE WITH BUILDING CODE AND SMACNA.

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Revision	By	Appd	YYYY.MM.DD
ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15
Issued	By	Appd	YYYY.MM.DD
File Name: N/A	JMR Dwn.	JMR Dsgn.	KF Chkd.	- YYYY.MM.DD

Permit/Seal

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Client/Project Logo

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Client/Project

NEW ROCHELLE

1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

Title

MECHANICAL SPECIFICATIONS

Project No.
191506465

Scale
NONE

Revision

Drawing No.
M-401

J. PROVIDE FIRESTOPPING FOR ALL DUCT PENETRATIONS THROUGH FIRE–RATED PARTITIONS.

D. DUCTWORK LAYOUT AND ROUTING IS SCHEMATIC AND THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL DUCT SIZE CHANGES AND RELOCATIONS TO ACCOMMODATE SPACE AND STRUCTURAL CONDITIONS. OFFSETS AND TRANSFORMATIONS SHALL PRESERVE THE FULL INSIDE CROSS–SECTIONAL AREA OF DUCTWORK SHOWN ON THE DRAWINGS.

E. DUCTWORK (NEW AND EXISTING TO BE REUSED) SHALL HAVE PRESSURE CLASSIFICATION, SEALING REQUIREMENTS AND LEAKAGE TESTING IN ACCORDANCE WITH SMACNA AND AS LISTED BELOW UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE DRAWINGS.

1. 2" CLASS: ALL LOW PRESSURE DUCTWORK. SEAL CLASS C, LEAKAGE CLASS 24 (RECTANGULAR) OR CLASS 12 (ROUND).

F. MATERIALS:

1. GALVANIZED STEEL: UNLESS OTHERWISE SPECIFIED OR INDICATED, DUCTS SHALL BE CONSTRUCTED OF HOT–DIPPED GALVANIZED SHEETMETAL WITH 60 COMMERCIAL COATING ACCORDING TO ASTM 653 AND A924.

2. ALUMINUM: PROVIDE DUCTWORK OF ALUMINUM CONSTRUCTION, WHERE INDICATED. DUCTWORK SHALL BE ALLOY 3003–H14, OF THICKNESS REQUIRED BY THE SMACNA DUCT CONSTRUCTION STANDARDS. PROVIDE FOR ALL DUCTWORK EXPOSED TO WEATHER AND MOISTURE INCLUDING OUTSIDE AIR DUCTS WITHIN 10 FEET OF LOUVERS AND DISHWASHER EXHAUST.

3. FLEXIBLE CONNECTIONS AT FANS SHALL BE NEOPRENE COATED, FLAME RETARDANT GLASS FABRIC (COMPLYING WITH NFPA 90 AND 96), 30 OZ./SQ. YD. WITH SOWN AND CEMENTED SEAMS. FLEXIBLE CONNECTIONS MUST BE TESTED IN ACCORDANCE WITH UL 181, LISTED AND LABELED AS CLASS 0 OR CLASS 1 'FLEXIBLE AIR CONNECTORS'.

4. FLEXIBLE DUCTWORK SHALL BE LIMITED TO THE LAST 6 FEET OF BRANCH DUCTWORK TO A SINGLE DIFFUSER OR REGISTER, UNLESS OTHERWISE NOTED. DO NOT INSTALL FLEXIBLE DUCTWORK IN LOCATIONS EXPOSED TO VIEW. FLEXIBLE DUCTS MUST BE TESTED IN ACCORDANCE WITH UL 181, LISTED AND LABELED AS CLASS 0 OR CLASS 1 'FLEXIBLE AIR DUCTS'.

G. FABRICATION:

1. CONFORM TO SMACNA AND MECHANICAL CODE REQUIREMENTS FOR METAL THICKNESS, REINFORCING, JOINTS, AND SEALING FOR MAXIMUM STATIC PRESSURES INVOLVED. ALL SEAMS AND JOINTS SHALL BE SEALED AND TAPED.

2. ELBOWS SHALL CONFORM TO SMACNA REQUIREMENTS AND THE FOLLOWING:

   A) PROVIDE LONG RADIUS TYPE WITH CENTERLINE RADIUS MINIMUM 1.5 TIMES DUCT WIDTH. PROVIDE SHORT RADIUS OR SQUARE ELBOWS WHERE INDICATED OR WHERE REQUIRED TO FIT RESTRICTED SPACES. PROVIDE DOUBLE THICKNESS TURNING VANES ON ALL SHORT RADIUS AND MITERED ELBOWS. CONFORM TO SMACNA FOR THE NUMBER OF VANES FOR FITTINGS

3. BRANCH CONNECTIONS: PROVIDE 45 DEGREE ENTRY OR CONICAL TAPS. PROVIDE RADIUS TYPE FITTINGS FOR DIVIDED FLOW BRANCHES.

H. ACOUSTICALLY LINED DUCTWORK:

1. PROVIDE MATTE–FACED GLASS DUCT LINER, 1–INCH THICK –2 LB/CF DENSITY. DUCT DIMENSIONS INDICATED ARE CLEAR (NET) INSIDE DIMENSIONS. FOR DUCT VELOCITIES GREATER THAN 2,000 FPM, FACE DUCT LINER WITH 24 GAUGE PERFORATED ALUMINUM OR GALVANIZED STEEL, FULLY COVERING DUCT LINER, AND SUPPORTED 12" ON CENTER. DO NOT EXTERNALLY INSULATE ACOUSTICALLY LINED DUCTWORK. CONFORM TO SMACNA REQUIREMENTS FOR INSTALLATION. PROVIDE ACOUSTICALLY LINED DUCT WHERE LISTED BELOW AND/OR SHOWN ON THE DRAWINGS:

   A) ALL TRANSFER DUCTS.

   B) WITHIN A MINIMUM OF 20 FEET OF ALL AC UNIT DISCHARGES.

   C) WITHIN A MINIMUM OF 20 FEET OF FAN INLET AND DISCHARGES.

   D) WITHIN A MINIMUM OF 10 FEET DOWNSTREAM OF THE TERMINAL BOXES (VAV, DUAL DUCT, CAV OR FAN POWERED).

I. VOLUME DAMPERS:

1. GALVANIZED STEEL OR SAME AS DUCT CONSTRUCTION. CONFORM TO SMACNA HVAC DUCT CONSTRUCTION STANDARDS, 1995 OR LATEST EDITION, OPPOSED BLADE TYPE. PROVIDE BEARING AT BOTH ENDS OF DAMPER ROD AND QUADRANT, WITH LEVER AND LOCKSCREW, AT ONE END. INSTALL WITH LEVERS ACCESSIBLE THROUGH INSULATION. SPLITTER DAMPER OR AIR EXTRACTORS SHALL NOT BE USED ON THIS PROJECT.

2. PROVIDE MANUAL BALANCING VOLUME DAMPERS AS REQUIRED TO PROPERLY BALANCE THE AIR DISTRIBUTION SYSTEM. IF THE LOCATION OF BALANCING DAMPERS ARE NOT DEFINED ON THE DRAWINGS, THE FOLLOWING MINIMUM STANDARDS SHALL GOVERN:

   A) LOW PRESSURE: ALL SUPPLY AIR MAIN BRANCHES FROM TRUNK, EACH SPLIT, AND ALL SUB–BRANCHES FROM MAINS SHALL BE PROVIDED WITH BALANCING DAMPERS.

   B) LOW PRESSURE: ALL EXHAUST AND RETURN BRANCHES FROM TRUNK, EACH SPLIT AND ALL SUB–BRANCHES FROM MAINS SHALL BE PROVIDED WITH BALANCING DAMPERS.

   C) AS NOTED ON PLANS.

J. DUCT ACCESS DOORS:

1. CONFORM TO SMACNA WITH PIANO HINGES, TWO SASH LOCKS AND DOOR GASKETS. SCREWED ACCESS PANELS ARE NOT PERMITTED. PROVIDE REMOVABLE ACCESS DOORS WHERE DOOR SWING CANNOT BE ACCOMMODATED.

2. SIZE: MINIMUM 20"X14" EXCEPT DUCTS LESS THAN 16", ONE DIMENSION 20" AND THE OTHER DIMENSION, 2" LESS THAN THE DUCT WIDTH.

3. PROVIDE ACCESS DOORS: AT ENTERING AND LEAVING SIDES OF COILS IN DUCTS; AUTOMATIC DAMPERS ON LINKAGE SIDE, MANUAL VOLUME DAMPERS 2 SQ. FT. AND LARGER, FIRE DAMPERS, SMOKE DAMPERS, COMBINATION FIRE/SMOKE DAMPERS, SMOKE DETECTION HEADS, FAN BEARINGS ENCLOSED IN DUCTS, SUCTION AND DISCHARGE SIDES OF CEILING MOUNTED FANS, FILTERS, REHEAT COILS, AT ALL EQUIPMENT REQUIRING ACCESS AND AS INDICATED ON DRAWINGS.

K. FIRE DAMPERS:

1. DYNAMIC FIRE DAMPERS:

   A) FUSIBLE LINK DYNAMIC RATED FIRE DAMPERS SHALL BE FURNISHED AND INSTALLED WHERE SHOWN ON PLANS AND/OR AS DESCRIBED ON SCHEDULES. DAMPERS SHALL MEET THE REQUIREMENTS OF NFPA 80, 90A & 101 AND FURTHER SHALL BE TESTED, RATED AND LABELED IN ACCORDANCE WITH THE LATEST EDITION OF UL STANDARD 555. DAMPERS SHALL HAVE A UL555 FIRE RATING OF 1 1/2 HOURS OR 3 HOURS.

   B) DAMPERS SHALL BE CONSTRUCTED WITH A GALVANIZED STEEL FRAME, GALVANIZED CURTAIN STYLE BLADES IN GAUGES REQUIRED BY UL LISTING R13317. EACH FIRE DAMPER SHALL BE SUPPLIED AS A SINGLE ASSEMBLY WITH A FACTORY SLEEVE. EACH FIRE DAMPERS SHALL BE EQUIPPED WITH A FACTORY INSTALLED HEAT RESPONSIVE DEVICE, FUSIBLE LINK (REPLACEABLE), RATED TO CLOSE THE DAMPER WHEN TEMPERATURE AT THE DAMPERS REACHES 165°F.

   C) DAMPERS SHALL HAVE A MINIMUM UL555 DIFFERENTIAL PRESSURE RATING OF 4IN. WG. DAMPERS SHALL ALSO A MINIMUM UL555 VELOCITY RATING OF 2,000 FPM.

   D) EACH DAMPER SHALL BE SUPPLIED WITH FACTORY RETAINING ANLES SIZED TO PROVIDE INSTALLATION OVERLAP IN ACCORDANCE WITH THE MANUFACTURER'S UL LISTING.

   E) FIRE DAMPERS SHALL BE TYPE B WITH SHUTTER OUT OF AIRSTREAM. DO NOT USE TYPE A WITH SHUTTER IN AIRSTREAM.

   F) FIRE DAMPER SHALL BE MANUFACTURED BY POTTORFF MODEL DFD–10D (1–1/2 HR. RATED) OR MODEL DFD–30D (3–HOUR RATED), OR APPROVED EQUAL.

L. SEAL OPENINGS AROUND DUCTS THROUGH WALLS WITH MINERAL WOOL OR OTHER NON–COMBUSTIBLE MATERIAL. SEAL ALL DUCT PENETRATIONS THROUGH WALLS AIRTIGHT.

M. ALL DUCTS EXPOSED TO MOISTURE SHALL BE ALUMINUM, SLOPED AND DRAINED AND SHALL NOT BE INTERNALLY LINED.

N. AUTOMATIC CONTROL DAMPERS:

1. PROVIDE DAMPERS WITH PARALLEL BLADES FOR 2–POSITION CONTROL, OR OPPOSED BLADES FOR MODULATING CONTROL OF CONSTANT OR VARIABLE VOLUME SYSTEM.

2. AUTOMATIC DAMPERS TO BE VERY LOW LEAKING TYPE WITH JAMB AND BLADE SEALS RATED FOR SMOKE DAMPER APPLICATION. CONSTRUCT BLADES OF 16 GAUGE GALVANIZED STEEL. PROVIDE HEAVY–DUTY MOLDED SELF–LUBRICATING NYLON BEARINGS, 1/2" DIAMETER STEEL AXLES SPACED ON 9" CENTERS, BLADES TO BE MAXIMUM 10" HIGH. FRAME SHALL BE CONSTRUCTED OF 16 GAUGE X 4–3/8" GALVANIZED HAT SHAPED STEEL PROPERLY BRACED WITH GALVANIZED STEEL FINISH AND ALUMINUM TOUCH–UP.

3. AUTOMATIC DAMPERS SHALL HAVE A MAXIMUM LEAKAGE RATE OF 4 CFM/FT2 AT 1.0 INCHES W.G. WHEN TESTED IN ACCORDANCE WITH AMCA 500D.

4. DAMPERS INSTALLED IN ALUMINUM DUCTS SHALL BE ALUMINUM WITH WEATHERPROOF COMPONENTS.

5. DAMPERS TO BE MANUFACTURED BY IMPERIAL OR APPROVED EQUAL.

O. EXPOSED DUCTWORK:

1. WHERE DUCTWORK IS INDICATED TO BE EXPOSED TO VIEW IN OCCUPIED SPACES, PROVIDE MATERIALS WHICH ARE FREE FROM VISUAL IMPERFECTIONS, INCLUDING PITTINGS, SEAM MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

2. PROVIDE FINISHES WHICH WILL ALLOW PAINTING. CLEAN SURFACES OF ALL DUST, GREASE, AND DEBRIS PRIOR TO PAINTING BY THE GENERAL CONTRACTOR.

3. PROVIDE FLAT TYPE SEAMS AND JOINTS FOR ALL EXPOSED DUCT CONSTRUCTION.
4. UNLESS OTHERWISE NOTED, ALL EXPOSED SUPPLY DUCTWORK IN FINISHED SPACES SHALL BE RECTANGULAR WITH FLAT SEAMS AND 1 INCH THICK INTERNAL ACOUSTICAL LINING, NO EXTERNAL DUCT INSULATION.

5. UNLESS OTHERWISE NOTED, ALL EXPOSED OUTSIDE AIR INTAKE DUCTWORK IN FINISHED SPACES SHALL BE RECTANGULAR WITH FLAT SEAMS AND 2 INCH THICK INTERNAL ACOUSTICAL LINING, NO EXTERNAL DUCT INSULATION.

6. UNLESS OTHERWISE NOTED, ALL EXPOSED RETURN AND EXHAUST DUCTWORK IN FINISHED SPACES SHALL BE RECTANGULAR WITH FLAT SEAMS, NO EXTERNAL DUCT INSULATION, INTERNAL ACOUSTICAL LINING ONLY WHERE SPECIFIED IN SECTION 2.01–N.

2.02 PIPING AND ACCESSORIES

A. PROVIDE ALL PIPING, FITTINGS, VALVES, SPECIALTIES, THERMOMETERS, AND PRESSURE GAUGES REQUIRED FOR THE OPERATING AND MAXIMUM PRESSURE AND TEMPERATURE OF THE PIPING SYSTEMS.

B. PROVIDE FIRESTOPPING FOR ALL DUCT PENETRATIONS THROUGH FIRE–RATED PARTITIONS.

C. ALL PIPING SHALL BE NEW, STANDARD SIZE, FREE FROM SCALE OR RUST WITH ENDS CAPPED FOR DELIVERY AND STORAGE. EACH LENGTH OF PIPING SHALL BE PROPERLY MARKED AT THE MILL FOR PROPER IDENTIFICATION WITH NAME OR SYMBOL OF MANUFACTURER.

D. ALL HORIZONTAL CONDENSATE PIPING SHALL BE PITCHED A MINIMUM OF 1/8" PER FOOT OF LENGTH. CONDENSATE PIPING SHALL NOT BE LESS THAN ¾" DIAMETER.

E. PIPE APPLICATION SCHEDULE:

SERVICE	SIZE	MATERIAL	WEIGHT	STANDARD	JOINT TYPE
COLD CONDEN–SATE DRAINS MISCELLANEOUS DRAINS AND OVERFLOWS	ALL	HARD COPPER	TYPE L	ASTM A88	BRAZE OR SILVER SOLDER
REFRIGERANT (AIR COOLED AND COMMERCIAL REFRIGERATION)	ALL	HARD COPPER	TYPE ACR REFRIGER–ANT OR TYPE L	ASTM B280 OR ASTM B–88	BRAZE OR SOLDER

D. FITTING MATERIALS AND APPLICATION SCHEDULE:

1. ALL FITTING JOINT TYPE SHALL BE THE SAME AS THE PIPING JOINT TYPE REQUIRED FOR SERVICE, BASED ON THE PIPING APPLICATION SCHEDULE.

2. FITTING CLASS SHALL MEET THE PRESSURE AND TEMPERATURE REQUIREMENT OF THE PIPING SYSTEM BASED ON ITS MAXIMUM OPERATING PRESSURE AND TEMPERATURE OR TEST PRESSURE, WHICHEVER IF MORE STRINGENT. PRESSURE AND TEMPERATURE RATINGS OF A FITTING SHALL BE DETERMINED BY ITS CLASS AND THE CORRESPONDING ANSI STANDARD.

3. FITTING APPLICATION TABLE:

PIPE MATERIAL	PIPE SIZE (INCHES)	JOINT TYPE	FITTING MATERIAL	FITTINGS CLASS
COPPER TUBING HARD DRAWN	4" & SMALLER	SOLDER 95–5 TINANTIMONY ASTM B32 GR 95 TA	WROUGHT COPPER OR CAST COPPER	300 PSIG AT 100EF, 150 PSIG @ 250EF
		SILVER SOLDER ASTM B32 GR 95TS		
		BRAZING	WROUGHT COPPER	450 PSIG AT 100EF TO 200EF, 150 PSIG @ 250EF
COPPER TUBING HARD DRAWN REFRIGERANT SYSTEMS TYPE ACR	4" & SMALLER	SOLDER 15–5–80 SILVER PHOSPHOROUS COPPER AWS A5.8 OR BRAZING	WROUGHT COPPER	STANDARD

PROVIDE DIELECTRIC FITTING AT ALL PIPING CONNECTIONS JOINING DISSIMILAR METALS, SUCH AS STEEL AND COPPER.

E. VALVES

1. VALVES SHALL HAVE NAME OF MANUFACTURER AND GUARANTEED WORKING PRESSURE CAST OR STAMPED ON BODIES. VALVES OF SIMILAR TYPE SHALL BE BY A SINGLE MANUFACTURER. VALVES LOCATED 7 FEET OR MORE ABOVE OPERATING FLOOR OR PLATFORM SHALL BE PROVIDED WITH CHAIN OPERATED HANDWHEELS, RUSTPROOF CHAIN AND CHAIN GUIDE. GASKETS AND PACKINGS SHALL NOT CONTAIN ASBESTOS.

2. ALL VALVING AND VALVE MATERIALS SHALL BE SUITABLE FOR THE OPERATING TEST AND MAXIMUM PRESSURE AND TEMPERATURE REQUIREMENTS OF THE PIPING SYSTEM FOR WHICH THEY ARE BEING UTILIZED.

3. VALVING SHALL BE AS SHOWN ON THE DRAWINGS AND INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:

   A) BALL VALVES (APOLLO)
      SWING CHECK VALVES (STOCKHAM)

   B) ALL VALVE MANUFACTURERS SHALL BE AS LISTED OR APPROVED EQUAL BY THE ENGINEER.

F. REFRIGERANT SYSTEMS:

1. PROVIDE ALL REFRIGERANT PIPING REQUIRED FOR A COMPLETE REFRIGERATION SYSTEM, WITH ALL VALVES, FITTINGS AND SPECIALTIES NECESSARY FOR SATISFACTORY OPERATION IN ACCORDANCE WITH ASHRAE STANDARD 15–1994 OR LATEST EDITION AND ALL AUTHORITIES HAVING JURISDICTION. REFRIGERATION SYSTEM SHALL INCLUDE ALL REQUIRED ITEMS FOR CHARGING, DRAINING AND PURGING THE SYSTEM.

2. JOINTS IN REFRIGERATION PIPING SHALL BE BRAZED. REFRIGERANT PIPING SHALL BE OF THE SIZE RECOMMENDED BY THE MANUFACTURER AND AS APPROVED BY THE ENGINEER.

3. HORIZONTAL PIPING OF THE COMPRESSOR SUCTION AND DISCHARGE LINES AND THE CONDENSER DISCHARGE LINES SHALL BE PITCHED A MINIMUM OF 1/2" IN 10', IN THE DIRECTION OF REFRIGERANT FLOW. EACH SUCTION GAS VERTICAL RISER SHALL BE TRAPPED AT ITS EVAPORATOR WITH A TRAP AS RECOMMENDED BY THE COMPRESSOR MANUFACTURER.

4. INSTALL REFRIGERANT PIPING TO PREVENT EXCESSIVE OIL FROM BEING TRAPPED IN THE SYSTEM. ANY ADDITIONAL RISERS OR EQUALIZER LINES REQUIRED BY THE MANUFACTURER OF EQUIPMENT FOR THE PROPER SYSTEM OPERATION SHALL BE INSTALLED AS PART OF THIS CONTRACT. PROVIDE A FULLY PIPED OIL SEPARATOR FOR EACH REFRIGERANT SYSTEM AS PER MANUFACTURER=S RECOMMENDATIONS.

5. VALVES SHALL BE DESIGNED FOR REFRIGERANT SERVICE. SHUTOFF VALVES SHALL BE BRASS PACKLESS TYPE. UNIONS, FLANGED VALVES OR FITTINGS SHALL BE PROVIDED FOR DISCONNECTING EQUIPMENT, CONTROLS, ETC., FOR MAKING REPAIRS. PIPING SHALL BE RUN IN A SINGLE LAYER, WITH EACH LINE ISOLATED FROM ANOTHER TO PREVENT RUBBING. PROVISION SHALL BE MADE FOR EXPANSION AND CONTRACTION OF PIPING. ALL PIPING PASSING THROUGH WALLS, PARTITIONS, ETC. SHALL BE FURNISHED WITH SLEEVES AS REQUIRED.

6. REFRIGERANT PIPING PASSING THROUGH RATED FLOORS OR DEMISING WALLS SHALL BE ENCLOSED IN A RIGID AND GAS–TIGHT CONTINUOUS FIRE–RESISTING PIPE DUCT OR SHAFT VENTED TO THE OUTSIDE, IN ACCORDANCE WITH ASHRAE STANDARD 15–1994 OR LATEST EDITION. PIPE CONDUIT SHALL BE COPPER TUBE TYPE L WITH SOLDERED FITTINGS.

G. PROVIDE CORE DRILLED OPENINGS WITH PIPE SLEEVES AT ALL SLAB AND SHAFT PENETRATIONS. PROVIDE FIREPROOFING AS REQUIRED TO MAINTAIN WALL, SHAFT AND SLAB FIRE RATINGS.

H. PROVIDE WATERPROOF SLEEVES (LINK SEAL (LS TYPE) AT ALL EXTERIOR WALL AND FLOOR PENETRATIONS, AND AS REQUIRED OR AS NOTED ON PLANS.

I. PROVIDE LABELING OF ALL PIPING (BOTH EXPOSED AND CONCEALED) IN ACCORDANCE WITH ANSI STANDARDS AND COLOR CODED AS PER BUILDING MANAGEMENT STANDARDS. LABELS TO BE SECURELY FASTENED TO PIPING WITH LETTERING OF SUFFICIENT SIZE FOR EASY IDENTIFICATION BY OPERATING PERSONNEL.

J. ALL PIPING TO BE MAINTAINED AT THE HIGHEST ELEVATIONS POSSIBLE SO AS NOT TO INTERFERE WITH EXISTING OPERATIONS AND SERVICE/MAINTENANCE REQUIREMENTS.

K. HANGERS AND SUPPORTS:

1. PROVIDE ALL PIPE HANGERS, HANGAR RODS SUPPORTS, INSERTS, ATTACHMENTS, CLAMPS, GUIDES, SUPPLEMENTAL STEEL AND ANCHORS AS REQUIRED TO INSTALL PIPING SYSTEM SIZED TO ACCOMMODATE THE SYSTEM LOADS. HANGERS AND SUPPORTS ARE TO BE IN ACCORDANCE WITH MSS RECOMMENDATIONS AND TO BE MANUFACTURED BY GRINNELL OR APPROVED EQUAL.

2. PROVIDE INSULATED PROTECTIVE SADDLES FOR INSULATED PIPING.

3. PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH RECOMMENDATIONS OF MSS SP–69 AND ALL APPLICABLE CODES. ALL THREADED ROD IS TO BE GALVANIZED. PROVIDE 2" VERTICAL ADJUSTMENT FOR ALL HANGERS. PROVIDE ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, BRANCH PIPING OVER 5 FEET, AND CONCENTRATED LOADS DUE TO VALVES, STRAINERS AND OTHER ACCESSORIES.

L. EXPANSION COMPENSATION:

1. ALL PIPING SHALL BE INSTALLED TO COMPENSATE FOR EXPANSION TO PROTECT THE BUILDING, EQUIPMENT AND PIPING SYSTEMS. PROVIDE ALL GUIDES, ANCHORS, EXPANSION LOOPS, SUPPLEMENTAL STEEL AND APPROVED TYPE EXPANSION JOINTS AS INDICATED OR REQUIRED FOR CONTROL OF EXPANSION.

M. TESTING:

1. GENERAL

   A) TESTS SHALL BE CONDUCTED AFTER COMPLETION AND ASSEMBLY OF PIPING SYSTEM, BEFORE ANY INSULATION OR PAINT IS APPLIED TO JOINTS, INCLUDING WELDS AND PRIOR TO MAKING THE SYSTEM OPERABLE. INSULATION MATERIALS INSTALLED PRIOR TO THE TESTS SHALL BE REMOVED.

   B) THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY TEMPORARY PIPING CONNECTIONS, TEES, VALVES, EQUIPMENT, AND LABOR TO PRESSURE TEST PIPING AND EQUIPMENT.

   C) EQUIPMENT THAT IS NOT SUBJECTED TO THE PRESSURE TEST SHALL BE EITHER DISCONNECTED FROM THE SYSTEM OR ISOLATED BY A BLANK OR SIMILAR MEANS. VALVES MAY BE USED FOR THIS PURPOSE PROVIDED THAT VALVE CLOSURE IS SUITABLE FOR THE PROPOSED TEST PRESSURE.

   D) SUBMIT TO THE ENGINEER AND OWNER REPRESENTATIVE A RECORD OF TEST PRESSURE APPLIED TO EACH PIPING SYSTEM.

2. REFRIGERANT PIPING

   A) THE REFRIGERANT PIPING FOR TIGHTNESS AND LEAKS UNDER PRESSURE OR VACUUM. THE DURATION OF EACH TEST SHALL BE TWENTY–FOUR (24) HOURS

   B) TEST JOINTS IN ACCORDANCE WITH ASHRAE 15–1994. THERE SHALL BE NO OBSERVABLE LEAKS OR CHANGES IN PRESSURE. IF EITHER IS OBSERVED, SEAL LEAKS, AND REPEAT TEST PROCEDURES.

N. PIPE CLEANING:

1. NEW PIPING SYSTEMS SHALL BE ISOLATED, CLEANED AND CHEMICALLY TREATED WHEN THE INSTALLATION IS COMPLETED TO REMOVE ANY CONSTRUCTION DEBRIS AND PROVIDE CORROSION PROTECTION.

2. PROVIDE THE NECESSARY APPARATUS, COMPLETE WITH RELIEF VALVES, ISOLATING VALVES, CHECK VALVES, PIPING, POWER, WIRING, CHEMICALS, FEED TANKS, AND SERVICE TO PROVIDE PROPER WATER TREATMENT FOR THE CONTROL OF SCALE, CORROSION AND MICROBIOLOGICAL GROWTHS IN THE PIPING SYSTEMS. ALL CHEMICALS USED SHALL COMPLY WITH POLLUTION CONTROLS ESTABLISHED BY ALL AUTHORITIES HAVING JURISDICTION. CHLORATES SHALL NOT BE USED.

2.03 INSULATION

A. ALL INSULATION SHALL MEET THE REQUIREMENTS OF ASTM, NFPA, THE ENERGY CODE AND ALL AUTHORITIES HAVING JURISDICTION. ALL MECHANICAL INSULATION (JACKETING, COVERINGS, ADHESIVES, MASTICS, FACINGS, TAPES, ETC.), SHALL HAVE RATINGS NOT EXCEEDING A FLAME SPREAD OF 25 OR LESS AND SMOKE DEVELOPED INDEX OF 50 OR LESS.

B. BEFORE APPLYING INSULATION, ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED. FURNISH AND INSTALL AS PER MANUFACTURER'S REQUIREMENTS.

C. INSULATION FOR FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION

Revision	By	Appd	YYYY.MM.DD
ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15
Issued	By	Appd	YYYY.MM.DD

File Name: N/A | Dwn. JMR | Dsgn. JMR | Chkd. KF | YYYY.MM.DD -

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NEW ROCHELLE

1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

Title
MECHANICAL SPECIFICATIONS

Project No. 191506465
Scale NONE
Revision
Drawing No. **M-402**

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REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

D. PIPE INSULATION:

1. FIBERGLASS PIPE INSULATION: ONE-PIECE MOLDED SECTIONAL FIBERGLASS INSULATION, CONFORMING TO ASTM C-547, CLASS 1, 2, 3 TO 850EF WITH 4 LB./CU. FT. DENSITY WITH A THERMAL CONDUCTIVITY OF NOT OVER 0.23 AT 75EF MEAN. PROVIDE WITH FACTORY-APPLIED ALL SERVICE JACKET AND DOUBLE ADHESIVE SELF-SEALING LAP. COLD WATER PIPE INSULATION JACKET SHALL BE OF THE CONTINUOUS VAPOR BARRIER TYPE. THE INSULATION SHALL BE SIMILAR TO OWENS-CORNING FIBERGLASS ASJ/SSL-II PIPE INSULATION.

2. CALCIUM SILICATE PIPE INSULATION: MOLDED CALCIUM SILICATE PIPE INSULATION, CONFORMING TO ASTM C-335, 1200EF MAXIMUM TEMPERATURE, ASBESTOS FREE, SHALL HAVE A NOMINAL 14 LB./CU. FT. DENSITY WITH A THERMAL CONDUCTIVITY OF NOT OVER 0.44 AT 300EF MAIN TEMPERATURE. WIRE ON PRE-MOLDED SECTION OF CALCIUM SILICATE AND APPLY SKIM COAT OF FINISHING CEMENT TO SMOOTH OUT SURFACE OF INSULATION. THE INSULATION SHALL BE SIMILAR TO OWENS-CORNING KAYLO.

3. INSULATION FOR FITTINGS, FLANGES, AND VALVES: PROVIDE INSULATION FOR FITTINGS, FLANGES, AND VALVES PREMOLDED, PRECUT, OR JOB FABRICATED OF THE SAME THICKNESS AND CONDUCTIVITY AS USED ON ADJACENT PIPING.

4. INSULATION THICKNESS FOR PIPING, FITTINGS, FLANGES AND VALVES SHALL BE AS FOLLOWS, BASED ON INSULATION HAVING A CONDUCTIVITY (K) NOT EXCEEDING 0.27 BTU/H PER INCH/H*FT2*DEGF AT A MEAN TEMPERATURE OF 75 DEGF. ADJUST THICKNESS FOR DIFFERENT CONDUCTIVITY.

   a. FOR REFRIGERANT PIPING, INSULATION THICKNESS SHALL BE 1-1/2 INCHES.

   b. FOR COLD CONDENSATE DRAIN AND COLD CONDENSATE PUMP DISCHARGE PIPING, INSULATION THICKNESS SHALL BE 1 INCH.

5. INDOOR PIPING EXPOSED IN FINISHED SPACES

   A) PROVIDE PVC JACKET, ZESTON 2000 OR EQUAL. PROVIDE A MOISTURE BARRIER LINING.

E. DUCT INSULATION:

1. GENERAL

   A) INSULATION SHALL BE APPLIED WITH MASTICS, ADHESIVES, AND COATINGS, WITH COVERS, WEATHER-PROTECTION AND OTHER WORK AS REQUIRED BY MANUFACTURER'S RECOMMENDATIONS. MATERIALS SHALL MEET REQUIREMENTS OF ADHESIVE AND SEALANT COUNCIL STANDARDS AND SMACNA.

2. INDOOR DUCTWORK

   A) ALL SUPPLY AIR, RETURN AIR, OUTSIDE AIR INTAKE, AND EXHAUST/SPILL/RELIEF AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-6 INSULATION WHEN LOCATED WITHIN THE BUILDING ENVELOPE ASSEMBLY, UNLESS OTHERWISE INDICATED. WHEN LOCATED WITHIN THE BUILDING ENVELOPE ASSEMBLY, THE DUCT OR PLENUM MUST BE SEPARATED FROM THE BUILDING EXTERIOR OR UNCONDITIONED OR EXEMPT SPACES BY A MINIMUM OF R-8 INSULATION.

   B) CONCEALED DUCTWORK: INSULATE SUPPLY AND FRESH AIR DUCTS AND PLENUMS IN CONCEALED SPACES AND RETURN DUCT NOT IN CEILING PLENUM WITH AT LEAST 1-1/2" THICK FIBROUS GLASS DUCT WRAP, WITH A MINIMUM R-VALUE OF R-6 AND FOIL-KRAFT FLAME RESISTANT VAPOR BARRIER.

   C) EXPOSED DUCTWORK: INSULATE EXPOSED SUPPLY, RETURN AND FRESH AIR DUCTS AND EXPOSED PLENUMS WITH AT LEAST 2" THICK, SEMI-RIGID FIBROUS GLASS BOARDS WITH A MINIMUM R-VALUE OF R-6 AND A FACTORY APPLIED FIRE RETARDANT FOIL REINFORCED KRAFT VAPOR BARRIER FACING. PROVIDE WELD PINS AND VAPOR SEAL ALL JOINTS WITH TAPE. (THIS REQUIREMENT DOES NOT APPLY TO INTERNALLY LINED DUCTWORK LOCATED IN FINISHED SPACES.)

   D) RETURN DUCTS AND PLENUMS LOCATED IN CONDITIONED SPACES OR CEILING PLENUMS SHALL NOT REQUIRE INSULATION.

   E) EXHAUST/SPILL/RELIEF AIR DUCTS AND PLENUMS LOCATED UPSTREAM OF MOTORIZED OR BAROMETRIC ISOLATION DAMPERS SHALL NOT REQUIRE INSULATION. PORTIONS AFTER ISOLATION DAMPERS MUST BE INSULATED FROM THE DAMPER TO THE WALL/ROOF PENETRATION.

   F) WHERE INDOOR DUCTWORK IS INTERNALLY ACOUSTICALLY LINED, EXTERNAL INSULATION THICKNESS MAY BE REDUCED SUBJECT TO MAINTAINING THE R-VALUES SPECIFIED HEREIN.

3. OUTDOOR DUCTWORK

   A) ALL SUPPLY AIR, RETURN AIR, OUTSIDE AIR INTAKE, AND EXHAUST/SPILL/RELIEF AIR DUCTS AND PLENUMS SHALL BE INSULATED WITH A MINIMUM OF R-8 INSULATION WHEN LOCATED OUTDOORS OR OUTSIDE THE BUILDING ENVELOPE ASSEMBLY.

   B) INSULATE OUTDOOR DUCTWORK AND PLENUMS WITH AT LEAST 2" THICK, SEMI-RIGID FIBROUS GLASS BOARDS WITH A MINIMUM R VALUE OF R-8 AND A FACTORY APPLIED FIRE RETARDANT FOIL REINFORCED KRAFT VAPOR BARRIER FACING. PROVIDE WELD PINS AND VAPOR SEAL ALL JOINTS WITH TAPE.

   C) IN ADDITION, APPLY TWO (2) COATS OF WEATHERPROOF MASTIC AND EMBED INTO WET COAT TWO (2) LAYERS OF GLASS CLOTH OVER INSULATION JACKET. SMOOTH MEMBRANE TO AVOID WRINKLES AND OVERLAP ALL SEAMS AT LEAST 3". APPLY A SECOND COAT OF THE SAME COATING TO THE ENTIRE SURFACE. TOP CENTER OF RECTANGULAR DUCT SHALL PITCH TO EACH SIDE TO AVOID TRAPPING OF WATER IN THE CENTER.

2.04 ELECTRICAL WORK

A. GENERAL

1. ELECTRICAL POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACT; CONTROL WIRING SHALL BE BY THE HVAC CONTRACT. CONTROL WIRING SHALL BE DEFINED AS ANY 12V, 24V, OR 120V WIRING INSTALLED FOR PURPOSES OTHER THAN PROVIDING PRIMARY ELECTRICAL POWER TO EQUIPMENT.

2. MOTOR STARTERS AND VARIABLE FREQUENCY DRIVES (VFD) SHALL BE FURNISHED BY THE HVAC CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. REFER TO THE EQUIPMENT SECTION FOR VARIABLE FREQUENCY DRIVE SPECIFICATIONS.

3. DUCT MOUNTED SMOKE DETECTORS, WHERE REQUIRED, SHALL BE PROVIDED BY AD WIRED BY THE ELECTRICAL CONTRACTOR, AND MOUNTED BY THE HVAC CONTRACTOR.

4. ALL ELECTRICAL CONTROL WIRING SHALL COMPLY WITH LOCAL ELECTRICAL CODE, ALL AUTHORITIES HAVING JURISDICTION AND THE PROJECT ELECTRICAL SPECIFICATIONS.

5. MECHANICAL CONTRACTOR TO OBTAIN QUANTITY OF CONTROLLERS REQUIRED AND COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR ALL OPERATING REQUIREMENTS, INTERLOCKS AND CONNECTIONS FOR STARTERS.

6. THE MECHANICAL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL POINT-TO-POINT, COMPLETELY COORDINATED WIRING DIAGRAMS AND INDICATE ALL SOURCE POWER REQUIREMENTS AND ALL FIELD WIRING TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR.

7. WHERE EXISTING STARTERS ARE TO BE REUSED, THIS CONTRACTOR SHALL MAINTAIN ALL EXISTING CONTROL CONNECTIONS. WHERE NEW STARTERS ARE TO BE PROVIDED TO REPLACE EXISTING, THIS CONTRACTOR SHALL SURVEY THE EXISTING CONTROL CONNECTIONS AND PREPARE AN EXISTING CONTROL WIRING DIAGRAM PRIOR TO DEMOLITION FOR SUBMITTAL TO THE ENGINEER. THE NEW STARTERS SHALL BE PROVIDED WITH THE NECESSARY CONTACTS AND RELAYS REQUIRED TO RECONNECT THE EXISTING CONTROLS. PROVIDE ALL REQUIRED CONTACTS FOR UNIT START/STOP AND FIRE ALARM.

B. MOTORS:

1. MOTORS SHALL HAVE THE ELECTRICAL CHARACTERISTICS AS LISTED ON THE DRAWINGS. COORDINATE ALL REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR. ALL MOTORS SHALL COMPLY WITH NEMA MG-1 STANDARD AND SHALL BE OF THE HIGH EFFICIENCY TYPE AND MEET THE 1992 EPA ENERGY EFFICIENCY ACT AND UTILITY COMPANY REBATE REQUIREMENTS.

2. MOTORS FOR VARIABLE FREQUENCY DRIVES (VFD) SHALL BE INVERTED DUTY RATED, SUITABLE FOR USE WITH VARIABLE FREQUENCY DRIVES, AND SHALL COMPLY WITH NEMA MG-1 PART 31.40.4.2. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIREMENTS OF THE MOTOR AND VFD MANUFACTURER. PROVIDE A SHAFT GROUNDING RING FOR EACH MOTOR CONNECTED TO A VFD TO PROTECT BEARINGS FROM DAMAGE, AEGIS TYP AGR OR APPROVED EQUAL.

3. IF CONTRACTOR ELECTS TO SUBSTITUTE OR INCREASE MOTOR HORSEPOWER OVER THAT WHICH IS SPECIFIED, THE COST OF MOTOR AND ELECTRICAL CHANGES SHALL BE BORNE BY THIS CONTRACTOR.

F. STARTERS:

1. EACH MOTOR EXCEPT AS NOTED, SHALL BE PROVIDED WITH A COMBINATION FUSED DISCONNECT AND ACROSS-THE-LINE MAGNETIC STARTER WITH PUSHBUTTON STATIONS MOUNTED ON THE COVER. COORDINATE REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR. FOR AUTOMATICALLY OR REMOTELY CONTROLLED MOTORS, FURNISH HAND OFF AUTO (HOA) SELECTOR SWITCHES IN PLACE OF THE PUSH BUTTONS.

2. FURNISH MANUALLY OPERATED MOTOR STARTERS OF THE PROPER SIZE FOR ALL MOTORS LESS THAN 1/2 HP WHICH ARE NOT AUTOMATICALLY CONTROLLED. STARTERS FOR MOTORS 175 WATTS OR LESS SHALL CONSIST OF A SNAP SWITCH WITH THERMAL OVERLOAD PROTECTION WHERE SUCH PROTECTION IS NOT AN INTEGRAL PART OF THE MOTOR.

3. COMBINATION MAGNETIC STARTERS FOR ALL MOTORS SHALL HAVE THERMAL OVERLOAD, PILOT LIGHT, LOW VOLTAGE PROTECTION IN ALL THREE PHASES. INCLUDE A CONTROL TRANSFORMER FOR EACH MAGNETIC STARTER TO PROVIDE 120 VOLT CONTROL POWER WITH THREE (3) SETS OF SPARE NORMALLY CLOSED OR NORMALLY OPEN CONTACTS.

4. ALL STARTERS SHALL BE ASSEMBLED AND INTERNALLY WIRED WITH ALL DEVICES IN CONFORMANCE WITH NEMA STANDARDS.

5. DISCONNECT SWITCHES ARE PROVIDED BY THE ELECTRICAL CONTRACTOR IF NOT INTEGRAL WITH EQUIPMENT.

G. ENCLOSURES:

1. PROVIDE ENCLOSURES FOR STARTERS AND VFD'S SUITABLE FOR OPERATING ENVIRONMENT. ENCLOSURES SHALL BE NEMA 1 VENTILATED SHEETMETAL FOR INDOOR APPLICATION, NEMA 3R WITH ADDITIONAL GASKETED WEATHERPROOF RAINTIGHT ENCLOSURE OR EXPOSED OUTDOOR SERVICE OR INDOOR SERVICE EXPOSED TO MOISTURE. PROVIDE DISCONNECT SWITCH ON ENCLOSURE AS REQUIRED FOR SERVICE.

2.05 VIBRATION ISOLATION PRODUCTS

A. FURNISH AND INSTALL ALL NECESSARY VIBRATION ISOLATORS, VIBRATION HANGERS, MOUNTING PADS, RAILS, ETC., TO ISOLATE VIBRATION AND SOUND FROM BEING TRANSMITTED TO THE BUILDING CONSTRUCTION. ALL VIBRATION ISOLATION PRODUCTS SHALL BE SPECIFICALLY DESIGNED FOR THEIR INTENDED USE.

B. MANUFACTURER OF VIBRATION ISOLATION EQUIPMENT SHALL HAVE THE FOLLOWING RESPONSIBILITIES:

1. DETERMINE VIBRATION ISOLATOR SIZES AND LOCATIONS.

2. PROVIDE SUITABLE PIPING AND EQUIPMENT VIBRATION ISOLATION SYSTEMS.

3. GUARANTEE SPECIFIED ISOLATION SYSTEM ATTENUATION AND DEFLECTION.

4. PROVIDE INSTALLATION INSTRUCTIONS, DRAWINGS AND FIELD SUPERVISION TO ASSURE PROPER INSTALLATION AND PERFORMANCE.

C. ISOLATION SYSTEMS SHALL BE MANUFACTURED BY MASON INDUSTRIES OR APPROVED EQUAL BY THE ENGINEER.

D. MOUNTING TYPES:

1. STATIC DEFLECTION OF ISOLATORS SHALL BE A MINIMUM OF 90% EFFICIENCY. PROVIDE CORROSION PROTECTION FOR EQUIPMENT MOUNTED OUTDOORS.

2. FLOOR AND ROOF MOUNTING OF FACTORY ASSEMBLED AIR HANDLING UNITS, AIR CONDITIONING UNITS, HEAT EXCHANGERS AND CONDENSING UNITS - SPRING ISOLATORS (ROOF EQUIPMENT TYPE SLR), OR (INDOOR EQUIPMENT TYPE SLF).

3. MOUNTING OF CEILING-SUPPORTED FANS, IN-LINE PUMPS, HEAT EXCHANGERS, AND AIR HANDLING UNITS - SPRING ISOLATORS - (TYPE DNHS).

4. ROOFTOP AC UNITS - SPRING ROOF CURB - TYPE RSC.

5. PROVIDE FLEXIBLE CONNECTIONS BETWEEN ALL FANS AND DUCTWORK (REFER TO DUCTWORK SECTION FOR SPECIFICATIONS).

2.07 TESTING AND BALANCING

A. GENERAL:

1. TESTING AND BALANCING WORK SHALL BE PERFORMED BY AN INDEPENDENT COMPANY (NOT ASSOCIATED WITH THE HVAC CONTRACTOR), AABC CERTIFIED OR AS APPROVED BY THE ENGINEER BEFORE COMMENCEMENT OF WORK. APPROVED COMPANIES INCLUDE MERENDINO ASSOCIATES, R.H. MCDERMOTT, INTERNATIONAL TESTING AND BALANCING OR AS APPROVED BY THE ENGINEER AND BUILDING MANAGEMENT.

2. AFTER ALL PROJECT HVAC WORK IS COMPLETE, TESTED, AND IN FULL WORKING ORDER, THE AGENCY SHALL PERFORM THE BALANCING AND TESTING OF THE PROJECT HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS.

3. UPON THE COMPLETION OF THE AIR CONDITIONING SYSTEM, THE BALANCING AGENCY SHALL PERFORM TESTING AND BALANCING AND COMPILE ALL TEST DATA IN A CERTIFIED REPORT AND SUBMIT FOUR (4) COPIES FOR REVIEW AND APPROVAL TO THE ENGINEER.

4. THE REPORT SHALL INCLUDE DESIGN AND ACTUAL READINGS FOR ALL EQUIPMENT AND LOCATION PLAN INDICATING WHERE ALL WORK HAS BEEN PERFORMED, AND METHODS OF BALANCING AND DETAILS OF INSTRUMENTS USED.

5. IF DISCREPANCIES EXIST IN THE REPORT THAT REQUIRE FIELD VERIFICATION, THE TESTING AND BALANCING COMPANY IN THE PRESENCE OF THE ENGINEER SHALL VISIT THE JOBSITE FOR FIELD VERIFICATION OF THE REPORT.

6. AFTER SUBMISSION OF THE FIELD VERIFIED BALANCING REPORT, THE AIR BALANCING COMPANY SHALL RETURN TO THE JOB SITE TO PERFORM TWO (2) OCCUPANT COMFORT BALANCES AS DIRECTED BY THE OWNER OR ENGINEER.

7. THE FINAL REPORT AFTER THE COMFORT BALANCE IS TO BE INCLUDED IN PROJECT OPERATING AND MAINTENANCE MANUAL.

8. THE TESTING AND BALANCING AGENCY SHALL INCLUDE AS PART OF THEIR WORK AN EXTENDED WARRANTY OF 90 DAYS AFTER COMPLETION OF TEST AND BALANCE WORK. THE ENGINEER AT HIS DISCRETION DURING THE WARRANTY PERIOD MAY REQUEST A RECHECK OR RESETTING OF ANY EQUIPMENT. THE MECHANICAL CONTRACTOR AND THE BALANCING CONTRACTOR SHALL PROVIDE THE NECESSARY TECHNICIANS TO FACILITATE THIS WORK.

9. THE BALANCING AGENCY SHALL PERMANENTLY MARK ALL ADJUSTMENT DEVICES (VALVES, DAMPERS, ETC.) TO ENABLE THE SETTING TO BE RESTORED.

10. HVAC CONTRACTOR SHALL ARRANGE FOR THE AUTOMATIC CONTROLS SUBCONTRACTOR TO BE ONSITE DURING BALANCING TO ADJUST, MONITOR, AND CALIBRATE SYSTEM OPERATION AS NEEDED TO FACILITATE BALANCING.

11. BALANCER SHALL IMMEDIATELY NOTIFY HVAC CONTRACTOR IF BALANCING SCOPE CANNOT BE COMPLETED DUE TO MALFUNCTIONING EQUIPMENT OR INCOMPLETE INSTALLATIONS. HVAC CONTRACTOR SHALL PERFORM CORRECTIVE WORK SO THAT THE BALANCER CAN COMPLETE BALANCING SCOPE AND SUBMIT A COMPLETE REPORT. IF CORRECTIVE WORK CANNOT BE COMPLETED, HVAC CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR VIA RFI FOR DISTRIBUTION TO ENGINEER.

12. AS PART OF THE BALANCING REPORT, PROVIDE FLOOR PLANS WITH A UNIQUE TAG FOR EACH DEVICE FOR WHICH AIRFLOW OR WATER FLOW WAS MEASURED. THESE TAGS SHALL USED IN THE REPORT FOR IDENTIFICATION.

13. AS PART OF THE BALANCING REPORT, PROVIDE A COVER LETTER IDENTIFYING ALL SYSTEMS THAT COULD NOT BE BALANCED TO DESIGN FLOWS, AND REASONS THAT FLOWS COULD NOT BE ACHIEVED.

B. AIR BALANCING

1. HVAC CONTRACTOR SHALL ENSURE THAT A FIRST SET OF AIR FILTERS ARE IN PLACE, WHENEVER FANS ARE RUNNING AND REPLACED WITH A NEW CLEAN SET OF FILTERS BEFORE TESTING IS COMMENCED.

2. TEST, ADJUST, REPLACE SHEAVES, REPLACE BELTS, AND BALANCE ALL EQUIPMENT AND AIR DISTRIBUTION SYSTEMS TO PROVIDE AIR QUANTITIES INDICATED ON PLANS WITHIN PLUS OR MINUS (10) PERCENT FOR INDIVIDUAL AIR INLETS AND OUTLETS AND (5) PERCENT FOR EQUIPMENT AND SYSTEMS.

3. TEST REPORT SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:

   A) FLOW, LEAKAGE CLASS, TEMPERATURE, STATIC PRESSURE OF AIR AT ALL TRUNK DUCTS SERVING AREAS OF WORK.

   B) TEMPERATURE OF AIR LEAVING OUTLETS AT TWO (2) TYPICAL AIR OUTLETS FOR EACH SYSTEM.

   C) QUANTITY OF AIR AT EACH AIR INLET AND OUTLET AFTER BALANCING.

   D) PROVIDE FOR ALL FANS: FAN MOTOR HP, AMPS, VOLTS, FAN RPM, CFM, INLET AND DISCHARGE STATIC PRESSURE, SHEAVE POSITION. TOTAL AIRFLOWS SHALL BE DETERMINED BY DUCT TRAVERSE, NOT SUM OF CONNECTED AIR INLETS OR OUTLETS. INCLUDE A FLOW DIAGRAM FOR EACH FAN IN THE REPORT.

   E) PROVIDE FOR ALL AIR CONDITIONING UNITS AND AIR HANDLING UNITS: SUPPLY AIR CFM, OUTSIDE AIR CFM, RETURN AIR CFM, AND SPILL AIR CFM. TOTAL AIRFLOWS SHALL BE DETERMINED BY DUCT TRAVERSE, NOT SUM OF CONNECTED AIR INLETS OR OUTLETS. INCLUDE A FLOW DIAGRAM FOR EACH AIR SYSTEM IN THE REPORT. PLACE UNITS INTO OCCUPIED MODE (WITH AIRSIDE ECONOMIZER AND DEMAND CONTROLLED VENTILATION DISABLED) FOR AIRFLOW TESTING. PROVIDE OUTSIDE AIR, MIXED AIR, RETURN AIR, AND SUPPLY AIR TEMPERATURES (DRY BULB - COOLING AND HEATING, WET-BULB-COOLING). FOR UNITS WITH AIRSIDE ECONOMIZER, REPEAT AIRFLOW TESTING WITH UNIT PLACED INTO 100% AIRSIDE ECONOMIZER MODE.

   F) CALIBRATE ALL NEW AND EXISTING TO BE REUSED TERMINAL BOXES (VAV, FAN POWERED, OR DUAL DUCT) AS REQUIRED TO MEET SPECIFIED MINIMUM/MAXIMUM CFM.

   G) LIST DESIGN AND ACTUAL READINGS AS WELL AS ALL MANUFACTURER'S DATA FOR EQUIPMENT.

2.08 EQUIPMENT

A. PROVIDE ALL EQUIPMENT AND ACCESSORIES OF THE SIZES AND CAPACITIES AS SCHEDULED AND AS INDICATED ON THE DRAWINGS.

B. INSTALL EQUIPMENT IN ACCORDANCE WITH APPROVED SHOP DRAWINGS, MANUFACTURER'S RECOMMENDATIONS, INSTRUCTIONS, AND ALL AUTHORITIES HAVING JURISDICTION.

C. PROVIDE EQUIPMENT SUPPORTS AND/OR MOUNTINGS AS INDICATED ON THE DRAWING, IN VIBRATION SPECIFICATION AND AS FOLLOWS:

1. ROOF MOUNTED EQUIPMENT - PROVIDE PRE-FABRICATED ISOLATED ROOF CURB WITH INTEGRAL VIBRATION ISOLATORS.

2. CEILING MOUNTED EQUIPMENT - PROVIDE SUPPORTS WITH APPROVED SUITABLE ANCHORS SUSPENDED DIRECTLY FROM BUILDING STEEL STRUCTURE.

3. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED TO ADEQUATELY SUPPORT THE EQUIPMENT LOAD.

D. EQUIPMENT SHALL BE INSTALLED WITH VIBRATION ISOLATION, REFER TO VIBRATION ISOLATION SECTION.

E. DIFFUSERS, GRILLES AND REGISTERS

1. GENERAL

   A) GRILLES, REGISTERS AND DIFFUSERS SHALL BE TESTED IN ACCORDANCE WITH ASHRAE STANDARD 70-1991 OR LATEST EDITION. THE MANUFACTURER SHALL PROVIDE PUBLISHED PERFORMANCE DATA FOR ALL AIR INLETS AND OUTLETS TO BE USED ON PROJECT AS PART OF THE SUBMISSION.

   B) THE MECHANICAL CONTRACTOR TO COORDINATE THE LOCATION OF DIFFUSERS, GRILLES AND REGISTERS WITH OTHER TRADES AND WITH CEILING AND WALL CONSTRUCTION. THE MECHANICAL CONTRACTOR IS TO VERIFY THAT ALL DIFFUSERS, GRILLES AND REGISTERS ARE COMPATIBLE WITH CEILING CONSTRUCTION TO WHICH THEY ARE TO BE INSTALLED.

   C) COORDINATE ALL WORK WITH THE GENERAL CONTRACTOR AND REFER TO THE ARCHITECTURAL DRAWINGS FOR THE EXACT LOCATION, LENGTHS AND FOR FRAMING AND MITERING ARRANGEMENTS THAT MAY DIFFER FROM THOSE SHOWN ON HVAC DRAWINGS. PROVIDE ALL REQUIRED GENERAL CONSTRUCTION, FRAMING, BLOCKING, PLASTERING AND SUPPORTS TO MATCH CEILING, SOFFIT OR WALL CONSTRUCTION AS PART OF THE PROJECT.

   D) INLETS AND OUTLETS SHALL HANDLE AIR QUANTITIES INDICATED AT OPERATING VELOCITIES WITH SOUND PRESSURE LEVEL NOT TO EXCEED NC-30, UNLESS NOTED OTHERWISE.

   E) DIFFUSERS, GRILLES AND REGISTERS SHALL BE INSTALLED WITH FACES SET LEVEL AND PLUM AND MOUNTED TIGHTLY AGAINST MOUNTING SERVICE.

   F) ALL AIR INLETS AND OUTLETS SHALL BE STEEL OR ALUMINUM CONSTRUCTION. USE ALUMINUM FOR APPLICATIONS EXPOSED TO MOISTURE. FINISHES TO BE SELECTED BY THE ARCHITECT.

   G) DIFFUSERS, GRILLES AND REGISTERS SHALL BE MANUFACTURED BY TITUS, PRICE, ANEMOSTAT OR APPROVED EQUAL.

   H) SUBMIT FOR APPROVAL A COMPLETE SCHEDULE OF ALL AIR INLETS AND OUTLETS TO BE USED ON PROJECT INCLUDING MANUFACTURER'S MODELS, SIZES, PERFORMANCES, ACCESSORIES, ACOUSTIC INFORMATION, FINISHES, ETC., BEFORE RELEASE FOR FABRICATION. NOTE ANY DEVIATIONS FROM SPECIFICATIONS AND SCHEDULES SHALL BE INDICATED ON SUBMITTAL.

2. AIR INLET AND OUTLET DEVICES:

   A) PROVIDE DIFFUSERS, GRILLES AND REGISTERS FOR SUPPLY, RETURN AND EXHAUST INLETS AND OUTLETS, OF THE SIZE, TYPE AND DESIGN INDICATED ON DRAWINGS.

   B) ALL CEILING DIFFUSERS SHALL BE PROVIDED WITH EQUALIZING GRIDS.

   C) ALL SUPPLY, RETURN, AND EXHAUST AIR REGISTERS SHALL BE PROVIDED WITH AN OPPOSED BLADE DAMPER.

   D) SUPPLY REGISTERS SHALL HAVE TWO SETS OF DIRECTIONAL CONTROL BLADES.

   E) ONLY 4-WAY DIFFUSERS SHALL BE USED. PROVIDE BLANK-OFF SHEETMETAL BAFFLE FOR ALL 1-WAY, 2-WAY AND 3-WAY DIFFUSERS.

   F) ALL LINEAR DIFFUSERS SHALL BE PROVIDED WITH CABLE OPERATED OPPOSED BLADE DAMPER ADJUSTABLE THROUGH THE FACE OF THE DIFFUSER. DAMPERS AND PLENUM TAPS SHALL BE SPACED AT A MAXIMUM OF 4 FEET ON CENTER. PROVIDE DIFFUSERS WITH ADJUSTABLE AIR PATTERN CONTROL VALVES.

2.09 AUTOMATIC TEMPERATURE CONTROLS

A. GENERAL:

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Revision	By	Appd	YYYY.MM.DD
ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15
Issued	By	Appd	YYYY.MM.DD
File Name: N/A	JMR	JMR	KF	-
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Client/Project Logo

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Client/Project

NEW ROCHELLE

1923 BUILDING RENOVATION FLOWER PARK

491 5TH AVE,
NEW ROCHELLE, NY 10801

Title

MECHANICAL SPECIFICATIONS

Project No. 191506465

Scale NONE

Revision

Drawing No. **M-403**

1. FURNISH AND INSTALL AS HEREIN SPECIFIED, A COMPLETE AUTOMATIC TEMPERATURE CONTROL SYSTEM OF THE DIGITAL STANDALONE TYPE.

2. ALL TEMPERATURE CONTROL SYSTEMS AND COMPONENTS UNDER THIS SUBCONTRACT ARE TO BE FULLY MODULATING TYPE, EXCEPT WHERE NOTED OTHERWISE. THE SYSTEM SHALL BE COMPLETE IN ALL RESPECTS INCLUDING ALL ASSOCIATED CONTROL EQUIPMENT, THERMOSTATS, CONTROL VALVES, VALVE ACTUATORS, DAMPER OPERATORS, RELAYS, PILOT POSITIONERS, CONTROL WIRING, CONTROL AIR PIPING, SWITCHES, INTERLOCK WIRING, ELECTRICAL OR PNEUMATIC CONTROL COMPONENTS AND ASSOCIATED PIPING OR WIRING, APPURTENANCES, ETC., TO PROVIDE THE FUNCTIONS DESCRIBED IN THESE SPECIFICATIONS AND PLANS, REGARDLESS OF WHETHER OR NOT SAID DEVICE RELAY, ETC. IS SPECIFICALLY MENTIONED HEREAFTER.

3. THE SYSTEM SHALL BE SUPERVISED AND CHECKED OUT COMPLETELY IN ALL RESPECTS BY COMPETENT MECHANICS, REGULARLY EMPLOYED BY THE MANUFACTURER.

4. ALL CONTROLS MUST BE THE PRODUCT OF ONE MANUFACTURER. ALL AUTOMATIC CONTROL VALVES, SENSORS AND DAMPER OPERATORS SHALL BE MANUFACTURED BY THE TEMPERATURE CONTROL MANUFACTURER.

5. THE CONTROL SYSTEMS SHALL BE IN ACCORDANCE WITH THE FOLLOWING DESCRIPTION OF SYSTEM OPERATIONS AND/OR DETAIL INFORMATION SHOWN ON THE PLANS AND AS DESCRIBED HEREIN.

   A) THE MANUFACTURER OF THE AUTOMATIC CONTROL EQUIPMENT SHALL SUBMIT THE FOLLOWING FOR APPROVAL: A SCHEMATIC DIAGRAM OF EACH CONTROL SYSTEM WHICH SHALL INDICATE THE PROPER SEQUENCE OF OPERATION AND RANGE OF THE CONTROLS FOR ALL CYCLES. PROVIDE A COMPLETE DESCRIPTION OF THE AUTOMATIC OPERATION OF EACH SYSTEM. THE DESCRIPTION SHOULD INCLUDE THE DUTY OF EACH THERMOSTAT, VALVE, SWITCH, ETC., INCORPORATED IN THE CONTROL SYSTEM WITH A SCHEDULE AND ILLUSTRATION OF ALL CONTROL INSTRUMENTS AND EQUIPMENT INCLUDING CONTROL PANELS AND DEVICES FOR EACH SYSTEM.

B. ELECTRIC WIRING:

1. ALL ELECTRICAL WORK (EXCEPT FOR MOTOR FEEDERS, WIRING BETWEEN MOTORS, MOTOR CONTROLLERS, FEEDER PANELS, FUSES, CIRCUIT BREAKERS AND BUS BARS) REQUIRED FOR THE AUTOMATIC TEMPERATURE CONTROL SYSTEM SHALL BE PROVIDED BY THIS CONTRACTOR. WORK SHALL INCLUDE BUT NOT BE LIMITED TO TIME SWITCHES, DAMPER MOTORS, DAMPER SWITCHES, ELECTRIC THERMOSTATS, ELECTRIC RELAYS, E/P SWITCHES, INTERLOCKING WIRING, WIRE, CONDUIT, ETC.

2. ALL 115 VOLT POWER REQUIRED FOR CONTROL PURPOSES SHALL BE PROVIDED BY THE CONTROL CONTRACTOR FROM A SOURCE ESTABLISHED BY THE ELECTRICAL CONTRACTOR.

3. THE CONTROL MANUFACTURER SHALL INCLUDE WIRING DIAGRAMS IN HIS SHOP DRAWINGS SUBMITTALS FULLY COORDINATED WITH THE ELECTRICAL CONTRACTOR'S WORK. IT SHALL BE THE AUTOMATIC TEMPERATURE CONTROL CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL WIRING AND CONDUIT AS REQUIRED TO ACHIEVE THE FUNCTION CALLED FOR IN THESE SPECIFICATIONS, CONFORMING WITH LOCAL CODES FOR MATERIAL AND INSTALLATION. THE ELECTRICAL SPECIFICATION FOR THE PROJECT'S ELECTRICAL WORK IS TO BE FOLLOWED.

4. FURNISH A CERTIFICATE INDICATING THE METHOD OF WIRING COMPLIANCE WITH LOCAL CODES AS PART OF THE FIRST SHOP DRAWING SUBMITTAL.

D. ROOM THERMOSTAT AND SWITCH LOCATIONS:

1. ALL ROOM THERMOSTATS AND SWITCH LOCATIONS (WHETHER SHOWN ON PLANS OR NOT) SHALL BE SELECTED AND SUBMITTED BY THE TEMPERATURE CONTROL MANUFACTURER FOR APPROVAL BY THE ARCHITECT AND ENGINEER PRIOR TO ACTUAL INSTALLATION.

2. EACH PROGRAMMABLE THERMOSTAT SHALL BE CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES PER WEEK AND RETAINING THEIR PROGRAMMING AND TIME SETTING DURING LOSS OF POWER FOR AT LEAST 10 HOURS.

3. THE PROGRAMMABLE THERMOSTAT SHALL BE CAPABLE OF MANUAL OVERRIDE THAT ALLOWS TEMPORARY OPERATION OF THE SYSTEM FOR UP TO 2–HOURS.

4. EACH PROGRAMMABLE THERMOSTAT SHALL INCLUDE MANUAL SET POINT ADJUSTMENT BY THE ROOM OCCUPANT.

5. HEATING AND COOLING THERMOSTATS SHALL BE PROVIDED WITH A TEMPERATURE RANGE OR DEADBAND OF AT LEAST 3°F.

6. COLOR SHALL BE WHITE, UNLESS OTHERWISE NOTED.

7. LABEL EACH THERMOSTAT AND SWITCH WITH THE BMS DESGINATION FOR THE EQUIPMENT SERVED (I.E. VAV–3–7).

E. AUTOMATIC DAMPERS:

1. PROVIDE CONTROLS FOR ALL THE AUTOMATIC DAMPERS, AS SPECIFIED IN THE DUCTWORK SECTION, AND SHOWN ON THE DRAWINGS.

2. CONTROL MOTORS OR ACTUATORS SHALL BE OF THE ELECTRONIC OR PNEUMATIC TYPE, UNLESS OTHERWISE NOTED, OF APPROPRIATE SIZES AND QUANTITIES TO PROVIDE TWO–POSITION OR PROPORTIONING CONTROL ACTION AS SPECIFIED. PROPORTIONING TYPE SHALL BE EQUIPPED WITH PILOT TYPE POSITIONERS. PILOT POSITIONERS SHALL BE SELECTED FOR VARIED SPRING RANGES AND ADJUSTABLE WITHOUT DISMANTLING POSITIONER AND CONTROL MOTOR.

3. AUTOMATIC DAMPERS EXPOSED TO THE ELEMENTS SHALL HAVE ELECTRIC ACTUATORS WITH ALL REQUIRED ACCESSORIES.

F. SEQUENCE OF OPERATIONS:

1. GENERAL

   A) ALL SAFETY DEVICES SHALL BE HARDWIRED TO THE MOTOR CONTROLLER.

   B) ALARMING DEVICES SHALL BE WIRED SO THAT CONTACTS ARE OPEN IN THE ALARM CONDITION.

   C) ALL CONTROL DEVICES EXPOSED TO OUTDOOR AIR CONDITIONS SHALL BE SPECIFICALLY DESIGNED BY MANUFACTURER FOR OUTSIDE AIR CONDITIONS, INCLUDING BUT NOT LIMITED TO WEATHERPROOF NEMA 3R ENCLOSURES.

   D) WHEN A MOTOR CONTROLLER IS EQUIPPED WITH A HAND–OFF–AUTO (HOA) SWITCH, THE MOTOR SHALL ONLY BE CONTROLLED BY EXTERNAL SIGNAL WHEN THE SWITCH IS IN THE 'AUTO' POSITION.

   E) PRESSURE SAFETIES, INTERLOCKED DAMPERS, FREEZESTATS, FIRE ALARM SYSTEM DEVICES, ETC. SHALL BE HARDWIRED TO THE MOTOR CONTROLLER TO SHUT DOWN MOTORS WHEN THE HOA IS IN 'HAND' AND 'AUTO' POSITIONS. OVERRIDE OF SAFETIES SHALL NOT BE POSSIBLE, EXCEPT FOR FIRE ALARM SYSTEM OVERRIDE OF FREEZESTATS FOR SMOKE CONTROL FUNCTIONS.

   F) WHERE FANS AND DAMPERS ARE TO BE HARDWIRE INTERLOCKED, PROVIDE CONTROL WIRING BETWEEN THE FAN MOTOR TERMINAL STRIP AND DAMPER, SUCH THAT THE DAMPER MUST BE OPEN, AS DETECTED BY AN END SWITCH, BEFORE THE MOTOR IS ENERGIZED. HARDWIRE INTERLOCK SHALL FUNCTION WHEN THE MOTOR CONTROLLER HOA SWITCH IS IN 'HAND' AND 'AUTO' POSITIONS.

   G) THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL POINTS, DEVICES, SENSORS, AND CONTROL WIRING NECESSARY TO ACCOMPLISH THE SPECIFIED SEQUENCES OF OPERATIONS. ALL POINTS REQUIRED TO PROVIDE THE SEQUENCE OF OPERATIONS SHALL BE INCLUDED IN THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR 'S BID AS IF LISTED.

   H) IN THE CASE OF A DISCREPANCY, THE WORST CASE OR HIGHEST COST SHALL APPLY FOR BIDDING PURPOSES. THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCY VIA RFI PRIOR TO PERFORMING THE ASSOCIATED WORK.

2. DX SPLIT SYSTEM HEAT PUMPS AND AIR CONDITIONING UNITS

   A) THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL MOUNT AND WIRE ALL CONTROL COMPONENTS THAT ARE SHIPPED WITH THE UNIT THAT ARE NOT FACTORY INSTALLED. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, THE MANUFACTURER–SUPPLIED WALL MOUNTED TEMPERATURE SENSOR, WALL–MOUNTED CONTROLLER, ETC.

   B) THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL FURNISH, MOUNT, AND WIRE ANY ADDITIONAL COMPONENTS NOT PROVIDED BY THE UNIT MANUFACTURER TO ACHIEVE A COMPLETELY OPERATIONAL SYSTEM. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, ANY DEVICES REQUIRED TO INTERFACE TO THE UNIT.

   C) THE AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE A LEAK DETECTOR IN THE EXTERNAL DRIP PAN BELOW EACH UNIT.

      1) LEAK DETECTOR SHALL BE HARDWIRE INTERLOCKED TO SHUT DOWN THE AC UNIT COMPRESSOR.

   D) A 'COMMON ALARM' DRY CONTACT OUTPUT AT THE UNIT SHALL BE HARDWIRED BY AUTOMATIC TEMPERATURE CONTROLS CONTRACTOR TO A DRY CONTACT AT THE TENANT'S SECURITY PANEL. COORDINATE SPECIFIC DRY CONTACT WITH THE SECURITY CONTRACTOR.

   E) THE UNIT SHALL OPERATE AS PER THE MANUFACTURER PROVIDED CONTROLS AND SEQUENCE OF OPERATION DESCRIBED BELOW. PROVIDE ALL NECESSARY PROGRAMMING FOR THE MANUFACTURER'S PACKAGED CONTROLS, INCLUDING SPACE TEMPERATURE HEATING/COOLING OCCUPIED/UNOCCUPIED SETPOINTS IN AND OCCUPANCY SCHEDULES.

   F) DURING OCCUPIED HOURS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY, COOLING SETPOINT SHALL BE 75°F (ADJ), AND HEATING SETPOINT SHALL BE 75°F (ADJ).

   G) DURING UNOCCUPIED HOURS, THE SUPPLY FAN SHALL CYCLE UPON CALL FOR COOLING OR HEATING BUT OTHERWISE BE OFF, COOLING SETPOINT SHALL BE 85°F (ADJ), AND HEATING SETPOINT SHALL BE 65°F (ADJ).

   H) FOR ANY HEAT PUMPS AND AIR CONDITIONING UNITS WITH OUTSIDE AIR INTAKE DUCTWORK, PROVIDE A MOTORIZED DAMPER IN THE OUTSIDE AIR DUCT, HARDWIRE INTERLOCKED TO OPEN WHEN THE SUPPLY FAN IS RUNNING AND OTHERWISE CLOSE. THE ACTUATOR TYPE SHALL BE POWERED OPEN, FAIL CLOSED.

3. TOILET EXHAUST FANS

   A) UNIT SHALL BE PROVIDED WITH PROGRAMMABLE TIME CLOCK

4. FIRST FLOOR LOCKER EXHAUST FAN

   A) UNIT SHALL BE PROVIDED WITH PROGRAMMABLE TIME CLOCK

5. INLINE DIRECT FIRED HEATER

   A) UNITS SHALL BE PROVIDED WITH PROGRAMMABLE TIME CLOCK

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ISSUED FOR REBID	JMR	KF	2022.01.12
ISSUED FOR BID	JMR	KF	2020.01.15
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File Name: N/A	JMR Dwn.	JMR Dsgn.	KF Chkd.	- YYYY.MM.DD

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