Report By:

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

Report: **Test and Balance**
Date: **3/14/2022**

PROJECT

CASEY'S #4071 - OKLAHOMA CITY, OK

601 E RENO AVE.
OKLAHOMA CITY , OK

Client

Accurex
PO Box 410
Schofield, WI 54476

National TAB

Project: CASEY'S #4071 - OKLAHOMA CITY, OK

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REMARKS

Assigned Organization: National TAB

Status: Not Submitted

Asset:

PRIORITY (HIGH/LOW/INFO ONLY)	
LOW	DOAS Condenser Coil has minor damage.
LOW	Temporary 4-way diffusers are installed on the DOAS.

Notes/Comments:

Project Summary

Facility Identification and TAB Requirements
The scope of work is to perform startup and test and balance of the new HVAC and kitchen ventilation equipment.

DOAS
Each of the DOAS 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 DOAS was then adjusted to +/-10% of the specified design. Each terminal diffuser was balanced to within +/-10% of the engineer's design volume utilizing the provided hand damper located at the takeoff of the main & branch trunk line(s). Any equipment that fell outside of this tolerance is noted throughout the report.

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 +/-10% of the engineers design flow.

Existing Equipment
The existing equipment airflows were measured as required to ensure that the building pressurization was positive and that the overall building will be functional.

Startup Procedure
A startup procedure was completed on the DOAS and kitchen ventilation and the results are documented on checklists throughout the report. This includes wiring verificiation, performance checks, and overall quality control checks.

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 of -0.02" wc to +0.02" wc and that the pressure measurement coincides with the actual and design net airflow. Any deviations from these standards are noted throughout the report.

The hood capture was tested at the perimeter of the hood and the cook top level with the equipment heat on to ensure satisfactory hood capture and containment.

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
PKU-1	SALES					300	96								
PKU-2	SALES					300	106								
PKU-3	SALES					300	287								
KRTU-1	KITCHEN	2000	2029	250	247	1750	1782	87.5%	87.8%						
EF-1	HD1											1800	1796		
EF-2	RESTROOM													110	86
EF-3	RESTROOM													110	58
TOTALS		2000	2029	250	247	2650	2271			0	0	1800	1796	220	144

NET BUILDING AIRFLOW CALCULATION

TOTALS	DESIGN	ACTUAL
TOTAL OA	2650	2271
TOTAL EXHAUST	2020	1940
NET AIRFLOW	630	331

DOOR TESTED	BUILDING PRESSURE MEASUREMENTS (IN. H20)
FRONT	0.01
SIDE	0.005
REAR	0.007
AVERAGE	**0.0073**

FINAL CHECKS

ACTUAL NET AIRFLOW COINCIDES WITH DESIGN: ✓

MEASURED PRESSURES COINCIDES WITH ACTUAL NET AIRFLOW: ✓

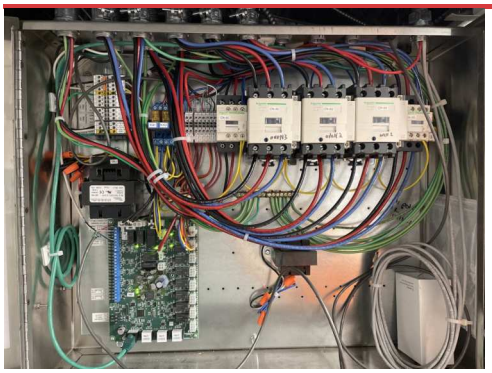
PRESSURE FALLS WITHIN IMC TOLERANCE OF +/-0.02" W.C. ✓

NOTES:

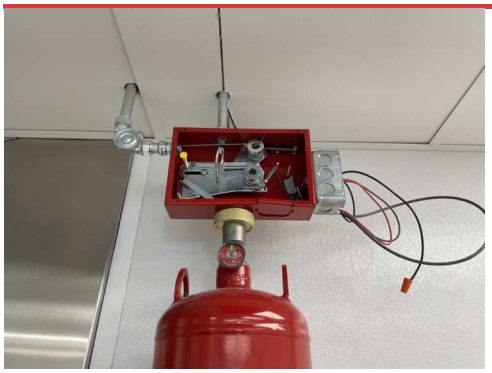
STORE FRONT

KITCHEN HOOD

ABOVE HOOD



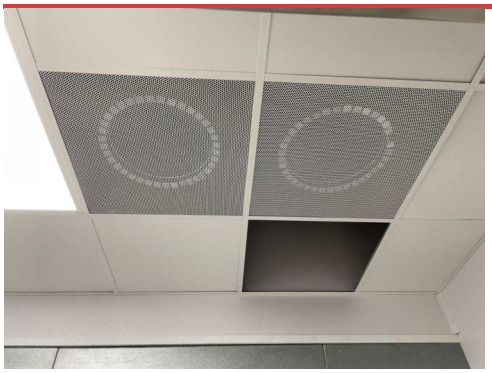
HOOD WIRING



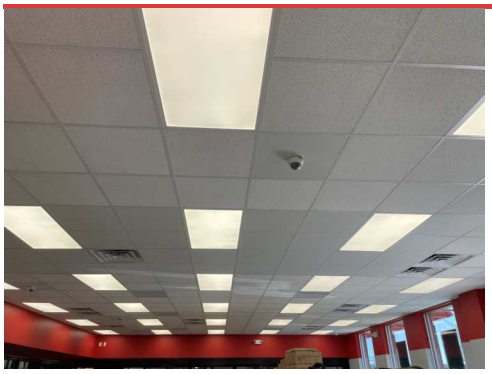
MICROSWITCH

DOAS THERMOSTAT

KITCHEN DIFFUSERS (TEMPORARY 4-WAYS)



DOAS RETURN GRILLES



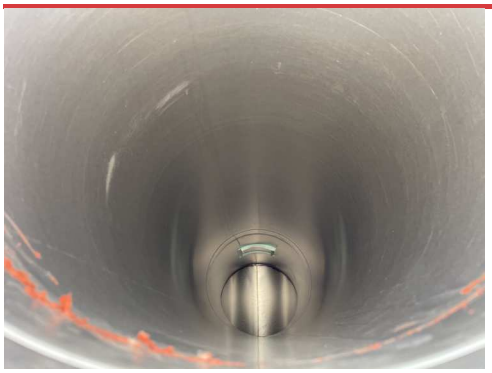
SALES AREA CEILING

RS-1

RE-2

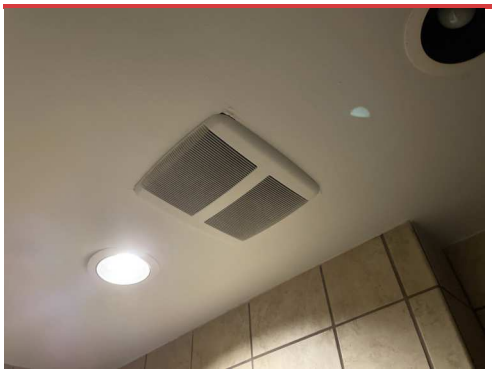
RS-3

EF-1



EF-1 DUCT

EF-2



EF-3

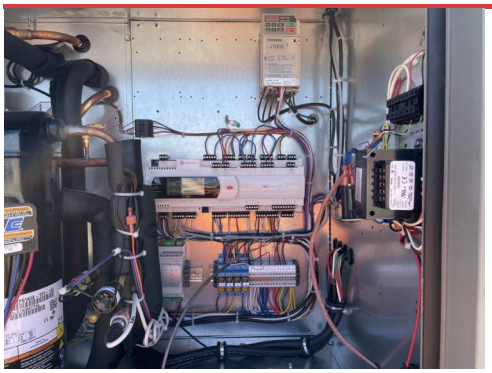
DOAS

PKU-1

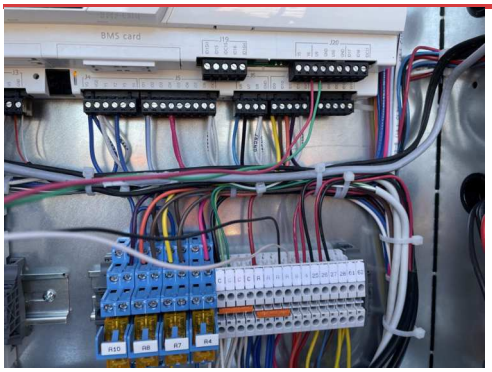
PKU-2

PKU-3

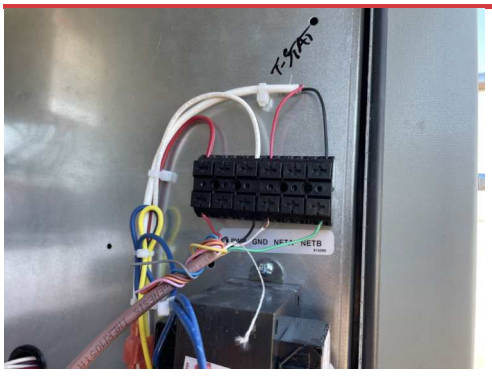
DEHUMIDIFIER



DOAS WIRING



HOOD CONTROL WIRING TO DOAS



THERMOSTAT WIRING TO DOAS

DOAS GAS VALVE OPEN

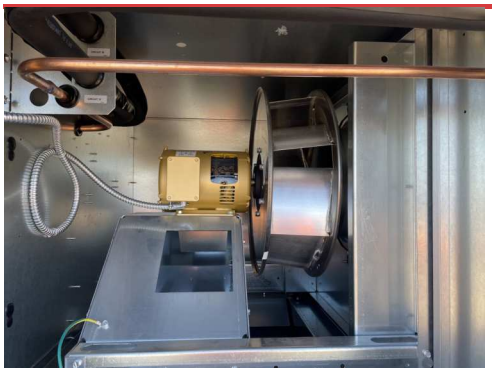
DOAS CONDENSATE DRAIN

DOAS CONDENSER COIL DAMAGED

DOAS OA FILTERS

DOAS ECONOMIZER

DOAS EVAP COIL



DOAS MOTOR AND FAN

DOAS FINAL FILTERS

DOAS CONDENSER FANS OPERATING

TECH - ACCUREX XKC
HOOD STARTUP

Assigned Organization: National TAB

Status: Not Submitted

Asset:

HOOD	
Back Integral Airspace matches submittal?	YES
Factory mounted Exhaust Collars present and installed?	INSTALLED
End skirts (End panels) dimensions match submittal?	YES
Backsplash insulated to match submittal?	YES
Check Temperature Sensors are correctly field wired to controls?	CORRECTLY WIRED
Confirm hanging height AFF matches submittal?	YES
HOOD CONTROLS	
Room temperature setpoint?	75F
Temperature offset setpoint?	10F
Modulation setpoint?	5F
Do lights turn on?	YES
Does fan speed modulate from low to high speed?	YES
Fire Test	
Microswitch is wired properly?	WIRED CORRECTLY
In a call for fire, do the lights turn off, supply fan turn off, and exhaust go to max?	LIGHTS OFF, SUPPLY OFF, EXHUAST HIGH

Notes/Comments:

TECH - ACCUREX XRV
PRE-START-UP
CHECKLIST

Assigned Organization: National TAB

Status: Not Submitted

Asset:

IMPORTANT: Prior to doing any of the checklist items below, ensure that the service disconnect is off and verify that there is no power to the electrical compartment with a multimeter	Yes
PRE-START-UP CHECKLIST	
Remove any foreign objects that are located in the unit?	ALL FOREIGN OBJECTS REMOVED
Check all fasteners, set-screws, and locking collars on the fans, bearings, drives, motor bases and accessories for tightness?	ALL TIGHT
Rotate the fan wheels by hand and ensure no parts are rubbing?	CLEAN ROTATION
Replace any dirty pleated filters and clean aluminum mesh filters in the intake hood?	ALL CLEAN
Check the tightness of all factory wiring connections?	ALL TIGHT
Verify proper drain trap installation?	INSTALLED
Check condensing fans for any damage or misalignment. Spin the blades. They don't contact any parts and are free turning without any resistance?	CLEAN ROTATION
Are filters clean and mesh outside air intake filters clean?	ALL CLEAN
ELECTRICAL	
Is DOAS thermostat communicating with DOAS? Check back of thermostat for blinking indicator light (Solid Green is Active communication)	SOLID GREEN LIGHT IS ON
All field-mounted sensors and instruments are installed and wired?	ALL SENSORS AND INSTRUMENTS INSTALLED
Electrical Service matches unit voltage? (Check at disconnect)	VOLTAGE MATCHES
Unit controls are off?	CONTROLS ARE OFF
Electrical field wiring complete?	FIELD WIRING COMPLETE
All electrical connections are tightened?	ALL TIGHT
Compressor and motor breakers or fuses are open (disconnected)?	ALL OPEN

Main power is wired to the disconnect?	WIRED CORRECTLY
Discharge air sensor is installed per wiring instructions?	INSTALLED PROPERLY
Space temperature and humidity sensors are installed per if selected with unit?	NA
Inspect evaporator coil and ensure there is no damage?	COIL IS FREE OF DAMAGE
Inspect condenser coil and ensure there is no damage?	COILE IS DAMAGED ON THE RIGHT SECTION
COMPRESSORS	
Compressor shipping brackets are removed?	REMOVED
Model and serial number of Compressor 1	ZPV0382E-2E9-130 / 21L0A584L
Model and serial number of compressor 2	ZP61K5E-TF5-130 / 21KD4774L
IG Furnace	
Gas venting is in place?	INSTALLED
Gas piping is complete and gas lines are purged?	GAS METER REMOVED AT TIME OF BALANCING

Notes/Comments:

TECH - ACCUREX XRV
START-UP PROCEDURE

Assigned Organization: National TAB

Status: Not Submitted

Asset:

START-UP PROCEDURE	
Pre-Start-Up Checklist is complete?	COMPLETE
Jumper R to G, R to Y1, and R to Y2 (If applicable) on the control board	UNIT PUT INTO FULL COOLING
Turn on the disconnect. After 3 minutes compressors will come on. Make sure all fans and compressors are rotating in the correct direction	COMPLETE
If unit control board screen does not turn on, check phase protector and reverse phase if necessary.	COMPLETE
At unit control board, make sure unit status is switched from "Disabled" to "Enabled". (They ship and install in "Disabled")	ENABLED
Allow the unit to run until the refrigerant system stabilizes? Approximately 1-2 minutes	COMPLETE
Verify that non-motorized dampers open and close properly?	COMPLETE

Notes/Comments:

TECH - STEP 1: INITIAL WALKTHROUGH

Assigned Organization: National TAB

Status: Not Submitted

Asset:

INITIAL SITE WALKTHROUGH	
Review Plan Review Checklist, has it been signed off and meets our standards to start balancing? If not contact processor to ensure job is ready.	COMPLETE
All diffusers and grilles are installed and match design?	INSTALLED PROPERLY
All hood filters installed and accounted for?	ALL ACCOUNTED FOR
Hoods are wired and have power?	POWERED
Hood is free of alarms?	FREE OF ALARMS
Thermostats have power?	POWERED
Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	YES

Notes/Comments:

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?	FUNCTIONING PROPERLY
DCV Max damper opening position is set to same as minimum damper position?	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?	DD ONLY
If direct drive unit is the speed controller working.	YES
Is gas piping installed and valves turned on?	PIPING NOT COMPLETED
Unit free of noticeable noise and vibration	FREE OF NOISE AND VIBRATION
EF's	
Rotation is correct?	YES
Belts are tight?	DD ONLY
Grease cup installed on hood fan?	NO GREASE CUP
Hinge kit installed installed on hood fan?	NO HINGE KIT
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?	NO LEAKAGE
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?	FREE OF NOISE AND VIBRATION
MUA	
Rotation is correct?	NA

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

Notes/Comments:

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?	SPACE IS FREE OF DRAFTING
Is space comfortable in all areas?	SPACE IS COMFORTABLE
Is the space free of ventilation noise?	SPACE IS FREE OF VENTILATION
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	PIZZA OVEN
List smoke candle type used	45 SECOND EMITTER
Smoke test capture - Perimeter of hood	100%
Smoke test capture - Top of cooking surface	100%
WITNESS	
Date test was completed	3/2/2022
TAB tech name / Firm	TITUS / NATIONAL TAB
Site super name / Firm	LYNDALL / CASEY'S
Owner representative name / Firm (if Applicable)	NA
Building pressure at front & back doors (All Systems On)	0.005"/0.01"/0.007"
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?	NOT PROGRAMABLE

Notes/Comments:

System/Unit: AHU/RTU

Asset: KRTU1 AREA: KITCHEN

Unit Data

	Design	Actual
MFG	ACCUREX	ACCUREX
Model Num	XRV-25-12.5I-G	XRV-25-12.5I-G
Serial Num	-	191155857
Type	RTU	RTU (DOAS)
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	4
OA Filter Size 1	-	18X18
Num Final Filter 1	-	8
Final Filter Size 1	-	20X20X2
Num Final Filter 2	-	-
Final Filter Size 2	-	-

Motor Data

	Design	Actual
Motor MFG	-	BALDOR
Frame	-	145T
Horsepower	0.697	1.5
Motor Rpm	-	1755
Phase	3	3
Rated Voltage	208	230
Rated Amperage	-	4.4

Drive Data

	Design	Actual
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	7.3VDC
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Completed By: Titus Mowry on 03/02/2022

Notes:

Test Data

	Design	Actual
SF CFM	2000	2029
SF RPM	1271	1281
RA CFM	250	247
OA CFM	1750	1782
RL Voltage	-	212
RL Amperage	-	3.2
SF Rotation	-	CCW
RA Damper Position	-	20%
Min OA Damper Position	-	80%
Min OA Damper Type	-	ECONOMIZER

Performance Data

	Design	Actual
MA Plenum SP	-	-0.07"
Fan Suction SP	-	-0.30"
Fan Discharge SP	-	0.32"
Total ESP	0.5"	0.39"
Fan Total SP	-	0.62"

General

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

System/Unit: AHU/RTU

Diffuser Supply (GRD)

KRTU1 / KITCHEN

Asset	Area Served	Type	Size	DESIGN CFM	AK	CFM(1)	CFM(2)	FINAL CFM	% to design
SGRD1	KITCHEN	N	10"	250	1	343	278	271	108.4
SGRD2	KITCHEN	N	10"	250	1	396	246	240	96.0
SGRD3	KITCHEN	N	10"	300	1	323	276	280	93.3
SGRD4	KITCHEN	N	10"	300	1	381	319	312	104.0
SGRD5	KITCHEN	N	10"	300	1	454	293	289	96.3
SGRD6	KITCHEN	N	10"	300	1	386	314	308	102.7
SGRD7	KITCHEN	N	10"	300	1	436	348	329	109.7

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Asset	Area Served	Notes

System/Unit: FAN - Exhaust

Asset: EF1 AREA: HD1

Unit Data		
	Design	**Actual**
MFG	ACCUREX	ACCUREX
Model Num	XRUD-140-VG	XRUD-140-VG
Serial Num	-	19123205
Type	UPBLAST	UPBLAST
Configuration	HORIZONTAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	VARI-GREEN
Frame	-	NL
Horsepower	1	1
Motor Rpm	1725	1750
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	7.0
Service Factor	-	1

Test Data		
	Design	**Actual**
CFM	1800	1796
Fan RPM	1233	1025
Fan Rotation	-	CW
Motor RPM	-	1025
System SetPt	-	7.5VDC
RL Voltage	-	214
RL Amperage	-	1.9
Total ESP	0.5"	0.60"
Fan Inlet SP	-	-0.60"
Fan Discharge SP	-	ATM

Completed By: Titus Mowry on 03/02/2022

Notes:

National TAB

Project: CASEY'S #4071 - OKLAHOMA CITY, OK

System/Unit: Kitchen Hood Type I

Asset: HD1 AREA:

Unit Data		
	Design	**Actual**
MFG	ACCUREX	ACCUREX
Model Num	XBEW-144-S	XBEW-144-S
Job / Serial Num	-	19176424
Type	TYPE II LOW PROXIMITY	TYPE I LOW PROXIMITY
Hood length	144"	144"
Hood Width	54"	54"

Test Data Exhaust		
	Design	**Actual**
Filter Type	BAFFLE	BAFFLE
Filter Size 1	20X16	20X16
Filter Size 2	20X20	20X20
Filter Qty 1	4	4
Filter Qty 2	4	4
Filter AK factor size 1	1.96	1.96
Filters AK factor size 2	2.40	2.40
Filter Total AK Area	17.44	17.44
Filter1 FPM	-	96
Filter2 FPM	-	100
Filter3 FPM	-	103
Filter4 FPM	-	133
Filter5 FPM	-	125
Filter6 FPM	-	99
Filter7 FPM	-	85
Filter8 FPM	-	84
Filter9 FPM	-	
Filter10 FPM	-	
Filter11 FPM	-	
Filter12 FPM	-	
Filter Ave FPM(corr)	-	103
CFM	1800	1796

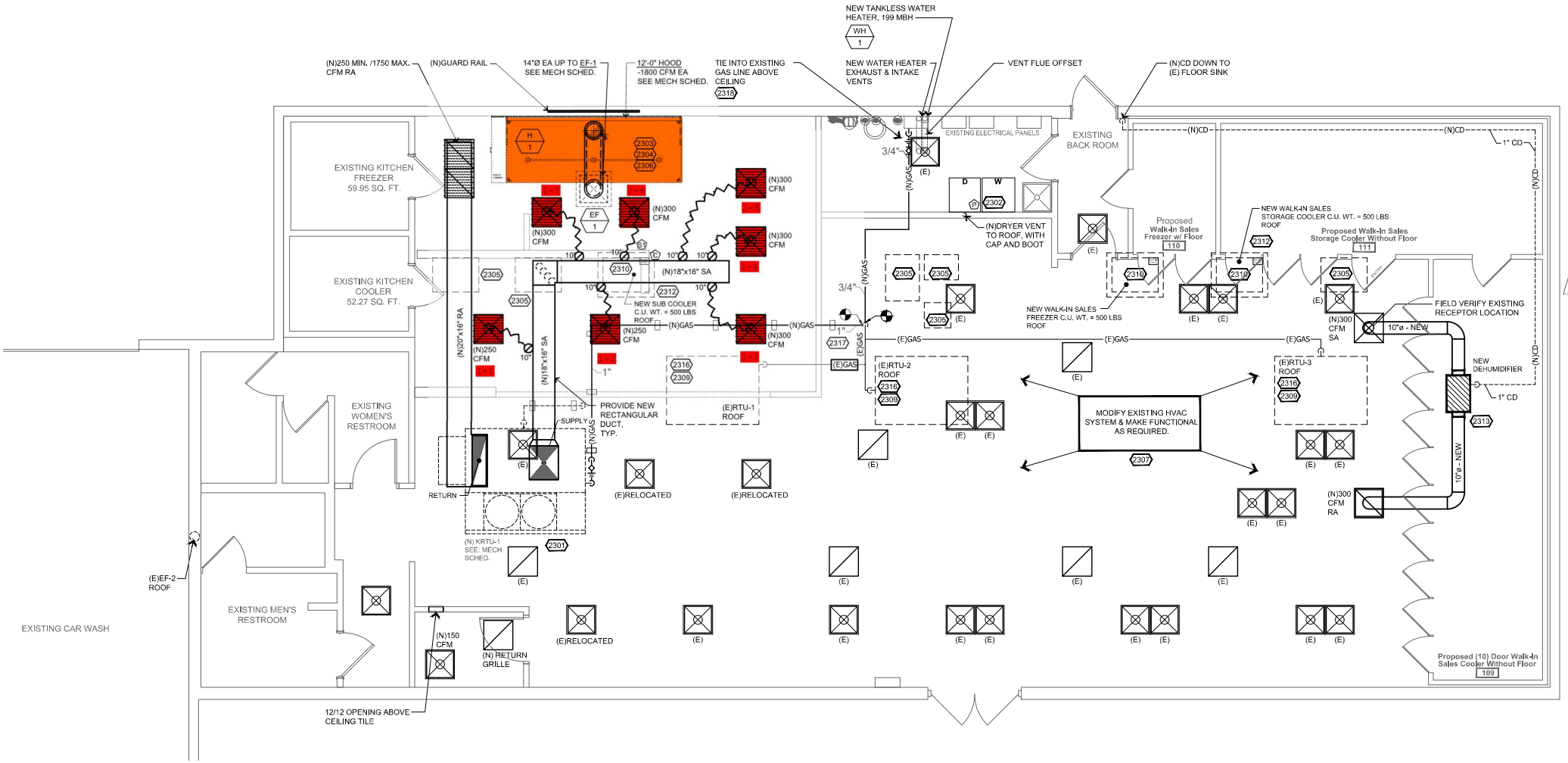
Cooking Equipment		
	Design	**Actual**
Item 1	-	PIZZA OVEN
Item 2	-	

Performance Data		
	Design	**Actual**
Smoke Generation Type	-	45 SECOND EMITTER
Hood Capture %	-	100%
End Panels Installed (Y/N)	-	YES

General		
	Design	**Actual**
Third Party Witness	-	KORY
Third Party Company	-	SENECA
Tech Witness	-	TITUS MOWRY

Completed By: Titus Mowry on 03/02/2022

Notes:


NEW TANKLESS WATER HEATER, 199 MBH
WH 1
(N)250 MIN. /1750 MAX. CFM RA
(N)GUARD RAIL
14"Ø EA UP TO EF-1 SEE MECH SCHED.
12'-0" HOOD -1800 CFM EA SEE MECH SCHED.
TIE INTO EXISTING GAS LINE ABOVE CEILING
2318
NEW WATER HEATER EXHAUST & INTAKE VENTS
VENT FLUE OFFSET
(N)CD DOWN TO (E) FLOOR SINK
EXISTING KITCHEN FREEZER 59.95 SQ. FT.
EXISTING KITCHEN COOLER 52.27 SQ. FT.
EXISTING WOMEN'S RESTROOM
EXISTING MEN'S RESTROOM
EXISTING CAR WASH
EXISTING ELECTRICAL PANELS
EXISTING BACK ROOM
H 1
EF 1
2303
2304
2306
(N)300 CFM
(N)18"x16" SA
(N)20"x16" RA
(N)18"x16" SA
(N)250 CFM
NEW SUB COOLER C.U. WT. = 500 LBS ROOF
(N)GAS
3/4"
(E)
D
W
P
2302
(N)DRYER VENT TO ROOF, WITH CAP AND BOOT
Proposed Walk-In Sales Freezer w/ Floor
110
NEW WALK-IN SALES STORAGE COOLER C.U. WT. = 500 LBS ROOF
2312
Proposed Walk-In Sales Storage Cooler Without Floor
111
NEW WALK-IN SALES FREEZER C.U. WT. = 500 LBS ROOF
2310
(N)CD
1" CD
FIELD VERIFY EXISTING RECEPTOR LOCATION
(N)300 CFM SA
10"ø - NEW
NEW DEHUMIDIFIER
2313
10"ø - NEW
(N)300 CFM RA
(E)GAS
2317
(E)RTU-2 ROOF
(E)RTU-3 ROOF
2316
2309
(E)RTU-1 ROOF
MODIFY EXISTING HVAC SYSTEM & MAKE FUNCTIONAL AS REQUIRED.
2307
PROVIDE NEW RECTANGULAR DUCT, TYP.
SUPPLY
RETURN
(E)RELOCATED
(N) KRTU-1 SEE MECH SCHED.
2301
(E)EF-2 ROOF
(N)150 CFM
(N) RETURN GRILLE
12/12 OPENING ABOVE CEILING TILE
Proposed (10) Door Walk-In Sales Cooler Without Floor
109

Kit

MANU

Sy