Inspections Division
Date: 05/11/17

AIR SYSTEM SIZING RTU-1

Air System Information
Air System Name RTU-1
Equipment Class ..... PKG ROOF
Air System Type ..... SZCAV
Number of zones 1
Floor Area ..... 2340.0 ft²
Location ..... Portland, Maine

Sizing Calculation Information
Calculation Months ..... Jan to Dec
Sizing Data ..... Calculated
Zone CFM Sizing ..... Peak zone sensible load
Space CFM Sizing ..... Coincident space loads

Central Cooling Coil Sizing Data
Total coil load ..... 7.7 Tons
Total coil load ..... 92.1 MBH
Sensible coil load ..... 75.3 MBH
Coil CFM at Jul 1600 ..... 2985 CFM
Max block CFM ..... 2985 CFM
Sum of peak zone CFM ..... 2985 CFM
Sensible heat ratio 0.817
ft²/Ton 304.7
BTU/(hr·ft²) 39.4
Water flow @ 10.0 °F rise ..... N/A
Load occurs at ..... Jul 1600
OA DB / WB ..... 85.4 / 70.8 °F
Entering DB / WB ..... 77.0 / 63.3 °F
Leaving DB / WB ..... 53.6 / 52.4 °F
Coil ADP ..... 51.0 °F
Bypass Factor 0.100
Resulting RH ..... 46 %
Design supply temp. ..... 55.0 °F
Zone T-stat Check ..... 0 of 1 OK
Max zone temperature deviation ..... 0.3 °F

Central Heating Coil Sizing Data
Max coil load ..... 76.0 MBH
Coil CFM at Des Htg ..... 2985 CFM
Max coil CFM ..... 2985 CFM
Water flow @ 20.0 °F drop ..... N/A
Load occurs at ..... Des Htg
BTU/(hr·ft²) 32.5
Ent. DB / Lvg DB ..... 65.1 / 78.8 °F

Supply Fan Sizing Data
Actual max CFM ..... 2985 CFM
Standard CFM ..... 2978 CFM
Actual max CFM/ft² ..... 1.28 CFM/ft²
Fan motor BHP ..... 1.63 BHP
Fan motor kW ..... 1.30 kW
Fan static ..... 2.00 in wg

Outdoor Ventilation Air Data
Design airflow CFM ..... 515 CFM
CFM/ft² ..... 0.22 CFM/ft²
CFM/person ..... 16.50 CFM/person

VENTILATION SIZING RTU-1

1. Summary
Ventilation Sizing Method ..... Sum of Space OA Airflows
Design Ventilation Airflow Rate ..... 515 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
SALES (1)	1	1517.0	20.2	2356.0	7.50	0.12	0.0	0.0	333.7
SALES (2)	1	823.0	11.0	648.8	7.50	0.12	0.0	0.0	181.1
Totals (incl. Space Multipliers)				2984.7					514.8

AIR SYSTEM SIZING RTU-3

Air System Information
Air System Name RTU-3
Equipment Class ..... PKG ROOF
Air System Type ..... SZCAV
Number of zones 1
Floor Area ..... 2199.0 ft²
Location ..... Portland, Maine

Sizing Calculation Information
Calculation Months ..... Jan to Dec
Sizing Data ..... Calculated
Zone CFM Sizing ..... Peak zone sensible load
Space CFM Sizing ..... Coincident space loads

Central Cooling Coil Sizing Data
Total coil load ..... 6.5 Tons
Total coil load ..... 78.4 MBH
Sensible coil load ..... 65.9 MBH
Coil CFM at Aug 1500 ..... 2600 CFM
Max block CFM ..... 2600 CFM
Sum of peak zone CFM ..... 2600 CFM
Sensible heat ratio 0.841
ft²/Ton 336.5
BTU/(hr·ft²) 35.7
Water flow @ 10.0 °F rise ..... N/A
Load occurs at ..... Aug 1500
OA DB / WB ..... 86.0 / 71.0 °F
Entering DB / WB ..... 77.1 / 63.0 °F
Leaving DB / WB ..... 53.6 / 52.3 °F
Coil ADP ..... 51.0 °F
Bypass Factor 0.100
Resulting RH ..... 45 %
Design supply temp. ..... 55.0 °F
Zone T-stat Check ..... 0 of 1 OK
Max zone temperature deviation ..... 0.6 °F

Central Heating Coil Sizing Data
Max coil load ..... 57.4 MBH
Coil CFM at Des Htg ..... 2600 CFM
Max coil CFM ..... 2600 CFM
Water flow @ 20.0 °F drop ..... N/A
Load occurs at ..... Des Htg
BTU/(hr·ft²) 26.1
Ent. DB / Lvg DB ..... 56.8 / 77.3 °F

Supply Fan Sizing Data
Actual max CFM ..... 2600 CFM
Standard CFM ..... 2594 CFM
Actual max CFM/ft² ..... 1.18 CFM/ft²
Fan motor BHP ..... 1.42 BHP
Fan motor kW ..... 1.13 kW
Fan static ..... 2.00 in wg

Outdoor Ventilation Air Data
Design airflow CFM ..... 402 CFM
CFM/ft² ..... 0.18 CFM/ft²
CFM/person ..... 20.42 CFM/person

VENTILATION SIZING RTU-3

1. Summary
Ventilation Sizing Method ..... Sum of Space OA Airflows
Design Ventilation Airflow Rate ..... 402 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
SALES (6)	1	971.0	12.9	979.1	7.50	0.12	0.0	0.0	213.6
CORR.	1	218.0	0.0	81.8	7.50	0.12	0.0	0.0	26.2
EMPLOYEE	1	350.0	1.8	588.6	7.50	0.12	0.0	0.0	55.1
OFFICE	1	70.0	2.0	423.1	5.00	0.06	0.0	0.0	14.2
RESTROOMS	1	364.0	0.0	227.7	7.50	0.12	0.0	0.0	43.7
SALES (5)C	1	225.0	3.0	299.7	7.50	0.12	0.0	0.0	40.6
Totals (incl. Space Multipliers)				2600.1					402.3

AIR SYSTEM SIZING RTU-2

Air System Information
Air System Name RTU-2
Equipment Class ..... PKG ROOF
Air System Type ..... SZCAV
Number of zones 1
Floor Area ..... 2886.0 ft²
Location ..... Portland, Maine

Sizing Calculation Information
Calculation Months ..... Jan to Dec
Sizing Data ..... Calculated
Zone CFM Sizing ..... Peak zone sensible load
Space CFM Sizing ..... Coincident space loads

Central Cooling Coil Sizing Data
Total coil load ..... 7.7 Tons
Total coil load ..... 92.4 MBH
Sensible coil load ..... 71.8 MBH
Coil CFM at Aug 1500 ..... 2704 CFM
Max block CFM ..... 2704 CFM
Sum of peak zone CFM ..... 2704 CFM
Sensible heat ratio 0.777
ft²/Ton 374.8
BTU/(hr·ft²) 32.0
Water flow @ 10.0 °F rise ..... N/A
Load occurs at ..... Aug 1500
OA DB / WB ..... 86.0 / 71.0 °F
Entering DB / WB ..... 78.3 / 64.3 °F
Leaving DB / WB ..... 53.6 / 52.4 °F
Coil ADP ..... 50.9 °F
Bypass Factor 0.100
Resulting RH ..... 46 %
Design supply temp. ..... 55.0 °F
Zone T-stat Check ..... 0 of 1 OK
Max zone temperature deviation ..... 0.7 °F

Central Heating Coil Sizing Data
Max coil load ..... 76.1 MBH
Coil CFM at Des Htg ..... 2704 CFM
Max coil CFM ..... 2704 CFM
Water flow @ 20.0 °F drop ..... N/A
Load occurs at ..... Des Htg
BTU/(hr·ft²) 26.4
Ent. DB / Lvg DB ..... 49.9 / 76.0 °F

Supply Fan Sizing Data
Actual max CFM ..... 2704 CFM
Standard CFM ..... 2698 CFM
Actual max CFM/ft² ..... 0.94 CFM/ft²
Fan motor BHP ..... 1.48 BHP
Fan motor kW ..... 1.17 kW
Fan static ..... 2.00 in wg

Outdoor Ventilation Air Data
Design airflow CFM ..... 682 CFM
CFM/ft² ..... 0.24 CFM/ft²
CFM/person ..... 19.82 CFM/person

VENTILATION SIZING RTU-2

1. Summary
Ventilation Sizing Method ..... Sum of Space OA Airflows
Design Ventilation Airflow Rate ..... 604 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
SALES (3)	1	707.0	9.4	394.7	7.50	0.12	0.0	0.0	155.5
SALES (4)	1	1097.0	14.6	1257.3	7.50	0.12	0.0	0.0	241.3
SALES (5)A	1	550.0	7.3	627.7	7.50	0.12	0.0	0.0	121.0
SALES (5)B	1	225.0	3.0	299.7	7.50	0.12	0.0	0.0	49.5
EXIT CORR.	1	307.0	0.0	124.6	7.50	0.12	0.0	0.0	36.8
Totals (incl. Space Multipliers)				2704.0					604.2

AIR SYSTEM SIZING RTU-4

Air System Information
Air System Name RTU-4
Equipment Class ..... PKG ROOF
Air System Type ..... SZCAV
Number of zones 1
Floor Area ..... 3027.0 ft²
Location ..... Portland, Maine

Sizing Calculation Information
Calculation Months ..... Jan to Dec
Sizing Data ..... Calculated
Zone CFM Sizing ..... Peak zone sensible load
Space CFM Sizing ..... Coincident space loads

Central Cooling Coil Sizing Data
Total coil load ..... 3.9 Tons
Total coil load ..... 47.3 MBH
Sensible coil load ..... 34.7 MBH
Coil CFM at Jul 1500 ..... 1210 CFM
Max block CFM ..... 1210 CFM
Sum of peak zone CFM ..... 1210 CFM
Sensible heat ratio 0.733
ft²/Ton 768.5
BTU/(hr·ft²) 15.6
Water flow @ 10.0 °F rise ..... N/A
Load occurs at ..... Jul 1500
OA DB / WB ..... 86.0 / 71.0 °F
Entering DB / WB ..... 80.2 / 66.8 °F
Leaving DB / WB ..... 53.6 / 52.4 °F
Coil ADP ..... 50.7 °F
Bypass Factor 0.100
Resulting RH ..... 44 %
Design supply temp. ..... 55.0 °F
Zone T-stat Check ..... 0 of 1 OK
Max zone temperature deviation ..... 1.4 °F

Central Heating Coil Sizing Data
Max coil load ..... 34.7 MBH
Coil CFM at Des Htg ..... 1210 CFM
Max coil CFM ..... 1210 CFM
Water flow @ 20.0 °F drop ..... N/A
Load occurs at ..... Des Htg
BTU/(hr·ft²) 11.5
Ent. DB / Lvg DB ..... 40.0 / 66.6 °F

Supply Fan Sizing Data
Actual max CFM ..... 1210 CFM
Standard CFM ..... 1207 CFM
Actual max CFM/ft² ..... 0.40 CFM/ft²
Fan motor BHP ..... 0.66 BHP
Fan motor kW ..... 0.53 kW
Fan static ..... 2.00 in wg

Outdoor Ventilation Air Data
Design airflow CFM ..... 477 CFM
CFM/ft² ..... 0.16 CFM/ft²
CFM/person ..... 31.50 CFM/person

VENTILATION SIZING RTU-4

1. Summary
Ventilation Sizing Method ..... Sum of Space OA Airflows
Design Ventilation Airflow Rate ..... 477 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
STOCKROOM	1	3027.0	15.1	1210.1	7.50	0.12	0.0	0.0	476.8
Totals (incl. Space Multipliers)				1210.1					476.8

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Firm Registration No. N/A
EEA Project No. 20166538

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PRELIMINARY DESIGN DOCUMENT
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Registrant's Name: MICHAEL N. HART
Serial No. 10907

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Dowtown Portland
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PROJECT #006-160335.00

ISSUED / REVISED	DATE
PRELIMINARY SET	09/08/16
LL COORDINATION SET	11/08/16
LL/PERMIT SET	11/21/16
BID SET	1/26/17
MSK-2	3/17/17

HVAC CALCULATIONS

M-003