

PROVIDE DEDUCT ALTERNATE FOR ALL WORK ASSOCIATED WITH HP-1, 2, 3, 4, 5 AND AHU-1, 2, 3, 4, 5.

**1 HVAC DEMOLITION PLAN**  
SCALE: 1/8" = 1'-0"

**DEMOLITION NOTES**

- CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK. NOTIFY ENGINEER OF ANY DISCREPANCIES.
- WHEN PERFORMING SITE EXCAVATIONS, CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING EXACT LOCATIONS AND AVOIDING BURIED SERVICE LINES, DUCT BANKS AND EQUIPMENT.
- EXISTING RTU'S INDICATED SHALL BE COMPLETELY REMOVED, INCLUDING IMMEDIATE PIPING, DUCTS, CONNECTIONS AND TRIM. PREPARE PIPING AND DUCT TERMINATIONS FOR NEW RTU CONNECTIONS.
- CONTRACTOR SHALL PROVIDE SUITABLE PROTECTION FOR ADJACENT AREAS AND EQUIPMENT NOT SUBJECT TO DEMOLITION.
- CONTRACTOR SHALL COORDINATE ALL WORK WITH MAINTENANCE PERSONNEL TO MINIMIZE DISRUPTION OF FACILITY OPERATIONS DURING DEMOLITION. CONTRACTOR SHALL ISOLATE WATER SUPPLY AND DISCONNECT POWER TO EQUIPMENT SCHEDULED FOR REMOVAL.
- ALL MATERIALS AND EQUIPMENT SUBJECT TO DEMOLITION SHALL BE APPROPRIATELY CONTAINED AND DISPOSED OF OFF SITE IN A SAFE AND LEGAL MANNER.
- E.C. SHALL BE RESPONSIBLE FOR DISCONNECTING EXISTING WIRING TO ALL ELECTRICAL COMPONENTS ASSOCIATED WITH EXISTING EQUIPMENT AS REQUIRED TO REMOVE/RELOCATE EXISTING EQUIPMENT.

**DEMO LEGEND**

(A) MC SHALL REMOVE AND REPLACE.

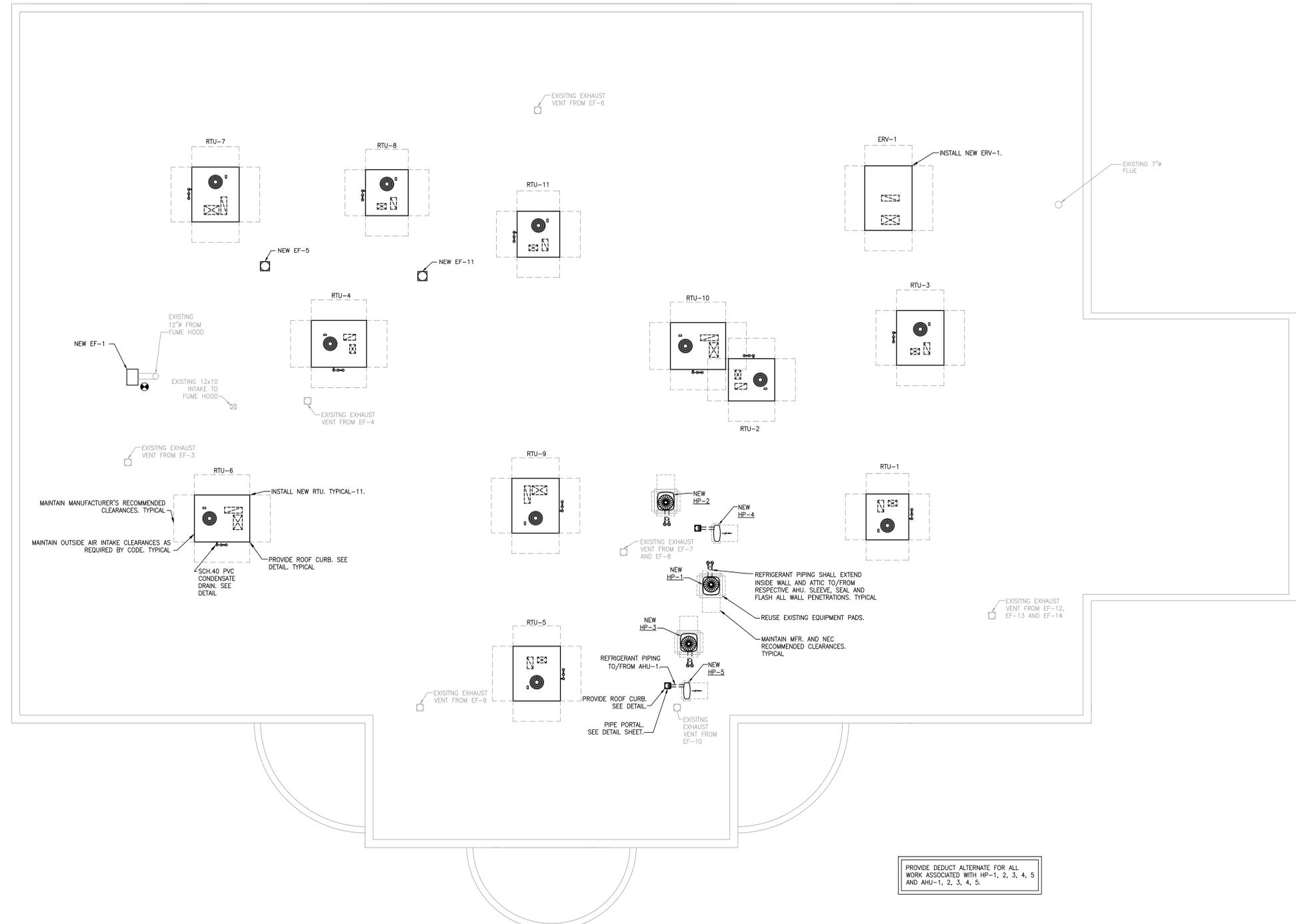
**MECHANICAL DEMOLITION PLAN**

DRAWN BY: BCH  
CHECKED BY: SEC  
DATE: DECEMBER 07TH, 2018  
PROJECT NO: A18-173  
FILE:



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**1 HVAC ROOF PLAN**  
SCALE: 1/8" = 1'-0"

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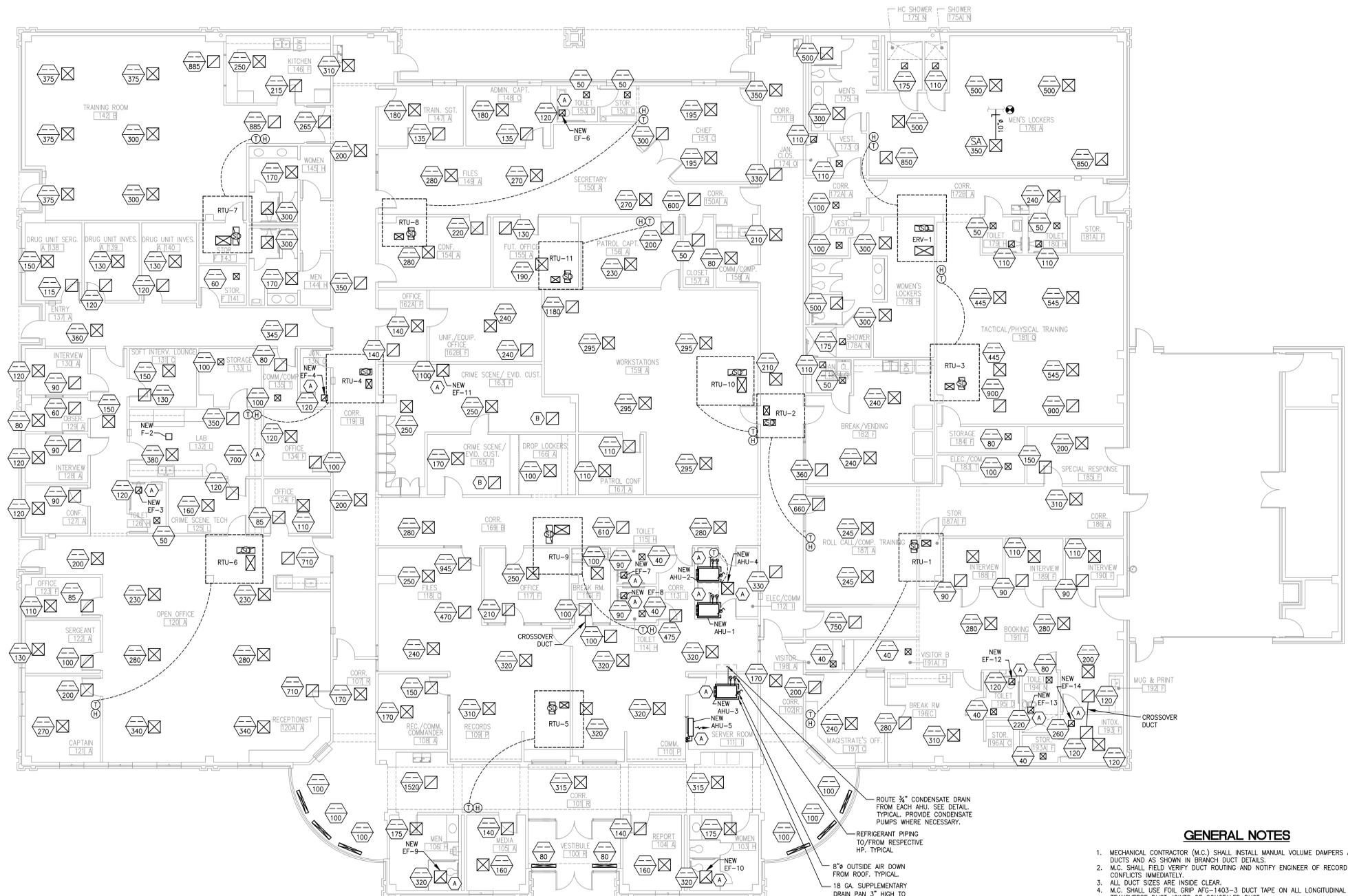
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**1 HVAC PLAN**  
SCALE: 1/8" = 1'-0"

ROUTE 3/4" CONDENSATE DRAIN FROM EACH AHU. SEE DETAIL. TYPICAL. PROVIDE CONDENSATE PUMPS WHERE NECESSARY.

REFRIGERANT PIPING TO/FROM RESPECTIVE HP. TYPICAL.

8" Ø OUTSIDE AIR DOWN FROM ROOF. TYPICAL.

18 GA. SUPPLEMENTARY DRAIN PAN 3" HIGH TO EXTEND 3" BEYOND UNIT ON ALL SIDES. SOLDER ALL SEAMS AND SUSPEND WITH ANGLE CLIPS. SEE AHU DETAIL TYPICAL.

PROVIDE DEDUCT ALTERNATE FOR ALL WORK ASSOCIATED WITH HP-1, 2, 3, 4, 5 AND AHU-1, 2, 3, 4, 5.

M.C. SHALL BE RESPONSIBLE FOR STRUCTURAL FRAMING UNDER NEW ROOF CURBS AND ANY ASSOCIATED ENGINEERING.

**GENERAL NOTES**

- MECHANICAL CONTRACTOR (M.C.) SHALL INSTALL MANUAL VOLUME DAMPERS AT BRANCH DUCTS AND AS SHOWN IN BRANCH DUCT DETAILS.
- M.C. SHALL FIELD VERIFY DUCT ROUTING AND NOTIFY ENGINEER OF RECORD OF ANY CONFLICTS IMMEDIATELY.
- ALL DUCT SIZES ARE INSIDE CLEAR.
- M.C. SHALL USE FOIL GRIP AFG-1403-3 DUCT TAPE ON ALL LONGITUDINAL SEAMS AND TRANSVERSE DUCT JOINTS OF CONCEALED DUCT.
- LONGITUDINAL SEAMS SHALL BE PITTSBURGH LOCK. BUTTON PUNCH SNAP LOCK IS NOT ALLOWED. TRANSVERSE JOINTS ON RECTANGULAR DUCTS SHALL BE DUCTIMATE.
- DUCT PRESSURE CLASSIFICATION IS BASED ON THE MAXIMUM VELOCITY AND STATIC PRESSURE THROUGH THE SUPPLY AND RETURN DUCT SYSTEMS. ALL SEAMS, JOINTS, FASTENER PENETRATIONS AND CONNECTIONS ARE TO BE SEALED PER SMACNA STANDARDS BASED ON DUCT CLASSIFICATION.
- HOLD ALL DUCT WORK LEVEL AND TIGHT AGAINST BOTTOM OF STRUCTURE UNLESS OTHERWISE INDICATED. CLOSELY COORDINATE WITH LIGHTING/ELECTRICAL CONTRACTOR BEFORE ANY DUCT IS FABRICATED. M.C. SHALL BE RESPONSIBLE FOR COORDINATED DETAILED MECHANICAL SHOP DRAWINGS OF EXACT DUCT AND PIPE ROUTING AND LOCATIONS.
- M.C. SHALL ADJUST GRILLE AND DIFFUSER LOCATIONS TO MATCH REFLECTED CEILING PLAN AND LIGHT LAYOUT.
- M.C. SHALL COORDINATE WITH ALL TRADES AND PROVIDE OFFSETS AND TRANSITIONS AS NECESSARY TO CORRECT ANY INTERFERENCES. ALL SUPPLY, RETURN AND EXHAUST DUCT, HOT, COLD AND CONDENSATE WATER, DRAIN PIPING AND EQUIPMENT SHALL MEET OR EXCEED THE REQUIREMENTS OF ALL STATE AND LOCAL BUILDING CODES REGARDING SEISMIC CONSIDERATIONS IN RELATION TO THEIR INSTALLATION.
- PROVIDE AN NEBB OR AABC CERTIFIED TEST AND BALANCE OF ALL SYSTEMS.
- ALL LOW AND MEDIUM PRESSURE SUPPLY AND RETURN DUCT IN CONCEALED LOCATIONS SHALL HAVE 2.2 INCH THICKNESS WITH INSTALLED VALUE OF R-6.0 WRAP INSULATION WITH VAPOR SEAL.
- PROVIDE 1" ANTI-MICROBIAL COATED DUCT LINER ON RETURN/SUPPLY DUCTS TO/FROM AIR HANDLING UNIT CONNECTION THROUGH FIRST 8' OF DUCT. INCREASE INDICATED DUCT SIZE 1" ON ALL SIDES WHERE LINER IS INSTALLED.
- ALL CONDENSATE LINES SHALL BE INSULATED WITH 1" FIBERGLASS INSULATION WITH VAPOR BARRIER AND PREFORMED FITTINGS.
- EXPOSED ROUND DUCT SHALL BE UNDER DOUBLE WALL PERFORATED LINER DUCT.

**LEGEND**

- ⊗ SUPPLY AIR DIFFUSER
- ⊠ RETURN AIR DIFFUSER
- △ EXHAUST AIR DIFFUSER
- MANUAL VOLUME DAMPER
- SA GRILLE TYPE - SEE SCHEDULE
- 150 AIR QUANTITY - CFM
- ⊙ SMOKE DETECTOR WITH ACCESS DOOR, INTERLOCKED WITH RESPECTIVE AIR HANDLING UNIT.
- Ⓟ PROGRAMMABLE ELECTRONIC THERMOSTAT ± 0.5° F ACCURACY, MOUNT 42" A.F.F.
- Ⓜ HUMIDISTAT ± 0.5" RH ACCURACY, MOUNT 42" A.F.F.
- Ⓢ EXISTING GRILLE TO REMAIN

**KEYNOTES**

- (A) M.C. SHALL REMOVE AND REPLACE.
- (B) M.C. SHALL REMOVE RETURN DIFFUSER AND CAP DUCT ABOVE CEILING, SEAL AND INSULATE, REPLACE CEILING TILE OPENING WITH NEW TILE.

**MECHANICAL HVAC PLAN**

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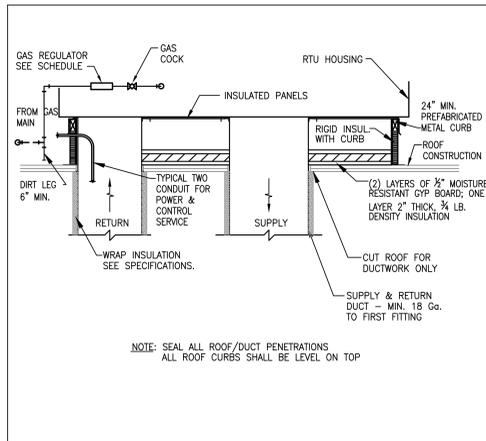
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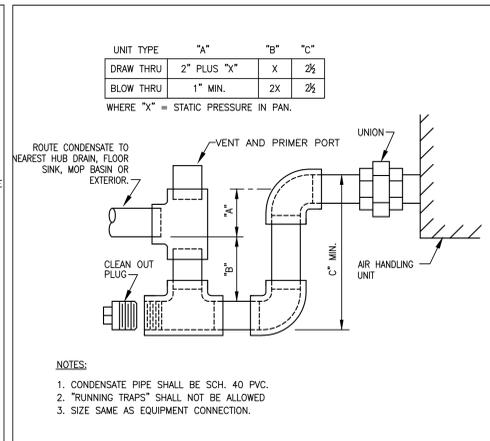
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**M1.2**

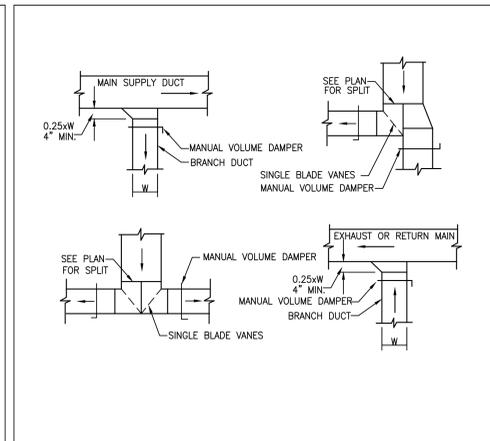
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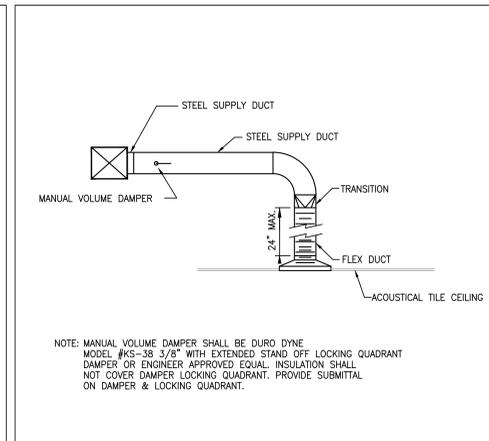
**1 RTU CURB DETAIL**  
Scale: NONE



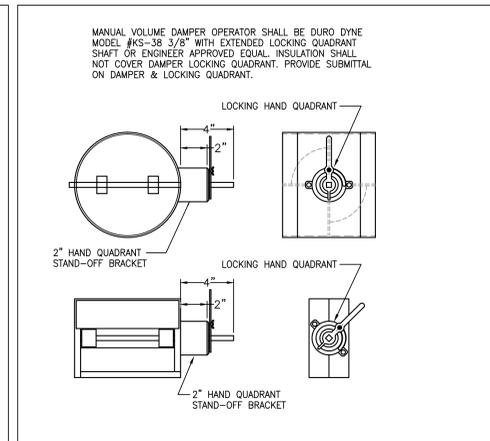
**2 CONDENSATE DRAIN DETAIL**  
Scale: NONE



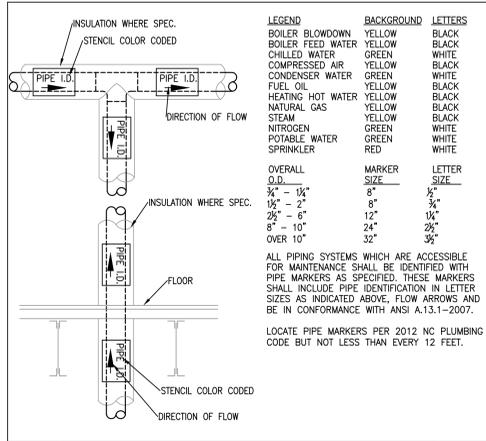
**3 TYPICAL DUCT FITTINGS**  
Scale: NONE



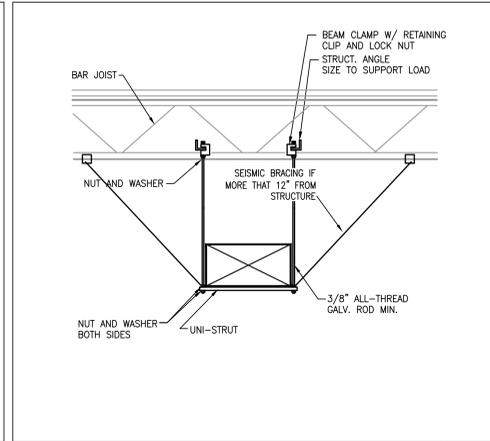
**4 TYPICAL BRANCH DUCT**  
Scale: NONE



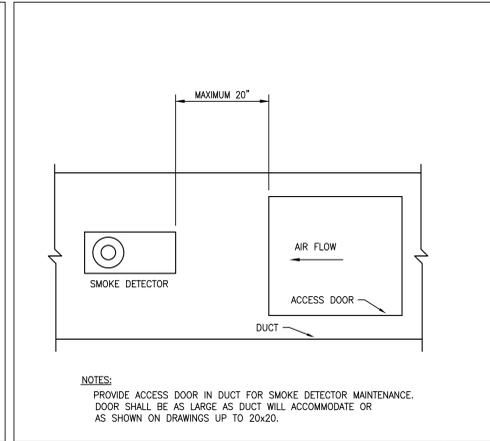
**5 TYPICAL BALANCING DAMPER DETAIL**  
Scale: NONE



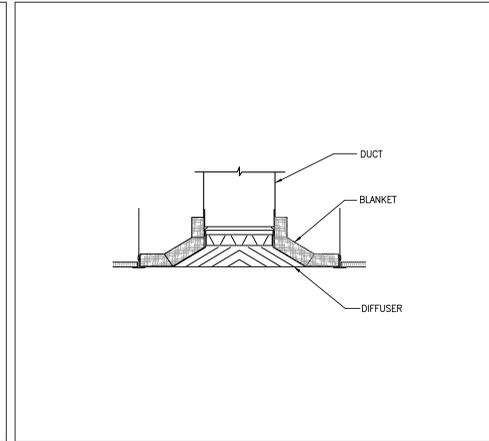
**6 PIPE LABELING**  
Scale: NONE



**7 TYPICAL DUCT HANGER DETAIL**  
Scale: NONE



**8 TYPICAL SMOKE DETECTOR/ACCESS DOOR DETAIL**  
Scale: NONE

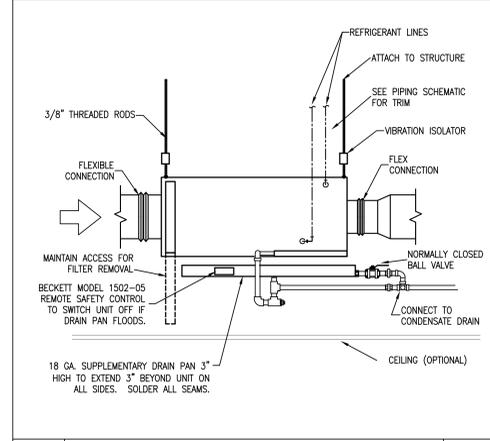


**9 DIFFUSER DETAIL**  
Scale: NONE

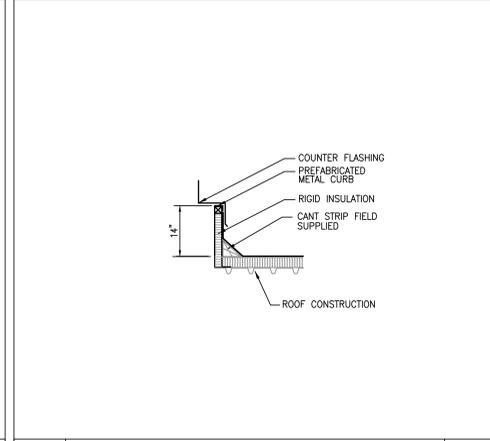
**ABBREVIATIONS**

AD	ACCESS DOOR
AF	AIRFOIL FAN WHEEL
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
CFM	CUBIC FEET PER MINUTE
CH	WATER COOLED CHILLER
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CT	COOLING TOWER
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
Db	DRY BULB TEMPERATURE, DEGREES FAHRENHEIT
Dp	DEW POINT TEMPERATURE, DEGREES FAHRENHEIT
DI	DIAMETER
EF	EXHAUST FAN
EC	ELECTRICAL CONTRACTOR
EFF. %	MOTOR EFFICIENCY-PERCENT
EW	ENTERING WATER TEMPERATURE
FLA	FULL LOAD AMPS
FM	WATER FLOW METER DEVICE
FPI	FINS PER INCH
FBM	FEET PER MINUTE
FT.W.G.	FEET OF WATER GAUGE
GPM	GALLONS PER MINUTE
HWS	HEATING HOT WATER SUPPLY
HWHR	HEATING HOT WATER RETURN
HP	HORSEPOWER
HRS	HOT ROLL STEEL
I.N.W.G.	INCHES OF WATER GAUGE
LWT	LEAVING WATER TEMPERATURE
MAX.	MAXIMUM
MC	MECHANICAL CONTRACTOR
MBH	BTU/HR x 1000
MFR	MANUFACTURER
MIN.	MINIMUM
NOM.	NOMINAL
O.A.	OUTSIDE AIR
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
PAC	PACKAGED AIR CONDITIONING UNIT
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP
QTY.	QUANTITY
R.A.	RETURN AIR
RAF	RETURN AIR FAN
RH	REHEAT COIL
RFM	REVOLUTIONS PER MINUTE
S.A.	SUPPLY AIR
SF	SUPPLY FAN
SP	STATIC PRESSURE (INCHES OF WATER)
UH	UNIT HEATER
VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
Wb	WET BULB TEMPERATURE, DEGREES FAHRENHEIT

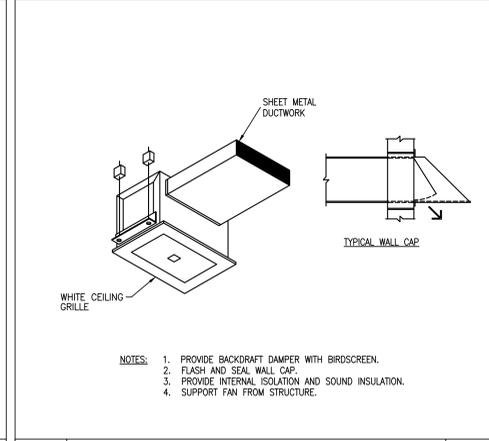
**13 ABBREVIATIONS**  
Scale: NO SCALE



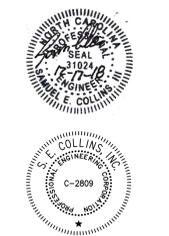
**10 TYPICAL AIR HANDLING UNIT DETAIL**  
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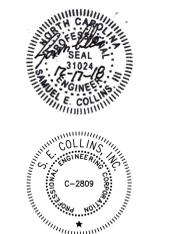
**11 TYPICAL CURB DETAIL**  
Scale: NONE



**12 EXHAUST FAN DETAIL**  
Scale: NONE







**MINIMUM OUTDOOR AIR REQUIREMENTS (NCSBC MECHANICAL 2012)**

EQUIPMENT ID	ROOM NAME AND ROOM NUMBER	OCCUPANCY CLASSIFICATION	AREA SQFT.	PEOPLE / PERSON	AREA CFM / SQ FT.	DENSITY /1000 SQFT.	MAXIMUM OCCUPANCY	TOTAL REQ. O.A. CFM	MINIMUM PROVIDED	TOTAL REQ. MIN. E.A. CFM	
RTU-1	BOOKING 191	BOOKING/WAITING	460	7.5	0.06	50	23	200.1	260	0.0	
	INTERVIEW 188	OFFICE SPACE	80	5	0.06	5	1	9.8	20	0.0	
	INTERVIEW 189	OFFICE SPACE	80	5	0.06	5	1	9.8	20	0.0	
	INTERVIEW 190	OFFICE SPACE	75	5	0.06	5	1	9.5	45	0.0	
	MUG & PRINT 192	OFFICE SPACE	70	5	0.06	5	1	9.2	20	0.0	
	INTOX. 193	OFFICE SPACE	80	5	0.06	5	1	9.8	20	0.0	
	STORAGE 193A	STORAGE ROOMS	30	0	0.12	0	0	3.6	15	0.0	
	BREAK ROOM 196	OFFICE SPACE	240	5	0.06	5	1	19.4	30	0.0	
	TOILET 194	TOILET ROOMS PUBLIC NON HEAVY USE	60	0	0	0	0	0	0	70.0	
	TOILET 195	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
	MAGISTRATE'S OFF 197	OFFICE SPACE	195	5	0.06	5	1	16.7	30	0.0	
	VISITOR 198	OFFICE SPACE	30	5	0.06	5	1	6.8	20	0.0	
	VISITOR 191	OFFICE SPACE	65	5	0.06	5	1	8.9	20	0.0	
		<b>TOTAL</b>		<b>1,505</b>	<b>53</b>	<b>1</b>	<b>95</b>	<b>32</b>	<b>304</b>	<b>500</b>	<b>140.0</b>
RTU-2	ROLL CALL/COMP. TRAINING 187	OFFICE SPACE	360	5	0.06	5	2	31.6	160	0.0	
	BREAK/VENDING 182	OFFICE SPACE	390	5	0.06	5	2	33.4	160	0.0	
	ELEC./COM. 183	OFFICE SPACE	70	5	0.06	5	1	9.2	80	0.0	
	SPECIAL RESPONSE 185	OFFICE SPACE	150	5	0.06	5	1	14	0	0.0	
	CORR. 186	CORRIDORS	285	0	0.06	0	0	17.1	100	0.0	
		<b>TOTAL</b>		<b>1,255</b>	<b>20</b>	<b>0.3</b>	<b>20</b>	<b>6</b>	<b>105.3</b>	<b>500</b>	<b>0.0</b>
RTU-3	STORAGE 184	STORAGE ROOMS	65	0	0.12	0	0	7.8	60	0.0	
	TACTICAL/PHYSICAL TRAINING 181	HEALTH CLUB/ WEIGHT ROOM	1140	20	0.06	10	11	288.4	540	0.0	
	TOILET 179	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
	TOILET 180	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
	CORR. 172B	CORRIDORS	40	0	0.06	0	0	2.4	5	70.0	
	<b>TOTAL</b>		<b>1,325</b>	<b>20</b>	<b>0.24</b>	<b>10</b>	<b>11</b>	<b>298.6</b>	<b>600</b>	<b>140.0</b>	
RTU-4	CORR. 119	CORRIDORS	745	0	0.06	0	0	44.7	115	0.0	
	OFFICE 124	OFFICE SPACE	100	5	0.06	5	1	11	45	0.0	
	OFFICE 134	OFFICE SPACE	125	5	0.06	5	1	12.5	45	0.0	
	COMM./COMP. 135	COPY/PRINTING ROOMS	55	5	0.06	4	1	8.3	35	30.0	
	STORAGE 141	STORAGE ROOMS	55	0	0.12	0	0	6.6	35	0.0	
	STORAGE 133	STORAGE ROOMS	95	0	0.12	0	0	11.4	45	0.0	
	CRIME SCENE TECH 125	OFFICE SPACE	140	5	0.06	5	1	13.4	45	0.0	
	TOILET 126	TOILET ROOMS PUBLIC NON HEAVY USE	55	0	0	0	0	0	0	70.0	
	LAB 132	OFFICE SPACE	240	5	0.06	5	1	19.4	50	0.0	
	SOFT INTRV. LOUNGE 131	OFFICE SPACE	110	5	0.06	5	1	11.6	45	0.0	
	ENTRY 137	CORRIDORS	320	0	0.06	0	0	19.2	50	0.0	
	DRUG UNIT INVES. 139	OFFICE SPACE	120	5	0.06	5	1	12.2	45	0.0	
	DRUG UNIT INVES. 140	OFFICE SPACE	120	5	0.06	5	1	12.2	45	0.0	
		<b>TOTAL</b>		<b>2,280</b>	<b>40</b>	<b>0.84</b>	<b>39</b>	<b>8</b>	<b>182.5</b>	<b>600</b>	<b>100.0</b>
RTU-5	CORR. 102	CORRIDORS	110	0	0.06	0	0	6.6	55	0.0	
	WOMEN 103	TOILET ROOMS PUBLIC NON HEAVY USE	145	0	0	0	0	0	0	140.0	
	REPORT 104	OFFICE SPACE	120	5	0.06	5	1	12.2	85	0.0	
	VESTIBULE 100	CORRIDORS	125	0	0.06	0	0	7.5	0	0.0	
	CORR. 101	CORRIDORS	490	0	0.06	0	0	29.4	165	0.0	
	MEDIA 105	MEDIA CENTER	120	10	0.12	25	3	44.4	240	0.0	
	MEN 106	TOILET ROOMS PUBLIC NON HEAVY USE	145	0	0	0	0	0	0	140.0	
	CORR. 107	CORRIDORS	95	0	0.06	0	0	5.7	55	0.0	
		<b>TOTAL</b>		<b>1,950</b>	<b>15</b>	<b>0.42</b>	<b>30</b>	<b>4</b>	<b>105.8</b>	<b>600</b>	<b>280.0</b>
	RTU-6	DRUG UNIT SERG. 138	OFFICE SPACE	125	5	0.06	5	1	12.5	40	0.0
INTERVIEW 130		OFFICE SPACE	80	5	0.06	5	1	9.8	25	0.0	
OBSER. 129		OFFICE SPACE	60	5	0.06	5	1	8.6	25	0.0	
INTERVIEW 128		OFFICE SPACE	85	5	0.06	5	1	10.1	40	0.0	
CONF. 127		CONFERENCE ROOM	85	5	0.06	50	4	25.1	90	0.0	
OFFICE 123		OFFICE SPACE	85	5	0.06	5	1	10.1	40	0.0	
SERGEANT 122		OFFICE SPACE	110	5	0.06	5	1	11.6	40	0.0	
RECEPTIONIST 120		RECEPTION AREAS	180	5	0.06	30	5	34.6	100	0.0	
CAPTAIN 121		OFFICE SPACE	180	5	0.06	5	1	15.8	50	0.0	
OPEN OFFICE 120		OFFICE SPACE	1300	5	0.06	5	7	113	300	0.0	
		<b>TOTAL</b>		<b>2,270</b>	<b>50</b>	<b>0.6</b>	<b>120</b>	<b>23</b>	<b>251.2</b>	<b>750</b>	<b>0.0</b>
RTU-7		TRAINING ROOM 142	OFFICE SPACE	1100	5	0.06	5	6	96	750	0.0
		KITCHEN 146	KITCHEN	195	0	0	0	0	0	0	140.0
		MEN 144	TOILET ROOMS PUBLIC NON HEAVY USE	145	0	0	0	0	0	0	210.0
	WOMEN 145	TOILET ROOMS PUBLIC NON HEAVY USE	145	0	0	0	0	0	0	140.0	
		<b>TOTAL</b>		<b>1,585</b>	<b>5</b>	<b>0.06</b>	<b>5</b>	<b>6</b>	<b>96</b>	<b>750</b>	<b>490.0</b>
RTU-8	CORR. 171	CORRIDORS	185	0	0.06	0	0	11.1	60	0.0	
	CHIEF 151	OFFICE SPACE	295	5	0.06	5	1	22.7	100	0.0	
	STOR. 152	STORAGE ROOMS	40	0	0.12	0	0	4.8	20	0.0	
	TOILET 153	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
	ADMIN. CAPT. 148	OFFICE SPACE	140	5	0.06	5	1	13.4	60	0.0	
	TRAIN. SGT. 147	OFFICE SPACE	140	5	0.06	5	1	13.4	60	0.0	
		<b>TOTAL</b>		<b>840</b>	<b>15</b>	<b>0.36</b>	<b>15</b>	<b>3</b>	<b>65.4</b>	<b>300</b>	<b>70.0</b>
RTU-9	COMM. 110	OFFICE SPACE	520	5	0.06	5	3	46.2	220	0.0	
	TOILET 114	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
	REC./COMM. COMMANDER 108	OFFICE SPACE	145	5	0.06	5	1	13.7	75	0.0	
	FILES 118	STORAGE ROOMS	330	0	0.12	0	0	39.6	75	0.0	
	RECORDS 109	STORAGE ROOMS	425	0	0.12	0	0	51	235	0.0	
	BREAK ROOM 116	OFFICE SPACE	80	5	0.06	5	1	9.8	55	0.0	
	OFFICE 117	OFFICE SPACE	175	5	0.06	5	1	15.5	90	0.0	
	TOILET 115	TOILET ROOMS PUBLIC NON HEAVY USE	40	0	0	0	0	0	0	70.0	
		<b>TOTAL</b>		<b>1,755</b>	<b>20</b>	<b>0.48</b>	<b>20</b>	<b>6</b>	<b>175.8</b>	<b>750</b>	<b>140.0</b>
	RTU-10	CRIME SCENE/EVID. CUST. 163	OFFICE SPACE	410	5	0.06	5	2	34.6	100	0.0
		OFFICE 162A	OFFICE SPACE	100	5	0.06	5	1	11	45	0.0
UNIF. & EQUIP. OFFICE 162B		OFFICE SPACE	220	5	0.06	5	1	18.2	65	0.0	
CRIME SCENE/EVID. CUST. 165		OFFICE SPACE	140	5	0.06	5	1	13.4	50	0.0	
DROP LOCKERS 166		LOCKER/DRESSING ROOMS	110	5	0.06	4	1	11.6	50	30.0	
PATROL CONF. 167		CONFERENCE ROOM	110	5	0.06	50	6	36.6	110	0.0	
WORKSTATIONS 159		OFFICE SPACE	985	5	0.06	5	5	84.1	230	0.0	
CORR. 169		CORRIDORS	510	0	0.06	0	0	30.6	100	0.0	
		<b>TOTAL</b>		<b>2,585</b>	<b>35</b>	<b>0.48</b>	<b>79</b>	<b>17</b>	<b>240.1</b>	<b>750</b>	<b>30.0</b>
RTU-11		COMM/COMP. 158	COMPUTER W/OUT PRINTING	55	5	0.06	4	1	8.3	25	0.0
		SECRETARY 150	OFFICE SPACE	230	5	0.06	5	1	18.8	45	0.0
		FILES 149	STORAGE ROOMS	315	0	0.12	0	0	37.8	85	0.0
		CORR. 150	CORRIDORS	95	0	0.06	0	0	5.7	25	0.0
		PATROL CAPT. 156	OFFICE SPACE	195	5	0.06	5	1	16.7	45	0.0
	CONF. 154	CONFERENCE ROOM	215	5	0.06	50	11	67.9	145	0.0	
	FUT. OFFICE 155	OFFICE SPACE	165	5	0.06	5	1	14.9	30	0.0	
		<b>TOTAL</b>		<b>1,270</b>	<b>25</b>	<b>0.48</b>	<b>69</b>	<b>15</b>	<b>170.1</b>	<b>400</b>	<b>0.0</b>
	ERV-1	MEN'S LOCKERS 176	LOCKER/DRESSING ROOMS	850	5	0.06	4	3	66	1760	215.0
MEN'S 175		TOILET ROOMS PUBLIC NON HEAVY USE	165	0	0	0	0	0	0	350.0	
VEST. 173		CORRIDORS	42	0	0.06	0	0	2.52	135	0.0	
CORR. 172A		CORRIDORS	65	0	0.06	0	0	3.9	135	0.0	
VEST. 177		CORRIDORS	40	0	0.06	0	0	2.4	135	0.0	
WOMEN'S LOCKERS 178		LOCKER/DRESSING ROOMS	375	5	0.06	4	2	32.5	885	305.0	
JAN. CL. 182		STORAGE ROOMS	45	0	0.12	0	0	5.4	260	0.0	
	<b>TOTAL</b>		<b>1,582</b>	<b>10</b>	<b>0.42</b>	<b>8</b>	<b>5</b>	<b>112.72</b>	<b>3310</b>	<b>870.0</b>	
AHU-4	ELEC./COMM. 112	ELECTRICAL ROOM	125	0	0	0	0	0	0	0.0	
		<b>TOTAL</b>	<b>125</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	
AHU-5	SERVER ROOM 111	ELECTRICAL ROOM	145	0	0	0	0	0	0	0.0	
		<b>TOTAL</b>	<b>145</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.0</b>	
						<b>GRAND TOTALS</b>			<b>136</b>	<b>2,107</b>	<b>9,</b>

**MECHANICAL SYSTEMS**

1. REFER TO ARCHITECTURAL INDEX FOR PARTICULAR SPECIFICATIONS.
2. IT IS UNDERSTOOD AND AGREED THAT THE MECHANICAL CONTRACTOR HAS BY CAREFUL EXAMINATION OF THE PLANS AND SPECIFICATIONS, AND THE SITE WHERE APPROPRIATE, SATISFIED HIMSELF AS TO THE NATURE AND LOCATION OF THE WORK, AND ALL CONDITIONS WHICH MUST BE MET IN ORDER TO CARRY OUT THE WORK UNDER THIS SECTION OF THE CONTRACT.
3. SCOPE OF THE WORK
  - A. THE SCOPE OF THE WORK CONSISTS OF THE FURNISHING AND INSTALLING OF COMPLETE MECHANICAL SYSTEMS - EXTERIOR AND INTERIOR - INCLUDING MISCELLANEOUS SYSTEMS. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL SUPERVISION, LABOR, MATERIALS, EQUIPMENT, MACHINERY, AND ANY OTHER ITEMS NECESSARY TO COMPLETE THE SYSTEMS. THE MECHANICAL CONTRACTOR SHALL NOTE THAT ALL ITEMS OF EQUIPMENT ARE SPECIFIED IN THE SINGULAR; HOWEVER, THE CONTRACTOR SHALL PROVIDE AND INSTALL THE NUMBER OF ITEMS OF EQUIPMENT AS INDICATED ON THE DRAWINGS AND AS REQUIRED FOR COMPLETE SYSTEMS.
  - B. IT IS THE INTENTION OF THE SPECIFICATIONS AND DRAWINGS TO CALL FOR FINISHED WORK, TESTED, AND READY FOR OPERATION.
  - C. ANY APPARATUS, APPLIANCE, MATERIAL, OR WORK NOT SHOWN ON DRAWINGS BUT MENTIONED IN THE SPECIFICATIONS, OR VICE VERSA, OR ANY INCIDENTAL ACCESSORIES NECESSARY TO MAKE THE WORK COMPLETE AND PERFECT IN ALL RESPECTS AND READY FOR OPERATION, EVEN IF NOT PARTICULARLY SPECIFIED, SHALL BE FURNISHED, DELIVERED, AND INSTALLED BY THE CONTRACTOR WITHOUT ADDITIONAL CHARGE TO THE OWNER.
  - D. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER INSTALLATION AND OPERATION, SHALL BE INCLUDED IN THE CONTRACTOR'S ESTIMATE, THE SAME AS IF HEREBY SPECIFIED OR SHOWN.
  - E. WITH SUBMISSION OF BID, THE MECHANICAL CONTRACTOR SHALL GIVE WRITTEN NOTICE TO THE ENGINEER OF ANY MATERIALS OR APPARATUS BELIEVED INADEQUATE OR UNSUITABLE, IN VIOLATION OF LAWS, ORDINANCES, RULES, AND ANY NECESSARY ITEMS OF WORK OMITTED. IN THE ABSENCE OF SUCH WRITTEN NOTICE, IT IS MUTUALLY AGREED THAT THE CONTRACTOR HAS INCLUDED THE COST OF ALL REQUIRED ITEMS IN HIS PROPOSAL AND THAT HE WILL BE RESPONSIBLE FOR THE APPROVED SATISFACTORY FUNCTIONING OF THE ENTIRE SYSTEM WITHOUT EXTRA COMPENSATION.
4. MECHANICAL DRAWINGS
  - A. THE MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF EQUIPMENT AND WORK INCLUDED IN THE CONTRACT.
  - B. CONTRACTOR SHALL FOLLOW DRAWINGS IN LAYING OUT WORK AND CHECK DRAWINGS OF OTHER TRADES TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS WHERE HEADROOM OR SPACE CONDITIONS APPEAR INADEQUATE. THE ENGINEER SHALL BE NOTIFIED BEFORE PROCEEDING WITH INSTALLATION.
  - C. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK.
5. CODES, PERMITS, AND FEES
  - A. CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS AND PAY ALL GOVERNMENT TAXES, FEES AND OTHER COSTS, INCLUDING UTILITY CONNECTIONS OR EXTENSIONS IN CONNECTION WITH HIS WORK; FILE ALL NECESSARY PLANS, PREPARE ALL DRAWINGS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION; OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK AND DELIVER SAME TO THE ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.
  - B. CONTRACTOR SHALL INCLUDE IN THE WORK, WITHOUT EXTRA COST TO THE OWNER, ANY LABOR MATERIALS, SERVICES, APPARATUS, DRAWINGS (IN ADDITION TO CONTRACT DRAWINGS AND DOCUMENTS) IN ORDER TO COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES AND REGULATIONS, WHETHER OR NOT SHOWN ON DRAWINGS AND/OR SPECIFIED.
  - C. WORK AND MATERIALS SHALL CONFORM TO THE LATEST RULES OF THE NATIONAL BOARD OF FIRE UNDERWRITERS' CODE REGULATIONS OF THE STATE FIRE MARSHAL, AND WITH APPLICABLE LOCAL ORDINANCES AND WITH ALL PREVAILING RULES AND REGULATIONS PERTAINING TO ADEQUATE PROTECTION AND/OR GUARDING OF ALL MOVING PARTS, OR OTHERWISE HAZARDOUS CONDITIONS. NOTHING IN THESE SPECIFICATIONS SHALL BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THE MOST STRINGENT OF APPLICABLE CODES.
  - D. IF DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK.
6. SHOP DRAWINGS
  - A. THE MECHANICAL CONTRACTOR SHALL SUBMIT ONE (1) COPY OF THE SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL WITHIN FOURTEEN (14) DAYS AFTER THE AWARD OF THE CONTRACT. IF SUCH A SCHEDULE CANNOT BE MET, THE MECHANICAL CONTRACTOR MAY REQUEST IN WRITING FOR AN EXTENSION OF TIME TO THE ENGINEER. IF THE MECHANICAL CONTRACTOR DOES NOT SUBMIT SHOP DRAWINGS IN THE PRESCRIBED TIME, THE ENGINEER HAS THE RIGHT TO SELECT THE EQUIPMENT.
  - B. SHOP DRAWINGS SHALL BE SUBMITTED ON ALL MAJOR PIECES OF MECHANICAL EQUIPMENT. EACH ITEM OF EQUIPMENT PROPOSED SHALL BE A STANDARD CATALOG PRODUCT OF AN ESTABLISHED MANUFACTURER. THE SHOP DRAWING SHALL SHOW COMPLETE INFORMATION ON THE PROPOSED EQUIPMENT. EACH ITEM OF THE SHOP DRAWINGS SHALL BE PROPERLY LABELED, INDICATING THE INTENDED SERVICE OF THE MATERIAL, THE JOB NAME AND MECHANICAL CONTRACTOR'S NAME.
  - C. THE SHOP DRAWINGS SHALL BE NEATLY BOUND AND SUBMITTED TO THE ENGINEER WITH A LETTER OF TRANSMITTAL. THE LETTER OF TRANSMITTAL SHALL LIST EACH ITEM SUBMITTED ALONG WITH THE MANUFACTURER'S NAME.
  - D. APPROVAL RENDERED ON SHOP DRAWINGS SHALL NOT BE CONSIDERED AS A GUARANTEE OF MEASUREMENTS OR BUILDING CONDITIONS. WHERE DRAWINGS ARE APPROVED, SAID APPROVAL DOES NOT MEAN THAT DRAWINGS HAVE BEEN CHECKED IN DETAIL. SAID APPROVAL DOES NOT IN ANY WAY RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITY, OR NECESSITY OF FURNISHING MATERIAL OR PERFORMING WORK AS REQUIRED BY THE CONTRACT DRAWINGS AND SPECIFICATIONS.
7. COOPERATION WITH OTHER TRADES
  - A. THE MECHANICAL CONTRACTOR SHALL GIVE FULL COOPERATION TO OTHER TRADES AND SHALL FURNISH (IN WRITING, WITH COPIES TO ENGINEER) ANY INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE INTERFERENCE OR DELAY.
  - B. WHERE THE WORK OF THE MECHANICAL CONTRACTOR WILL BE INSTALLED IN CLOSE PROXIMITY TO WORK OF OTHER TRADES, OR WHERE THERE IS EVIDENCE THAT WORK OF THE MECHANICAL CONTRACTOR WILL INTERFERE WITH THE WORKS OF OTHER TRADES, HE SHALL ASSIST IN WORKING OUT SPACE CONDITIONS TO MAKE A SATISFACTORY ADJUSTMENT. IF SO DIRECTED BY THE ENGINEER, THE MECHANICAL CONTRACTOR SHALL PREPARE COMPOSITE WORKING DRAWINGS AND SECTIONS AT A SUITABLE SCALE CLEARLY SHOWING HOW HIS WORK IS TO BE INSTALLED IN RELATION TO THE WORK OF OTHER TRADES. HE SHALL MAKE NECESSARY CHANGES IN HIS WORK TO CORRECT THE CONDITION WITHOUT EXTRA CHARGE.

- C. THE COMPLEXITY OF EQUIPMENT AND THE VARIATION BETWEEN EQUIPMENT MANUFACTURERS REQUIRES COMPLETE COORDINATION OF ALL TRADES. THE CONTRACTOR WHO OFFERS, FOR CONSIDERATION, SUBSTITUTES OF EQUAL PRODUCTS OF RELIABLE MANUFACTURERS, HAS TO BE RESPONSIBLE FOR ALL CHANGES THAT AFFECT HIS INSTALLATION AND THE INSTALLATION EQUIPMENT OF OTHER TRADES. ALL SYSTEMS AND THEIR ASSOCIATED CONTROLS MUST BE COMPLETELY INSTALLED, CONNECTED, AND OPERATING TO THE SATISFACTION OF THE ENGINEER PRIOR TO FINAL ACCEPTANCE AND CONTRACT PAYMENT.
9. AS-BUILT DRAWINGS
  - A. THE MECHANICAL CONTRACTOR SHALL MAINTAIN ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS ACTUALLY INSTALLED FROM WORK INDICATED ON THE DRAWINGS. ON COMPLETION OF THE PROJECT, TWO (2) COMPLETE SETS OF MARKED-UP PRINTS SHALL BE DELIVERED TO THE ENGINEER.
10. INSPECTION AND CERTIFICATES
  - A. ON THE COMPLETION OF THE ENTIRE INSTALLATION, THE APPROVAL OF THE ENGINEER AND OWNER SHALL BE SECURED, COVERING THE INSTALLATION THROUGHOUT. THE CONTRACTOR SHALL OBTAIN AND PAY FOR CERTIFICATE OF APPROVAL FROM THE PUBLIC AUTHORITIES HAVING JURISDICTION. A FINAL INSPECTION CERTIFICATE SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO FINAL PAYMENT. ANY AND ALL COST INCURRED FOR FEES SHALL BE PAID FOR BY THE CONTRACTOR.
11. TESTS
  - A. THE RIGHT IS RESERVED TO INSPECT AND TEST ANY PORTION OF THE EQUIPMENT AND/OR MATERIALS DURING THE PROGRESS OF ITS ERECTION.
  - B. THE CONTRACTOR SHALL TEST THE ENTIRE SYSTEM IN THE PRESENCE OF THE ENGINEER WHEN THE WORK IS FINALLY COMPLETED TO ENSURE THAT ALL PORTIONS ARE FREE OF FAULTS. ALL EQUIPMENT NECESSARY TO CONDUCT THESE TESTS SHALL BE FURNISHED AT THE CONTRACTOR'S EXPENSE.
12. EQUIVALENTS
  - A. WHEN MATERIAL OR EQUIPMENT IS MENTIONED BY NAME, IT SHALL FORM THE BASIS OF THE CONTRACT. WHEN APPROVED BY THE ENGINEER IN WRITING, OTHER MATERIAL AND EQUIPMENT MAY BE USED IN PLACE OF THOSE SPECIFIED, BUT WRITTEN APPLICATION FOR SUCH SUBSTITUTIONS SHALL BE MADE TO THE ENGINEER AS DESCRIBED IN THE BIDDING DOCUMENTS. THE DIFFERENCE IN COST OF SUBSTITUTE MATERIAL OR EQUIPMENT SHALL BE GIVEN WHEN SUCH REQUEST IS MADE. APPROVAL OF SUBSTITUTE IS, OF COURSE, CONTINGENT ON SAME MEETING SPECIFIED REQUIREMENTS AND BEING OF SUCH DESIGN AND DIMENSIONS AS TO COMPLY WITH SPACE REQUIREMENTS.
13. DUCTWORK GENERAL
  - A. DUCTWORK SHALL BE FABRICATED TO CONFORM ACCURATELY TO THE REQUIRED DIMENSIONS AND SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. ALL DUCTWORK SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES.
  - B. DUCTWORK SHALL BE ANCHORED SECURELY TO THE BUILDING STRUCTURE IN AN APPROVED MANNER AND SHALL BE INSTALLED SO AS TO BE COMPLETELY FREE FROM VIBRATION UNDER ALL CONDITIONS OF OPERATION.
  - C. DUCTWORK SHALL BE SUPPORTED INDEPENDENTLY BY THE BUILDING STRUCTURE. DUCTWORK SHALL NOT BE SUPPORTED BY OR FROM PIPING, OTHER DUCTWORK, CONDUIT, CABLE TRAY, BUSB DUCT, FANS, AIR HANDLING UNITS, OR OTHER EQUIPMENT OR COMPONENTS.
14. MATERIALS
  - A. UNLESS OTHERWISE SPECIFIED, ALL DUCTWORK, INCLUDING ALL JOINT AND SEAM CONNECTORS, DRIVE SLIPS, ETC., FURNISHED AND INSTALLED UNDER THIS SPECIFICATION, SHALL BE CONSTRUCTED OF LOCKFORMING QUALITY GALVANIZED STEEL SHEETS WITH MINIMUM GALVANIZED COATING OF 1.25 OUNCES PER SQUARE FOOT. GALVANIZED STEEL SHEETS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A525, COATING G90.
  - B. ALL FASTENERS SHALL BE CADMIUM PLATED OR GALVANIZED STEEL.
  - C. ALL REINFORCING MEMBERS, STIFFENERS, HANGERS AND SUPPORTS FOR GALVANIZED DUCTWORK SHALL BE GALVANIZED STEEL.
  - D. WHERE USED, CALKING SHALL BE ALUMINUM PIGMENTED, NON-HARDENING TYPE.
  - E. DUCT SEALER SHALL BE FAST SETTING, NON-HARDENING, THIXOTROPIC PASTE TYPE AND HARDCAST TAPE #AFT-1403 - 3 INCHES WIDE.
  - F. AFTER WELDING, ALL STEEL WORK SHALL BE PAINTED TO PREVENT RUST. PAINT SHALL BE PROVIDED WITH EXTENDED VENT BLOCK EDGE SEALS AND FLEXIBLE METAL COMPRESSION TYPE JAMB SEALS. DAMPER LEAKAGE RATE FOR A 4" WIDE DAMPER AT A DIFFERENTIAL PRESSURE OF 1 INCH WATER GAUGE, SHALL NOT EXCEED 3 CUBIC FEET OF AIR PER MINUTE PER SQUARE FOOT OF DAMPER AREA WHEN TESTED IN ACCORDANCE WITH AMCA STANDARD 500. EACH MANUAL VOLUME DAMPER SHALL BE PROVIDED WITH A HEAVY DUTY, 90 DEG. MANUAL LOCKING QUADRANT OPERATOR.
15. LOW PRESSURE HVAC DUCTWORK
  - A. GENERAL
    - LOW PRESSURE DUCTWORK SHALL INCLUDE ALL DUCTWORK WITH A STATIC PRESSURE OF 2 IN. WG. OR LESS AND AIR VELOCITIES OF 2500 FEET PER MINUTE OR LESS.
  - B. FABRICATION
    - ROUND BRANCH DUCT TO RECTANGULAR DUCT CONNECTIONS, LOW PRESSURE DUCTWORK SHALL BE FABRICATED IN ACCORDANCE WITH THE REQUIREMENTS AND RECOMMENDATIONS OF THE SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS, FIFTH EDITION (1976), WITH THE EXCEPTIONS AND CLARIFICATIONS SPECIFIED HEREIN. TABLES, PAGES, AND/OR FIGURE NUMBERS REFERENCED IN THIS SECTION OF THE SPECIFICATION REFER TO TABLES, PAGE NUMBERS, AND/OR FIGURE NUMBERS IN THE SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS.
  - C. SEALING
    - ALL LOW PRESSURE DUCTWORK, BOTH RECTANGULAR AND ROUND, REGARDLESS OF PRESSURE CLASSIFICATION SHALL BE SEALED TO PREVENT AIR LEAKAGE IN ACCORDANCE WITH THE REQUIREMENTS OF SMACNA SEAL CLASS B (SMACNA MANUAL 150, 1985).
  - D. RECTANGULAR DUCTWORK
    1. GAUGES
      - SHEET METAL GAUGES FOR RECTANGULAR DUCTWORK SHALL BE AS SHOWN IN TABLE 1-5, PAGE 1-17 (SMACNA), EXCEPT NO THICKNESS LESS THAN 24 GAUGE SHALL BE USED.
    2. JOINTS, SEAMS AND REINFORCING
      - JOINTS, SEAMS, AND REINFORCING FOR RECTANGULAR DUCTWORK SHALL BE IN ACCORDANCE WITH PAGES 1-17 THROUGH 1-23 AND PAGES 1-25 THROUGH 1-38 (SMACNA), EXCEPT THAT JOINT "1-2" SHALL NOT BE USED. FOR CORNER CLOSURES OF POCKET LOCK JOINTS, FABRICATE AS SHOWN IN FIG. 1-6 OR FIG. 1-7, SPOT WELDING OR FRETTING THE METAL DO NOT STAPLE. ANGLE REINFORCED POCKET LOCKS OR COMPANION ANGLES ARE USED, MITER THE ANGLES AT CORNERS AND WELD.

3. ELBOWS
  - A. RADIUS ELBOWS FOR RECTANGULAR DUCTWORK SHALL BE FABRICATED IN ACCORDANCE WITH FIG. 2-1, PAGE 2-2 (SMACNA). WHERE POSSIBLE, ELBOWS SHALL BE FULL RADIUS 1/4" WITH CENTERLINE RADIUS EQUAL TO 1.5 TIMES THE DUCT WIDTH.
  - B. STANDARD 90 DEG. MITERED ELBOWS FOR RECTANGULAR DUCTWORK SHALL BE PROVIDED WITH SINGLE THICKNESS TURNING VANES WHICH SHALL BE CONSTRUCTED IN ACCORDANCE WITH FIG. 2-3, PAGE 2-4 AND FIG. 2-4, PAGE 2-5 (SMACNA). AS AN ALTERNATE, THE SUBCONTRACTOR MAY USE FACTORY MANUFACTURED TURNING VANES AND RUNNERS. FACTORY MANUFACTURED VANES SHALL BE SINGLE THICKNESS TYPE WITH MATCHING RUNNERS. FACTORY MANUFACTURED TURNING VANES AND RUNNERS SHALL BE INSTALLED IN ACCORDANCE WITH FIG. 2-3 AND 2-4 (SMACNA).
4. CONNECTIONS
  - BRANCH DUCT CONNECTIONS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH FIG. 2-6, 2-6 AND 2-10 (SMACNA), WITH THE FOLLOWING EXCEPTIONS AND CLARIFICATIONS:
    - A. STRAIGHT TAP CONNECTIONS AS SHOWN IN FIG. 2-5 AND 2-10 (SMACNA) SHALL NOT BE USED FOR RECTANGULAR BRANCH DUCT CONNECTIONS, BUT MAY BE USED FOR DUCT MOUNTED REGISTERS AND GRILLES. RECTANGULAR BRANCH DUCT CONNECTIONS SHALL BE MADE USING A 45 DEG. ENTRY AS SHOWN IN FIG. 2-5 AND 2-10 (SMACNA).
    - B. SPIN-IN FITTINGS AND DOVETAIL JOINTS AS SHOWN IN FIG. 2-10, PAGE 2-10 (SMACNA) SHALL NOT BE USED. SHALL BE MADE USING CONICAL BELLMOUTH, OR FLANGED CONNECTIONS AS SHOWN IN FIG. 2-10 (SMACNA).
    - C. AIR EXTRACTORS AS SHOWN IN FIG. 2-5 AND 2-10 (SMACNA) SHALL NOT BE USED.
5. TRANSITIONS AND OFFSETS
  - TRANSITIONS AND OFFSETS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH FIG. 2-7, PAGE 2-8 (SMACNA).
6. SUPPORTS
  - A. SUPPORTS FOR RECTANGULAR DUCTWORK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SECTION V OF THE SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS, FIFTH EDITION (1976), WITH EXCEPTIONS AND CLARIFICATIONS AS SPECIFIED HEREIN.
  - B. ALL NECESSARY MATERIALS AND COMPONENTS, INCLUDING MISCELLANEOUS STEEL, REQUIRED FOR PROPER SUPPORT OF ALL DUCTWORK SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
  - C. THE UPPER ATTACHMENT OF EACH TRAPEZOID SUPPORT TO THE BUILDING STEEL, OR TO MISCELLANEOUS STEEL, FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR, SHALL BE SIMILAR TO THAT SHOWN AS SHOWN IN FIG. 5-2, PAGE 5-5 (SMACNA). ALL CLAMPS SHALL INCORPORATE SUBSTANTIAL RETAINING CLIPS.
  - D. THE LOWER HANGER ATTACHMENT SHALL BE AS SHOWN FOR TRAPEZOID HANGERS IN FIG. 5-4, PAGE 5-7 (SMACNA), AND SHALL INCLUDE THREADED HANGER RODS, SUPPORT ANGLE, AND HARDWARE. THE DIAMETER OF THE HANGER RODS SHALL BE AS SHOWN IN TABLE 5-1, PAGE 5-8 (SMACNA). ACTUAL LOADS ON SUPPORT ANGLES SHALL NOT EXCEED THE ALLOWABLE LOADS SHOWN IN TABLE 5-3, PAGE 5-10 (SMACNA). LENGTH OF TRAPEZOID SUPPORT ANGLES SHALL NOT EXCEED DUCT WIDTH BY MORE THAN 6 INCHES.
16. DUCTWORK ACCESSORIES
  - A. MANUAL VOLUME DAMPERS
    - MANUAL VOLUME DAMPERS SHALL BE OPPOSED BLADE TYPE. DAMPERS SHALL BE CONSTRUCTED OF GALVANIZED STEEL AND SHALL HAVE MINIMUM 1/8" GAUGE HAT CHANNEL FRAME. DAMPER AXLES SHALL BE 1/2" PLATED STEEL HEX AND BEARINGS SHALL BE STAINLESS STEEL OR OIL-IMPREGNATED BRONZE. DAMPER BLADES SHALL BE WITH 14 GAUGE EQUIVALENT THICKNESS. DAMPER BLADES SHALL NOT EXCEED 6" IN WIDTH OR 54" IN LENGTH, WHERE REQUIRED DAMPER BLADE LENGTH EXCEEDS 54". DAMPER SHALL BE FURNISHED AS A FACTORY FABRICATED AND ASSEMBLED MULTI-SECTION ASSEMBLY WITH HEAVY DUTY JACKSHAFT FOR OPERATION OF THE ENTIRE ASSEMBLY AS A SINGLE UNIT. DAMPERS SHALL BE LOW LEAKAGE TYPE AND SHALL BE PROVIDED WITH EXTENDED VENT BLOCK EDGE SEALS AND FLEXIBLE METAL COMPRESSION TYPE JAMB SEALS. DAMPER LEAKAGE RATE FOR A 4" WIDE DAMPER AT A DIFFERENTIAL PRESSURE OF 1 INCH WATER GAUGE, SHALL NOT EXCEED 3 CUBIC FEET OF AIR PER MINUTE PER SQUARE FOOT OF DAMPER AREA WHEN TESTED IN ACCORDANCE WITH AMCA STANDARD 500. EACH MANUAL VOLUME DAMPER SHALL BE PROVIDED WITH A HEAVY DUTY, 90 DEG. MANUAL LOCKING QUADRANT OPERATOR.
17. FLEXIBLE DUCTWORK (HVAC)
  - A. CONSTRUCTION
    - FLEXIBLE DUCTWORK SHALL CONSIST OF A CORROSION RESISTANT, VINYL COATED SPRING STEEL WIRE HELIX WITH ACOUSTICALLY TRANSPARENT LINER OR PERFORATED ALUMINUM INNER LINER, A MINIMUM ONE (1) INCH THICK FIBERGLASS INSULATION WRAPPING, AND A CLASS 1 VINYL VAPOR BARRIER. THE MAXIMUM LENGTH OF FLEX DUCT ALLOWED WILL BE 48'.
  - B. RATING
    - FLEXIBLE DUCTWORK, INCLUDING INSULATION AND VAPOR BARRIER, SHALL BE LISTED AND LABELED AS A CLASS 1 AIR DUCT IN ACCORDANCE WITH UL STANDARD 181.
    - FLEXIBLE DUCTWORK, INCLUDING INSULATION AND VAPOR BARRIER, SHALL HAVE A MAXIMUM FLAME SPREAD RATING OF 25 AND A MAXIMUM SMOKE DEVELOPED RATING OF 50.
    - FLEXIBLE DUCTWORK SHALL BE RATED FOR AN OPERATING PRESSURE UP TO 2.0 IN. WG. A VELOCITY OF 1500 FEET PER MINUTE, AND AN OPERATING TEMPERATURE OF 0 DEG. F.
    - THE THERMAL CONDUCTANCE OF FLEXIBLE DUCTWORK INSULATION SHALL NOT EXCEED 0.23 BTU-IN/HR-SQ.FT.-DEG.F.
18. INSULATION
  - A. GENERAL
    - THE MECHANICAL CONTRACTOR SHALL HAVE AN INSULATION SUBCONTRACTOR FURNISH AND INSTALL INSULATION AND ACCESSORY MATERIALS AND COMPONENTS AS SPECIFIED HEREIN.
  - B. SCOPE
    - FURNISH AND INSTALL INSULATION AND ACCESSORY MATERIALS INCLUDING, BUT NOT LIMITED TO, ADHESIVE, MASTICS, SEALERS, WELD PINS, COATINGS, VAPOR BARRIERS, AND TAPES, AS REQUIRED TO MEET THE SOUND LEVEL REQUIREMENTS SPECIFIED HEREIN. PREVENT SURFACE CONDENSATION. PROVIDE PERSONNEL PROTECTION, AND PROVIDE ENERGY EFFICIENT THERMAL COVERING SYSTEMS FOR ALL DUCTWORK, PIPING, EQUIPMENT AND APPURTENANCES FURNISHED AND INSTALLED UNDER THIS SPECIFICATION.

- C. QUALITY ASSURANCE
  - ALL INSULATION AND ACCESSORY MATERIALS, AND THE INSTALLATION THEREOF, SHALL MEET THE REQUIREMENTS OF THE CODES, STANDARDS, REGULATIONS, AND OTHER DOCUMENTS REFERENCED IN THIS SPECIFICATION.
- D. FLAME SPREAD AND SMOKE DEVELOPED RATINGS
  - ALL INSULATION AND ACCESSORY MATERIALS WHICH ARE FURNISHED AND INSTALLED UNDER THIS SPECIFICATION, SHALL HAVE A FLAME SPREAD RATING OF NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 60 WHEN TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 255, ASTM E-84, OR UL 723.
  - MATERIALS THAT ARE FACTORY APPLIED SHALL BE TESTED AS ASSEMBLED AND SHALL BE CERTIFIED BY THE MANUFACTURER TO MEET THESE STANDARDS. MATERIALS WHICH ARE FIELD APPLIED MAY BE TESTED INDIVIDUALLY. NO FUGITIVE OR CORROSION TREATMENTS SHALL BE EMPLOYED TO IMPART FLAME RESISTANCE.
- E. INSULATION THICKNESS
  - INSULATION THICKNESSES SHALL BE EQUAL TO OR GREATER THAN THAT REQUIRED BY THE MORE STRINGENT OF THE FOLLOWING REQUIREMENTS:
    1. THE INSULATION THICKNESSES NECESSARY TO MEET THE REQUIREMENTS OF SECTION 20 BELOW.
    2. THE INSULATION THICKNESSES NECESSARY TO MEET THE REQUIREMENTS OF ASHRAE STANDARD 90A.
    3. THE INSULATION THICKNESSES NECESSARY TO MEET THE ENERGY PERFORMANCE REQUIREMENTS OF THE STATE OF NORTH CAROLINA.
19. GENERAL REQUIREMENTS
  - A. ALL INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS AND AS SPECIFIED HEREIN.
  - B. NO INSULATION SHALL BE APPLIED TO ANY PIPING, DUCTWORK, EQUIPMENT, OR APPURTENANCE UNTIL THE WORK IS TO BE INSTALLED AND INSPECTED BY THE OWNER'S REPRESENTATIVE AND RELEASED FOR INSULATION. ALL SURFACES TO BE INSULATED SHALL BE PROPERLY CLEANED BY THE MECHANICAL CONTRACTOR PRIOR TO INSPECTION BY THE OWNER'S REPRESENTATIVE.
  - C. INSULATION SHALL BE APPLIED TO CLEAN, DRY SURFACES AFTER TESTS AND APPROVALS REQUIRED BY THIS SPECIFICATION HAVE BEEN COMPLETED.
  - D. ALL INSULATION SHALL BE KEPT DRY AND PROTECTED FROM DAMAGE BOTH BEFORE AND DURING APPLICATION. ANY INSULATION WHICH BECOMES WET PRIOR TO APPLICATION SHALL BE DISCARDED. ANY INSULATION WHICH BECOMES WET AFTER APPLICATION SHALL BE REMOVED AND REPLACED.
  - E. WHERE STICK CLIPS ARE USED IN LIEU OF WELD PINS FOR THE ATTACHMENT OF INSULATION TO THE SURFACES TO BE INSULATED, THE MECHANICAL CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR CLEANING THE SURFACES TO BE INSULATED OF ALL OIL, SILICONE, OR OTHER SUBSTANCES WHICH MAY INTERFERE WITH THE PROPER ADHESION OF THE STICK CLIPS TO THE SURFACE TO BE INSULATED.
  - F. ALL INSULATION SHALL BE APPLIED IN A WORKMANLIKE MANNER BY SKILLED WORKMEN REGULARLY ENGAGED IN THIS TYPE OF WORK. ANY INSULATION WORK, WHICH IN THE OPINION OF THE OWNER'S REPRESENTATIVE IS NOT IN ACCORDANCE WITH THE BEST PREVAILING TRADE PRACTICES SHALL BE REMOVED AND REPLACED AT NO COST TO THE OWNER.
  - G. ON COLD SURFACES WHERE A VAPOR BARRIER MUST BE MAINTAINED TO PREVENT CONDENSATION, INSULATION SHALL BE APPLIED WITH A CONTINUOUS, UNBROKEN MOISTURE AND VAPOR SEAL. ALL HANGERS, SUPPORTS, ANCHORS, OR OTHER PROJECTIONS THAT ARE IN CONTACT WITH COLD SURFACES SHALL BE INSULATED AND VAPOR SEALED TO PREVENT CONDENSATION.
  - H. ALL SURFACE FINISHES SHALL BE EXTENDED IN SUCH A MANNER AS TO PROTECT ALL RAW EDGES, ENDS, AND SURFACES OF INSULATION.
  - I. ALL PIPE OR DUCT INSULATION SHALL BE CONTINUOUS THROUGH WALLS, CEILING OR FLOOR OPENINGS, AND/OR SLEEVES, EXCEPT WHERE FIRE DAMPERS OR FIRESTOPPING MATERIALS ARE REQUIRED.
20. INSULATION FOR HVAC DUCTWORK
  - A. GENERAL
    - THE INSULATION SUBCONTRACTOR SHALL APPLY INSULATION ON CLEAN, DRY SURFACES AFTER THE DUCTWORK HAS BEEN TESTED, INSPECTED AND RELEASED FOR INSULATION APPLICATION.
  - B. INSULATION
    - DUCT WRAP SHALL BE FLEXIBLE FIBERGLASS INSULATION WITH A FACTORY APPLIED FOR EXTERIOR FACING. DUCT WRAP SHALL HAVE A THICKNESS OF 2" WITH A DENSITY OF 3/4 POUNDS PER CUBIC FOOT AND SHALL BE SUITABLE FOR TEMPERATURES UP TO 250 DEG. F. UNLESS OTHERWISE REQUIRED BY CODES, STANDARDS, REGULATIONS, AND OTHER DOCUMENTS REFERENCED HEREIN, DUCT WRAP SHALL HAVE A MAXIMUM THERMAL CONDUCTIVITY OF 0.24 BTU-IN/HR-FT-SQ-OF AT 75 DEG. F. MEAN TEMPERATURE. EXTERIOR FACING SHALL HAVE A MAXIMUM VAPOR TRANSMISSION RATE OF 0.02 PERMS (GRAINS/HR-FT-SQ-IN. HG) WHEN TESTED IN ACCORDANCE WITH ASTM E96, PROCEDURE A OR EQUIVALENT.
21. GUARANTEE
  - THE MECHANICAL CONTRACTOR SHALL GUARANTEE, BY HIS ACCEPTANCE OF THE CONTRACT, THAT ALL WORK INSTALLED WILL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS. IF DURING THE PERIOD OF ONE YEAR, OR AS OTHERWISE SPECIFIED, FROM DATE OF CERTIFICATE OF COMPLETION AND ACCEPTANCE OF WORK, ANY SUCH DEFECTS IN WORKMANSHIP, MATERIALS OR PERFORMANCE APPEAR, THE CONTRACTOR SHALL, WITHOUT COST TO THE OWNER, REMEDY SUCH DEFECTS WITHIN A REASONABLE TIME TO BE SPECIFIED IN NOTICE FROM ENGINEER. IN DEFAULT, THE OWNER MAY HAVE SUCH WORK DONE AND CHARGE COST TO CONTRACTOR.

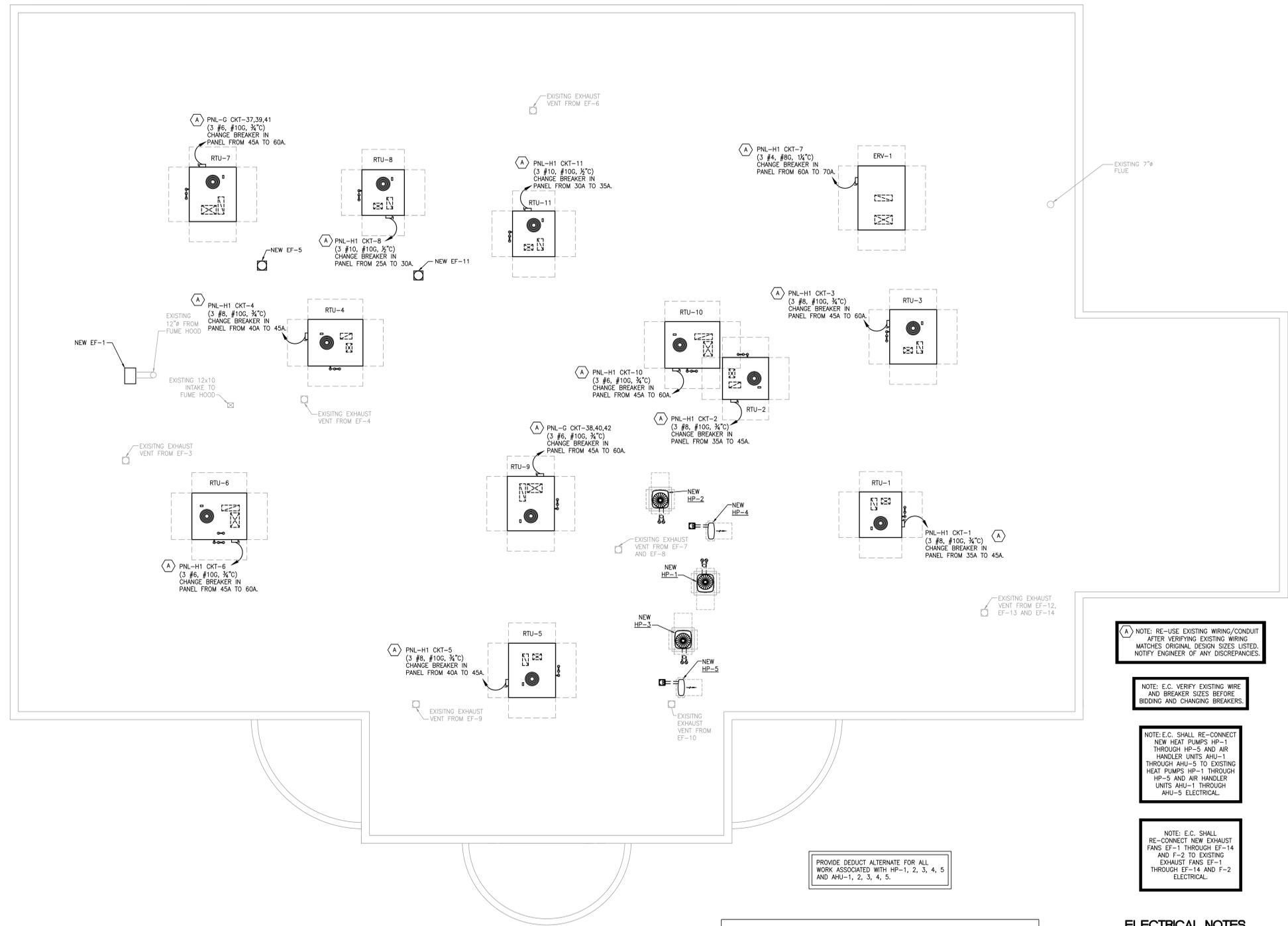
**MECHANICAL  
CONTROLS**

DRAWN BY: BCH  
CHECKED BY: SEC  
DATE: DECEMBER 17TH, 2018  
PROJECT NO: A18-173  
FILE:



DUPLICATION OR REUSE OF THIS DRAWING IN WHOLE OR IN PART IS PROHIBITED WITHOUT THE EXPRESSED WRITTEN CONSENT OF S. E. COLLINS, INC.

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**(A) NOTE: RE-USE EXISTING WIRING/CONDUIT AFTER VERIFYING EXISTING WIRING MATCHES ORIGINAL DESIGN SIZES LISTED. NOTIFY ENGINEER OF ANY DISCREPANCIES.**

**NOTE: E.C. VERIFY EXISTING WIRE AND BREAKER SIZES BEFORE BIDDING AND CHANGING BREAKERS.**

**NOTE: E.C. SHALL RE-CONNECT NEW HEAT PUMPS HP-1 THROUGH HP-5 AND AIR HANDLER UNITS AHU-1 THROUGH AHU-5 TO EXISTING HEAT PUMPS HP-1 THROUGH HP-5 AND AIR HANDLER UNITS AHU-1 THROUGH AHU-5 ELECTRICAL.**

**NOTE: E.C. SHALL RE-CONNECT NEW EXHAUST FANS EF-1 THROUGH EF-14 AND F-2 TO EXISTING EXHAUST FANS EF-1 THROUGH EF-14 AND F-2 ELECTRICAL.**

**1 POWER PLAN**  
SCALE: 1/8" = 1'-0"

**ELECTRICAL LOAD SUMMARY (2000A SERVICE)**

POWER	ITEM	CURRENT	FUTURE	TOTAL VA	POWER FACTOR	EQUIVALENT VA	MDP PANEL LOAD
	LIGHTING	NO CHANGE	0	0.0	1.25	0.0	
	RECEPTACLES	NO CHANGE	0	0.0	1.0	0.0	
	HVAC	14,328.0	0	14,328.0	1.0	14,328.0	
	MOTORS	NO CHANGE	0	0.0	1.0	0.0	
	FANS	NO CHANGE	0	0.0	1.0	0.0	
	WTR.HTRS/ PMPs	NO CHANGE	0	0.0	1.0	0.0	
	KITCHEN	NO CHANGE	0	0.0	1.0	0.0	
	OTHER	NO CHANGE	0	0.0	1.0	0.0	
	HISTORIC LOAD	110,000.0	0	110,000.0	1.0	110,000.0	
<b>TOTAL</b>		<b>124,328.00</b>	<b>0</b>	<b>124,328.00</b>		<b>124,328.00</b>	<b>/ 1.73 x 208 = 345.5 A</b>

**ELECTRICAL SYSTEM AND EQUIPMENT**

PREScriptive  PERFORMANCE  ENERGY COST BUDGET

Provide a standard riser diagram which indicates designed points for check metering.  
Provide a standard panel schedule description which identifies different enduse loads.

**LIGHTING SCHEDULE**

lamp type required in fixture \_\_\_\_\_ N/A  
number of lamps in fixture \_\_\_\_\_  
ballast type used in the fixture \_\_\_\_\_  
number of ballast in fixture \_\_\_\_\_  
total wattage per fixture \_\_\_\_\_

**MOORESVILLE POLICE DEPARTMENT**

total interior wattage specified vs allowed \_\_\_\_\_ NOT APPLICABLE (NO CHANGE TO EXISTING)  
total exterior wattage specified vs allowed \_\_\_\_\_ NOT APPLICABLE (NO CHANGE TO EXISTING)

**EQUIPMENT SCHEDULES WITH MOTORS (not used for mechanical systems)**

motor horsepower \_\_\_\_\_ N/A  
number of phases \_\_\_\_\_  
minimum efficiency \_\_\_\_\_  
motor type \_\_\_\_\_  
# of poles \_\_\_\_\_

**DESIGNER STATEMENT:**  
To the best of my knowledge and belief, the design of this building complies with the thermal envelope requirements of the North Carolina State Building Code, Volume X-Energy.

NAME: SAMUEL E. COLLINS, II, P.E.  
TITLE: PROFESSIONAL ENGINEER

- ELECTRICAL NOTES**
- ALL WIRE SHALL BE SOLID COPPER THHN/THWN RATED FOR 75 DEGREE C.
  - 20A HOMERUN CIRCUITS ON #12 GA WIRE SHALL NOT EXCEED 60' LENGTH. IF 61'-100' USE #10 GA WIRE. IF 101'-160' USE #8 GA WIRE. IF 161'-220' USE #6 GA WIRE.
  - PROVIDE A GREEN GROUND WIRE FOR ALL CIRCUITS. METAL CONDUITS SHALL NOT BE USED AS A SOLE MEAN FOR GROUNDING.
  - PROVIDE ALL WIRING IN EMT CONDUIT WITH COMPRESSION FITTINGS.
  - PROVIDE PLASTIC ENGRAVED LABELS FOR ALL PANELS AND DISCONNECTS. LETTERS SHALL NOT BE LESS THAN 1/2" TALL.
  - HAND LABEL ALL JUNCTION BOXES WITH PERMANENT MARKER.
  - PROVIDE PRINTED LABELS ON ALL DEVICE COVERS WITH CIRCUIT # AND PANEL.
  - PROVIDE TYPED PANEL SCHEDULE AND AFFIX TO INTERIOR OF PANEL DOOR.
  - MAINTAIN ALL NEC, STATE AND LOCAL BUILDING CODE CLEARANCES.
  - ALL WORK SHALL MEET/EXCEED NEC, STATE AND LOCAL BUILDING CODES.
  - ALL LIGHT FIXTURE SELECTIONS SHALL BE BY OWNER AND MUST COMPLY WITH ENERGY CODE.

- ELECTRICAL LEGEND**
- DUPLEX RECEPTACLE
  - STAINLESS STEEL COVER
  - EXISTING PANEL BOX
  - DISCONNECT (NEMA-3R)
  - QUAD RECEPTACLE
  - STAINLESS STEEL COVER
  - JUNCTION BOX
  - WHEN EXTERIOR MOUNTED