GENERAL MECHANICAL NOTES

1. ALL NOTES, ABBREVIATIONS AND SYMBOLS ON THIS DRAWING APPLY TO ALL THE MECHANICAL DRAWINGS IN THIS PACKAGE.
2. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL MATERIAL, CONSTRUCTION, WORKMANSHIP, TESTING AND COMMISSIONING REQUIREMENTS. WHERE A CONFLICT EXISTS BETWEEN THE SPECIFICATION AND PROJECT DRAWINGS THE MORE STRINGENT REQUIREMENT SHALL APPLY.
3. ALL MECHANICAL WORK TO BE DONE IN ACCORDANCE WITH THE GENERAL CONTRACTORS PHASING PLAN.
4. VERIFY EQUIPMENT TO BE REMOVED WITH BUILDING OWNER BEFORE COMMENCING DEMOLITION. DISPOSE OF ALL DEMOLITION DEBRIS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS. WHERE CONNECTING PIPE AND DUCT ARE TO REMAIN, CAP BEHIND FINISHED SURFACE. INFILL AND PATCH TO MATCH ADJACENT SURFACE.
5. ALL MECHANICAL WORK TO BE DONE IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE - 2009 EDITION AND ITS ADDENDUMS, SMACNA DUCT CONSTRUCTION STANDARDS - 2005, SMACNA FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE - 2002, NFPA 90A - STANDARD FOR THE INSTALLATION OF VENTILATION AND AIR CONDITIONING SYSTEMS - 2009.
6. INSTALL ALL MECHANICAL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE CONFLICTS EXIST BETWEEN PROJECT DOCUMENTS AND MANUFACTURER'S RECOMMENDATIONS THE MORE STRINGENT REQUIREMENT SHALL APPLY.
7. THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY DAMAGE CAUSED BY THE MECHANICAL CONTRACTOR TO ANY NEW OR EXISTING BUILDING SYSTEMS.
8. COORDINATE INSTALLATIONS WITH THE GENERAL CONTRACTOR, STRUCTURAL, ELECTRICAL AND ARCHITECTURAL DESIGN. CONSULT STRUCTURAL ENGINEER BEFORE ANY MODIFICATIONS TO STRUCTURAL MEMBERS.
9. THE MECHANICAL DRAWINGS ARE DIAGRAMMATIC. THE EXACT LOCATION OF MECHANICAL EQUIPMENT AND SYSTEMS IS TO BE DETERMINED BY THE MECHANICAL CONTRACTOR.
10. PROVIDE TRANSITIONS AND OFFSETS AS REQUIRED TO ROUTE PIPING AND DUCT AROUND OTHER BUILDING SYSTEMS AND EQUIPMENT.
11. SEAL PENETRATIONS THROUGH PARTITIONS FOR SOUND. SEAL FIRE RATED PARTITIONS IN ACCORDANCE WITH UL APPROVED ASSEMBLY FOR THE ASSOCIATED FIRE RATING. PROVIDE FIRE DAMPER AND ASSOCIATED ACCESS DOOR WHERE FIRE DAMPERS ARE INDICATED ON THE MECHANICAL PLANS.
12. SEE DETAILS FOR TYPICAL INSTALLATIONS NOT SHOWN ON THE MECHANICAL PLANS.
13. ALL MECHANICAL DUCT AND PIPING IS TO BE CONCEALED IN WALLS , FLOORS AND CEILINGS UNLESS NOTED OTHERWISE. PROVIDE ACCESS PANELS WHERE REQUIRED TO ACCESS VALVES, DAMPERS, CONTROLS AND OTHER MAINTENANCE ITEMS.
14. COORDINATE MECHANICAL FLOOR, WALL AND ROOF PENETRATIONS WITH THE GENERAL CONTRACTOR.
15. PROVIDE EQUIPMENT, PIPING AND DUCTWORK INSULATION AS REQUIRED IN THE PROJECT SPECIFICATION.
16. PROVIDE HVAC CONTROLS AS REQUIRED IN THE PROJECT DOCUMENTS.

ABBREVIATIONS

AFF	ABOVE FLOOR FACE
BFF	BELOW FLOOR FACE
BFP	BACK FLOW PREVENTER
BTU	BRITISH THERMAL UNIT
BHP	BRAKE HORSEPOWER
BO	BOTTOM OF
CFM	CUBIC FEET PER MINUTE
CO	CLEAN OUT
COA	CONDITIONED OUTSIDE AIR
DB	DRY BULB
ESP	EXTERNAL STATIC PRESSURE
EA	EXHAUST AIR
F	DEGREE FAHRENHITE
FO	FUEL OIL
FCO	FLOOR CLEAN OUT
FPW	FIRE PROTECTION WATER
ERV	ENERGY RECOVERY VENTILATOR
ERVEXH	ENERGY RECOVERY VENTILATOR EXHAUST
HWR	HYDRONIC WATER RETURN
HWS	HYDRONIC WATER SUPPLY
MBH	1000 BTU PER HOUR
NGAS	NATURAL GAS
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAT	OUTDOOR AIR TEMPERATURE
PEX	CROSS LINKED POLYETHYLENE
RA	RELIEF AIR
SP	STATIC PRESSURE
TO	TOP OF
TSP	TOTAL STATIC PRESSURE
VRF	VARIABLE REFRIGERANT FLOW
WB	WET BULB
WC	WATER COLUMN

SYMBOLS

- CLEAN OUT
- PIPE CONTINUES
- PIPE OR DUCT CAP
- HYDRONIC SUPPLY
- HYDRONIC RETURN
- UNDERGROUND / UNDERSLAB PIPE
- SUPPLY DUCT
- RETURN DUCT
- SUPPLY DIFFUSER
- BLANKED OFF DIRECTION OF SUPPLY DIFFUSER
- RETURN GRILLE
- VOLUME DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- MODULATING MOTORIZED DAMPER
- TWO POSITION MOTORIZED DAMPER
- GRAVITY DAMPER
- PIPE DROP
- PIPE RISER
- BALL VALVE
- GATE VALVE
- CHECK VALVE
- RELIEF VALVE
- BALANCE VALVE
- CIRCULATION PUMP
- Y - STRAINER
- VACUUM BREAKER
- AUTOMATIC VENT
- THERMOMETER IN THERMOWELL
- PRESSURE GAUGE W/ PETCOCK
- PIPE REDUCER / INCREASER
- TIE-IN TO EXISTING SYSTEM
- CAP
- LOCKABLE VALVE
- DIFFUSER / RETURN TAG #
- DESIGN AIRFLOW IN CFM
- THERMOSTAT
- HUMIDITY SENSOR
- TEMPERATURE SENSOR
- SMOKE DETECTOR
- PRESSURE SENSOR
- CO2 SENSOR
- FLOW SENSOR
- PRESSURE REGULATOR
- MODULATING CONTROL VALVE
- TWO POSITION CONTROL VALVE
- BACK FLOW PREVENTER

CONTROL SEQUENCES

BUILDING SCHEDULE
BUILDING OCCUPIED AND UNOCCUPIED SCHEDULES SHALL BE SET AT THE BUILDING AUTOMATION SYSTEM HEAD THROUGH A 7 DAY, 24 HOUR SCHEDULING APPLICATION.

BOILERS
BOILER AND BOILER CIRCULATOR SHALL BE ACTIVATED WHENEVER OAT IS BELOW 40°F AND FIN TUBE, AIR HANDLER OR DUCT COIL CALLS FOR HEAT. BOILER SHALL MAINTAIN SUPPLY WATER TEMPERATURE THAT IS RESET ON A LINEAR SCALE BASED ON OUTDOOR TEMPERATURE. OAT = 40°F, HWS=140°F; OAT=20, HWS=170°F.
BOILER AND BOILER CIRCULATOR SHALL BE DEACTIVATED WHEN CALL FOR HEAT IS SATISFIED.

RTU-1
ROOF TOP UNIT SUPPLY FAN SHALL OPERATE WHEN BUILDING IS OCCUPIED OR THE THERMOSTAT CALLS FOR HEATING OR COOLING. FAN SHALL OPERATE AT 67% AIRFLOW UNLESS IN HEATING OR SECOND STAGE COOLING MODE.
ROOF TOP UNIT OUTDOOR AIR DAMPER SHALL OPEN TO MINIMUM POSITION WHEN BUILDING IS OCCUPIED.
UPON CALL FOR FIRST STAGE COOLING: RTU SHALL USE SELF CONTAINED ENTHALPY CONTROL TO DETERMINE IF ECONOMIZER COOLING IS AVAILABLE AND/OR START 1ST STAGE REFRIGERANT COMPRESSOR.
UPON CALL FOR 2ND STAGE COOLING: SUPPLY FAN WILL GO TO 100% AIRFLOW, RTU SHALL USE SELF CONTAINED ENTHALPY CONTROL TO DETERMINE IF ECONOMIZER COOLING IS AVAILABLE AND/OR START 2ND STAGE REFRIGERANT COMPRESSOR.
UPON CALL FOR 1ST STAGE HEATING: SUPPLY FAN SHALL GO TO 100% AIRFLOW AND GAS BURNER SHALL BE ACTIVATED AND MODULATE TO PROVIDE 85°F SUPPLY AIR.
UPON CALL FOR 2ND STAGE HEATING: GAS BURNER SHALL MODULATE TO PROVIDE 90°F SUPPLY.
SUPPLY FAN SHALL STOP UPON SA SMOKE SENSOR SIGNAL.

RTU-2, RTU-3, RTU-5
RTU SUPPLY FAN SHALL RUN WHENEVER THE BUILDING IS OCCUPIED OR THE THERMOSTAT CALLS FOR HEATING OR COOLING.
RTU OUTDOOR AIR DAMPER SHALL OPEN TO MINIMUM POSITION WHEN BUILDING IS OCCUPIED.
UPON THERMOSTAT CALL FOR COOLING: RTU SHALL USE IS SELF CONTAINED ENTHALPY CONTROL TO DETERMINE IF ECONOMIZER COOLING IS AVAILABLE AND/OR START REFRIGERANT COMPRESSOR.
WHEN OUTDOOR AIR TEMPERATURE IS BELOW 40°F, BUILDING IS OCCUPIED, THERMOSTAT IS NOT CALLING FOR COOLING: RTU DUCT COIL CONTROL VALVE SHALL MODULATE TO PROVIDE 72°F SUPPLY AIR.
UPON THERMOSTAT CALL FOR HEATING: DUCT COIL CONTROL VALVE SHALL MODULATE TO PROVIDE 85°F SUPPLY AIR. RTU-2, RTU-5: ASSOCIATE FINTUBE ZONE VALVE SHALL OPEN.
UPON FREEZESTAT SENSING COIL DISCHARGE TEMPERATURES BELOW 40°F. SUPPLY FAN SHALL BE SECURED AND CONTROL VALVE SHALL MODULATE TO FULL OPEN.
SUPPLY FAN SHALL STOP UPON SA SMOKE SENSOR SIGNAL.

RTU-4
ROOF TOP UNIT SUPPLY FAN SHALL OPERATE WHEN BUILDING IS OCCUPIED OR THE THERMOSTAT CALLS FOR HEATING OR COOLING. FAN SHALL OPERATE AT 67% AIRFLOW UNLESS IN HEATING OR SECOND STAGE COOLING MODE.
ROOF TOP UNIT OUTDOOR AIR DAMPER SHALL OPEN TO MINIMUM POSITION WHEN BUILDING IS OCCUPIED.
UPON CALL FOR FIRST STAGE COOLING: RTU SHALL USE SELF CONTAINED ENTHALPY CONTROL TO DETERMINE IF ECONOMIZER COOLING IS AVAILABLE AND/OR START 1ST STAGE REFRIGERANT COMPRESSOR.
UPON CALL FOR 2ND STAGE COOLING: SUPPLY FAN WILL GO TO 100% AIRFLOW. RTU SHALL USE SELF CONTAINED ENTHALPY CONTROL TO DETERMINE IF ECONOMIZER COOLING IS AVAILABLE AND/OR START 2ND STAGE REFRIGERANT COMPRESSOR.
UPON CALL FOR HEATING:SUPPLY FAN SHALL GO TO 100% AIRFLOW AND GAS BURNER SHALL BE ACTIVATED.
SUPPLY FAN SHALL STOP UPON SA SMOKE SENSOR SIGNAL.

AH-1 ARCHIVE VAULT HVAC
AIR HANDLER SUPPLY FAN SHALL OPERATE DURING OCCUPIED HOURS AND UPON CALL FOR HEATING, COOLING, HUMIDIFICATION OR DEHUMIDIFICATION.
UPON THERMOSTAT CALL FOR HEATING: AH HYDRONIC COIL CONTROL VALVE SHALL MODULATE TO PROVIDE 78°F SUPPLY AIR.
UPON THERMOSTAT CALL OF COOLING: AC-1 SHALL BE ENERGIZED. HUMIDIFIER SHALL BE LOCKED OUT.
UPON HUMIDISTAT CALL FOR HUMIDIFICATION: H-1 SHALL BE ENERGIZED UNLESS THERMOSTAT IS CALLING FOR COOLING.
UPON HUMIDISTAT CALL FOR DEHUMIDIFICATION: DH-1 SHALL BE ENERGIZED.
AH-1 SUPPLY FAN SHALL STOP UPON BUILDING FIRE ALARM.

VARIABLE REFRIGERANT FLOW HEAT PUMPS
HEAT PUMP IS IN HEATING OR COOLING MODE BASED ON POLL OF ASSOCIATED THERMOSTATS.
HEAT PUMP IS SECURED WHEN OUTDOOR TEMPERATURES DROP BELOW 8°F.
FANCOILS FAN RUN UPON CALL FOR HEATING OR COOLING.
FANCOILS FC-1, FC-11 AND FC-14 FAN RUNS DURING OCCUPIED HOURS AS WELL AS CALL FOR HEATING OR COOLING.
FANCOIL REFRIGERANT FLOW IS ACTIVATED WHEN THERMOSTAT CALLS FOR HEATING OR COOLING AND HEAT PUMP IS IN MATCHING MODE.

ERV-1, ERV-2, ERV-3
ERV SHALL OPERATE DURING OCCUPIED HOURS.

CIRCULATING PUMPS P-3, P-4
CIRCULATING PUMP SHALL OPERATE WHENEVER OUTDOOR TEMPERATURES ARE BELOW 40°F AND ANY ASSOCIATED THERMOSTAT OR DUCT COIL CALLS FOR HEAT.
CIRCULATING PUMPS SHALL MODULATE SPEED TO MAINTAIN SCHEDULED DIFFERENTIAL PRESSURE BETWEEN SUCTION MANIFOLD AND PUMP DISCHARGE.

FIN TUBE
FIN TUBE ZONE VALVE SHALL OPEN UPON SPACE THERMOSTAT CALL FOR HEATING.

MECHANICAL ROOM VENTILATION
MECHANICAL ROOM EXHAUST FAN EF-1 SHALL START AND INTAKE LOUVER L-1 SHALL OPEN WHEN SPACE TEMPERATURE IS OVER 80°F.
EF-1 SHALL STOP AND L-1 SHALL CLOSE WHEN SPACE TEMPERATURE DROPS BELOW THERMOSTAT DEADBAND (3°F +/-)

EF-1, EF-2, EF-4, EF-5
EXHAUST FANS SHALL OPERATE WHENEVER SPACE TEMPERATURE IS ABOVE THERMOSTAT SETTING.

L-1, L-4
LOUVERS SHALL OPEN WHENEVER ASSOCIATED EXHAUST FAN IS ENERGIZED.

EF-3
EF-3 SHALL OPERATE WHENEVER RESTROOM LIGHT IS ENERGIZED. EF-3 SHALL CONTINUE OPERATING FOR 10 MINUTES AFTER RESTROOM LIGHT IS DEENERGIZED.

STATE FIRE MARSHAL REVIEW
03/12/2018

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CITY OF PORTLAND DEPARTMENT HEADQUARTERS:

–Parks, Recreation & Facilities
–Public Works

RENOVATION PROJECT

212 Canco Road, Portland

STATE OF MAINE
ANDREW W. HOLBROOK
No. 9103
MARCH 12, 2018
LICENSED PROFESSIONAL ENGINEER

REVIEW SET

Scale: 1/8" = 1'–0"

HVAC NOTES, LEGENDS, ABBREVIATIONS AND SEQUENCE OF OPERATIONS

M1.0

March 12, 2018