

SEISMIC BRACING	
ALL SUSPENDED UTILITY SYSTEMS WHICH INCLUDE: ELECTRICAL, MECHANICAL, AND PLUMBING EQUIPMENT AND ASSOCIATED CONDUIT, DUCTWORK, AND PIPING ARE REQUIRED TO HAVE SEISMIC RESTRAINT ATTACHMENTS DESIGNED TO RESIST THE TOTAL DESIGN SEISMIC FORCES DESCRIBED IN ASCE 7-05, CHAPTER 13 PROVIDE TYPICAL SEISMIC RESTRAINT DETAILS, DOCUMENTATION SUBSTANTIATING COMPLIANCE WITH 2010 CBC, ASCE 7-05, CHAPTER 13 TO INCLUDE SEISMIC RESTRAINT ASSEMBLY DETAILS, ANCHORAGE TO OVERHEAD STRUCTURE WITH SUPPORTING ENGINEERING STAMPED BY A LICENSED CIVIL OR STRUCTURAL ENGINEER AT TIME OF INSPECTION. "CITY POLICY"	
STRUCTURAL NOTES	
THE GENERAL CONTRACTOR SHALL HIRE A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA TO DESIGN SEISMIC RESTRAINTS FOR THE FOLLOWING:	
a. STORAGE RACKS OVER 5'-0" IN HEIGHT.	
b. MECHANICAL DUCTWORK AND ROOF MOUNTED MECHANICAL EQUIPMENT.	
c. PIPING (AND/OR) SPRINKLERS.	
d. ELECTRICAL CABLE TRAYS (AND/OR) CONDUITS RUNS.	
SEISMIC RESTRAINTS SHALL BE DEFINED AS BRACINGS, STRUTS, HANGERS AND CONNECTIONS BETWEEN THE ABOVE ITEMS AND THE PRIMARY STRUCTURE AS REQUIRED, PROVIDING LATERAL STABILITY IN THE EVENT OF THE CODE PRESCRIBED EARTHQUAKE.	
ALL BRACING, STRUTS, HANGERS AND CONNECTIONS SHALL BE DESIGNED IN CONFORMANCE WITH 2010 CBC, ASCE 7-05, CHAPTER 13, STRUCTURAL CALCULATIONS AND SEISMIC RESTRAINT DETAILS SHALL BE STAMPED AND PROVIDED TO THE BUILDING INSPECTOR PRIOR TO INSPECTION.	

KITCHEN NOTES	
1)	AN AIR BALANCE TEST WILL BE REQUIRED TO VERIFY THE PROPER AMOUNT OF OUTSIDE AIR TO COMPLY WITH T24 CALCULATIONS, BEFORE FINAL APPROVAL OF THIS PROJECT.
2)	PRIOR TO MECHANICAL PERMIT FINAL, A SMOKE DETECTOR SHUT-OFF TEST WILL BE REQUIRED. 2010 CMC 609.
3)	HVAC AND AIR DUCT / VENT OVER 96 SQUARE INCHES REQUIRE BURGLAR BARS OR SCREEN.
4)	UPON COMPLETION AND BEFORE FINAL APPROVAL OF THE INSTALLATION OF A VENTILATION SYSTEM SERVING COMMERCIAL FOOD HEAT-PROCESSING EQUIPMENT, A PERFORMANCE TEST MAY BE REQUIRED TO VERIFY THE RATE OF AIRFLOW AND PROPER OPERATION. THE PERMITTEE SHALL FURNISH THE NECESSARY TEST EQUIPMENT AND DEVICES REQUIRED TO PERFORM THE TEST.

AIR CONDITIONING SYMBOLS AND ABBREVIATIONS						
SYMBOLS	ABBR	DESCRIPTION	ABBR/SYMBOL	DESCRIPTION	ABBR/SYMBOL	DESCRIPTION
	FD	AUTOMATIC FIRE DAMPER	GA	GAUGE	(S)	SPACE SENSOR
	C.S.F.D.	COMBINATION SMOKE FIRE DAMPER	AC	AIR CONDITIONING	WB	WATER BULB
	APV	AIR PROPORTIONING VALVE	B.H.P	BREAK HORSEPOWER	WG	WATER GAGE
	F.C.	FLEXIBLE DUCT CONNECTION	B.O.D	BOTTOM OF DUCT ELEVATION	△	DIFFERENCE BETWEEN
	TV	THROAT AND SIZE	O.C	ON CENTER	CFM	CUBIC FEET / MINUTE (CFM)
	TH	TURNING VANES	COMP.	COMPRESSOR	☒	SUPPLY DIFFUSER
	MVD OR VD	MANUAL VOLUME DAMPER WITH INDIVIDUAL BLADE QUADRANTS	COND.	CONDENSER (ING)	☒	RETURN REGISTER
	DB	DRY BULB	☒	CEILING EXHAUST REGISTER	☒	ROOF EXHAUST FAN
	DISH	DUCT SIZE NOTATION FIRST DIMENSION IS FOR NEAR SIDE	EXT	EXTERNAL	☒	EXIST. SUPPLY DIFFUSER
	OBD	OPPOSED BLADE DAMPER	EVAP	EVAPORATOR (ING) (VE)	☒	EXIST RETURN REGISTER
	PBD	PARALLEL BLADE DAMPER	FT.IN	SQUARE FEET CUBIC INCH	☒	EXIST. CEILING EXHAUST REGISTER
	-MO	-MOTOR OPERATED	T	THERMOSTAT	☒	EXIST. ROOF EXHAUST FAN
	-HO	-HAND OPERATED (QUADRANT)	FFM	FEET PER MINUTE	☒	EXIST. MANUAL VOLUME DAMPER
	BFT	BOTTOM FLAT TRANSITION	HP	HORSEPOWER	---	NEW SUPPLY DUCT
	TFT	TOP FLAT TRANSITION	INSUL	INSULATE INSULATION	---	NEW RETURN DUCT
	LINE	PLENUM OR DUCT LINER	MBH	THOUSAND BTU PER HOUR	---	NEW EXHAUST DUCT
	FLEX	FLEXIBLE DUCT	NIC	NOT IN CONTRACT	---	NEW MAKE-UP DUCT
	EXHAUST DUCT SECTION	CD	CEILING DIFFUSER	---	---	NEW GREASE DUCT
	RETURN DUCT SECTION	CR	CEILING REGISTER	---	---	NEW OSA DUCT
	SUPPLY DUCT SECTION	CG	CEILING GRILLE	---	---	EXISTING SUPPLY/ RETURN/ EXHAUST/ MAKE-UP/ GREASE/ OSA
	EXH	EXHAUST	TR	TOP REGISTER	(R)	RELOCATED
	OSA	OUTSIDE AIR FLOW	BR	BOTTOM REGISTER	(E)	EXISTING
	RA	RETURN AIR	RH	RELATIVE HUMIDITY	(N)	NEW
	SA	SUPPLY AIR	REQ'D	REQUIRED	EXIST.	EXISTING
	UC	UNDERCUT DOOR	S.P	STATIC PRESSURE	☒	(MZD) MOTORIZED ZONE DAMPER
	D.LVR	DOOR LOUVER WITH CROSS	T.S	TIP SPEED	☒	SUPPLY AIR DUCT UP
	TR	TRANSFER AIR FLOW	TYP	TYPICAL FOR	☒	RETURN AIR DUCT UP
	P.O.C	POINT OF CONNECTION	O.V	OUTLET VELOCITY (FPM)	☒	EXHAUST AIR DUCT UP
	POINT OF DISCONNECTION	UTR	UP THRU ROOF	☒	---	SUPPLY AIR DUCT DOWN
	DIAMETER OR ROUND	OPNG	OPENING	☒	---	RETURN AIR DUCT DOWN
	DUCT SMOKE DETECTOR	(E)	BY ELECTRICAL CONTRACTOR	☒	---	EQUIPMENT DESIGNATION
	BACKDRAFT DAMPER	(M)	BY MECHANICAL CONTRACTOR	---	---	FLEXIBLE CONNECTION

DIFFUSER, REGISTER AND GRILLE SCHEDULE						
TAG	SYMBOL	MANUFACTURE AND MODEL	NECK SIZE	POSITION	CFM RANGE	REMARKS
S1 CFM		TITUS MCD (LAY-IN)	6"ø	CEILING	0-100	1 2 3 4 5 6 7 8 9 A B C D
			8"ø		101-175	
			12"ø		176-350	
			14"ø		351-480	
RT1 CFM		TITUS PAR-AA (LAY-IN)	6"ø	CEILING	0-200	1 2 3 4 5 6 7 8 9 A B C D
			8"ø		201-325	
			10"ø		326-426	
			12"ø		426-625	
ET1 CFM		TITUS MCD (GYPSBOARD/HARDLOD)	18x18	CEILING	826-1350	1 2 3 4 5 6 7 8 9 A B C D
			22x22		1351-2000	
			22x46		2001-4200	
			6"ø		0-100	
S21 CFM		TITUS MCD (GYPSBOARD/HARDLOD)	9x9	CEILING	101-225	1 2 3 4 5 6 7 8 9 A B C D
			12x12		226-400	
			15x15		401-625	
			18x18		626-900	
R21 CFM		TITUS 50P (GYPSBOARD / HARDLOD)	21x21	CEILING	901-1225	1 2 3 4 5 6 7 8 9 A B C D
			24x24		1226-1600	
			6"ø		0-75	
			8"ø		76-150	
E21 CFM		TITUS 50P (GYPSBOARD / HARDLOD)	10x10	CEILING	151-250	1 2 3 4 5 6 7 8 9 A B C D
			12x12		251-350	
			14x14		351-475	
			16x16		476-650	
E21 CFM		TITUS 50P (GYPSBOARD / HARDLOD)	18x18	CEILING	651-850	1 2 3 4 5 6 7 8 9 A B C D
			20x20		851-1025	
			22x22		1026-1275	
			24x24		1276-1600	
E21 CFM		TITUS 50P (GYPSBOARD / HARDLOD)	28x28	CEILING	1601-2500	1 2 3 4 5 6 7 8 9 A B C D
			30x30		2501-2900	
			32x32		2901-3375	
			34x34		3376-3825	

REMARKS:

- MODEL NUMBERS ARE TITUS UNLESS OTHERWISE NOTED.
- PROVIDE 24x24 MODULE FOR ALL DIFFUSERS INSTALLED IN LAY-IN CEILINGS.
- FRAME ALL AIR DEVICES FOR APPROPRIATE CEILING TYPE.
- PROVIDE ALUMINUM FRAME FOR HARD CEILINGS IN TOILETS, JANITOR'S CLOSET AND LOCK-UP ROOM.

- FLEXIBLE DUCTS CONNECTING THE DIFFUSERS SHALL BE FULL SIZE OF NECK DIAMETER.
- MAXIMUM NOISE CRITERION RATING < 30 DBA.
- BAKED ENAMEL FINISH, COLOR TO BE WHITE OR BY ARCHITECTURAL SPECIFICATIONS.
- DIFFUSERS SHALL BE 4-WAY BLOW UNLESS OTHERWISE INDICATED ON PLANS.
- MOUNTING FRAME TYPE SHALL BE COORDINATED WITH CEILING CONSTRUCTION TYPE, COORDINATE WITH ARCHITECT.
- NECK DIAMETER SHALL BE PER MANUFACTURER.
- DEVICE SHALL BE PAINTED BY PAINTING CONTRACTOR TO MATCH ADJACENT CEILING SURFACES PER ARCHITECTURAL SPECIFICATIONS.
- WITH DIRECTIONAL BLADES.
- PROVIDE SUBMITTAL FOR ARCHITECT'S / ENGINEER REVIEW AND APPROVAL.

R = RETURN S = SUPPLY E = EXHAUST

ROOF TOP UNIT SCHEDULE																																
SYMBOL	SERVICE	LOCATION	MANUFACT. AND MODEL	HEATING CAPACITY BTU/HR		AUE *4	COOLING CAPACITY BTU/HR		INDOOR FAN						COMPRESSOR				REMARKS													
				INPUT	OUTPUT		TH	SH	FAN		ELECTRIC DATA		COMP		FAN		ELEC. DATA	POWER EXHAUST		COMBUSTION MOTOR	UNIT FLA	WEIGHT LBS	EER	MCA	MOP	TON						
				CFM	ESP		RPM	BHP	V	PH	HZ	UNIT FLA	FLA	FLA	FLA	(1)											(2)	(1)	(2)			
RTU 1	KITCHEN SUPPORT	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	180,000	148,000	82.0	103.6	78.5	3500	0.7*	-	-	208	3	60	53	-	-	-	-	208	3	60	3.8	0.48	53	910	11.0	53.7	80	8.5	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.
RTU 2	KITCHEN SUPPORT	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	180,000	148,000	82.0	103.6	78.5	3500	0.7*	-	-	208	3	60	53	-	-	-	-	208	3	60	3.8	0.48	53	910	11.0	53.7	80	8.5	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.
RTU 3	DINING	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	180,000	148,000	82.0	103.6	78.5	3500	0.7*	-	-	208	3	60	53	-	-	-	-	208	3	60	3.8	0.48	53	910	11.0	53.7	80	8.5	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.
RTU 4	DINING	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	180,000	148,000	82.0	103.6	78.5	3500	0.7*	-	-	208	3	60	53	-	-	-	-	208	3	60	3.8	0.48	53	910	11.0	53.7	80	8.5	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.
RTU 5	DINING	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	180,000	148,000	82.0	103.6	78.5	3500	0.7*	-	-	208	3	60	53	-	-	-	-	208	3	60	3.8	0.48	53	910	11.0	53.7	80	8.5	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.
RTU 6	TAKE OUT/FOYER/PART-DINE	ROOF	CARRIER 48TCLAD9-C2C5-OF2A0	115,000	93,000	82.0	59.0	48.1	2000	0.7*	-	-	208	3	60	31	-	-	-	-	208	3	60	-	-	31	569	11.0	30.7	45	5.0	PROVIDE PROGRAMMABLE T'STAT, SMOKE DETECTOR IN SUPPLY PLENUM, COMPLETE ECONOMIZER SYSTEM, POWER EXHAUST AND VERATION ISOLATION ROOF CURB.

EXHAUST FAN SCHEDULE														
SYMBOL	SERVICE	LOCATION	MANUFACTURE AND MODEL	FAN DATA				MOTOR DATA				WEIGHT LBS	REMARKS	
				CFM	S.P. IN.W.G.	R.P.M.	DRIVE	HP	WATT	VOLTS	PHASE			HZ
EF 1	HOOD# 1 & 2 (ITEM 52)	ROOF	CAPTIVE_AIRE NCA24HPFA	3,800	1.5"	974	BELT	2	-	208	3	60	225	PROVIDE GREASE THROUGH & FACTORY ROOF CURB. INTERLOCK WITH MUA-1 & RTU-1 THROUGH RTU-6
EF 2	HOOD # 4 (ITEM 97)	ROOF	CAPTIVE_AIRE NCA16HPFA	2,200	1.5"	1266	BELT	1.5	-	208	3	60	145	PROVIDE GREASE THROUGH & FACTORY ROOF CURB. INTERLOCK WITH MUA-2 & RTU-1 THROUGH RTU-6
EF 3	HOOD# 5 & 6 (ITEM 97)	ROOF	CAPTIVE_AIRE NCA24HPFA	4,800	2.0"	1123	BELT	3	-	208	3	60	225	PROVIDE GREASE THROUGH & FACTORY ROOF CURB. INTERLOCK WITH MUA-2 & RTU-1 THROUGH RTU-6
EF 4	HOOD # 7 (ITEM 119)	ROOF	CAPTIVE_AIRE NCA18HPFA	2,400	1.75"	1200	BELT	2	-	208	3	60	165	PROVIDE GREASE THROUGH & FACTORY ROOF CURB. INTERLOCK WITH MUA-3 & RTU-1 THROUGH RTU-6
EF 5	HOOD # 8 (ITEM)	ROOF	CAPTIVE_AIRE NCA14HPFA	1,600	1.2"	1347	BELT	3/4	-	208	3	60	125	PROVIDE GREASE THROUGH & FACTORY ROOF CURB. INTERLOCK WITH MUA-3 & RTU-1 THROUGH RTU-6
EF 6	HOOD # 7 (ITEM 77)	ROOF	CAPTIVE_AIRE NCA10HPFA	1,400	0.625"	1194	BELT	1/2	-	208	3	60	115	PROVIDE FACTORY ROOF CURB. INTERLOCK WITH FAN SECTION OF RTU-1 THROUGH RTU-5
EF 7	MENS & WOMENS RESTROOMS	ROOF	CAPTIVE_AIRE DD11FA	600	0.375"	1113	BELT	1/4	-	208	3	60	85	PROVIDE BACK DRAFT DAMPER. INTERLOCK WITH BUILDING TIMECLOCK.
EF 8	EMPLOYEE RESTROOMS	CEILING	CAPTIVE_AIRE CFA 150CA	100	0.375"	588	DIRECT	0.134	-	120	1	60	35	PROVIDE BACK DRAFT DAMPER. INTERLOCK WITH LIGHT SWITCH.
EF 9	AV ROOM AT OFFICE	CEILING	CAPTIVE_AIRE CFA 500CA	400	0.375"	733	DIRECT	0.310	-	120	1	60	40	PROVIDE BACK DRAFT DAMPER. INTERLOCK WITH LINEVOLT T'STAT.
MAU 1	HOOD# 1 & 2	ROOF	CAPTIVE_AIRE A2-G12	3800	0.625"	868	BELT	1.5	-	208	3	60	600	INTERLOCK WITH EF-1 & FAN SECTION OF RTU-1 & RTU-2
MAU 2	HOOD# 4, 5 & 6	ROOF	CAPTIVE_AIRE A2-G15	7400	0.625"	945	BELT	5.0	-	208	3	60	700	INTERLOCK WITH EF-2, EF-3 & FAN SECTION OF RTU-1 & RTU-2
MAU 3	HOOD# 7 & 8	ROOF	CAPTIVE_AIRE A2-G12	4200	0.625"	868	BELT	1.5	-	208	3	60	600	INTERLOCK WITH EF-4 & EF-5 & FAN SECTION OF RTU-1 & RTU-2
AD 1	EXIT DOOR (BACKSIDE)	ABOVE DOOR	BERNER ASR1036A	1812	--	--	DIRECT	3/4	-	120	1	60	50	WITH DOOR MOUNTED MICRO SWITCH.

DIFFUSER, REGISTER AND GRILLE SCHEDULE						
TAG	SYMBOL	MANUFACTURE AND MODEL	DUCT SIZE	POSITION	CFM RANGE	REMARKS
S31 CFM		TITUS S300FS	18X12 24X12	EXPOSED DUCT	400, 475 600	1 2 3 4 5 6 7 8 9 A B C D
S41 CFM		TITUS TMR	8"-10" DIA 12"-14" DIA 16"-18" DIA		400 800 1000	1 2 3 4 5 6 7 8 9 A B C D

REMARKS:

- MODEL NUMBERS ARE TITUS UNLESS OTHERWISE NOTED.
- FRAME ALL AIR DEVICES FOR APPROPRIATE CEILING TYPE.

- FLEXIBLE DUCTS CONNECTING THE DIFFUSERS SHALL BE FULL SIZE OF NECK DIAMETER.
- MAXIMUM NOISE CRITERION RATING < 30 DBA.
- BAKED ENAMEL FINISH, COLOR TO BE WHITE OR BY ARCHITECTURAL SPECIFICATIONS.
- DIFFUSERS SHALL BE 4-WAY BLOW UNLESS OTHERWISE INDICATED ON PLANS.
- MOUNTING FRAME TYPE SHALL BE COORDINATED WITH CEILING CONSTRUCTION TYPE, COORDINATE WITH ARCHITECT.
- NECK DIAMETER SHALL BE PER MANUFACTURER.
- DEVICE SHALL BE PAINTED BY PAINTING CONTRACTOR TO MATCH ADJACENT CEILING SURFACES PER ARCHITECTURAL SPECIFICATIONS.
- WITH DIRECTIONAL BLADES.
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MINIMUM VENTILATION RATES IN BREATHING ZONE (ASHRAE 62.1: TABLE 6-1)						
SPACE	AREA SQ. FT.	PEOPLE OUTDOOR AIR RATE (CFM/PERSON)	AREA OUTDOOR AIR RATE (CFM/SQ. FT.)	OCCUPANT DENSITY (PEOPLE/1000 SQ.FT.)	NO. PEOPLE	MIN. OUTSIDE AIR (CFM)
KITCHEN	2313	20	0.12	5	12	278
DINING	4228	7.5	0.18	70	296	2220
SUPPORT(STORAGE ETC)	398	7.5	0.12	30	12	90
FOYER/TAKEOUT	596	7.5	0.12	30	18	135
BUILDING SPACE TOTAL OUTSIDE AIR QTY:	2723 CFM					
* OSA CALCULATED WHICHEVER IS MORE RESTRICTIVE.						
BUILDING SPACE PRESSURIZATION: (ASSUME MAKEUP AIR SUPPLY ARE EQUAL EXHAUST FANS IN THE KITCHEN AREA) RESTROOM EXHAUST AIR=700 CFM, TOTAL AC UNIT SUPPLY AIR =19500 CFM (2723 CFM OSA-700 CFM EXH)/ 19500 CFM TOTAL SUPPLY AIR QTY) x 100 = 10.3%						

CONTROL LEGEND			
	LINE VOLTAGE WIRING UNDER ELECTRICAL SECTION.		

GENERAL NOTES

- DUCTWORK:**
- INSTALLATION OF DUCTWORK SHALL BE COORDINATED WITH OTHER TRADES. DUCTS INSTALLED IN LOCATIONS WHERE THEY ARE SUBJECT TO PHYSICAL DAMAGE SHALL BE PROTECTED BY SUITABLE GUARDS.
 - ALL AIR CONDITIONING DUCTS TO COMPLY WITH SMCMNA AND CHAPTER 6 OF THE 2010 CALIFORNIA MECHANICAL CODE. ALL TRANSVERSE JOINTS TO BE SUBSTANTIALLY AIRTIGHT WITH TAPE, MASTIC, GASKETING OR OTHER MEANS; ALL LOW PRESSURE DUCTWORK SIZED EQUAL TO OR LESS THAN 0.1" W.G./100 FT. ALL DUCTS FOR VENTILATION INCLUDING GARAGE VENTILATION SYSTEM TO COMPLY WITH CHAPTER 5 OF THE 2010 CALIFORNIA MECHANICAL CODE.
 - DUCT SUPPORTS AND ANCHORAGE SHALL COMPLY WITH 2010 CMC 604.0 AND TABLE 6-2-A, 6-2-B, 6-2-C, AND 6-2-D.
 - MANUAL VOLUME DAMPERS TO BE INSTALLED IN ALL BRANCH TAKE-OFFS. ALL DAMPERS TO HAVE LOCKING QUADRANTS.
 - DUCT SIZES SHOWN ARE NET SIZES REQUIRED. LINED DUCTS SHALL BE INCREASED IN SIZE TO ACCOMMODATE LINING WITHOUT LOSS OF AREA.
 - PROVIDE MASTIC OR DUCT TAPE JOINT SEALANT TO SEAL TRANSVERSE JOINTS ON AIR SUPPLY DUCTS INSTALLED IN LOCATIONS WHERE AIR LEAKAGE THROUGH THE JOINTS WOULD BE NON-BENEFICIAL TO THE OCCUPIED AREA TEMPERATURE REQUIREMENTS, AND SEAL LONGITUDINAL JOINTS ON LOW-PRESSURE SUPPLY DUCTS WHERE INTERNAL STATIC PRESSURE EXCEED 0.75" OF WATER PRESSURE.
 - FLEX DUCT SHALL BE ATTACHED TO ALL REGISTERS, GRILLS, COLLARS AND FITTINGS ACCORDING TO ITS LISTINGS. I.E. A MINIMUM OF TWO WRAPS OF UL 181 TAPE AND A PANDUIT STRAP ON THE INSIDE LINER AND A MINIMUM OF TWO WRAP OF UL 181 TAPE OR A PANDUIT STRAP OR BOTH ON THE OUTSIDE COVER.
 - ALL FLEX DUCT SPLICES SHALL BE SLEEVED.
 - ALL END SPLICES SHALL BE SLEEVED.
 - MATERIALS EXPOSED WITHIN DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED RATING OF NOT MORE THAN 50 PER CBC 602.0
 - FLEXIBLE DUCTS TO BE GLASS-FLEX FOR STRAIGHT RUNS ONLY 8'-0", MAXIMUM IN LENGTH. ALL ELBOWS AND TURNS SHALL BE SHEET METAL GALVANIZED.
 - PROVIDE DUCT LINING TO SUPPLY DUCT OF EACH FAC UNIT FOR MINIMUM OF 10 FT. DUCT LINING TO BE EQUAL TO 1/2" THICK x 1-1/2" PFC DENSITY DUCT LINING. DUCTWORK TO BE INCREASED IN EACH DIMENSION TO INCORPORATE THICKNESS OF LINING.
 - VOLUME DAMPERS IN ALL BRANCH DUCTS.
 - PROVIDE GALVANIZED SHEET METAL DUCTS FABRICATED AND INSTALLED TO UMC 2010 EDITION.
- AIR DEVICES:**
- ARROWS AT CEILING DIFFUSERS INDICATE THE AIR THROW PATTERN.
 - COORDINATE WITH ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL DIFFUSERS AND REGISTERS AND LOCATIONS.
 - SUPPLY DIFFUSERS AND REGISTERS TO BE TITUS MODEL: TDX-AA, PAS-AA (KITCHEN ONLY) FOR CEILING INSTALLATION AND/OR TITUS FLOWBAR FOR SIDE-WALL INSTALLATION OR APPROVED EQUAL WITH KEY OPERATED OPPOSED BLADE DAMPER UNIT.
 - RETURN AND EXHAUST AIR REGISTERS TO BE TITUS MODEL: SOF-NT FOR CEILING INSTALLATION AND/OR TITUS FLOWBAR FOR SIDE-WALL INSTALLATION OR APPROVED EQUAL WITH KEY OPERATED OPPOSED BLADE DAMPER UNIT.
 - ALL REGISTERS AND GRILLS INSTALLED IN T-BAR CEILINGS SHALL BE ATTACHED AT EACH CORNER TO THE MAIN RUNNERS WITH APPROVED CLIPS OR SM SCREWS.
- INSULATION:**
- MINERAL FIBER INSULATION SHALL BE INSTALLED IN JOINT SPACES WHENEVER A PLUMBING PIPE OR DUCT PENETRATES A FLOOR-CEILING ASSEMBLY OR WHERE SUCH PIPE OR DUCT PASSES THROUGH THE PLANE OF FLOOR-CEILING ASSEMBLY FROM WITHIN A WALL. THE INSULATION SHALL BE INSTALLED TO A POINT 12" BEYOND THE PIPE OR DUCT.
 - COMBUSTION AIR, KITCHEN AND BATHROOM EXHAUST DUCTS WITHIN SOUND SEPARATION ASSEMBLIES SHALL BE WRAPPED WITH TYPE "C" INSULATION AS SHOWN IN TABLE NO. 6-4, UNIFORM MECHANICAL CODE.
 - CEILING CONCEALED SUPPLY AND RETURN DUCTS TO BE COVERED ALL SIDES WITH 2" THICK 3/4 LB./CU. FT. OR WITH 1" THICK 1.5 LB./CU. FT. DENSITY FIBERGLASS INSULATION, OR 1" THICK 3 LB./CU. FT. MINERAL FIBER BOARD, OR MATERIAL WITH A CONDUCTANCE OF 0.30 OR LESS, APPLIED WITH 2" LAPPED JOINTS SECURELY AND NEATLY WIRED AND FASTENED TO DUCT; THE INSULATION TO BE CERTIFIED BY CALIFORNIA ENERGY COMMISSION. CONDUITS ARE ACCEPTABLE WHEN DUCTWORK PENETRATE INSULATED WALLS OR ROOF, THE HOLE MUST BE SEALED WITH AN APPROVED POLY SEAL MATERIAL.
 - INSULATION INSTALLER SHALL POST IN A CONSPICUOUS LOCATION IN THE BUILDING A CERTIFICATE SIGNED BY THE INSTALLER AND BUILDER STATING THAT THE INSULATION CONFORMS WITH THE REQUIREMENTS OF TITLE 24, CHAPTER 2-53, AND THAT THE MATERIAL INSTALLED CONFORMS WITH THE REQUIREMENTS OF TITLE 20, CHAPTER 2, SUB-CHAPTER 4, ARTICLE 3.
 - ALL INSULATION MATERIALS SHALL BE CERTIFIED BY THE MANUFACTURER AS COMPLYING WITH THE CALIFORNIA QUALITY STANDARD FOR INSULATION MATERIAL.
 - INSULATION APPLIED TO THE EXTERIOR SURFACE OF DUCTS LOCATED IN THE BUILDINGS SHALL HAVE A FLAME SPREAD OF NOT MORE THAN 25 AND A SMOKE-DENSITY NOT EXCEEDING 50 PER CBC 605.0
- PIPING:**
- PROVIDE A 3/4" MINIMUM CONDENSATE DRAIN FROM EACH AC UNIT TO AN APPROVED DISPOSAL AREA. CONDENSATE WATER SHALL NOT DRAIN OVER A PUBLIC WAY. THE DRAIN SHALL HAVE A SLOPE OF NOT LESS THAN 1/8 INCH PER FOOT AND SHALL BE OF APPROVED CORROSION-RESISTANT PIPE. (THIS WORK IS UNDER PLUMBING SECTION, REFER TO PLUMBING DRAWINGS).
 - FOR COOLING EQUIPMENT LOCATED IN AN ATTIC OR FURRED SPACE, AN ADDITIONAL WATER-TIGHT PAN OF CORROSION-RESISTANT METAL SHALL BE INSTALLED BENEATH THE COOLING COIL TO CATCH THE OVERFLOW CONDENSATE DUE TO CLOGGED PRIMARY CONDENSATE DRAIN. THE ADDITIONAL PAN SHALL BE PROVIDED WITH A DRAIN PIPE, 3/4" INCH NOMINAL PIPE SIZE, DIMENSIONED AT A POINT WHICH CAN BE READILY OBSERVED. (THIS WORK IS UNDER PLUMBING SECTION REFER TO PLUMBING DRAWINGS).
- CODE:**
- MOUNT WALL MOUNTED THERMOSTATS 4' - 0" ABOVE FINISHED FLOOR.
 - EACH SINGLE SYSTEM WITH ONE OR MORE AIR CONDITIONING UNITS PROVIDING HEATING OR COOLING IN EXCESS 2000 CFM OR AIR SERVING MORE THAN ONE OCCUPANCY, SHALL HAVE SMOKE DETECTORS (PRODUCT OF COMBUSTION) AND SHALL BE INSTALLED IN THE MAIN SUPPLY DUCT DOWNSTREAM OF THE FILTERS. ACTIVATION OF THE SMOKE SHALL CAUSE THE UNIT TO SHUT DOWN AND ACTIVATE THE FIRE ALARM SYSTEM. (WHERE FIRE DETECTOR ALARM SYSTEMS ARE PROVIDED).
 - IF THERE ARE A NUMBER OF AIR CONDITIONING UNITS SERVING ONE AREA, OR THERE IS A COMMON RETURN AIR PLENUM FOR A NUMBER OF AIR CONDITIONING UNITS, ALL SMOKE DETECTORS MUST BE INTERCONNECTED TO A SHUT-OFF ALL EQUIPMENT EVEN WHEN SMOKE IS DETECTED BY ONLY ONE SMOKE DETECTOR. DUCT VELOCITY AND PRESSURE DIFFERENTIAL MAY HAVE TO BE VERIFIED FOR EACH DUCT SMOKE DETECTOR LOCATION IN ACCORDANCE WITH U.L. LISTING AND EC110-3(B). AUTOMATIC SHUTOFFS NEED NOT BE INSTALLED WHEN ALL ROOMS HAVE DIRECT EXIT TO THE EXTERIOR OF THE BUILDING.
 - ALL WORK SHALL COMPLY WITH REQUIREMENTS OF ALL APPLICABLE CODES, LAWS, ORDINANCES AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION. THIS CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, ADDITIONAL PLAN CHECK FEES, INSPECTIONS, ETC. AND FURNISH SIGNED, CERTIFIED AND ACCEPTABLE COPIES TO THE OWNER FOR HIS RECORD.

- CONTRACTOR SHALL PROVIDE FIRE DAMPERS AT FIRE RATED PENETRATIONS.
 - DUCTS OPENING INTO CORRIDOR SHALL HAVE INSTALLED A COMBINATION FIRE/SMOKE DAMPER CONFORMING TO CBC STANDARD SECTION 716 (J) WITH A MINIMUM LEAKAGE CLASSIFICATION OF III. CBC, 4306. FIRE DAMPER DETAIL SHOWN IS FOR REFERENCE ONLY. FIRE DAMPERS SHALL BE COVERED BY APPROVED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S PRINTED INSTRUCTIONS. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE MADE AVAILABLE TO THE INSPECTING AUTHORITIES.
 - DUCT VELOCITY AND PRESSURE DIFFERENTIAL SHALL BE VERIFIED FOR EACH DUCT SMOKE DETECTOR LOCATION IN ACCORDANCE WITH U.L. LISTING AND EC110-3(B). DUCT SMOKE DETECTORS SHALL BE MAGNETIC TESTED TO THE LISTED SPECIFICATIONS IN THE PRESENCE OF THE CITY BUILDING INSPECTOR PRIOR TO FINAL APPROVAL.
 - ACCESS TO INSPECT, SERVICE, REPAIR AND REPLACEMENT WITHOUT REMOVING PERMANENT CONSTRUCTION TO ALL EQUIPMENT SHALL BE PROVIDED, UNLESS OTHERWISE SPECIFIED, NOT LESS THAN 30 INCHES OF WORKING SPACE AND PLATFORM SHALL BE PROVIDED.
 - TOILET ROOMS WITHOUT WINDOWS OR WINDOW AREA LESS THAN 5% OF TOILET FLOOR AREA, SHALL HAVE A MECHANICALLY OPERATED EXHAUST SYSTEM CAPABLE OF PROVIDING A COMPLETE CHANGE OF AIR EVERY 10 MINUTES (6 AIR CHANGE PER HOUR). TOILET EXHAUST DUCTS SHALL BE DIRECTLY CONNECTED TO THE OUTSIDE AND SHALL BE OF SMOOTH, NON-ABSORBENT AND NON-COMBUSTIBLE SURFACE MATERIAL.
 - ALL OSA INTAKES MUST BE 10 FEET MINIMUM AWAY FROM ALL PLUMBING OR APPLIANCE VENTS (OR 5'-0" MINIMUM BELOW APPLIANCE VENT). OSA INLETS SHALL BE COVERED WITH SCREEN HAVING 1/4" OPENING.
 - ENVIRONMENTAL EXHAUST, SUCH AS BATHROOM, DRYER VENT, ETC. SHALL TERMINATE AT LEAST 3 FEET FROM PROPERTY LINE, ANY OPERABLE WINDOW, AND 10 FEET AWAY FROM ANY FRESH AIR INTAKE. PRODUCT CONVEYING EXHAUST, SUCH AS GARAGE VENTILATION, COMMERCIAL KITCHEN HOOD, ETC. SHALL TERMINATE AT LEAST 10 FEET FROM PROPERTY LINE, OPENINGS INTO THE BUILDING, FRESH AIR INTAKE OPENING, ABOVE ADJOINING GRADE, AND 3 FEET FROM EXTERIOR WALL OR ROOF.
 - ALL PENETRATIONS IN FIRE WALLS AND FLOOR-AND ROOF-CEILING ASSEMBLIES REQUIRING PROTECTED OPENING SHALL BE FIRE-STOPPED PROVIDE FIRE STOPPING SPECIFICATIONS INCLUDING MANUFACTURER AND REPORT OF APPROVED TESTING AGENCY.
 - ALL PENETRATIONS OR OPENINGS IN CONSTRUCTION ASSEMBLIES FOR PIPING, HEATING, VENTILATING OR EXHAUST DUCTS SHALL BE SEALED, LINED, INSULATED OR OTHERWISE TREATED TO MAINTAIN THE REQUIRED RATINGS.
 - ALL "ROOF" DUCTS, PIPES, AND APPLIANCE VENTS LOCATED IN SOUND ASSEMBLIES SHALL BE ISOLATED FROM THE BUILDING CONSTRUCTION BY MEANS OF RESILIENT SLEEVES, MOUNTS, OR MINIMUM 1/4" THICK APPROVED RESILIENT MATERIAL. (EXCEPTION: GAS PIPING NEED NOT BE LINED).
 - CLOTHES DRYER EXHAUST DUCTS MUST BE OF METAL.
 - ALL GAS FIRED HEATING EQUIPMENT SHALL BE "TID" (PILOT-LESS) TYPE.
 - PROVIDE A 6" CLEARANCE ON FRONT, SIDES AND BACK OF THE FURNACE.
 - IF THE CEILING MOUNTED EXHAUST FAN HOUSING TO THE CEILING MEMBRANE. USE ONLY APPROVED FIRE STOPPING SEALANT.
 - THIS PROJECT SHALL COMPLY WITH THE 2005 EDITION OF THE CALIFORNIA BUILDING CODE (1-24), WHICH ADOPTS THE 2010 CBC, 2010 CMC, 2010 CPC & THE 2010 CEC.
 - WHEN MORE THAN ONE HEATING, COOLING, VENTILATING OR REFRIGERATING SYSTEM IS INSTALLED ON THE ROOF OF A BUILDING OR WITHIN A BUILDING, IT SHALL BE PERMANENTLY IDENTIFIED AS TO THE AREA OR SPACE SERVED BY THE EQUIPMENT.
- ENERGY:**
- BACK-DRAFT DAMPERS FOR ALL EXHAUST AND FAN SYSTEMS SHALL BE PROVIDED. EXCEPTION: NO BACK-DRAFT DAMPERS IN GREASE DUCTS.
 - ALL WATER HEATING AND AIR CONDITIONING EQUIPMENT, SHOWER HEADS AND FAUCETS SHALL BE C.E.C. CERTIFIED.
 - AUTOMATIC TEMPERATURE CONTROL DEVICE FOR REGULATION OF SPACE TEMPERATURE SHALL BE EQUIPPED WITH NIGHT SET BACK AND HAVE THE ABILITY TO OPERATE THE HEATING AND THE COOLING IN SEQUENCE. CONTROL SHALL BE ADJUSTABLE TO PROVIDE A RANGE OF UP TO 10 DEGREES F. BETWEEN FULL HEATING AND FULL COOLING AND HAVE A CAPABILITY OF TERMINATING ALL HEATING AT A TEMPERATURE NO MORE THAN 70 DEGREES F AND COOLING AT A TEMPERATURE NO LESS THAN 78 DEGREES F. AT LEAST ONE AUTOMATIC SPACE TEMPERATURE CONTROL DEVICE (THERMOSTAT) SHALL BE PROVIDED FOR EACH ZONE AND/OR FOR EACH SEPARATE HVAC SYSTEM. (NOT MORE THAN ONE FLOOR OF BUILDING SHALL BE INCLUDED).
 - ALL AIR CONDITIONING UNITS TO BE FURNISHED WITH MAINTENANCE MANUALS, SCHEDULES AND TAGS.
 - ALL AIR CONDITIONING UNITS TO BE EQUIPPED WITH A READILY ACCESSIBLE MANUALLY ADJUSTABLE AUTOMATIC MEANS OF REDUCING THE ENERGY USED FOR HVAC HEATING PERIOD OF NON USE OR ALTERNATE USE OF THE BUILDING SPACE OR ZONES SERVED BY THE SYSTEM, SUCH AS A TIME CLOCK OR TIME SWITCH.
 - EACH MECHANICAL OR GRAVITY VENTILATING UNIT, EXCEPT ATTIC VENTILATORS SHALL BE EQUIPPED WITH AN AUTOMATIC TYPE NORMALLY CLOSED OUTSIDE AIR DAMPER TO SERVE AS A MEANS OF PROVIDING AIR VOLUME REDUCTION AND/OR SHUT-OFF WHEN VENTILATION IS NOT REQUIRED. (DOES NOT APPLY TO COMBUSTION AIR OPENINGS).
- QUALITY CONTROL:**
- PROVIDE AS BUILT DRAWINGS AND SUBMIT COPIES TO THE OWNER.
 - CONTRACTOR SHOULD SUBMIT SHOP DRAWINGS, EQUIPMENT HANGERS, ANCHOR BOLTS AND METHODS OF INSTALLATION MUST HAVE CITY APPROVAL AND MAY BE SUPPLIED BY HILTI OR EQUAL.
 - IT IS THE SPECIFIC INTENT OF THIS DESIGN CONDITIONS THAT THE ENTIRE SYSTEM INCLUDING EQUIPMENT, DUCTWORK, OUTLETS/INLS AND ALL OTHER PARTS BE NOISELESS AND FREE OF VIBRATION TRANSMISSION. PROVIDE AND INSTALL VIBRATION ISOLATORS OR DAMPERS, SOUND INSULATION PADS, FLEXIBLE CONNECTORS AND SIMILAR MATERIAL AS REQUIRED. INSTALL VOLUME DAMPERS ON ALL DUCTS AS FAR AS POSSIBLE FROM AIR INLET/OUTLET. MAKE THE NECESSARY NOISE OR VIBRATION CORRECTIONS BY INSTALLING THESE ITEMS AT NO COST TO THE OWNER.
 - THE DRAWINGS ARE IN PART DIAGRAMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF THE WORK; THEY INDICATE THE GENERAL ARRANGEMENT AND APPROXIMATE SIZES OF EQUIPMENT, DUCTWORK, PIPING, OUTLETS, ETC. FOLLOW THE DRAWINGS AS CLOSE AS PRACTICAL IN LAYING OUT THE WORK. BE GUIDED BY THE CONDITIONS AT THE JOB AND CONSULT THE CONSTRUCTION DRAWINGS OF THE OTHER TRADES TO BECOME FAMILIAR WITH ALL CONDITIONS AFFECTING THE WORK.
 - UPON COMPLETION OF AND AFTER CLEANING OF SYSTEM AND EQUIPMENT, CAREFULLY ADJUST FOR NORMAL OPERATION OF THE AUTOMATIC PARTS OF HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS.
 - EQUIPMENT AND DUCTWORK EXPOSED TO WEATHER MUST BE WEATHERPROOFED.
 - ROOF MOUNTED EQUIPMENT SHALL BE LABELED AS TO THE SPACE IT SERVES. (WHEN MORE THAN ONE HEATING OR COOLING UNIT SERVES DIFFERENT OCCUPANTS.)
 - CONTRACTOR SHALL BALANCE AIR SYSTEM TO THE CFM CAPACITY AS SHOWN ON FLOOR
 - ALL APPLIANCES DESIGNED TO BE FIXED IN POSITION SHALL BE SECURELY FASTENED IN PLACE PER 2010 CMC, 304.4 (FOR SECURED FASTENING AND SUPPORT OF APPLIANCES)
 - FURNISHING AND INSTALLATION OF ALL LOW VOLT. WIRING FOR MECHANICAL SYSTEMS SHALL BE BY THE MECHANICAL CONTRACTOR.
 - ALL NECESSARY EQUIPMENT CURBS, RUNNERS, PLATFORMS, ROOFING, PATCHING, CUTTING, RATING SHEETS, FURRING, FLASHING AND PAINTING SHALL BE BY THE GENERAL CONTRACTOR.
 - ALL NECESSARY DRAINS, GAS, CONDENSATE DRAINS WITH TRAPS, MAKE-UP WATER, INCLUDING FINAL CONNECTIONS SHALL BE BY THE PLUMBING CONTRACTOR.

TABLE NO. 6-2-A RECTANGULAR DUCT HANGERS, MINIMUM SIZE								
MAXIMUM HALF OF DUCT PERMITTER	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING	
	STRAP	WIRE / ROD	STRAP	WIRE / ROD	STRAP	WIRE / ROD	STRAP	WIRE / ROD
P=30"	1"x0.030	10 ga.	1"x0.030	10 ga.	1"x0.030	12 ga.	1"x0.030	12 ga.
2	(1"x22 ga.)	(0.135")	(1"x22 ga.)	(0.135")	(1"x22 ga.)	(0.106")	(1"x22 ga.)	(0.106")
P=72"	1"x0.047	3/8"	1"x0.036	1/4"	1"x0.030	1/4"	1"x0.030	1/4"
2	(1"x18 ga.)	-	(1"x20 ga.)	-	(1"x22 ga.)	-	(1"x22 ga.)	-
P=96"	1"x0.058	3/8"	1"x0.047	3/8"	1"x0.036	3/8"	1"x0.030	1/4"
2	(1"x16 ga.)	-	(1"x18 ga.)	-	(1"x20 ga.)	-	(1"x22 ga.)	-
P=120"	1 1/2"x0.058	1/2"	1"x0.058	3/8"	1"x0.047	3/8"	1"x0.036	1/4"
2	(1 1/2"x16 ga.)	-	(1"x16 ga.)	-	(1"x18 ga.)	-	(1"x20 ga.)	-
P=168"	1 1/2"x0.058	1/2"	1"x0.058	1/2"	1"x0.058	3/8"	1"x0.047	3/8"
2	(1 1/2"x16 ga.)	-	(1 1/2"x16 ga.)	-	(1"x16 ga.)	-	(1"x18 ga.)	-
P=192"	1 1/2"x0.058	1/2"	1 1/2"x0.058	1/2"	1"x0.058	3/8"	1"x0.058	3/8"
2	-	-	(1 1/2"x16 ga.)	-	(1"x16 ga.)	-	(1"x16 ga.)	-
P=192" up	Special analysis required							

When straps are lap-joined, use these minimum fasteners:

STRAP	WIRE OR ROD (DIA.)
1" x 0.047", 0.036", 0.030" - two No. 10 or one 1/4" bolt	0.106"-80 lbs.
1" x 0.058" - two 1/4" dia.	0.135"-120 lbs.
1 1/2" x 0.058" - two 3/8" dia.	0.162"-160 lbs.
Place fasteners in series, not side by side.	1/4"-270 lbs.
	3/8"-680 lbs.
	1/2"-1,250 lbs.
	5/8"-2,000 lbs.
	3/4"-3,000 lbs.

Notes:

- Dimensions other than gauge are in inches.
- Tables allow for duct weight 1 lb./sq. ft. (4.8 kg/m²), insulation weight normal reinforcement, and trapeze weight, but no external loads.
- Straps are galvanized steel; other materials are uncoated steel.
- Allowable loads for P/2 assume that ducts are 0.058 (16 ga.) (1.47 mm) maximum, except that when maximum duct dimensions (W) is over 60" (1,524 mm), then P/2 maximum is 1.25 w.
- For trapeze sizes see Table 6-2-B.
- Twelve [0.081 in. (2.05 mm)], 10 [0.102 in. (2.59 mm)], or 8 [0.128 in. (3.25 mm)] ga. wire steel of black-annealed, bright basism or galvanized type.

TABLE NO. 6-2-B ALLOWABLE LOADS FOR TRAPEZE ANGLES (FOR RECTANGULAR DUCTS)										
LENGTH	1 x 1 x 0.058" (16 ga.)	1 x 1 x 1/8"	1 1/2 x 1 1/2 x 0.058" (16 ga.)	1 1/2 x 1 1/2 x 1/8"	1 1/2 x 1 1/2 x 3/16"	1 1/2 x 1 1/2 x 1/4" or 2 x 2 x 1/8"	2 x 2 x 3/16"	2 x 2 x 1/4"	2 1/2 x 2 1/2 x 3/16"	2 1/2 x 2 1/2 x 1/4"
18"	80	150	180	350	510	650	940	1,230	1,500	1,860
24"	75	150	180	350	510	650	940	1,230	1,500	1,960
30"	70	150	180	350	510	650	940	1,230	1,500	1,960
36"	60	130	160	340	500	620	920	1,200	1,480	1,940
42"	60	110	140	320	480	610	900	1,190	1,470	1,830
48"	-	80	110	290	450	580	870	1,160	1,440	1,900
54"	-	40	70	250	400	540	840	1,120	1,400	1,860
60"	-	-	-	190	350	490	780	1,060	1,340	1,800
66"	-	-	-	100	270	400	700	980	1,260	1,720
72"	-	-	-	-	190	320	620	900	1,180	1,640
78"	-	-	-	-	80	210	500	790	1,070	1,530
84"	-	-	-	-	-	80	380	660	940	1,400
96"	-	-	-	-	-	-	-	320	600	1,060
108"	-	-	-	-	-	-	-	-	150	610

Note: Loads above assume that a hanger rod is 6" max. distance from duct side.

TABLE NO. 6-2-C ROUND DUCT HANGERS					
DUCT DIAMETER	MAXIMUM SPACING	WIRE DIAMETER	ROD	STRAP	
10" down	12'	One 12 ga.	1/4"	1" x 0.030 (22 ga.)	
11 to 18"	12'	Two 12 ga.	1/4"	1" x 0.030 (22 ga.)	
-	-	or one 8 ga.	-	-	
19 to 24"	12'	Two 10 ga.	1/4"	1" x 0.030 (22 ga.)	
25 to 36"	12'	Two 8 ga.	3/8"	1" x 0.036 (20 ga.)	
37 to 50"	12'	fi	Two 3/8"	Two 1" x 0.036 (20 ga.)	
51 to 80"	12'	fi	Two 3/8"	Two 1" x 0.047 (18 ga.)	
81 to 94"	12'	fi	Two 3/8"	Two 1" x 0.058 (16 ga.)	

TABLE NO. 6-2-D FLAT OVAL DUCT CONSTRUCTION			
DUCT DIAMETER	INCHES (GAUGE)		
	SPIRAL LOCK SEAM DUCT	LONGITUDINAL SEAM DUCT	FITTINGS
To 24"	0.024 (24)	0.036 (20)	0.036 (20)
25" to 36"	0.030 (22)	0.036 (20)	0.036 (20)
37" to 48"	0.030 (22)	0.047 (18)	0.047 (18)
49" to 60"	0.036 (20)	0.047 (18)	0.047 (18)
61" to 70"	0.036 (20)	0.058 (16)	0.058 (16)
71" and up	0.047 (18)	0.058 (16)	0.058 (16)

CONDENSATE WASTE SIZING			
EQUIPMENT CAPACITY IN		MINIMUM CONDENSATE PIPE DIAMETER	
Tons of Refrigeration	(kW)	Inches	(mm)
UP to 20	(Up to 70.34)	3/4"	(20)
21 - 40	(73.85 - 140.67)	1"	(25)
41 - 90	(144.19 - 316.6)	1-1/4"	(32)
91 - 125	(320.03 - 439.6)	1-1/2"	(40)
126 - 250	(443.12 - 879.2)	2"	(90)

THE SIZE OF CONDENSATE WASTE PIPES MAY BE FOR ONE UNIT OR A COMBINATION OF UNITS, OR AS RECOMMENDED BY THE MANUFACTURER. THE CAPACITY OF WASTE PIPES ASSUMES A 3/8" INCH PER FOOT (10.5 mm/m) OR ONE PERCENT SLOPE, WITH THE PIPE RUNNING THREE-QUARTERS (3/4) FULL AT THE FOLLOWING CONDITIONS:

Outside Air - 20%		Room Air - 80%	
DB	WB	DB	WB
90°F	73°F	75°F	62.5°F
(32°C)	(23°C)	(24°C)	(17°C)

TABLE NO. 6-2-E ROUND DUCT GAUGE SELECTION FOR GALVANIZED STEEL						
DUCT DIAMETER INCHES	MAXIMUM 2" W.G. (498 Pa) STATIC POSITIVE		MAXIMUM 10" W.G. (2.5 kPa) STATIC POSITIVE		MAXIMUM 2" W.G. (498 Pa) STATIC NEGATIVE	
	SPIRAL SEAM, INCHES (GAUGE)	LONGITUDINAL SEAM, INCHES (GAUGE)	SPIRAL SEAM, INCHES (GAUGE)	LONGITUDINAL SEAM, INCHES (GAUGE)	SPIRAL SEAM, INCHES (GAUGE)	LONGITUDINAL SEAM, INCHES (GAUGE)
3 thru 8	0.016 (28)	0.016 (28)	0.019 (26)	0.024 (24)	0.016 (28)	0.024 (24)
9 thru 14	0.016 (28)	0.016 (28)	0.019 (26)	0.024 (24)	0.016 (28)	0.024 (24)
15 thru 26	0.019 (26)	0.024 (24)	0.024 (24)	0.030 (22)	0.024 (24)	0.030 (22)
27 thru 36	0.024 (24)	0.030 (22)	0.030 (22)	0.036 (20)	0.030 (22)	0.036 (20)
37 thru 50	0.030 (22)	0.036 (20)	0.036 (20)	0.036 (20)	0.036 (20)	0.047 (18)
51 thru 60	0.036 (20)	0.047 (18)	0.047 (18)	0.047 (18)	0.047 (18)	0.058 (16)
61 thru 84	0.047 (18)	0.058 (16)	0.047 (18)	0.058 (16)	0.058 (16)	0.070 (14)

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GENERAL NOTES AND HVAC TABLES
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Willows Shopping Center
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Concord, CA 94520
RESTAURANT & BAR

PROFESSIONAL ENGINEER
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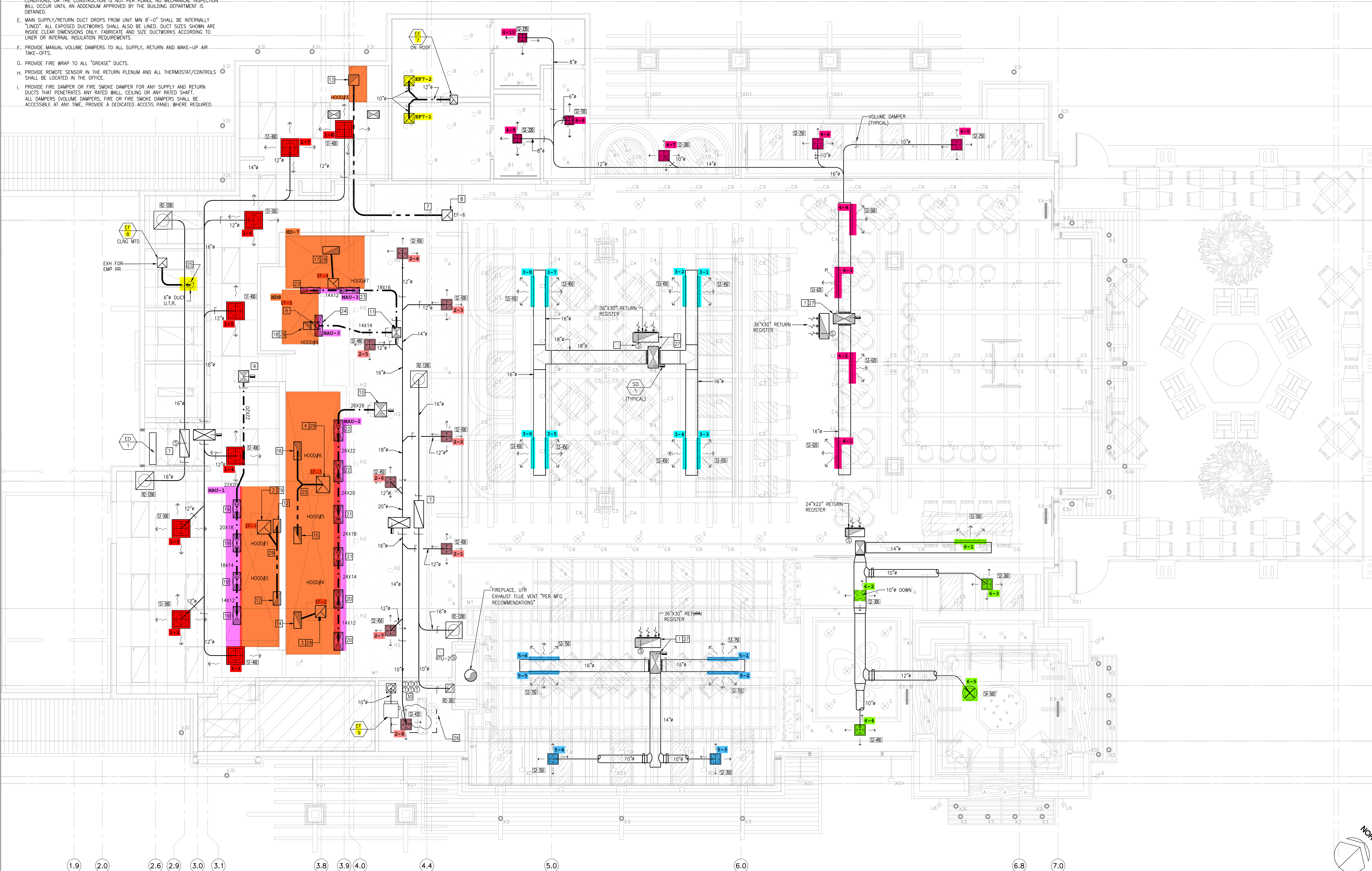
04.22.2013 - CONSTRUCTION SET

CONSTRUCTION NOTES

- A. PRIOR TO STARTING WORK, MECHANICAL CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS, REVIEW PLANS FOR ALL EQUIPMENT PLACEMENTS, DUCTWORK LAYOUT AND SIZINGS. NOTIFY TENANT'S ENGINEER IMMEDIATELY OF ANY MAJOR DISCREPANCIES.
- B. ROUTE ALL NEW DUCTWORKS IN OR BETWEEN THE TRUSS SPACES OR THROUGH JOIST WEBS. WHERE CEILING SPACE IS EXTREMELY TIGHT, CAREFULLY COORDINATE DUCT SIZES AND ROUTING WITH ARCHITECTURAL, STRUCTURAL, ELECTRICAL, FIRE PROTECTION AND PLUMBING SYSTEMS PRIOR TO COMMENCING WITH ANY DUCTING WORK.
- C. WHERE INTERFERENCE EXIST FOR DUCTWORK INSTALLATION:
 - 1.) APPROVED ADJUSTMENT AND RE-ROUTING OF DUCTWORK FOR PROPER FIT OR A TRANSITION TO SUITABLE RECTANGULAR DUCT WITH EQUAL FACE AREA OF THE PLAN AND WITH EQUIVALENT PRESSURE DROP CHARACTERISTICS SHALL BE FIELD OR SITE MANUFACTURED TO MAINTAIN REQUIRED CEILING HEIGHTS AND CLEARANCES.
 - 2.) INSTALLATION OF SMACNA AND CODE APPROVED FLEXIBLE DUCT AS ALTERNATE, APPROVAL BY THE LOCAL CITY BUILDING DEPARTMENT IS REQUIRED IF THE FLEXIBLE DUCT LENGTH EXCEEDS THE STANDARD CODE REQUIREMENT OF 8'-0". BID PRICE SHALL INCLUDE AN ALLOWANCE TO COVER ALL SUCH MODIFICATIONS.
- D. FOR EXACT LOCATION OF CEILING DIFFUSERS & REGISTERS SEE ARCHITECTURAL REFLECTIVE CEILING PLAN. IF THE PLAN DOES NOT ACCURATELY REFLECT THE JOB CONDITIONS, OR THE CONSTRUCTION IS NOT PER PLANS, NO MECHANICAL INSPECTION WILL OCCUR UNTIL AN ADDENDUM APPROVED BY THE BUILDING DEPARTMENT IS OBTAINED.
- E. MAIN SUPPLY/RETURN DUCT DROPS FROM UNIT MIN 8'-0" SHALL BE INTERNALLY "LINED". ALL EXPOSED DUCTWORKS SHALL ALSO BE LINED. DUCT SIZES SHOWN ARE INSIDE CLEAR DIMENSIONS ONLY. FABRICATE AND SIZE DUCTWORKS ACCORDING TO LINER OR INTERNAL INSULATION REQUIREMENTS.
- F. PROVIDE MANUAL VOLUME DAMPERS TO ALL SUPPLY, RETURN AND MAKE-UP AIR TAKE-OFFS.
- G. PROVIDE FIRE WRAP TO ALL "GREASE" DUCTS.
- H. PROVIDE REMOTE SENSOR IN THE RETURN PLENUM AND ALL THERMOSTAT/CONTROLS SHALL BE LOCATED IN THE OFFICE.
- I. PROVIDE FIRE DAMPER OR FIRE SMOKE DAMPER FOR ANY SUPPLY AND RETURN DUCTS THAT PENETRATES ANY RATED WALL, CEILING OR ANY RATED SHAFT. ALL DAMPERS VOLUME DAMPERS, FIRE OR FIRE SMOKE DAMPERS SHALL BE ACCESSIBLE AT ANY TIME. PROVIDE A DEDICATED ACCESS PANEL WHERE REQUIRED.

KEY NOTES

- 1. SUPPLY AND RETURN AIR DUCTS (LINED) UP THRU ROOF TO ROOF TOP UNIT. (TYPICAL FOR RTU-1 THROUGH RTU-6)
- 2. 18"x18" GREASE EXHAUST AIR DUCT UP THRU ROOF TO EF-1 WITH FIRE-WRAP. (3800 CFM)
- 3. 16"x14" GREASE EXHAUST AIR DUCT UP THRU ROOF TO EF-2 WITH FIRE-WRAP. (2400 CFM)
- 4. 22"x20" GREASE EXHAUST AIR DUCT UP THRU ROOF TO EF-3 WITH FIRE-WRAP. (5000 CFM)
- 5. 16"x14" GREASE EXHAUST AIR DUCT UP THRU ROOF TO EF-4 WITH FIRE-WRAP. (2400 CFM)
- 6. 12"x12" GREASE EXHAUST AIR DUCT UP THRU ROOF TO EF-5 WITH FIRE-WRAP. (1800 CFM)
- 7. 14"x14" EXHAUST AIR DUCT UP THRU ROOF TO EF-6. (1400 CFM)
- 8. 12"x12" EXHAUST AIR DUCT UP THRU ROOF TO EF-7. (600 CFM)
- 9. 20"x20" MAKE-UP AIR DUCT UP THRU ROOF TO MAU-1. (3420 CFM)
- 10. 24"x24" MAKE-UP AIR DUCT UP THRU ROOF TO MAU-2. (7400 CFM)
- 11. 20"x20" MAKE-UP AIR DUCT UP THRU ROOF TO MAU-3. (3200 CFM)
- 12. 18"x10" GREASE EXHAUST AIR DUCT CONNECTION TO HOOD. TYPICAL FOR HOOD#-1 AND HOOD#-2. (1900 CFM)
- 13. 14"x14" EXHAUST AIR DUCT CONNECTION TO DISHWASHER HOOD#-3. (1400 CFM)
- 14. 22"x10" GREASE EXHAUST AIR DUCT CONNECTION TO HOOD#-4. (2400 CFM)
- 15. 22"x10" GREASE EXHAUST AIR DUCT CONNECTION TO HOOD#-5. (2400 CFM)
- 16. 24"x10" GREASE EXHAUST AIR DUCT CONNECTION TO HOOD#-6. (2600 CFM)
- 17. 22"x10" GREASE EXHAUST AIR DUCT CONNECTION TO WOK HOOD#-7. (2400 CFM)
- 18. 14"x10" GREASE EXHAUST AIR DUCT CONNECTION TO PIZZA HOOD#-8. (1800 CFM)
- 19. 24"x10" MAKE UP AIR DUCT CONNECTION TO HOOD#-1 AND #2. (855 CFM)
- 20. 24"x12" MAKE UP AIR DUCT CONNECTION TO HOOD#-4. (1080 CFM)
- 21. 24"x12" MAKE UP AIR DUCT CONNECTION TO HOOD#-5. (1080 CFM)
- 22. 28"x12" MAKE UP AIR DUCT CONNECTION TO HOOD#-6. (1170 CFM)
- 23. 24"x10" MAKE UP AIR DUCT CONNECTION TO WOK HOOD#-7. (960 CFM)
- 24. 28"x12" MAKE UP AIR DUCT CONNECTION TO PIZZA HOOD#-8. (1440 CFM)
- 25. 6" (EMP RR) EXHAUST DUCT UP THRU ROOF TO ROOF CAP.
- 26. 10" EXHAUST DUCT UP THRU ROOF TO ROOF CAP.
- 27. ALL EXPOSED DUCTWORK TO BE LINED.
- 28. PROVIDE REMOTE SENSOR IN RETURN DUCT PLENUM, HONEYWELL MODEL C7770A1006 OR EQUAL. TYPICAL FOR RTU-1, RTU-3 TO RTU-6. FIRE WRAP GREASE DUCT.
- 29. PROVIDE REMOTE SENSOR FOR RTU-2, WALL MOUNTED, MIN 6'-0" A.F.F. HONEYWELL MODEL C7770A1006 OR EQUAL.
- 30. THERMOSTATS/CONTROL RTU-1 THRU-6 IN THE MANAGER'S OFFICE. PROGRAMMABLE HONEYWELL MODEL TB8220-U1003 OR EQUAL.



HVAC FLOOR PLAN

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RSI

LAZY DOG RESTAURANT & BAR
1961 Diamond Blvd
Concord, CA 94520

Lazy Dog Willows Shopping Center
1961 Diamond Blvd
Concord, CA 94520

Issue Date: 4-22-13
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Revisions

Scale: 1/4" = 1'-0"

AS NOTED
Checked By: WF
Sheet Number: M2.0

04.22.2013 - CONSTRUCTION SET

1

PLAN NOTES

- A. MAINTAIN A MIN. OF 10'-0" BETWEEN ALL EXHAUST AND VENTS TO ANY FRESH AIR SUPPLY OR INTAKES INTO THE BUILDING (OUTSIDE AIR FOR THE A/C UNITS AND MAKE UP AIR UNITS).
- B. GENERAL CONTRACTOR TO FURNISH OR INSTALL FACTORY EQUIPMENT CURB AND LEVEL PLATFORM. LOCATE SO THAT ROOF PENETRATIONS OCCUR BETWEEN TRUSSES. PROVIDE DUCT TRANSITION ADAPTOR WHERE REQUIRED.
- C. ALL WORKS ON THE ROOF AND FINAL LOCATIONS OF THE HVAC UNITS SHALL BE COORDINATED AND APPROVED BY THE OWNER AND STRUCTURAL ENGINEER.
- D. INSTALLATION OF ANY NEW HVAC CURBS ON ROOF OR ANY ROOF PENETRATIONS SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE LOCAL CITY BUILDING CODE AND MANUFACTURER'S SPECIFICATIONS TO MAINTAIN ALL APPLICABLE EQUIPMENT WARRANTIES.
- E. UNLESS OTHERWISE NOTED, ALL HVAC PIPINGS, VENTS, SHALL BE RUN INTO THE ATTIC SPACE, ABOVE CEILING OR TO THE BUILDING SHIRT. MUST INSULATE ALL PIPING INTO THE BUILDING. NO ADDITIONAL PENETRATION OF THE ROOF SHALL BE MADE WITHOUT THE OWNER'S APPROVAL.
- F. PROVIDE 4" CASCO HP CLASS 1 FLEXIBLE DUCTWORK RATED FOR 1" SP END CONNECTION TO AIR OUTLET. FLEXIBLE CONNECTIONS SHALL MEET NFPA SPECS AND BE UL LISTED AND FIRE MARSHALL APPROVED.
- G. ALL JOINTS OF EXPOSED DUCTWORK SHALL BE SEALED FROM AIR LEAKAGE WATER TIGHT WITH ARABOL AND CANVAS. JOINTS OF PROTECTED DUCTWORK SHALL BE TAPED WITH MASHUA NO. 357 PRESSURE SENSITIVE TAPE OR EQUAL.
- H. LABEL ALL EQUIPMENT FOR IDENTIFICATION IN ACCORDANCE AND IN COMPLIANCE WITH BUILDING/MECHANICAL CODE TO IDENTIFY EQUIPMENT FOR THE SPACES TO WHICH AREA(S) BEING SERVED.
- I. DRAWING IS DIAGRAMMATIC LAYOUT OF DUCTWORK AND EQUIPMENT LOCATION BASED STRUCTURAL AND INFORMATION SUPPLIED BY ARCHITECT. MECHANICAL CONTRACTOR TO COORDINATE WITH STRUCTURAL AND ARCHITECTURAL PLANS PRIOR TO ONSET OF CONSTRUCTION.

HVAC GENERAL NOTES

TENANT'S CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL WITHIN THE LANDLORD'S TENANT CRITERIA MANUAL INCLUDING LANDLORD'S RULES AND REGULATIONS.

ALL SUPPORTS TO BE FROM STRUCTURAL BEAMS AND JOISTS AND NOT FROM DECK ABOVE.

TENANT IS RESPONSIBLE FOR THE BALANCING OF ALL HVAC DISTRIBUTION SYSTEMS. AIR BALANCING SHALL BE PERFORMED BY AN AABC OR NEBB CERTIFIED ENGINEER (COPY) OF THE REPORT TO BE FORWARDED TO THE WESTFIELD OPERATIONS MANAGER.

SUPPLY AND RETURN DUCTWORK SHALL BE INSULATED WITH MINIMUM OF 1" THICK BLANKET TYPE INSULATION WITH VAPOR BARRIER.

TENANTS WITH GREASE, ODDOR OR SMOKE PRODUCING OPERATIONS MAYBE REQUIRED TO INSTALL POLLUTION CONTROL EQUIPMENT AT TENANT'S EXPENSE.

DUCTS SHALL BE WELDED 16 GAGE METAL ENCLOSED WITH A 2" RATED FIRE SHAFT OR APPROVED FIRE WRAP MATERIAL PER LOCAL CODE.

MAKE UP AIR SYSTEMS ARE REQUIRED FOR ALL EXHAUST SYSTEMS DESIGNED FOR MAXIMUM OF 90% OF ALL EXHAUSTED AIR QUANTITY. THE EXHAUST AND MAKE UP AIR SYSTEMS SHALL BE ELECTRICALLY INTERLOCKED SO THAT ONE SWITCH ACTIVATES BOTH.

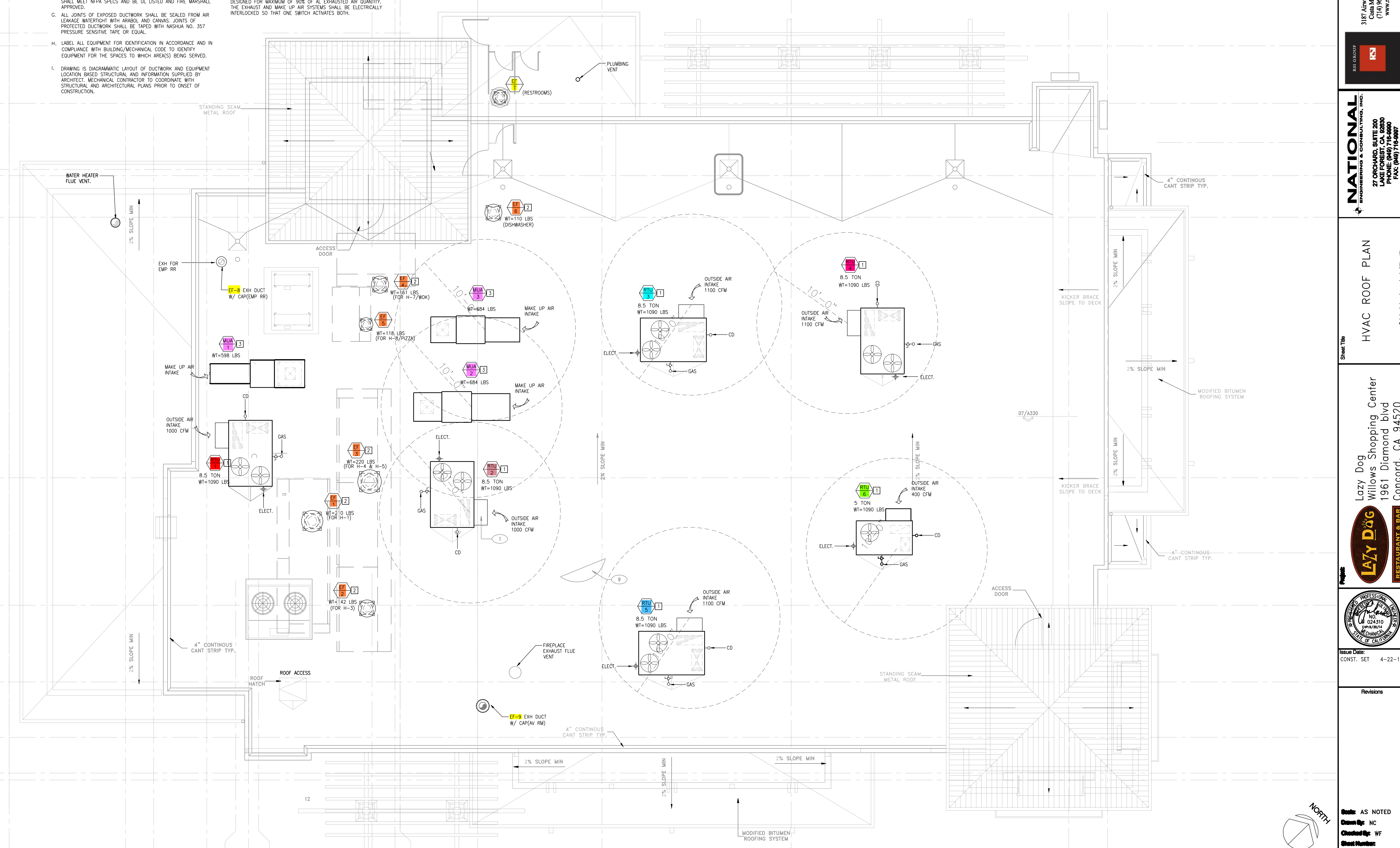
KEY NOTES

- 1 ROOFTOP A/C UNITS GAS-ELECTRIC, MOUNTED ON FACTORY CURB COMPLETE WITH ISOLATION AND CALIFORNIA SEISMIC RESTRAINTS COMPLIANT. SEE DETAIL # 1 & 2 /M4.1
- 2 EXHAUST FAN MOUNTED ON FACTORY MANUFACTURED CURB. DETAIL 13 & 17/M4.0
- 3 MAKE UP AIR UNIT MOUNTED ON FACTORY MANUFACTURED CURB. SEE DETAIL M5.1

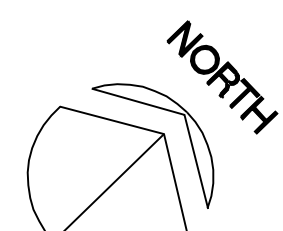
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3.8 3.9 4.0

4.4



ROOF PLAN



SCALE: 1/4"=1'-0"

1 M2.1

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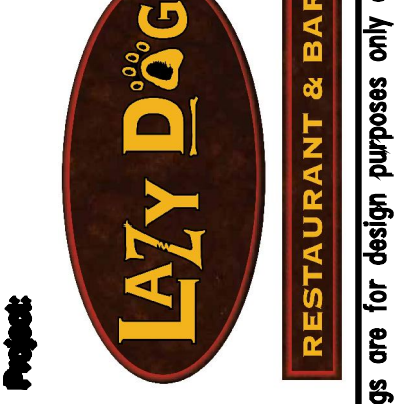
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Sheet Title
HVAC ROOF PLAN

Project
Lazy Dog
Willows Shopping Center
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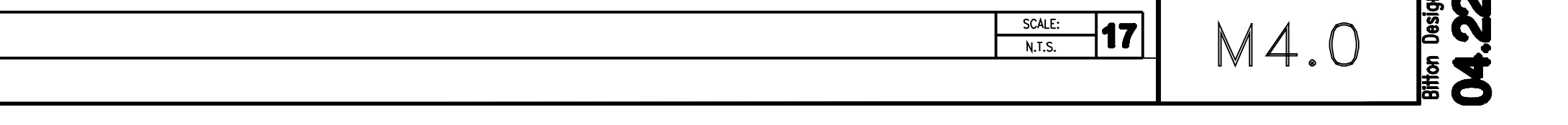
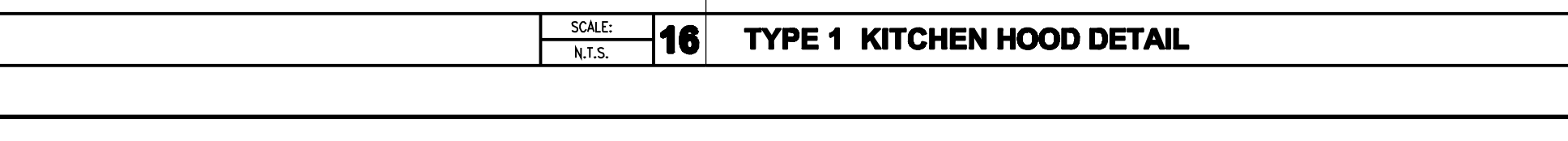
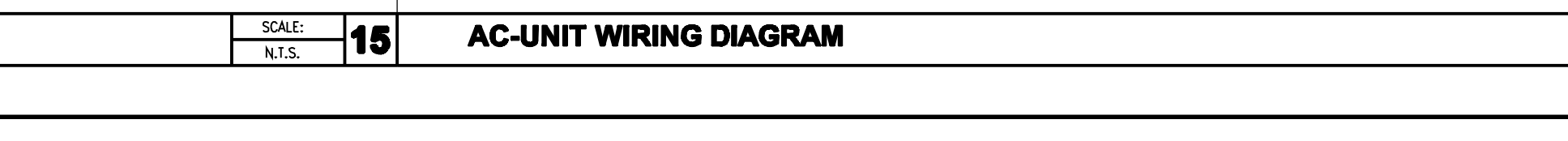
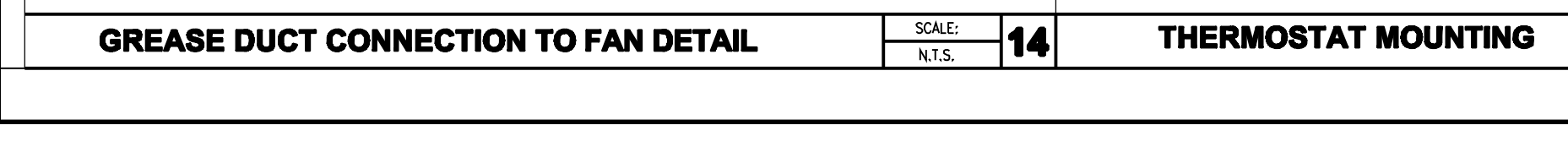
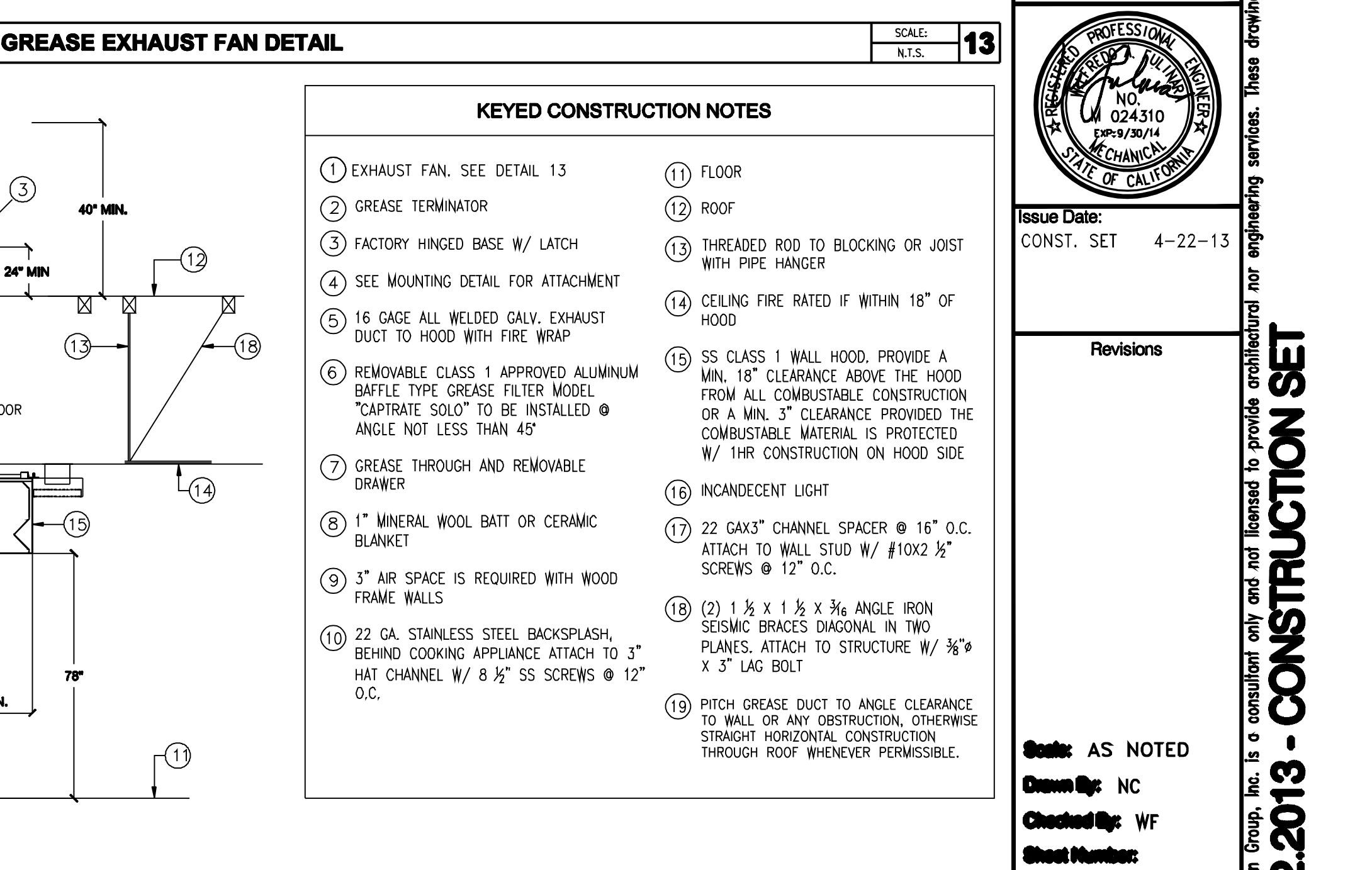
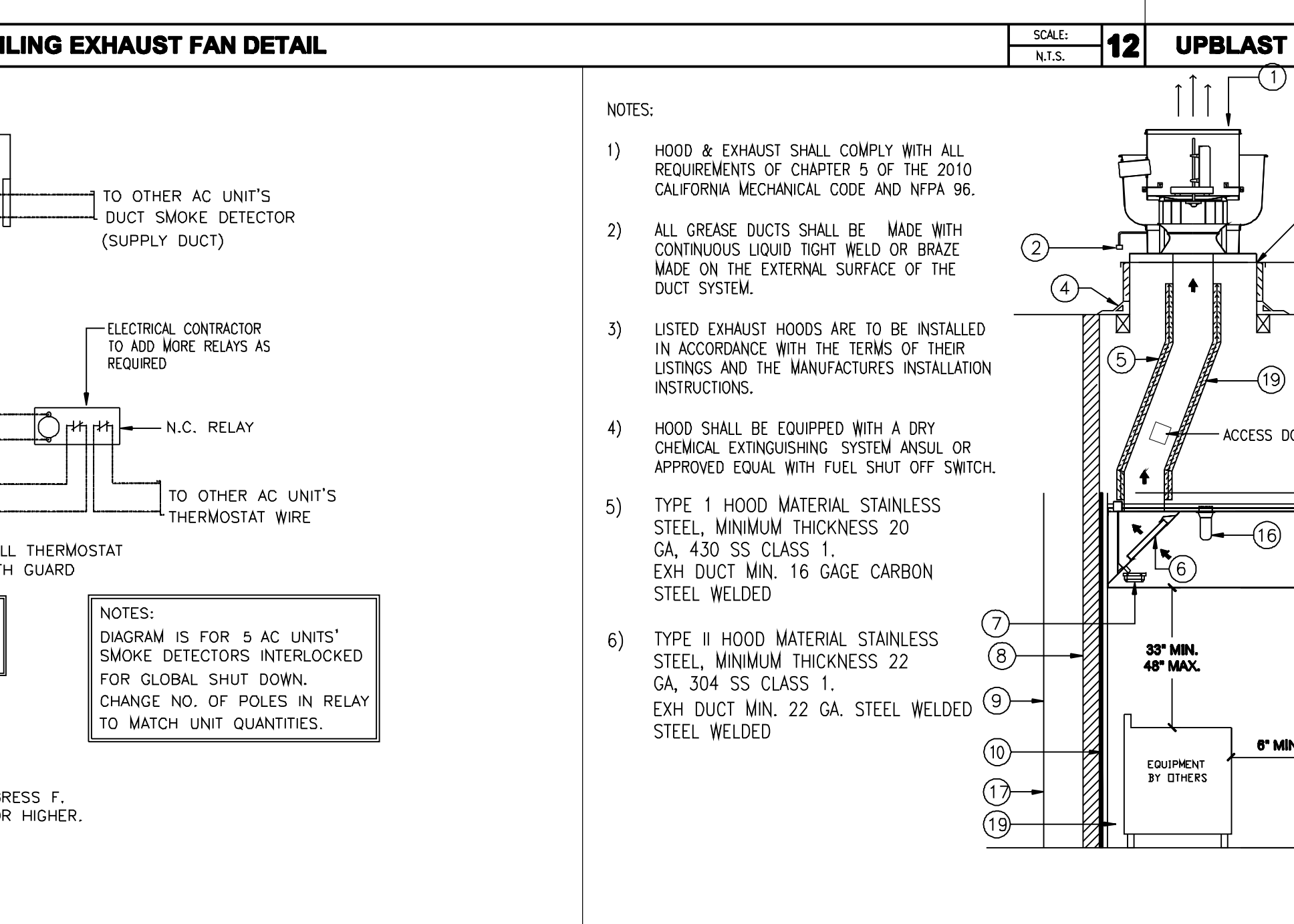
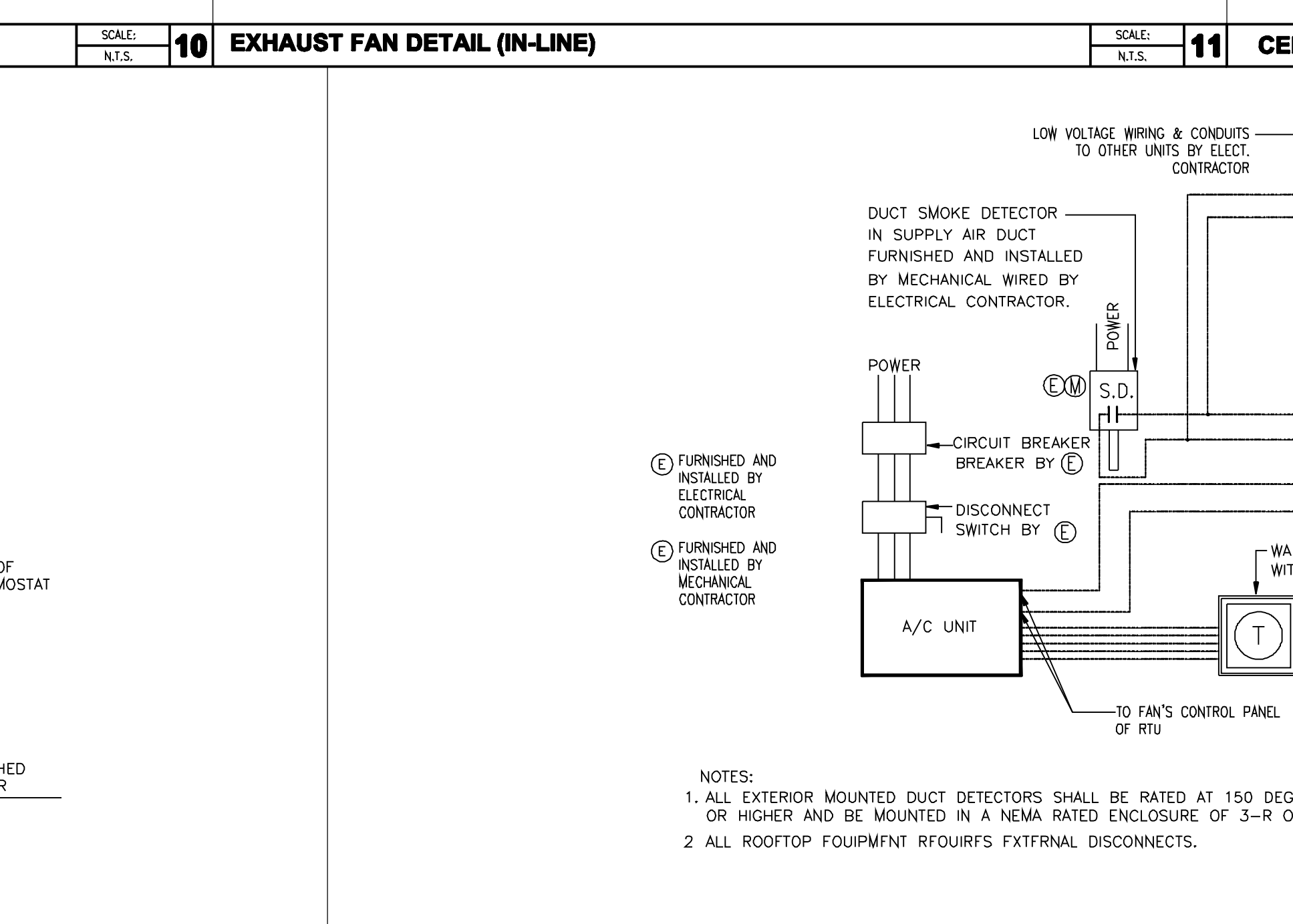
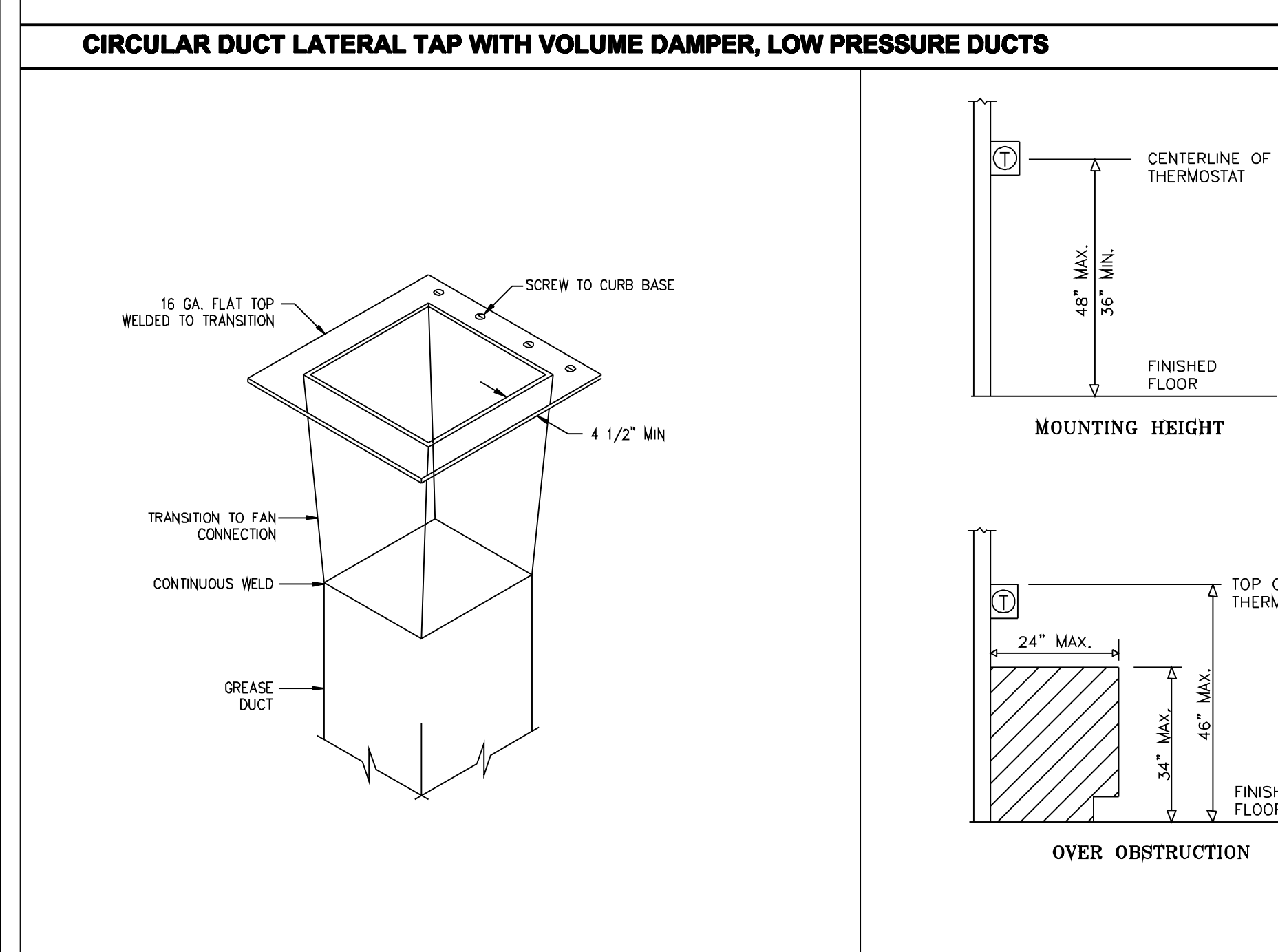
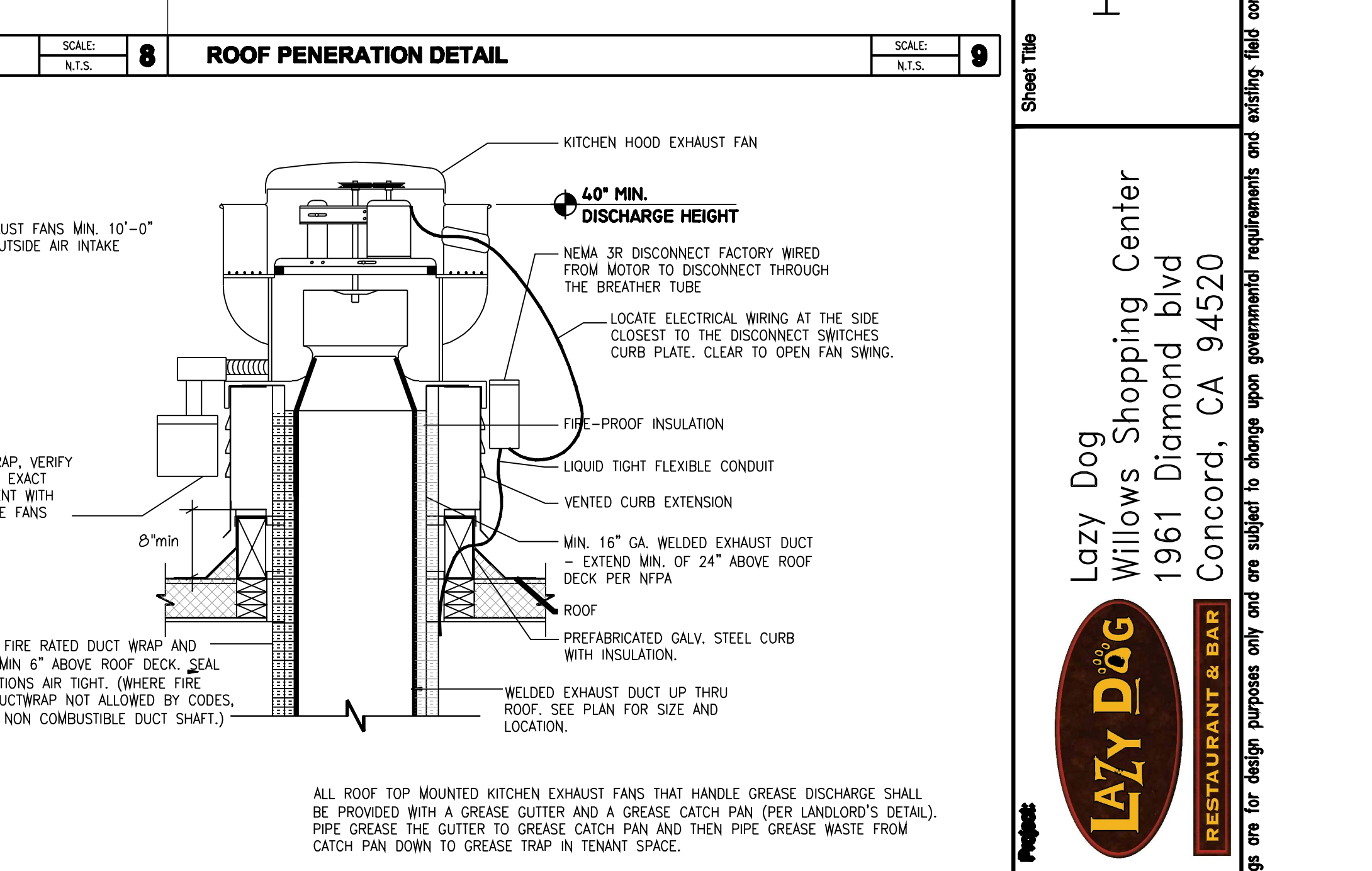
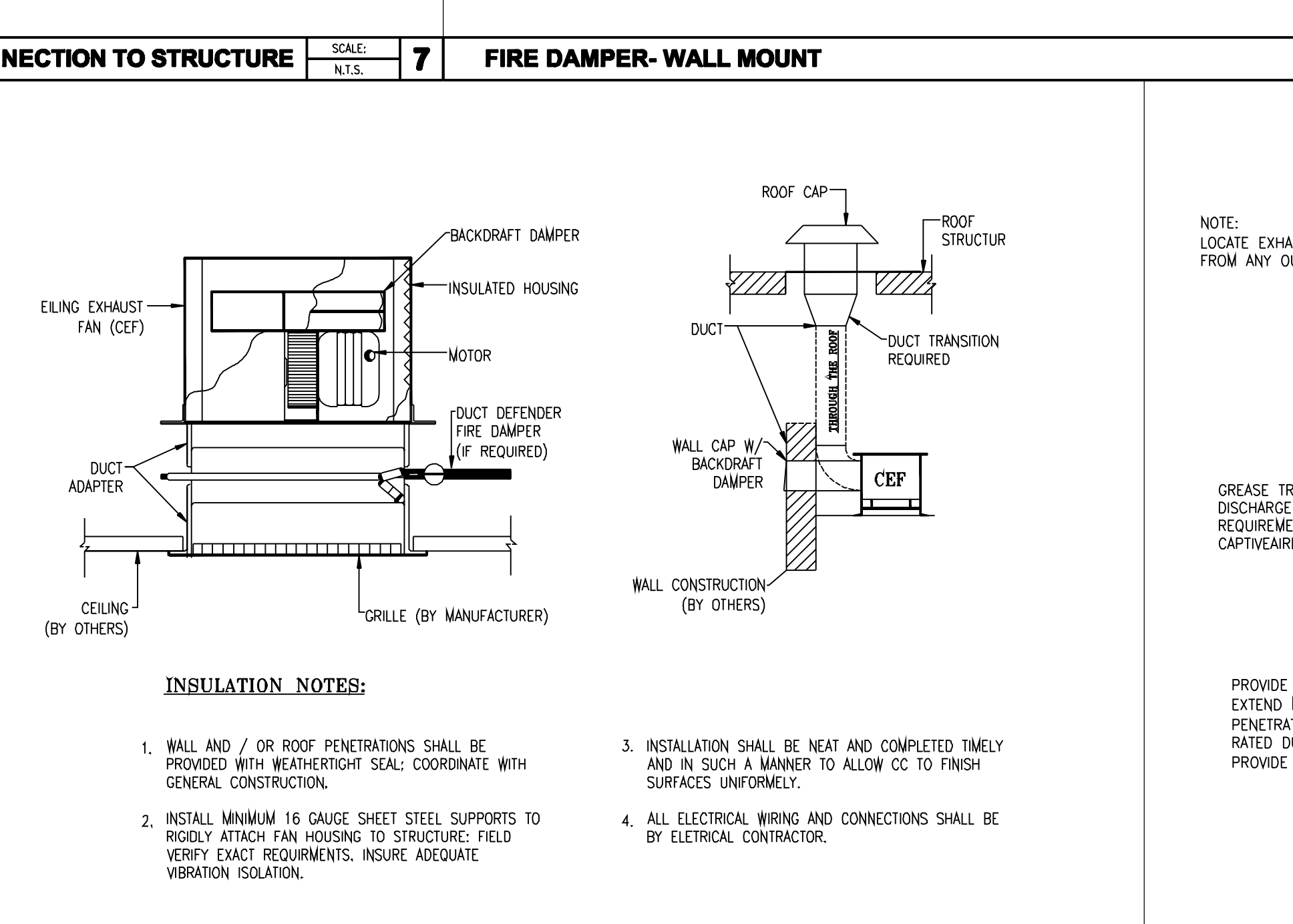
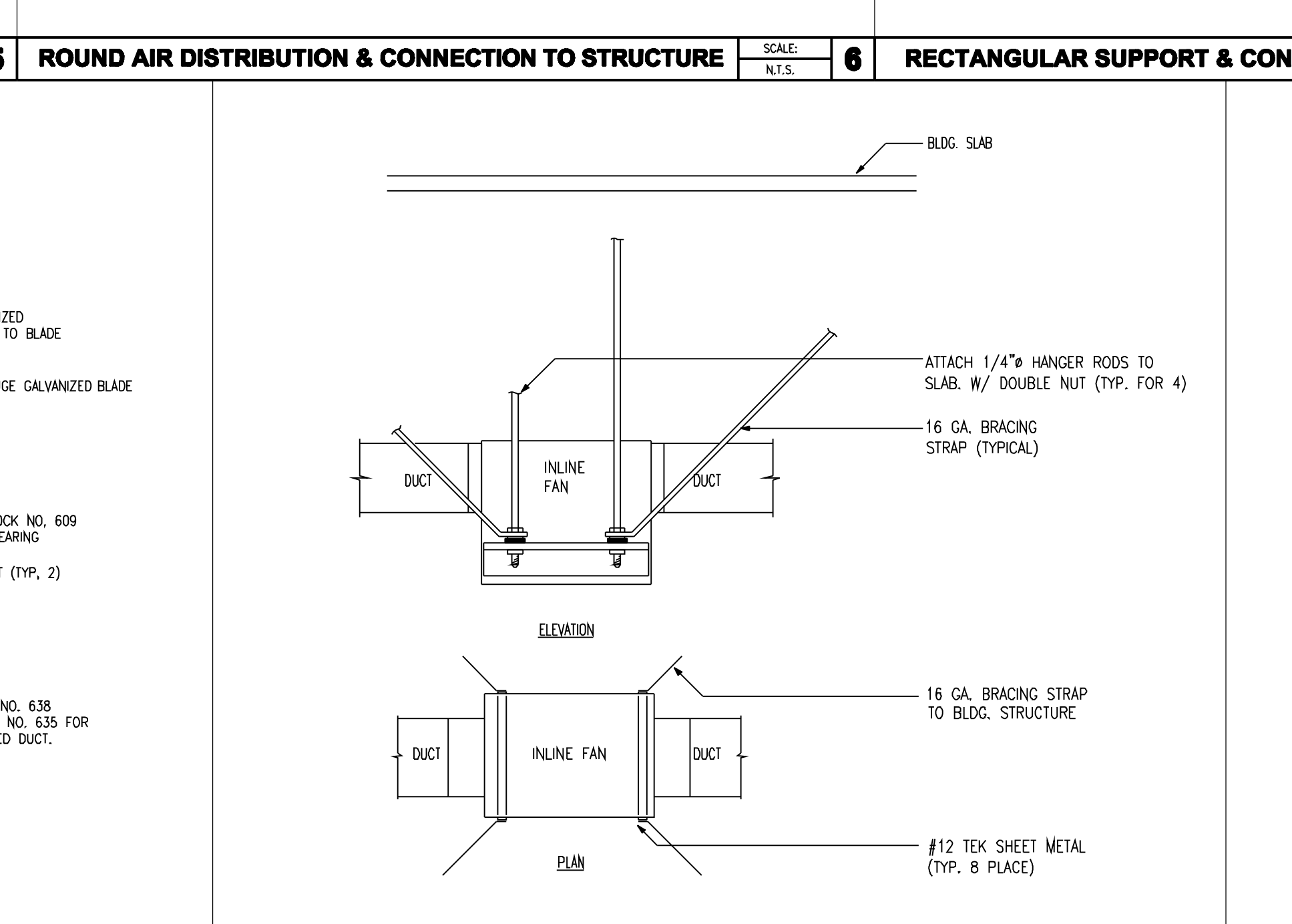
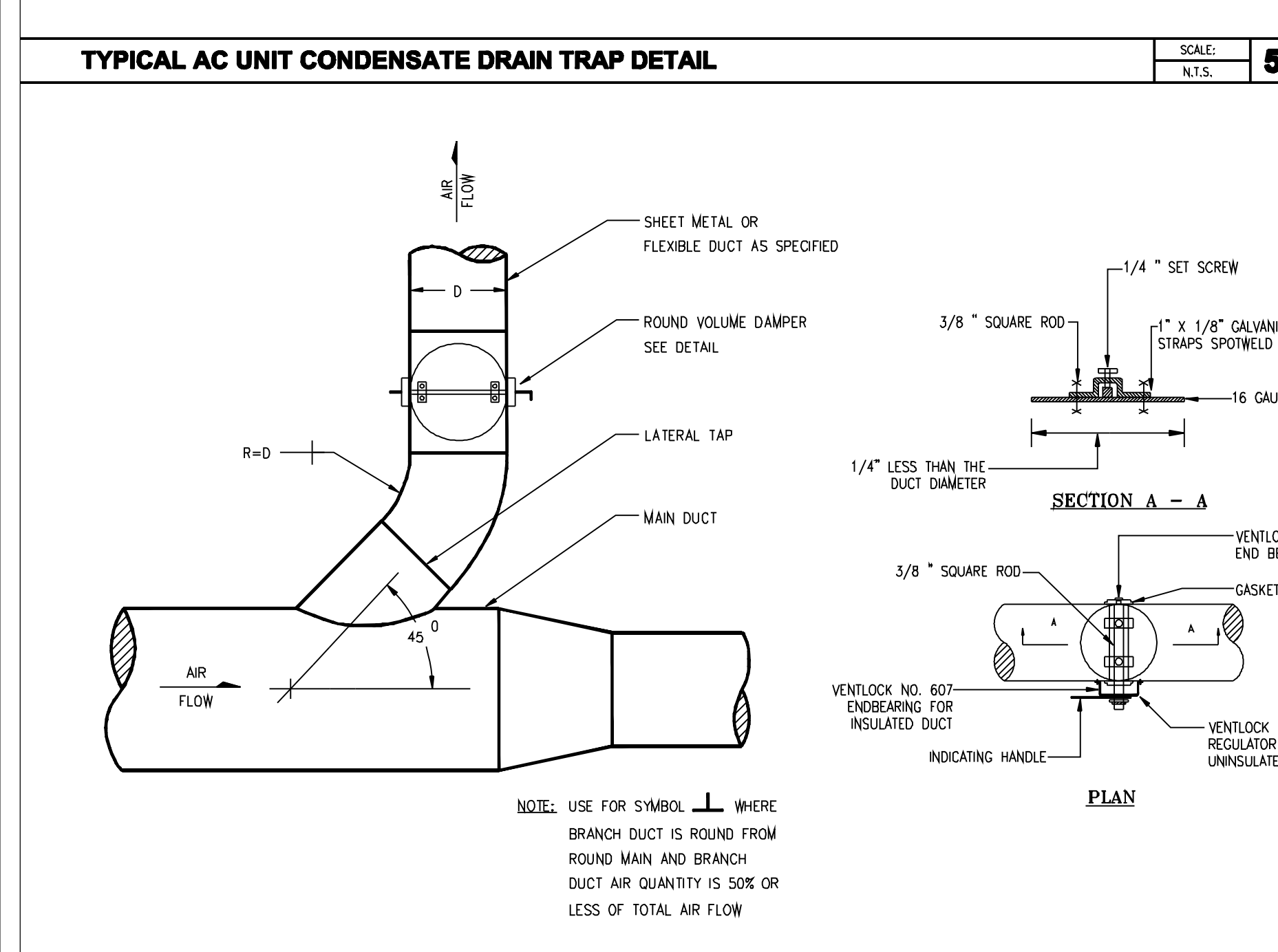
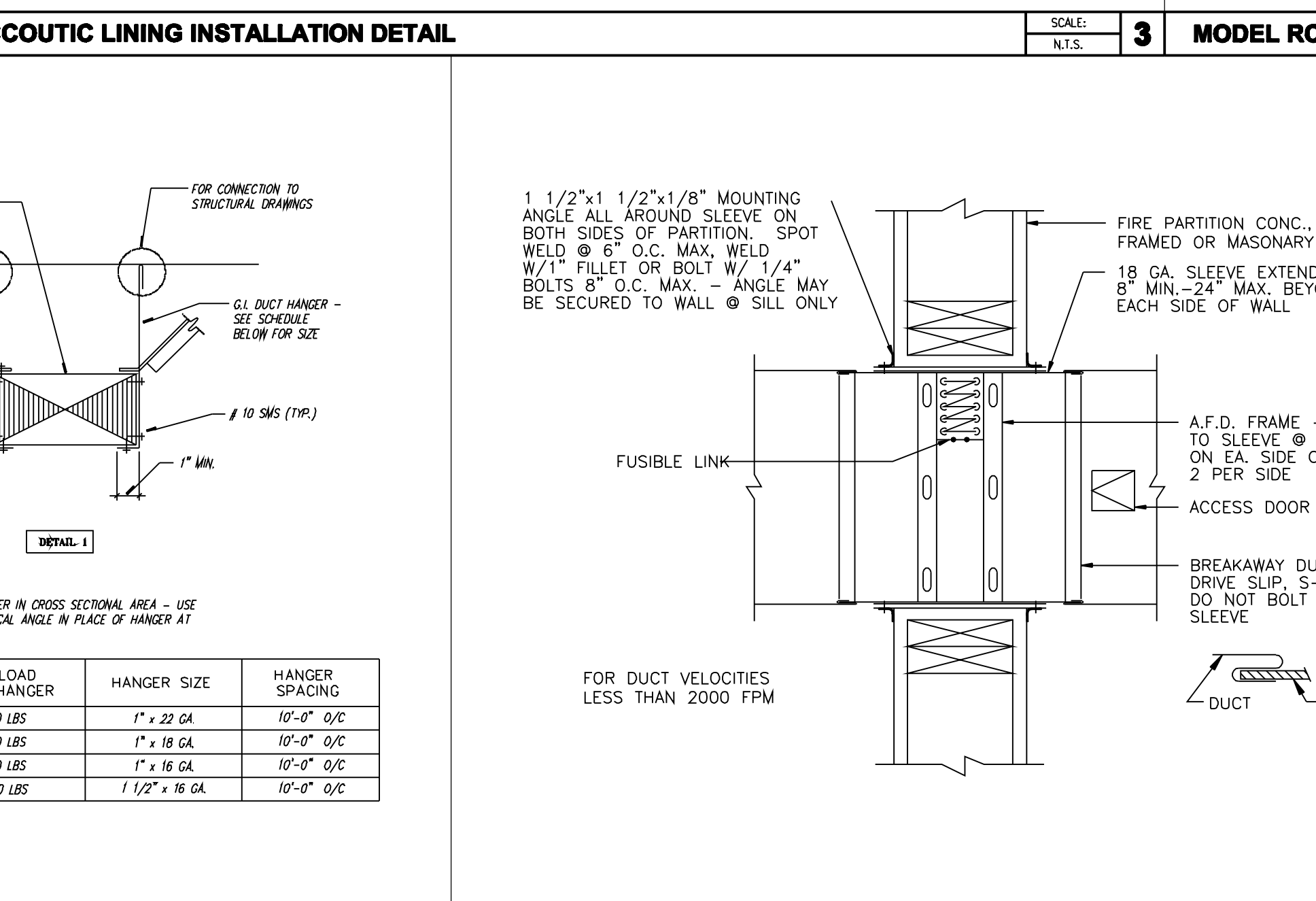
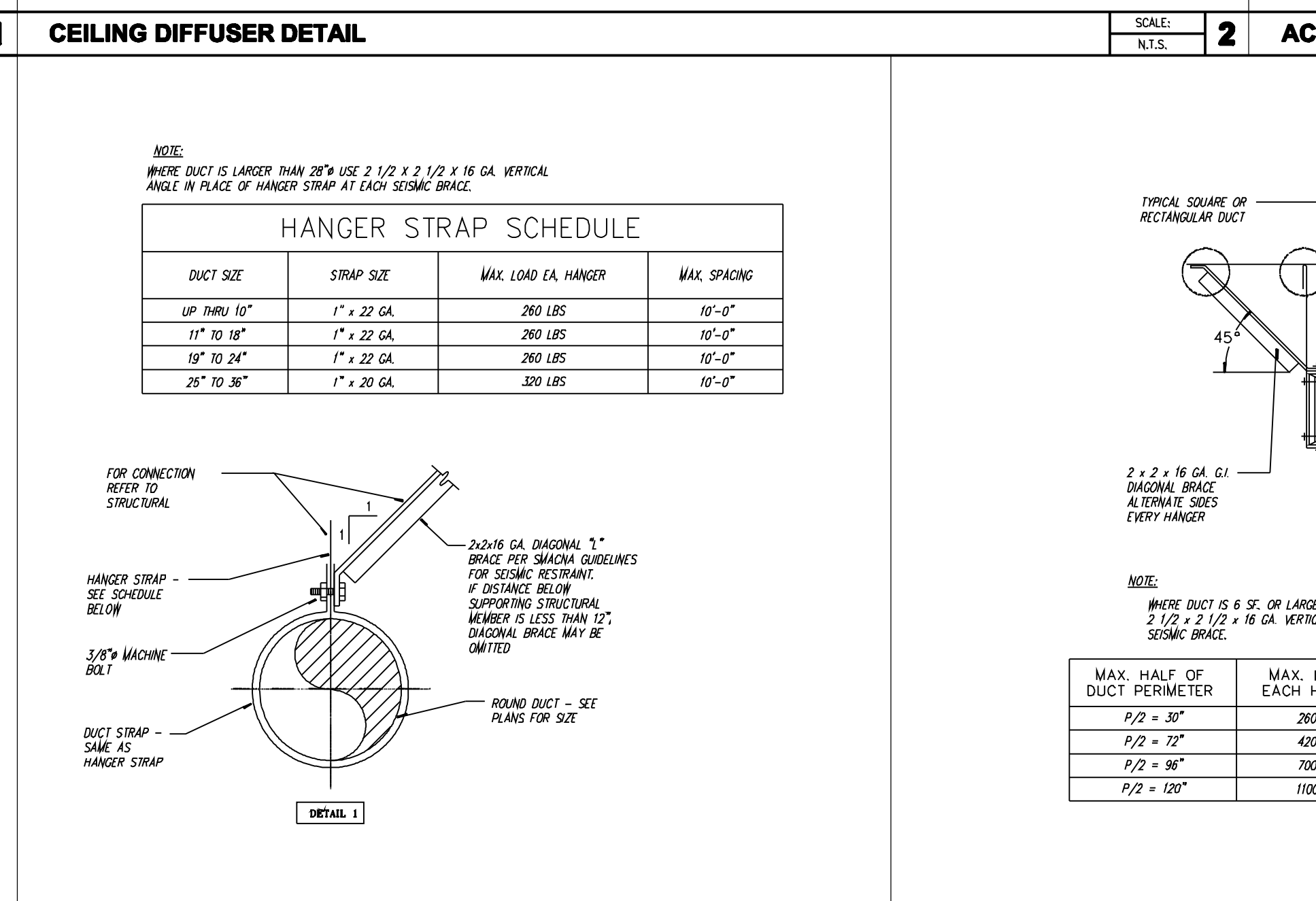
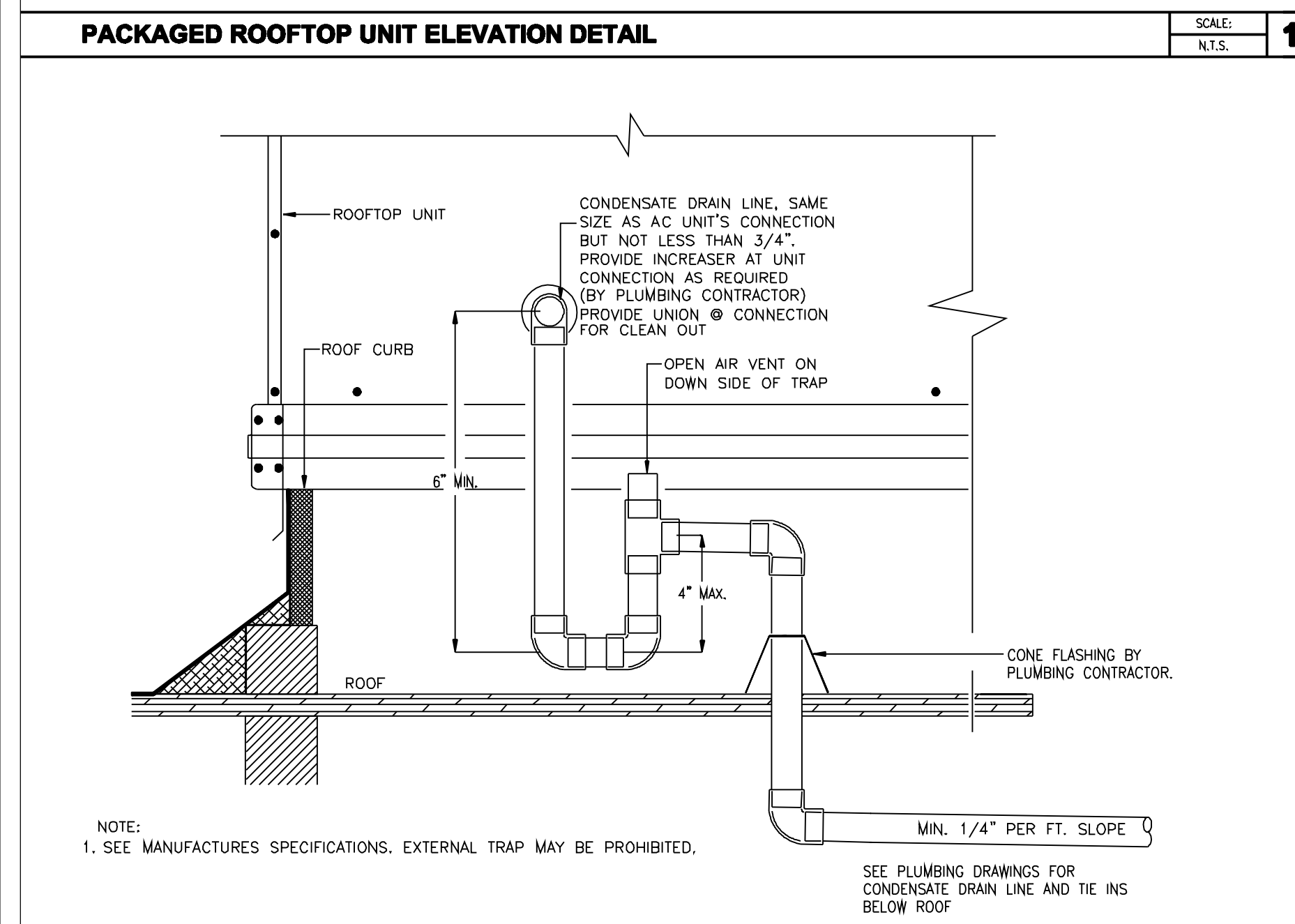
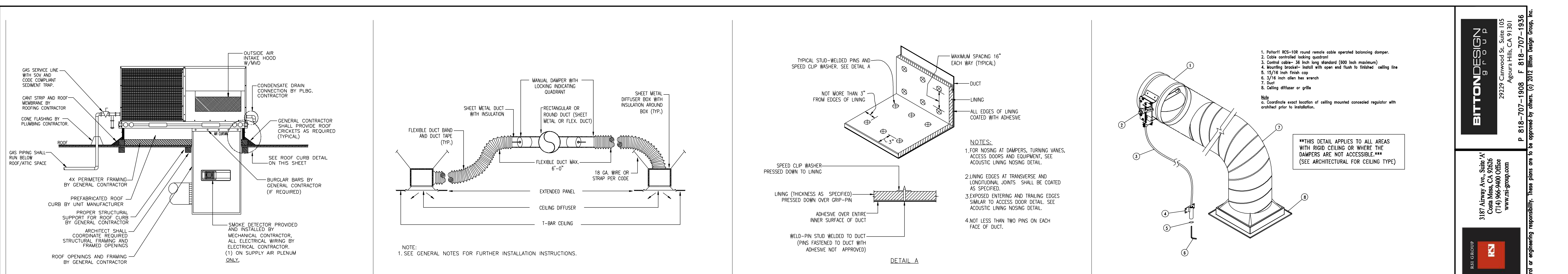


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Revisions

Scale: AS NOTED
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Checked By: WF
Sheet Number: M2.1

04.22.2013 - CONSTRUCTION SET



SUBMITTAL 0403-972A SERIES

MicroMetl Corporation
 Sparks, NV. (800) 884-4662
 Indianapolis, IN. (800) 662-4822
 Longview, TX. (903) 248-4800

PRODUCT NUMBER: 0403-972A ISOLATION CURBS
 0403-972A-08-07CBC 18" TALL
 0403-972A-07CBC 21" TALL
 0403-972A-14B-07CBC 24" TALL

STRUCTURALLY CALCULATED VIBRATION ISOLATION CURB FOR CARRIER 48/50 H.U.M.T.F.C. 008-014 50HJ0 008-012 UNITS

ANCHORAGE DETAILS TO ROOF:
 WOOD ATTACHMENT: 10 GA. WOODHOLE ATTACH TO UNIT (2) 1/8" x 2" SIMPSON SID. W/ WASHER CENTER ON CURB FLANGE, EASILY SPACED, 100 EACH LONG SIDE, (2) EACH SHORT SIDE.
 CONCRETE ATTACHMENT: 1/2" MIN. THICKNESS (2) 1/2" x 2" SIMPSON TITEN HD. EVENLY SPACED CENTER ON CURB FLANGE (2) EACH LONG SIDE, (2) EACH SHORT SIDE.

SCALE: N.T.S.

Thermal Ceramics FireMaster FastWrap XL Commercial Kitchen Grease Duct Enclosure System Air Ventilation Duct Enclosure System 1 or 2 Hour Shaft Alternative / Zero Clearance to Combustibles

ICC: ESR-2213

LEGEND:
 1 Two Layers of FireMaster FastWrap XL Blanket for Grease Duct Enclosure
 One Layer of FireMaster FastWrap XL Blanket for Air Ventilation Duct Enclosure
 2 Steel banding minimum 1/2" wide by 0.018" thick.
 3 Tight but joints on inner layer
 4 Min. 3" overlap on perimeter and between adjacent blanket on outside layer
 5 Min. 3/8" diameter hanger rod
 6 Min. 2" x 2" x 1/8" angle for Grease Duct Enclosure
 Min. 1-1/2" x 1-1/2" x 1/8" angle or SMACNA Equivalent for Air Ventilation Duct Enclosure
 7 Optional FireMaster FastWrap XL color

SCALE: N.T.S.

Thermal Ceramics FireMaster FastWrap XL Access Door Systems Commercial Kitchen Grease Duct Enclosure System

FireMaster Ductmate F2-HT Door System
 FireMaster Field Fabricated Door System

NOTE: Available from Thermal Ceramics FireMaster Distributors.

FIREMASTER FASTWRAP XL DOOR SYSTEMS

1	Ductmate F2-HT Access Door or 16 Gauge Cover Plate.
2	All Thread Rods.
3	Installation Pins with Speed Clips.
4	Three Layers of FastWrap XL Blanket with Minimum 1" Overlaps and All Edges Sealed with Aluminum Tape.
5	Spool Plates for Threaded Rods
6	Wing Nuts and Washers
7	Outer Cover Plate Labeled "ACCESS DOOR - DO NOT OBSTRUCT"

SCALE: N.T.S.

SUBMITTAL 0403-372A SERIES

MicroMetl Corporation
 Sparks, NV. (800) 884-4662
 Indianapolis, IN. (800) 662-4822
 Longview, TX. (903) 248-4800

PRODUCT NUMBER: 0403-372A ISOLATION CURBS
 0403-372A-08-07CBC 18" TALL
 0403-372A-07CBC 21" TALL
 0403-372A-14B-07CBC 24" TALL

STRUCTURALLY CALCULATED VIBRATION ISOLATION CURB FOR CARRIER 48/50 H.U.M.T.F.C. 004-007 48/50 HE004-006 UNITS

ANCHORAGE DETAILS TO ROOF:
 WOOD ATTACHMENT: 10 GA. WOODHOLE ATTACH TO UNIT (2) 1/8" x 2" SIMPSON SID. W/ WASHER CENTER ON CURB FLANGE, EASILY SPACED, 100 EACH LONG SIDE, (2) EACH SHORT SIDE.
 CONCRETE ATTACHMENT: 1/2" MIN. THICKNESS (2) 1/2" x 2" SIMPSON TITEN HD. EVENLY SPACED CENTER ON CURB FLANGE (2) EACH LONG SIDE, (2) EACH SHORT SIDE.

SCALE: N.T.S.

1 KITCHEN EXHAUST DUCT FIRE WRAP DETAIL

VERIFY POWER REQUIREMENTS * BEFORE ORDERING UNITS *

HOOD SYSTEM -1 (FOR MUA-1)

HOOD SYSTEM -2 (TYPICAL FOR MUA-2 & MUA-3)

SCALE: N.T.S.

3 FIRE WRAP ACCESS DOOR DETAIL

HOOD SYSTEM -3 (DISHWASHER)

SCALE: N.T.S.

2 VIBRATION ISOLATION CURB FOR RTU-6

MicroMetl Corporation
 Sparks, NV. (800) 884-4662
 Indianapolis, IN. (800) 662-4822
 Longview, TX. (903) 248-4800

PRODUCT NUMBER: 0403-372A ISOLATION CURBS
 0403-372A-08-07CBC 18" TALL
 0403-372A-07CBC 21" TALL
 0403-372A-14B-07CBC 24" TALL

STRUCTURALLY CALCULATED VIBRATION ISOLATION CURB FOR CARRIER 48/50 H.U.M.T.F.C. 004-007 48/50 HE004-006 UNITS

ANCHORAGE DETAILS TO ROOF:
 WOOD ATTACHMENT: 10 GA. WOODHOLE ATTACH TO UNIT (2) 1/8" x 2" SIMPSON SID. W/ WASHER CENTER ON CURB FLANGE, EASILY SPACED, 100 EACH LONG SIDE, (2) EACH SHORT SIDE.
 CONCRETE ATTACHMENT: 1/2" MIN. THICKNESS (2) 1/2" x 2" SIMPSON TITEN HD. EVENLY SPACED CENTER ON CURB FLANGE (2) EACH LONG SIDE, (2) EACH SHORT SIDE.

SCALE: N.T.S.

RESTAURANT AIR BALANCE

FANS	EXHAUST	MAKE-UP AIR TO HOOD	OSA FROM UNITS
EF-1	3800 CFM	MAU-1 = 3420 CFM	
EF-2	2400 CFM		
EF-3	4800 CFM	MAU-2 = 6300 CFM	
EF-4	2400 CFM		
EF-5	2400 CFM	MAU-3 = 3200 CFM	
EF-6	1400 CFM	0	
TOTAL	17,200 CFM (FROM EXH. FANS)	12,920 CFM (FROM MAU'S)	3980 CFM (FROM OSA UNIT)

HOOD SYSTEM -3 (DISHWASHER)

SCALE: N.T.S.

HOOD CALCULATION AND AIR BALANCE

HOOD #1 & 2 (EF-1)	HOOD #3 (EF-6)	HOOD #4 (EF-2)	HOOD #5 (EF-3)	HOOD #6 (EF-3)	HOOD #7 (EF-4)	HOOD #8 (EF-5)
LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) CONNECTION OVEN SINGLE (ITEM # 41) (2) RICE COOKER-GAS FIRED (ITEM # 42) (3) BRAISING PAN-40 GAL. (ITEM # 43) (4) BRAISING PAN-30 GAL. (ITEM # 48) (5) 6-OPEN BURNER RANGE W/ CONV. OVEN (ITEM # 50)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) DISHWASHER-LOW TEMP. (ITEM # 76)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) FRYER BATTERY (ITEM # 100) (1) FRYER BATTERY (ITEM # 101)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) GRIDDLE RANGE W/ STANDARD OVEN (ITEM # 105) (1) 8-OPEN BURNER RANGE (ITEM # 109)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) RADIANT BROILER (ITEM # 112) (1) CHEESEMELTER (ITEM # 122)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) CHINESE WOK RANGE (ITEM # 117)	LIST OF COOKING UNDER HOOD, PER ARCHITECTURAL DWG'S: (1) PIZZA OVEN (ITEM # 126)
EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 3,800 CFM EXHAUST AIR PROVIDED _____ 3,800 CFM DUCT SIZE _____ (2) 10" x 18" DUCT AIR, 3800 x 144 VELOCITY = (2) 10 x 18 _____ 1520 FPM MAKE-UP AIR PROVIDED _____ 3420 CFM FROM MAU-1 _____ 380 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (2) 16"x16" _____ (8) 16"x20"	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 1,400 CFM EXHAUST AIR PROVIDED _____ 1,400 CFM DUCT SIZE _____ (1) 14" x 14" DUCT AIR, 1400 x 144 VELOCITY = 14" x 14" _____ 1028 FPM MAKE-UP AIR PROVIDED _____ 1,400 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ 0	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 2,400 CFM EXHAUST AIR PROVIDED _____ 2,400 CFM DUCT SIZE _____ (1) 10" x 22" DUCT AIR, 2400 x 144 VELOCITY = 10" x 22" _____ 1570 FPM MAKE-UP AIR PROVIDED _____ 2,400 CFM FROM MAU-2 _____ 240 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (2) 16"x16" _____ (4) 16"x20"	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 2,400 CFM EXHAUST AIR PROVIDED _____ 2,400 CFM DUCT SIZE _____ (1) 10" x 22" DUCT AIR, 2400 x 144 VELOCITY = 10" x 22" _____ 1570 FPM MAKE-UP AIR PROVIDED _____ 2,400 CFM FROM MAU-2 _____ 240 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (2) 16"x16" _____ (4) 16"x20"	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 2,600 CFM EXHAUST AIR PROVIDED _____ 2,600 CFM DUCT SIZE _____ (1) 10" x 24" DUCT AIR, 2600 x 144 VELOCITY = 10" x 24" _____ 1560 FPM MAKE-UP AIR PROVIDED _____ 2,600 CFM FROM MAU-2 _____ 260 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (2) 16"x16" _____ (4) 16"x20"	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 2,400 CFM EXHAUST AIR PROVIDED _____ 2,400 CFM DUCT SIZE _____ (1) 10" x 22" DUCT AIR, 2400 x 144 VELOCITY = 10" x 22" _____ 1570 FPM MAKE-UP AIR PROVIDED _____ 1920 CFM FROM MAU-3 _____ 480 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (5) 16"x20"	EXHAUST AIR FLOW REQUIRED PER MANUFACTURER (CAPTIVE/AIR) _____ 1,800 CFM EXHAUST AIR PROVIDED _____ 1,800 CFM DUCT SIZE _____ (1) 10" x 10" DUCT AIR, 1800 x 144 VELOCITY = 10" x 10" _____ 2592 FPM MAKE-UP AIR PROVIDED _____ 1,800 CFM FROM MAU-3 _____ 360 CFM FROM RTU'S OSA SIZE & NO. OF FILTERS _____ (2) 16"x16" _____ (2) 16"x20"

SCALE: N.T.S.

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PROFESSIONAL ENGINEER
 No. 024310
 State of California

Issue Date: 4-22-13
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Revisions

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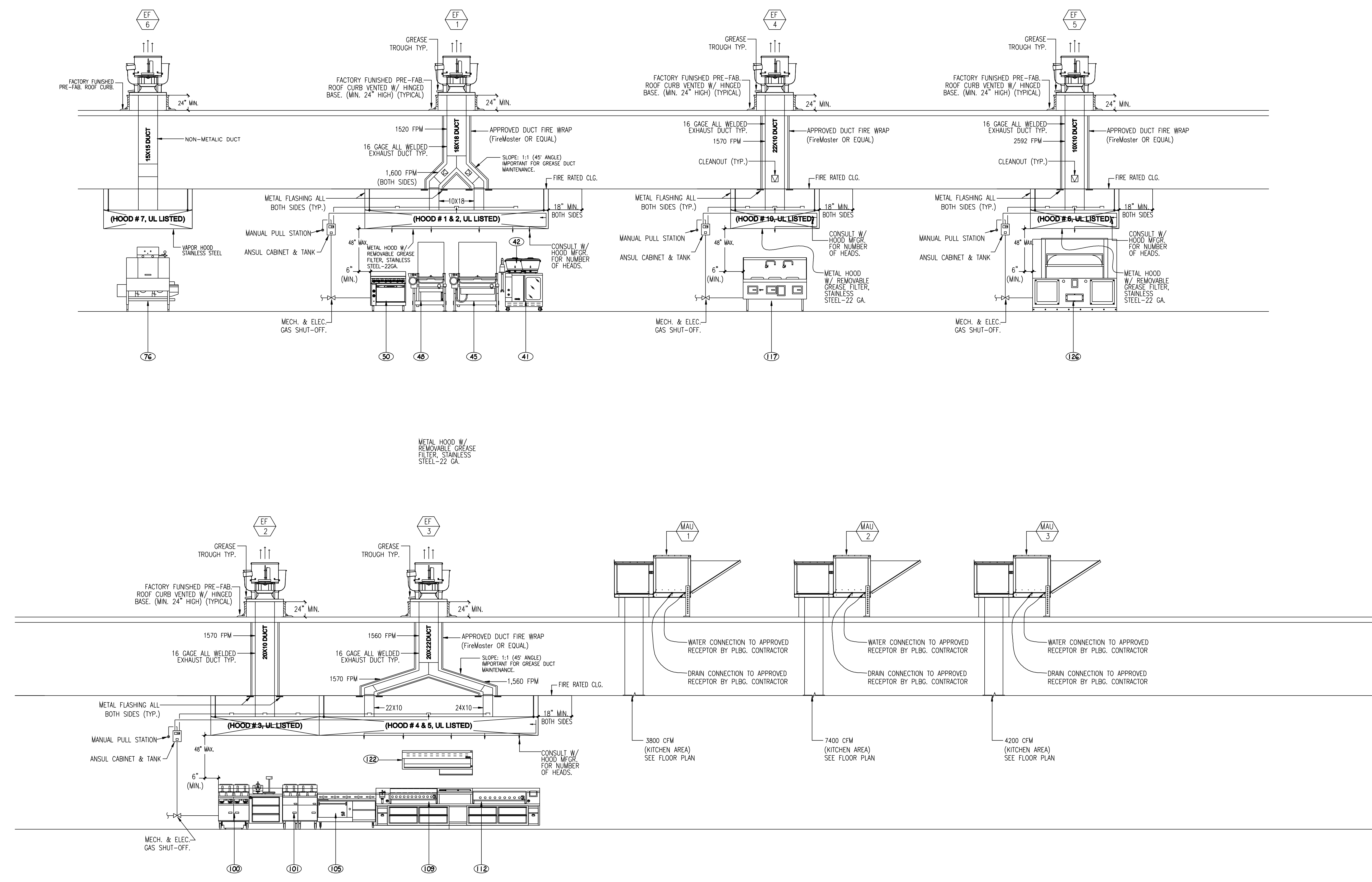
04.22.2013 - CONSTRUCTION SET

NOTES (NOT ALL MAY APPLY)

- 1 PROVIDE CLEAN OUT AT EVERY CHANGE OF DIRECTION AND EVERY 12 FOOT PER SECTION 510.3 THRU 510.3.4.5
- 2 EXHAUST OUTLETS SERVING GREASE DUCT SYSTEM SHALL TERMINATE ABOVE ROOF SURFACE, 10' FROM PROPERTY LINE, 10' FROM AIR INTAKE OPENINGS AND 10' ABOVE ADJOINING GRADE. BASE OF FAN SHALL BE 2' ABOVE ROOF SURFACE.
- 3 HOODS LESS THAN 12" FROM THE CEILING OR WALL SHALL BE FLASHED SOLIDLY WITH MATERIALS AS REQUIRED.
- 4 THE FIRE-EXTINGUISHING SYSTEM SHALL BE INTERCONNECTED TO THE FUEL OR CURRENT SUPPLY SO THAT THE FUEL OR CURRENT IS AUTOMATICALLY SHUT OFF ALL EQUIPMENT UNDER THE HOOD WHEN THE SYSTEM IS ACTUATED.
- 5 DUCT BRACING AND SUPPORTS SHALL BE OF NONCOMBUSTIBLE MATERIAL.
- 6 WEATHER PROTECTION FOR OPENINGS TO BE A MINIMUM OF 26 GAUGE GALVANIZED STEEL.
- 7 FIRE DEPARTMENT APPROVAL SHALL BE REQUIRED ON FIRE PROTECTION SYSTEMS FOR GREASE HOODS AND DUCTS AS REQUIRED BY SECTION 510.2 OF THE MECHANICAL CODE AND AS REQUIRED BY THE FIRE CODE.
- 8 DUCT SYSTEMS SHOULD BE INSTALLED SO GREASE CANNOT BE POCKETED. THE SYSTEM SHALL SLOPE NOT LESS THAN 1/4" PER FOOT TOWARD AN APPROVED GREASE RESERVOIR. (WHERE HORIZONTAL DUCTS EXCEED 75' IN LENGTH, THE SLOPE SHALL BE MINIMUM 1" PER FOOT).
- 9 EACH EXHAUST OUTLET WITHIN THE HOOD SHALL SERVE NOT MORE THAN 12-FOOT SECTION OF HOOD.
- 10 THE DUCT ENCLOSURE SHALL BE SEALED AROUND THE DUCT AT THE POINT OF PENETRATION.
- 11 TYPE 1 HOODS FOR USE OVER SOLID-FUEL COOKING EQUIPMENT SHALL BE PROVIDED WITH SEPARATE EXHAUST SYSTEMS.
- 12 EXPOSED GREASE DUCT/ HOOD SYSTEMS SERVING TYPE 1 HOOD SHALL HAVE A CLEARANCE FROM UNPROTECTED COMBUSTIBLE CONSTRUCTION OF AT LEAST 18 INCHES. CLEARANCE MAY BE REDUCED TO NOT LESS THAN 3 INCHES WHEN COMBUSTIBLE CONSTRUCTION IS PROTECTED WITH MATERIAL REQUIRED FOR ONE-HOUR FIRE-RESISTIVE CONSTRUCTION.
- 13 BOLTS, SCREWS, RIVETS OR OTHER MECHANICAL FASTENERS, EXCEPT OVAL OR PAN HEAD SCREWS SHALL NOT PENETRATE THE INSIDE OF THE GREASE DUCT OR HOOD WALLS.

KITCHEN EQUIPMENT DESCRIPTION

- 41 ----- CONVECTION OVEN SINGLE
- 42 ----- RICE COOKER-GAS FIRED
- 45 ----- BRAISING PAN-40 GAL
- 46 ----- BRAISING PAN-30 GAL
- 50 ----- 6-OPEN BURNER RANGE W/ CONV. OVEN
- 76 ----- DISHWASHER-LOW TEMP
- 100 ----- FRYER BATTERY
- 101 ----- FRYER BATTERY
- 105 ----- GRIDDLE RANGE W/ STANDARD OVEN
- 109 ----- 8-OPEN BURNER RANGE
- 112 ----- RADIANT BROILER
- 117 ----- CHINESE WOK RANGE
- 122 ----- CHEESE MELTER
- 126 ----- PIZZA OVEN



EXHAUST FAN INFORMATION

FAN UNIT NO.	FAN UNIT MODEL #	MODEL	TAG	CFM	ESP.	RPM	H.P.	#	VOLT	FLA	WEIGHT (LBS.)
1	NCA24HPFA	NCA24HPFA	EF-1	3800	1.500	974	2.000	3	208	6.0	207.42
2	NCA18HPFA	NCA18HPFA	EF-2	2400	1.750	1200	2.000	3	208	6.0	161.71
3	NCA24HPFA	NCA24HPFA	EF-3	4800	2.000	1123	3.000	3	208	9.5	222.42
4	NCA18HPFA	NCA18HPFA	EF-4	2400	1.750	1200	2.000	3	208	6.0	161.71
5	NCA18HPFA	NCA18HPFA	EF-5	1800	1.500	1266	1.000	3	208	3.7	120.07
6	NCA10FA	NCA10FA	EF-6	1400	0.625	1194	0.500	1	115	8.0	101.73
7	DD1FA	DD1FA	EF-7	600	0.375	1113	0.250	1	115	4.8	82.09
8	CFA 150CA	CFA 150CA	EF-8	100	0.375	988	0.134	1	115	1.3	23.75
9	CFA 500CA	CFA 500CA	EF-9	400	0.375	733	0.310	1	115	2.2	38.00

MUA FAN INFORMATION

FAN UNIT NO.	FAN UNIT MODEL #	BLOWER	HOUSING	TAG	CFM	ESP.	RPM	H.P.	#	VOLT	FLA	EWP COOLER ENTERING DB TEMP.	EWP COOLER LEAVING WB TEMP.	EWP COOLER LEAVING DB TEMP.	EWP COOLER LEAVING WB TEMP.	WEIGHT (LBS.)	SONES
9	A2-G12 (MUA-1)	G12	A2	52-S	3800	0.750	927	1.500	3	208	4.7	90.0F	65.0F	71.0F	65.0F	984.49	28
10	NOT USED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	A3-G18 (MUA-2)	G18-PB	A3	97-S	7400	0.750	668	3.000	3	208	9.5	90.0F	65.0F	72.0F	65.0F	918.2800000000000	19.3
12	A2-G12 (MUA-3)	G12	A2	119/127-S	4200	0.750	949	2.000	3	208	6.2	90.0F	65.0F	71.0F	65.0F	593.49	29

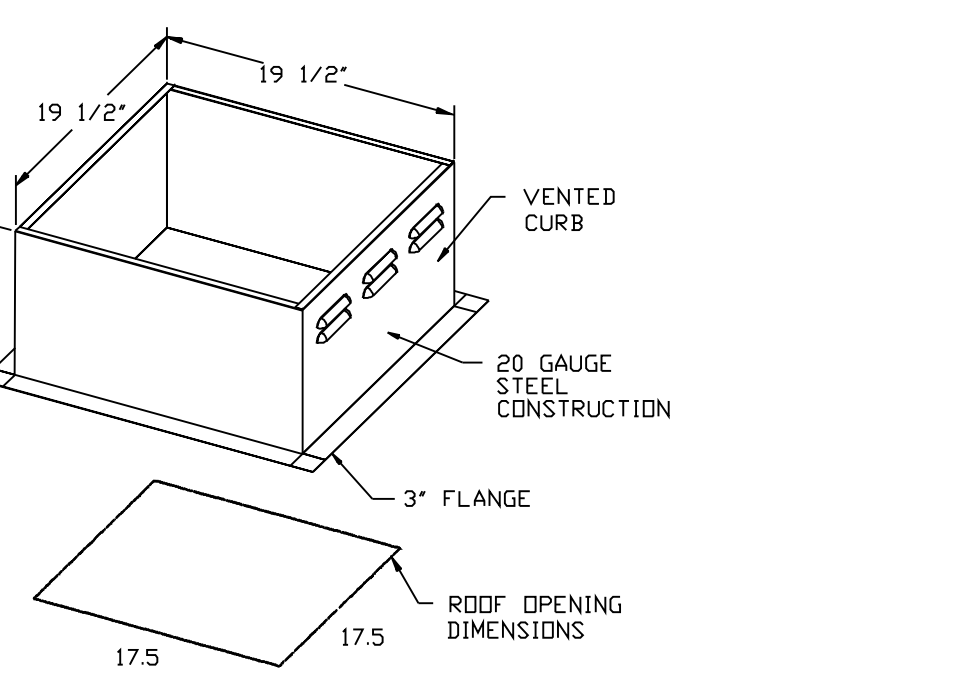
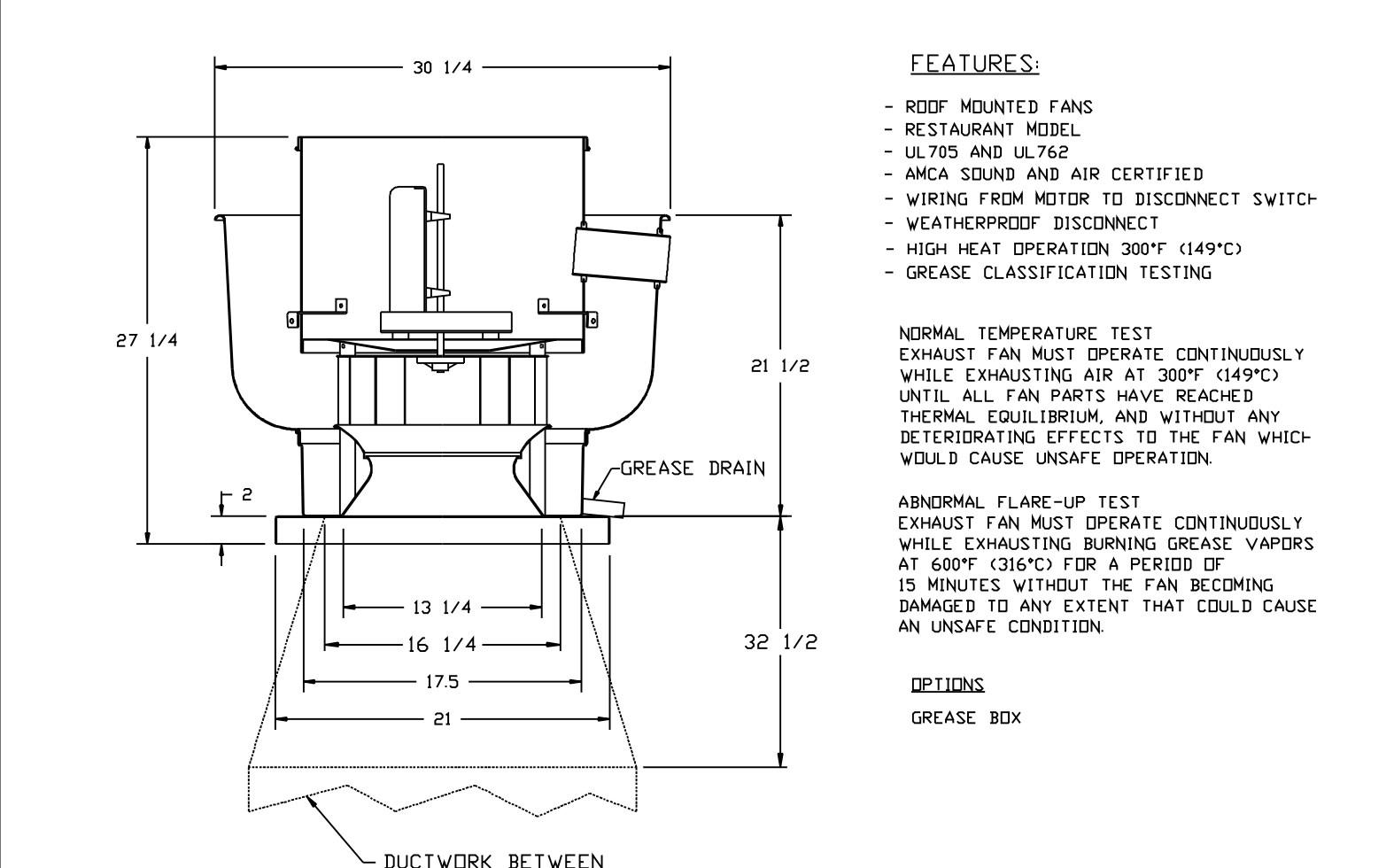
FAN OPTIONS

FAN UNIT NO.	OPTION (Qty. - Descr.)	QTY.	DESCR.
1	1 - Grease Box	10	1 - Straight Through Discharge - Assembly - CFA Inline.
2	1 - Grease Box	1	1 - 982L In Line Kit
3	1 - Grease Box	11	1 - Evaporative Cooler Wiring Harness
4	1 - Grease Box	1	1 - Gravity Backdraft Damper For Size 2 Housing
5	1 - Grease Box	12	1 - Evaporative Cooler Wiring Harness
6	1 - Grease Box	1	1 - Gravity Backdraft Damper For Size 2 Housing
7	1 - Grease Box	13	1 - Evaporative Cooler Wiring Harness
8	1 - 15-BDD Damper	1	1 - Gravity Backdraft Damper For Size 1 Housing
9	1 - Fan Control - 3 Amp Fan Mounted Speed Control	14	1 - Gravity Backdraft Damper For Size 2 Housing
			1 - Evaporative Cooler Wiring Harness

CURB ASSEMBLIES

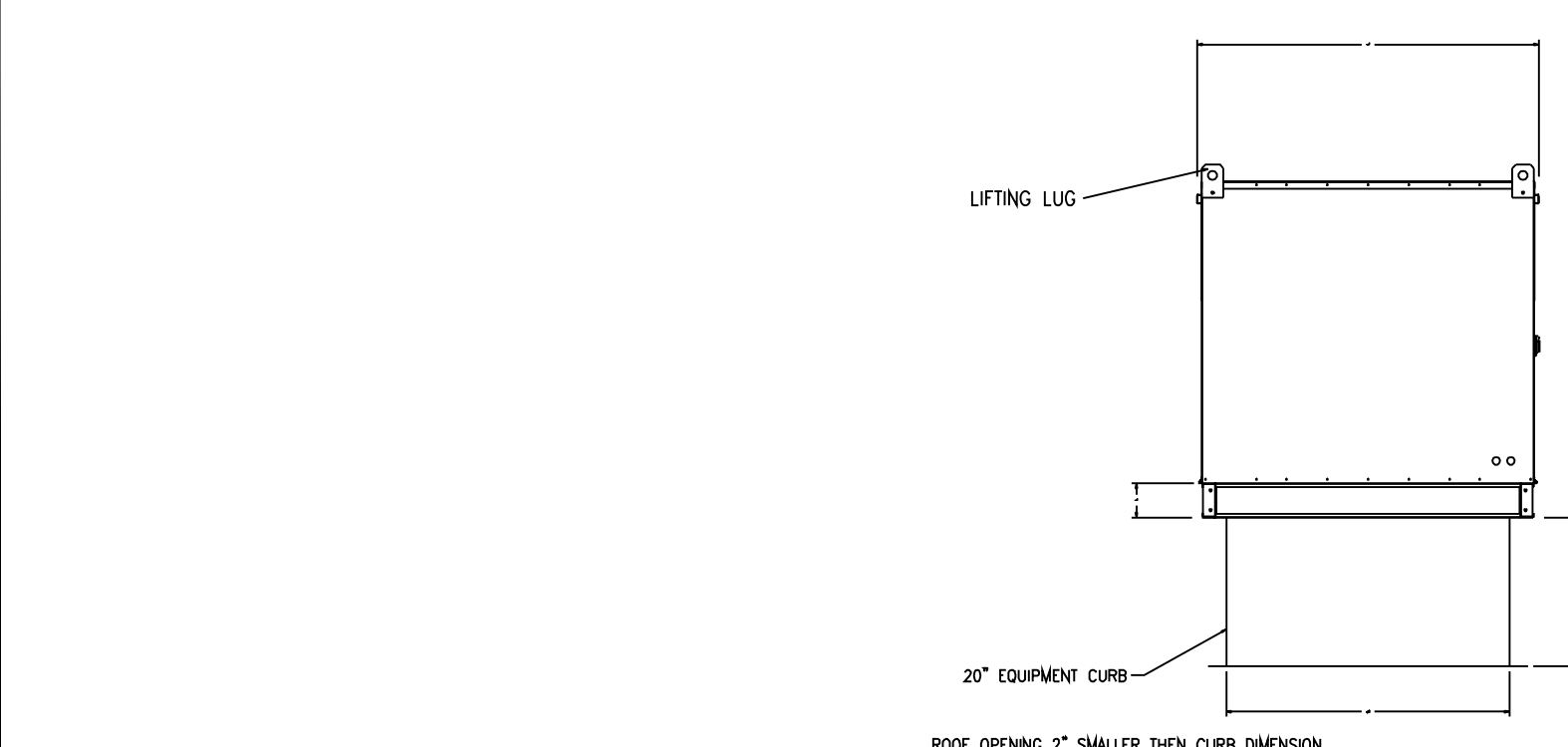
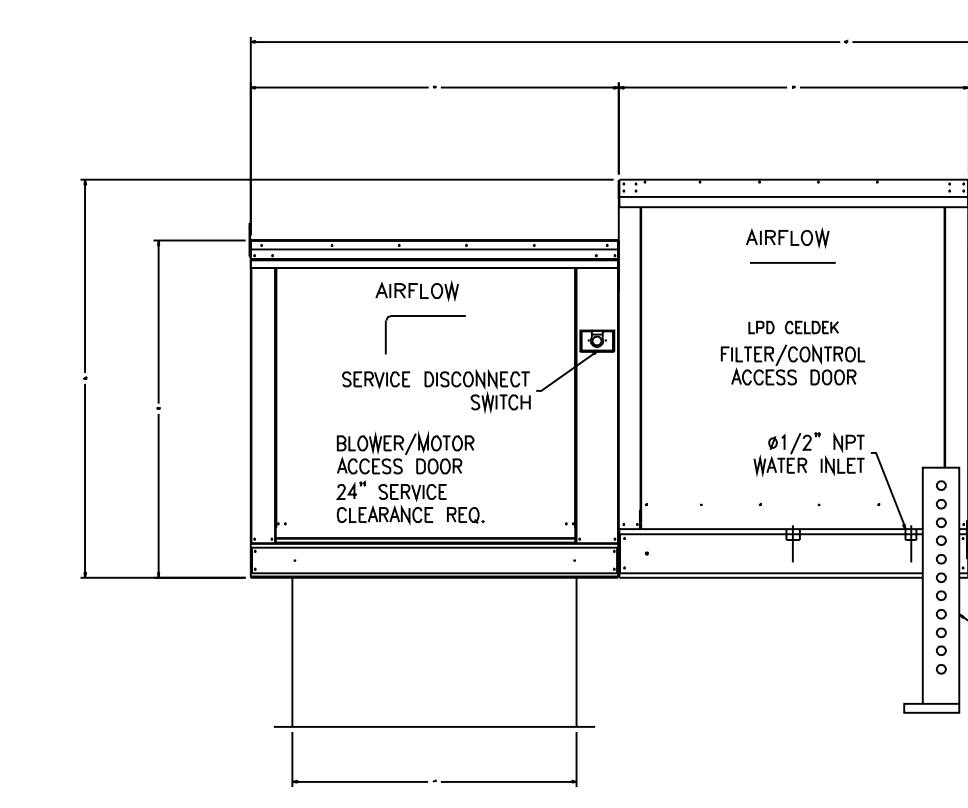
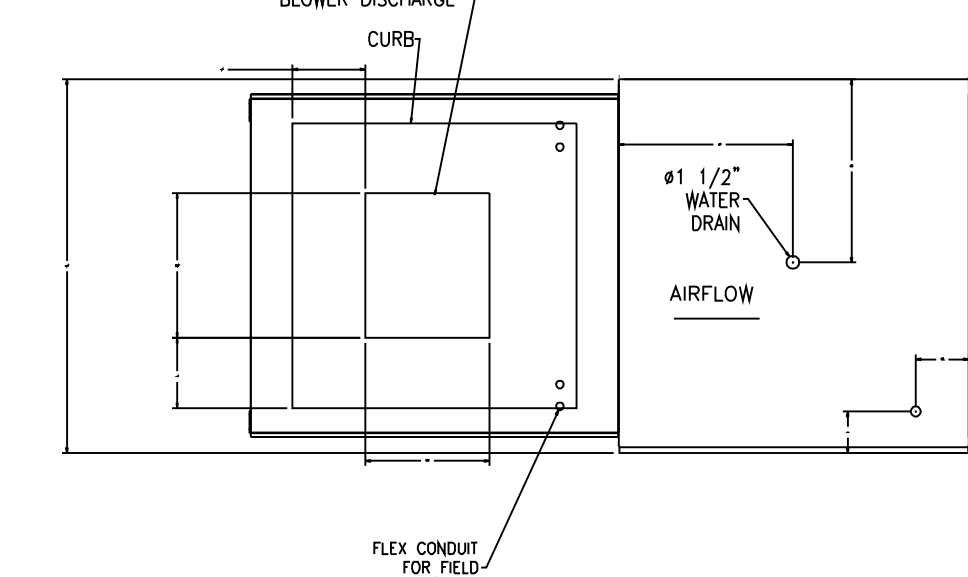
NO.	DN FAN	WEIGHT	ITEM	SIZE	VENTED	HINGED	#	#	#	#	#	#	#	#	#	#	#
1	# 1	48 LBS	Curb	31.500"W x 31.500"L x 20.000"H	Vented	Hinged	11	# 11	42 LBS	Curb	31.000"W x 31.000"L x 20.000"H						
2	# 2	41 LBS	Curb	26.500"W x 26.500"L x 20.000"H	Vented	Hinged	# 11	Rail	4.000"W x 4.000"L x 36.000"Halong Width.								
3	# 3	48 LBS	Curb	31.500"W x 31.500"L x 20.000"H	Vented	Hinged	12	# 12	42 LBS	Curb	31.000"W x 31.000"L x 20.000"H						
4	# 4	41 LBS	Curb	26.500"W x 26.500"L x 20.000"H	Vented	Hinged	# 12	Rail	4.000"W x 4.000"L x 36.000"Halong Width.								
5	# 5	36 LBS	Curb	23.000"W x 23.000"L x 20.000"H	Vented	Hinged	13	# 13	29 LBS	Curb	21.000"W x 21.000"L x 20.000"H						
6	# 6	31 LBS	Curb	19.500"W x 19.500"L x 20.000"H	Vented	Hinged	# 13	Rail	4.000"W x 4.000"L x 36.000"Halong Width.								
7	# 7	48 LBS	Curb	31.500"W x 31.500"L x 20.000"H	Vented	Hinged	14	# 14	42 LBS	Curb	31.000"W x 31.000"L x 20.000"H						
8	# 8	18 LBS	Curb	19.500"W x 19.500"L x 12.000"H			# 14	Rail	4.000"W x 4.000"L x 36.000"Halong Width.								

FAN # 6 NCA10FA - EXHAUST FAN (EF-6)

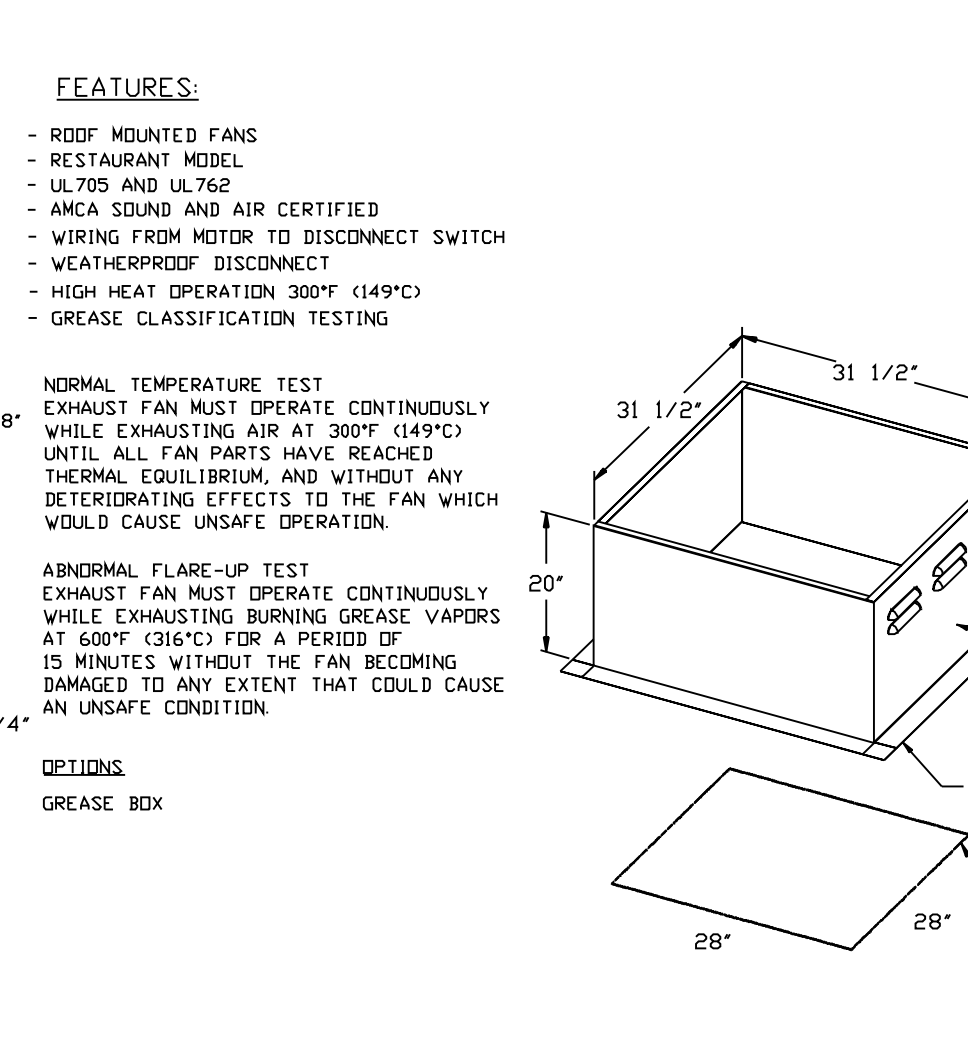
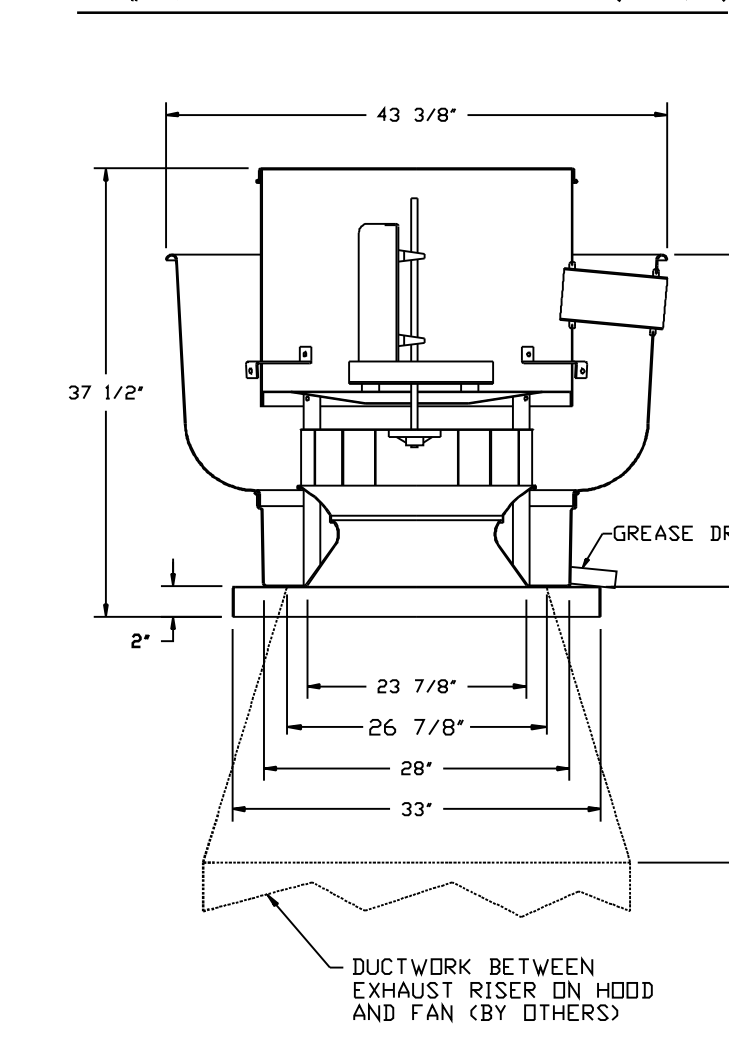


FAN # 12 A2-G12-SUPPLY FAN MUA-1 & 3

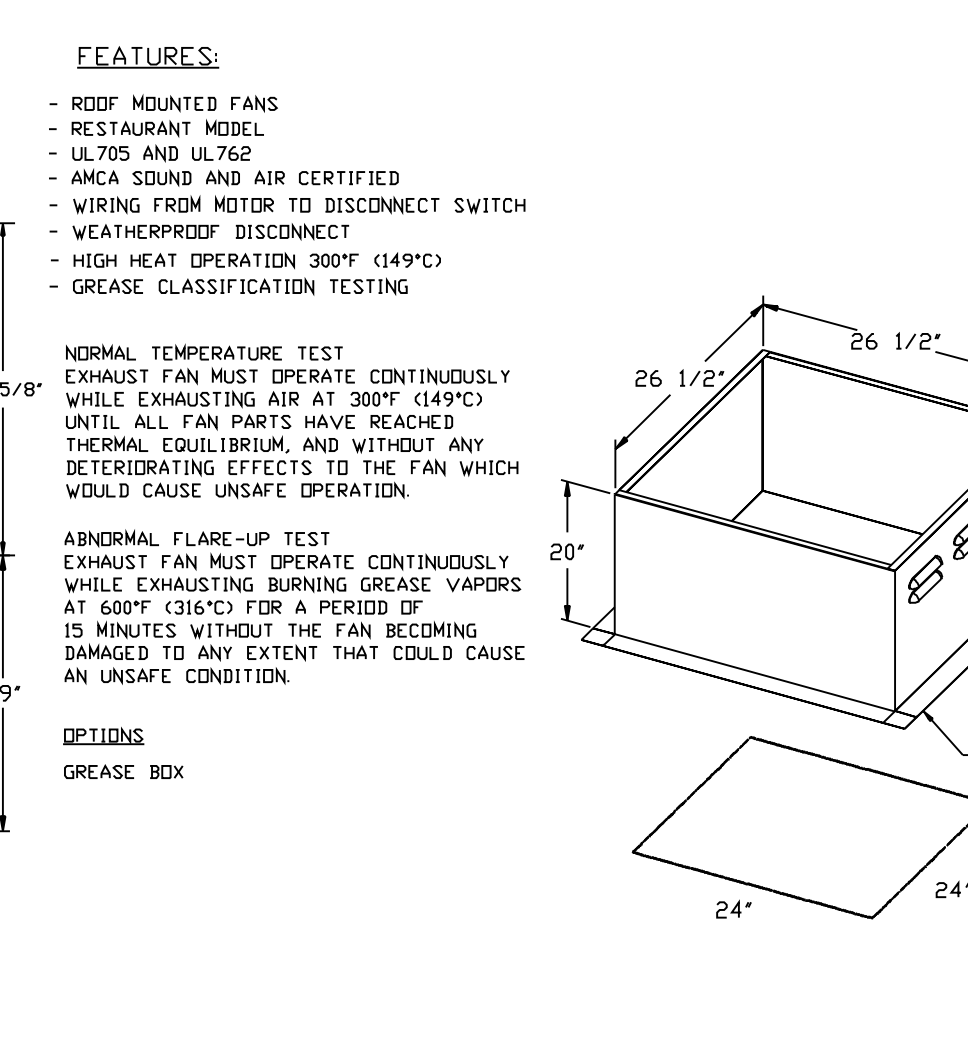
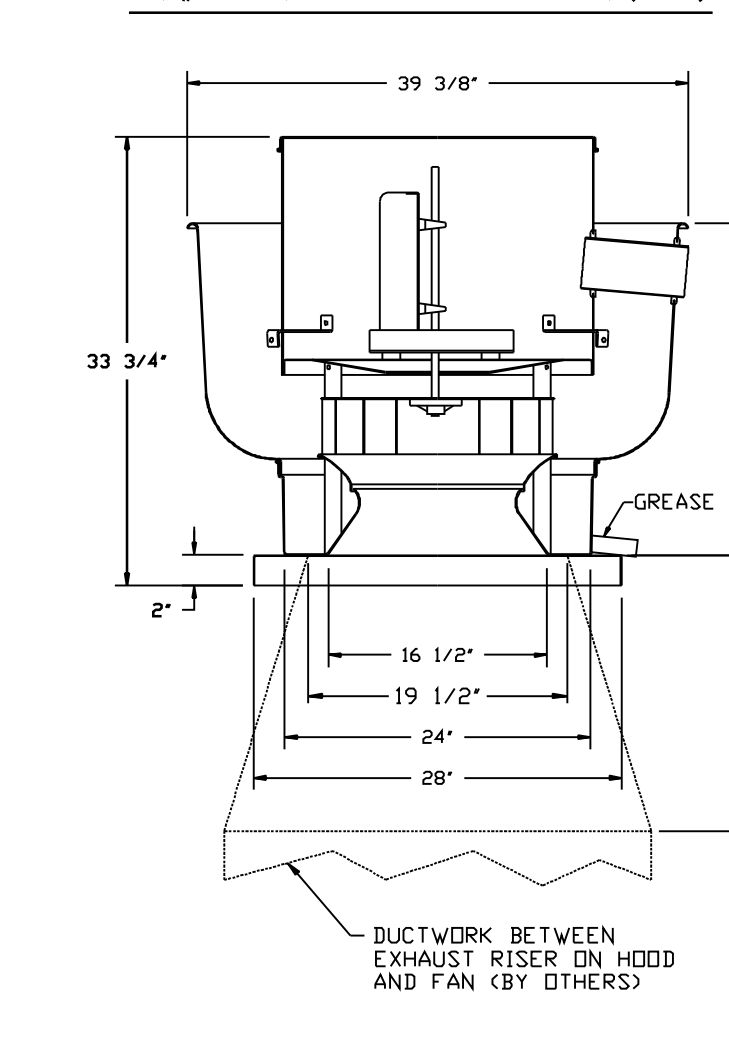
- FAN #12 A2-G12 - SUPPLY FAN (119/127-S)
 1. UNTEMPERED SUPPLY UNIT WITH 12" BLOWER IN SIZE #2 HOUSING
 2. EWP COOLER (EWP COOLER) - W/ WASHING HOOD W/ EZ FILTERS
 3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT
 4. 12V WIRING CONNECTION TO EXHAUST EVAPORATIVE COOLERS FROM UNTEMPERED SUPPLY FANS.



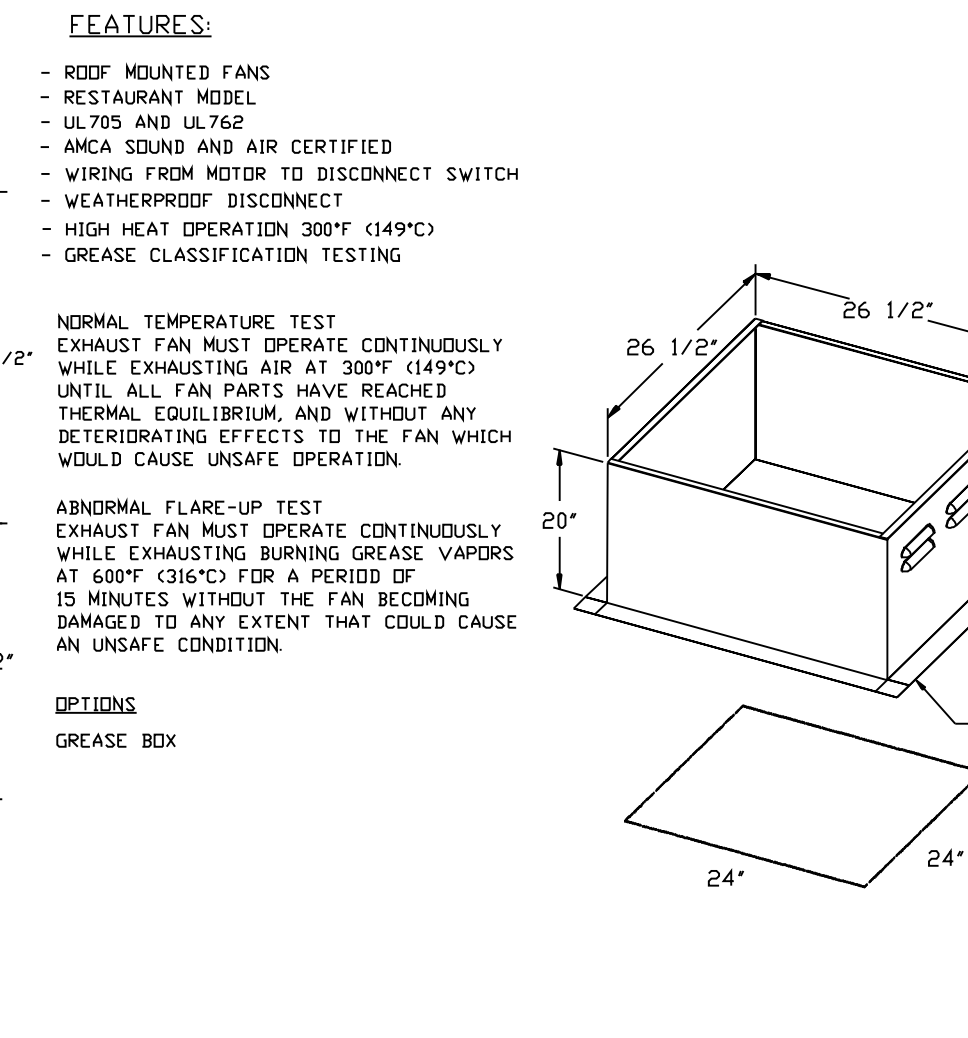
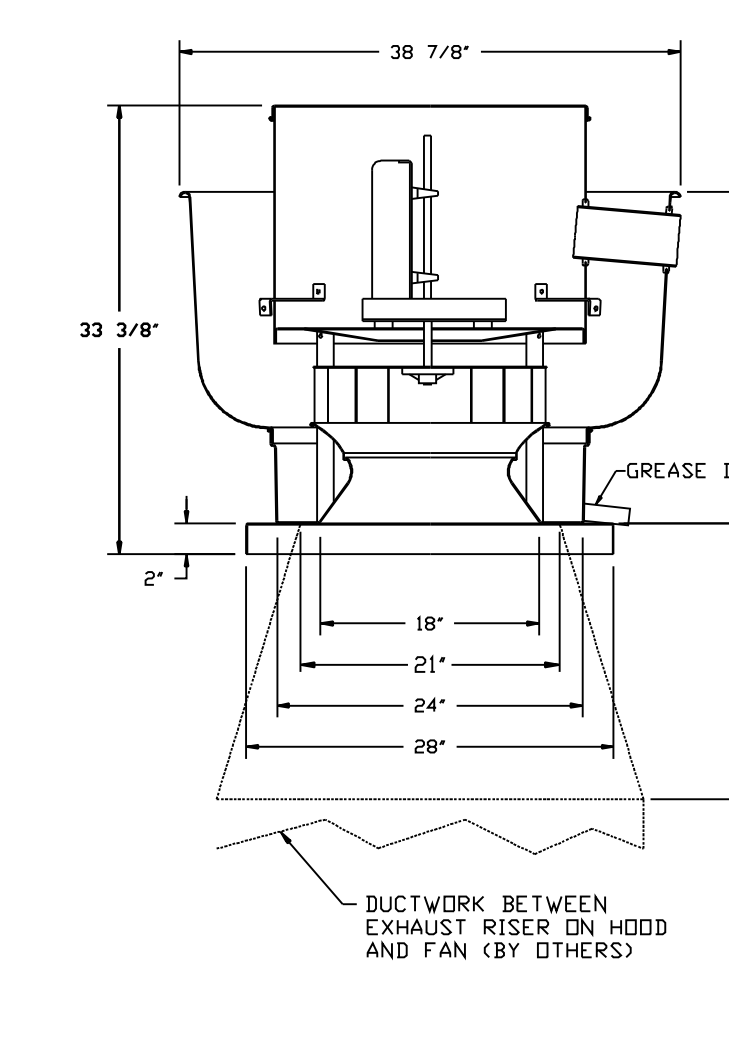
FAN # 1, 3 NCA24HPFA - EXHAUST FAN (EF-1, 3)



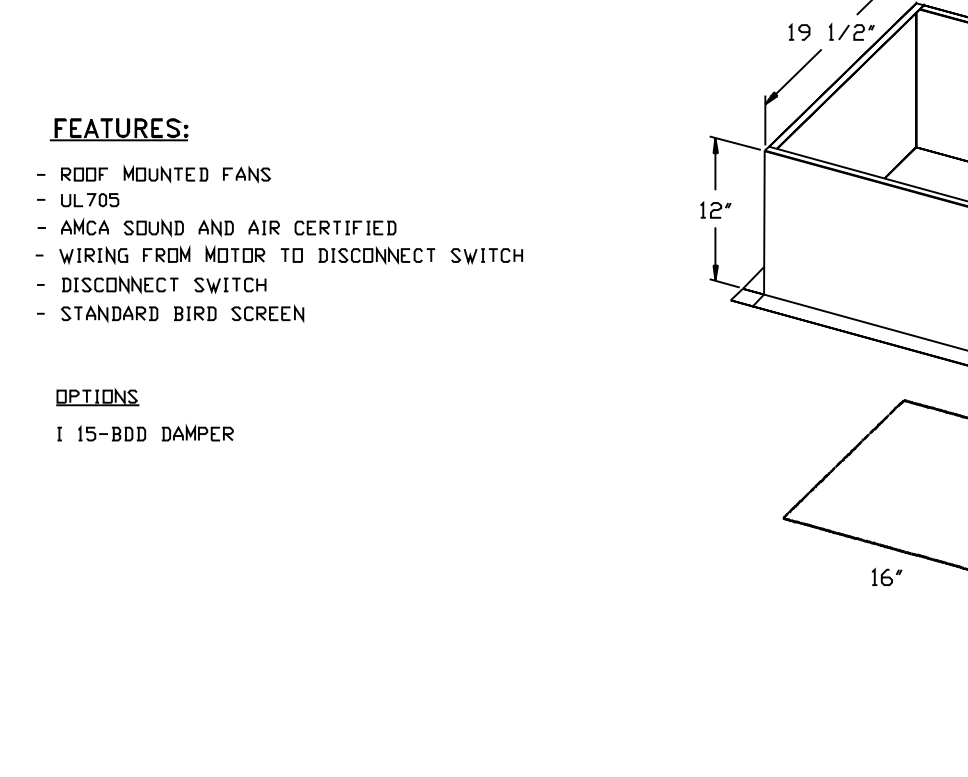
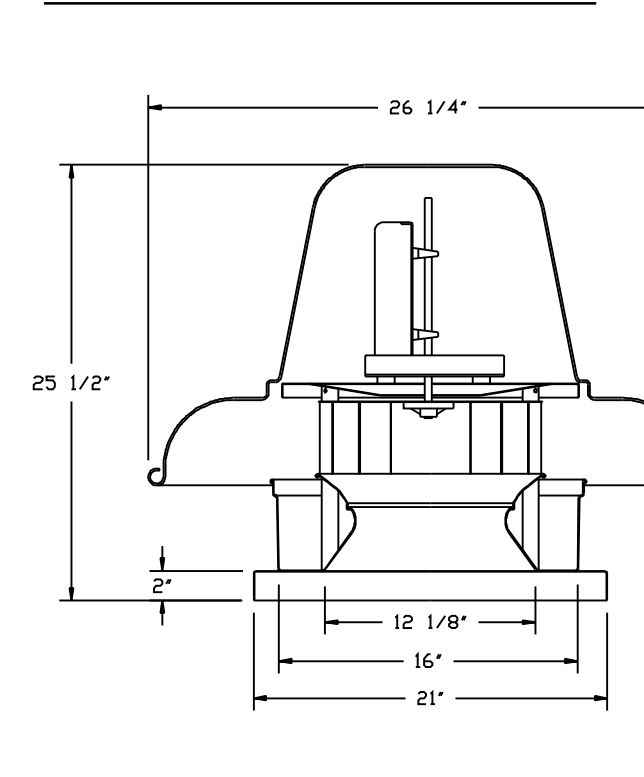
FAN # 5 NCA18HPFA - EXHAUST FAN (EF-5)



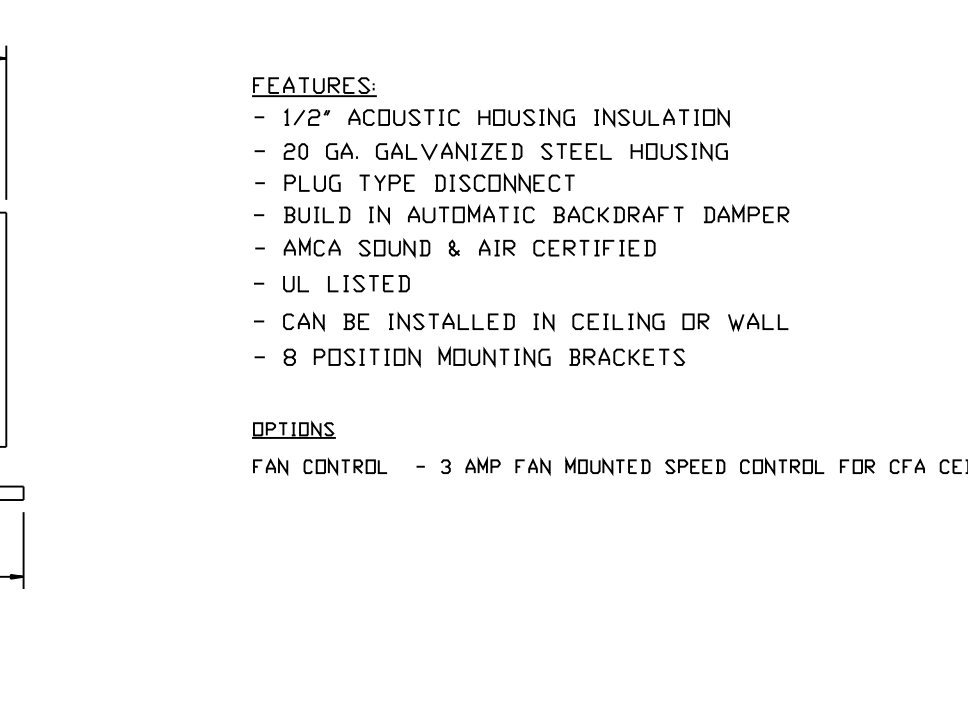
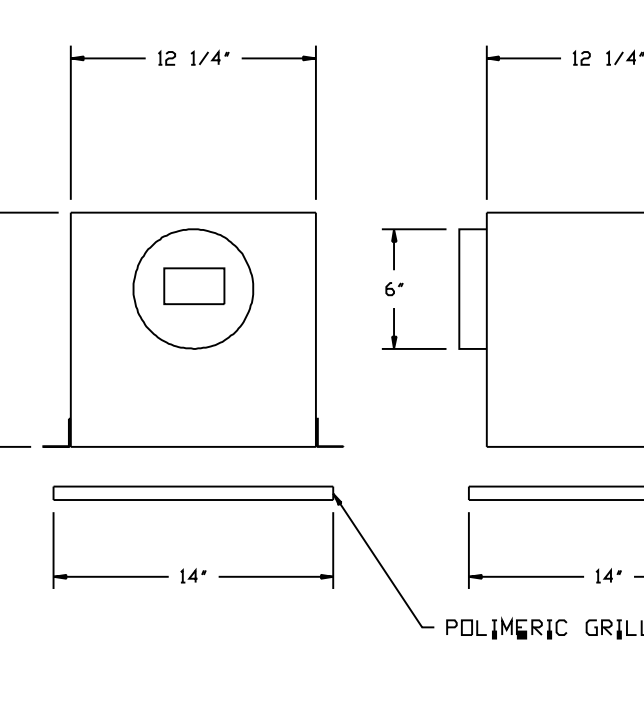
FAN # 2, 4 NCA18HPFA - EXHAUST FAN (EF-2 & 4)



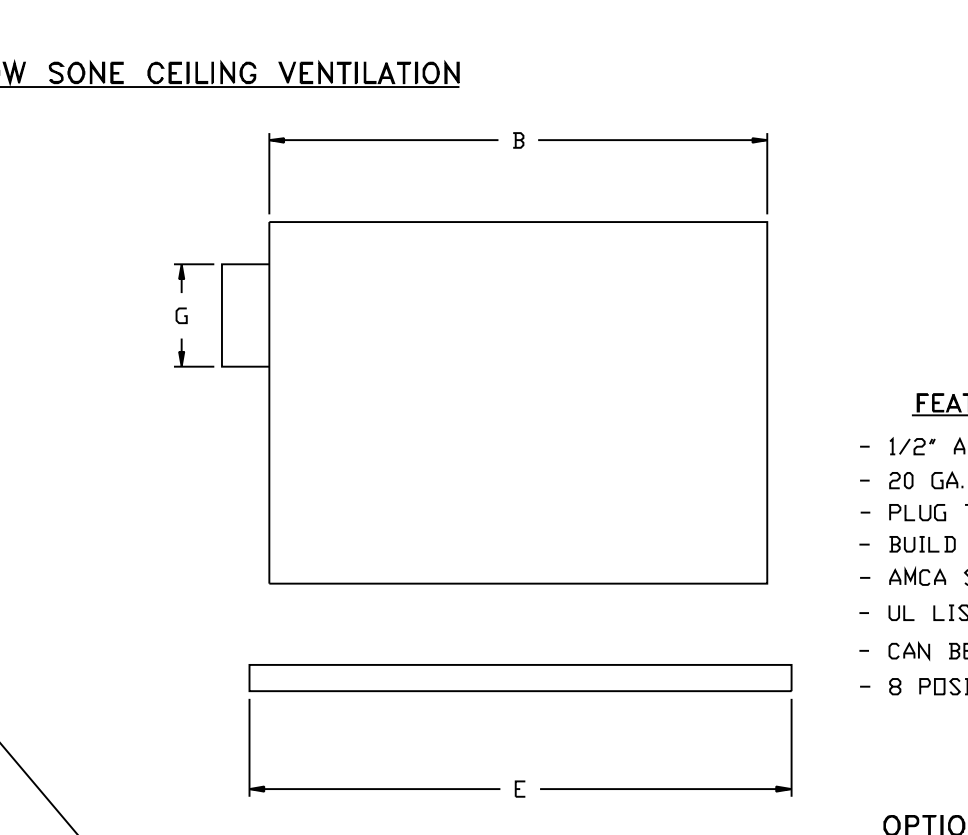
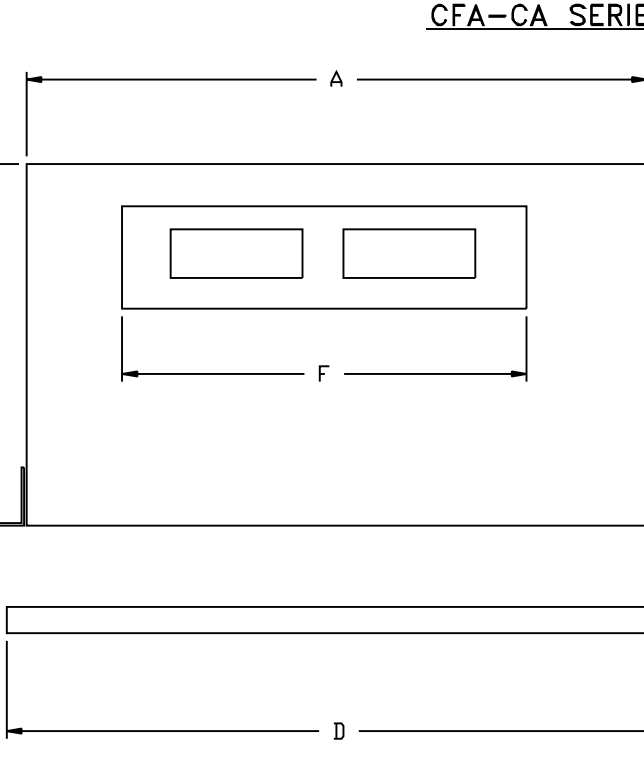
FAN # 7 DD1FA - EXHAUST FAN (EF-7)



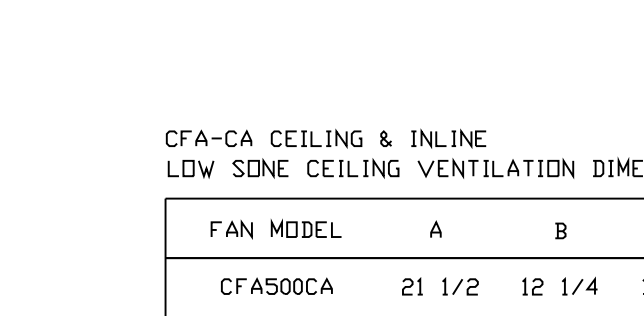
FAN # 8 CFA 150CA - EXHAUST FAN (EF-8)



FAN # 9 CFA500 - EXHAUST FAN (EF-9)



CFA-CA SERIES LOW SLOPE CEILING VENTILATION

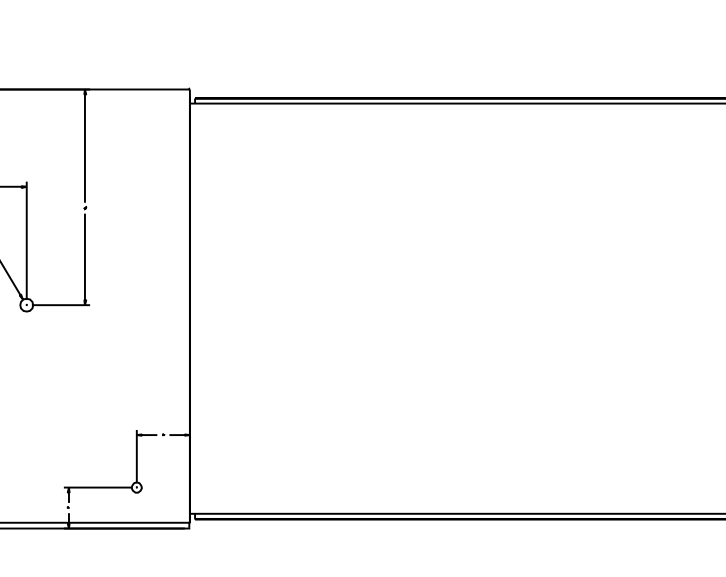
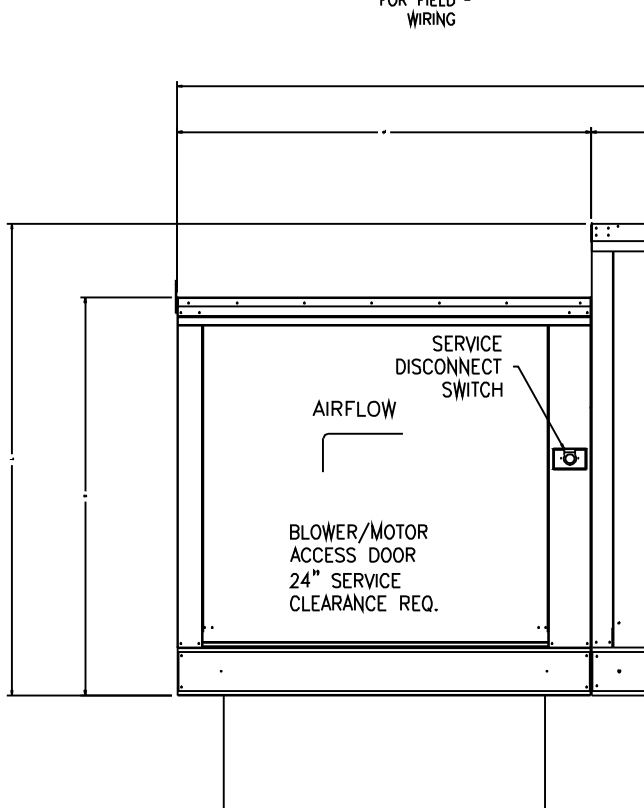
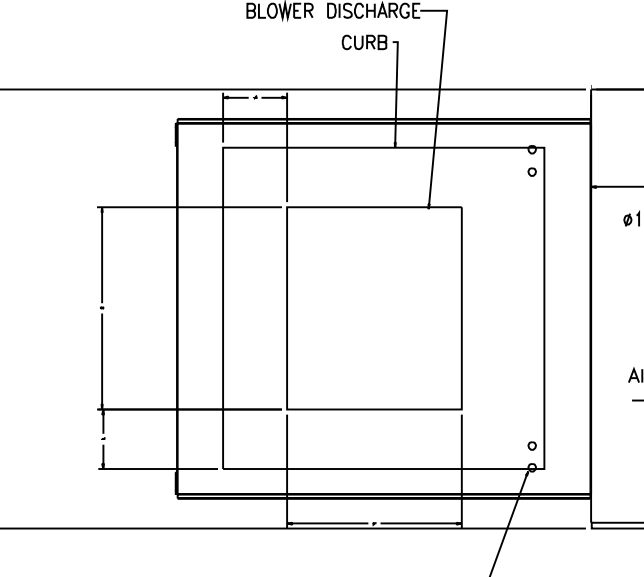


CFA-CA CEILING & INLINE LOW SLOPE CEILING VENTILATION DIMENSIONAL DATA

FAN MODEL	A	B	C	D	E	F	G	WEIGHT LB
CFA500CA	21 1/2	12 1/4	11 3/4	23 1/4	14	18 1/2	4 1/2	34

FAN # 11 A3-G118-SUPPLY FAN (MUA-2)

- FAN #11 A3-G118 - SUPPLY FAN (119/127-S)
 1. UNTEMPERED SUPPLY UNIT WITH 18" BLOWER IN SIZE #3 HOUSING
 2. EWP COOLER (EWP COOLER) - W/ WASHING HOOD W/ EZ FILTERS
 3. DOWN DISCHARGE - AIR FLOW RIGHT -> LEFT
 4. 12V WIRING CONNECTION TO EXHAUST EVAPORATIVE COOLERS FROM UNTEMPERED SUPPLY FANS.



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MAKE UP AIR AND EXHAUST FAN
 Original drawings size 8 1/2" x 11"

LAZY DOG RESTAURANT & BAR
 Lazy Dog
 Willows Shopping Center
 1961 Diamond Blvd
 Concord, CA 94520

PROFESSIONAL ENGINEER
 No. 024310
 REGULAR
 STATE OF CALIFORNIA

Issue Date: 4-22-13
 CONST. SET

Revisions
 AS NOTED
 NC
 WF
 M5.1

04.22.2013 - CONSTRUCTION SET

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Part 3 of 4) **MECH-1C**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

Required Acceptance Tests

Designer:
This form is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for mechanical systems. The designer is required to check the applicable boxes by all acceptance tests that apply and list all equipment that requires an acceptance test. If all equipment of a certain type requires a test, list the equipment description and the number of systems. The NA number designates the Section in the Appendix of the Nonresidential Reference Appendices Manual that describes the test. Since this form will be part of the plans, completion of this section will allow the responsible party to budget for the scope of work accordingly.

Building Departments:
Systems Acceptance: Before occupancy permit is granted, a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance Requirements for Code Compliance.
Systems Acceptance: Before occupancy permit is granted, all newly installed HVAC equipment must be tested using the Acceptance Requirements.

The MECH-1C form is not considered a completed form and is not to be accepted by the building department unless the correct boxes are checked. The equipment requiring testing, person performing the test (Example: HVAC installer, TAB contractor, controls contractor, PE in charge of project) and what Acceptance test must be conducted. The following checked off items are required for ALL newly installed equipment. In addition a Certificate of Acceptance form shall be submitted to the building department that certifies plans, specifications, installation, certificates, and operating and maintenance information meet the requirements of §10-103(b) and Title 24 Part 6. The building inspector must receive the properly filled out and signed forms before the building can receive final occupancy.

TEST DESCRIPTION	MECH-12A	MECH-13A	MECH-14A	MECH-15A	MECH-16A	MECH-17A	MECH-18A	MECH-19A	MECH-20A	MECH-21A
Equipment Requiring Testing or Verification	City	City	City	City	City	City	City	City	City	City
Carrier-48TCL-A09	2									
Carrier-48TCL-A09	2									
Carrier-48TCL-A06	1									

EnergyPro 5.1 by EnergySoft User Number: 20524 ID: LDMV-004 Page 17 of 37

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Part 4 of 4) **MECH-1C**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

TEST DESCRIPTION	MECH-12A	MECH-13A	MECH-14A	MECH-15A	MECH-16A	MECH-17A	MECH-18A	MECH-19A	MECH-20A	MECH-21A
Equipment Requiring Testing	City	City	City	City	City	City	City	City	City	City
Carrier-48TCL-A09	2									
Carrier-48TCL-A09	2									
Carrier-48TCL-A06	1									

EnergyPro 5.1 by EnergySoft User Number: 20524 ID: LDMV-004 Page 18 of 37

AIR SYSTEM REQUIREMENTS (Part 1 of 2) **MECH-2C**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

Item or System Tags (i.e. AC-1, RTU-1, HP-1)	RTU-1, RTU-2	RTU-3, RTU-4 & RTU-5	RTU-6
Number of Systems	2	3	1

MANDATORY MEASURES

T-24 Sections

Section	RTU-1, RTU-2	RTU-3, RTU-4 & RTU-5	RTU-6
112(a) Heating Equipment Efficiency	81% AFUE	81% AFUE	80% AFUE
112(a) Cooling Equipment Efficiency	11.3 EER	11.3 EER	13.0 SEER / 11.3 EER
112(b), 112(c) HVAC Heat Pump Thermostat	n/a	n/a	n/a
112(c), 115(a) Furnace Controls/Thermostat	Yes	Yes	Yes
121(b) Natural Ventilation	173 cfm	4,333 cfm	128 cfm
121(c) Mechanical Ventilation	No	No	No
121(c) Demand Control Ventilation	No	Yes	Yes
122(a) Time Control	Programmable Switch	Programmable Switch	Programmable Switch
122(a) Setback and Setup Control	Setback Required	Setback Required	Setback Required
122(f) Outdoor Damper Control	Auto	Auto	Auto
122(g) Isolation Zones	n/a	n/a	n/a
123 Pipe Insulation			
124 Duct Location/ R-value	Attic, Ceiling Ins, vented / 4.2	Attic, Ceiling Ins, vented / 4.2	Attic, Ceiling Ins, vented / 4.2

PRESCRIPTIVE MEASURES

Item or System Tags	RTU-1, RTU-2	RTU-3, RTU-4 & RTU-5	RTU-6
144(a & b) Calculated Design Heating Load	n/a	n/a	n/a
144(a & b) Proposed Heating Capacity	286,000 Btu/hr	444,000 Btu/hr	83,000 Btu/hr
144(a & b) Calculated Design Cooling Load	n/a	n/a	n/a
144(a & b) Proposed Cooling Capacity	152,567 Btu/hr	297,214 Btu/hr	43,877 Btu/hr
144(c) Fan Control	Constant Volume	Constant Volume	Constant Volume
144(c) DP Sensor Location			
144(c) Supply Pressure Reset (DDC only)	Yes	Yes	Yes
144(d) Simultaneous Heat/Cool	No	No	No
144(e) Economizer	Fixed Enth (Integrated)	Fixed Enth (Integrated)	Fixed Enth (Integrated)
144(f) Heat Air Supply Reset	Constant Temp	Constant Temp	Constant Temp
144(f) Cool Air Supply Reset	Constant Temp	Constant Temp	Constant Temp
144(g) Electric Resistance Heating			
144(i) Air Cooled Chiller Limitation			
144(j) Duct Leakage Sealing			
144(k) MECH-4-A must be submitted	No	No	No

1. Total installed capacity (MBtu/hr) of all electric heat on this project exclusive of electric auxiliary heat for heat pumps. If electric heat is used explain which exception(s) to §144(g) apply.

EnergyPro 5.1 by EnergySoft User Number: 20524 ID: LDMV-004 Page 19 of 37

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Part 1 of 4) **MECH-1C**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

Project Address: *1961 Diamond Blvd, Concord* Climate Zone: *12* Total Cond. Floor Area: *7,535* Addition Floor Area: *n/a*

GENERAL INFORMATION

Building Type: Nonresidential High-Rise Residential Hotel/Motel Guest Room
 Schools (Public School) Relocatable Public School Bldg Conditioned Spaces Unconditioned Spaces (attic/av)

Phase of Construction: New Construction Addition Alteration

Approach of Compliance: Component Overall Envelope TDV Energy Unconditioned (file affidavit)

Front Orientation: N, E, S, W or in Degrees: *0 deg*

Equipment	Inspection Criteria	Pass	Fail - Describe Reason
Item or System Tags (i.e. AC-1, RTU-1, HP-1)	RTU-3, RTU-4 & RTU-5		
Equipment Type	Packaged DX		
Number of Systems	3		
Max Allowed Heating Capacity	148,000 Btu/hr		
Minimum Heating Efficiency	81% AFUE		
Max Allowed Cooling Capacity	103,600 Btu/hr		
Cooling Efficiency	11.3 EER		
Duct Location/ R-Value	Attic, Ceiling Ins, vented / 4.2		
When duct testing is required, submit MECH-4-A & MECH-4-HERS	No		
Economizer	Fixed Enth (Integrated)		
Thermostat	Setback Required		
Fan Control	Constant Volume		

FIELD INSPECTION ENERGY CHECKLIST

Equipment	Inspection Criteria	Pass	Fail - Describe Reason
Item or System Tags (i.e. AC-1, RTU-1, HP-1)	RTU-6		
Equipment Type	Packaged DX		
Number of Systems	1		
Max Allowed Heating Capacity	93,000 Btu/hr		
Minimum Heating Efficiency	80% AFUE		
Max Allowed Cooling Capacity	59,000 Btu/hr		
Cooling Efficiency	13.0 SEER / 11.3 EER		
Duct Location/ R-Value	Attic, Ceiling Ins, vented / 4.2		
When duct testing is required, submit MECH-4-A & MECH-4-HERS	No		
Economizer	Fixed Enth (Integrated)		
Thermostat	Setback Required		
Fan Control	Constant Volume		

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submittal or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance fails if a Fail box is checked.
3. Indicate Equipment Type: Gas (Pkg or Split), VAV, HP (Pkg or split), Hydronic, PTAC, or other.

EnergyPro 5.1 by EnergySoft User Number: 20524 ID: LDMV-004 Page 15 of 37

MECHANICAL MANDATORY MEASURES: NONRESIDENTIAL **MECH-MM**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

Equipment and System Efficiencies

§111: Any appliance for which there is a California standard established in the Appliance Efficiency Regulations will comply with the applicable standard.

§115(a): Fan type central furnaces shall not have a pilot light.

§123: Piping, except that conveying fluids at temperatures between 60 and 105 degrees Fahrenheit, or within HVAC equipment, shall be insulated in accordance with Standards Section 123.

§124: Air handling duct systems shall be installed and insulated in compliance with Sections 601, 602, 603, 604, and 605 of the CMC Standards.

Controls

§122(e): Each space conditioning system shall be installed with one of the following:
1A. Each space conditioning system serving building types such as offices and manufacturing facilities (and all others not explicitly exempt from the requirements of Section 112 (d)) shall be installed with an automatic time switch with an accessible manual override that allows operation of the system during off-hours for up to 4 hours. The time switch shall be capable of programming different schedules for weekdays and weekends and have program backup capabilities that prevent the loss of the device's program and time setting for at least 10 hours if power is interrupted; or
1B. An occupancy sensor to control the operating period of the system; or
1C. A 4-hour timer that can be manually operated to control the operating period of the system.

§122(g): Each space conditioning system shall be installed with controls that temporarily restart and temporarily operate the system as required to maintain a setback heating and/or a setup cooling thermostat setpoint.
Each space conditioning system serving multiple zones with a combined conditioned floor area more than 25,000 square feet shall be provided with isolation zones. Each zone shall not exceed 25,000 square feet; shall be provided with isolation devices, such as valves or dampers that allow the supply of heating or cooling to be setback or shut off independently of other isolation areas, and shall be controlled by a time control device as described above.

§122(c): Thermostats shall have numeric setpoints in degrees Fahrenheit, (F) and adjustable setpoint stops accessible only to authorized personnel.

§122(b): Heat pumps shall be installed with controls to prevent electric resistance supplementary heater operation when the heating load can be met by the heat pump alone.

§122(a&b): Each space conditioning system shall be controlled by an individual thermostat that responds to temperature within the zone. Where used to control heating, the control shall be adjustable down to 55 degrees F or lower. For cooling, the control shall be adjustable up to 85 degrees F or higher. Where used for both heating and cooling, the control shall be capable of providing a deadband of at least 5 degrees F within which the supply of heating and cooling is shut off or reduced to a minimum.

Ventilation

§121(e): Controls shall be provided to allow outside air dampers or devices to be operated at the ventilation rates as specified on these plans.

§122(f): All gravity ventilating systems shall be provided with automatic or readily accessible manually operated dampers in all openings to the outside, except for combustion air openings.

§121(f): Ventilation System Acceptance. Before an occupancy permit is granted for a newly constructed building or space, or a new ventilating system serving a building or space is operated for normal use, all ventilation systems serving the building or space shall be certified as meeting the Acceptance Requirements for Code Compliance.

Service Water Heating Systems

§13(c) Installation

3. Temperature controls for public lavatories. The controls shall limit the outlet Temperature to 110°F.

2. Circulating service water-heating systems shall have a control capable of automatically turning off the circulating pump when hot water is not required.

EnergyPro 5.1 by EnergySoft User Number: 20524 ID: LDMV-004 Page 24 of 37

CERTIFICATE OF COMPLIANCE and FIELD INSPECTION ENERGY CHECKLIST (Part 1 of 4) **MECH-1C**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

Project Address: *1961 Diamond Blvd, Concord* Climate Zone: *12* Total Cond. Floor Area: *7,535* Addition Floor Area: *n/a*

GENERAL INFORMATION

Building Type: Nonresidential High-Rise Residential Hotel/Motel Guest Room
 Schools (Public School) Relocatable Public School Bldg Conditioned Spaces Unconditioned Spaces (attic/av)

Phase of Construction: New Construction Addition Alteration

Approach of Compliance: Component Overall Envelope TDV Energy Unconditioned (file affidavit)

Front Orientation: N, E, S, W or in Degrees: *0 deg*

Equipment	Inspection Criteria	Pass	Fail - Describe Reason
Item or System Tags (i.e. AC-1, RTU-1, HP-1)	DHW Heater		
Equipment Type	Gas Fired DHW Boiler		
Number of Systems	1		
Max Allowed Heating Capacity	199,000 Btu/hr		
Minimum Heating Efficiency	84 %		
Max Allowed Cooling Capacity	n/a		
Cooling Efficiency	n/a		
Duct Location/ R-Value	n/a		
When duct testing is required, submit MECH-4-A & MECH-4-HERS	n/a		
Economizer	n/a		
Thermostat	n/a		
Fan Control	n/a		

FIELD INSPECTION ENERGY CHECKLIST

Equipment	Inspection Criteria	Pass	Fail - Describe Reason
Item or System Tags (i.e. AC-1, RTU-1, HP-1)	RTU-1, RTU-2		
Equipment Type	Packaged DX		
Number of Systems	2		
Max Allowed Heating Capacity	148,000 Btu/hr		
Minimum Heating Efficiency	81% AFUE		
Max Allowed Cooling Capacity	103,600 Btu/hr		
Cooling Efficiency	11.3 EER		
Duct Location/ R-Value	Attic, Ceiling Ins, vented / 4.2		
When duct testing is required, submit MECH-4-A & MECH-4-HERS	No		
Economizer	Fixed Enth (Integrated)		
Thermostat	Setback Required		
Fan Control	Constant Volume		

1. If the Actual installed equipment performance efficiency and capacity is less than the Proposed (from the energy compliance submittal or from the building plans) the responsible party shall resubmit energy compliance to include the new changes.
2. For additional detailed discrepancy use Page 2 of the Inspection Checklist Form. Compliance fails if a Fail box is checked.
3. Indicate Equipment Type: Gas (Pkg or Split), VAV, HP (Pkg or split), Hydronic, PTAC, or other.

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ENVELOPE MANDATORY MEASURES: NONRESIDENTIAL **ENV-MM**

Project Name: *Lazy Dog-Concord* Date: *1/14/2013*

DESCRIPTION

Building Envelope Measures:

§118(a): Installed insulating material shall have been certified by the manufacturer to comply with the California Quality Standards for insulating material, Title 20 Chapter 4, Article 3.

§118(c): All insulating materials shall be installed in compliance with the flame spread rating and smoke density requirements of Sections 2602 and 707 of Title 24, Part 2.

§118(d): The opaque portions of framed demising walls in nonresidential buildings shall have insulation with an installed R-value of no less than R-13 between framing members.

§117(a): All Exterior Joints and openings in the building that are observable sources of air leakage shall be caulked, gasketed, weatherstripped or otherwise sealed.

§116(a) 1: Manufactured fenestration products and exterior doors shall have air infiltration rates not exceeding 0.3 cfm/ft² of window area, 0.3 cfm/ft² of door area for residential doors, 0.3 cfm/ft² of door area for nonresidential single doors (swinging and sliding), and 1.0 cfm/ft² for nonresidential double doors (swinging).

§116(a) 2: Fenestration U-factor shall be rated in accordance with NFRC 100, or the applicable default U-factor.

§116(a) 3: Fenestration SHGC shall be rated in accordance with NFRC 200, or NFRC 100 for site-built fenestration, or the applicable default SHGC.

§116(b): Site Constructed Doors, Windows and Skylights shall be caulked between the unit and the building, and shall be weatherstripped (except for unframed glass doors and fire doors).

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Willows Shopping Center
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PROFESSIONAL ENGINEER
No. 024310
PE/ARCHITECT
STATE OF CALIFORNIA

Issue Date: 4-22-13
CONST. SET

Revisions

AS NOTED
NC
WF
M6.1

04.22.2013 - CONSTRUCTION SET

1500- HEATING, VENTILATING, AND AIR CONDITIONING, GENERAL

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. SECTIONS 1500 THROUGH 1599 PERTAIN TO HEATING, VENTILATING AND AIR CONDITIONING (HVAC) WORK. THIS SECTION APPLIES TO AND GOVERNS ALL HVAC SECTIONS.
 - B. REFER TO OTHER DIVISIONS FOR CONTINUATION OF EXTERIOR AND ALLED WORK.
 - C. FIELD PAINTING IS SPECIFIED IN DIVISION 9.
- 1.02 PERMITS, FEES, CODES, ORDINANCES AND REGULATIONS
- A. OBTAIN AND PAY FOR ALL PERMITS, INSPECTIONS AND CONNECTION FEES REQUIRED BY GOVERNING BODIES IN CONNECTION WITH THE WORK. DELIVER CERTIFICATES OF INSPECTION TO THE ARCHITECT-ENGINEER.
 - B. ALL WORK SHALL COMPLY WITH GOVERNING CODES, ORDINANCES, AND REGULATIONS OF CITY, COUNTY AND STATE HAVING JURISDICTION, AND THE NATIONAL ELECTRICAL CODE, MECHANICAL CODE, AND REQUIREMENTS OF BOARD OF HEALTH.
- 1.03 QUALITY ASSURANCE
- A. INDUSTRY STANDARDS AND CODES: UNLESS MODIFIED BY THESE SPECIFICATIONS, THE DESIGN, MANUFACTURE, TESTING AND METHOD OF INSTALLING ALL MATERIALS, APPARATUS AND EQUIPMENT SHALL CONFORM TO THE FOLLOWING:
 1. AIR CODE FOR REFRIGERATION APPARATUS
 2. ASME BOILER AND PRESSURE VESSEL CODE
 3. STANDARDS OF NATIONAL FIRE PROTECTION ASSOCIATION
 4. SMACNA
 5. ASHRAE
 - B. SUBSTITUTIONS: SEE GENERAL CONDITIONS
- 1.04 SUBMITTALS
- A. SHOP DRAWINGS: SUBMIT ON ALL MATERIALS, PRODUCTS, EQUIPMENT AND SYSTEMS AS SPECIFIED UNDER HVAC SECTION IN THIS DIVISION IN ACCORDANCE WITH THE GENERAL CONDITIONS.
 - B. PRODUCT DATA: SUBMIT ON ALL MATERIALS, PRODUCTS AND EQUIPMENT UNLESS OTHERWISE SPECIFIED OR ACKNOWLEDGED IN WRITING.
 - C. SAMPLES: SUBMIT WHEN SPECIFIED OR REQUESTED
 - D. TEST AND BALANCE RE-PORIT: SUBMIT AT FINAL INSPECTION
 - E. OPERATION AND MAINTENANCE MANUALS: SUBMIT COPIES IN COMPLIANCE WITH SECTION, OPERATION AND MAINTENANCE MANUALS
- 1.05 JOB CONDITIONS
- A. PROTECT MATERIALS, APPARATUS AND EQUIPMENT FROM DAMAGE, MOISTURE, DIRT, DEBRIS AND WORK OF OTHER TRADES.
 - B. USE OF PAPER, CARBOARD OR OTHER FLUAMY MATERIAL WILL NOT BE PERMITTED. REPLACE DAMAGED PROTECTIVE MATERIALS IMMEDIATELY. DO NOT INSTALL DAMAGED MATERIALS AND EQUIPMENT; REMOVE FROM THE SITE.
 - C. RECORD DOCUMENTS
 - A. REFER TO GENERAL CONDITIONS AND DIVISION 1 FOR REQUIREMENTS CONCERNING RECORD DOCUMENTS.
 - B. FURNISH ARCHITECT-ENGINEER WITH ONE SET OF ACCURATELY MARKED BLUE-LINE COPIES OF THE DRAWINGS, INDICATING ALL CHANGES FROM THE CONTRACT DRAWINGS AND ALL HVAC WORK AND CONTROLS AS INSTALLED.
 - D. GUARANTEE AND SERVICE
 - A. REFER TO GENERAL CONDITIONS FOR GUARANTEE.
 - B. WHERE EXTENDED GUARANTEES ARE CALLED FOR HEREIN, FURNISH THREE COPIES TO BE INSERTED IN OPERATION AND MAINTENANCE MANUALS.
 - C. ALL PREVENTATIVE MAINTENANCE AND NORMAL SERVICE WILL BE PERFORMED BY THE OWNER'S MAINTENANCE PERSONNEL AFTER FINAL ACCEPTANCE OF THE WORK. THIS SHALL NOT ALTER THE CONTRACTOR'S GUARANTEE OF THE WORK IN ANY WAY.
 - D. ALL LABELS SHALL BE SECURELY AFFIXED.
- PART 2 - PRODUCTS
- 2.01 GENERAL
- A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW. SYSTEMS SHALL BE PROVIDED COMPLETE, AND EACH SYSTEM AS A WHOLE, AND IN ALL ITS PARTS, SHALL FUNCTION CORRECTLY UP TO THE SPECIFIED CAPACITY. SHOULD A SYSTEM, OR ANY PART THEREOF FAIL TO MEET PERFORMANCE REQUIREMENTS, NECESSARY REPLACEMENTS, ALTERATIONS OR REPAIRS, AS REQUIRED BY THE ARCHITECT-ENGINEER, SHALL BE MADE TO BRING PERFORMANCE UP TO SPECIFIED REQUIREMENTS OF BUILDING CONSTRUCTION AND INSURED DAMAGED OR MARKED BY SUCH REPLACEMENTS, ALTERATIONS OR REPAIRS SHALL BE RESTORED TO PROOF CONDITIONS, AT NO ADDITIONAL COST TO THE OWNER.
 - B. WHERE MULTIPLE TYPES OF EQUIPMENT OF MATERIALS ARE REQUIRED, THEY SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER.
 - C. BEFORE ORDERING ANY EQUIPMENT, THE SIZE OF ALL EQUIPMENT SHALL BE CHECKED TO EASILY FIT SPACES ALLOTTED ON THE DRAWINGS.
 - D. INSERTS, PIPE SLEEVES, SUPPORTS AND ANCHORAGE OF AIR CONDITIONING EQUIPMENT SHALL BE PROVIDED IS SPECIFIED HEREIN. WHERE SUCH ITEMS ARE TO SET OR EMBEDDED IN CONCRETE MASONRY OR SIMILAR WORK, THE ITEMS SHALL BE FURNISHED AND LAYOUT MADE AT THE PROPER TIME FOR THE SETTING OR EMBEDMENT THEREOF SO AS TO CAUSE NO DELAY IN THE WORK.
 - E. PIPING ASSEMBLIES OF EQUIPMENT SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. ALL PIPING AND APPURTENANCES REQUIRED FOR THE PROPER OPERATION OF ALL EQUIPMENT SHALL BE PROVIDED.
- 2.02 MANUFACTURER'S NAMES AND CATALOG NUMBERS
- A. SPECIFIC REFERENCES HAVE BEEN MADE TO ONE OR MORE MANUFACTURER'S NAMES AND MODEL OR CATALOG NUMBERS.
 - B. THIS DOES NOT INDICATE THAT THE MATERIAL AND EQUIPMENT SPECIFIED IS NECESSARILY AN "OFF THE SHELF" ITEM. REQUIREMENTS FOR SPECIFIC FINISHES, MATERIALS OR OTHER MODIFICATIONS MAY INTRODUCE VARIANCES FROM MANUFACTURER'S STANDARDS; CONTRACTOR SHALL ASCERTAIN THAT SUCH MODIFICATIONS ARE FULLY CONSIDERED
- 2.03 DIAGRAM, NAMEPLATES, AND LABELS
- A. EACH MAJOR COMPONENT OF EQUIPMENT SHALL HAVE THE MANUFACTURER'S NAME, ADDRESS AND CATALOG NUMBER ON A PLATE SECURELY AFFIXED IN A CONSPICUOUS PLACE. THE NAMEPLATE OF A DISTRIBUTING AGENT WILL NOT BE ACCEPTED.
 - B. ALL PICES OF EQUIPMENT, VALVES, STARTERS, DISCONNECTS, AND ALL PNEUMATIC AND ELECTRIC CONTROL INSTRUMENTS AND APPARATUS SHALL BE IDENTIFIED WITH 1/16" THICK BLACK LAMINATED PLASTIC NAMEPLATES, WITH 3/16" HIGH WHITE LAMINATED LETTERS. SWAP AND LIKE EQUIPMENT SHALL BE DESIGNATED WITH NUMERICAL SUFFIXES (EXAMPLE: THERMOSTAT, T1). THE NAMEPLATE IDENTIFICATIONS SHALL CONCLUDE WITH ITEMS APPEARING ON DIAGRAMS.
 - C. PROVIDE A LABEL FOR THE MECHANICAL SYSTEM STATING: "INSTALLATION BY " (NAME, ADDRESS AND PHONE NUMBER OF CONTRACTOR)
 - D. LETTERS SHALL BE 1/4" HIGH AND LOCATED IN A CONSPICUOUS PLACE IN THE MECHANICAL ROOM.
- PART 3 - EXECUTION
- 3.01 INSTALLATION AND WORKMANSHIP
- A. THE WORK SHALL BE PERFORMED BY QUALIFIED MECHANICS AND ALL MATERIALS, APPARATUS AND EQUIPMENT SHALL BE INSTALLED IN NEAT, WORKMANLIKE MANNER. ANY MATERIAL, APPARATUS OR EQUIPMENT WHICH, IN THE OPINION OF THE ARCHITECT-ENGINEER, IS IMPROPERLY INSTALLED SHALL BE REMOVED AND REINSTALLED IN AN APPROVED MANNER AT NO ADDITIONAL COST TO THE OWNER.
 - B. THE WORK SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES. WHERE THE WORK IS DEPENDENT UPON WORK OF OTHER TRADES OR WORK ALREADY IN PLACE, SUCH OTHER WORK AND WORK IN PLACE SHALL BE EXAMINED AND SHALL BE IN PROPER CONDITION AND STATE OF COMPLETION BEFORE CONTINUING THE INSTALLATION.
 - C. THE INSTALLATION OF THE SYSTEM SHALL, IN GENERAL, BE IN ACCORDANCE WITH THE DRAWINGS WITH REGARDS TO LOCATION OF EQUIPMENT, DUCTS, PIPES, AND THE LIKE. PIPING DUCTWORK INDICATED SHALL BE FOLLOWED AS ACCURATELY AS ACTUAL CONSTRUCTION WILL PERMIT AND ANY DEVIATIONS THERE FROM SHALL BE CALLED TO THE ATTENTION OF THE ARCHITECT-ENGINEER. WHERE NECESSARY, AS DETERMINED BY THE ARCHITECT-ENGINEER, CONTRACTOR SHALL FURNISH DRAWINGS SHOWING PROPOSED CHANGES.
- 3.02 EARTHWORK AND DEMATERING
- A. PERFORM IN ACCORDANCE WITH DIVISION 2.
- 3.03 CUTTING AND PATCHING
- A. LAYOUT OPENINGS FOR CUTTING BY OTHER TRADES AS REQUIRED.
 - B. CUTTING OF STEEL, CONCRETE OR ANY OTHER STRUCTURAL PART MUST BE APPROVED IN WRITING BY ARCHITECT-ENGINEER PRIOR TO CUTTING.
- 3.04 WATERPROOFING
- A. DO NOT CUT OR PENETRATE WATERPROOFED SURFACES, OR WATERPROOFING MEMBRANES, WITHOUT FIRST MAKING ARRANGEMENTS FOR REPAIR BY A METHOD APPROVED BY ARCHITECT-ENGINEER.
- 3.05 ELECTRICAL WORK
- A. POWER WIRAND FROM CONTROLLERS TO MOTORS IS SPECIFIED IN DIVISION 16. NG FROM PANELS TO MOTOR CONTROLLERS
 - B. MOTOR STARTERS NOT SPECIFIED TO BE PROVIDED WITH THE MOTORS AT THE FACTORY ARE SPECIFIED IN DIVISION 16.
 - C. SUBMIT WIRING DIAGRAMS FOR APPROVAL AND PROVIDE APPROVED DIAGRAMS SO THAT THE ELECTRICAL WORK MAY BE PROPERLY ACCOMPLISHED.
 - D. ELECTRICAL CONTROL WIRING FOR CONNECTION OF TEMPERATURE CONTROLLERS, PUSH BUTTONS, INTERLOCKS IN MOTOR CONTROLLERS, AND LIKE ITEMS SPECIFIED IN THE CONTROL SECTION(S) IN THIS DIVISION, FURNISH ALL EQUIPMENT WITH COMPLETE INTERNAL CONTROL WIRING.
 - E. ELECTRICAL WORK SPECIFIED IN THIS DIVISION SHALL CONFORM TO APPLICABLE PROVISIONS OF DIVISION 16. ALL CONTROL WIRING SHALL BE IN CONDUIT.
 - F. PROVIDE MOTORS CONFORMING TO CHARACTERISTICS SHOWN ON ELECTRICAL DRAWINGS.
- 3.06 SUPPORTS FOR PIPING AND EQUIPMENT
- A. SUPPORT FOR PIPING AND EQUIPMENT SHALL BE SUPPORTED FROM STRUCTURAL MEMBERS AND NOT FROM METAL DECK AND SLAB ASSEMBLIES.

- 3.07 ACCESS DOORS (ACCESS PANELS)
 - A. PROVIDE ACCESS DOORS FOR MAINTENANCE, ADJUSTMENT, REMOVAL AND REPAIR OF VALVES, CONTROLS, DAMPERS, EQUIPMENT AND LIKE ITEMS FURNISHED HERE-UNDER
 - B. PROVIDE ACCESS DOORS CONFORMING TO REQUIREMENTS OF SECTION ACCESS DOORS (ACCESS PANELS), IN DIVSION 8. PANELS SHALL BE LOCATED TO MAKE ALL ITEMS EASILY ACCESSIBLE.
- 3.08 CLEAN UP
 - A. REFER TO GENERAL CONDITIONS FOR CLEANING-UP
 - B. CLEAN ALL MATERIALS AND EQUIPMENT OF DIRT, DUST, PAINT, SPOTS AND STAINS, SOIL MARKS AND OTHER FOREIGN MATTER.
- 3.09 FINAL INSPECTION
 - A. NOTICE TO THE ARCHITECT-ENGINEER THAT THE WORK IS READY FOR FINAL INSPECTION. THE CONTRACTOR SHALL:
 1. SUBMIT TEST AND BALANCE REPORT AND COMPLETE REQUIREMENTS AS NOTED.
 2. SUBMIT LETTER FROM CONTROL MANUFACTURER CERTIFYING THAT CONTROLS HAVE BEEN CHECKED FOR OPERATION AND CALIBRATION, AND THAT SYSTEM IS OPERATING AS INTENDED.
 - B. CONTRACTOR SHALL FURNISH NECESSARY MECHANICS TO OPERATE SYSTEM, MAKE NECESSARY ADJUSTMENTS AND ASSIST WITH FINAL INSPECTION.
- 3.10 INSTRUCTION OF OWNER'S OPERATING PERSONNEL
 - A. THE CONTRACTOR SHALL INCLUDE THE COST OF THE SERVICES OF QUALIFIED INSTRUCTOR(S) TO INSTRUCT THE OWNER'S OPERATING PERSONNEL IN THE OPERATION, ADJUSTMENT, CARE AND MAINTENANCE OF ALL HVAC EQUIPMENT AND SYSTEMS.
 - B. INSTRUCTION SHALL BE PERFORMED AT A TIME APPROVED BY THE OWNER AND AFTER ALL HVAC EQUIPMENT AND SYSTEMS ARE INSTALLED, COMPLETE, ADJUSTED AND OPERATING TO SPECIFIED REQUIREMENTS. CONTRACTOR SHALL NOTIFY THE ARCHITECT-ENGINEER WHEN INSTRUCTIONS WILL BE GIVEN.
 - C. QUALIFICATIONS OF INSTRUCTORS SHALL BE SUBJECT TO APPROVAL OF THE OWNER AND EQUIPMENT MANUFACTURER.
 - D. ADDITIONAL REQUIREMENTS CONCERNING OPERATION AND MAINTENANCE OF MECHANICAL EQUIPMENT AND SYSTEMS MAY BE SPECIFIED IN OTHER SECTIONS.
 - E. TWO COPIES OF ACKNOWLEDGMENT OF ALL REQUIRED INSTRUCTIONS TO OWNER'S OPERATING PERSONNEL, SIGNED BY THE OWNER OR HIS AUTHORIZED REPRESENTATIVE, SHALL BE SUBMITTED TO THE ARCHITECT-ENGINEER PRIOR TO SUBMITTING APPLICATION FOR FINAL PAYMENT. AN ADDITIONAL COPY OF THIS ACKNOWLEDGMENT IS REQUIRED IN EACH COPY OF OPERATION AND MAINTENANCE MANUALS REQUIRED IN THE SECTION, OPERATION AND MAINTENANCE MANUALS.

END OF SECTION

15005 - OPERATION AND MAINTENANCE MANUALS

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. FURNISH THREE COPIES OF COMPLETE OPERATION AND MAINTENANCE MANUALS TO THE ARCHITECT-ENGINEER, FOR APPROVAL AND FOR THE OWNER, ON ALL EQUIPMENT AND SYSTEMS. THE MANUALS SHALL BE BOUND IN HARD-BACK, THREE RING LOOSE-LEAF BINDERS.
- PART 2 - PRODUCTS
- 2.01 MANUAL CONTENTS
- A. TITLE SHEET WITH JOB NAME, AND THE NAMES, ADDRESSES AND PHONE NUMBERS OF THE CONTRACTOR, SUBCONTRACTOR, CONTROL SUBCONTRACTOR, RELATED CONTRACTORS AND MATERIAL AND EQUIPMENT SUPPLIERS.
 - B. TABLE OF CONTENTS.
 - C. A COPY OF ACKNOWLEDGMENT OF INSTRUCTION TO THE OWNER'S OPERATING PERSONNEL IN THE OPERATION OF ALL MECHANICAL EQUIPMENT AND SYSTEMS, SIGNED BY THE OWNER OR HIS AUTHORIZED REPRESENTATIVE.
 - D. TYPED/WRITTEN OPERATING INSTRUCTIONS FOR THE OWNER'S PERSONNEL, DESCRIBING HOW TO STOP AND START EACH PIECE OF EQUIPMENT, HOW TO SET THE TEMPERATURE CONTROL SYSTEM FOR NORMAL OPERATION AND NORMAL RESTORING PROCEDURES, CAUTION AND WARNING NOTICES.
 - E. APPROVED SHOP DRAWINGS, PRODUCT DATA AND PARTS AND MAINTENANCE BOOKLET FOR EACH ITEM OF MATERIAL AND EQUIPMENT FURNISHED UNDER DIVISION 15000.
 - F. RECORD DRAWINGS OF ALL SYSTEMS INCLUDING ELECTRICAL AND CONTROL DIAGRAMS.
 - G. TEST AND BALANCE REPORT.
 - H. COPIES OF CERTIFICATES OF INSPECTION.
 - I. GUARANTEES, INCLUDING EXTENDED GUARANTEES.
- PART 3 - EXECUTION
- 3.01 DELIVERY
- A. DELIVER THE MANUALS TO THE OWNER PRIOR TO SUBMITTING APPLICATION FOR FINAL PAYMENT.
- END OF SECTION

15112 - HVAC PIPING, CONDENSATE DRAIN

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. PROVIDE CONDENSATE DRAIN PIPING SHOWN ON DRAWINGS AND SPECIFIED HEREIN.
- PART 2 - PRODUCTS
- 2.01 MATERIALS
- A. PIPING SHALL BE PVC; ASTM D2665.
 - B. FITTINGS SHALL BE PVC; ASTM D2466-902
 - C. PVC SOLVENT CEMENT; ASTM D2564 FOR PVC.
- PART 3 - EXECUTION
- 3.01 INSTALLATION
- A. PROVIDE CONDENSATE DRAINS FOR ALL SPLIT-SYSTEM ALL AIR CONDITIONING UNITS AND PIPE AS BLOCK AS SHOWN ON DRAWINGS.
 - B. CONDENSATE DRAIN PIPING SHALL BE INSTALLED WITH TRAP AT THE COIL CONNECTION AND SHALL HAVE A MINIMUM SEAL DEPTH EQUAL TO THE RESPECTIVE AIR HANDLING UNIT FAN STATIC PRESSURE. DEPTH SHALL BE A MINIMUM OF 2".
- END OF SECTION

15305 - DUCTWORK, LOW PRESSURE, GALVANIZED STEEL

- PART 1 - GENERAL
- 1.01 QUALITY ASSURANCE
- A. DUCTS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH "HVAC DUCT CONSTRUCTION STANDARDS" PUBLISHED BY THE SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC. (SMACNA)
- 1.02 JOB CONDITIONS
- A. INSPECT THE DRAWINGS AND VERIFY EXISTING CONDITIONS IN THE FIELD. REPORT CONFLICTS BEFORE STARTING FABRICATION.
- PART 2 - PRODUCTS
- 2.01 DUCT MATERIAL
- A. WEIGHTS AND GAGES SHALL BE IN ACCORDANCE WITH TABLE I OF "HVAC DUCT CONSTRUCTION STANDARDS" PUBLISHED BY SMACNA. DUCT MATERIAL SHALL BE GALVANIZED STEEL.
- 2.02 SPLITTERS
- A. SPLITTERS SHALL BE 18 GAGE GALVANIZED STEEL WITH HORIZONTAL AND VERTICAL DIMENSIONS SUFFICIENT TO CLOSE OFF AIR TO BRANCH.
 - B. PROVIDE VENTLOK NO. 607 END BEARINGS AND VENTLOK NO. 690 DAMPER ASSEMBLY.
- 2.03 VOLUME DAMPERS
- A. VOLUME DAMPERS SHALL BE 18 GAGE STEEL; SINGLE BLADE UP TO 8" X 8", OPPOSED BLADE ON ALL DUCTS OVER 8" X 8".
 - B. PROVIDE VENTLOK NO. 607 END BEARINGS AND VENTLOK NO. 641 SELF-LOCKING REGULATOR.
- 2.04 DAMPER RODS SHALL BE 1/2" SQUARE BARS WITH BLADES SECURELY RIVETED TO BAR.
- 2.04 TURNING VANES
- A. ALL SQUARE AND RECTANGULAR ELBOWS SHALL CONTAIN TITUS NO. AG-225 TURNING VANES.
- 2.05 HANGERS
- A. IN ACCORDANCE WITH CHAPTER IV OF SMACNA.

- 2.06 FLEXIBLE CONNECTIONS
 - A. FLEXIBLE CONNECTIONS SHALL BE PROVIDED FOR EACH AIR HANDLING DEVICE TO PREVENT TRANSMISSION OF VIBRATIONS.
 - B. MAKE FLEXIBLE CONNECTION A MINIMUM OF 4 INCHES WIDE OF VENTGLASS AS MADE BY VENTFABRICS, INC.
 - C. BRAIDED COPPER BRIDGE STRAP FOR INSTALLATION ACROSS FLEXIBLE CONNECTIONS SHALL BE THOMPSON LIGHTNING PROTECTION, INC. NO. 288.
- 3.01 - EXECUTION
- 3.01 INSTALLATION
 - A. GENERAL: SPLIT, DANCE OR TURN DUCTS AS NECESSARY TO AVOID OBSTRUCTIONS AND, IN SUCH CASES, PROVIDE AIR STREAM DEFLECTORS AND INCREASE SIZE OF DUCT TO AN EQUIVALENT AREA.
 - B. SPLITTERS: RIDGIDLY ATTACH SPLITTERS TO PIVOT ROD AND OPERATING LINKAGE. SET DAMPER ASSEMBLY ON RAISED INSULATED BASE ON INSULATED DUCTWORK.
 - C. VOLUME DAMPERS: SUPPLY AND MAKE-UP AIR DUCTWORK IN CONCEALED SPACES. SET REGULATOR ON RAISED BASE ON INSULATED DUCTWORK. MARK END OF DAMPER ROD TO SHOW DAMPER POSITION.
 - D. FLEXIBLE CONNECTIONS: SECURE FLEXIBLE CONNECTIONS TO DUCT AND UNIT WITH GALVANIZED STEEL STRAPS HOLDING THE MATERIALS IN TIGHTED GALVANIZED STEEL CHANNELS. INSTALL BRAIDED COPPER BRIDGE STRAP ACROSS ALL FLEXIBLE CONNECTIONS.
 - E. TEST PLUGS: PROVIDE SQUARE HEAD PIPE TEST PLUGS AS REQUIRED FOR INSERTION OF TEST APPARATUS. PROVIDE A RING AND A REMOVABLE INSULATION PLUG WHERE DUCTS ARE INSULATED.
 - F. PAINTING: PAINT INTERIOR OF DUCTWORK FLAT BLACK WHERE VISIBLE THROUGH GRILLES AND REGISTERS.
 - G. SEALING: DUCTWORK SHALL BE SEALED IN ACCORDANCE WITH TABLE 1-2 FOR "SEAL CLASS B".
- 3.02 CORRECTIONS
 - A. REMOVE ALL DUCTWORK FOUND TO VIBRATE, CHATTER OR PULSATE AND REPLACE WITH NEW DUCTWORK.

END OF SECTION

15319 - DUCTWORK, LOW PRESSURE, FLEXIBLE

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. PROVIDE WHERE INDICATED ON THE DRAWINGS AND SPECIFIED HEREIN, FACTORY FABRICATED AND PREINSULATED FLEXIBLE DUCTS.
 - B. FLEXIBLE DUCTS, INCLUDING INSULATION AND SEALANTS, SHALL CONFORM TO THE REQUIREMENTS OF NFPA 90A AND UL STANDARD 191 FOR CLASS 1 DUCTS.
 - C. PERFORMANCE DATA SHALL BE BASED ON TEST PERFORMED IN ACCORDANCE WITH AIR DIFFUSION COUNCIL FLEXIBLE AIR DUCT TEST CODE F072.
- 1.03 SUBMITTALS
- A. SUBMIT SHOP DRAWINGS AND MANUFACTURER'S PRODUCT DATA, INCLUDE COMPLETE ENGINEERING AND TEST DATA AND CLEARLY INDICATE ALL CONSTRUCTION FEATURES AND ACCESSORY ITEMS.
- PART 2 - PRODUCTS
- 2.01 LOW PRESSURE FLEXIBLE DUCTWORK
- A. LOW PRESSURE FLEXIBLE DUCTWORK SHALL CONSIST OF CORROSION RESISTANT SPRING STEEL HELIX BONDED TO A GLASS REINFORCED NEOPRENE SLEEVE INSULATED WITH A MINIMUM OF 1 INCH THICK, 1 POUND DENSITY FIBERGLASS INSULATION WHICH IS IN TURN COVERED WITH AN OUTER VAPOR BARRIER OF FIBER REINFORCED POLYURETHANE/FOAM DAMASK.
 - B. INSULATION SHALL HAVE A TERMINAL CONDUCTIVITY (K) NO GREATER THAN 0.25 AT 75 DEGREES F.
 - C. DUCT FOR LOW VELOCITY SYSTEM CONNECTORS SHALL HAVE A WORKING PRESSURE OF NOT LESS THAN 1-1/2 INCHES OF WATER GAGE AND A MINIMUM OPERATING TEMPERATURE OF NOT LESS THAN 250 DEGREES F.
 - D. DUCT CONNECTORS
 - E. WHERE FLEXIBLE DUCTS CONNECT TO LOW PRESSURE DUCTS TO FORM RUNOUTS TO INDIVIDUAL OUTLETS, FLENUMS OR LOW PRESSURE TERMINALS, PROVIDE FACTORY FABRICATED FITTINGS COMPLETE WITH AND MANUALS BALANCING DAMPERS HAVING LOCKING GUARANTEES. WHERE LOW PRESSURE DUCTS ARE INTERNALLY INSULATED, THE CONNECTOR SHALL BE FURNISHED WITH AIR EXTENSION TO PROTECT THROUGH AND PROJECT THE INSULATION FOR CONNECTION TO EQUIPMENT. AUXILIARY SLEEVES SHALL BE PROVIDED TO ALLOW AT LEAST 2 INCHES OF SURFACE FOR CLAMPING OF FLEXIBLE DUCTWORK. SLEEVES SHALL BE SCREWED OR BOLTED TO EQUIPMENT LP FRAME.
- 2.03 CLAMPS
- A. PROVIDE GALVANIZED SPRING STEEL CLAMPS OR PADOUT STRAPS AT CONNECTIONS TO DUCT FITTINGS OR DEVICES.
- 2.04 MANUFACTURER
- A. FLEXIBLE DUCTWORK AND COMPONENTS SHALL BE AS MANUFACTURED BY GENERAL ENVIRONMENTAL CORPORATION OR APPROVED EQUAL.
- PART 3 - EXECUTION
- 3.01 INSTALLATION
- A. INSTALL DUCT CONNECTORS TO LOW PRESSURE DUCTS USING MANUFACTURER TEMPLATE FOR ALL HOLES AND SECURE THE CONNECTOR TO EXPOSED SURFACE FIRST USING FOSTER'S 30-02 DUCT SEALANT TO THE ADJOINING SURFACES. DO NOT PRESSURE THE SYSTEM FOR 48 HOURS.
 - B. STRETCH NEW DUCT WHEN REMOVING IT FROM CARTONS WHERE IT MAY HAVE BEEN SHIPPED IN A COMPRESSED STATE.
 - C. USE THE MINIMUM LENGTH OF FLEXIBLE DUCT REQUIRED TO MAKE THE SPECIFIC CONNECTION UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. THE MAXIMUM DEVELOPED LENGTH OF FLEX DUCT IS 8'-0".
 - D. AVOID SHARP BENDS. USE A MINIMUM INSIDE BEND RADIUS EQUAL TO 1/2 THE INSIDE DIAMETER OF THE DUCT.
 - E. SUPPORT HORIZONTAL DUCT RUNS WITH HANGERS MAXIMUM OF 3'-0" ON CENTER. USE 3/4 INCH OR WIDER GALVANIZED STRAP HANGER MATERIAL.
 - F. ALLOW THE FLEXIBLE DUCT TO EXTEND STRAIGHT AWAY FROM CONNECTORS FOR A FEW INCHES PRIOR TO INITIATING ALL BENDS.
 - G. MAKE ALL CONNECTIONS OF FLEXIBLE DUCT TO RIGID DUCT OR TERMINALS AS FOLLOWS:
 1. APPLY FOSTER'S 30-02 SEALANT TO THE INSIDE OF THE FLEXIBLE DUCT TO DEPTH OF 3 INCHES.
 2. SLIDE THE FLEXIBLE DUCT OVER THE CONNECTOR AND WRAP WITH MINIMUM OF TWO REVOLUTIONS OF REINFORCED FOL DUCT TAPE STARTING ABOUT 2 INCHES BACK FROM END OF FLEXIBLE DUCT AND SEALING OVERLAP WITH LAST WRAP.
 3. PLACE A CLAMP OR STRAP OVER THE TAPED END AND SECURE FIRMLY.
 4. REPAIR ALL DAMAGE TO VAPOR BARRIER WITH FOSTER'S 39-00 REINFORCED WITH 4 INCH WIDE GLASS FABRIC AND A SECOND COAT OF FOSTER'S 35-00.
- END OF SECTION

END OF SECTION

15450 - AIR DISTRIBUTION EQUIPMENT

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. AIR DISTRIBUTION DEVICES SHALL BE PROVIDED TO DELIVER THE INDICATED VOLUME OF SUPPLY AIR WITHOUT EXCEEDING THE AVAILABLE THROW AND WITH NO RATING AS FOLLOWS:
 1. KITCHEN: NC-35
 2. DINING, ASSEMBLY LOBBY, OFFICES : NC-30
- 1.02 SUBMITTALS
- A. SHOP DRAWINGS: INDICATE LOCATIONS, SPACING AIR VOLUME AND TYPE OF EACH DEVICE.
 - B. PRODUCT DATA: MANUFACTURERS CATALOG DUTHS AND PRODUCT DESCRIPTION INCLUDING AIR QUANTITY, PATTERN, THROW, PRESSURE DROP, NC RATINGS, FINISH, DIMENSIONS AND COMPLETE CONSTRUCTION DETAILS AND MATERIALS.
- PART 2 - PRODUCTS
- 2.01 DIFFUSERS, GRILLES, AND REGISTERS
- A. DIFFUSERS, GRILLES AND REGISTERS SHALL BE AS MANUFACTURED BY TITUS, ANEMOSTAT, KRUEGER OR APPROVED EQUAL.
 - B. FOR MODEL NUMBERS AND TYPES SEE AIR DISTRIBUTION SCHEDULE ON DRAWING.
 - C. DIFFUSERS, GRILLES, AND REGISTERS SHALL BE OF THE SURFACE, FLUSH OR LAY-IN TYPE CORRESPONDING TO THE TYPE OF CEILING IN WHICH THEY ARE LOCATED.
 - D. INTERIOR OF DIFFUSERS, GRILLES AND REGISTERS SHALL BE FLAT BLACK.
 - E. THE FINISH OF THE DIFFUSERS, GRILLE, OR REGISTER FACE PANEL SHALL BE BAKED ENAMEL, OFF WHITE COLOR.
- 2.02 MOUNTING SCREENS
- A. WHERE MOUNTING SCREENS ARE REQUIRED IN AIR DISTRIBUTION DEVICES, THEY SHALL BE FINISHED TO MATCH THE ADJACENT SURFACE OF THE DEVICES.
- 2.03 CASSETS
- A. SUPPLY AND RETURN GRILLES AND REGISTERS WHICH ARE SURFACE MOUNTED SHALL BE PROVIDED WITH SPONGE RUBBER CASKETS FRAMES TO PREVENT SMOODING.

END OF SECTION

15450 - AIR DISTRIBUTION EQUIPMENT

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. ALL SUPPLY AND RETURN AIR DUCTWORK.
 - B. AIR SUPPLY DIFFUSERS BACKS AND NECKS:
 1. ALL AIR SUPPLY DIFFUSERS BACKS AND NECKS, SHALL BE INSULATED WITH 1/2-INCH THICK, 3/4 POUND DENSITY, MANVILLE R-SERIES SMALLITE, OR APPROVED EQUAL FIBERGLASS BLANKET INSULATION, HAVING A CONDUCTANCE (K) NO GREATER THAN .31. ADHERE INSULATION TO THE DUCT AS SPECIFIED BELOW.
- END OF SECTION

15885 - CONTROLS, ELECTRIC

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. THE WORK CONSISTS OF INSTALLING CONTROLS FOR THE HVAC SYSTEM AS ON THE DRAWINGS.
- 1.02 SUBMITTALS
- A. PROVIDE SUBMITTAL CONSISTING OF COMPLETE CONTROL DIAGRAMS FOR THE SYSTEM WITH CONSTRUCTION DETAILS AND ENGINEERING DATA SHEETS ON ALL SYSTEM COMPONENTS.
- 1.03 ELECTRICAL
- A. ELECTRICAL WORK AND MATERIALS ASSOCIATED WITH THE CONTROL SYSTEM SHALL BE INSTALLED AS WORK OF THIS SECTION BUT IN ACCORDANCE WITH DIVISION 16.
 - B. POWER WIRING IS SPECIFIED UNDER DIVISION 16 AND SHOWN ON ELECTRICAL DRAWINGS.
 - C. ELECTRICAL CONTROL WIRING CONDUIT AND FITTINGS ASSOCIATED WITH THE SPACE TEMPERATURE AND HUMIDITY CONTROL INCLUDING INTERLOCKING WITH MOTOR CONTROLLERS, CONTROL ACCESSORIES AND APPURTENANCES ARE TO BE PROVIDED UNDER THIS SECTION. CONTROL WIRING SHALL BE IN CONDUIT.
- PART 2 - PRODUCTS
- 2.01 ELECTRIC ROOM THERMOSTATS
- A. THERMOSTAT SHALL BE BY HONEYWELL, CARRIER, LENNOX AS OR SPECIFIED IN THE DRAWINGS.
 - B. THERMOSTAT SHALL HAVE MANUAL HEATING COOLING CHANGEOVER SWITCH TO CONTROL OPERATION OF THE HEATING AND COOLING ON ALL AIR CONDITIONING UNITS.
 - C. THERMOSTATS SHALL HAVE LOCKABLE COVERS. SECTION 15990 TESTING, ADJUSTING AND BALANCING

- PART 3 - EXECUTION
 - 3.01 INSTALLATION
 - A. INSTALL WHERE SHOWN ON DRAWINGS.
 - B. DIFFUSERS, REGISTERS AND FITTINGS SHALL BE SECURELY ATTACHED TO FINISH SURFACES, OR STRUCTURAL MEMBERS BEHIND FINISH SURFACES.
 - C. LAY-IN DIFFUSERS MOUNTED IN ACOUSTICAL TILE CEILING SHALL BE RIGIDLY MOUNTED, ABOVE THE FACE PANEL, TO THE CEILING SUSPENSION SYSTEM.
- END OF SECTION

15525 - AIR DISTRIBUTION EQUIPMENT, GAS FIRED HEATING (WHERE APPLICABLE)

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. INSTALL AIR CONDITIONING UNITS OF THE CAPACITIES INDICATED, COMPLETE WITH GAS-FIRED HEATING SYSTEM, WHERE INDICATED ON THE DRAWINGS.
 - B. UNIT SHALL BE CONSTRUCTED IN ACCORDANCE WITH APPLICABLE ASME AND ANSI CODES AND SHALL BE LISTED BY UNDERWRITER'S LABORATORIES.
 - C. UNIT SHALL BE RATED IN ACCORDANCE WITH THE LATEST AIR STANDARD 21, WHERE SPECIFIED OPERATING CONDITIONS ARE OTHER THAN AIR STANDARD CONDITIONS. CAPACITIES SHALL BE INTERPOLATED FROM AIR CONDITIONS AS SPECIFIED.
- 1.02 SUBMITTALS
- A. SHOP DRAWINGS: SUBMIT COMPLETE ENGINEERING DATA WITH ALL SPECIFIED CONSTRUCTION FEATURES AND CAPACITIES CLEARLY INDICATED WITH COMPLETE POWER AND CONTROL WIRING DIAGRAMS. DATA SHALL BE CLEARLY MARKED TO INDICATE SELECTIONS AND MODIFICATIONS REQUIRED TO UNIT OR WIRING IN ORDER TO MEET THESE SPECIFICATIONS AND TO PROVIDE SATISFACTORY PERFORMANCE OPERATION IN THIS APPLICATION. CALCULATIONS OF INTERPOLATED AIR CONDITIONS SHALL BE SUBMITTED.
 - B. OPERATING AND MAINTENANCE DATA: PROVIDE OPERATION AND SERVICE INSTRUCTION TIONS, IN ILLUSTRATED FORM, FOR MANUALS AS SPECIFIED IN SECTION HVAC INSTRUCTIONS AND MAINTENANCE MANUALS.
 - C. WARRANTY: THE ENTIRE UNIT SHALL BE WARRANTED FOR ONE YEAR, AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP. THE REFRIGERATION COMPRESSOR SHALL HAVE AN ADDITIONAL FOUR YEAR WARRANTY. HEAT EXCHANGERS SHALL HAVE A LIMITED WARRANTY FOR A FULL TEN YEARS.
- 1.03 MANUFACTURER
- A. UNITS SHALL BE OF THE FOLLOWING MANUFACTURERS
 1. LENNOX, TRANE, OR APPROVED EQUAL.
- END OF SECTION

15892 - HVAC INSULATION GENERAL

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. THIS SECTION GOVERNS ALL HVAC INSULATION.
- 1.02 SUBMITTALS
- A. SUBMIT PRODUCT DATA COVERING THERMAL, PERMEABILITY AND FIRE PERFORMANCE CHARACTERISTICS OF ALL INSULATION MATERIALS. ADVISORIES CONCERNING FINISH SHALL BE CLEARLY MARKED TO SHOW INTENDED USE, THICKNESS, FINISHES, ADHESIVES AND APPLICATION TECHNIQUES.
- PART 2 - EXECUTION
- 2.01 INSTALLATION
- A. INSULATION SHALL NOT BE INSTALLED UNTIL TESTING PROCEDURES HAVE BEEN COMPLIED WITH ALL SURFACES AND HAVE BEEN CLEANED FREE OF DIRT AND GREASE AND ARE COMPLETELY DRIED.
 - B. PROTECT ADJACENT SURFACES, EQUIPMENT AND PREMISES FROM DROPPING OF COATINGS ADHESIVES AND FINISHES.
 - C. REMOVE ALL EXCESS MATERIALS AND DEBRIS FROM BOTH EXPOSED AND CONCEALED AREAS SO THAT THESE AREAS ARE COMPLETELY CLEAN.
- PART 3 - EXECUTION
- NOT USED
- END OF SECTION

15841 - INSULATION, LOW PRESSURE DUCT

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. ALL LOW PRESSURE DUCT SYSTEMS, 2 INCHES WATER GAGE OR LESS, SHALL BE INSULATED.
 - B. ALL APPLICABLE REQUIREMENTS OF THE SECTION, HVAC INSULATION, GENERAL, SHALL APPLY TO THIS SECTION.
- 1.02 EQUIVALENT MATERIALS
- A. MATERIALS OTHER THAN THOSE SPECIFIED WILL BE CONSIDERED FOR APPROVAL EQUAL.
- PART 2 - PRODUCTS
- 2.01 INSULATION
- A. EXTERNAL INSULATION SHALL BE 1-1/2 INCH THICK, 2.0 POUND DENSITY, (K = .25), SCHULLER TYPE SMALLITE, FSK SPRING-GLASS OR APPROVED EQUAL WITH AN EMBOSSED ALUMINUM FOIL FACING.
- 2.02 ADHESIVES, MASTIC, SEALANTS
- A. ADHESIVE SHALL BE FOSTER'S 85-20. STUDDWELL PINS SHALL BE SEALED WITH FOSTER'S 30-36 ADHESIVE.
- 2.03 JOINTS, SEAMS AND BREAKS IN THE VAPOR BARRIER SHALL BE SEALED WITH FOSTER'S 35-00, REINFORCED WITH 4 INCH WIDE GLASS FABRIC.
- PART 3 - EXECUTION
- 3.01 INSTALLATION
- A. ALL SUPPLY AND RETURN AIR DUCTWORK.
 - B. AIR SUPPLY DIFFUSERS BACKS AND NECKS:
 1. ALL AIR SUPPLY DIFFUSERS BACKS AND NECKS, SHALL BE INSULATED WITH 1/2-INCH THICK, 3/4 POUND DENSITY, MANVILLE R-SERIES SMALLITE, OR APPROVED EQUAL FIBERGLASS BLANKET INSULATION, HAVING A CONDUCTANCE (K) NO GREATER THAN .31. ADHERE INSULATION TO THE DUCT AS SPECIFIED BELOW.
- END OF SECTION

15885 - CONTROLS, ELECTRIC

- PART 1 - GENERAL
- 1.01 DESCRIPTION
- A. THE WORK CONSISTS OF INSTALLING CONTROLS FOR THE HVAC SYSTEM AS ON THE DRAWINGS.
- 1.02 SUBMITTALS
- A. PROVIDE SUBMITTAL CONSISTING OF COMPLETE CONTROL DIAGRAMS FOR THE SYSTEM WITH CONSTRUCTION DETAILS AND ENGINEERING DATA SHEETS ON ALL SYSTEM COMPONENTS.
- 1.03 ELECTRICAL
- A. ELECTRICAL WORK AND MATERIALS ASSOCIATED WITH THE CONTROL SYSTEM SHALL BE INSTALLED AS WORK OF THIS SECTION BUT IN ACCORDANCE WITH DIVISION 16.
 - B. POWER WIRING IS SPECIFIED UNDER DIVISION 16 AND SHOWN ON ELECTRICAL DRAWINGS.
 - C. ELECTRICAL CONTROL WIRING CONDUIT AND FITTINGS ASSOCIATED WITH THE SPACE TEMPERATURE AND HUMIDITY CONTROL INCLUDING INTERLOCKING WITH MOTOR CONTROLLERS, CONTROL ACCESSORIES AND APPURTENANCES ARE TO BE PROVIDED UNDER THIS SECTION. CONTROL WIRING SHALL BE IN CONDUIT.
- PART 2 - PRODUCTS
- 2.01 ELECTRIC ROOM THERMOSTATS
- A. THERMOSTAT SHALL BE BY HONEYWELL, CARRIER, LENNOX AS OR SPECIFIED IN THE DRAWINGS.
 - B. THERMOSTAT SHALL HAVE MANUAL HEATING COOLING CHANGEOVER SWITCH TO CONTROL OPERATION OF THE HEATING AND COOLING ON ALL AIR CONDITIONING UNITS.
 - C. THERMOSTATS SHALL HAVE LOCKABLE COVERS. SECTION 15990 TESTING, ADJUSTING AND BALANCING

- PART 3 - EXECUTION
 - 3.01 INSTALLATION
 - A. INSTALL WHERE SHOWN ON DRAWINGS.
 - B. DIFFUSERS, REGISTERS AND FITTINGS SHALL BE SECURELY ATTACHED TO FINISH SURFACES, OR STRUCTURAL MEMBERS BEHIND FINISH SURFACES.
 - C. LAY-IN DIFFUSERS MOUNTED IN ACOUSTICAL TILE CEILING SHALL BE RIGIDLY MOUNTED, ABOVE THE FACE PANEL, TO THE CEILING SUSPENSION SYSTEM.
- END OF SECTION

- 2.02 SMOKE DETECTION FAN SHUT-DOWN
 - A. SMOKE DETECTOR SHALL BE AS SPECIFIED IN THE DRAWINGS OR AN APPROVED EQUAL AS REQUIRED.
 - B. REMOTE ALARM INDICATOR FOR DUCT MOUNTED SMOKE DETECTOR SHALL BE AS SPECIFIED IN THE DRAWINGS.
 - C. SMOKE DETECTOR SHALL BE POWERED AS SPECIFIED IN DRAWINGS OR AS REQUIRED.
- PART 3 - EXECUTION
- 3.01 ELECTRIC ROOM THERMOSTATS
- A. SHALL BE ALL MOUNTED AND INSTALLED ON A COMMON BASE PLATE.
- END OF SECTION

15890 - TESTING, ADJUSTING AND BALANCING

- PART 1 - GENERAL
- 1.01 SPECIAL NOTICE
- A. EACH CONTRACTOR SHALL READ ALL RELEVANT DOCUMENTS, BECOME FAMILIAR WITH THE JOB, SCOPE OF WORK, TYPE OF GENERAL CONSTRUCTION, AND THE ARCHITECTURE, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS. EACH CONTRACTOR SHALL ALSO FAMILIARIZE HIMSELF WITH THE PURPOSE FOR WHICH THESE DOCUMENTS HAVE BEEN PREPARED AND SHALL BECOME COGNIZANT OF ALL THE DETAILS INVOLVED. EACH CONTRACTOR SHALL COORDINATE HIS WORK WITH THAT OF OTHERS.
 - B. THE TERM "CONTRACTOR" USED IN THIS SECTION OF THE SPECIFICATION WILL MEAN THE CONTRACTOR WHOSE WORK IS COVERED BY THIS SECTION.
 - C. WHEN THE TERM "OWNER" IS USED IN THIS SECTION OF THE SPECIFICATION, IT SHALL MEAN THE CONSULTING MECHANICAL ENGINEER.
- 1.02 STARTUP TEXT AND ADJUSTMENT
- A. THE PURPOSE OF STARTUP, TESTING AND ADJUSTING THIS EQUIPMENT