Report By:

National TAB - Kansas City
1126 Swift St
N Kansas City, MO 64116

Report: **Test and Balance**
Date: **6/24/2022**

PROJECT

BEAUTIFUL SAVIOR (OLATHE, KS)

13145 S BLACKBOB RD
OLATHE, KS

Client
AIRTECH ENGINEERING

National TAB

Project: BEAUTIFUL SAVIOR (OLATHE, KS)

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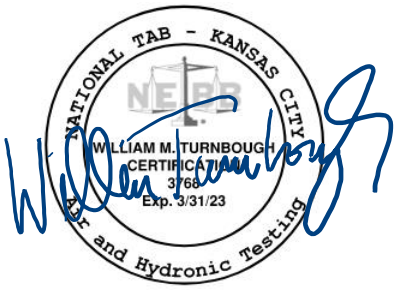


Certification Page

Assigned Organization: National TAB

Status: Not Submitted

Asset:

	The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems. Any variances from design quantities, which exceed NEBB tolerances, are noted in the Test-Adjust-Balance Report Project Summary.
	The air distribution system has been tested and balanced and final adjustments have been made in accordance with NEBB standards and the project specifications.
NEBB TAB FIRM:	National TAB - Kansas City
REGISTRATION NUMBER:	3768
CERTIFIED BY:	William Turnbough
DATE:	6/24/2022

Notes/Comments:

Project Summary

Facility Identification and TAB Requirements
The mechanical equipment to be tested, adjusted, and balanced includes: All Roof Top Units (RTU, All Fan Powered Boxes (FTUs), All Exhaust Fans (EF), and all associated air devices.

Variable Volume RTU's
Prior to balancing, the RTU's serving these boxes were first examined on the roof to ensure that they were in satisfactory operating condition. I.e., filters clean, coils clean, blowers free of debris, and belts tight, OA opened to approximate position. The static pressure setpoint was then set appropriately so that calibration of the boxes could begin. The FTU's were calibrated in a call for max cooling and the correction factors are reported on the individual asset. While in a call for full cooling, the individual air devices were then balanced within design tolerance. The FTUs were then stroked to minimum cool and the airflow values reported. The FTU was then stroked to heating and the airflow values reported. It was verified that there was a sufficient temp rise on each FTU. The procedure for calibrating the maximum and minimum is identical for the parallel fan powered boxes. During heating mode, the fan was balanced using the provided speed controller. The flashing lights on the box correspond to a percentage on the dial and this value was reported on the individual asset.

After all FTU's calibration was completed, set up of the RTU's began. The RTU's have no diversity and in the case for RTU-1, the unit is scheduled for more airflow than the outlets total. So to test total flow for the RTU's the FTU'S on that particular unit were all stroked to maximum cooling. A total traverse was taken on the unit and compared to the sum of the FTU airflows shown on the front end. If any discrepancy was found, troubleshooting steps were taken to resolve or determine the cause. The airflow was then balanced within +/-10% of the design airflow using the VFD's at the unit. Outside airflow was then balanced using a velgrid times the free area of the opening at the unit. Performance data was gathered at this time. The relief fan was then tested by positioning the outside air damper 100% open and closing the return damper. The airflow was measured in the space either by total traverse or velocity times free area calculation at the inlet. Once these tests were completed, the overides were then released.

Constant Volume RTU's
Each of the RTU's were measured at their terminal devices utilizing a flow hood. The sum of these readings is equal to the total flow for that particular unit. The total flow of each RTU was then adjusted to +/-10% of the specified design. Each terminal diffuser was balanced to within +/-10% of the engineer's design volume utilizing the provided hand damper located at the takeoff of the main & branch trunk line(s). Any equipment that fell outside of this tolerance is noted throughout the report.

General Exhaust Fans
The general exhaust fans were measured by reading each air device with a flow hood. The total airflow for each fan is equivalent to the sum of these readings. Fan speed was then adjusted so that the airflow was within +/-10% of design. Each terminal device was balanced to within +/-10% of the design volume using the installed volume dampers. Any equipment that fell outside of this tolerance is noted throughout the report.

Remarks

[1] RTU-1 and RTU-2 fan speed is limited due to high duct static pressure limit in the unit. RTU-2 was able to achieve design airflow and all boxes are within tolerance during RTU setup. RTU-1 was only able to achieve 89.7 % of design on total airflow (7626 CFM out of 8500). During RTU setup the following boxes were out of design: FTU-11 is 396 out of 450 CFM (88%) with damper 100% open. FTU-12 is 860 out of 1050 CFM (81%) with damper 100% open. FTU-14 is 912 out of 1050 CFM (87%) with damper 100% open. FTU-11 is 1398 out of 1700 CFM (82%) with damper 100% open. All boxes were able to easily achieve design airflow during normal conditions and during calibration. The boxes listed above were only unable to achieve design airflow when all boxes were calling for max cooling. TAB and M.C. inspect duct and ensured no duct leakage and confirmed turning vanes are installed.

[2] RTU-3 and RTU-4 were able to achieve design airflow at 60HZ (95%/93% of design) and were maxed out on fan speed. At 60HZ RTU-3 motor sheave kept sliding off the shaft. TMI (Daikin Rep) limited RTU-3 to 45HZ and RTU-4 to

50HZ to a solution could be provided. Outside air setpoint were proportionally set low, so when unit can run at 60HZ the desired outside air cfm would be achieved.

[3] F-1 is at 1673 out of design 2000 CFM (84%). Fan speed is maxed out. All dampers were left 100% open to maximize airflow. Unit calls for 400 CFM of outside air. However, the drawings show no outside duct work attached to the unit.

[4] EF-1 and 2 are high on airflow. These are single speed fans with no speed adjustment.

System/Unit: AHU/RTU

Asset: RTU-1 AREA: FIRST FLOOR NORTH

Unit Data		
	Design	**Actual**
MFG	NA	DAIKIN
Model Num	NA-DD	DPS025AHMG2 DV-4
Serial Num	-	FB0U210201353
Configuration	HORIZONTAL	HORIZONTAL
Num OA Filters 1	-	3
OA Filter Size 1	-	37.5X20
Num OA Filters 2	-	NA
OA Filter Size 2	-	NA
Num PreFilter 1	-	9
PreFilter Size 1	-	18X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BALDOR
Frame	-	254T
Horsepower	15	15
Motor Rpm	-	1765
Phase	3	3
Rated Voltage	208	200
Rated Amperage	40.7	41
Service Factor	-	1.15

Test Data		
	Design	**Actual**
SF CFM	8500	8190
SF RPM	1763	1698
RA CFM	5447.7	4979
OA CFM	3052.3	3211
RL Voltage	-	198 VFD
RL Amperage	-	28.1 VFD
VFD Max SetPt	-	58.0 HZ
SF System SetPt	-	1.7"
OA Damper Position	-	15%

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.74”
Fan Suction SP	-	-1.05”
Fan Discharge SP	-	2.40”
Total ESP	3"	3.14"
Fan Total SP	4.9"	345"

Completed By: Greg O'Day on 06/21/2022

Notes: [1] low fan speed outside damper is set to 20% at 3017 CFM
[2] Fan speed is limited by high duct static pressure alarm.

VAV-Fan Powered Box

RTU-1 / FIRST FLOOR NORTH

Asset	Area Served	MFG	Model Num	Type	Fan Speed	Design Max Cool CFM	Max Cool CFM	Design Min Cool CFM	Min Cool CFM	Design Fan CFM (Heat)	Fan CFM (Heat)	Ak (max)
FTU-10	122	DAIKIN	MQFVI5	6	VARIABLE	400	395	125	126	250	263	0.60
FTU-11	121	DAIKIN	MQFVI5	6	VARIABLE	450	481	150	148	275	282	0.61
FTU-12	123	DAIKIN	MQFVI5	10	VARIABLE	1050	1038	325	318	650	631	0.68
FTU-13	125	DAIKIN	MQFVI5	8	VARIABLE	850	877	275	268	525	511	0.67
FTU-14	127	DAIKIN	MQFVI5	10	VARIABLE	1050	1052	325	331	650	621	0.72
FTU-15	129	DAIKIN	MQFVI5	12	VARIABLE	1300	1303	400	417	800	872	0.80
FTU-16	108	DAIKIN	MQFVI5	12	VARIABLE	1700	1738	525	524	1050	1042	0.72
FTU-17	108	DAIKIN	MQFVI5	12	VARIABLE	1700	1756	525	522	1050	1042	0.72

Completed By: Greg O'Day on 03/30/2022

Asset	Area Served	Notes

Diffuser Supply (GRD)

FTU-10 / 122

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	122	CSD-1	8	100	1	80	90	109	109.0
SGRD2	122	CSD-1	8	225	1	116	147	208	92.4
SGRD3	122	CSD-1	6	75	1	134	186	78	104.0

FTU-11 / 121

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	121	CSD-1	8	200	1	164	221	218	109.0
SGRD2	121	CSD-1	8	200	1	125	184	211	105.5
SGRD3	121	CSD-1	6	50	1	49	80	52	104.0

FTU-12 / 123

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	123	CSD-1	10	235	1	146	248	225	95.7
SGRD2	123	CSD-1	10	235	1	241	193	243	103.4
SGRD3	123	CSD-1	8	215	1	189	169	219	101.9
SGRD4	123	CSD-1	8	215	1	147	138	206	95.8
SGRD5	123	CSD-1	8	150	1	262	291	145	96.7

FTU-13 / 125

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	125	CSD-1	8	225	1	234	253	243	108.0
SGRD2	125	CSD-1	8	225	1	232	253	247	109.8
SGRD3	125	CSD-1	8	200	1	165	199	199	99.5
SGRD4	125	CSD-1	8	200	1	157	188	188	94.0

FTU-14 / 127

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	127	CSD-1	10	235	1	223	240	240	102.1
SGRD2	127	CSD-1	10	235	1	282	233	233	99.1
SGRD3	127	CSD-1	8	215	1	209	221	221	102.8
SGRD4	127	CSD-1	8	215	1	189	214	214	99.5
SGRD5	127	CSD-1	8	150	1	182	144	144	96.0

FTU-15 / 129

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	129	CSD-1	6	50	1	60	52	52	104.0
SGRD2	129	CSD-1	8	200	1	186	193	193	96.5
SGRD3	129	CSD-1	8	200	1	226	210	210	105.0
SGRD4	129	CSD-1	6	50	1	86	48	48	96.0
SGRD5	129	CSD-1	8	200	1	235	200	200	100.0

SGRD6	129	CSD-1	8	200	1	221	214	214	107.0
SGRD7	129	CSD-1	8	200	1	221	199	199	99.5
SGRD8	129	CSD-1	8	200	1	190	187	187	93.5

FTU-16 / 108

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	108	CSD-1	8	100	1	182	104	104	104.0
SGRD2	108	CSD-1	10	250	1	328	257	257	102.8
SGRD3	108	CSD-1	10	250	1	201	248	248	99.2
SGRD4	108	WSD-2	8X8	100	1	149	107	107	107.0
SGRD5	108	CSD-1	10	300	1	275	311	311	103.7
SGRD6	108	CSD-1	10	300	1	89	282	282	94.0
SGRD7	108	CSD-1	8	200	1	274	211	211	105.5
SGRD8	108	CSD-1	8	200	1	252	218	218	109.0

FTU-17 / 108

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	108	CSD-1	10	275	1	284	284	284	103.3
SGRD2	108	CSD-1	10	275	1	267	267	267	97.1
SGRD3	108	CSD-1	10	300	1	313	313	313	104.3
SGRD4	108	CSD-1	10	275	1	293	293	293	106.5
SGRD5	108	CSD-1	10	275	1	289	289	289	105.1
SGRD6	108	CSD-1	10	300	1	310	310	310	103.3

Completed By: Greg O'Day on 02/08/2022

Asset	Area Served	Notes

System/Unit: AHU/RTU

Asset: RTU-2 AREA: FIRST FLOOR SOUTH

Unit Data		
	Design	**Actual**
MFG	NA	DAIKIN
Model Num	NA-DD	DPS025AHMG2 DV-4
Serial Num	-	FB0U210201354
Configuration	HORIZONTAL	HORIZONTAL
Num OA Filters 1	-	3
OA Filter Size 1	-	35X18.5
Num OA Filters 2	-	NA
OA Filter Size 2	-	NA
Num PreFilter 1	-	9
PreFilter Size 1	-	18X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BALDOR
Frame	-	254T
Horsepower	15	15
Motor Rpm	-	1765
Phase	3	3
Rated Voltage	208	200
Rated Amperage	40.7	41
Service Factor	-	1.15

Test Data		
	Design	**Actual**
SF CFM	8500	8272
SF RPM	1763	1497
RA CFM	6233.8	5880
OA CFM	2266.2	2392
RL Voltage	-	196 VFD
RL Amperage	-	26.5 FD
VFD Max SetPt	-	50.9 HZ
SF System SetPt	-	1.2"
OA Damper Position	-	12%

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.39”
Fan Suction SP	-	-0.59”
Fan Discharge SP	-	2.25”
Total ESP	3"	2.64"
Fan Total SP	4.9"	2.84"

Completed By: Greg O'Day on 06/21/2022

Notes: [1] low fan speed outside damper is set to 15% at 2116 CFM
[2] Fan speed is limited by high duct static pressure alarm.

VAV-Fan Powered Box

RTU-2 / FIRST FLOOR SOUTH

Asset	Area Served	MFG	Model Num	Type	Fan Speed	Design Max Cool CFM	Max Cool CFM	Design Min Cool CFM	Min Cool CFM	Design Fan CFM (Heat)	Fan CFM (Heat)	Ak (max)
FTU-1	117	DAIKIN	MQFVI5	8	VARIABLE	900	887	275	281	550	549	0.64
FTU-2	114	DAIKIN	MQFVI5	8	VARIABLE	600	607	200	211	375	364	0.62
FTU-3	110	DAIKIN	MQFVI5	10	VARIABLE	1100	1075	350	348	675	711	0.65
FTU-4	111	DAIKIN	MQFVI5	8	VARIABLE	900	914	275	281	550	511	0.62
FTU-5	112	DAIKIN	MQFVI5	10	VARIABLE	1100	1098	350	355	675	673	0.55
FTU-6	128	DAIKIN	MQFVI5	12	VARIABLE	1350	1393	425	411	825	874	0.72
FTU-7	102	DAIKIN	MQFVI5	8	VARIABLE	750	741	225	221	475	451	0.66
FTU-8	109	DAIKIN	MQFVI5	12	VARIABLE	1350	1327	425	432	825	801	0.80
FTU-9	104	DAIKIN	MQFVI5	6	VARIABLE	500	489	150	152	275	281	0.62

Completed By: Greg O'Day on 03/30/2022

Asset	Area Served	Notes
FTU-9	104	[1] Mission Mechnical installed an extra grill into a janitor closet. Just set it to design 50 CFM and increase total flow by that much

Diffuser Supply (GRD)

FTU-1 / 117

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	117	CSD-1	8	225	1	158	203	213	94.7
SGRD2	117	CSD-1	8	225	1	208	224	224	99.6
SGRD3	117	CSD-1	8	225	1	236	215	215	95.6
SGRD4	117	CSD-1	8	225	1	217	235	235	104.4

FTU-2 / 114

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	114	CSD-1	8	140	1	136	157	135	96.4
SGRD2	114	CSD-1	8	160	1	145	162	169	105.6
SGRD3	114	CSD-1	8	150	1	108	104	145	96.7
SGRD4	114	CSD-1	8	150	1	132	162	158	105.3

FTU-3 / 110

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	110	CSD-1	8	200	1	117	148	201	100.5
SGRD2	110	CSD-1	8	215	1	158	198	220	102.3
SGRD3	110	CSD-1	8	215	1	206	278	201	93.5
SGRD4	110	CSD-1	8	235	1	344	207	216	91.9
SGRD5	110	CSD-1	8	235	1	279	247	237	100.9

FTU-4 / 111

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	111	CSD-1	8	215	1	206	210	235	109.3
SGRD2	111	CSD-1	8	215	1	170	188	195	90.7
SGRD3	111	CSD-1	10	235	1	216	227	242	103.0
SGRD4	111	CSD-1	10	235	1	261	218	242	103.0

FTU-5 / 112

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	112	CSD-1	8	215	1	175	199	216	100.5
SGRD2	112	CSD-1	8	200	1	109	122	189	94.5
SGRD3	112	CSD-1	8	215	1	142	150	221	102.8
SGRD4	112	CSD-1	10	235	1	245	296	238	101.3
SGRD5	112	CSD-1	10	235	1	239	309	234	99.6

FTU-6 / 128

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	128	CSD-1	8	205	1	231	271	198	96.6
SGRD2	128	CSD-1	8	215	1	197	208	228	106.0
SGRD3	128	CSD-1	8	205	1	136	160	198	96.6

SGRD4	128	CSD-1	6	50	1	61	50	54	108.0
SGRD5	128	CSD-1	8	205	1	211	229	211	102.9
SGRD6	128	CSD-1	8	215	1	186	201	236	109.8
SGRD7	128	CSD-1	8	205	1	196	211	217	105.9
SGRD8	128	CSD-1	6	50	1	110	90	51	102.0

FTU-7 / 102

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	102	CSD-1	10	325	1	278	298	298	91.7
SGRD2	102	CSD-1	10	325	1	312	336	336	103.4
SGRD3	102	CSD-1	6	100	1	107	107	107	107.0

FTU-8 / 109

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	109	CSD-1	12	450	1	394	336	431	95.8
SGRD2	109	CSD-1	10	250	1	387	337	248	99.2
SGRD3	109	CSD-1	10	250	1	353	292	266	106.4
SGRD4	109	CSD-1	10	400	1	367	333	382	95.5

FTU-9 / 104

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	104	CSD-1	8	150	1	147	171	143	95.3
SGRD2	104	CSD-1	8	150	1	115	133	153	102.0
SGRD3	104	WSD-2	8X8	150	1	110	125	146	97.3
SGRD4	104	CSD-1	6	50	1	62	70	47	94.0

Completed By: Greg O'Day on 02/22/2022

Asset	Area Served	Notes

System/Unit: AHU/RTU

Asset: RTU-3 AREA: SECOND FLOOR NORTH

Unit Data

	Design	Actual
MFG	NA	DAIKIN
Model Num	NA-BELT	MPS040FG2DW1CYBVDC
Serial Num	-	FBOU210200490
Configuration	VERTICAL	HORIZONTAL
Num OA Filters 1	-	8
OA Filter Size 1	-	15.75X18.5
Num OA Filters 2	-	2
OA Filter Size 2	-	10.5X15.75
Num PreFilter 1	-	8
PreFilter Size 1	-	24X24X2
Num PreFilter 2	-	4
PreFilter Size 2	-	18X24X2

Motor Data

	Design	Actual
Motor MFG	-	BAULDOR
Frame	-	215T
Horsepower	15	10
Motor Rpm	-	1700
Phase	3	3
Rated Voltage	208	200
Rated Amperage	195.1	29.5
Service Factor	-	1.15

Drive Data

	Design	Actual
Motor Sheave Size	-	2BK45
Motor Bore Size	-	1 3/8"
Motor Sheave SetPt	-	FIXED
Fan Sheave Size	-	2B5V60
Fan Sheave Bore	-	1 15/16"
Belt CL Distance	-	34"
Num of Belts	-	2
Belt Size	-	BX81

Test Data

	Design	Actual
SF CFM	12000	11348
SF RPM	1166	862
RA CFM	7500	8850
OA CFM	3500	2498
RL Voltage	-	150 VFD
RL Amperage	-	21.4 VFD
OA Damper Position	-	15%

Performance Data

	Design	Actual
MA Plenum SP	-	-0.33”
Fan Suction SP	-	-0.56”
Fan Discharge SP	-	0.95”
Total ESP	2.0"	1.28”
Fan Total SP	3.15"	1.51”

Completed By: Greg O'Day on 06/24/2022

Notes: [1] Total flow measured at 60HZ as 11348 CFM. Performance data taken at 45HZ. Per TMI at 60 HZ the motor sheave gets throw off the shaft on RTU-3. So unit maxed out at 45HZ. (At 45 Hz airflow is 8511 CFM)
[2] Set OA airflow proportionally low so that if fan speed is increased, the outside air will be within design. In low fan speed outside air damper is set to 2578 at 35%.

System/Unit: AHU/RTU

Diffuser Supply (GRD)

RTU-3 / SECOND FLOOR NORTH

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	208	WSD-1	24X10	1000	1.16	1278	946	946	94.6
SGRD2	206	CSD-1	8	250	1	150	218	218	87.2
SGRD3	206	CSD-1	8	250	1	136	226	226	90.4
SGRD4	208	CSD-2	24X12	950	2.03	894	888	888	93.5
SGRD5	208	CSD-2	42X12	1600	5.09	1338	1522	1522	95.1
SGRD6	208	CSD-2	24X12	950	2.03	1003	898	898	94.5
SGRD7	208	CSD-2	42X12	1600	5.09	1634	1492	1492	93.3
SGRD8	208	CSD-2	24X12	950	2.03	773	897	897	94.4
SGRD9	208	CSD-2	42X12	1600	5.09	1338	1557	1557	97.3
SGRD10	208	CSD-2	24X12	950	2.03	817	887	887	93.4
SGRD11	208	CSD-2	42X12	1600	5.09	1576	1507	1507	94.2
SGRD12	208	CSD-1	10	300	1	454	310	310	103.3

Completed By: Greg O'Day on 06/24/2022

Asset	Area Served	Notes
SGRD2	206	Damper 100% open. Unit max out on fan speed. Unable to push anymore airflow to diffuser. Diffuser 2 and 3 share same common area. Total flow into the common area is within tolerance.

System/Unit: AHU/RTU

Asset: RTU-4 AREA: SECOND FLOOR SOUTH

Unit Data		
	Design	**Actual**
MFG	NA	DAIKIN
Model Num	NA-BELT	MPS040FG2WD 1CYBVDC
Serial Num	-	FBOU210200491
Configuration	VERTICAL	HORIZONTAL
Num OA Filters 1	-	8
OA Filter Size 1	-	15.75X18.5
Num OA Filters 2	-	2
OA Filter Size 2	-	10.5X15.75
Num PreFilter 1	-	8
PreFilter Size 1	-	24X24X2
Num PreFilter 2	-	4
PreFilter Size 2	-	18X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BAULDOR
Frame	-	215T
Horsepower	15	10
Motor Rpm	-	1700
Phase	3	3
Rated Voltage	208	200
Rated Amperage	195.1	29.5
Service Factor	-	1.15

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	2BK45
Motor Bore Size	-	1 3/8"
Motor Sheave SetPt	-	FIXED
Fan Sheave Size	-	2B5V60
Fan Sheave Bore	-	1 15/16"
Belt CL Distance	-	34"
Num of Belts	-	2
Belt Size	-	BX81

Test Data		
	Design	**Actual**
SF CFM	12000	11149
SF RPM	1166	958
RA CFM	7500	8276
OA CFM	3500	2873
RL Voltage	-	167 VFD
RL Amperage	-	21.7 VFD
OA Damper Position	-	15%

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.09”
Fan Suction SP	-	-0.37”
Fan Discharge SP	-	1.24”
Total ESP	2.0"	1.33”
Fan Total SP	3.15"	1.51”

Completed By: Greg O'Day on 06/21/2022

Notes: [1] Total flow measured at 60HZ. Performance data taken at 50HZ. Per TMI at 60 HZ the motor sheave gets throw off the shaft on RTU-3. So unit maxed out at 50HZ. (Supply airflow at 50HZ is 9290 CFM)
[2] Set OA airflow proportionally low so that if fan speed is increased, the outside air will be within design. In low fan speed outside air damper is set to 2938CFM at 35%

System/Unit: AHU/RTU

Diffuser Supply (GRD)

RTU-4 / SECOND FLOOR SOUTH

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	STAIRS	CSD-1	10	400	1	274	330	346	86.5
SGRD2	207	CSD-1	8	200	1	179	219	197	98.5
SGRD3	207	CSD-1	8	200	1	224	279	214	107.0
SGRD4	208	CSD-2	42X12	1600	5.09	2110	1396	1587	99.2
SGRD5	208	CSD-2	24X12	950	2.03	826	1180	1030	108.4
SGRD6	208	CSD-2	42X12	1600	5.09	1910	1536	1636	102.3
SGRD7	208	CSD-2	24X12	950	2.03	874	1000	965	101.6
SGRD8	208	CSD-2	42X12	1600	5.09	1569	1521	1498	93.6
SGRD9	208	CSD-2	24X12	950	2.03	576	714	948	99.8
SGRD10	208	CSD-2	42X12	1600	5.09	2192	1187	1448	90.5
SGRD11	208	CSD-2	24X12	950	2.03	749	1058	993	104.5
SGRD12	210	CSD-1	10	350	1	0	0	0	0.0
SGRD13	210	CSD-1	10	350	1	0	0	0	0.0
SGRD14	STAIRS	CSD-1	10	300	1	453	512	287	95.7

Completed By: Jacob Davidson on 02/01/2022

Asset	Area Served	Notes

NATIONAL TAB

RTU-1

FTU	DESIGN CFM	CTUAL CF	% OF DESIGN
10	400	360	90.0%
11	450	396	88.0%
12	1050	860	81.9%
13	850	784	92.2%
14	1050	912	86.9%
15	1300	1300	100.0%
16	1700	1616	95.1%
17	1700	1398	82.2%
TOTAL CFM	8500	7626	89.7%

RTU-2

FTU	DESIGN CFM	ACTUAL CFM	% OF DESIGN
1	900	828	92.0%
2	600	596	99.3%
3	1100	1028	93.5%
4	900	860	95.6%
5	1100	1096	99.6%
6	1350	1344	99.6%
7	750	752	100.3%
8	1350	1352	100.1%
9	450	416	92.4%
TOTAL CFM	8500	8272	97.3%

NOTES:

These are the CFMs of the boxes during RTU setup. The boxes were all calling for max cool to drive the RTUs to max fan speed.

System/Unit: Split Sys Furnace

Asset: F-1 AREA: 205

Unit Data		
	Design	**Actual**
MFG	NA	DAIKIN
Model Num	NA	DM96SE1005CNAA
Serial Num	-	2003600848
Configuration	UPFLOW	UPFLOW
Num Filters Size 1	-	NONE
Filter Size Size 1	-	NONE

Test Data		
	Design	**Actual**
SF CFM	2000	1673
Motor Speed SetPt	-	HIGH (OFF/OFF/ON)
RL Voltage	-	118
RL Amperage	-	8.9
RA CFM	1600	1673
OA CFM	400	0

Motor Data		
	Design	**Actual**
Motor MFG	-	[1]
Frame	-	[1]
Horsepower	1	[1]
Motor Rpm		[1]
Phase	1	1
Voltage	120	115
Amperage	-	16.9 UNIT TOTAL

Performance Data		
	Design	**Actual**
Suction ESP	-	-0.29"
Discharge ESP	-	0.11"
Total ESP	0.5"	0.40"

Completed By: Jacob Davidson on 01/31/2022

Notes: [1] MOTOR DATA TAKEN FROM UNIT LABEL
[2] UNIT FAN SPEED IS MAXED OUT. ALL DAMPER 100% OPEN TO MAXIMIZE AIRFLOW
[3] NO OUTSIDE AIR DUCT SHOWED ON PAGE M102

Diffuser Supply (GRD)

F-1 / 205

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	205	CSD-1	10	400	1	161	167	233	58.3
SGRD2	205	CSD-1	12	400	1	389	402	390	97.5
SGRD3	205	CSD-1	10	300	1	208	210	220	73.3
SGRD4	205	CSD-1	10	300	1	316	329	314	104.7
SGRD5	204	CSD-1	6	100	1	121	123	120	120.0
SGRD6	201	CSD-1	8	250	1	193	197	194	77.6
SGRD7	202	CSD-1	8	250	1	196	208	202	80.8

Completed By: Jacob Davidson on 01/31/2022

Asset	Area Served	Notes

System/Unit: FAN - Exhaust

Asset: EF-1 AREA: RESTROOMS

Unit Data		
	Design	**Actual**
MFG	NA	COOK
Model Num	NA	100SQN15D
Serial Num	-	299SJ31969-00/000370
Type	INLINE	INLINE

Test Data		
	Design	**Actual**
CFM	150	353 [3]
RL Voltage	-	NOT SAFE
RL Amperage	-	NOT SAFE
Total ESP	0.5"	0.517"

Motor Data		
	Design	**Actual**
Motor MFG	-	COOK
Frame	-	[2]
Horsepower	1/6	1/6
Motor Rpm	1260	1550
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	[2]
Service Factor	-	[2]

Completed By: Jacob Davidson on 03/15/2022

Notes: [1] Single Speed
[2] Motor Unit data pulled from unit label
[3] EF1 and EF3 were installed backwards from their submittals. Fans are the same model. EF1 is a stronger fan than submittals. Informed MC and was instructed to leave as is.

Diffuser Ret/Exh (GRD)

EF-1 / RESTROOMS

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
EGRD1	126	EG-1	6	75	1	155	156	156	208.0
EGRD2	107	EG-1	6	75	1	185	197	197	262.7

Completed By: Greg O'Day on 02/23/2022

Asset	Area Served	Notes

System/Unit: FAN - Exhaust

Asset: EF-2 AREA: RESTROOMS

Unit Data		
	Design	**Actual**
MFG	NA	COOK
Model Num	NA	100SQN12D
Serial Num	-	299SJ31969-00/0002201
Type	INLINE	INLINE

Test Data		
	Design	**Actual**
CFM	500	723
RL Voltage	-	NOT SAFE
RL Amperage	-	NOT SAFE
Total ESP	0.5"	0.257"

Motor Data		
	Design	**Actual**
Motor MFG	-	COOK
Frame	-	[2]
Horsepower	1/6	1/6
Motor Rpm	1468	1200
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	5
Service Factor	-	[2]

Completed By: Jacob Davidson on 03/15/2022

Notes: [1] Single speed
[2] Motor data pulled from unit label

Diffuser Ret/Exh (GRD)

EF-2 / RESTROOMS

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
EGRD1	105	EG-1	10	250	1	378	378	378	151.2
EGRD2	106	EG-1	10	250	1	345	345	345	138.0

Completed By: Jacob Davidson on 03/15/2022

Asset	Area Served	Notes

System/Unit: FAN - Exhaust

Asset: EF-3 AREA: RESTROOMS

Unit Data		
	Design	**Actual**
MFG	NA	COOK
Model Num	NA	100SQN15D
Serial Num	-	299SJ76846-00/0000701
Type	INLINE	INLINE

Test Data		
	Design	**Actual**
CFM	600	608 [3]
RL Voltage	-	NOT SAFE
RL Amperage	-	NOT SAFE
Total ESP	0.5"	UTO

Motor Data		
	Design	**Actual**
Motor MFG	-	COOK
Frame	-	[2]
Horsepower	1/6	1/6
Motor Rpm	1556	1550
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	5
Service Factor	-	[2]

Completed By: Jacob Davidson on 03/15/2022

Notes: [1] Single speed
[2] Motor data taken from unit label
[3] EF1 and EF3 were installed backwards from their submittals. Both fans are the same model.

Diffuser Ret/Exh (GRD)

EF-3 / RESTROOMS

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
EGRD1	201	EG-1	10	300	1	195	195	195	65.0
EGRD2	202	EG-1	10	300	1	413	413	413	137.7

Completed By: Mike Gabbert on

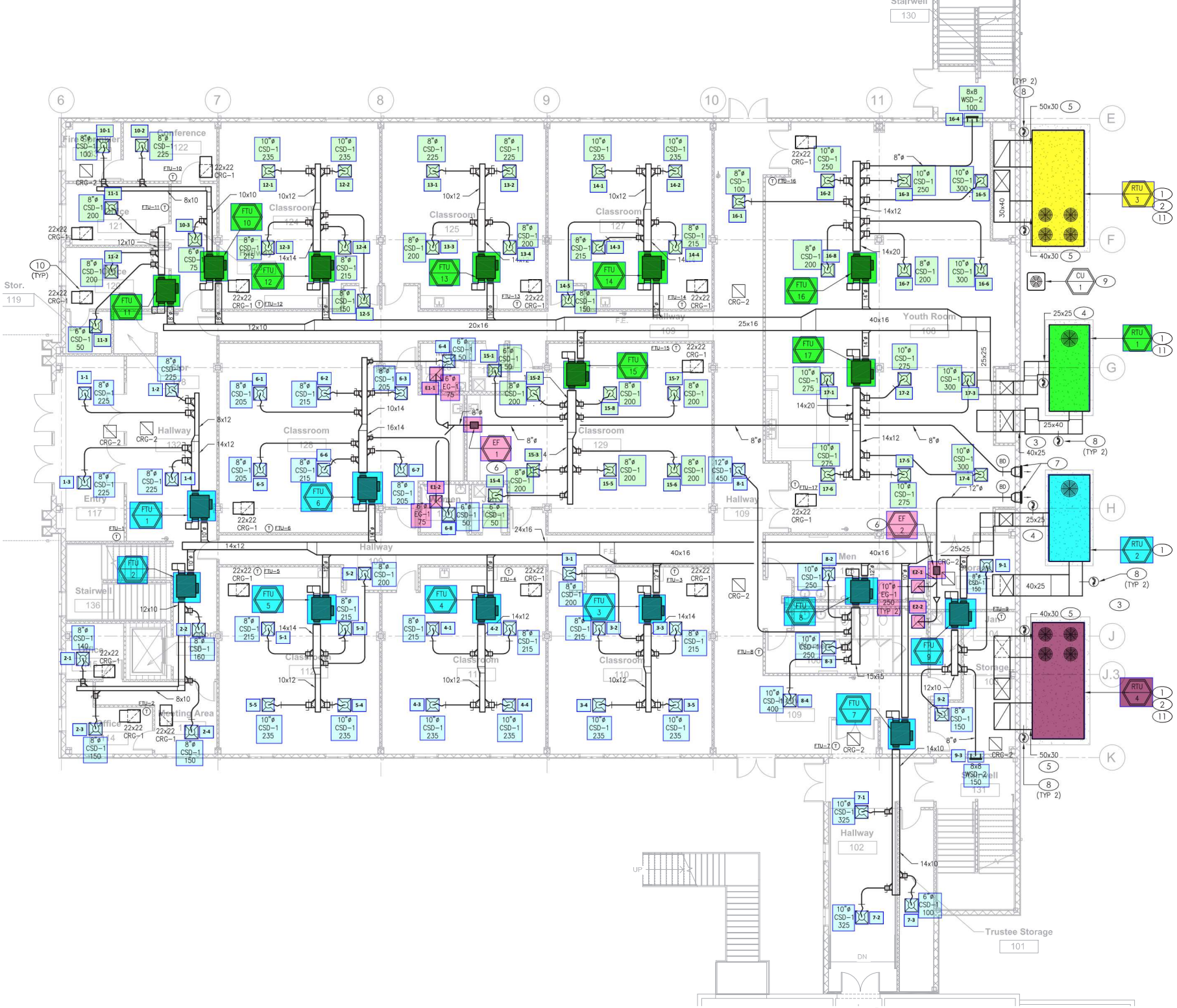
Asset	Area Served	Notes

National TAB

Testing, Adjusting, and Balancing Equipment

Function		Range	Minimum Accuracy	Instrument Information	Calibration Date	Date Due
AIR	AIR PRESSURE	0 in wg to 10 in wg	2% +/- 0.001 in wg	Shortridge ADM-860 M99048	8/5/2021	8/5/2022
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Shortridge ADM-860 M99048	8/5/2021	8/5/2022
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 5 % +/- 7 cfm	Alnor EBT Micromanometer EBT731 EBT732117009	1/26/2022	6/30/2022
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper SRH77A S/N 100516003	8/18/2021	8/18/2022
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Fluke 323 S/N 35491023WS	8/17/2021	8/17/2022
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Fluke 323 S/N 35491023WS	8/17/2021	8/17/2022
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Shimpo DT 207Lp S/N D1690029R	8/18/2021	8/18/2022
HYDRONIC	PRESSURE MEASUREMENT	-30 in Hg to 200 psi	±2% of reading +/- 1 psi	Hydronic Manometer - Dwyer 490W-6-HKIT S/N: 359515093207912	7/21/2020	7/21/2021
	DIFFERENTIAL PRESSURE MEASUREMENT	0 psi - 80 psi	±2% of reading +/- 1 psi	Hydronic Manometer - Dwyer 490W-6-HKIT S/N: 359515093207912	7/21/2020	7/21/2021

NEBB ABBREVIATIONS	
A = Area (ft^2) IP, (m^2) SI	M = Mass (lb) IP, (kg) SI
ACH = Air Changes per Hour	ma = Mixed Air
A_k = Effective Area	m = meter (metre)
AV = Average	m^3/s = Volumetric Flow: Cubic Meters Per Second
BHP = Brake Horsepower (IP) HP	NLA = No Load Amperage
BP = Brake Power (SI) kW	NPSHA = Net Positive Suction Head Available
Btu = British Thermal Unit	oa = Outside Air
Btu/h = Btuh = BTUH = BTU/Hour	$\%_{oa}$ = % of Outside Air
℄ = Center Distance (used in belt formula)	Ω = Ohm
°C = Degrees Celsius, °C	P = Pressure
C = Friction Loss Coefficient (For Duct Fittings)	P_a = Atmospheric Pressure
CCF = 100 Cubic Feet	P_{ab} = Absolute Pressure (Atmospheric Pressure + Gauge Pressure)
CFM = Volumetric Flow: Cubic Feet Per Minute	Pa = Pascals, Pressure SI
C_p = Specific Heat	π = 3.14
C_v = Flow Constant (IP)	PD = Sheave Pitch Diameter
ρ = Density (lb/ft^3) IP, (kg/m^3) SI	$P_℄$ = Pressure at Pump Centerline
d = Diameter (in.) IP, (mm) SI	ppm = parts per million
Δ = Difference or Change (Final - Initial)	psi = Pounds Per Square Inch
d_{imp} = Impeller Diameter	psia = Pounds Per Square Inch Absolute
E = Volts	psig = Pounds Per Square Inch Gauge
Eff = Efficiency	P_{vp} = Absolute Vapor Pressure
EP = Pump Efficiency	Q (flow) = Volumetric Fluid Flow Rate: (i.e. CFM, GPM, m^3/s, l/s, etc.)
°F = Degrees Fahrenheit, °F	Q (heat) = Heat Flow Rate (BTU/Hour) IP, (W or kW) SI
f = Friction Factor	°R = °Rankin = Degrees Rankin, °R
FLA = Full Load Amps	r = Radius (in) IP, (mm) SI
fpm = Feet per Minute (fpm)	$\%_{ra}$ = % of Return Air
ft = Foot	R = Resistance
g = Acceleration of Gravity	ra = Return Air
gal = Gallons	rad = Radians
GPM = Gallons Per Minute (GPM)	RH = Relative Humidity
h = Enthalpy (BTU/lb dry air) IP, (kJ/kg dry air) SI	RPM = Revolutions Per Minute
H = Head (in wc, ft wc, psi) IP, (Pa, kPa) SI	R_{value} = Thermal Resistance
Hg = Mercury	s = second
h_{ma} = Mixed Air Enthalpy	SHR = Sensible Heat Ratio
h_{oa} = Outside Air Enthalpy	SME = Sash Movement Effect Performance Rating (SME-XX yyy)
HP = Horsepower	SP = Static Pressure
hr = Hour	Sp Gr = Specific Gravity (for water use 1.00)
h_{ra} = Return Air Enthalpy	T = Temperature
HT = Height (in) IP, (mm) SI	Ta = Absolute Temperature (460˚ + T) or °R
I = Amps	T_{ma} = Mixed Air Temperature
J = Joules	T_{oa} = Outside Air Temperature
K = Kelvin, K	TP = Total Pressure
K_v = Flow constant (SI)	T_{ra} = Return Air Temperature
kg = Kilogram	TS = Tip Speed (fpm) IP, (m/s) SI
kJ = Kilojoule	U = Heat Transfer Coefficient
kPa = Kilopascal	μ = viscosity, dynamic
kW = Kilowatt = 1000 Watts	V = Velocity
l = Liter (Litre)	VP = Velocity Pressure
l/s = Volumetric Flow: Liters Per Second	W = Watt
lb = Pounds	WD = Width (in) IP, (mm) SI
lm = Lumens	wg = wc = water gauge = water column
ln = natural log	WHP = Water Horsepower (IP)
LG = Length (in) IP, (mm) SI	WP = Water Power (SI)
lx = Lux	ω = Humidity Ratio (lb or grains of water/lb of dry air) (g H_2O/kg dry air)



FIRST FLOOR MECHANICAL PLAN

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

1

NORTH

SECOND FLOOR MECHANICAL PLAN

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

1

NORTH