

**Report By:**

National TAB  
1329 E. KEMPER ROAD  
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**Report: TAB REPORT**  
**Function: Test, Adjust, & Balance**  
**Date: 11/07/2024**  
**Completed By: National TAB**

**PROJECT**  
**DOT Headquarters (Ewing, NJ)**

1035 Parkway Ave.

Ewing, NJ 08618

**Client**

EMY Solutions Inc.  
624 Montgomery Rd  
Hillsborough, NJ 08844

# National TAB

Project: DOT Headquarters (Ewing, NJ)

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**DOT Headquarters (Ewing, NJ)**

**PROJECT TEAM MEMBERS**

**Architect/Engineer/Consultant:**

Jarmel Kizel Architects and Engineers Inc.  
42 Okner Parkway  
Livingston, NJ, 07039

**Mechanical Contractor:**

EMY Solutions Inc.  
624 Montgomery Rd  
Hillsborough, NJ, 08844



# CERTIFICATION



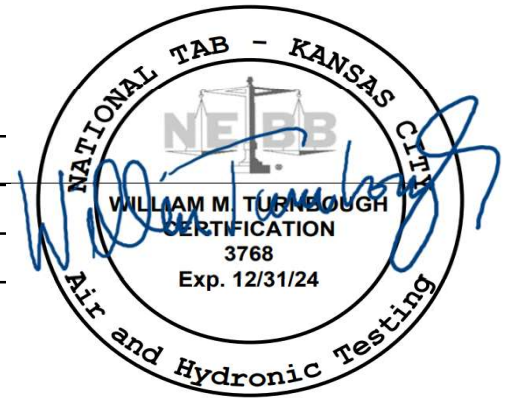
**PROJECT:** DOT Headquarters (Ewing, NJ)

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems. The measurements shown, and the information given, in this report are certified to be accurate and complete, at the time and date information was gathered. Any variances from design quantities, which exceed NEBB tolerances, are noted in the TAB report project summary.

**NEBB TAB FIRM:** National TAB - Kansas City  
**REGISTRATION NO:** 3768  
**CERTIFIED BY:** Will Turnbough  
**DATE:** 11/7/2024

## Submitted and Certified by:

**NEBB TAB FIRM:** National TAB - Kansas City  
**TAB PROFESSIONAL:** Will Turnbough  
**REGISTRATION NO:** CP-24289  
**CERTIFICATION EXP:** 12/31/2024



## Project Summary

### 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.

### FCU's w/ Diffusers

Each of the FCU'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 FCU was then adjusted to within tolerance of the specified design. Each terminal diffuser was balanced to within tolerance 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.

### Energy Recovery Ventilator (ERV)

#### Energy Recovery Ventilator (ERV)

The supply side of the ERV was measured either by traverse or reading the individual outlets with a flow hood. The fan speed was then adjusted until airflow was within design tolerance. Each outlet was then adjusted to within tolerance of the design flow. The exhaust side was measured by either a traverse or by reading the individual outlets. Total flow was adjusted until airflow was within design tolerance and then each inlet was balanced. Any equipment that fell outside of that tolerance is noted throughout the report.



# National TAB

Project: DOT Headquarters (Ewing, NJ)  
System/Unit: AHU/RTU



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Asset: RTU-1

AREA: MULTIPURPOSE RM

Unit Data		
	Design	Actual
MFG	NA	TRANE
Serial Num	-	240810538D
Model Num	NA	YHJ18003S0H02H2E0A1B1
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	68X20
Num PreFilter 1	-	8
PreFilter Size 1	-	20X24X2

Test Data		
	Design	Actual
SF CFM	5995	5994
RA CFM	5270	5230
OA CFM	725	764
RL Voltage	208	206.3/206.2/207.3
RL Amperage	-	6.55/6.44/5.98
OA Damper Position	-	10%
Brake Horse Power	-	2.86

Motor Data		
	Design	Actual
Motor MFG	-	2X EBM PABST
Frame	-	NL
Horsepower	3.00	3000W
Motor Rpm	-	1790
Phase	3	3
Rated Voltage	208	200
Rated Amperage	-	8.8
Service Factor	-	1

Performance Data		
	Design	Actual
MA Plenum SP	-	-0.58"
Fan Suction SP	-	-0.99"
Fan Discharge SP	-	0.54"
Total ESP	0.70	1.12"
Fan Total SP	-	1.53"

## Unit Data - PHOTO LOG



image\_1806439161



image\_1251469911

Completed By: Tyler Youells on 11/07/2024

Notes:  
[1] MAX FAN SETPOINT 64%

Written By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## AHU/RTU



### Diffuser Supply (GRD)

#### RTU-1/MULTIPURPOSE RM

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	MULTIPURPOSE STORAGE	A2	8	120	161	114	95.0
SGRD2	MULTIPURPOSE RM	A6	16	635	300	578	91.0
SGRD3	MULTIPURPOSE RM	A6	16	635	602	648	102.0
SGRD4	MULTIPURPOSE RM	A6	16	635	550	597	94.0
SGRD5	MULTIPURPOSE RM	A6	16	635	643	644	101.4
SGRD6	MULTIPURPOSE RM	A6	16	635	645	681	107.2
SGRD7	MULTIPURPOSE RM	A6	16	635	685	654	103.0
SGRD8	MULTIPURPOSE RM	A6	16	635	574	623	98.1
SGRD9	MULTIPURPOSE RM	A6	16	635	711	654	103.0
SGRD10	MULTIPURPOSE RM	A6	16	635	638	635	100.0
SGRD11	VESTIBULE	A2	8	160	263	166	103.8
Total				5995	5772	5994	99.98%

Completed By: Tyler Youells on 11/07/2024



# National TAB

Project: DOT Headquarters (Ewing, NJ)

## System/Unit: Energy Recovery Unit



Asset: ERV-1

AREA:VRF'S

Unit Data		
	Design	Actual
MFG	NA	ALDES
Model Num	NA	E1100L-Fi-EC-N
Serial Num	-	N23100012
Service	-	FCU-OA
Num Exh-Filters 1	-	3
Exh-Filter Size 1	-	15X11.5
Num OA-Filters 1	-	3
OA-Supply Size 1	-	15X11.5

Exhaust Fan Motor Data		
	Design	Actual
Motor MFG	-	2X EBMPABST
Frame	-	NL
Horsepower	-	170W
Motor Rpm	-	2510
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	1.4
Service Factor	-	1

OA Fan Motor Data		
	Design	Actual
Motor MFG	-	2X EBM PABST
Frame	-	NL
Horsepower	-	170W
Motor Rpm	-	2510
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	1.4
Service Factor	-	1

Exhaust Fan Test Data		
	Design	Actual
Exh-ERU CFM	400	372
Exh-ERU RPM	-	NA
RL Voltage	-	204.7
RL Amperage	-	0.88

Exhaust Fan Performance Data		
	Design	Actual
Exh-ERU Filter Delta SP	-	COMBINED
Exh-ERU Wheel Delta SP	-	0.21"
Exh-ERU Delta T	-	0.9F

OA Fan Test Data		
	Design	Actual
OA-ERU CFM	370	354
OA-ERU RPM	-	FULL SPEED
RL Voltage	-	207.7
RL Amperage	-	1.48

OA Fan Performance Data		
	Design	Actual
OA-ERU Filter Delta SP	-	COMBINED
OA-ERU Wheel Delta SP	-	0.15"
OA-ERU Delta T	-	2.1F

Completed By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## Energy Recovery Unit



### Diffuser Supply (GRD)

#### ERV-1/VRF'S

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	FC-1	DUCT	6	100	95	92	92.0
SGRD2	FC-3	DUCT	6	70	45	64	91.4
SGRD3	FC-2	DUCT	6	50	39	49	98.0
SGRD4	FC-4	DUCT	4	20	12	19	95.0
SGRD5	FC-5	DUCT	6	40	19	37	92.5
SGRD6	FC-6	DUCT	6	40	25	41	102.5
SGRD7	FC-7	DUCT	6	50	45	52	104.0
Total				370	280	354	95.68%

Completed By: Tyler Youells on 11/07/2024

Asset: FC-1

AREA:CORRIDOR

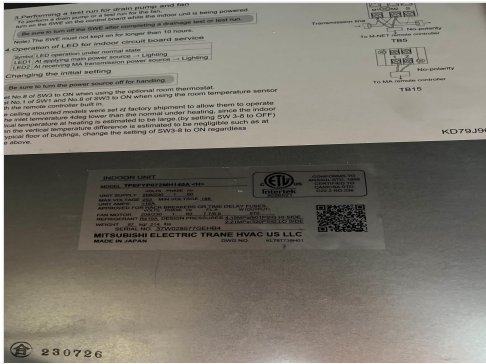
Unit Data		
	Design	Actual
MFG	NA	TRANE
Model Num	NA	TPEFYP072MH140A
Serial Num	-	37W028577GEHB4
Configuration	-	HORIZONTAL

Motor Data		
	Design	Actual
Horsepower	-	870W
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	7.7

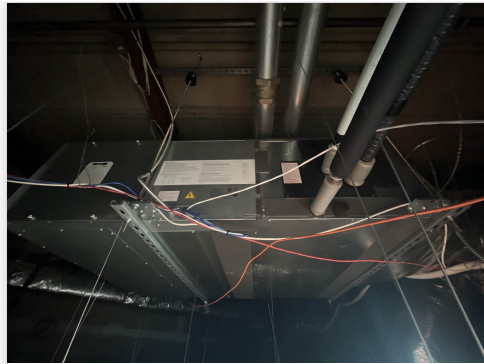
Test Data		
	Design	Actual
SFAN CFM	1780	1795
Motor Speed SetPt	-	50 Pa
RL Voltage	-	206.4
RL Amperage	-	2.14
RA CFM	1680	1703
OA CFM	100	92

Performance Data		
	Design	Actual
Suction ESP	-	-0.01"
Discharge ESP	-	0.28"
Total ESP	0.60	0.29"

**Unit Data - PHOTO LOG**



image\_2021832413



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Completed By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## Fan Coil



### Diffuser Supply (GRD)

#### FC-1/CORRIDOR

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	CORRIDOR	A4	12	400	379	363	90.8
SGRD2	CORRIDOR	A4	12	400	585	403	100.8
SGRD3	CORRIDOR	A4	12	400	501	428	107.0
SGRD4	CORRIDOR	A4	12	400	491	412	103.0
SGRD5	CORRIDOR	A2	8	180	216	189	105.0
Total				1780	2172	1795	100.84%

Completed By: Tyler Youells on 11/06/2024



# National TAB

Project: DOT Headquarters (Ewing, NJ)

## System/Unit: Fan Coil



Asset: FC-2

AREA:FAC MGMT OFC

Unit Data		
	Design	Actual
MFG	NA	TRANE
Model Num	NA	TPEFYP027MA144A
Serial Num	-	3XR0051330P911
Configuration	-	HORIZONTAL

Motor Data		
	Design	Actual
Horsepower	-	0.162HP
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	2.03

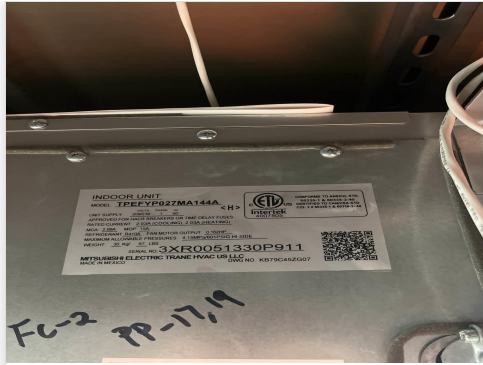
Test Data		
	Design	Actual
SFAN CFM	740	677
Motor Speed SetPt	-	150 Pa
RL Voltage	-	206.3
RL Amperage	-	1.84
RA CFM	690	628
OA CFM	50	49

Performance Data		
	Design	Actual
Suction ESP	-	-0.12"
Discharge ESP	-	0.63"
Total ESP	0.60	0.75"

### Unit Data - PHOTO LOG



image\_767314476



image\_1473006188

Completed By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## Fan Coil



### Diffuser Supply (GRD)

#### FC-2/FAC MGMT OFC

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	FAC MGMT OFC	A4	12	370	256	337	91.1
SGRD2	FAC MGMT OFC	A4	12	370	241	340	91.9
Total				740	497	677	91.49%

Completed By: Tyler Youells on 11/06/2024

Asset	Notes	Date	Written By
SGRD1	[1] DIFFUSER INSTALLED AS 8"	11/07/2024	Tyler Youells
SGRD2	[1] DIFFUSER INSTALLED AS 8"	11/07/2024	Tyler Youells



# National TAB

Project: DOT Headquarters (Ewing, NJ)

## System/Unit: Fan Coil



Asset: FC-3

AREA:OFFICE

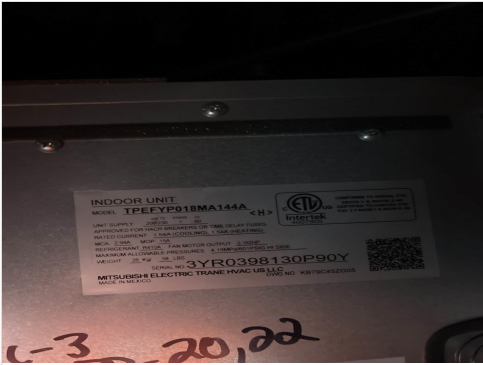
Unit Data		
	Design	Actual
MFG	NA	TRANE
Model Num	NA	TPEFYP018MA144A
Serial Num	-	3YR0398130P90Y
Configuration	-	HORIZONTAL

Motor Data		
	Design	Actual
Horsepower	-	0.162
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	1.54

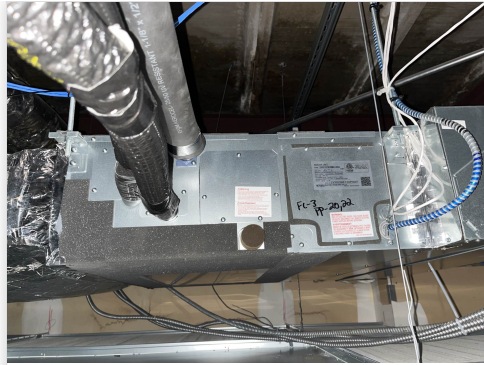
Test Data		
	Design	Actual
SFAN CFM	500	521
Motor Speed SetPt	-	50Pa
RL Voltage	-	206.3
RL Amperage	-	0.77
RA CFM	430	457
OA CFM	70	64

Performance Data		
	Design	Actual
Suction ESP	-	-0.07"
Discharge ESP	-	0.14"
Total ESP	0.60	0.21"

### Unit Data - PHOTO LOG



image\_1092711546



image\_881523781

Completed By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## Fan Coil



### Diffuser Supply (GRD)

#### FC-3/OFFICE

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	OFFICE 1	A2	8	185	204	189	102.2
SGRD2	CORRIDOR	A2	8	130	170	139	106.9
SGRD3	OFFICE 1	A2	8	185	162	193	104.3
Total				500	536	521	104.2%

Completed By: Tyler Youells on 11/06/2024



# National TAB

Project: DOT Headquarters (Ewing, NJ)

## System/Unit: Fan Coil



Asset: FC-7

AREA: OFFICE 2,3

Unit Data		
	Design	Actual
MFG	NA	TRANE
Model Num	NA	TPEFYP018MA144A
Serial Num	-	39R0357630P90Y
Configuration	-	HORIZONTAL

Motor Data		
	Design	Actual
Horsepower	-	0.162HP
Phase	1	1
Voltage (rated)	208	208
Amperage (rated)	-	1.54

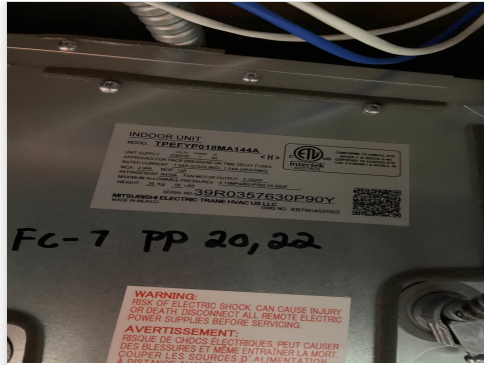
Test Data		
	Design	Actual
SFAN CFM	420	434
Motor Speed SetPt	-	35 Pa
RL Voltage	-	207.4
RL Amperage	-	0.60
RA CFM	370	382
OA CFM	50	52

Performance Data		
	Design	Actual
Suction ESP	-	-0.06"
Discharge ESP	-	0.16"
Total ESP	0.60	0.22"

### Unit Data - PHOTO LOG



image\_1505105255



image\_1868759971

Completed By: Tyler Youells on 11/07/2024



# National TAB

Project:DOT Headquarters (Ewing, NJ)

## Fan Coil



### Diffuser Supply (GRD)

#### FC-7/OFFICE 2,3

Asset							
Asset Name	Location	Type	Size	DESIGN CFM	CFM(1)	FINAL CFM	% to design
SGRD1	OFFICE 2	A2	8	200	230	214	107.0
SGRD2	OFFICE 3	A2	8	220	292	220	100.0
Total				420	522	434	103.33%

Completed By: Tyler Youells on 11/06/2024



# National TAB

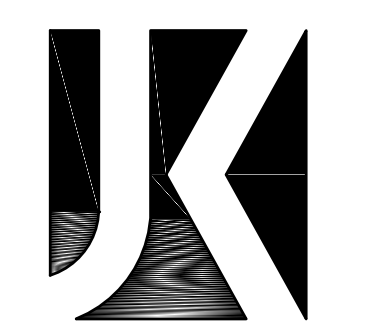
Testing, Adjusting, and Balancing Equipment



Function		Range	Minimum Accuracy	Instrument Information	Calibration Date	Date Due
AIR	AIR PRESSURE	0 in wg to 10 in wg	2% +/- 0.001 in wg	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
	AIR VELOCITY INSTRUMENT	50 fpm to 3900 fpm	+/- 5 % +/- 7 fpm	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
	DIRECT HOOD READING	100 cfm to 2000 cfm	+/- 5 % +/- 7 cfm	Evergreen S-PVF-1 24D-00509	6/17/2024	6/17/2025
TEMPERATURE	AIR METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	AIR PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	IMMERSION PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT METER	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
	CONTACT PROBE	-20 F to 240 F	+/- .5 % 2 F	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
HUMIDITY	HUMIDITY PROBE	10 % RH to 90 % RH	3% of reading	Cooper SRH77A S/N 100516003	9/18/2024	9/18/2025
ELECTRICAL	VOLTAGE MEASUREMENT	0 VAC to 600 VAC	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
	AMPERAGE MEASUREMENT	0 Amperers to 100 Amperes	2 % reading +/- 5 digits	Klein Tools CL800 S/N 1220C-C1	9/18/2024	9/18/2025
ROTATION	ROTATION MEASUREMENT	60 rpm to 5000 rpm	2 % reading 2 rpm	Shimpo DT 207Lp S/N D1690029R	9/18/2024	9/18/2025

## Abbreviation List

A = Area (ft <sup>2</sup> )	S.F. = Service Factor
AHU = Air Handling Unit	SF = Supply Fan
A <sub>k</sub> = Effective Area	SP = Static Pressure
BHP = Brake Horsepower (IP) HP	SR = Supply Register
Btu = British Thermal Unit	T = Temperature
Btu/h = Btuh = BTUH = BTU/Hour	T <sub>ma</sub> = Mixed Air Temperature
CL = Center Distance (used in belt formula)	T <sub>oa</sub> = Outside Air Temperature
CD = Ceiling Diffuser	T <sub>ra</sub> = Return Air Temperature
CF = Correction Factor	H = Head (in wc, ft wc, psi)
CFM = Volumetric Flow: Cubic Feet Per Minute	h = Enthalpy
CO <sub>2</sub> = Carbon Dioxide	HP = Horsepower
CO = Carbon Monoxide	hr = Hour
C <sub>v</sub> = Flow Constant	K <sub>v</sub> = Flow constant (SI)
d = Diameter (in.) IP	kW = Kilowatt = 1000 Watts
Δ = Difference or Change (Final - Initial)	LAT = Leaving Air Temperature
DB = Dry Bulb	lb = Pounds
EA = Exhaust Air	LWT = Leaving Water Temperature
EAT = Entering Air Temperature	ma = Mixed Air
EF = Exhaust Fan	MIN = Minimum
Eff = Efficiency	MAX = Maximum
EG = Exhaust Grille	N/A = Not Applicable
ESP = External Static Pressure	NA = No Access
EWT = Entering Water Temperature	NL = Not Listed
°F = Degrees Fahrenheit, °F	NPSHA = Net Positive Suction Head Available
FPB = Fan Powered Box	NS = Not Specified
FLA = Full Load Amps	OA = Outside Air
fpm = Feet per Minute (fpm)	OAT = Outside Air Temperature
ft = Foot	PD = Sheave Pitch Diameter
gal = Gallons	P.D. = Pressure Drop
GPM = Gallons Per Minute (GPM)	PF = Power Factor
h = Enthalpy (BTU/lb dry air)	SG = Supply Grille
P = Pressure	SR = Supply Register
ppm = parts per million	TP = Total Pressure
psi = Pounds Per Square Inch	T <sub>ra</sub> = Return Air Temperature
psid = PSI Differential	TS = Tip Speed (fpm) IP, (m/s) SI
r = Radius (in)	TSP = Total Static Pressure
% <sub>ra</sub> = % of Return Air	V = Velocity
RA = Return Air	VAV = Variable Air Volume
RAT = Return Air Temperature	VD = Volume Damper
RF = Return Fan	VFD = Variable Frequency Drive
RG = Return Grille	W = Watt
RH = Relative Humidity	WB = Wet Bulb
RPM = Revolutions Per Minute	wg = wc = water gauge = water column
RTU = Roof Top Unit	WHP = Water Horsepower (IP)
SA = Supply Air	ω = Humidity Ratio



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Architecture  
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Interior Design  
Implementation Services  
NJ State Board Of Architects Authorization No. 161  
NJ State Board Of Engineers & Land Surveyors Authorization No. GA-278177

**ISSUE**

NO.	DATE	DESCRIPTION	INT.
1	12-03-21	SCHEMATIC DESIGN SUBMISSION	IHK
2	01-27-22	DESIGN DEVELOPMENT SUBMISSION	IHK
3	04-01-22	FINAL DESIGN SUBMISSION	IHK
4	6-20-22	DCA SUBMISSION	IHK

**REVISION**

NO.	DATE	DESCRIPTION	INT.
1	04-01-22	REVISED AS NOTED	IHK

**PRINCIPALS**

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RICHARD A. JARMEL, PE  
IRWIN H. KIZEL, AIA, PP  
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JEROME LESLIE EBEN, FAIA, PP  
GERARD P. GIESARD, PE  
FREDERICK KINGAID, AIA  
DAVID L. LESSENE, RA  
KAROLINA PROKOROVICH, AIA  
ROBERT B. RICHARDSON, AIA  
CHERYL SCHWEIKER, AIA

Project:  
ROOF REPLACEMENT AND HVAC REHABILITATION FOR CONNECTOR BLDG. NJ DEPARTMENT OF TRANSPORTATION HEADQUARTERS COMPLEX  
T0647-00  
1035 PARKWAY AVE  
EWING, NJ 08618

Project Number: DPMC21-236  
Scale: AS NOTED

Drawn By: LN  
Approved By: RAJ

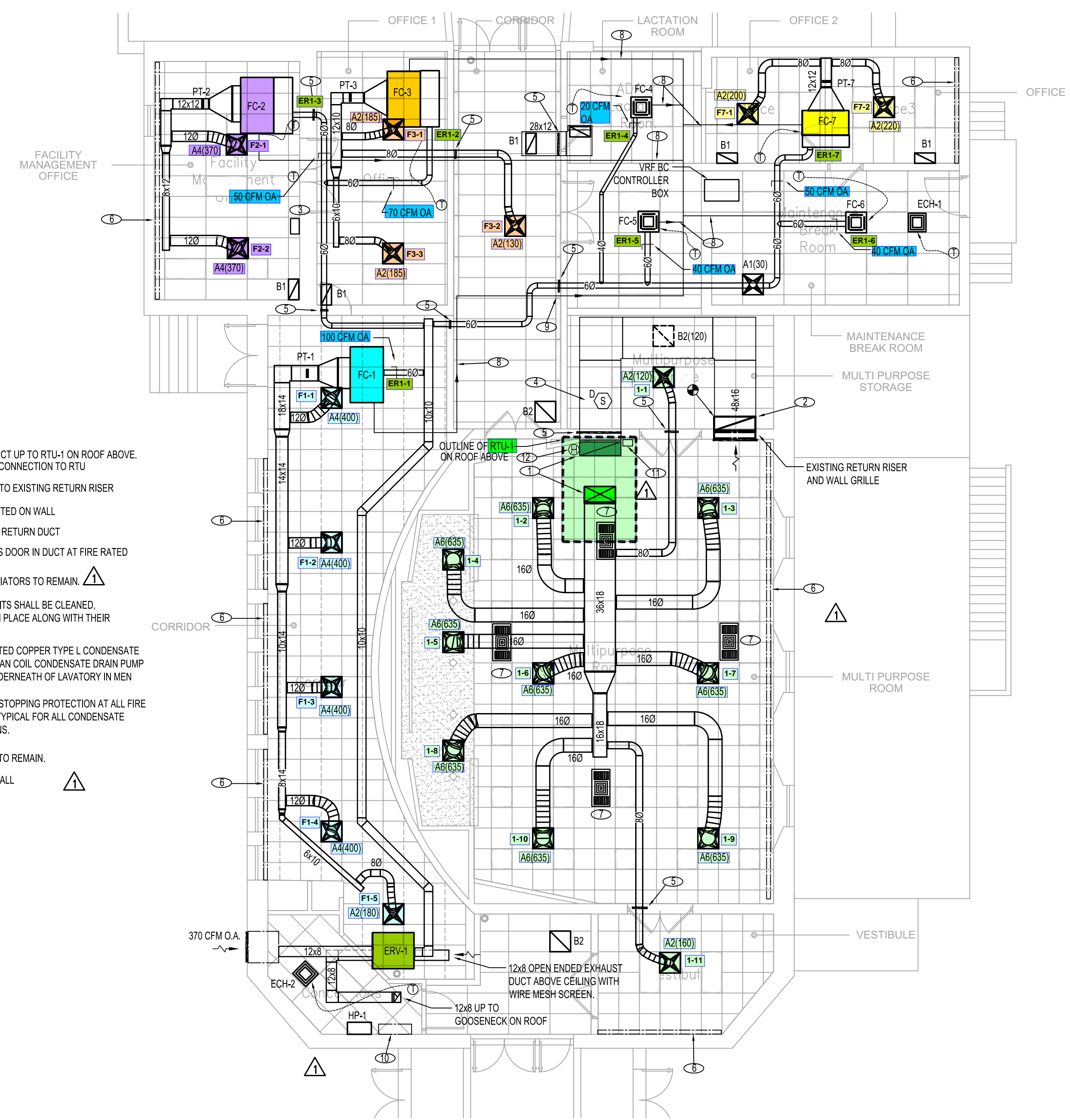
Drawing Name:  
HVAC NEW PLAN

Drawing Number:  
**M-300**

Initial Date: 10-1-21

ENGINEER OF RECORD

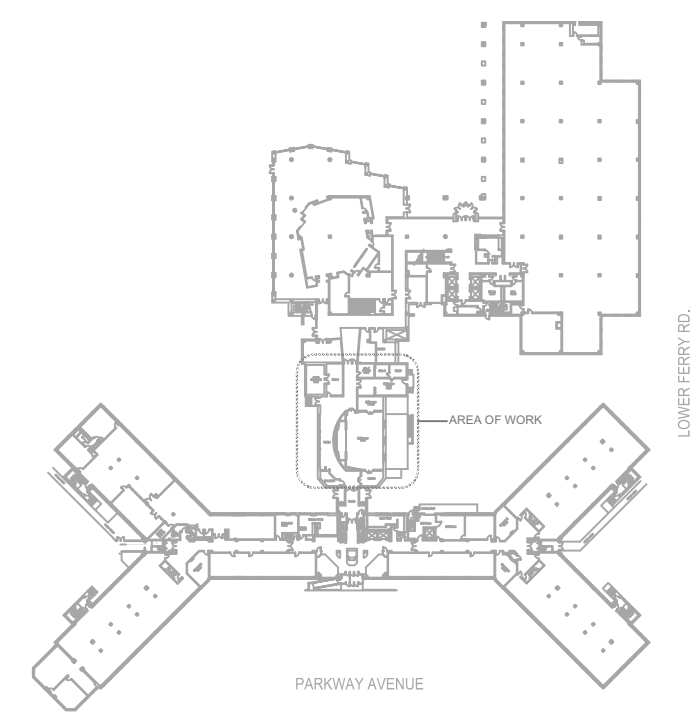
RICHARD A. JARMEL, PE  
NJ LIC 37491



- KEY NOTES:**
- 36x18 SUPPLY AND 48x16 RETURN DUCT UP TO RTU-1 ON ROOF ABOVE. PROVIDE FLEXIBLE CONNECTION AT CONNECTION TO RTU
  - CONNECT NEW 48x16 RETURN DUCT TO EXISTING RETURN RISER
  - VRF SYSTEM CONTROL PANEL MOUNTED ON WALL
  - SMOKE DETECTOR MOUNTED INSIDE RETURN DUCT
  - PROVIDE FIRE DAMPER WITH ACCESS DOOR IN DUCT AT FIRE RATED WALL PENETRATION
  - EXISTING ABANDONED FIN TUBE RADIATORS TO REMAIN
  - EXISTING FAN FILTER MICROCON UNITS SHALL BE CLEANED, REFURBISHED AND SHALL REMAIN IN PLACE ALONG WITH THEIR CONTROLS.
  - CONTRACTOR SHALL RUN 1" INSULATED COPPER TYPE L CONDENSATE DRAIN ABOVE CEILING FROM EACH FAN COIL CONDENSATE DRAIN PUMP AND DISCHARGE INDIRECTLY TO UNDERNEATH OF LAVATORY IN MEN RESTROOM. SLOPE 1/8" PER FOOT
  - CONTRACTOR SHALL PROVIDE FIRE STOPPING PROTECTION AT ALL FIRE RATED WALL PIPE PENETRATIONS. TYPICAL FOR ALL CONDENSATE DRAIN AND VRF PIPING PENETRATIONS.
  - EXISTING ABANDONED CONNECTOR TO REMAIN.
  - RTU-1 THERMOSTAT MOUNTED ON WALL
  - WALL MOUNTED HUMIDISTAT

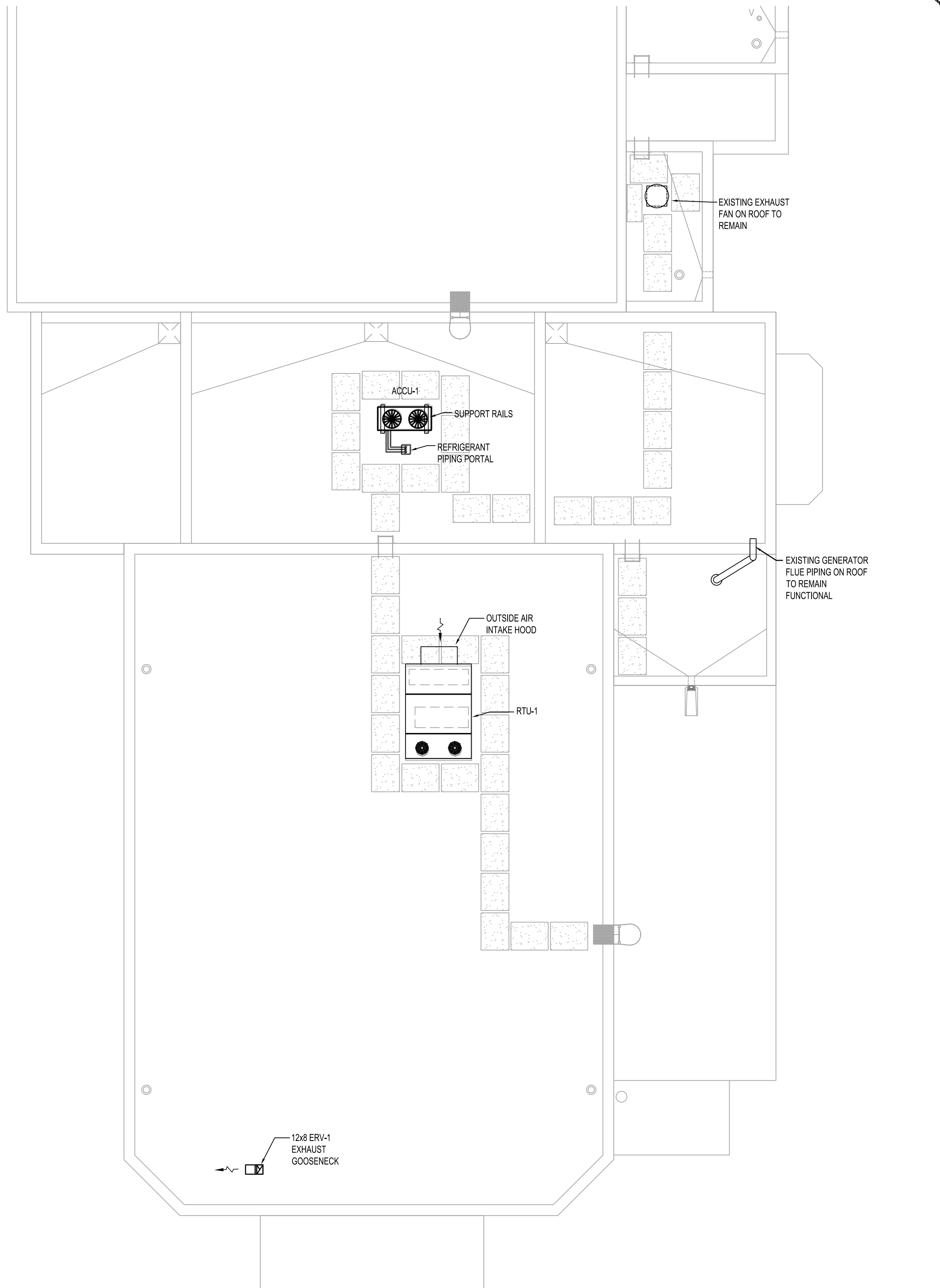
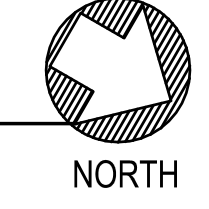
**2 CONNECTOR HVAC NEW FLOOR PLAN**

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



**3 KEY PLAN**

SCALE: NTS



**1 CONNECTOR HVAC NEW ROOF PLAN**

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

