Report By:

National TAB
1329 E Kemper Rd, Ste 4210
Cincinnati, OH 45246

Report: **Test and Balance**
Date: **10/16/2018**

PROJECT

FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

9800 NE BARRY ROAD
KANSAS CITY, MO 64157

Client

Freddy's Frozen Custard & Steakburgers (CORPORATE)
260 N Rock Rd
Suite 200
Wichita, KS 67206

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

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Deficiency List

Assigned Organization: National TAB

Status: Not Submitted

Asset:

PRIORITY (HIGH/LOW/INFO ONLY)	
High	RTU 1(Dining) is at 267 CFM/ton which is below the recommended 350 to 400 cfm/tom. The motor pulley is rusted where it can't be adjusted. The pulley needs to be replaced and the return grille needs to be clean. The return grille was not accessible during operating hours.
High	EF 1(Restroom) is not operational. Unable to turn fan blades freely by hand. Unit needs to be replaced.
High	KEF 2(Griddle) is under design on airflow and the hood is not capturing properly. The duct above the ceiling needs to be inspected to see if a clean out door is loose. If there are no issues, then the unit needs to be replaced. Unable to get above the ceiling during operating hours.
High	KEH 3(Griddle) and slightly KEF 2(Griddle) are being affected by a cross draft created by RTU 2(Kitchen) The duct layout will need to be evaluated to improve hood capture.
Low	MAU has an electrical short and trips the circuit breaker when the heater tries to start up. Unable to troubleshoot any further due to not being able to shut the unit off during operating hours. Not an urgent issue due summer approaching.
Info Only	The GRD lay for the dining room diffusers does not match what actually is installed. See GRD for the positions.
Info Only	The return filters at the return grille and the final filters in RTU 2 were removed during testing due to massive amount of grease on the filters.
Info Only	RTU 2 economizer was not functioning properly and was unplugged and set manually.
Info Only	Damper 2-5 is broken and needs to be replaced.
Info Only	Due to the space in the ceiling and duct layout, some dampers were no accessible. This caused the diffusers on RTU 2 not to be within 10% of design. Due to the risk of food contamination, the ceiling tiles were not dropped so we could properly trace all ducts.
Info Only	KEF 3(Griddle) was left over design. If the motor speed is lowered any further with the speed control it will cause the motor to over amp. This should not have a significant enough impact on the space to fix the issue of being over design.

Notes/Comments:

Project Summary

Preface
The summary below provides a quick understanding of how well your HVAC systems balanced in respect to the design criteria. The summary concludes with a quick understanding of your building environment and possible suggestions for each of your systems after testing has been performed. Our focus is to work with the trades to remedy any issues or deficiencies during the actual field balancing and not after the balancing has occurred. Our focus is to achieve a positive environment and outcome. The level of success is determined by the availability of the trades, possible parts needed, or time constraints. Also, enclosed are pictures of building assets and items listed below that will provide your team with more insight

Facility Identification and TAB Requirements
Freddy's (Liberty) is located at 9800 NE Barry Rd Kansas City, MO 64157. The mechanical equipment to be tested, adjusted, and balanced includes: (2) Roof Top Units (RTU), (5) Exhaust Fans (EF), (1) Make Up Air Units (MUA), (3) Kitchen Hoods, and all associated air devices.
Constant Volume RTU's with Lay-In Ceiling Diffusers
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. RTU 2 has no dampers and RTU 1 has dampers not accessible, so the diffusers were not able to be balanced with +/-10% of design. RTU 1 motor pulley is rusted and can't be adjusted. This caused RTU 1 to be 67% of design. If this is not corrected this could cause the evaporator coil to build up ice.

Kitchen Exhaust Hood & Associated Fan
Each kitchen exhaust fan was measured at the hood filter bay utilizing a velocity matrix and a manufacturer's correction factor. Each filter velocity is multiplied by the manufacturer's corrected area. The sum of these readings equals the total flow of the exhaust fans. The total flow of the exhaust was then adjusted to +/-10% of the engineers design flow.
Total flow for the MAU (Make-up Air Unit) unit was measured by readings taken at the discharge of the hood's perforated supply plenum. Readings taken with a velocity matrix were averaged and multiplied by a manufacturer's corrected area. Adjustments to the fan speed were made in order to bring the unit to within +/-10% of design criteria.

General Exhaust Fans
EF 1 & 2 were measured by reading each air device with a flow hood. EF-1 needs to be replaced. The unit is not operational. EF-2 is under design, but due to single speed the fan can't be increased. No futher action is necessary.
Final Building Tests
After completing the test and balance, the final building pressure was recorded at 0.007" W.C. average. This pressure falls within the recommended tolerances by the International Mechanical Code of +0.02" W.C. to -0.02" W.C. The building is designed for a net positive pressure and this measurement coincides with that requirement.
The hood capture was tested at the perimeter of the hood and the cook top level with the equipment heat "on" and Hood 1:100%, Hood 2:90%, and Hood 3: 85% capture was observed. KEF-2 is low on flow causing capture issues on Hood 2. Hood 3 has hood capture problem due to a cross draft across the hood.

NATIONAL TAB

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AIR BALANCE SCHEDULE

UNIT	AREA SERVED	HVAC SUPPLY		HVAC RETURN		HVAC OUTDOOR		OA %		HOOD MAKE-UP		HOOD EXHAUST		GENERAL EXH.	
		DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL	DESIGN	ACTUAL
RTU-1	DINING	4000	2673	3430	2100	570	573	14.3%	21.4%						
RTU-2	KITCHEN	4000	4219	3430	3593	570	626	14.3%	14.8%						
MUA-1										2560	2468				
KEF-1	HOOD 1-FRYER											1250	1261		
KEF-2	HOOD 2-GRIDDLE											1050	705		
KEF-3	HOOD 3-GRIDDLE											900	1042		
EF-1	MENS RR													150	0
EF-2	WOMENS RR													150	88
TOTALS		8000	6892	6860	5693	1140	1199			2560	2468	3200	3008	300	88

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	3700	3667
TOTAL EXHAUST	3500	3096
NET AIRFLOW	200	571

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H20)
FRONT	0.01
SIDE	0.01
REAR	0.002
AVERAGE	**0.0073**

FINAL CHECKS

ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✓

MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✓

PRESSURE FALLS WITHIN IMC TOLERANCE OF +/-0.02" W.C. ✓

NOTES:

Initial MUA CFM 597.

Freddy's

Liberty, MO

Store Front

RTU 1

RTU 2

KEF 1

KEF 2

KEF 3

MUA

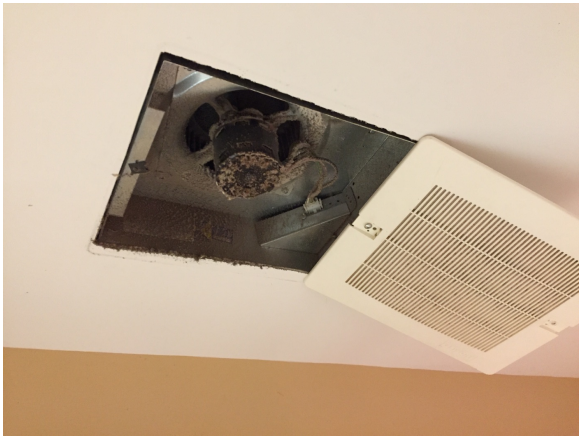
MUA

MUA

MUA

EF 1

EF 2

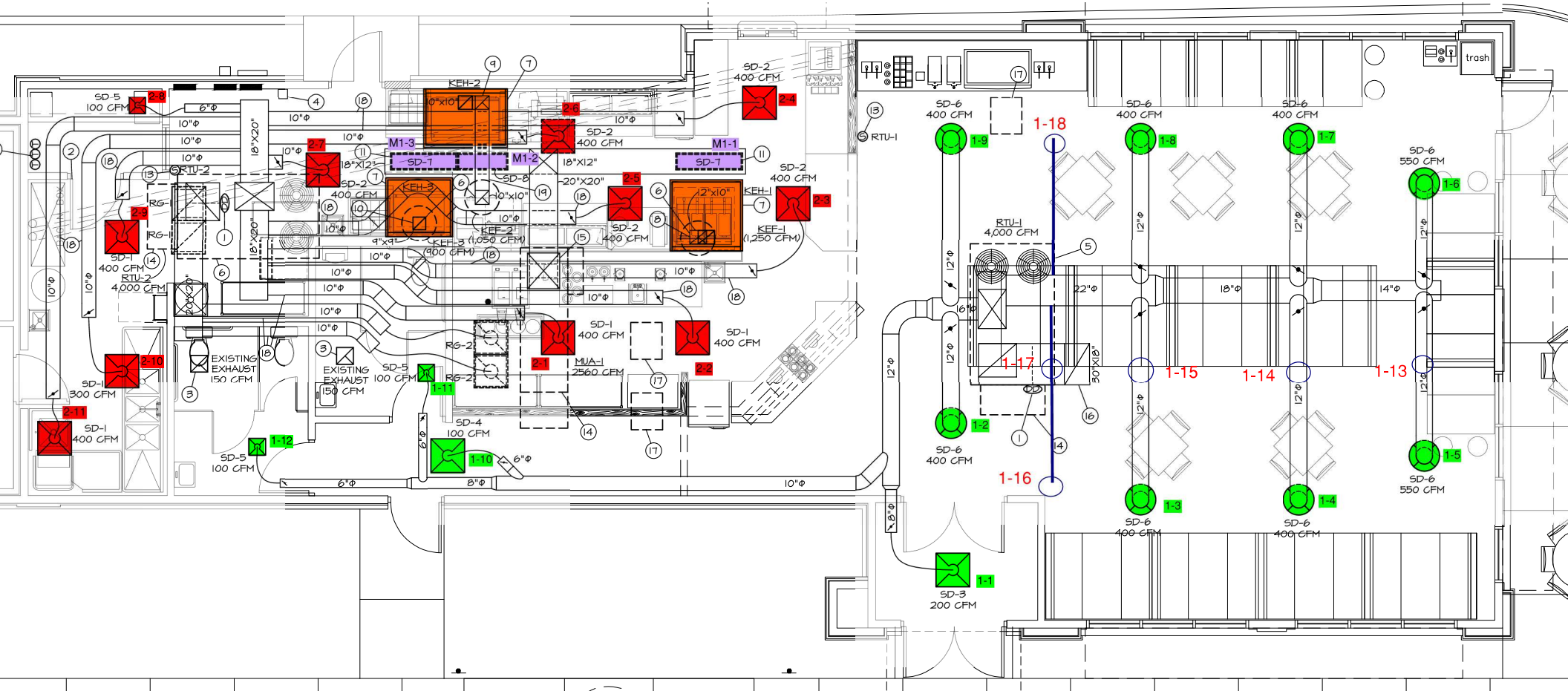


Hood 1

Hood 2

Hood 3

RTU 1 Return


SD-5
100 CFM
2-8
6"Φ
10"Φ
18"X20"
RTU-2
RG-1
2-9
SD-1
400 CFM
RTU-2
4,000 CFM
RG-2
2-10
SD-1
300 CFM
2-11
SD-1
400 CFM
EXISTING
EXHAUST
150 CFM
EXISTING
EXHAUST
150 CFM
SD-5
100 CFM
1-11
1-12
SD-5
100 CFM
KEH-2
10"x10"
2-6
SD-2
400 CFM
2-7
18"X12"
SD-2
400 CFM
M1-3
SD-7
M1-2
SD-8
KEH-3
9"x9"
KEF-3 (1,050 CFM)
(900 CFM)
KEF-2
10"x10"
18"X12"
20"X20"
2-5
SD-2
400 CFM
SD-2
400 CFM
2-4
M1-1
SD-7
SD-2
400 CFM
12"x10"
KEH-1
2-3
KEF-1
(1,250 CFM)
SD-1
400 CFM
2-1
MUA-1
2560 CFM
SD-1
400 CFM
2-2
RG-2
SD-4
100 CFM
1-10
6"Φ
8"Φ
10"Φ
RTU-1
SD-6
400 CFM
1-9
1-18
SD-6
400 CFM
1-8
SD-6
400 CFM
1-7
trash
SD-6
550 CFM
1-6
RTU-1
4,000 CFM
12"Φ
22"Φ
18"Φ
14"Φ
16"Φ
30"X18"
1-17
1-15
1-14
1-13
1-2
SD-6
400 CFM
1-16
1-3
SD-6
400 CFM
1-4
SD-6
400 CFM
1-5
SD-6
550 CFM
8"Φ
1-1
SD-3
200 CFM

TECH - STEP 1: INITIAL WALKTHROUGH

Assigned Organization: National TAB

Status: Not Submitted

Asset:

INITIAL SITE WALKTHROUGH	
All diffusers and grilles are installed and match design?	No
All hood filters installed and accounted for?	Yes
Hoods are wired and have power?	Yes
Hood is free of alarms?	Yes
Thermostats have power?	Yes
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	NA

Notes/Comments:

The GRD for the dining room diffusers did not match. There were additional diffusers. GRD has been marked to show this.

TECH - STEP 2: UNIT DATA AND EVAL

Assigned Organization: National TAB

Status: Not Submitted

Asset:

UNIT DATA AND EVALUATION WHILE GATHERING UNIT DATA CHECK THE FOLLOWING:	
RTU's/AHU's	
Economizers are assembled and functional?	Yes
DCV Max damper opening position is set to minimum?	Yes
Free cooling enthalpy set point set for lowest setting (Typically "D")	Yes
Motors are all operating below the FLA rating?	Yes
Are belts tight?	Yes
If direct drive unit is the speed controller working.	NA
Is gas piping installed and valves turned on?	Yes
Unit free of noticeable noise and vibration	Yes
EF's	
Rotation is correct?	Yes
Belts are tight?	NA
Grease cup installed on hood fan?	Yes
Hinge kit installed installed on hood fan?	Yes
Lean fan back. Is grease duct installation adequate and is duct ran all the way to the base of the fan?	Yes
Flex conduit is long enough so that fan can be completely tilted back?	Yes
There is no major leakage around base of fan?	Yes
Is the motor operating below the motor FLA rating?	Yes
For restroom fan(s) is the back draft damper installed and can it fully open?	NA
Unit free of noticeable noise and vibration?	Yes
MUA	
Rotation is correct?	Yes

Gas piping is installed and valves are in on position?	Yes
Heater tested and is functional?	No
Internal motorized damper is fully opening?	Yes
Motor is operating below the FLA rating?	Yes
Unit free of noticeable noise and vibration?	Yes
HOODS	
Kitchen equipment installed in proper places?	Yes
Can kitchen equipment be turned on for final smoke test?	Yes
Griddle is completely centered underneath hood?	Yes
DOCUMENTATION	
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	Yes
PICTURES TAKEN OF:	
All Issues	Yes
Each Piece of equipment	Yes
Each Hood	Yes
Front of Store	Yes

Notes/Comments:

There is a short when the MAU tries to startup heating. Unable to troubleshoot any further due to not being able to shut the unit off during operating hours.

TECH - STEP 3: TEST, ADJUST AND BALANCE

Assigned Organization: National TAB

Status: Not Submitted

Asset:

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:	
DURING TESTING MAKE NOTE OF THE FOLLOWING:	
Is space free of drafting?	Yes
Is space comfortable in all areas?	Yes
Is the space free of ventilation noise?	Yes
If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".	NA

Notes/Comments:

TECH - STEP 4: FINAL TESTS

Assigned Organization: National TAB

Status: Not Submitted

Asset:

FINAL TESTS	
HOOD CAPTURE TEST	
List equipment turned on for testing	Griddles and Fryers
List smoke candle type used	45 Second Smoke Candle
Smoke test capture - Perimeter of hood	Hood 1: 100% Hood 2: 90% Hood 3: 85%
Smoke test capture - Top of cooking surface	Hood 1: 100% Hood 2: 90% Hood 3: 85%
WITNESS	
Date test was completed	4/23/2018
TAB tech name / Firm	Mitch Kerr/National TAB
Site super name / Firm	NA
Owner representative name / Firm (if Applicable)	Amanda James/Freddys
Building pressure at front & back doors (All Systems On)	Front: 0.01, Side: 0.01, Back: 0.002
ADDITIONAL	
Do actual net building airflow, design net building airflow, and pressure coincide? If not why? (All three should either be positive or negative)	Yes
Thermostats are programmed?	Yes
Thermostats Schdedules: Program all thermostats to following settings:	
All three thermostats have correct time/date? (if not set correctly)	Yes
Occupied Time: 8am-11:55pm	Yes
Occupied Fan ON	Yes
Occupied cooling 74	Yes
Occupied heating 68	Yes
Unoccupied Time 11:55pm-8am	Yes
Unoccupied Fan Auto	Yes
Unoccupied cooling 79	Yes
Unoccupied heating 63	Yes

Set a Partial Screen Lock for Thermostats (i.e., make sure temperature is adjustable but not schedule)	No
Password is set to 999 for Partial Screen Lock?	No

Notes/Comments:

TECH - STEP 5: FINAL DOCUMENTATION

Assigned Organization: National TAB

Status: Not Submitted

Asset:

FINAL DOCUMENTATION	
Marked Data capture complete for all assets?	Yes
Picture file sent to processing team or uploaded?	Yes
Balance schedule complete and uploaded?	Yes
Prelim report generated and reviewed?	Yes

Notes/Comments:

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: AHU/RTU

Asset: RTU1 AREA: DINING

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Model Num	KGA120S4B	KGA120S4B
Serial Num	-	5610G13173
Type	RTU	RTU
Configuration	VERTICAL DISCHARGE	VERTICAL DISCHARGE
Num OA Filters 1	-	2
OA Filter Size 1	-	14.25X23 4.55
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BALDOR
Frame	-	56HZ
Horsepower	-	3
Motor Rpm	-	1725
Phase	3	3
Rated Voltage	208	200-230
Rated Amperage	-	9.6-9

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	5"
Motor Bore Size	-	0.875"
Motor Sheave SetPt	-	MINIMIZED
Fan Sheave Size	-	7"
Fan Sheave Bore	-	1"
Belt CL Distance	-	22.5"
Num of Belts	-	1
Belt Size	-	AX58
Belt Alignment	-	GOOD

Test Data		
	Design	**Actual**
SF CFM	4000	2673
SF RPM	-	907
RA CFM	3430	2100
OA CFM	570	573
RL Voltage	-	206/205/206
RL Amperage	-	5.8/5.4/5.4
SF Rotation	-	CCW
RA Damper Position	-	15
Min OA Damper Position	-	85
Min OA Damper Type	-	ECONOMIZING HORIZONTAL BLADE
Brake Horse Power	-	1.73

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.44
Fan Suction SP	-	-0.78
Fan Discharge SP	-	0.42
Total ESP	1.00"	0.86
Fan Total SP	-	1.20

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Mitch Kerr on 04/23/2018

Notes: Sheave is frozen with rust.
907 initial RPM
Dirty returns see pictures.

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: AHU/RTU

Asset: RTU2 AREA: KITCHEN

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Model Num	KGA120S4B	KGA120S4B
Serial Num	-	5610H04130
Type	RTU	RTU
Configuration	VERTICAL DISCHARGE	VERTICAL DISCHARGE
Num OA Filters 1	-	2
OA Filter Size 1	-	14X23 4.47
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	BALDOR
Frame	-	56 HZ
Horsepower	-	3
Motor Rpm	-	1725
Phase	3	3
Rated Voltage	208	200-230
Rated Amperage	-	9.6-9.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	4 3/4
Motor Bore Size	-	7/8
Motor Sheave SetPt	-	2 TURNS OPEN
Fan Sheave Size	-	7
Fan Sheave Bore	-	1
Belt CL Distance	-	21
Num of Belts	-	1
Belt Size	-	BX58
Belt Alignment	-	YES

Test Data		
	Design	**Actual**
SF CFM	4000	4219
SF RPM	-	1182
RA CFM	3430	3593
OA CFM	570	626
RL Voltage	-	209/208/209
RL Amperage	-	9.0/8.4/8.2
SF Rotation	-	CCW
RA Damper Position	-	80
Min OA Damper Position	-	20
Min OA Damper Type	-	ECONOMIZING HORIZONTAL BLADE
Brake Horse Power	-	2.67

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.38
Fan Suction SP	-	-0.58
Fan Discharge SP	-	0.90
Total ESP	1.00"	1.28
Fan Total SP	-	1.48

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	SEE NOTES
Condensate Drain Installed	-	YES

Completed By: Mitch Kerr on 04/23/2018

Notes: Filters are removed for testing and will be replaced with new filters.
The economizing control is bad and can not be adjusted. The linkage is un-engauged to set the damper.

Diffuser Supply (GRD)

RTU2 / KITCHEN

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	CUSTARD	SD1	10"	400		423	500	500	125.0
SGRD2	CUSTARD	SD1	10"	400		343	356	356	89.0
SGRD3	SERVING	SD2	10"	400		375	422	422	105.5
SGRD4	SERVING	SD2	10"	400		398	337	337	84.3
SGRD5	PREP	SD2	10"	400		460	520	520	130.0
SGRD6	PREP	SD2	10"	400		295	338	338	84.5
SGRD7	PREP	SD2	10"	400		412	432	432	108.0
SGRD8	OFFICE	SD5	6"	100		168	92	92	92.0
SGRD9	PREP	SD1	10"	400		342	382	382	95.5
SGRD10	DISHWASH	SD1	10"	300		343	393	393	131.0
SGRD11	DISHWASH	SD1	10"	400		386	447	447	111.8

Completed By: Mitch Kerr on 04/23/2018

Asset	Area Served	Notes
SGRD1	CUSTARD	damper not accessable
SGRD5	PREP	damper is broken and needs to be replaced.
SGRD10	DISHWASH	damper not accessable
SGRD11	DISHWASH	damper not accessible

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Supply

Asset: MAU1 AREA: COOKLINE HOOD1-3

Unit Data		
	Design	**Actual**
MFG	ACCUREX	CAPTIVE AIRE
Model Num	XIGX-110-H12	A2JBT-300-G15
Serial Num	-	1201481
Type	MAU	MUA
Configuration	VERTICAL DISCHARGE	VERTICAL DISCHARGE

Motor Data		
	Design	**Actual**
Motor MFG	-	WEG
Frame	-	E56
Horsepower	.932	1
Motor Rpm	1140	1740
Phase	3	3
Voltage (rated)	208	208-230/460
Amperage (rated)	-	3.3-3.4/1.7
Service Factor	-	1.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	1VL40
Motor Bore Size	-	5/8
Fan Sheave Size	-	AK79
Fan Sheave Bore	-	1
Belt CL Distance	-	17 3/8
Num of Belts	-	1
Belt Size	-	AX50
Belt Alignment Verified	-	YES

Gas Heat		
	Design	**Actual**
Heater Operates (y/n)	-	SEE ISSUES LIST
Flame Status (pass/fail)	-	[1]
Inlet Air Temp SetPt	55	[1]
Discharge Air Temp SetPt	60	[1]
Air Flow Switch SP Actual	-	N/A

Test Data		
	Design	**Actual**
CFM	2560	2468
SF RPM	981	692
Motor RPM	-	1783
RL Voltage	-	209/208/208
RL Amperage	-	2.5/2.6/2.4
Total ESP	.67"	NO ACCESS
Fan Discharge SP	-	NO ACCESS

General		
	Design	**Actual**
Fan Rotation Correct	-	YES

Completed By: Mitch Kerr on 04/23/2018

Notes: [1] See Deficiency List.
Initial CFM 597 before the PSP was cleaned.
Intake size 25x28

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Exhaust

Asset: EF1 AREA: MENS RR

Unit Data		
	Design	**Actual**
MFG	NA	DAYTON
Model Num	NA	5AE69
Serial Num	-	12158276
Type	-	CENTRIFUGAL
Configuration	-	CEILING MOUNT

Motor Data		
	Design	**Actual**
Motor MFG	-	FASCO
Frame	-	NOT LISTED
Horsepower	-	NOT LISTED
Motor Rpm	-	1050
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	1.8
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	150	0
Fan RPM	-	DIRECT DRIVE
Fan Rotation	-	CCW
Motor RPM	-	DIRECT DRIVE
System SetPt	-	
RL Voltage	-	121
RL Amperage	-	SEE NOTES
Total ESP	-	NO ACCESS
Fan Inlet SP	-	
Fan Discharge SP	-	

Completed By: Mitch Kerr on 04/23/2018

Notes: Fan is not running.
Fan does not turn freely by hand.

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Exhaust

Asset: EF2 AREA: WOMENS RR

Unit Data		
	Design	**Actual**
MFG	NA	DAYTON
Model Num	NA	5AF69
Serial Num	-	12062880
Type	-	CENTRIFUGAL
Configuration	-	CEILING MOUNTED

Motor Data		
	Design	**Actual**
Motor MFG	-	FASCO
Frame	-	NOT LISTED
Horsepower	-	NOT LISTED
Motor Rpm	-	1050
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	1.8
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	150	88
Fan RPM	-	DIRECT DRIVE
Fan Rotation	-	CCW
Motor RPM	-	DIRECT DRIVE
System SetPt	-	SINGLE SPEED
RL Voltage	-	121
RL Amperage	-	1.2
Total ESP	-	NO ACCESS
Fan Inlet SP	-	NA
Fan Discharge SP	-	NA

Completed By: Mitch Kerr on 04/23/2018

Notes: This is a single speed direct drive fan.

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Exhaust

Asset: KEF1 AREA: HOOD 1 - FRYER

Unit Data		
	Design	**Actual**
MFG	ACCUREX	CAPTIVE AIRE
Model Num	XRUB-131-4	DU50HFA
Serial Num	-	1201481
Type	CENTRIFUGAL	CENTRIFUGAL
Configuration	UPBLAST	UPBLAST

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	48Y
Horsepower	.25	0.5
Motor Rpm	1725	1380
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	7.6
Service Factor	-	1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DIRECT DRIVE
Motor Bore Size	-	DIRECT DRIVE
Motor Sheave SetPt	-	DIRECT DRIVE
Fan Sheave Size	-	DIRECT DRIVE
Fan Sheave Bore	-	DIRECT DRIVE
Belt CL Distance	-	DIRECT DRIVE
Num of Belts	-	DIRECT DRIVE
Belt Size	-	DIRECT DRIVE

Test Data		
	Design	**Actual**
CFM	1250	1261
Fan RPM	1304	DD
Fan Rotation	-	CCW
Motor RPM	-	DD
RL Voltage	-	119
RL Amperage	-	5.7
Suction ESP	-	-0.88
Discharge ESP	-	ATM
Total ESP	.71"	0.88
Brake Horse Power	-	0.38

Completed By: Mitch Kerr on 04/23/2018

Notes:

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Exhaust

Asset: KEF2 AREA: HOOD 2 - LARGE GRIDDLE

Unit Data		
	Design	**Actual**
MFG	ACCUREX	CAPTIVE AIRE
Model Num	XRUB-131-4	DU33HFA
Serial Num	-	1201481
Type	CENTRIFUGAL	CENTRIFUGAL
Configuration	UPBLAST	UPBLAST

Motor Data		
	Design	**Actual**
Motor MFG	-	MARATHON
Frame	-	48Y
Horsepower	.25	0.33
Motor Rpm	1725	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	4.4
Service Factor	-	1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DIRECT DRIVE
Motor Bore Size	-	DIRECT DRIVE
Motor Sheave SetPt	-	DIRECT DRIVE
Fan Sheave Size	-	DIRECT DRIVE
Fan Sheave Bore	-	DIRECT DRIVE
Belt CL Distance	-	DIRECT DRIVE
Num of Belts	-	DIRECT DRIVE
Belt Size	-	DIRECT DRIVE

Test Data		
	Design	**Actual**
CFM	1250	705
Fan RPM	1304	DD
Fan Rotation	-	CCW
Motor RPM	-	DD
RL Voltage	-	115
RL Amperage	-	3.3
Suction ESP	-	-0.66
Discharge ESP	-	ATM
Total ESP	.71"	0.66
Brake Horse Power	-	0.25

Completed By: Mitch Kerr on 04/23/2018

Notes:

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: FAN - Exhaust

Asset: KEF3 AREA: HOOD 3 - SMALL GRIDDLE

Unit Data		
	Design	**Actual**
MFG	ACCUREX	CAPTIVE AIRE
Model Num	XRUB-101-4	DU30HFA
Serial Num	-	1201481
Type	CENTRIFUGAL	CENTRIFUGAL
Configuration	UPBLAST	UPBLAST

Motor Data		
	Design	**Actual**
Motor MFG	-	MARATHON
Frame	-	48Y
Horsepower	.25	0.25
Motor Rpm	1725	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	3.7
Service Factor	-	1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DIRECT DRIVE
Motor Bore Size	-	DIRECT DRIVE
Motor Sheave SetPt	-	DIRECT DRIVE
Fan Sheave Size	-	DIRECT DRIVE
Fan Sheave Bore	-	DIRECT DRIVE
Belt CL Distance	-	DIRECT DRIVE
Num of Belts	-	DIRECT DRIVE
Belt Size	-	DIRECT DRIVE

Test Data		
	Design	**Actual**
CFM	900	1042
Fan RPM	1463	DD
Fan Rotation	-	CCW
Motor RPM	-	DD
RL Voltage	-	110
RL Amperage	-	3.6
Suction ESP	-	-0.58
Discharge ESP	-	ATM
Total ESP	.63"	0.58
Brake Horse Power	-	0.24

Completed By: Mitch Kerr on 04/23/2018

Notes: Initial cfm 1086. Due to the performance of the exhaust fan, if the airflow is reduced any further it will cause the motor over amp.

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: Kitchen Hood Type I

Asset: KEH1 AREA: FRYER

Unit Data		
	Design	**Actual**
MFG	ACCUREX	ACCUREX
Model Num	XBEW-4.33-S	XBEW-4.33-S
Job / Serial Num	-	NOT LEGIBLE
Type	TYPE I CANOPY	TYPE 1 CANOPY
Hood length	52	52
Hood Width	51	54
Supply Plenum Type	-	PSP
Supply Plenum Width	-	12
Supply Plenum Length	-	52

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	CAPTRATE SOLO
Filter Size 1	16X20	16X20
Filter Size 2	-	16X16
Filter Qty 1	3	1
Filter Qty 2	-	2
Filter AK factor size 1	2.08	2.08
Filters AK factor size 2	1.62	1.62
Filter Total AK Area	6.30	5.32
Filter1 FPM	-	235
Filter2 FPM	-	230
Filter3 FPM	-	246
Filter Ave FPM(corr)	-	237
CFM	1250	1261

Cooking Equipment		
	Design	**Actual**
Item 1	-	FRYER

Completed By: Mitch Kerr on 04/23/2018

Notes:

Test Data Supply		
	Design	**Actual**
AK factor	-	0.87
Total AK Area	-	4.33
Kv factor (Vel)	-	0.87
Num of Readings	-	4
Reading1 FPM	-	267
Reading2 FPM	-	253
Reading3 FPM	-	204
Reading4 FPM	-	240
Ave FPM(corr)	-	241
CFM	-	839

Performance Data		
	Design	**Actual**
Exh-Supply Net CFM	-	422
Smoke Generation Type	-	45 SECOND
Cooking Equip Heat On	-	YES
Hood Capture %	-	100
End Panels Installed (Y/N)	-	YES

General		
	Design	**Actual**
Third Party Witness	-	AMANDA JAMES
Third Party Company	-	FREDDYS
Tech Witness	-	MITCHELL KERR
Tech Company	-	NATIONAL TAB

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: Kitchen Hood Type I

Asset: KEH2 AREA: LARGE GRIDDLE

Unit Data		
	Design	**Actual**
MFG	ACCUREX	ACCUREX
Model Num	XBEW-5-S	XBEW-5-S
Job / Serial Num	-	NOT LEGIBLE
Type	TYPE I CANOPY	TYPE 1 CANOPY
Hood length	60	60
Hood Width	42	42
Supply Plenum Type	-	PSP
Supply Plenum Width	-	12
Supply Plenum Length	-	36

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	CAPTRATE SOLO
Filter Size 1	20X20	20X16
Filter Qty 1	3	3
Filter AK factor size 1	2.40	2.08
Filter Total AK Area	7.20	6.24
Filter1 FPM	-	121
Filter2 FPM	-	106
Filter3 FPM	-	114
Filter Ave FPM(corr)	-	113
CFM	1050	705

Cooking Equipment		
	Design	**Actual**
Item 1	-	GRIDDLE

Test Data Supply		
	Design	**Actual**
AK factor	-	1
Total AK Area	-	3
Kv factor (Vel)	-	0.87
Num of Readings	-	3
Reading1 FPM	-	216
Reading2 FPM	-	256
Reading3 FPM	-	322
Reading4 FPM	-	-
Ave FPM(corr)	-	264
CFM	-	689

Performance Data		
	Design	**Actual**
Exh-Supply Net CFM	-	16
Smoke Generation Type	-	45 SECOND
Cooking Equip Heat On	-	YES
Hood Capture %	-	90
End Panels Installed (Y/N)	-	YES

General		
	Design	**Actual**
Third Party Witness	-	AMANDA JAMES
Third Party Company	-	FREDDYS
Tech Witness	-	MITCHELL KERR
Tech Company	-	NATIONAL TAB

Completed By: Mitch Kerr on 04/23/2018

Notes: Smoke rolls out to the left and right. Exhasut is below design. There is some evidence of the cross draft that influcened Hood 3 but it is not as strong on this hood.

National TAB

Project: FREDDY'S - LIBERTY, MO (FULL BALANCE) [OPEN STORE]

System/Unit: Kitchen Hood Type I

Asset: KEH3 AREA: SMALL GRIDDLE

Unit Data		
	Design	**Actual**
MFG	ACCUREX	ACCUREX
Model Num	XBEW-4-S	XBEW-4-S
Job / Serial Num	-	NOT LEGIBLE
Type	TYPE I CANOPY	TYPE 1 CANOPY
Hood length	48	48
Hood Width	42	42
Supply Plenum Type	-	PSP
Supply Plenum Width	-	12
Supply Plenum Length	-	48

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	CAPTRATE SOLO
Filter Size 1	16X20	16X20
Filter Qty 1	3	3
Filter AK factor size 1	2.10	2.08
Filter Total AK Area	6.30	6.24
Filter1 FPM	-	155
Filter2 FPM	-	171
Filter3 FPM	-	177
Filter Ave FPM(corr)	-	167
CFM	900	1042

Cooking Equipment		
	Design	**Actual**
Item 1	-	GRIDDLE

Test Data Supply		
	Design	**Actual**
AK factor	-	1
Total AK Area	-	4
Kv factor (Vel)	-	0.87
Num of Readings	-	4
Reading1 FPM	-	297
Reading2 FPM	-	294
Reading3 FPM	-	221
Reading4 FPM	-	268
Ave FPM(corr)	-	270
CFM	-	940

Performance Data		
	Design	**Actual**
Exh-Supply Net CFM	-	122
Smoke Generation Type	-	45 SECOND
Cooking Equip Heat On	-	NO
Hood Capture %	-	85
End Panels Installed (Y/N)	-	YES

General		
	Design	**Actual**
Third Party Witness	-	AMANDA JAMES
Third Party Company	-	FREDDYS
Tech Witness	-	MITCHELL KERR
Tech Company	-	NATIONAL TAB

Completed By: Mitch Kerr on 04/23/2018

Notes: Smoke rolls out to the right of the hood due to a strong cross draft created by the kitchen RTU return.

Round Duct Traverse Report

System: RTU1 (LENNOX-KGA120S4B-DINING)

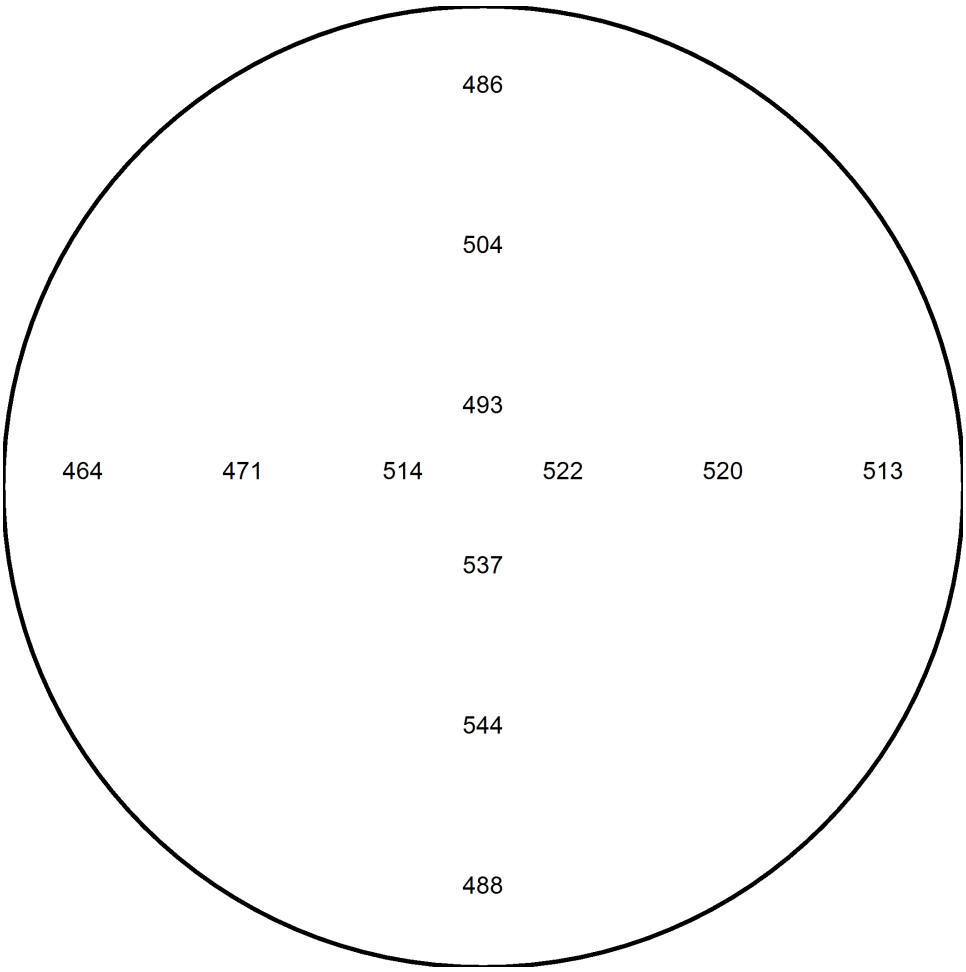
Service: SGRD18 (NA-NA-DINING)

Altitude: Density: Factor:

Duct		Design	Actual
Diameter: 8	Readings: 6	SCFM:	SCFM:
Area: 0.35		FPM:	FPM: 505
S.P.:	Temp:	CFM:	CFM: 176

Notes:

Duct Traverse Data Points



Round Duct Traverse Report

System: RTU1 (LENNOX-KGA120S4B-DINING)

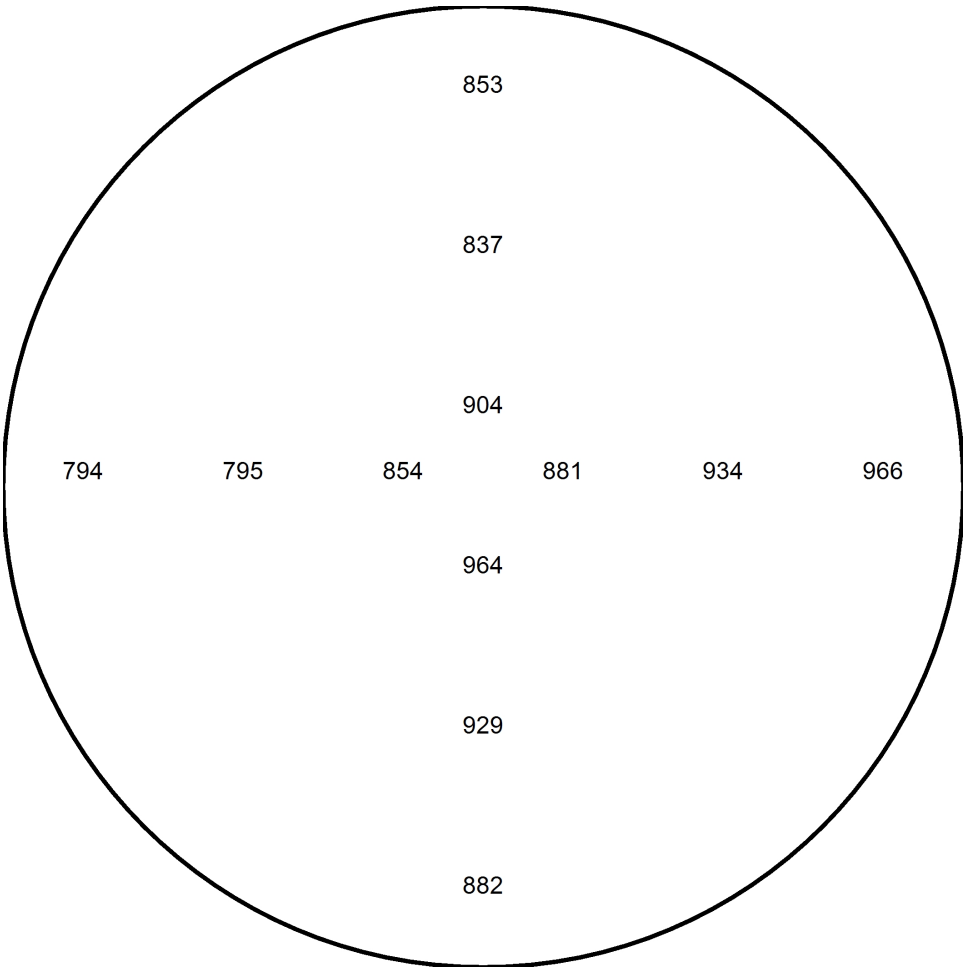
Service: SGRD16 (NA-NA-DINING); SGRD17 (NA-NA-DINING)

Altitude: Density: Factor:

Duct		Design	Actual
Diameter: 8	Readings: 6	SCFM:	SCFM:
Area: 0.35		FPM:	FPM: 883
S.P.:	Temp:	CFM:	CFM: 308

Notes:

Duct Traverse Data Points



Round Duct Traverse Report

System: RTU1 (LENNOX-KGA120S4B-DINING)

Service: SGRD3 (NA-NA-DINING); SGRD4 (NA-NA-DINING); SGRD5 (NA-NA-DINING); SGRD6 (NA-NA-DINING); SGRD7 (NA-NA-DINING); SGRD8 (NA-NA-DINING); SGRD13 (NA-NA-DINING); SGRD14 (NA-NA-DINING); SGRD15 (NA-NA-DINING)

Altitude: Density: Factor:

Duct		Design	Actual
Diameter: 18	Readings: 10	SCFM:	SCFM:
Area: 1.77		FPM: 1525	FPM: 909
S.P.:	Temp:	CFM: 2700	CFM: 1606

Notes:

This traverse is used to devlop a K.

Duct Traverse Data Points