Report By:

National TAB
1329 E. KEMPER ROAD
SUITE 4210
CINCINNATI, OH 45246

Report: TAB REPORT

Function: Test, Adjust, & Balance

Date: 02/15/2024

PROJECT

10-02-23 KROGER #018-615 - LIVONIA, MI

33523 8 MILE RD

LIVONIA, MI 48152

Client

Kroger Division 018

40393 Grand River Avenue

Novi, MI 48375

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

Table Of Contents

Project Summary

The summary below provides a quick understanding of our scope of work and general testing procedures. Enclosed in the report is further detail about your building performance including recommendations, asset data, and pictures. 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 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.

RTU's (Roof Top Units) w/ Diffusers

Each of the RTU's were measured at their terminal devices or via traverse to establish a total flow for that unit. Each RTU was adjusted to within tolerance of the engineer's design flow. Each outlet was then adjusted to within tolerance of the design flow. Outside air was measured by reading the intake air opening with a velocity grid and multiplying by the free area. The outside air damper was adjusted until the airflow was within the design requirements. Any equipment that fell outside of that tolerance is noted throughout the report.

General Exhaust Fans w/ Grilles

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 tolerance of design. Each terminal device was balanced to within tolerance of the design volume using the installed volume dampers. Any equipment that fell outside of this tolerance is noted throughout the report.

Kitchen Exhaust Hood & Associated Fans

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 within tolerance of the design flow. . Any EF's that fell outside of this tolerance is noted throughout the report.

Bakery Exhaust Fans

The bakery exhaust fans were measured by traversing the B-vent ductwork. The average velocity of these readings was multiplied by the cross-sectional area of the duct to calculate airflow. Adjustments were made to the fan speed so that the airflow is within tolerance.

Final Building Tests

After completing the test and balance the final building pressure was measured. It was confirmed that the building pressure fell within acceptable tolerances and that the pressure measurement coincides with the actual and design net airflow. Any deviations from these standards are noted throughout the report.

Issue List

- (Existing RTU-2) Upstairs Office Unit
- DOAS1/DOAS2 final filters missing
- EF-EC Significant amount of noise
- EF-EC1 low on flow
- EF-R2 (Pharmacy) low on flow
- EX-RTU-2/RTU-3 Economizers not functional
- Existing RTU-2/RTU-3 OA filters dirty
- Existing unit RTU-3 (Pickup area) low on flow
- Exusting Unit RTU-1 (Sales floor) OA damper broken
- RTU-8 Bakery High on Airflow

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : (Existing RTU-2) Upstairs Office Unit

Description : Unit is not functional at this time, spoke to Kroger technician JD, as well as Justin. They informed me the issue with the unit is it needs a new control board. Control board is ordered, and will be installed once it arrives. Please let us know when this unit is running and free of alarms.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : High

Asset Tag :

Originated Date : 10/05/2023 - Dylan Crisman - National TAB

Project Issue File Details

EXISTINGRTU-2
10/05/2023

Project Issue Response Details

- **06/20/2024 National TAB - Riley Frady**
  - 2024-06-20 Issue persists. Unit capable of pulling 700 CFM of OA when damper fully open, suggesting low discharge flow may be due to leakage in ductwork rather than low motor power.

- **10/19/2023 National TAB - Dylan Crisman**
  - Updated with photo of diffuser in question.

DiffuserServerRoom
10/19/2023

- **10/19/2023 National TAB - Dylan Crisman**
  - Unit is now functional, although when read out the unit is low on airflow at 925/1600 CFM. Also, diffuser in the conference room is operating at 35 CFM out of design of 300 CFM. Appears that a larger diffuser and duct is needed to increase airflow.

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : DOAS1/DOAS2 final filters missing

Description : DOAS-1/DOAS-2 both are missing 4 of the 8 final filters recommend installing matching 20x25x2 pleaded filters in both units.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority :

Asset Tag :

Originated Date : 10/04/2023 - Dylan Crisman - National TAB

Project Issue File Details

DOAS-1
10/04/2023

Project Issue Response Details

- **06/19/2024 National TAB - Riley Frady**
  - Correct final filters installed as of 2024-06-19

IMG_0605
06/19/2024

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : EF-EC Significant amount of noise

Description : Significant amount of noise coming from EF-EC Appears to be coming from the fan housing. Tightened down as much as I could with anchor bolts. Only slightly reduced noise.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Low

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

Project Issue Response Details

- **06/20/2024 National TAB - Riley Frady**
  - 2024-06-20 EF-EC still exhibits noise described, as well as EF-F3. A close examination of the fan at low speed suggests the fans in these units may be off balance, causing significant vibrations.
    1. Open IMG_0622.mp4
       06/20/2024
    2. Open IMG_0620.mp4
       06/20/2024

- **10/19/2023 National TAB - Dylan Crisman**
  - Updated with photo/videos
    1. Open SpaceNoise.MOV
       10/19/2023
    2. Open FanNoise.MOV
       10/19/2023

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : EF-EC1 low on flow

Description : Exhaust Fan is low on flow 501/600 CFM. Unit is at max speed on speed controller.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Low

Asset Tag :

Originated Date : 10/18/2023 - Dylan Crisman - National TAB

Project Issue File Details

EF-EC
10/18/2023

Project Issue Response Details

- **06/19/2024 National TAB - Riley Frady**
  - 2024-06-19 Fan currently operating as expected, motor controller turned down to roughly 1 O'clock and unit is moving 607/600 CFM.

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : EF-R2 (Pharmacy) low on flow

Description : Fan is at max speed on speed controller and operating at 87 CFM out of 150 CFM design

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Low

Asset Tag :

Originated Date : 10/17/2023 - Dylan Crisman - National TAB

Project Issue File Details

EF-R2
10/17/2023

Project Issue Response Details

- **06/19/2024 National TAB - Riley Frady**
  - 2024-06-19 Fan currently pulling 80/150 CFM, still low as previously reported.

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : EX-RTU-2/RTU-3 Economizers not functional

Description : Economizers on existing units RTU-2/RTU-3 Are not responding to setpoint changes on HMI controller nor DCV potentiometers. Had to be manually set.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Medium

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

Project Issue File Details

RTU-2(1)
10/19/2023

RTU-3(2)
10/19/2023

Project Issue Response Details

- **06/23/2024 National TAB - Riley Frady**
  - Example of economized behavior
    1. Open IMG_0611.mp4
       06/23/2024

- **06/19/2024 National TAB - Riley Frady**
  - 2024-06-19 E-RTU-2 damper has no response to HMI input of set point or DCV set point. E-RTU-3 has some inconsistent movement in the closing direction if damper manually opened before reducing set point, does not open under its

own motor power when HMI set points changed. Videos to follow when connected to WiFi.

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : Existing RTU-2/RTU-3 OA filters dirty

Description : OA filters for both units are considerably dirty and are restricting airflow. They need to be thoroughly cleaned or replaced.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : High

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

Project Issue File Details

RTU-3(2)
10/19/2023

RTU-2(1)
10/19/2023

Project Issue Response Details

- **06/19/2024 National TAB - Riley Frady**
  - 2024-06-19 OA filters for both units are still dirty and in need of cleaning or replacement.

IMG_0606
06/19/2024

IMG_0607
06/19/2024

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : Existing unit RTU-3 (Pickup area) low on flow

Description : Existing unit RTU-3 is low on flow. Airflow is 1283 CFM out of design of 1600 CFM. Unit is direct drive and the speed controller is set for the highest speed.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Medium

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

Project Issue File Details

RTU-3(2)
10/19/2023

Project Issue Response Details

- **06/20/2024 National TAB - Riley Frady**
  - 2024-06-20 Unit is moving 1664/1600 CFM on max cooling, within design.

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : Exusting Unit RTU-1 (Sales floor) OA damper broken

Description : Actuator for RTU-1 outside air intake is broken. Had to manually set damper to achieve design airflow. Recommend servicing and setting to the manually set position.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : High

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

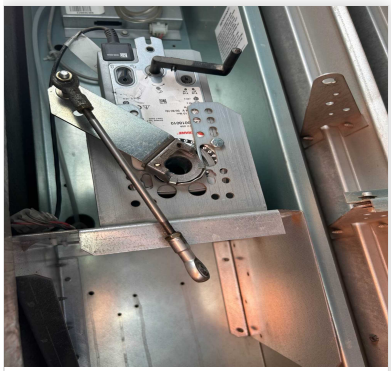
Project Issue File Details

Actuator
10/19/2023

RTU-1
10/19/2023

Project Issue Response Details

- **06/19/2024 National TAB - Riley Frady**
  - 2024-06-19 Outdoor air actuator system still nonfunctional, not connected to damper.



IMG_0612
06/19/2024

10-02-23 KROGER #018-615 - LIVONIA, MI

Project Issue Information

Issue Name : RTU-8 Bakery High on Airflow

Description : RTU-8 bakery is high on airflow. (1653 CFM out of 1550 CFM design). Adjusted the fan speed through the CORE app but there was no change in airflow.

Created By : National TAB

Assigned To : National TAB - Dylan Crisman

Status : Open

Priority : Medium

Asset Tag :

Originated Date : 10/19/2023 - Dylan Crisman - National TAB

Project Issue File Details

RTU-8
10/19/2023

NATIONAL TAB

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
DOAS 1	SALES	2500	2470	0	0	2500	2470	100.0%	100.0%						
DOAS 2	SALES	2500	2493	0	0	2500	2493	100.0%	100.0%						
RTU-1	SALES	5000	5355	5000	5355	0	0	0.0%	0.0%						
EX RTU 1	SALES	20000	18982	16000	14730	4000	4252	20.0%	22.4%						
EX RTU 2	OFFICES	1600	925	1280	597	320	328	20.0%	35.5%						
RTU-2	SALES	5000	5286	5000	5286	0	0	0.0%	0.0%						
EX RTU-3	PICKUP	1600	1283	1280	943	320	340	20.0%	26.5%						
RTU-4	PHARM.	3000	3234	2400	2605	600	629	20.0%	19.4%						
RTU-5	VESTIBLE	3000	3108	2400	2483	600	625	20.0%	20.1%						
RTU-6	SEATING	2000	1983	1600	1593	400	390	20.0%	19.7%						
RTU-7	DELI	2400	2554	1896	2032	504	522	21.0%	20.4%						
RTU-8	BAKERY	1550	1953	1230	1640	320	313	20.6%	16.0%						
RTU-9	OFFICES	1200	1126	1080	999	120	127	10.0%	11.3%						
EFG1	OVEN											900	970		
EFG2	OVEN											900	916		
EF-K	DELI											2800	2793		
EF-R1	ASSO. RR+CC													250	240
EF-EC	CLOSET													600	501
EF-R2	FAMI. RR													150	87
EF-R3	CUST. RR													400	416
EF-RC	RECY. CENTER													850	857
EF-S	SEAFOOD													800	783
TOTALS		51350	50752	39166	38263	12184	12489			0	0	4600	4679	3050	2884

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	12184	12489
TOTAL EXHAUST	7650	7563
NET AIRFLOW	4534	4926

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H20)
FRONT	
SIDE	
REAR	0.0189
AVERAGE	**0.0189**

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:

CheckList List

- SITE PICTURES
- TECH - STEP 1: INITIAL WALKTHROUGH
- TECH - STEP 2: UNIT DATA AND EVAL
- TECH - STEP 3: TEST, ADJUST AND BALANCE
- TECH - STEP 4: FINAL TESTS

10-02-23 KROGER #018-615 - LIVONIA, MI

CheckList Information

Name :	SITE PICTURES	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	10/05/2023 - Wale Odofin - National TAB		

CheckList Item Details

EX RTU-1

Comment:

EXRTU-1
10/18/2023

EXRTU-2

Comment:

EXRTU-2
10/18/2023

EX RTU-3

Comment:

EXRTU-3
10/18/2023

RTU-1

Comment:

RTU-1
10/18/2023

RTU-2

Comment:

RTU-2(1)
10/18/2023

RTU-4

Comment:

RTU-4
10/18/2023

RTU-5

Comment:

RTU-5
10/18/2023

RTU-6

Comment:

RTU-6
10/18/2023

RTU-7

Comment:

RTU-7
10/18/2023

RTU-8

Comment:

RTU-8
10/18/2023

RTU-9

Comment:

RTU-9
10/18/2023

EF-EC

Comment:

EF-EC
10/18/2023

EF-G1

Comment:

image
10/18/2023

EF-G2

Comment:

image
10/18/2023

EF-K

Comment:

image
10/18/2023

EF-R1

Comment:

image
10/18/2023

EF-R2

Comment:

image
10/18/2023

EF-R3

Comment:

image
10/18/2023

EF-RC

Comment:

image
10/18/2023

EF-S

Comment:

image
10/18/2023

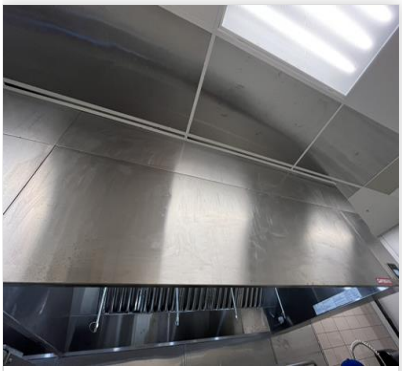
HOOD-1

Comment:

HD-1
10/18/2023

HOOD-2

Comment:



HD-2
10/18/2023

HOOD-3

Comment:

HD-3
10/18/2023

HOOD 4

Comment:

HD-4
10/18/2023

10-02-23 KROGER #018-615 - LIVONIA, MI

CheckList Information

Name :	TECH - STEP 1: INITIAL WALKTHROUGH	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	10/02/2023 - Wale Odofin - National TAB		
Completed Date :			

CheckList Item Details

INITIAL SITE WALKTHROUGH

All diffusers and grilles are installed and match design?	Yes
Comment:	
All hood filters installed and accounted for?	Yes
Comment:	
Hoods are wired and have power?	Yes
Comment:	
Hood is free of alarms?	Yes
Comment:	
Thermostats have power?	Yes
Comment:	
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	

Comment:

Yes

10-02-23 KROGER #018-615 - LIVONIA, MI

CheckList Information

Name :	TECH - STEP 2: UNIT DATA AND EVAL	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	10/02/2023 - Wale Odofin - National TAB		
Completed Date :			

CheckList Item Details

UNIT DATA AND EVALUATION WHILE GATHERING UNIT DATA CHECK THE FOLLOWING:

RTU's/AHU's

Economizers are assembled and functional?	Yes
Comment:	
DCV Max damper opening position is set to minimum?	Yes
Comment:	
Free cooling enthalpy set point set for lowest setting (Typically "D")	Yes
Comment:	
Motors are all operating below the FLA rating?	Yes
Comment:	
Are belts tight?	
Comment:	
Yes	
If direct drive unit is the speed controller working.	

Comment:

Yes

Is gas piping installed and valves turned on?	Yes

Comment:

Unit free of noticeable noise and vibration	Yes

Comment:

Sales floor RTU/AHU diffusers are directed away from open coolers and freezers	Yes

Comment:

EF's

Rotation is correct?	Yes

Comment:

Belts are tight?

Comment:

Yes

Grease cup installed on hood fan?	No

Comment:

Hinge kit installed installed on hood fan?	Yes

Comment:

Lean fan back. Is grease duct installation adequate and is duct ran all the way to the base of the fan?	Yes

Comment:

BAKERYOVENEF-1
10/04/2023

BakeryOVENEF-2
10/04/2023

DeliOvenEF
10/04/2023

Flex conduit is long enough so that fan can be completely tilted back?	Yes
Comment:	
There is no major leakage around base of fan?	No
Comment:	
Is the motor operating below the motor FLA rating?	Yes
Comment:	
For restroom fan(s) is the back draft damper installed and can it fully open?	Yes
Comment:	
Unit free of noticeable noise and vibration?	Yes
Comment:	
MUA	
Rotation is correct?	
Comment:	
Gas piping is installed and valves are in on position?	
Comment:	
Heater tested and is functional?	

Comment:	
Internal motorized damper is fully opening?	
Comment:	
Motor is operating below the FLA rating?	
Comment:	
Unit free of noticeable noise and vibration?	
Comment:	
HOODS	
Kitchen equipment installed in proper places?	Yes
Comment:	
Can kitchen equipment be turned on for final smoke test?	Yes
Comment:	
DOCUMENTATION	
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	Yes
Comment:	

10-02-23 KROGER #018-615 - LIVONIA, MI

CheckList Information

Name :	TECH - STEP 3: TEST, ADJUST AND BALANCE	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	10/02/2023 - Wale Odofin - National TAB		

CheckList Item Details

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:

DURING TESTING MAKE NOTE OF THE FOLLOWING:

Is space free of drafting?	Yes
Comment:	
Is space comfortable in all areas?	
Comment:	
Is the space free of ventilation noise?	Yes
Comment:	
If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".	
Comment:	

10-02-23 KROGER #018-615 - LIVONIA, MI

CheckList Information

Name :	TECH - STEP 4: FINAL TESTS	**Status :**	Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	10/02/2023 - Wale Odofin - National TAB		
Completed Date :			

CheckList Item Details

FINAL TESTS

HOOD CAPTURE TEST

List equipment turned on for testing

Comment:

Ovens

List smoke candle type used

Comment:

Smoke test capture - Perimeter of hood

Comment:

Observed cooking. 100%

Smoke test capture - Top of cooking surface

Comment:

Observed cooking 100%

WITNESS

Date test was completed	10/05/2023

Comment:

TAB tech name / Firm

Comment:

Dylan Crisman / National TAB Intelligence

Site super name / Firm

Comment:

Angelo

Owner representative name / Firm (if Applicable)

Comment:

Building pressure at front & back doors (All Systems On)

Comment:

0.0189”

ADDITIONAL

Do actual net building airflow, design net building airflow, and pressure coincide? If not why? (All three should either be positive or negative)

Comment:

Yes

Thermostats are programmed?	Yes

Comment:

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: DOAS1 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	CAPTIVE-AIRE
Serial Num	-	5111559
Model Num	NA	CASRTU-3-I.300-22-15T-DOAS
Type	DOAS	DOAS
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	4
OA Filter Size 1	-	16X25X2
Num Final Filter 1	-	8
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	ZIEHL-ABEGG
Frame	-	NL
Horsepower	-	5.0
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	5.1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	37%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	2500	2470
SF RPM	-	NA
RA CFM	0	0
OA CFM	2500	2470
RL Voltage	-	474
RL Amperage	-	2.7
SF Rotation	-	CCW
RA Damper Position	-	0%
Min OA Damper Position	-	100%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	NA
Fan Suction SP	-	NA
Fan Discharge SP	-	NA
Total ESP	-	NA
Fan Total SP	-	NA

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

Completed By: Dylan Crisman on 10/04/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: DOAS2 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	CAPTIVE-AIRE
Serial Num	-	5111559
Model Num	NA	CASRTU3-I.300-22-15T-DOAS
Type	DOAS	DOAS
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	4
OA Filter Size 1	-	16X25X2
Num Final Filter 1	-	8
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	ZIEHL-ABEGG
Frame	-	NL
Horsepower	-	5.0
Motor Rpm	-	NL
Phase	-	3
Rated Voltage	-	460
Rated Amperage	-	5.1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	37%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	2500	2493
SF RPM	-	NA
RA CFM	0	0
OA CFM	2500	2493
RL Voltage	-	473
RL Amperage	-	2.7
SF Rotation	-	CCW
RA Damper Position	-	0%
Min OA Damper Position	-	100%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	NA
Fan Suction SP	-	NA
Fan Discharge SP	-	NA
Total ESP	-	NA
Fan Total SP	-	NA

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

Completed By: Dylan Crisman on 10/04/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: EXISTING RTU1 AREA:

Unit Data		
	Design	**Actual**
MFG	TRANE	TRANE
Serial Num	-	C20B00965
Model Num	NA	SFHLF604HU10C89DA
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	2
OA Filter Size 1	-	58x31.5
Num Final Filter 1	-	30
Final Filter Size 1	-	16x20x2

Motor Data		
	Design	**Actual**
Motor MFG	-	CENTURY
Frame	-	Y286T
Horsepower	-	30.0
Motor Rpm	-	1765
Phase	-	3
Rated Voltage	-	460
Rated Amperage	-	36.6

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	6.5"
Motor Bore Size	-	2"
Motor Sheave SetPt	-	3 turns open
Fan Sheave Size	-	13.5"
Fan Sheave Bore	-	2"
Belt CL Distance	-	35"
Num of Belts	-	2
Belt Size	-	5VX1000
Belt Alignment	-	VERIFIED

Test Data		
	Design	**Actual**
SF CFM	20000	18982
SF RPM	-	858
RA CFM	-	14730
OA CFM	4000	4252
RL Voltage	-	484/486/482
RL Amperage	-	20.1/19.1
SF Rotation	-	CW
RA Damper Position	-	90%
Min OA Damper Position	-	10%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-1.01"
Fan Suction SP	-	-1.65"
Fan Discharge SP	-	1.54"
Total ESP	-	2.55"
Fan Total SP	-	3.19"

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

Completed By: Dylan Crisman on 10/19/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

AHU/RTU

Diffuser Supply (GRD)

EXISTING RTU1/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	SALES	CD-E	NA	4000	1.0	3887	3780	3780	94.5
SGRD2	SALES	CD-E	NA	4000	1.0	3970	3846	3846	96.2
SGRD3	SALES	CD-E	NA	4000	1.0	3867	3867	3867	96.7
SGRD4	SALES	CD-E	NA	4000	1.0	3609	3721	3721	93.0
SGRD5	SALES	CD-E	NA	4000	1.0	3690	3768	3768	94.2
Total				20000		19023	18982	18982	94.91%

Asset	Notes	Date	Written By
SGRD1	Airflow for RTU-1 not scheduled on plans. Proportionally adjusted diffuser designs to ensure 400 CFM/ton total flow for the unit.	10/05/2023	Will Turnbough

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: EXISTING RTU2 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	TRANE
Serial Num	-	200613715L
Model Num	NA	YHC048F4RHA1
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	36X16
Num Final Filter 1	-	4
Final Filter Size 1	-	16X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Frame	-	GY01
Horsepower	-	1.0
Motor Rpm	-	NL
Phase	-	1
Rated Voltage	-	460
Rated Amperage	-	4.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH SPEED
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1600	884
SF RPM	-	NA
RA CFM	-	704
OA CFM	-	180
RL Voltage	-	476/475/476
RL Amperage	-	1.7
SF Rotation	-	CW
RA Damper Position	-	95%
Min OA Damper Position	-	5%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.50"
Fan Suction SP	-	-0.64"
Fan Discharge SP	-	-0.35"
Total ESP	-	0.85"
Fan Total SP	-	1.09"

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

Completed By: Riley Frady on 06/20/2024

Diffuser Supply (GRD)

EXISTING RTU2/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	MEZZANINE	EXCD2	NA	300	1.0	205	205	220	73.3
SGRD2	MEZZANINE	EXCD1	NA	300	1.0	158	158	147	49.0
SGRD3	MEZZANINE	EXCD1	NA	150	1.0	141	141	146	97.3
SGRD4	MEZZANINE	EXCD2	NA	200	1.0	35	35	34	17.0
SGRD5	MEZZANINE	EXCD1	NA	225	1.0	193	193	149	66.2
SGRD6	MEZZANINE	EXCD1	NA	225	1.0	193	193	188	83.6
Total				1400		925	925	884	63.14%

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: EXISTING RTU3 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	TRANE
Serial Num	-	200613571L
Model Num	NA	YHC048F4RHA1
Type	-	RTU
Configuration	-	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	36X16
Num Final Filter 1	-	4
Final Filter Size 1	-	16X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Frame	-	GY01
Horsepower	-	1.0
Motor Rpm	-	NL
Phase	-	1
Rated Voltage	-	460
Rated Amperage	-	4.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH SPEED
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	-	1664
SF RPM	-	NA
RA CFM	-	1168
OA CFM	-	496
RL Voltage	-	476
RL Amperage	-	1.47/1.57
SF Rotation	-	CW
RA Damper Position	-	86%
Min OA Damper Position	-	14%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.30"
Fan Suction SP	-	-0.46"
Fan Discharge SP	-	0.28"
Total ESP	-	0.58"
Fan Total SP	-	0.74"

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

Completed By: Riley Frady on 06/20/2024

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU1 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622F01211
Model Num	LGM150U4E	LGM150U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	NA
OA Filter Size 1	-	NA
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	EBMPAPST
Frame	-	IP55
Horsepower	-	3.75
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	480
Rated Amperage	-	4.9

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	4175CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	5000	5355
SF RPM	-	NA
RA CFM	5000	5355
OA CFM	0	NA
RL Voltage	-	477/476/479
RL Amperage	-	3.0/2.9/2.9
SF Rotation	-	CW
RA Damper Position	-	100%
Min OA Damper Position	-	NA
Min OA Damper Type	-	NA
OA Enthalpy Setpt	-	NA

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-1.08"
Fan Suction SP	-	-1.49"
Fan Discharge SP	-	0.54"
Total ESP	0.4"	1.62"
Fan Total SP	-	2.03"

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

Completed By: Dylan Crisman on 10/04/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU2 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622F01211
Model Num	LGM150U4E	LGM150U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	NA
OA Filter Size 1	-	NA
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	EBMPAPST
Frame	-	IP55
Horsepower	-	3.75
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	480
Rated Amperage	-	4.9

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	4375 CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	5000	5286
SF RPM	-	NA
RA CFM	5000	5286
OA CFM	0	NA
RL Voltage	-	476/475/478
RL Amperage	-	2.8/3.0/2.8
SF Rotation	-	CW
RA Damper Position	-	5286
Min OA Damper Position	-	NA
Min OA Damper Type	-	NA
OA Enthalpy Setpt	-	NA

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.65"
Fan Suction SP	-	-1.13"
Fan Discharge SP	-	0.62"
Total ESP	0.4"	1.27"
Fan Total SP	-	1.75"

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

Completed By: Dylan Crisman on 10/04/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU4 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622E01497
Model Num	LGM092U4E	LGM092U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	2
OA Filter Size 1	-	23X14.5
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	EBMPAPST
Frame	-	IP55
Horsepower	-	3.75
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	480
Rated Amperage	-	4.9

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	2625 CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	3000	3234
SF RPM	-	NA
RA CFM	2400	2605
OA CFM	600	629
RL Voltage	-	476
RL Amperage	-	4.0
SF Rotation	-	CW
RA Damper Position	-	75%
Min OA Damper Position	-	25%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.41"
Fan Suction SP	-	-0.57"
Fan Discharge SP	-	0.23"
Total ESP	1.5"	0.64"
Fan Total SP	-	0.80"

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

Completed By: Dylan Crisman on 10/03/2023

Notes:
[1] DIFFUSER 4-11 At fully closed is still reading 60/50 CFM Could not reduce flow any further.
[2] diffusers 4-4,4-7 are high on flow. Ductwork is much higher above ceiling than i am able to get up to in order to adjust dampers to lower flow.

Written By: Dylan Crisman on 10/18/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

AHU/RTU

Diffuser Supply (GRD)

RTU4/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	PHARMACY	CD1	8"	150	1.0	156		156	104.0
SGRD2	PHARMACY	CD1	12	300	1.0	330		330	110.0
SGRD3	PHARMACY	CD1	12"	200	1.0	214		214	107.0
SGRD4	PHARMACY	CD1	10	300	1.0	400		378	126.0
SGRD5	PHARMACY	CD1	18	300	1.0	378		357	119.0
SGRD6	PHARMACY	CD1	10	300	1.0	298		298	99.3
SGRD7	PHARMACY	CD1	10	300	1.0	403		403	134.3
SGRD8	PHARMACY	CD1	10	300	1.0	297		297	99.0
SGRD9	PHARMACY	CD1	14	300	1.0	331		331	110.3
SGRD10	PHARMACY	CD1	12"	100	1.0	79		92	92.0
SGRD11	PHARMACY	CD1	12'	50	1.0	120		60	120.0
SGRD12	PHARMACY	CD4	10"	200	1.0	188		188	94.0
SGRD13	PHARMACY	CD1	8"	200	1.0	190		193	96.5
Total				3000		3384	0	3297	109.9%

Completed By: Dylan Crisman on 10/19/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU5 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622B04449
Model Num	LGM092U4E	LGM092U4E
Type	RTU	RTU
Configuration	VERTICAL3	VERTICAL
Num OA Filters 1	-	2
OA Filter Size 1	-	23X14.5
Num Final Filter 1	-	4
Final Filter Size 1	-	20X25X2

Motor Data		
	Design	**Actual**
Motor MFG	-	EBMPAPST
Frame	-	NL
Horsepower	-	3.75
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	4.3

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	2325CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	3000	3108
SF RPM	-	NA
RA CFM	2400	2483
OA CFM	600	625
RL Voltage	-	474
RL Amperage	-	4.0
SF Rotation	-	CW
RA Damper Position	-	75"
Min OA Damper Position	-	25%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.54"
Fan Suction SP	-	-0.88"
Fan Discharge SP	-	0.33"
Total ESP	1.5"	0.87"
Fan Total SP	-	1.21"

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

Completed By: Dylan Crisman on 10/03/2023

Diffuser Supply (GRD)

RTU5/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	F.E. CLEANING	CD3	NA	100	1.0	108	107	107	107.0
SGRD2	F.E. CLEANING	CD3	NA	50	1.0	36	53	53	106.0
SGRD3	F.E. CLEANING	CD2	NA	50	1.0	71	54	54	108.0
SGRD4	F.E. CLEANING	ADB3	NA	2800	1.0	2934	2894	2894	103.4
Total				3000		3149	3108	3108	103.6%

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU6 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G07017
Model Num	LGH060U4E	LGH060H4EH5G
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29x15
Num Final Filter 1	-	4
Final Filter Size 1	-	20x20x2

Motor Data		
	Design	**Actual**
Motor MFG	-	NL
Frame	-	NL
Horsepower	-	1
Motor Rpm	-	NL
Phase	3	1
Rated Voltage	480	NL
Rated Amperage	-	3.7

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH SPEED
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	2000	1983
SF RPM	-	NA
RA CFM	1600	1593
OA CFM	400	390
RL Voltage	-	481/483/485
RL Amperage	-	3.5/3.6/3.4
SF Rotation	-	CW
RA Damper Position	-	71%
Min OA Damper Position	-	29%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	D

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.40"
Fan Suction SP	-	-0.63"
Fan Discharge SP	-	0.22"
Total ESP	1.5"	0.62"
Fan Total SP	-	0.85"

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

Completed By: Dylan Crisman on 10/19/2023

Diffuser Supply (GRD)

RTU6/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	STORAGE	SR1	16'	400	1.0	692	399	399	99.8
SGRD2	STORAGE	SR1	16"	400	1.0	720	409	409	102.3
SGRD3	STORAGE	SR1	16"	400	1.0	578	401	401	100.3
SGRD4	STORAGE	CD4	14"	250	1.0	255	250	250	100.0
SGRD5	STORAGE	CD4	12"	300	1.0	270	287	287	95.7
SGRD6	STORAGE	CD4	10	250	1.0	263	237	237	94.8
Total				2000		2778	1983	1983	99.15%

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU7 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622B02240
Model Num	LGM074U4E	LGM074U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X15
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	NL
Frame	-	NL
Horsepower	-	1.5
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	2.3

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	2100CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	2400	2554
SF RPM	-	NA
RA CFM	1896	2032
OA CFM	504	522
RL Voltage	-	474
RL Amperage	-	3.9
SF Rotation	-	CW
RA Damper Position	-	72%
Min OA Damper Position	-	28%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.75"
Fan Suction SP	-	-1.18"
Fan Discharge SP	-	0.34"
Total ESP	1.5"	1.09"
Fan Total SP	-	1.52"

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

Completed By: Dylan Crisman on 10/03/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

AHU/RTU

Diffuser Supply (GRD)

RTU7/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	DELI	CD1	10"	300	1.0	219	289	289	96.3
SGRD2	DELI	CD1	10"	300	1.0	291	309	309	103.0
SGRD3	DELI	CD1	10"	300	1.0	352	317	317	105.7
SGRD4	DELI	CD1	10"	300	1.0	389	324	324	108.0
SGRD5	DELI	CD1	10"	300	1.0	241	303	303	101.0
SGRD6	DELI	CD1	10"	300	1.0	343	310	310	103.3
SGRD7	DELI	CD1	10"	300	1.0	362	317	317	105.7
SGRD8	DELI	CD1	10"	300	1.0	357	314	314	104.7
Total				2400		2554	2483	2483	103.46%

Completed By: Dylan Crisman on 10/17/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU8 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622K00648
Model Num	LGH048U4E	LGH048U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	15X15
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	NL
Frame	-	NL
Horsepower	-	1.5
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	2.3

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	1200CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1550	1953
SF RPM	-	NA
RA CFM	1230	1640
OA CFM	320	313
RL Voltage	-	481/480/482
RL Amperage	-	1.0/1.1/1.1
SF Rotation	-	CW
RA Damper Position	-	NA
Min OA Damper Position	-	51%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	12.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.12"
Fan Suction SP	-	-0.25"
Fan Discharge SP	-	0.36"
Total ESP	1.0"	0.48"
Fan Total SP	-	0.61"

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

Completed By: Dylan Crisman on 10/17/2023

Notes:
Changing speed setpoints in Lennox Core App, had no effect on blower speed. Could not get into design airflow. unit is high at 1953/1600. 122%
Action taken: Proportionally balanced diffusers High.

Written By: Dylan Crisman on 10/17/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

AHU/RTU

Diffuser Supply (GRD)

RTU8/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	BAKERY PREP	CD1	10"	400	1.0	441	478	478	119.5
SGRD2	BAKERY PREP	CD1	16"	400	1.0	557	485	485	121.3
SGRD3	BAKERY PREP	CD1	10"	400	1.19	439	489	489	122.3
SGRD4	BAKERY PREP	CD1	10"	400	1.0	554	501	501	125.3
Total				1600		1991	1953	1953	122.06%

Completed By: Dylan Crisman on 10/17/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: AHU/RTU

Asset: RTU9 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622K00649
Model Num	LGM036U4E	LGM036U4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	15X15
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	NL
Frame	-	NL
Horsepower	-	1.5
Motor Rpm	-	NL
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	2.3

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	1375CFM
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1200	1126
SF RPM	-	NA
RA CFM	1080	999
OA CFM	120	127
RL Voltage	-	485/486/488
RL Amperage	-	1.0/1.1/1.2
SF Rotation	-	CW
RA Damper Position	-	NA
Min OA Damper Position	-	27%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	12.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.14"
Fan Suction SP	-	-0.34"
Fan Discharge SP	-	0.38"
Total ESP	1.5"	0.52"
Fan Total SP	-	0.72"

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

Completed By: Dylan Crisman on 10/17/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

AHU/RTU

Diffuser Supply (GRD)

RTU9/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
SGRD1	BACK OFFICES	CD1	8"	120	1.0	116	163	118	98.3
SGRD2	BACK OFFICES	CD1	14"	140	1.0	117	202	132	94.3
SGRD3	BACK OFFICES	CD1	10"	300	1.0	184	207	271	90.3
SGRD4	BACK OFFICES	CD1	12"	140	1.0	137	269	128	91.4
SGRD5	BACK OFFICES	CD3	12"	100	1.0	61	89	92	92.0
SGRD6	BACK OFFICES	CD2	6"	50	1.0	38	41	52	104.0
SGRD7	BACK OFFICES	CD4	10"	300	1.0	170	111	279	93.0
SGRD8	BACK OFFICES	CD2	6"	50	1.0	49	51	54	108.0
Total				1200		872	1133	1126	93.83%

Completed By: Dylan Crisman on 10/17/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFEC1 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DR12HFA	DR12HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	-	1/6
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	1.9
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	600	607
Fan RPM	1379	~1360
Fan Rotation	-	CCW
Motor RPM	-	1625
System SetPt	-	MAX SPEED @ DIAL
RL Voltage	-	NA
RL Amperage	-	0.95
Total ESP	0.125	0.85"
Fan Inlet SP	-	-0.85"
Fan Discharge SP	-	ATM

Completed By: Riley Frady on 06/20/2024

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFG1 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DU50HFA	DU50HFA
Serial Num	-	5110396
Type	UPBLAST	UPBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	48Y
Horsepower	-	0.500
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	4.2
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	900	916
Fan RPM	1380	1035
Fan Rotation	-	CCW
Motor RPM	-	1035
System SetPt	-	MARKED ON SPEED DIAL
RL Voltage	-	117
RL Amperage	-	6.2
Total ESP	1.1	0.75"
Fan Inlet SP	-	-0.75"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFG2 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DU50HFA	DU50HFA
Serial Num	-	5110396
Type	UPBLAST	UPBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	48Y
Horsepower	-	0.500
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	4.2
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	900	970
Fan RPM	1380	1104
Fan Rotation	-	CCW
Motor RPM	-	1104
System SetPt	-	MARKED @ SPEED DIAL
RL Voltage	-	118
RL Amperage	-	8.1
Total ESP	1.1	0.46"
Fan Inlet SP	-	-0.46"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFK4 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DU180HFA	DU180HFA
Serial Num	-	5110396
Type	UPBLAST	UPBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	TECO WESTINGHOUSE
Frame	-	182T
Horsepower	-	1.5
Motor Rpm	-	1170
Phase	3	3
Voltage (rated)	208	230
Amperage (rated)	-	6.01
Service Factor	-	1.15

Test Data		
	Design	**Actual**
CFM	2800	2793
Fan RPM	1210	1170
Fan Rotation	-	CCW
Motor RPM	-	1170
System SetPt	-	60Hz
RL Voltage	-	183/183/183
RL Amperage	-	5.3/5.4/5.6
Total ESP	0.125	0.87"
Fan Inlet SP	-	-0.87"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFR1 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DR10HFA	DR10HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	-	1/15
Motor Rpm	-	1550
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	0.94
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	250	240
Fan RPM	1300	1300
Fan Rotation	-	CCW
Motor RPM	-	1300
System SetPt	-	Marked @ SPEED DIAL
RL Voltage	-	NA
RL Amperage	-	0.6
Total ESP	0.125"	0.11"
Fan Inlet SP	-	-0.11"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

FAN - Exhaust

Diffuser Ret/Exh (GRD)

EFR1/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
EGRD1	CLEANING	EG2	6	50	1.0	58	52	52	104.0
EGRD2	CLEANING	EG1	6	100	1.0	88	92	92	92.0
EGRD3	CLEANING	EG1	8	100	1.0	94	96	96	96.0
Total				250		240	240	240	96%

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFR2 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	DR10HFA	DR10HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	-	1/15
Motor Rpm	-	1550
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	0.94
Service Factor	-	NL

Test Data		
	Design	**Actual**
CFM	150	87
Fan RPM	847	1550
Fan Rotation	-	CCW
Motor RPM	-	1550
System SetPt	-	100%
RL Voltage	-	NA
RL Amperage	-	0.5
Total ESP	0.25"	0.11"
Fan Inlet SP	-	-0.11"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/18/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFR3 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	CAPTIVE-AIRE
Model Num	NA	DR12HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	NL
Horsepower	-	1/6
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	1.9
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	400	416
Fan RPM	1230	1137
Fan Rotation	-	CCW
Motor RPM	-	1137
System SetPt	-	MARKED @ SPEED DIAL
RL Voltage	-	NA
RL Amperage	-	NA
Total ESP	0.25	0.26"
Fan Inlet SP	-	-0.26"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/18/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

FAN - Exhaust

Diffuser Ret/Exh (GRD)

EFR3/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
EGRD1	CLEANING	EG1	12"	200	1.0	277	214	214	107.0
EGRD2	CLEANING	EG1	12"	200	1.0	261	202	202	101.0
Total				400		538	416	416	104%

Completed By: Dylan Crisman on 10/18/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFRC8 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	CAPTIVE-AIRE
Model Num	NA	DR30HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	488Y
Horsepower	-	0.250
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	1.5
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	850	857
Fan RPM	1233	731
Fan Rotation	-	CCW
Motor RPM	-	8731
System SetPt	-	45%
RL Voltage	-	NA
RL Amperage	-	1.3
Total ESP	0.25	0.22"
Fan Inlet SP	-	-0.22"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/19/2023

Notes:
Unable to get to dampers for recycling runs, dampers 25ft up.
[1] Mset shows 8 diffusers/runs, on site there is only 5 total. 4 going into recycling, 1 in the back left corner above mop sink.

Written By: Dylan Crisman on 10/19/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

FAN - Exhaust

Diffuser Ret/Exh (GRD)

EFRC8/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
EGRD1	RECYCLING	NA	8"	100	1.0	199	119	119	119.0
EGRD2	RECYCLING	NA	14"	100	1.0	322	170	170	170.0
EGRD3	RECYCLING	NA	14"	100	1.0	322	193	193	193.0
EGRD4	RECYCLING	NA	12"	100	1.0	308	184	184	184.0
EGRD5	RECYCLING	NA	10	100	1.0	200	120	120	120.0
EGRD6	RECYCLING	NA	10"	100	1.0	119	71	71	71.0
EGRD7	RECYCLING	NA	8'	100	1.0	[1]	[1]		-
EGRD8	RECYCLING	NA	6"	100	1.0	[1]	[1]		-
EGRD9	RECYCLING	NA	6"	50	1.0	[1]	[1]		-
Total				850		1470	857	857	100.82%

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: FAN - Exhaust

Asset: EFS9 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	CAPTIVE-AIRE
Model Num	NA	DR12HFA
Serial Num	-	5110396
Type	DOWNBLAST	DOWNBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	HSSA
Frame	-	42Y
Horsepower	-	1/6
Motor Rpm	-	1625
Phase	1	1
Voltage (rated)	115	115
Amperage (rated)	-	1.9
Service Factor	-	1.0

Test Data		
	Design	**Actual**
CFM	800	783
Fan RPM	1625	1462
Fan Rotation	-	CCW
Motor RPM	-	1462
System SetPt	-	MARKED @ SPEED DIAL
RL Voltage	-	NA
RL Amperage	-	1.3
Total ESP	0.25	0.14"
Fan Inlet SP	-	-0.14"
Fan Discharge SP	-	ATM

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project:10-02-23 KROGER #018-615 - LIVONIA, MI

FAN - Exhaust

Diffuser Ret/Exh (GRD)

EFS9/

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
EGRD1	PREP	EG-3	8"	200	1.0	184	191	191	95.5
EGRD2	PREP	EG-3	8"	150	1.0	149	154	154	102.7
EGRD3	PREP	EG-3	12"	150	1.0	146	150	150	100.0
EGRD4	PREP	EG-3	8"	150	1.0	137	142	142	94.7
EGRD5	PREP	EG-3	8"	150	1.0	142	146	146	97.3
Total				800		758	783	783	97.88%

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: Kitchen Hood Type I

Asset: HD1 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	6024-ND2	6024-ND2
Job / Serial Num	-	5110396
Type	TYPE I	TYPE I
Hood length	96"	96"
Hood Width	60	60"

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	BAFFLE
Filter Size 1	16X16	16X16
Filter Qty 1	5	5
Filter AK factor size 1	1.62	1.62
Filter Total AK Area	8.1	8.1
Filter1 FPM	-	148
Filter2 FPM	-	170
Filter3 FPM	-	188
Filter4 FPM	-	166
Filter5 FPM	-	168
Filter Ave FPM(corr)	-	168
CFM	1400	1360

Cooking Equipment		
	Design	**Actual**
Item 1	-	OVEN
Item 2	-	OVEN

Completed By: Dylan Crisman on 10/16/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: Kitchen Hood Type I

Asset: HD2 AREA:

Unit Data		
	Design	**Actual**
MFG	CAPTIVEAIRE	CAPTIVEAIRE
Model Num	6024-ND2	6024-ND2
Job / Serial Num	-	5110396
Type	TYPE I	TYPE I
Hood length	96"	96"
Hood Width	60"	60"

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	BAFFLE
Filter Size 1	16X16	16X16
Filter Qty 1	5	5
Filter AK factor size 1	1.62	1.62
Filter Total AK Area	8.1	8.1
Filter1 FPM	-	164
Filter2 FPM	-	165
Filter3 FPM	-	207
Filter4 FPM	-	185
Filter5 FPM	-	166
Filter Ave FPM(corr)	-	177
CFM	1400	1433

Cooking Equipment		
	Design	**Actual**
Item 1	-	OVEN
Item 2	-	OVEN

Completed By: Dylan Crisman on 10/16/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: Kitchen Hood Type I

Asset: HD3 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	BAXTER
Model Num	NA	PG-ND-BDL-O-(BAX-DR)
Job / Serial Num	-	GI-0323
Type	-	TYPE II CANOPY
Hood length	-	
Hood Width	-	

Test Data Exhaust		
	Design	**Actual**
Filter Type	-	NA
Filter Size 1	-	NA
Filter Size 2	-	NA
Filter Qty 1	-	NA
Filter Qty 2	-	NA
Filter AK factor size 1	-	NA
Filters AK factor size 2	-	NA
Filter Total AK Area	-	11.28
Filter1 FPM	-	79
Filter2 FPM	-	89
Filter3 FPM	-	69
Filter4 FPM	-	85
Filter5 FPM	-	77
Filter6 FPM	-	102
Filter7 FPM	-	93
Filter8 FPM	-	101
Filter Ave FPM(corr)	-	86
CFM	-	970

Cooking Equipment		
	Design	**Actual**
Item 1	-	OVEN
Item 2	-	

Completed By: Dylan Crisman on 10/05/2023

National TAB

Project: 10-02-23 KROGER #018-615 - LIVONIA, MI

System/Unit: Kitchen Hood Type I

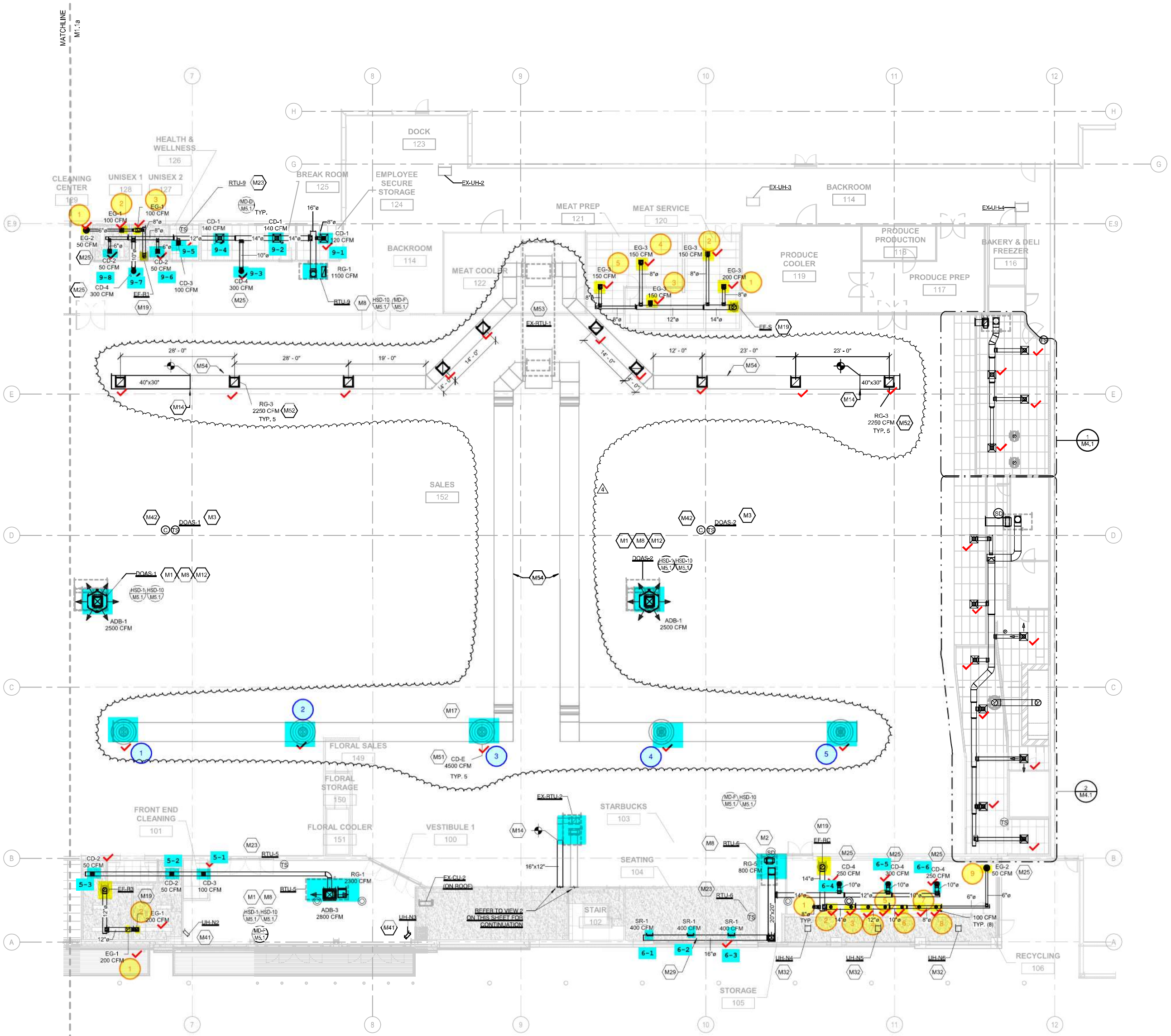
Asset: HD4 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	BAXTER
Model Num	NA	NL
Job / Serial Num	-	GI-6-16 05023
Type	-	TYPE II CANOPY
Hood length	-	
Hood Width	-	

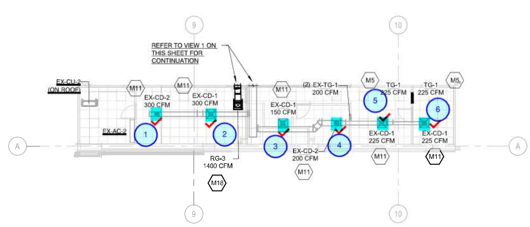
Test Data Exhaust		
	Design	**Actual**
Filter Type	-	NA
Filter Size 1	-	NA
Filter Size 2	-	NA
Filter Qty 1	-	NA
Filter Qty 2	-	NA
Filter AK factor size 1	-	NA
Filters AK factor size 2	-	NA
Filter Total AK Area	-	8.33
Filter1 FPM	-	111
Filter2 FPM	-	83
Filter3 FPM	-	92
Filter4 FPM	-	106
Filter5 FPM	-	146
Filter6 FPM	-	113
Filter7 FPM	-	117
Filter8 FPM	-	116
Filter Ave FPM(corr)	-	110
CFM	-	916

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

Completed By: Dylan Crisman on 10/05/2023



HVAC PLAN
SCALE: 3/32" = 1'-0"



HVAC MEZZANINE PLAN
SCALE: 3/32" = 1'-0"

KEYNOTE LEGEND

NUMBER	KEYNOTE
M1	DROP BOX DIFFUSER SYSTEM. REFER TO DIFFUSER SCHEDULE FOR AES MODEL NUMBERS AND QUANTITIES. REFER TO PLANS FOR THROW DIRECTIONS AND CFM.
M2	INSTALL SMOKE DETECTOR IN THE RETURN DUCTWORK DOWNSTREAM OF FILTERS AND UPSTREAM OF ANY BRANCH CONNECTIONS. TO BE INSTALLED PER MMC 606.3. INSTALL SAMPLING TUBES(S) AND DETECTOR HOUSING IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. DETECTOR,FAN SHUTDOWN WIRING, AND CONTROLS BY OTHERS - PER MMC 606.1,2,3,4.
M3	TEMPERATURE SENSOR FOR ROOF MOUNTED RTU FURNISHED BY CONTROL PROVIDER. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR 7'-6" AFF ON COLUMN. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.
M5	INSTALL TRANSFER GRILLE IN WALL. COORDINATE FINAL MOUNTING HEIGHTS WITH OWNER AND ARCHITECT.
M8	REFER TO ARCHITECTURAL ROOF PLAN FOR HVAC ROOFTOP DIMENSIONAL INFORMATION. REFER TO STRUCTURAL DRAWINGS FOR JOIST AND BEAM LOCATIONS AND DIMENSIONAL INFORMATION.
M11	LAY-IN EXISTING DIFFUSERS INTO NEW CEILING AS NECESSARY. CFM VALUES SHOWN ARE BASED ON EXISTING INFORMATION AT TIME OF DESIGN. CONTRACTOR TO VERIFY AND CONFIRM.
M12	REFER TO SHEETS M5.7 AND M5.8 FOR DETAILED INFORMATION REGARDING DOAS UNIT, INCLUDING SCHEDULES.
M14	CONNECT TO EXISTING DUCT AS INDICATED. MATCH EXISTING SIZE. SIZE SHOWN IS BASED ON EXISTING INFORMATION AVAILABLE AT TIME OF DESIGN. CONTRACTOR TO VERIFY AND CONFIRM. PROVIDE BALANCE DAMPER TRANSITIONS, OFFSETS, ETC. FOR A FULLY FUNCTIONAL, BALANCED SYSTEM.
M17	WIPE DOWN AND CLEAN ALL NEW AND EXISTING AIR DEVICES TO REMAIN. FIELD VERIFY EXACT QUANTITY. SCOPE OF WORK INCLUDES ALL AIR DEVICES IN FACILITY, INCLUDING AREAS NOTED AS EXISTING TO REMAIN OR NO SCOPE.
M18	NEW RETURN GRILLE TO SERVE ENTIRE MEZZANINE SPACE. CFM VALUE SHOWN IS BASED ON EXISTING INFORMATION AVAILABLE AT TIME OF DESIGN. BALANCE SYSTEM AND ADJUST AS NECESSARY.
M19	EXTEND FULL SIZE DUCTWORK (CURB SIZE) UP THROUGH ROOF AND SEAL OPENING AIRTIGHT. REFER TO SHEETS M5.4 AND M5.5 FOR DETAILED INFORMATION REGARDING EXHAUST FANS, INCLUDING SCHEDULES.
M23	TEMPERATURE SENSOR FOR ROOF MOUNTED RTU FURNISHED BY CONTROL PROVIDER. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR A MINIMUM OF 4'-0" AFF ON WALL. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.
M25	DIFFUSER/GRILLE TO BE INSTALLED 10'-0" AFF.
M29	MODIFY EXISTING CHASE AS NECESSARY FOR NEW DUCT RUN AND SUPPLY DIFFUSERS.
M32	CEILING MOUNTED HEATER. VERIFY LOCATION AND REQUIREMENTS WITH OWNER. CONTRACTOR TO INSTALL PER MANUFACTURER'S SPECIFIC INSTALLATION INSTRUCTIONS. REFER TO SHEET M6.1 FOR MORE INFORMATION.
M41	SUSPENDED ELECTRIC HEATER USING THREADED ROD TO UNISTRUT CHANNEL OR APPROVED EQUAL. MOUNT 12'-0" AFF TO BOTTOM OF UNIT. VERIFY LOCATION AND REQUIREMENTS WITH OWNER. REFER TO M6.1 FOR MORE INFORMATION.
M42	CO2 SENSOR FOR SALES FLOOR TO BE MOUNTED 7'-6" AFF ON COLUMN.
M51	REBALANCE EXISTING SUPPLY DIFFUSER AS INDICATED.
M52	PROVIDE RETURN GRILLE. MOUNT TO RETURN DUCT. REFER TO SCHEDULE.
M53	REBALANCE EXISTING ROOFTOP UNIT. REFER TO OUTSIDE AIR SCHEDULE AND BUILDING AIR BALANCE SCHEDULE.
M54	PAINT SUPPLY AND RETURN MAINS AND AIR DEVICES. COORDIATE WITH KROGER REPRESENTATIVE FOR FINISH REQUIRMENTS.

GENERAL NOTES

A.	REFER TO ABBREVIATIONS, SYMBOLS AND NOTES DRAWING M0.1 FOR HVAC GENERAL NOTES.
B.	WHERE SMOKE DETECTORS ARE INSTALLED MORE THAN 10 FEET ABOVE THE FINISHED FLOOR OR IN ARRANGEMENT WHERE THE DETECTOR'S ALARM OR SUPERVISORY INDICATOR IS NOT VISIBLE TO RESPONDING PERSONNEL, THE DETECTOR SHALL BE PROVIDED WITH REMOTE ALARM OR SUPERVISORY INDICATOR IN A LOCATION ACCEPTABLE TO AUTHORITY HAVING JURISDICTION. PROVIDE AN LED INDICATOR LIGHT ON CEILING BENEATH EACH HVAC UNIT THAT IS EQUIPPED WITH A SMOKE DETECTOR WHEN ACTIVATION LIGHT IS NOT VISIBLE FROM BELOW.
C.	COORDINATE ALL WORK WITH THE KROGER PROJECT MANAGER AND GENERAL CONTRACTOR FOR EXPANSION REMODEL PHASING. REFER TO THE KROGER PHASING PLAN ON G1.1 PROVIDED IN THE ARCHITECTURAL PLANS FOR ADDITIONAL REQUIREMENTS.

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REVIEWED BY: JCL

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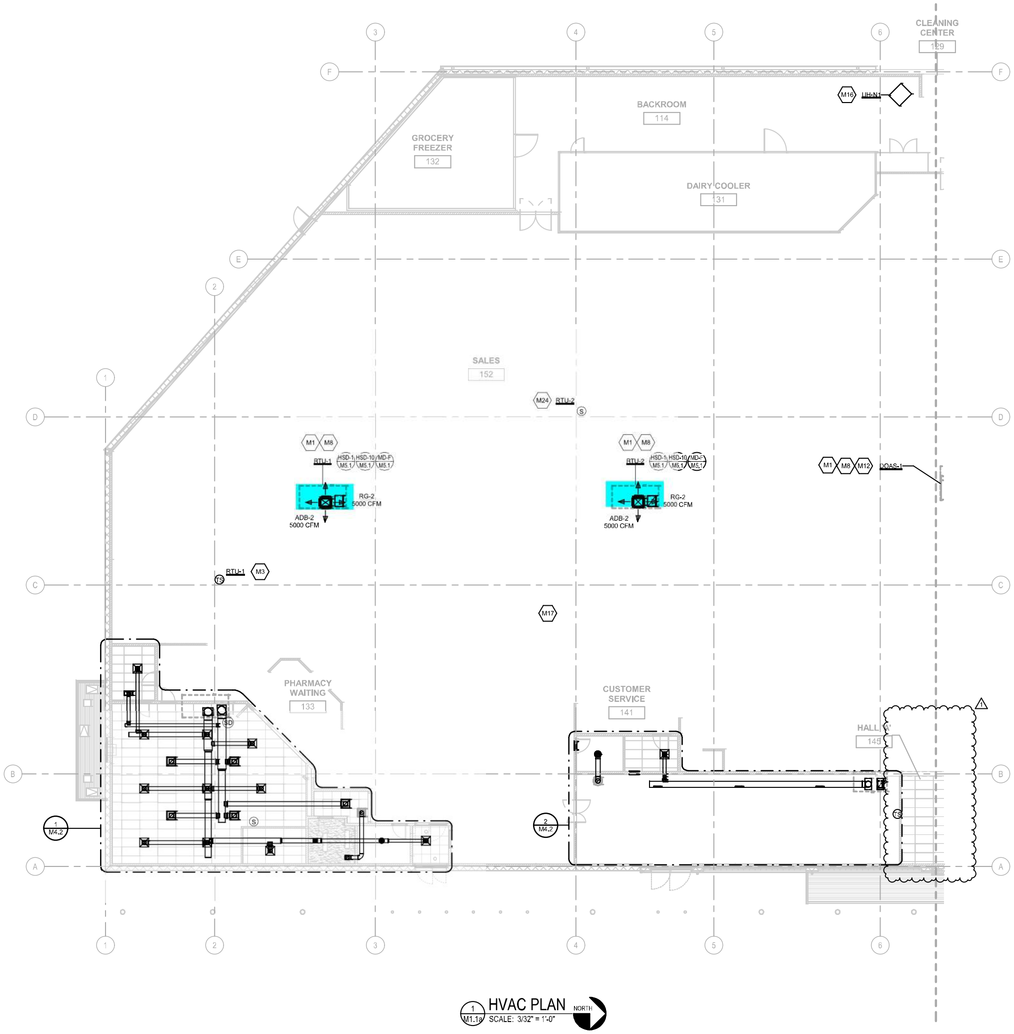
DATE	ISSUE

#	DATE	REVISION
1	12/07/2021	ADDENDUM NO. 2
2	01/03/2022	ADDENDUM NO. 4
3	10/14/2022	BULLETIN NO. 4
4	03/10/2023	BULLETIN NO. 6

Date: 6/27/2024

PROJECT TITLE
KROGER STORE
D615
33523 Eight Mile Rd.
Livonia, MI 48152

COMMISSION NO. 521342
ISSUE DATE 10/27/2021
SHEET TITLE
HVAC PLAN
SHEET NO.
M1.1b



1 HVAC PLAN
M1.1a SCALE: 3/32" = 1'-0"

KEYNOTE LEGEND

NUMBER	KEYNOTE
M1	DROP BOX DIFFUSER SYSTEM. REFER TO DIFFUSER SCHEDULE FOR AES MODEL NUMBERS AND QUANTITIES. REFER TO PLANS FOR THROW DIRECTIONS AND CFM.
M3	TEMPERATURE SENSOR FOR ROOF MOUNTED RTU FURNISHED BY CONTROL PROVIDER. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR 7'-6" AFF ON COLUMN. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.
M8	REFER TO ARCHITECTURAL ROOF PLAN FOR HVAC ROOFTOP DIMENSIONAL INFORMATION. REFER TO STRUCTURAL DRAWINGS FOR JOIST AND BEAM LOCATIONS AND DIMENSIONAL INFORMATION.
M12	REFER TO SHEETS M5.7 AND M5.8 FOR DETAILED INFORMATION REGARDING DOAS UNIT, INCLUDING SCHEDULES.
M16	GAS FIRED UNIT HEATER. ROUTE CONTROL WIRING BACK TO BUILDING CONTROL PANEL. PROVIDE CONCENTRIC VENT UP THROUGH ROOF. MOUNT UNIT PER MANUFACTURER'S GUIDELINES, ROUTE CONDENSATE TO NEAREST HUB DRAIN. MAINTAIN ALL MANUFACTURER AND CODE REQUIRED CLEARANCES.
M17	WIPE DOWN AND CLEAN ALL NEW AND EXISTING AIR DEVICES TO REMAIN. FIELD VERIFY EXACT QUANTITY. SCOPE OF WORK INCLUDES ALL AIR DEVICES IN FACILITY, INCLUDING AREAS NOTED AS EXISTING TO REMAIN OR NO SCOPE.
M24	COMBINATION RELATIVE HUMIDITY/TEMPERATURE SENSOR TO BE MOUNTED 7'-6" AFF AND, IN THE CASE OF RTU-2, USED FOR CYCLING ANTI-SWEAT CASE HEATERS AND HVAC HUMIDITY CONTROL.

GENERAL NOTES

A.	REFER TO ABBREVIATIONS, SYMBOLS AND NOTES DRAWING M0.1 FOR HVAC GENERAL NOTES.
B.	WHERE SMOKE DETECTORS ARE INSTALLED MORE THAN 10 FEET ABOVE THE FINISHED FLOOR OR IN ARRANGEMENT WHERE THE DETECTOR'S ALARM OR SUPERVISORY INDICATOR IS NOT VISIBLE TO RESPONDING PERSONNEL, THE DETECTOR SHALL BE PROVIDED WITH REMOTE ALARM OR SUPERVISORY INDICATOR IN A LOCATION ACCEPTABLE TO AUTHORITY HAVING JURISDICTION. PROVIDE AN LED INDICATOR LIGHT ON CEILING BENEATH EACH HVAC UNIT THAT IS EQUIPPED WITH A SMOKE DETECTOR WHEN ACTIVATION LIGHT IS NOT VISIBLE FROM BELOW.
C.	COORDINATE ALL WORK WITH THE KROGER PROJECT MANAGER AND GENERAL CONTRACTOR FOR EXPANSION REMODEL PHASING. REFER TO THE KROGER PHASING PLAN ON G1.1 PROVIDED IN THE ARCHITECTURAL PLANS FOR ADDITIONAL REQUIREMENTS.

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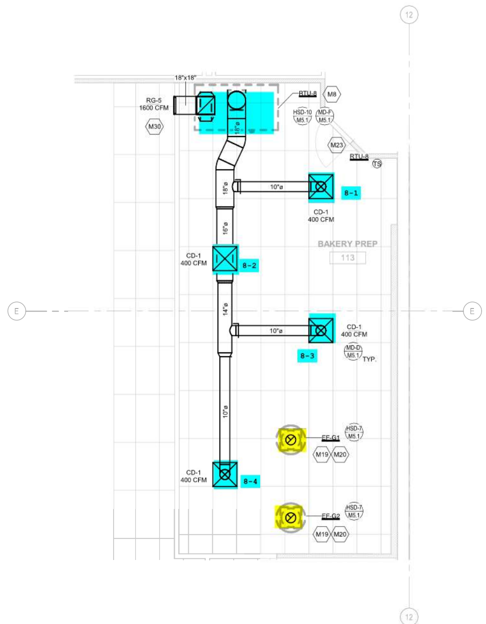
DATE	ISSUE

#	DATE	REVISION
1	01/03/2022	ADDENDUM NO. 4

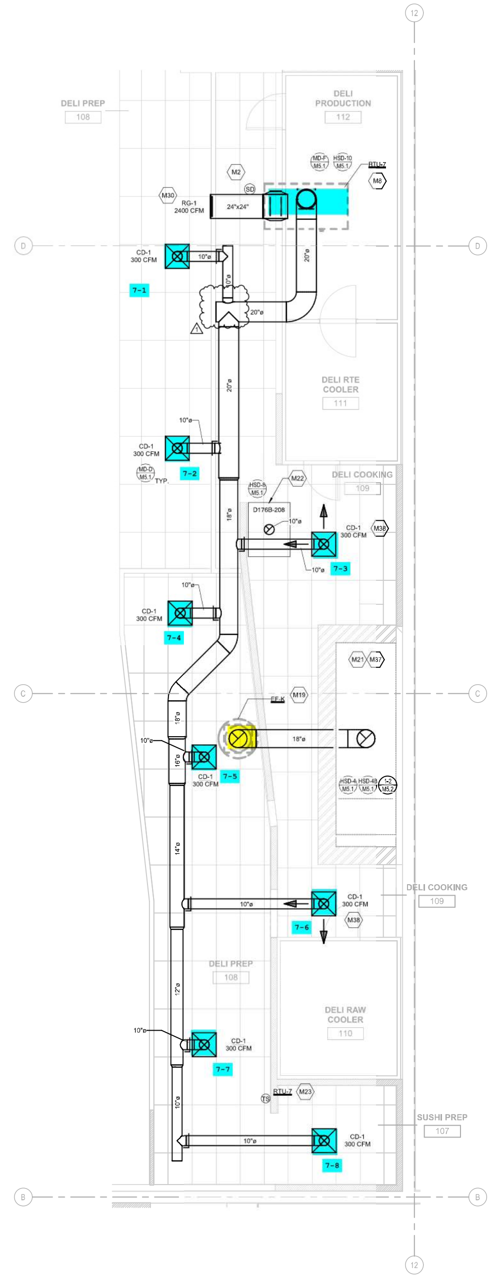
PROJECT TITLE
KROGER STORE
D615
33523 Eight Mile Rd.
Livonia, MI 48152

COMMISSION NO. 521342
ISSUE DATE 10/27/2021
SHEET TITLE
HVAC PLAN

SHEET NO.
M1.1a



HVAC ENLARGED PLAN
SCALE: 1/4" = 1'-0"



HVAC ENLARGED PLAN
SCALE: 1/4" = 1'-0"

KEYNOTE LEGEND

NUMBER	KEYNOTE
M2	INSTALL SMOKE DETECTOR IN THE RETURN DUCTWORK DOWNSTREAM OF FILTERS AND UPSTREAM OF ANY BRANCH CONNECTIONS. TO BE INSTALLED PER MMC 606.3. INSTALL SAMPLING TUBES(S) AND DETECTOR HOUSING IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. DETECTOR,FAN SHUTDOWN WIRING, AND CONTROLS BY OTHERS - PER MMC 606.1,2,3,4.
M8	REFER TO ARCHITECTURAL ROOF PLAN FOR HVAC ROOFTOP DIMENSIONAL INFORMATION. REFER TO STRUCTURAL DRAWINGS FOR JOIST AND BEAM LOCATIONS AND DIMENSIONAL INFORMATION.
M19	EXTEND FULL SIZE DUCTWORK (CURB SIZE) UP THROUGH ROOF AND SEAL OPENING AIRTIGHT. REFER TO SHEETS M5.4 AND M5.5 FOR DETAILED INFORMATION REGARDING EXHAUST FANS, INCLUDING SCHEDULES.
M20	VENT DUCT UP FROM OVEN RACK VENT COLLAR THROUGH ROOF. DUCTS ARE ONLY TO BE OFFSET ABOVE CEILING TILE. DUCTS ARE TO BE STRAIGHT AND VERTICAL WHEN VISIBLE TO SALES FLOOR.
M21	GREASE DUCT FROM EXHAUST HOOD TO OPENING THROUGH ROOF PER NFPA 96. H.C. TO INSTALL PROVIDED HOME KIT. DUCTWRAP TO BE INSTALLED THE ENTIRE LENGTH OF GREASE DUCT FROM CEILING PENETRATION TO FAN.
M22	INSTALL UW-50 VENT KIT INCLUDED WITH UNIT AND SUPPLIED BY HOBART. H.C. TO CONNECT STAINLESS STEEL DUCT TO VENT KIT OPENING THROUGH ROOF.
M23	TEMPERATURE SENSOR FOR ROOF MOUNTED RTU FURNISHED BY CONTROL PROVIDER. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR A MINIMUM OF 4'-0" AFF ON WALL. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.
M30	INSTALL RETURN GRILLE 13'0" AFF. COORDINATE LOCATION WITH ARCHITECT AND WITH DECOR. LOCATION OF DECOR TAKES PRECEDENCE OVER LOCATION OF RETURN GRILLE.
M37	REMOTE MANUAL HOOD ANSUL PULL STATION TO BE LOCATED IN THE MAIN PATH OF EGRESS, A MINIMUM OF 10 FEET AND A MAXIMUM OF 20 FEET FROM THE HOOD. MOUNTING HEIGHT SHOULD BE 42"-48" AFF. COORDINATE FINAL LOCATION WITH OWNER AND ARCHITECT. PROVIDE NAMEPLATE AT STATION WITH HOOD NUMBER AND LOCATION. REFER TO DETAIL SHEETS M5.2, M5.3, AND M5.4 FOR ADDITIONAL INFORMATION.
M38	DIFFUSER AROUND HOOD TO BE A 2-WAY DIFFUSER FACING AWAY FROM THE HOOD TO PREVENT INTERFERENCE WITH THE HOOD'S CONTAIN AND CAPTURE.

GENERAL NOTES

A.	REFER TO ABBREVIATIONS, SYMBOLS AND NOTES DRAWING M0.1 FOR HVAC GENERAL NOTES.
B.	WHERE SMOKE DETECTORS ARE INSTALLED MORE THAN 10 FEET ABOVE THE FINISHED FLOOR OR IN ARRANGEMENT WHERE THE DETECTOR'S ALARM OR SUPERVISORY INDICATOR IS NOT VISIBLE TO RESPONDING PERSONNEL, THE DETECTOR SHALL BE PROVIDED WITH REMOTE ALARM OR SUPERVISORY INDICATOR IN A LOCATION ACCEPTABLE TO AUTHORITY HAVING JURISDICTION. PROVIDE AN LED INDICATOR LIGHT ON CEILING BENEATH EACH HVAC UNIT THAT IS EQUIPPED WITH A SMOKE DETECTOR WHEN ACTIVATION LIGHT IS NOT VISIBLE FROM BELOW.
C.	COORDINATE ALL WORK WITH THE KROGER PROJECT MANAGER AND GENERAL CONTRACTOR FOR EXPANSION REMODEL PHASING. REFER TO THE KROGER PHASING PLAN ON G1.1 PROVIDED IN THE ARCHITECTURAL PLANS FOR ADDITIONAL REQUIREMENTS.

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1 01/03/2022	ADDENDUM NO. 4

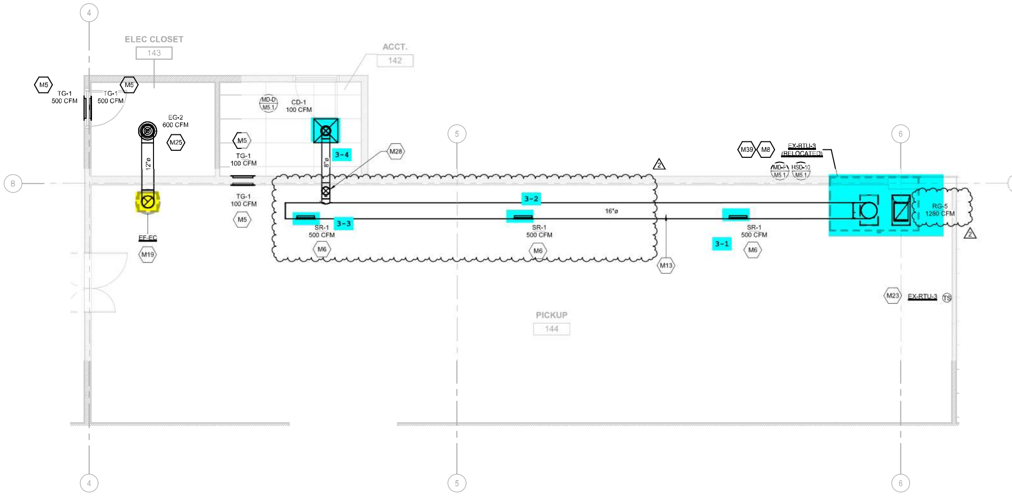
PROJECT TITLE
KROGER STORE D615
33523 Eight Mile Rd.
Livonia, MI 48152

COMMISSION NO. 521342
ISSUE DATE 10/27/2021

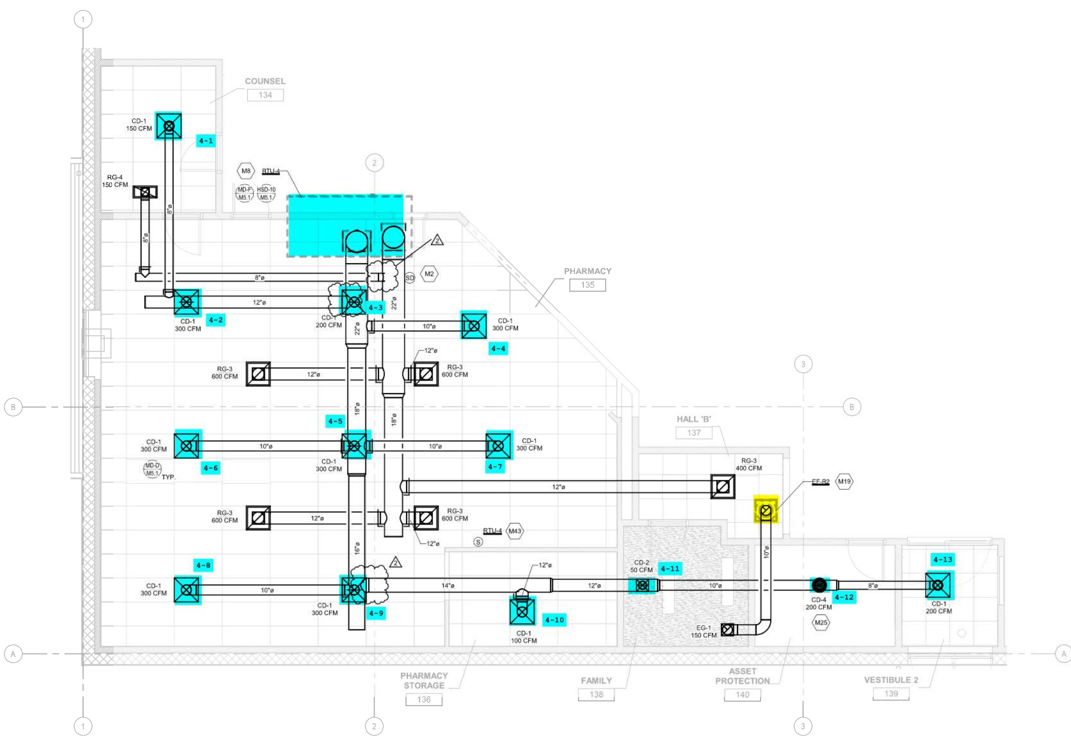
SHEET TITLE
HVAC ENLARGED PLANS

SHEET NO.
M4.1

Date: 6/27/2024



2 HVAC ENLARGED PLAN
M4.2 SCALE: 1/4" = 1'-0"



1 HVAC ENLARGED PLAN
M4.2 SCALE: 1/4" = 1'-0"

KEYNOTE LEGEND

NUMBER	KEYNOTE
M2	INSTALL SMOKE DETECTOR IN THE RETURN DUCTWORK DOWNSTREAM OF FILTERS AND UPSTREAM OF ANY BRANCH CONNECTIONS. TO BE INSTALLED PER MMC 606.3. INSTALL SAMPLING TUBES(S) AND DETECTOR HOUSING IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. DETECTOR,FAN SHUTDOWN WIRING, AND CONTROLS BY OTHERS - PER MMC 606.1,2,3,4.
M5	INSTALL TRANSFER GRILLE IN WALL. COORDINATE FINAL MOUNTING HEIGHTS WITH OWNER AND ARCHITECT.
M6	SIDEWALL DIFFUSERS TO BE INSTALLED AT 45 DEGREES DOWNWARD.
M8	REFER TO ARCHITECTURAL ROOF PLAN FOR HVAC ROOFTOP DIMENSIONAL INFORMATION. REFER TO STRUCTURAL DRAWINGS FOR JOIST AND BEAM LOCATIONS AND DIMENSIONAL INFORMATION.
M13	DUCTWORK TO BE HELD TIGHT TO STRUCTURE.
M19	EXTEND FULL SIZE DUCTWORK (CURB SIZE) UP THROUGH ROOF AND SEAL OPENING AIRTIGHT. REFER TO SHEETS M5.4 AND M5.5 FOR DETAILED INFORMATION REGARDING EXHAUST FANS, INCLUDING SCHEDULES.
M23	TEMPERATURE SENSOR FOR ROOF MOUNTED RTU FURNISHED BY CONTROL PROVIDER. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR A MINIMUM OF 4'-0" AFF ON WALL. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.
M25	DIFFUSER/GRILLE TO BE INSTALLED 10'-0" AFF.
M28	DROP DUCT DOWN TO 11'-0" TO MINIMIZE VISIBILITY FROM THE SALES FLOOR.
M39	NEW LOCATION FOR RELOCATED ROOFTOP UNIT. COORDINATE NATURAL GAS AND ELECTRIC REQUIREMENTS WITH P.C. AND E.C. RESPECTIVELY. PROVIDE ADDITIONAL ROOF SUPPORT IF DIRECTED TO DO SO BY STRUCTURAL ENGINEER. ROOF DUCTWORK PENETRATIONS TO BE FULL SIZE. SEAL AROUND OPENING AIR TIGHT.
M43	PHARMACY TO RECEIVE COMBINATION RELATIVE HUMIDITY/TEMPERATURE SENSOR. ROUTE CONTROL WIRING THROUGH RTU AND BACK TO BUILDING CONTROL PANEL. MOUNT SENSOR A MINIMUM OF 4'-0" AFF ON WALL. COORDINATE LOCATION WITH KROGER EQUIPMENT AND FURNISHINGS. PROVIDE LOCKABLE PROTECTIVE COVER OVER DEVICE.

GENERAL NOTES

A.	REFER TO ABBREVIATIONS, SYMBOLS AND NOTES DRAWING M0.1 FOR HVAC GENERAL NOTES.
B.	WHERE SMOKE DETECTORS ARE INSTALLED MORE THAN 10 FEET ABOVE THE FINISHED FLOOR OR IN ARRANGEMENT WHERE THE DETECTOR'S ALARM OR SUPERVISORY INDICATOR IS NOT VISIBLE TO RESPONDING PERSONNEL, THE DETECTOR SHALL BE PROVIDED WITH REMOTE ALARM OR SUPERVISORY INDICATOR IN A LOCATION ACCEPTABLE TO AUTHORITY HAVING JURISDICTION. PROVIDE AN LED INDICATOR LIGHT ON CEILING BENEATH EACH HVAC UNIT THAT IS EQUIPPED WITH A SMOKE DETECTOR WHEN ACTIVATION LIGHT IS NOT VISIBLE FROM BELOW.
C.	COORDINATE ALL WORK WITH THE KROGER PROJECT MANAGER AND GENERAL CONTRACTOR FOR EXPANSION REMODEL PHASING. REFER TO THE KROGER PHASING PLAN ON G1.1 PROVIDED IN THE ARCHITECTURAL PLANS FOR ADDITIONAL REQUIREMENTS.

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COMMISSION NO. 521342
ISSUE DATE 10/27/2021

SHEET TITLE
HVAC ENLARGED PLANS

SHEET NO.
M4.2