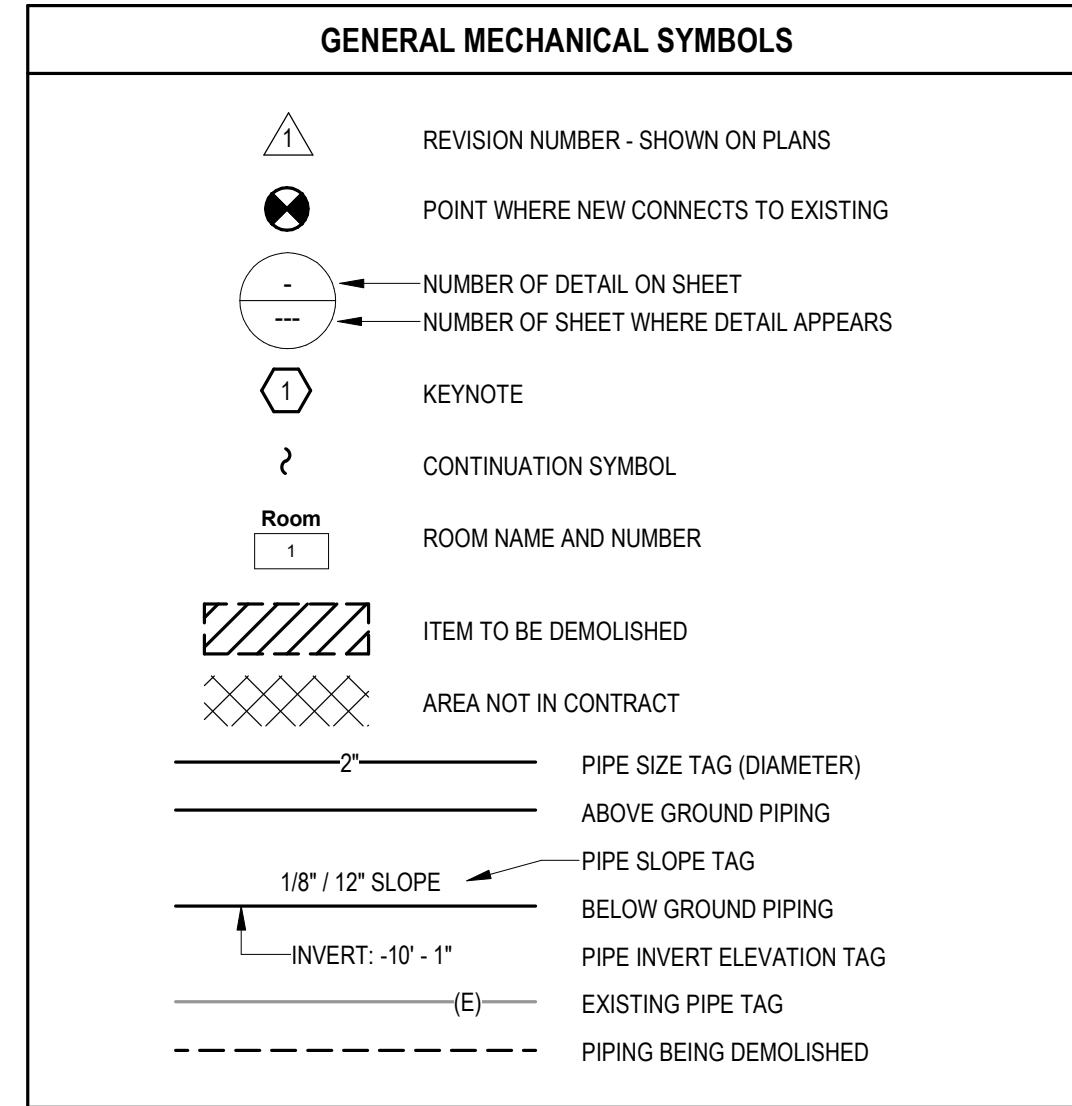
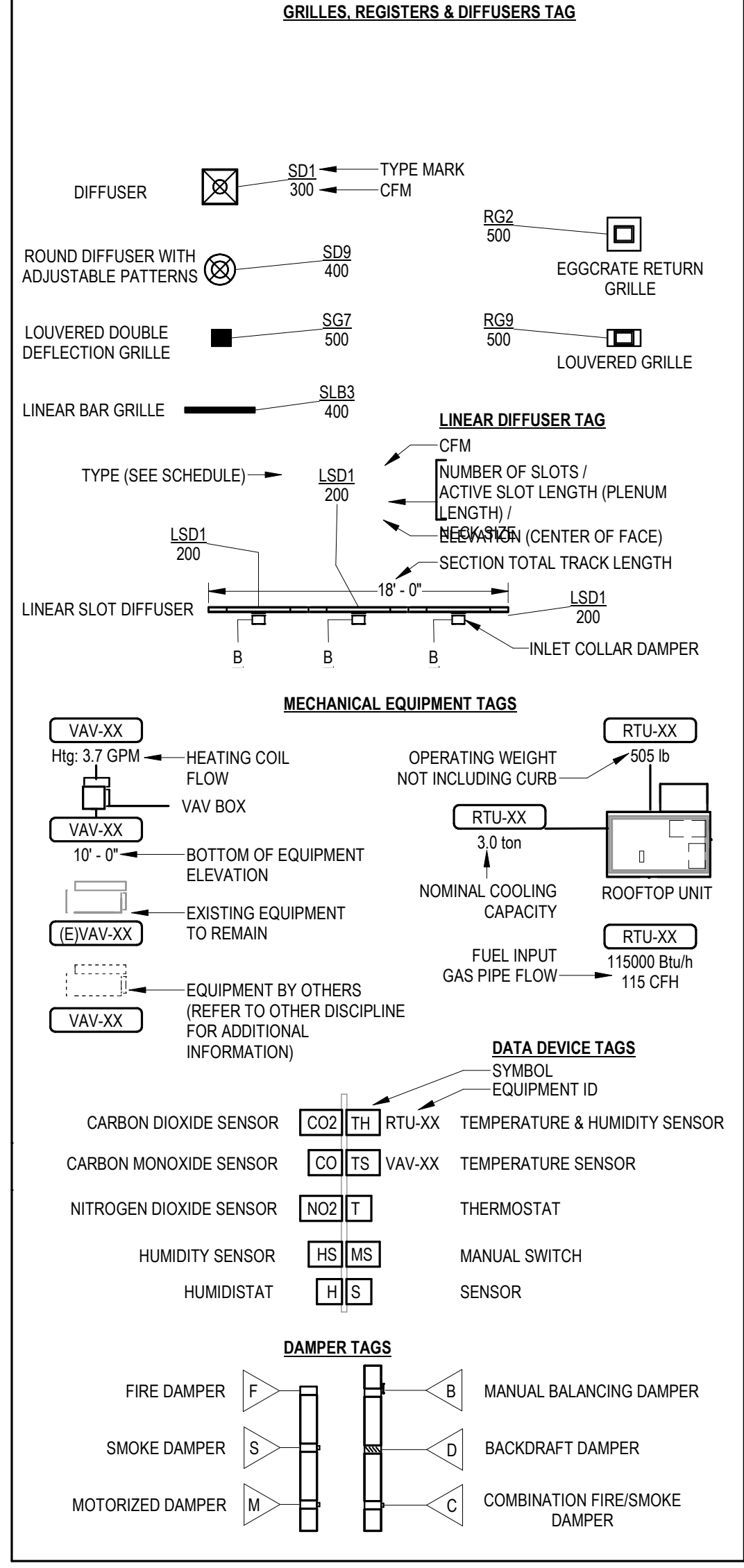
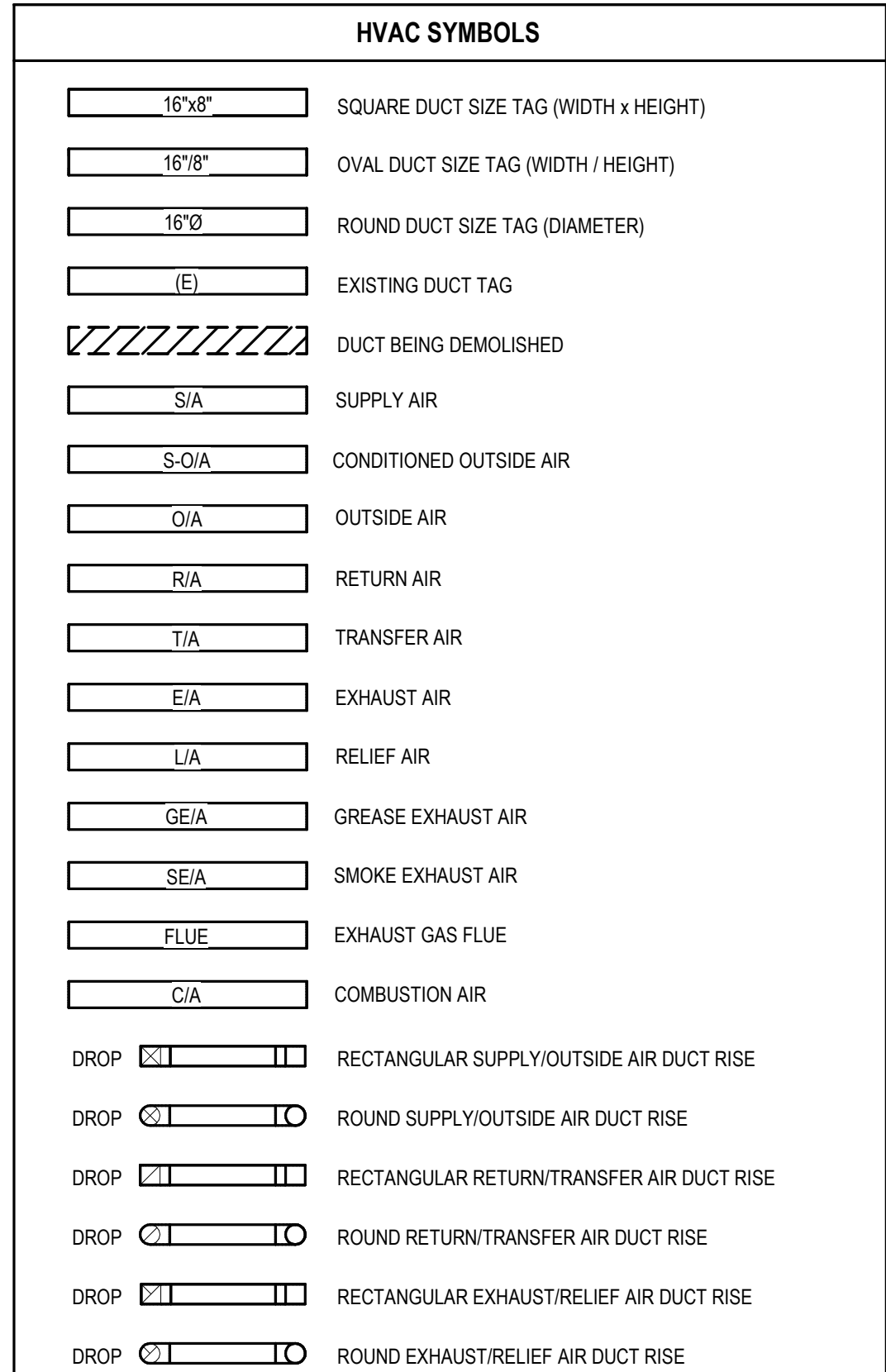


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ABBREVIATIONS

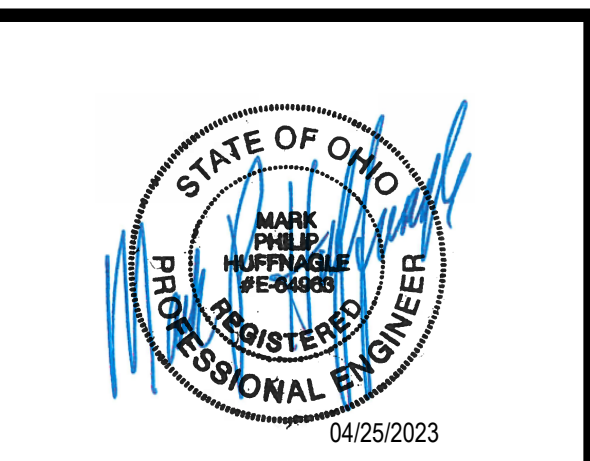
Ø	ROUND	LVR	LOUVER
ABV	ABOVE	LWT	LEAVING WATER TEMPERATURE
AC	AIR CONDITIONING	MIA	MIXED AIR
AD	AREA DRAIN	MAX	MAXIMUM
ADD	ADDENDUM	MBH	ONE THOUSAND BTU PER HOUR
AFF	ABOVE FINISHED FLOOR	MCF	ONE THOUSAND CUBIC FEET
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	MD	MOTORIZED DAMPER
ALT	ALTERNATE	MECH	MECHANICAL
AP	ACCESS PANEL	MFR	MANUFACTURER
ARCH	ARCHITECT/ARCHITECTURAL	MIN	MINIMUM
BFF	BELOW FINISHED FLOOR	MISC	MISCELLANEOUS
BLW	BELOW	MTR	MOTOR
BTU	BRITISH THERMAL UNITS	MU/A	MAKE-UP/AIR
BTUH	BRITISH THERMAL UNITS PER HOUR	NC	NOISE CRITERIA
CAP	CAPACITY	NC	NORMALLY CLOSED
CB	CATCH BASIN	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NO	NUMBER
CLG	CEILING	NO	NORMALLY OPEN
CO	CLEAN OUT	NTS	NOT TO SCALE
CW	COLD WATER	O	OXYGEN
D	DEGREE	O/A	OUTSIDE AIR
DB	DRY BULB	ORD	OVERFLOW ROOF DRAIN
DIA	DIAMETER	PD	PRESSURE DROP
DN	DOWN	PV	POST INDICATOR VALVE
DW	DISTILLED WATER	PLBG	PLUMBING
EA	EACH	PRESS	PRESSURE
EAT	ENTERING AIR TEMPERATURE	PRV	PRESSURE REDUCING VALVE
ELEC	ELECTRICAL	PSI	POUNDS PER SQUARE INCH
ELECC	ELECTRICAL	PSIG	POUNDS PER SQUARE INCH GAUGE
EQUIP	EQUIPMENT	PWR	POWER
EWC	ELECTRIC WATER COOLER	R	DUCT RISER
EWT	ENTERING WATER TEMPERATURE	R	DUCT RISER
E/A	EXHAUST AIR	R/A	RETURN AIR
EXIST	EXISTING	RCP	RADIANT CEILING PANEL
F	DEGREES FAHRENHEIT	RD	ROOF DRAIN
FCO	FLOOR CLEAN OUT	REC	RECESSED
FD	FLOOR DRAIN	RED	REDUCER
FD	FIRE DAMPER	RH	RELATIVE HUMIDITY
FDV	FIRE DEPARTMENT VALVE	R/A	RELIEF AIR
FL	FLOOR	RM	ROOM
FO	FUEL OIL	RPM	REVOLUTIONS PER MINUTE
FOV	FUEL OIL VENT	RW	RAIN WATER
FOR	FUEL OIL RETURN	SF	SQUARE FOOT
FOS	FUEL OIL SUPPLY	S/A	SUPPLY AIR
FPM	FEET PER MINUTE	SAN	SANITARY
FS	FLOOR SINK	SF	SQUARE FOOT
FT	FOOT/FEET	SD	SMOKE DAMPER
FTR	FIN TUBE RADIATION	SM	SURFACE MOUNT
GAL	GALLON	ST	STANDARD PIPE
GC	GENERAL CONTRACTOR	SP	STATIC PRESSURE
GPM	GALLONS PER MINUTE	STM	STEAM
GW	GREASE WASTE	T	THERMOSTAT
HB	HOSE BIB	TD	TEMPERATURE DROP
HP	HORSE POWER	TD	TRENCH DRAIN
HTG	HEATING	TEMP	TEMPERATURE
HTR	HEATER	TYP	TYPICAL
HW	HOT WATER	UG	UNDERGROUND
HYD	HYDRANT	VAC	VACUUM
ID	INDIRECT	V	VENT
IN	INCH	VAV	VARIABLE AIR VOLUME
INV	INVERT	V	VENT
LB	POUND	VTR	VENT THROUGH ROOF
LB/HR	POUNDS PER HOUR	W	WASTE
LAT	LEAVING AIR TEMPERATURE	WB	WET BULB
LP	LOW PRESSURE	WCO	WALL CLEAN OUT
LP	LIQUEFIED PETROLEUM GAS	WH	WALL HYDRANT



PROJECT GENERAL NOTES

- REMOVE ALL UNUSED PIPING, DUCTWORK AND ACCESSORIES.
- THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING, PRIOR TO FINAL BID, ALL EXISTING CONDITIONS FOR PLUMBING AND MECHANICAL SYSTEMS WITHIN TENANT SPACE AND WITHIN CLOSE PROXIMITY OF TENANT SPACE.
- THE MECHANICAL CONTRACTOR SHALL PERFORM SERVICE AND REPAIR ON THE EXISTING EQUIPMENT AND ITS ACCESSORIES AS FOLLOWS: CLEAN ALL COILS, REPLACE THE FILTERS AND BELTS, INSPECT, REPAIR, OR REPLACE THE ECONOMIZERS, DRIVES AND FAN BEARINGS, MOTORS, CONTROL COMPONENTS, VALVES AND ANY OTHER ITEM NECESSARY FOR A COMPLETE AND PROPER OPERATING SYSTEM. THIS CONTRACTOR SHALL ALSO VISIT THE SITE, PRIOR TO FINAL BIDDING, AND VERIFY ALL EXISTING SITE CONDITIONS. PROVIDE ALL MATERIAL AND COMPONENTS AS NEEDED TO BRING THE UNITS TO FULL COMPLIANCE OF THE LANDLORD'S CRITERIA AND LOCAL AUTHORITY HAVING JURISDICTION.
- WHERE FLOOR DRAINS OCCUR WITHIN THE LIMITS OF CONSTRUCTION, PREVENT CONSTRUCTION DEBRIS FROM ENTERING DRAIN BODY BY SEALING DRAIN OPENING PRIOR TO START OF WORK.
- COORDINATE INSTALLATION OF PIPING, DUCTWORK, CONDUIT, LIGHTS, CABLE TRAY, STRUCTURE, AND EQUIPMENT TO PREVENT CONFLICTS.
- THE CONTRACTOR SHALL BE FAMILIAR WITH ALL THE CONDITIONS BOTH EXISTING AND THOSE ILLUSTRATED BY THESE DOCUMENTS AS WELL AS THOSE WHICH CAN BE REASONABLY ANTICIPATED INCLUDING, BUT NOT LIMITED TO ARCHITECTURAL, ELECTRICAL, VENTILATION, PLUMBING, AND OTHER SYSTEMS INVOLVED ON THIS PROJECT.
- FINAL PRODUCT SHALL BE A COMPLETE AND FUNCTIONING SYSTEM, AND SHALL CONFORM TO ALL REQUIREMENTS OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, INCLUDING BUT NOT LIMITED TO THE INTERNATIONAL BUILDING CODE AND INTERNATIONAL MECHANICAL CODE.
- LOCATE EQUIPMENT REQUIRING ACCESS 2'-0" MAXIMUM ABOVE CEILING.
- ALL ROOF MOUNTED EQUIPMENT SHALL BE A MINIMUM 10'-0" FROM EDGE OF ROOF.
- LOCATE DUCTWORK, PIPING AND MECHANICAL EQUIPMENT AWAY FROM THE SPACE ABOVE ELECTRICAL PANELS, TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT.
- FIRE SEAL AROUND DUCT AND PIPING PENETRATIONS OF FIRE RATED WALLS. REFER TO SPECIFICATION.
- PROVIDE SLEEVES AND/OR OPENINGS TO RUN PIPES AND DUCTS THROUGH FOUNDATIONS, FLOORS, WALLS, AND ROOF.
- ADJUST PIPING AND DUCTWORK SIZES TO PROPERLY CONNECT TO MECHANICAL EQUIPMENT.
- REFER TO PLUMBING SERIES DRAWINGS FOR GAS AND A.C. CONDENSATE DRAIN PIPING.
- PIPE SIZES SHOWN SHALL BE CONTINUED IN THE DIRECTION OF FLOW UNTIL ANOTHER SIZE IS SHOWN.
- FOR DETAILS, EQUIPMENT CONNECTIONS, AND PIPE SIZES NOT SHOWN ON THE SEGMENTS, REFER TO DETAILS, SCHEDULES, AND SPECIFICATIONS.
- INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE RESPECTIVE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, AT A LEVEL OF QUALITY AND WORKMANSHIP CONSISTENT WITH THE SPECIFICATIONS.
- LOCATIONS OF PIPING, DUCTWORK AND EQUIPMENT AS INDICATED ON THE DRAWING, ARE APPROXIMATE AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD. WORK SHALL BE COORDINATED WITH ALL OTHER TRADES TO AVOID INTERFERENCE IN THE FIELD.
- INSTALL EXPOSED PIPING AND DUCTWORK AS HIGH AS PRACTICAL IN ROOMS WITHOUT CEILINGS.

M-Engineering
 750 Brooksedge Blvd.
 Westerville, Ohio 43081
 phone: 614.839.4639
 fax: 614.839.2222
 www.mengineering.us.com



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 800 READING ROAD
 MASON, OH 45040

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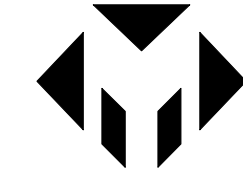
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 Scale: 1/8" = 1'-0"
 Drawn By: Author
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Sheet Title:
MECHANICAL ABBREVIATIONS, LEGENDS & GENERAL NOTES

M0.1

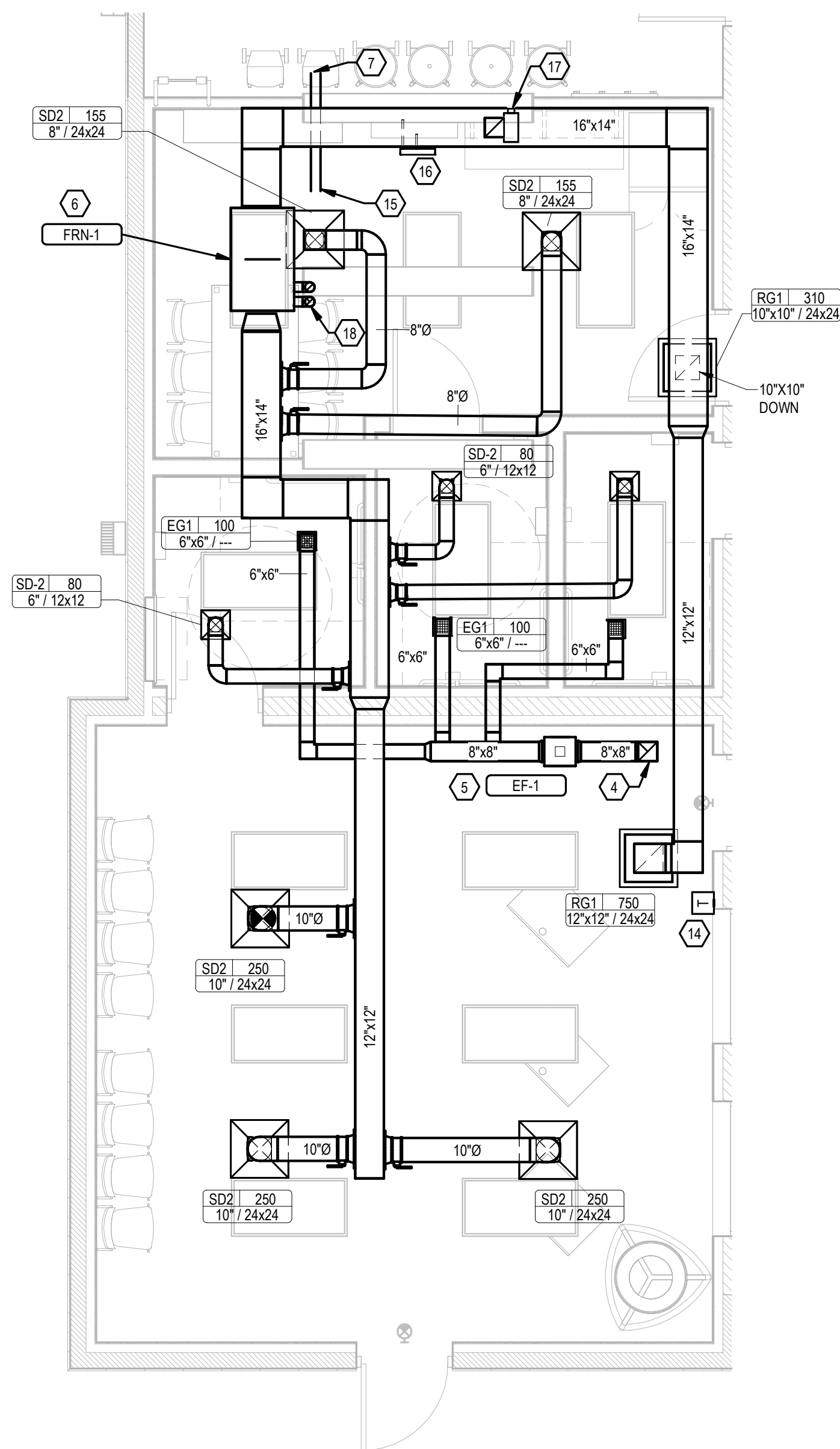


M-Engineering
 750 Brookside Blvd.
 Westerville, Ohio 43081
 phone: 614.839.4639
 fax: 614.839.2222
 www.mengineering.us.com

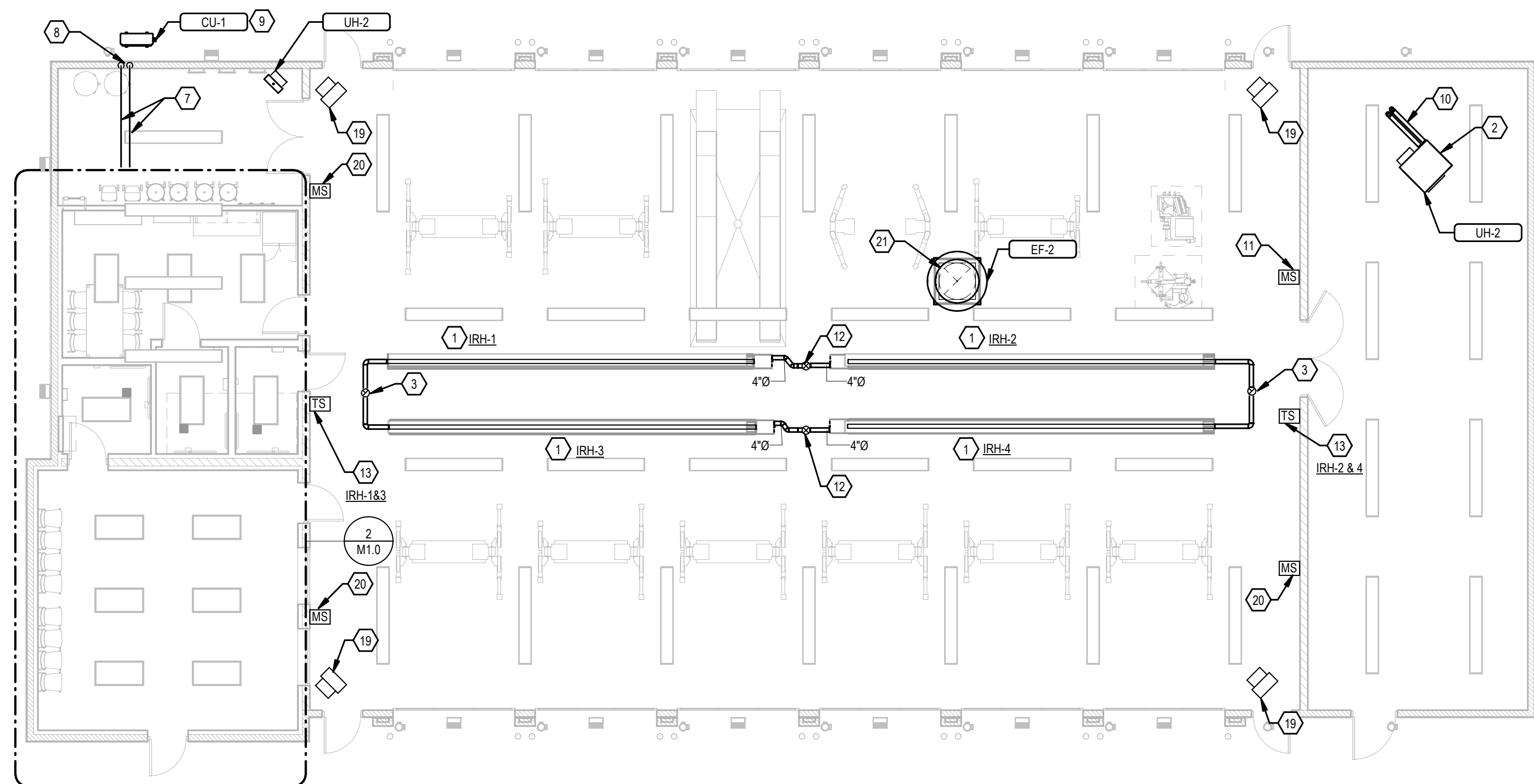


CODED NOTES

- SUSPEND THE RADIANT HEATER WITH STANDARD REFLECTOR FROM THE ROOF STRUCTURE ABOVE. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL ADDITIONAL SUPPORT STEEL THAT IS REQUIRED TO SUSPEND THE HEATING UNIT. DIRECT REFLECTOR AT 45 DEGREE ANGLE TOWARD OVERHEAD DOOR. PROVIDE AND INSTALL HANGERS AND CLIPS FOR RADIANT HEATER AND SHIELD AT EVERY 36" ON CENTER MAXIMUM.
- SUSPEND THE UNIT GAS-FIRED HEATER WITH INTEGRAL THERMOSTAT FROM THE ROOF STRUCTURE ABOVE. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL ADDITIONAL SUPPORT STEEL THAT IS REQUIRED TO SUSPEND THE UNIT HEATER UNIT.
- EXTEND 8" TYPE B FLUE THROUGH ROOF TO ROOF CAP PER MANUFACTURER RECOMMENDATION. INSTALL FLUE PER RADIANT HEATER MANUFACTURER'S INSTALLATION INSTRUCTION.
- EXTEND EXHAUST DUCT THROUGH ROOF TO ROOF CAP AND TRANSITION AS REQUIRED.
- SUPPORT INLINE EXHAUST FAN FROM THE ROOF STRUCTURE WITH HANGING RODS VIBRATION ISOLATORS.
- HORIZONTAL GAS-FIRED FURNACE WITH DX COOLING EVAPORATOR COIL TO BE LOCATED ON EQUIPMENT PLATFORM. UNIT TO BE SUPPORTED FROM OVERHEAD STRUCTURAL MEMBERS WITH HANGING RODS AND VIBRATION ISOLATORS.
- ROUTE REFRIGERANT LINES FROM AIR COOLED CONDENSING UNIT TO HORIZONTAL GAS-FIRED FURNACE. SIZE REFRIGERANT LINES PER MANUFACTURER RECOMMENDATION AND SUPPORT LINES FROM ROOF STRUCTURES.
- EXTEND REFRIGERANT LINES DOWN WALL TO AIR COOLED CONDENSING UNIT SIZE REFRIGERANT LINES PER MANUFACTURER RECOMMENDATION.
- PROVIDE 4" HOUSEKEEPING FOR CONDENSING UNIT. CONTRACTOR COORDINATE LOCATION WITH LANDSCAPING PLAN. MECHANICAL CONTRACTOR MUST ENSURE ALL MANUFACTURER REQUIRED CLEARANCES PER MANUFACTURER RECOMMENDATION. ALL EXTERIOR PIPING LOCATED OUTSIDE THE BUILDING ENVELOPE TO BE LOCATED WITH AND EXTERIOR ENCLOSURE PER MANUFACTURER RECOMMENDATION.
- EXTEND 4" ROUND VENT AND COMBUSTION AIR VENT THROUGH ROOF TO REZOR VENT KIT.
- PROVIDE MANUAL MOTOR STARTER AT 48" A.F.F. FOR ROOF MOUNTED EXHAUST FAN (EF-2). COORDINATE LOCATION OF MANUAL MOTOR STARTER WITH OWNER PRIOR TO ROUGH-IN.
- EXTEND 8" COMBUSTION AIR THROUGH ROOF TO ROOF CAP.
- CONTRACTOR SHALL FURNISH AND INSTALL A THERMOSTAT. THERMOSTAT SHALL BE MOUNTED AT 48" AFF. COORDINATE LOCATION OF THERMOSTAT WITH OWNER PRIOR TO ROUGH-IN. THE ENTIRE CONTROL SYSTEM SHALL BE PROVIDED COMPLETE IN EVERY RESPECT BY THE MECHANICAL CONTRACTOR AND BE COMPATIBLE WITH INFRARED HEATER MANUFACTURER.
- WALL MOUNTED PROGRAMMABLE THERMOSTAT AT 48" A.F.F. FOR GAS-FIRED FURNACE. THERMOSTAT SHALL BE COMPATIBLE WITH FURNACE MANUFACTURER.
- EXTEND REFRIGERANT LINES TO GAS-FIRED FURNACE. SIZE REFRIGERANT LINES PER MANUFACTURER RECOMMENDATION.
- PROVIDE AND INSTALL MOTORIZED OUTSIDE AIR DAMPER IN OUTSIDE AIR DUCT. PROVIDE ULTRA-LOW LEAKAGE PARALLEL BLADE MODULATING DAMPER EQUAL TO HONEYWELL #D642, SIZED TO MATCH DUCT DIMENSIONS DUCT. SUPPLY LINKAGE TO MATCH FACTORY SUPPLIED AC TUATOR (HONEYWELL #M6415A). CONTROLS AND ACTUATORS FACTORY FURNISHED WITH FAN COIL UNIT. OUTSIDE AIR DAMPER TO BE INTERLOCK WITH FAN COIL UNIT CONTROLS SO DAMPER IS OPEN IN A MINIMUM SETTING (REFER TO MECHANICAL SCHEDULE ON SHEET M-200) AND OUTSIDE AIR DAMPER WILL BE CLOSED DURING UNOCCUPIED MODE
- PROVIDE AND INSTALL DUCT MOUNTED SMOKE DETECTOR IN THE RETURN AIR DUCTWORK IN ACCORDANCE WITH LOCAL MECHANICAL CODE. SMOKE DETECTOR WILL SHUT DOWN AIR HANDLING UNIT UP ON DETECTION OF SMOKE AND SIGNAL FIRE ALARM SYSTEM (IF APPLICABLE)
- EXTEND OUTSIDE AIR FLUE AND COMBUSTION FLUE FROM FURNACE THROUGH ROOF TO CARRIER CONCENTRIC VENT KIT. COORDINATE SIZE OF OUTSIDE AIR AND COMBUSTION AIR FLUES WITH FURNACE MANUFACTURER PRIOR TO ROUGH-IN
- GREENHECK MODEL IC-24-B3-JI AIR CIRCULATOR WALL MOUNTED FAN. FAN SHALL HAVE A CAPACITY OF BETWEEN 6100 CFM WITH A VELOCITY OF 1075 F.P.M., 1/3 MOTOR HP, 120 VOLTAGE 1 PHASE AND OSHA-COMPLIANT ZINC PLATED WIRE GUARD (CERTIFICATIONS UL 507). PROVIDE FAN GREENHECK MODEL BKT-WPC-100-0D MOUNTING BRACKET PER MANUFACTURER RECOMMENDATIONS. CONTRACTOR COORDINATE LOCATION AND MOUNTING HEIGHT OF FAN WITH OWNER PRIOR TO ROUGH-IN.
- CONTRACTOR PROVIDE MANUAL WALL SWITCH AT 48" A.F.F FOR CIRCULATOR FAN. COORDINATE LOCATION WITH OWNER PRIOR TO ROUGH-IN.
- PROVIDE ROOF MOUNTED EXHAUST FAN WITH SLOPED ROOF CURB. COORDINATE SLOPED OF ROOF WITH GENERAL CONTRACTOR PRIOR TO ROUGH-IN. EXTEND 28"x28" EXHAUST DUCT FROM EXHAUST FAN THROUGH DRYWALL CEILING IN SERVICE BAYS. COVER EXHAUST OPENING IN CEILING WITH WIRE MESH.



ENLARGED FLOOR PLAN - MECHANICAL
 1/4" = 1'-0"



1 MECHANICAL - FIRST FLOOR
 M1.0 1/8" = 1'-0"

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MASON, OH
 800 READING ROAD
 MASON, OH 45040

Revisions / Submissions

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Sheet Title:
MECHANICAL - FIRST FLOOR

M1.0

DESIGN WEATHER PARAMETERS

Design Parameters:

City Name	MASON
Location	OH
Latitude	39.0 Deg.
Longitude	84.3 Deg.
Elevation	810.0 ft
Summer Design Dry-Bulb	90.0 °F
Summer Coincident Wet-Bulb	74.0 °F
Summer Daily Range	19.3 °F
Winter Design Dry-Bulb	1.0 °F
Winter Design Wet-Bulb	1.0 °F
Atmospheric Clearness Number	1.00
Average Ground Reflectance	0.20
Soil Conductivity	0.800 BTU/(hr-ft ² -F)
Local Time Zone (GMT +/- N hours)	5.0 hours
Consider Daylight Savings Time	No
Simulation Weather Data	(TM2)
Current Data is	2001 ASHRAE Handbook
Design Cooling Months	January to December

HVAC LOAD CALCULATIONS

Air System Information

Air System Name	SALES	Number of zones	1
Equipment Class	UNDEF	Floor Area	1483.0
Air System Type	SZCAV	Location	COLUMBUS, OH

Sizing Calculation Information
Zone and Space Sizing Method:

Calculation Months	Jan to Dec	Zone CFM	Sum of space airflow rates
Sizing Data	User-Modified	Space CFM	Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load	3.2 Tons	Load occurs at	AUG 1600
Total coil load	38.7 MBH	OA DB / WB	80.4 / 73.9 °F
Sensible coil load	30.8 MBH	Entering DB / WB	78.1 / 64.5 °F
Coil CFM at Aug 1500	1300 CFM	Leaving DB / WB	55.5 / 54.3 °F
Max block CFM	1300 CFM	Coil ADP	53.0 °F
Sum of peak zone CFM	1300 CFM	Bypass Factor	0.100
Sensible heat ratio	0.797	Resulting RH	48 %
Cfm/Ton	403.3	Design supply temp.	55.0 °F
St/Ton	460.1	Zone T-stat Check	1 of 1
BTU/(hr-sf)	26.1	Max zone temperature deviation	0.0 °F
Water flow @ 10.0 °F rise	7.74		

Central Heating Coil System

Max coil load	32.0 MBH	Load occurs at	Des Htg
Coil CFM at Des Htg	1300 CFM	BTU/(hr-sf)	21.6
Max coil at CFM	1300 CFM/SF	Ent. DB / Lvg DB	59.7 / 83.2 °F
Water flow @ 20.0 °F drop	3.2 CFM/SF		

Supply Fan Sizing Data

Actual max CFM	1300 CFM	Fan motor BHP	0.00 BHP
Standard CFM	1262 CFM	Fan motor kW	0.00 kW
Actual max CFM/SF	0.88 CFM/SF	Fan static	0.00 in wg

Outdoor Ventilation Air Data

Design airflow CFM	180 CFM	CFM/person	11.00 CFM/person
CFM/SF	0.12 CFM/SF		

DESIGN COOLING

COOLING DATA AT AUG 1600
COOLING OA DB / WB 89.4°F / 73.9°F

DESIGN HEATING

HEATING DATA AT DES HGT
HEATING OA DB / WB 1.0°F / -0.6°F

ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	156 SF	9923	-	156 SF	-	-
Wall Transmission	1504 SF	1089	-	1504 SF	4670	-
Roof Transmission	1116 SF	2730	-	1116 SF	3350	-
Window Transmission	156 SF	1043	-	156 SF	6329	-
Skylight Transmission	0 SF	0	-	0 SF	0	-
Door Loads	140 SF	478	-	140 SF	2898	-
Floor Transmission	823 SF	0	-	823 SF	2437	-
Partitions	0 SF	0	-	0 SF	0	-
Ceiling	0 SF	0	-	0 SF	0	-
Overhead Lighting	0 W	0	-	0 W	0	-
Task Lighting	1433 W	4350	-	0	0	-
Electric Equipment	2500 W	7852	-	0	0	-
People	16	3009	3348	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	29775	3348	-	19685	0
Zone Conditioning	-	28383	3348	-	19180	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	70%	0	-	0	0	-
Plenum Lighting Load	30%	0	-	0	0	-
Return Fan Load	1300 CFM	0	-	1300 CFM	0	-
Ventilation Load	180 CFM	2463	4481	180 CFM	12827	0
Supply Fan Load	1300 CFM	0	-	1300 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	30847	7829	-	32006	0
Central Cooling Coil	-	30847	7833	-	0	0
Central Heating Coil	-	0	-	-	32006	0
>> Total Conditioning Key:	-	30847	7833	-	32006	0

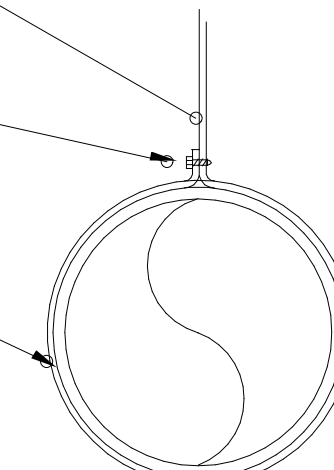
Key: Positive values are ckg loads
Negative values are htg loads

METAL GAUGE FOR DUCTWORK TO BE AS FOLLOWS:

ROUND DUCT 3 TO 19 INCHES TO BE 26 GAUGE
RECTANGULAR
STEEL STRAP HANGER

SELF-TAPPING, SHEET METAL SCREW (TYP.)

CLEAR METAL SPIRAL GALVANIZED DUCTWORK TO BE EXPOSED (NOT PAINTED) TYP. FOR ALL PARTS



HANGER SPACING:

DUCT FACE AREA FROM 0 TO 4 SQ. FT. HANGERS 98" O.C. MAX
DUCT FACE AREA FROM 4 TO 10 SQ. FT. HANGERS 72" O.C. MAX
DUCT FACE AREA FROM 10 AND GREATER HANGERS 48" O.C. MAX

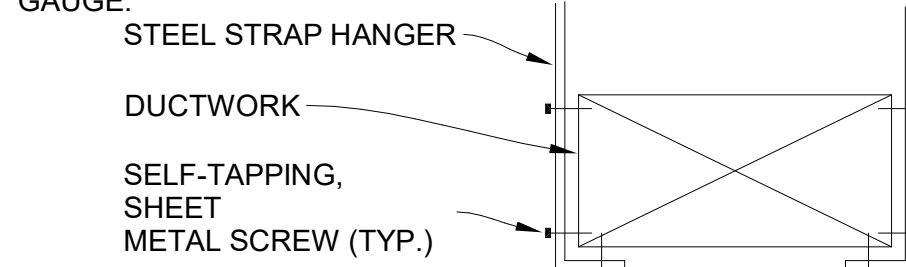
WHERE DUCTS ARE LESS THAN 2 SQ. FT. IN FACE AREA, HANGERS SHALL BE NOT LESS THAN 1"x1/16" STRAP STEEL.
WHERE DUCT ARE GREATER THAN 2 SQ. FT. IN FACE AREA, HANGERS SHALL BE NOT LESS THAN 1"x1/8" STRAP STEEL.
WHERE DUCT ARE 8 SQ. FT. IN FACE AREA, HANGERS SHALL BE BRACED BY 1"x1/8" STEEL ANGLES ALL AROUND, SPACED NO MORE THAN FOUR FEET ON CENTERS.

ROUND DUCT SUPPORT SCHEMATIC

1" = 1'-0"

METAL GAUGE FOR DUCTWORK TO BE AS FOLLOWS:

ROUND DUCT 3 TO 19 INCHES TO BE 26 GAUGE
RECTANGULAR DUCT UP TO 12 INCHES WIDE TO BE 26 GAUGE
RECTANGULAR DUCT 13 TO 30 INCHES WIDE TO BE 24 GAUGE.
RECTANGULAR DUCT ABOVE 30 INCHES WIDE TO BE 22 GAUGE.



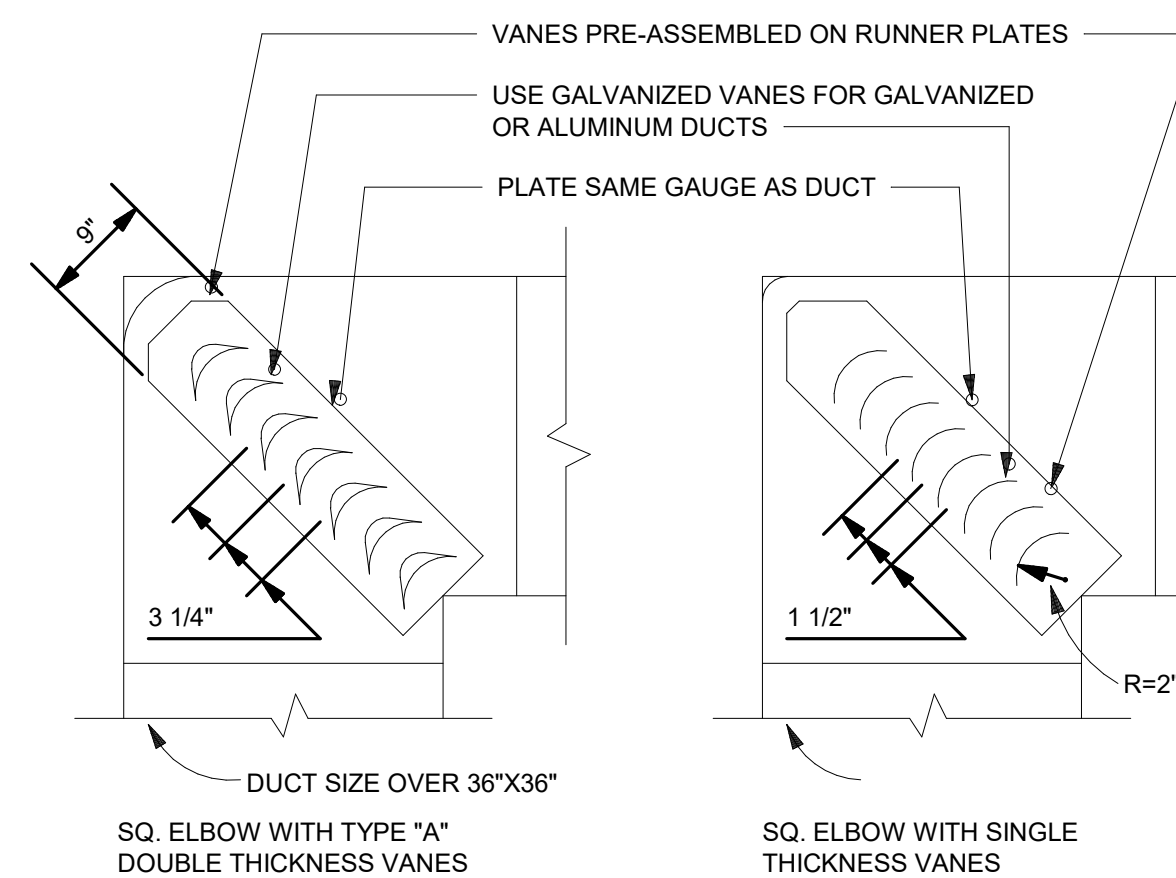
HANGER SPACING:

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DUCT FACE AREA FROM 4 TO 10 SQ. FT. HANGERS 72" O.C. MAX
DUCT FACE AREA FROM 10 AND GREATER HANGERS 48" O.C. MAX

WHERE DUCTS ARE LESS THAN 2 SQ. FT. IN FACE AREA, HANGERS SHALL BE NOT LESS THAN 1"x1/16" STRAP STEEL.
WHERE DUCT ARE GREATER THAN 2 SQ. FT. IN FACE AREA, HANGERS SHALL BE NOT LESS THAN 1"x1/8" STRAP STEEL.
WHERE DUCT ARE 8 SQ. FT. IN FACE AREA, HANGERS SHALL BE BRACED BY 1"x1/8" STEEL ANGLES ALL AROUND, SPACED NO MORE THAN FOUR FEET ON CENTERS.
WHERE DUCTS ARE OVER 48" WIDE, THE HANGERS SHALL BE BROUGHT DOWN UNDER THE DUCT SIDES 4" AND FASTENED TO THE BOTTOM.

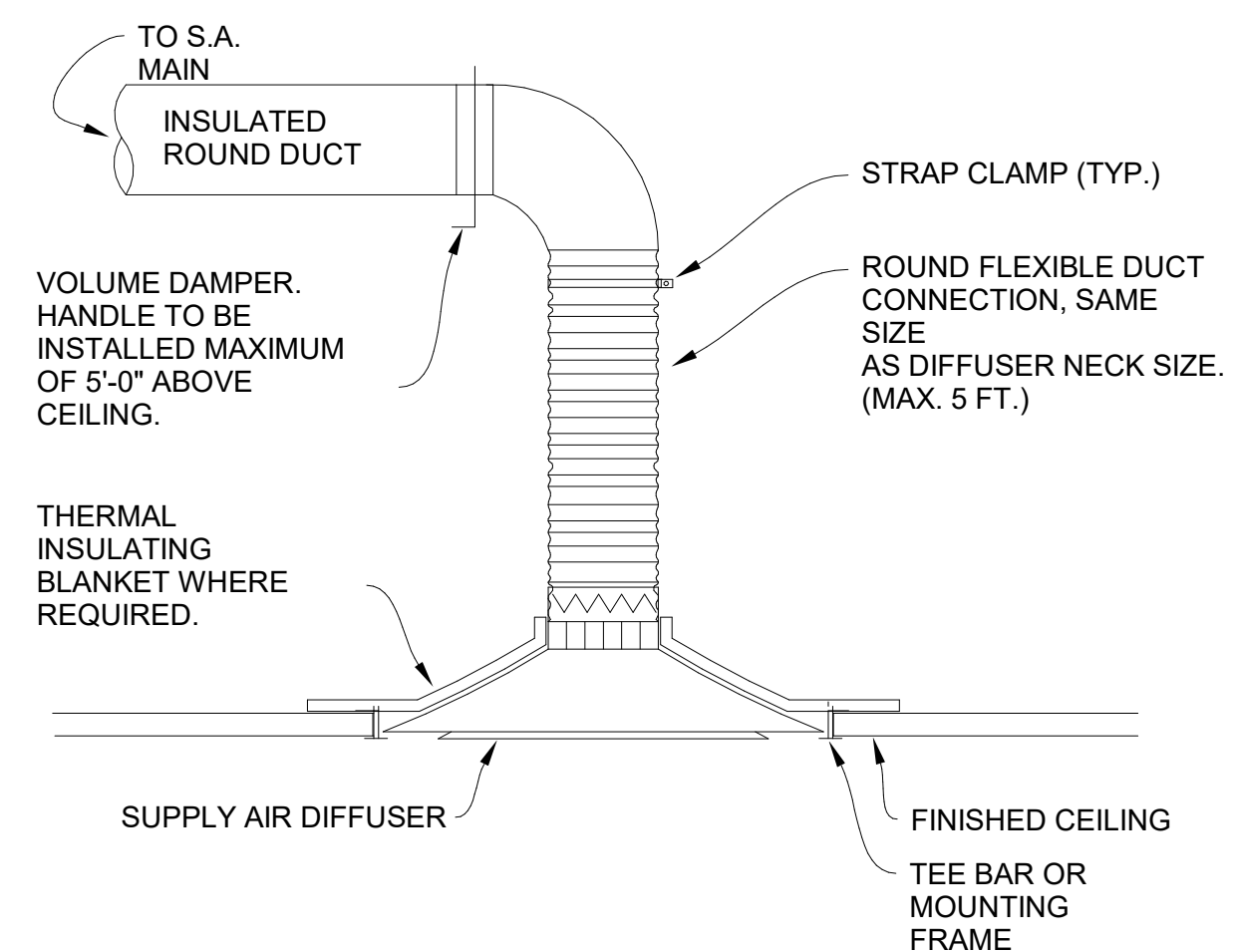
DUCT SUPPORT SCHEMATIC

1" = 1'-0"



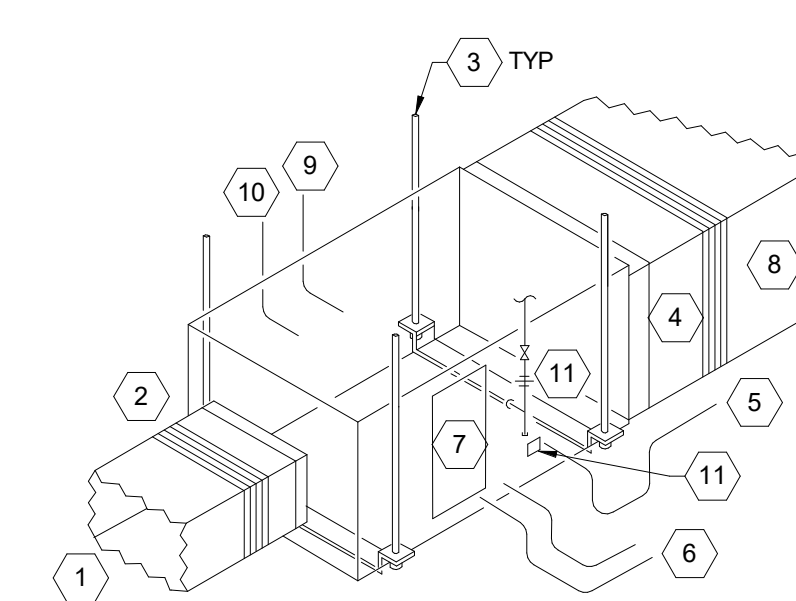
TURNING VANES SCHEMATIC

1" = 1'-0"



DIFFUSER MOUNTING SCHEMATIC

1" = 1'-0"

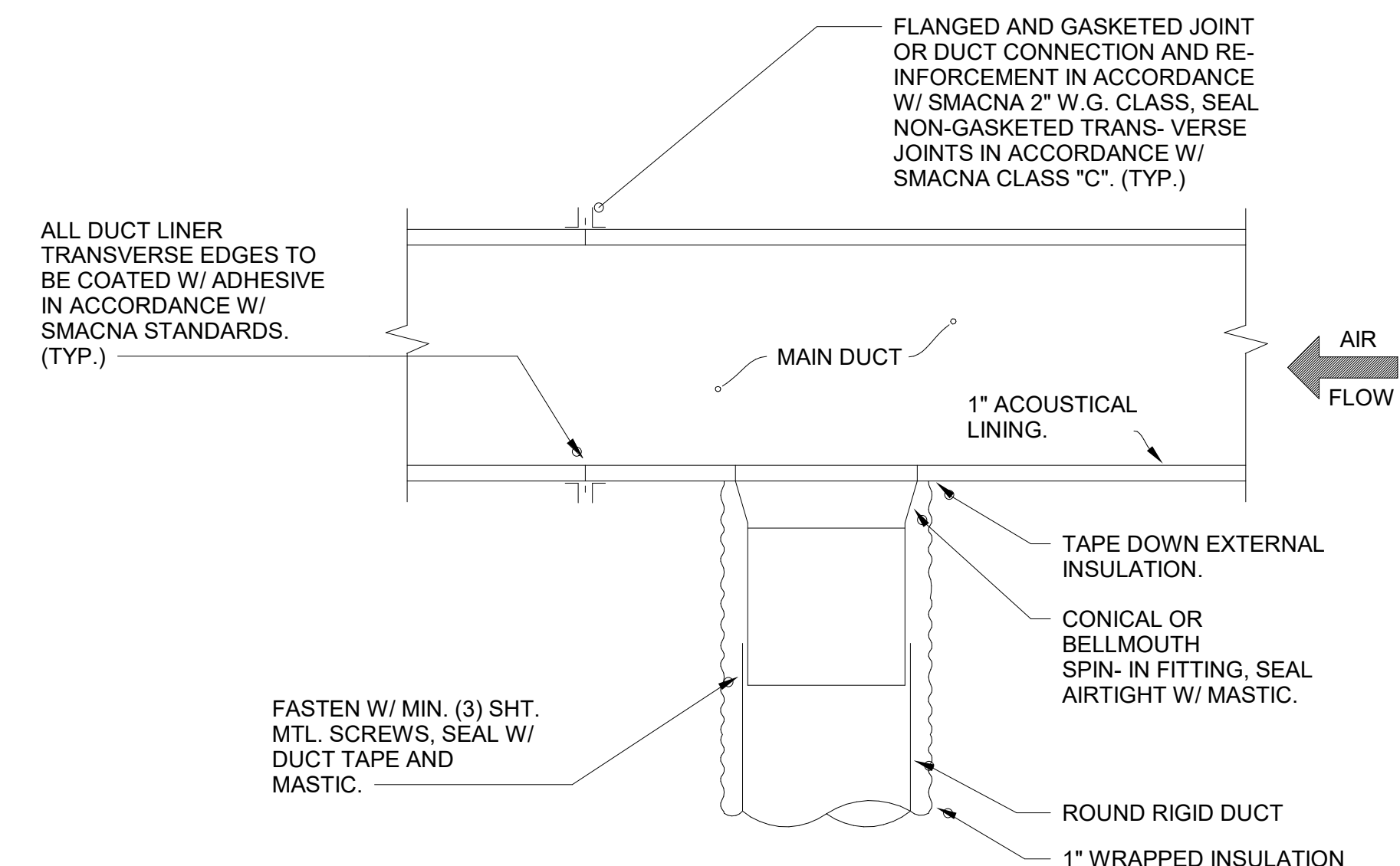


GAS FURNACE SCHEMATIC

1" = 1'-0"

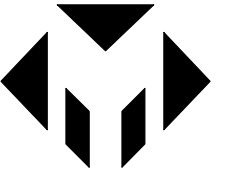
KEYED NOTES:

- INSULATED SUPPLY DUCT.
- FLEXIBLE CONNECTION.
- GALVANIZED ALL THREAD ROD W/ VIBRATION ISOLATOR (TYP.).
- FILTER RACK AND ACCESS DOOR (2" 30% EFF.).
- CONDENSATE LINE WITH TRAP. REFER CONDENSATE DRAIN TRAP DETAIL.
- REFRIGERANT LINES, SUCTION LINE INSULATED WITH 3/4" ARMFLEX.
- SERVICE ACCESS PANEL.
- RETURN AIR DUCT W/1/2" ACOUSTIC LINING (MIN. OF 10'-0").
- VENT PER MANUFACTURER'S RECOMMENDATIONS.
- COMBUSTION AIR INTAKE.
- GAS TRAIN, PLUG VALVE, UNION AND DIRT LEG.
- HIGH WATER ALARM IN CONDENSATE DRAIN PAN. WIRE TO BREAK 24 VOLT CONTROL POWER IN THE CASE OF A HIGH WATER EVENT.



TYP. ROUND DUT TAKE-OFF SCHEMATIC

1" = 1'-0"



M-Engineering
750 Brooksedge Blvd.
Westerville, Ohio 43081
phone: 614.839.4639
fax: 614.839.2222
www.mengineering.us.com



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GRISMER TIRE & AUTO SERVICE

MASON, OH
800 READING ROAD
MASON, OH 45040

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 fax: 614.839.2222
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GAS FURNACE SCHEDULE

TAG	CARRIER MODEL	TYPE	AIRFLOW				HEATING			ELECTRICAL DATA			REMARKS		
			SUPPLY (CFM)	RETURN (CFM)	OUTSIDE (CFM)	ESP (IN. H ₂ O)	MBH INPUT	MBH OUTPUT	AFUE	GAS SUPPLY PRESSURE		M.C.A.		MAX.	VOLTS / PH
										MIN.	MAX.				
FRN-1	59TP5A-120	HORIZONTAL	1,300	1,050	250	0.60	120,000	117,000	97% MIN.	7"	14"	12.3	16.1	120V 1Ø	SUPPORT FURNACE FROM ROOF STRUCTURE WITH HANGING RODS WITH VIBRATION ISOLATORS. DISCONNECT BY ELECTRICAL CONTRACTOR.

NOTE: THROW AWAY FILTER EXTERNAL STATIC PRESSURE (ESP) INCLUDES COOLING COIL PRESSURE DROP. PROVIDE HORIZONTAL UNIT ADEQUATE SPACE FOR CONDENSATE TRAP CLEARANCES.

AIR DEVICE SCHEDULE

NOTES:

- SYMBOL KEY - FIRST LETTER: S-SUPPLY, R-RETURN, E-EXH, T-TRANSFER SECOND LETTER: D-DIFFUSER, R-REGISTER, G-GRILLE
- PROVIDE OPTIONAL DIRECTIONAL THROW FEATURE FOR OTHER THAN 4-WAY
- FINISH - "A" WHITE "B" WHITE - G.C. TO FIELD PAINT TO MATCH CEILING OR WALL WITH ENAMEL FINISH.
- VOLUME DAMPER - FACTORY FURNISHED. OPPOSED BLADE OR BUTTERFLY WHERE AVAILABLE. ADJUSTABLE FROM FACE.
- BORDER STYLE - "A" SURFACE MOUNTED "B" LAY-IN. PROVIDE WITH PLASTER FRAME FOR DRYWALL CEILING MOUNTING. "C" LAY-IN FRAME FOR T-BAR CEILING.
- PROVIDE BOOT FOR DUCT MOUNTING.

SYMBOL (1)(2)	MANUFACTURER CATALOG NUMBER	NOMINAL SIZE MOD.	NECK REFER TO PLAN	MOUNTING CLG. OTHER	MATERIAL STEEL ALUM.	FINISH (3)	DPR. (4)	BORDER (5)	REMARKS
SD-1	TITUS OMNI	24"x24"	REFER TO PLAN	o	o	B	o	C	
SD-2	TITUS OMNI	12"x12"	REFER TO PLAN	o	o	B	o	C	
RG-1	TITUS 355RL	24"x24"	22"x22"	o	o	B	o	C	
EG-1	TITUS 50F	12"x12"	10"x10"	o	o	B	o	C	

INFRARED HEATING SCHEDULE

TAG	MANUFACTURER	MODEL	HEATING CAPACITY		LENGTH OF STRAIGHT TUB	EXHAUST FLUE	COMBUSTION AIR INLET	WEIGHT LBS	VOLTAGE/ PHASE	REMARKS
			GAS SUPPLY PRESSURE							
			MIN.	MAX.						
IRH-1	ROBERT GORDON	CTH2V	100,000	7" 14"	30'-0"	4"Ø	4"Ø	161	120V/1Ø	PROVIDE HEATER WITH STANDARD REFLECTOR AND END CAPS
IRH-2	ROBERT GORDON	CTH2V	100,000	7" 14"	30'-0"	4"Ø	4"Ø	161	120V/1Ø	PROVIDE HEATER WITH STANDARD REFLECTOR AND END CAPS
IRH-3	ROBERT GORDON	CTH2V	100,000	7" 14"	30'-0"	4"Ø	4"Ø	161	120V/1Ø	PROVIDE HEATER WITH STANDARD REFLECTOR AND END CAPS
IRH-4	ROBERT GORDON	CTH2V	100,000	7" 14"	30'-0"	4"Ø	4"Ø	161	120V/1Ø	PROVIDE HEATER WITH STANDARD REFLECTOR AND END CAPS

EXHAUST FAN SCHEDULE

Identity Mark	MANUFACTURER	MODEL NO.	TYPE	ARRANGEMENT	FAN				UNIT WEIGHT	MOCP	VOLT	PH	REMARKS
					AIRFLOW		MOTOR						
					DESIGN	ESP	POWER	RPM					
EF-1	GREENHECK	B5Q-90	INLINE	IN-LINE	300 CFM	0.50 in-wg	0.25 hp	1211	77 lb	15	120 V	1	SUPPORT FAN FROM STRUCTURE WITH HANGING RODS WITH VIBRATION ISOLATORS
EF-2	GREENHECK	GB-330	EXTERIOR	DOWNFLOW	7400 CFM	0.25 in-wg	0.76 hp	370	485 lb	35	120 V	1	PROVIDE FAN WITH SLOPE ROOF CURB

AIR COOLED CONDENSING SCHEDULE

TAG	CARRIER MODEL	NOM. TONS	COOLING CAPACITY (BTU)	COMPRESSOR			ELEC. DATA		EER	REMARK
				REF. TYPE	NOM. CAPACITY	COMP. STEPS	VOLTS	PHASE		
CU-1	24ABB348	4.0	48,000	R-22	1	1	208	1	13.0	PROVIDE UNIT HOUSEKEEPING PAD

UNIT HEATER SCHEDULE (GAS)

TAG	REZNOR MODEL	TYPE	AIRFLOW CFM	GAS HEATING SECTION			ELECTRICAL DATA				REMARKS
				MBH INPUT	MBH OUTPUT	GAS SUPPLY PRESSURE	HP	FLA	M.C.P.	VOLTS / PH.	
UH-1	UDX-125	GAS-FIRED	1537	125,000	99,600	7" 14"	1/20	3.8	15	120V. 1Ø	SUPPORT HEATER FROM ROOF STRUCTURE WITH HANGING RODS WITH VIBRATION ISOLATORS. DISCONNECT BY ELECTRICAL CONTRACTOR.

UNIT HEATER SCHEDULE (ELECTRIC)

TAG	QMARK MODEL	TYPE	AIRFLOW CFM	ELECTRIC CAPACITY		ELECTRICAL DATA				REMARKS
				KW	MBH OUTPUT	HP	FLA	M.C.P.	VOLTS / PH.	
UH-2	MUH-07-02	ELECTRIC	650	7.5	25,600	1/30	3.8	19.1	208V. 3Ø	SUPPORT HEATER FROM ROOF STRUCTURE WITH HANGING RODS WITH VIBRATION ISOLATORS. DISCONNECT BY ELECTRICAL CONTRACTOR.



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MECHANICAL SCHEDULES

M4.1

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. THE CONTRACTOR FOR THIS WORK IS REFERRED TO BIDDING REQUIREMENTS, GENERAL CONDITIONS, SUPPLEMENTAL GENERAL CONDITIONS, SPECIAL CONDITIONS, ADDENDA, TEMPORARY SERVICES, ELECTRICAL, FIRE SUPPRESSION, PLUMBING, AND OTHER PERTINENT SECTIONS OF DIVISION 01. THESE SECTIONS DESCRIBE WORK WHICH IS A PART OF THIS CONTRACT. THE FOLLOWING GENERAL PROVISIONS APPLY AND SUPPLEMENT THESE SECTIONS OF DIVISION 01. IN CASES OF CONFLICTING REQUIREMENTS, THE STIPULATIONS SET FORTH IN DIVISION 01 SUPERSEDE AND MUST BE SATISFIED BY THE CONTRACTOR.
B. SUBMIT SHOP DRAWINGS, OPERATION MAINTENANCE MANUALS AND RECORD AS-BUILT DRAWINGS AS CALLED FOR IN DIVISION 01.
C. ANY SUBSTITUTIONS THE CONTRACTOR WISHES TO BID MUST BE DONE FOLLOWING THE FORMAT AND PROCEDURES DESCRIBED IN DIVISION 01.

1.2 SUMMARY

- A. FURNISH ALL MATERIALS, LABOR, TOOLS, TRANSPORTATION, INCIDENTALS AND APPURTENANCES TO COMPLETE IN EVERY DETAIL AND LEAVE IN WORKING ORDER ALL ITEMS OF WORK CALLED FOR HEREIN OR SHOWN ON THE ACCOMPANYING DRAWINGS.
B. INCLUDE ANY AND ALL MINOR ITEMS OF WORK NECESSARY TO PROVIDE A COMPLETE AND FULLY OPERATIVE SYSTEM.

1.3 GENERAL REQUIREMENTS

- A. CONTRACTOR MUST READ THE ENTIRE SPECIFICATIONS COVERING OTHER BRANCHES OF WORK. HE IS RESPONSIBLE FOR COORDINATION OF HIS WORK WITH WORK PERFORMED BY OTHER TRADES.
B. CONSULT ALL CONTRACT DRAWINGS WHICH MAY AFFECT THE LOCATION OF ANY EQUIPMENT OR APPARATUS FURNISHED UNDER THIS WORK AND MAKE MINOR ADJUSTMENTS IN LOCATION AS NECESSARY TO SECURE COORDINATION.
C. THE LAYOUT SHOWN ON DRAWINGS IS BASED ON A PARTICULAR MAKE OF EQUIPMENT. IF ANOTHER MAKE OF EQUIPMENT IS USED WHICH REQUIRES MODIFICATION OR CHANGE OF ANY DESCRIPTION FROM THE DRAWINGS OR SPECIFICATIONS, THIS CONTRACTOR SHALL BE RESPONSIBLE AS PART OF THIS WORK, FOR MAKING ALL SUCH MODIFICATIONS AND CHANGES, INCLUDING THOSE INVOLVING OTHER TRADES WITH THE COST THEREOF INCLUDED IN HIS BID. IN SUCH CASE, CONTRACTOR SHALL SUBMIT DRAWINGS AND SPECIFICATIONS PRIOR TO STARTING WORK SHOWING ALL SUCH MODIFICATIONS AND CHANGES. HIS PROPOSAL SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT AND ENGINEER.
D. SYSTEM LAYOUTS ARE SCHEMATIC AND SHOW APPROXIMATE LOCATIONS OF PIPING, DUCTWORK AND EQUIPMENT. EXACT LOCATIONS SHALL BE COORDINATED AND VERIFIED IN THE FIELD AND MAY BE DETERMINED BY STRUCTURAL AND OTHER CONDITIONS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT THE DESIGN OF THE SYSTEM MAY BE ARBITRARILY CHANGED. BECAUSE OF THE SMALL SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL DUCT AND PIPING OFFSETS, FITTINGS AND ACCESSORIES THAT MAY BE REQUIRED. THE EQUIPMENT LAYOUT IS TO FIT INTO THE BUILDING AS CONSTRUCTED AND TO COORDINATE WITH EQUIPMENT INCLUDED UNDER OTHER DIVISIONS OF WORK.
E. THE EQUIPMENT LAYOUT IS TO FIT INTO THE BUILDING AS CONSTRUCTED AND TO COORDINATE WITH EQUIPMENT INCLUDED UNDER OTHER DIVISIONS OF WORK.
F. CONTACT THE ARCHITECT OR ENGINEER IMMEDIATELY IF ANY DISCREPANCIES OR OMISSIONS ARE NOTED IN EITHER THE DRAWINGS OR THE SPECIFICATIONS, OR IF THERE ARE ANY QUESTIONS REGARDING THE MEANING OR INTENT THEREOF.
G. SUBMIT ALL CHANGES, OTHER THAN MINOR ADJUSTMENTS, TO THE ARCHITECT OR ENGINEER FOR APPROVAL PRIOR TO FABRICATION, ORDERING AND PROCEEDING WITH THE WORK.
H. ARCHITECT/ENGINEER RESERVES THE RIGHT TO MAKE MINOR CHANGES IN LOCATION OF PIPING, DUCTWORK, AIR DEVICES AND EQUIPMENT, UP TO THE TIME OF ROUGHING-IN, WITHOUT ADDITIONAL COST.

1.4 PROJECT SITE CONDITIONS

- A. THE CONTRACTOR IS REQUIRED TO VISIT THE SITE AND FULLY INFORM HIMSELF CONCERNING ALL CONDITIONS AFFECTING THE SCOPE OF WORK. FAILURE TO VISIT THE SITE SHALL NOT RELIEVE THE CONTRACTOR FROM ANY RESPONSIBILITY IN THE PERFORMANCE OF HIS WORK.
B. ALL WORKMANSHIP TO BE OF THE HIGHEST QUALITY IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADE BY CRAFTSMEN SKILLED IN THIS PARTICULAR WORK.
C. CONTRACTOR IS TO HAVE A COMPETENT SUPERINTENDENT IN CHARGE OF THE WORK INSTALLED UNDER THIS CONTRACT. SUPERINTENDENT TO BE EXPERIENCED IN THIS TYPE OF WORK AND BE ON THE JOB SITE AT ALL TIMES DURING PERIODS OF WORK UNDER HIS JURISDICTION.

1.5 PERMITS, INSPECTIONS AND CODES

- A. FILE ALL DRAWINGS, PAY ALL FEES AND OBTAIN PERMITS AND CERTIFICATES OF INSPECTION RELATIVE TO THIS WORK.
B. COMPLETED INSTALLATION SHALL CONFORM WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS, CODES AND ORDINANCES, INCLUDING BUT NOT LIMITED TO THE LATEST APPROVED EDITIONS OF THE FOLLOWING:
1. LOCAL BUILDING CODE.
2. LOCAL MECHANICAL CODE.
3. SPECIFIC CONSTRUCTION SAFETY REQUIREMENTS, STATE INDUSTRIAL COMMISSION.
4. STATE PRESSURE PIPING SYSTEM RULES.
5. A.S.M.E. PRESSURE PIPING CODE.
6. STANDARDS FOR WELDING REQUIREMENTS, STATE INDUSTRIAL COMMISSION.
7. LIFE SAFETY CODE, NFPA-101.
8. AIR-CONDITIONING AND VENTILATING, NFPA-90A.
9. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) OF 1971 AND ALL AMENDMENTS THERETO.
10. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
C. NOTHING CONTAINED IN THE DRAWINGS AND SPECIFICATIONS SHALL BE CONSTRUED TO CONFLICT WITH THESE LAWS, CODES AND ORDINANCES AND THEY ARE HEREBY INCLUDED IN THESE SPECIFICATIONS.

1.6 SUBMITTALS

- A. SUBMIT SHOP DRAWINGS UNDER PROVISIONS OF DIVISION 01 AND INCLUDE SPECIFIC DATA DESCRIBED IN VARIOUS SPECIFICATION SECTIONS. CLEARLY INDICATE WHICH MATERIALS ARE PROPOSED FOR USE IN THIS PROJECT, THEIR SIZES AND LOCATIONS, PER THE SCHEDULES OR TABLES IN THESE SPECIFICATIONS.
B. SUBMIT SHOP DRAWINGS AND PRODUCT DATA GROUPED TO INCLUDE COMPLETE SUBMITTALS OF RELATED SYSTEMS, PRODUCTS, AND ACCESSORIES IN A SINGLE SUBMITTAL.
C. MARK DIMENSIONS AND VALUES IN UNITS TO MATCH THOSE SPECIFIED.
D. 1/4" SCALE COORDINATION DRAWINGS: THE HVAC CONTRACTOR SHALL PREPARE ONE-FOURTH INCH EQUALS ONE FOOT SCALE DRAWINGS OF ALL SHEET METAL WORK WITH PLAN AND ELEVATION DIMENSIONS TO SPECIFICALLY LOCATE ALL DUCTWORK, EQUIPMENT AND HVAC PIPE WORK ON THE SAME DRAWINGS. THE DRAWINGS SHALL BE KEPT TO THE STRUCTURAL COLUMN IDENTIFICATION SYSTEM AND SHALL BE PROGRESSIVELY NUMBERED. DO NOT FABRICATE OR INSTALL ANY EQUIPMENT OR MATERIALS UNTIL COORDINATION DRAWINGS ARE APPROVED BY THE GENERAL CONTRACTOR, ARCHITECT/ENGINEER AND OWNER. THE DRAWINGS SHOULD INCLUDE PROPOSED MAJOR EQUIPMENT ITEMS SUCH AS AIR HANDLING UNITS, VAV BOXES, FANS OR OTHER SUCH ITEMS AS NECESSARY TO OBTAIN COORDINATION. THE DRAWINGS SHOULD BE PREPARED TO COORDINATE WITH BUILDING PHASING.

- 1. THE HVAC CONTRACTOR WILL PROVIDE THE DRAWINGS TO THE CEILING, ELECTRICAL, TECHNOLOGY, FIRE SUPPRESSION, AND PLUMBING CONTRACTORS FOR USE IN PREPARING DRAWINGS OF THE CONTRACTORS WORK, TO SPECIFICALLY LOCATE CEILING SUSPENSION LOCATIONS, EQUIPMENT, PIPING, CONDUIT, APPURTENANCES AND OTHER WORK.
2. ELECTRICAL, FIRE SUPPRESSION, AND PLUMBING CONTRACTORS SHALL SUBMIT THE DRAWINGS TO THE HVAC CONTRACTOR SHOWING THE LOCATION OF THE CONTRACTORS EQUIPMENT, PIPING, CONDUIT, AND OTHER WORK FOR PREPARATION OF DETAILED COORDINATION DRAWINGS BY THE HVAC CONTRACTOR.
3. THE DRAWINGS SHALL INDICATE LOCATIONS OF CEILING GRID, LIGHT FIXTURES, SPEAKERS, SMOKE DETECTORS, AIR DEVICES, SPRINKLER HEADS, ACCESS DOORS, ETC. IN THE CEILING AND THE CEILING COMPONENTS.
4. THE DRAWINGS SHALL INCLUDE ADDENDA ITEMS AND CHANGE ORDERS, KEEPING PLANS CURRENT WITH THESE CHANGES.
E. THE CONTRACTOR SHALL ADVISE THE ARCHITECT/ENGINEER OF ANY CONFLICTS THEY ARE UNABLE TO RESOLVE FOR RESOLUTION. CONTRACTORS SHALL BEAR ALL COSTS FOR RELOCATION REQUIRED DURING LATER PHASES OF CONSTRUCTION. THE CONTRACTOR SHALL ADVISE THE ARCHITECT/ENGINEER OF CONFLICTS.
F. COORDINATION DRAWINGS SHALL BE FURNISHED TO THE TEST AND BALANCING CONTRACTOR FOR THEIR WORK.
G. FINAL COORDINATION DRAWINGS SHALL BE SUBMITTED AS RECORD DRAWINGS AT THE COMPLETION OF THE PROJECT.

1.7 ALTERNATES

- A. ALTERNATES QUOTED ON BID FORMS WILL BE REVIEWED AND ACCEPTED OR REJECTED AT THE OWNER'S OPTION. ACCEPTED ALTERNATES WILL BE IDENTIFIED IN OWNER-CONTRACTOR AGREEMENT. REFER TO DIVISION 01 - ALTERNATES.
B. COORDINATE RELATED WORK AND MODIFY SURROUNDING WORK AS REQUIRED.
1.8 ELECTRICAL MOTORS
A. FURNISH, INSTALL AND ALIGN ALL MOTORS REQUIRED FOR THIS EQUIPMENT. UNLESS THEY ARE FACTORY INSTALLED ON THE UNIT, ALL STARTERS AND ASSOCIATED WIRING AND SAFETY SWITCHES FOR SUCH MOTORS SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. STARTERS SHALL MEET ALL REQUIREMENTS AS DEFINED IN THE ELECTRICAL DIVISION OF THE SPECIFICATIONS.
B. DESIGN, CONSTRUCTION AND PERFORMANCE CHARACTERISTICS OF MOTORS SHALL CONFORM TO ALL APPLICABLE PROVISIONS OF LATEST NEMA, ANSI, IEEE AND NFPA STANDARDS FOR ELECTRICAL EQUIPMENT. ALL MOTORS SHALL BE SUITABLE FOR OPERATION ON VOLTAGE VARIATION OF PLUS OR MINUS 10% 40 DEGREES AMBIENT TEMPERATURE, HAVE A SERVICE FACTOR OF NOT LESS THAN 1.15.
C. EXPLOSION-PROOF MOTORS: UL APPROVED AND LABELED FOR HAZARD CLASSIFICATION, WITH OVER TEMPERATURE PROTECTION.
D. VISIBLE NAMEPLATE: INDICATING MOTOR HORSEPOWER, VOLTAGE, PHASE, CYCLES, RPM,

FULL AMP'S, LOCKED ROTOR AMP'S, FRAME SIZE, MANUFACTURER'S NAME AND MODEL NUMBER, SERVICE FACTOR, POWER FACTOR EFFICIENCY

- 1. CONFORM TO LOCAL ENERGY CODE, PROVIDE HIGH EFFICIENCY MOTORS PER APPLICABLE ENERGY CODE.
E. ELECTRICAL CONNECTION: CONDUIT CONNECTION BOXES, THREADED FOR CONDUIT, FOR FRACTIONAL HORSEPOWER MOTORS WHERE CONNECTION IS MADE DIRECTLY, PROVIDE SEPARATE CONDUIT CONNECTION IN END FRAME.
F. THIS CONTRACTOR SHALL FURNISH THE ELECTRICAL CONTRACTOR WITH ALL WIRING DIAGRAMS NECESSARY TO CONNECT AND CONTROL MECHANICAL EQUIPMENT.
G. MOTORS LOCATED IN EXTERIOR LOCATIONS, WET AIR STREAMS, DOWNSTREAM OF SPRAYED COIL DEHUMIDIFIERS, DRAW THRU COOLING TOWERS, AIR COOLED CONDENSERS, HUMIDIFIERS, DIRECT DRIVE AXIAL FAN EXHAUST PROOF ENVIRONMENTS AND DUST COLLECTION SYSTEMS SHALL BE TOTALLY ENCLOSED TYPE.
H. PROTECT MOTORS STORED ON SITE FROM WEATHER AND MOISTURE BY MAINTAINING FACTORY COVERS AND SUITABLE WEATHERPROOF COVERING. FOR EXTENDED OUTDOOR STORAGE, REMOVE MOTORS FROM EQUIPMENT AND STORE SEPARATELY.

1.9 RECORD DRAWINGS

- A. THE CONTRACTOR OR SUBCONTRACTOR FOR THIS WORK SHALL KEEP ON THE JOB ONE COMPLETE SET OF THE CONTRACT WORKING DRAWINGS ON WHICH HE SHALL RECORD ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION. RECORD SHALL SHOW CHANGES IN:
1. LOCATION OF ANY DEVICE OR PIECE OF EQUIPMENT.
2. LOCATION OF ANY OUTLET OR SOURCE IN BUILDING SERVICE SYSTEM.
3. ROUTING OF ANY PIPING, DUCTS, OR OTHER BUILDING SERVICES.
B. THESE DRAWINGS SHALL ALSO RECORD THE LOCATION OF ALL CONCEALED DUCTS, AND OTHER PIPING, BY INDICATION OF MEASURED DIMENSIONS TO EACH SUCH LINE FROM READILY IDENTIFIABLE AND ACCESSIBLE WALLS OR CORNERS OF THE BUILDING.
C. SHEET METAL FABRICATION/MEASURED DRAWINGS ARE NOT ACCEPTABLE AS-BUILT OR RECORD DRAWINGS. ONLY RED-LINED CONTRACT DRAWINGS WILL BE ACCEPTED.
D. THESE DRAWINGS SHALL BE KEPT CLEAN AND UNDAMAGED AND SHALL NOT BE USED FOR ANY PURPOSE OTHER THAN RECORDING DEVIATIONS FROM WORKING DRAWINGS AND EXACT LOCATIONS OF CONCEALED WORK.
E. AFTER THE JOB IS COMPLETED, THESE SETS OF DRAWINGS SHALL BE DELIVERED TO THE ARCHITECT OR ENGINEER IN GOOD CONDITION AS A PERMANENT RECORD OF THE INSTALLATION AS ACTUALLY CONSTRUCTED.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. INSTRUCT THE OWNER'S REPRESENTATIVES IN ALL MATTERS PERTAINING TO THE PROPER OPERATION AND MAINTENANCE OF EQUIPMENT FURNISHED UNDER THE HVAC CONTRACTS, SUBMIT UNDER THE PROVISIONS OF DIVISION 01.

1.11 INSPECTION

- A. THIS CONTRACTOR TO ARRANGE FOR AND INCLUDE IN HIS BID, INSPECTION OF THE WORK IN CONNECTION WITH EQUIPMENT INCLUDING UNDER OTHER DIVISIONS OF WORK. THE CONTRACTOR SHALL OBTAIN SIGNED CERTIFICATES OF FINAL INSPECTION BEFORE THE WORK WILL BE ACCEPTED.
B. THIS CONTRACTORS SHALL CALL FOR ALL INSPECTIONS WHEN THEY BECOME DUE, AND SHALL NOT COVER ANY WORK UNTIL APPROVED.

1.12 GUARANTEE

- A. CONTRACTOR SHALL GUARANTEE HIS WORK TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE UNLESS SPECIFIED OTHERWISE. ANY EQUIPMENT, PIPING OR ANY OTHER PART OF THE SYSTEM, WHICH FALLS WITHIN THE GUARANTEE PERIOD, SHALL BE REPAIRED OR REPLACED BY CONTRACTOR WITHOUT COST TO THE OWNER. IN CASE OF REPLACEMENT OR REPAIR OF EQUIPMENT DUE TO DEFECTS, ACCESS DOORS SHALL BE SUITABLE FOR INSTALLATION IN WALL OR CEILING MATERIALS SHOWN IN ROOM FINISH SCHEDULES.
B. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF EQUIPMENT WHICH SHALL BE EXTENDED FOR A PERIOD EQUAL TO THE ORIGINAL GUARANTEE FROM DATE OF SUCH REPLACEMENT OR REPAIR.

1.13 CADD FILES

- A. A SET OF ELECTRONIC CADD FILES OF THE DRAWINGS WILL BE MADE AVAILABLE TO THE CONTRACTOR BY THE ENGINEER. THESE FILES WILL BE ISSUED AT CONTRACTOR'S REQUEST FOR THE SOLE PURPOSE OF COORDINATION OF WORK ON THIS PROJECT AND SHALL NOT BE USED FOR ANY OTHER PURPOSE WITHOUT WRITTEN APPROVAL BY THE ENGINEER.
B. DUE TO THE NATURE OF ELECTRONIC MEDIA, THE ENGINEER/ARCHITECT CANNOT WARRANT THE ACCURACY OF DATA CONTAINED IN ELECTRONIC DRAWING FILES. ANY USE OR REUSE OF ORIGINAL OR ALTERED DATA FILES BY THE CONTRACTOR OR OTHER PARTIES WITHOUT THE REVIEW AND WRITTEN APPROVAL OF THE ENGINEER/ARCHITECT SHALL BE AT THE SOLE RISK OF THE CONTRACTOR. FURTHERMORE, THE CONTRACTOR AGREES TO DEFEND, INDEMNIFY AND HOLD ENGINEER HARMLESS FROM ALL CLAIMS, INJURIES, DAMAGES, LOSSES, EXPENSES AND ATTORNEY FEES ARISING OUT OF THE MODIFICATION OR REUSE OF THESE MATERIALS.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. FURNISH NEW AND UNDETERIORATED MATERIALS AND OF A QUALITY NOT LESS THAN WHAT IS SPECIFIED.
B. CONTRACTOR TO FURNISH AND INSTALL ONLY THOSE BRANDS OF EQUIPMENT MENTIONED SPECIFICALLY OR ACCEPTED AS SUBSTITUTES.
C. THE SELECTION OF MATERIALS AND EQUIPMENT TO BE FURNISHED SHALL BE GOVERNED BY THE FOLLOWING:
1. WHERE TRADE NAMES, BRANDS OR MANUFACTURER OF EQUIPMENT OR MATERIALS ARE LISTED IN THE SPECIFICATION, THE EXACT EQUIPMENT LISTED SHALL BE USED IN THE BID. WHERE MORE THAN ONE NAME IS LISTED, CONTRACTOR MAY SELECT ANY ONE OF THE SEVERAL BRANDS SPECIFIED.
2. ANY ADDITIONAL APPROVED MANUFACTURERS WILL BE LISTED BY ADDENDUM ONLY. IN ORDER TO BE CONSIDERED, CONTRACTOR MUST REQUEST APPROVAL OF OPTIONAL MANUFACTURER IN WRITING NO LATER THAN TEN (10) WORKING DAYS PRIOR TO THE BID DATE.

2.2 SUBCONTRACTORS AND EQUIPMENT APPROVAL

- A. WITHIN TEN (10) DAYS AFTER AWARD OF CONTRACT, CONTRACTOR MUST SUBMIT A LIST TO THE ARCHITECT/ENGINEER SHOWING THE NAMES OF MANUFACTURERS AND SUBCONTRACTORS HE INTENDS TO USE.

2.3 SUBSTITUTIONS

- A. CONTRACTOR MUST BASE HIS BID ON FURNISHING THE BRANDS OF MATERIAL AND EQUIPMENT LISTED IN THE SPECIFICATIONS.
B. HE IS ENTITLED TO BID ON ANY OTHER EQUAL OR SIMILAR BRANDS OF MATERIAL AND EQUIPMENT HE MAY DESIRE TO SUBSTITUTE. THE SUBSTITUTE MUST BE LISTED ON THE PROPOSAL FORM SUBSTITUTION SHEET, WITH THE DIFFERENCE IN COST FROM BASE BID CLEARLY STATED.
C. CHANGES REQUIRED BY SUBSTITUTES, SUCH AS REVISIONS TO FOUNDATIONS, BASES, PIPING, CONTROLS, WIRING, OPENINGS AND APPURTENANCES SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
D. SUBSTITUTIONS WHICH ARE APPROVED AND ACCEPTED SHALL BE WRITTEN INTO THE CONTRACT AND NO CHANGES OF BRANDS SHALL BE MADE AFTER THE CONTRACT IS SIGNED UNLESS APPROVED IN WRITING.

2.4 COST BREAKDOWN

- A. CONTRACTOR SHALL SUBMIT ITEMIZED CONTRACT COST BREAKDOWN IN ACCORDANCE WITH GENERAL CONDITIONS AND DIVISION 01, GENERAL REQUIREMENTS.

PART 3 - EXECUTION

3.1 MATERIALS AND RESPONSIBILITY

- A. ALL MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER AND PROTECTED FROM DAMAGE. UNLESS OTHERWISE SPECIFIED, MATERIALS SHALL BE NEW. SECONDS OR DAMAGED MATERIALS SHALL NOT BE USED. THE INSTALLATION FOR ANY MATERIALS AND EQUIPMENT NOT MEETING THESE STANDARDS MAY BE CONDEMNED BY THE ARCHITECT OR ENGINEER, AND SHALL BE REMOVED AND REPLACED AT NO ADDITIONAL COST TO THE OWNER.
B. CONTRACTOR IS RESPONSIBLE FOR THE SAFETY AND GOOD CONDITIONS OF THE MATERIALS, EQUIPMENT AND SYSTEMS INSTALLED UNTIL FINAL ACCEPTANCE BY OWNER. ALL MATERIALS SHALL BE STORED IN SUCH A MANNER AS TO PREVENT DAMAGE OR WEATHERING PRIOR TO INSTALLATION.
C. WHEN AN INSTALLATION IS FOUND TO BE IMPROPER, THE ARCHITECT OR ENGINEER SHALL NOTIFY THE CONTRACTOR TO MAKE CORRECTIONS AT ONCE. THE CONTRACTOR SHALL THEN PROCEED ONLY WHEN CORRECTIONS HAVE BEEN MADE AND APPROVED.
D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR START-UP, TEMPORARY OPERATION AND SHUTDOWN OF EQUIPMENT PRIOR TO FINAL ACCEPTANCE BY OWNER.
E. THIS CONTRACTOR SHALL BE HELD RESPONSIBLE FOR DAMAGE CAUSED BY HIS WORK OR THROUGH NEGLECT OF HIS WORKMEN. REPAIRING OF DAMAGED WORK SHALL BE DONE BY THIS CONTRACTOR AS DIRECTED BY THE ARCHITECT OR ENGINEER. COST OF REPAIRS SHALL BE PAID BY THIS CONTRACTOR.
F. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO THE GROUNDS, WALKS, ROADS, BUILDINGS, AND THEIR EQUIPMENT AND CONTENTS, PIPING SYSTEMS AND ELECTRIC SYSTEMS CAUSED BY LEAKS IN THE PIPING SYSTEM BEING INSTALLED HEREIN. HE SHALL REPAIR AT HIS EXPENSE ALL DAMAGE SO CAUSED. ALL REPAIR WORK SHALL BE DONE AS DIRECTED BY THE ARCHITECT OR ENGINEER.
G. THE OWNER RESERVES THE RIGHT TO MAKE EMERGENCY REPAIRS AS REQUIRED TO KEEP EQUIPMENT IN OPERATION WITHOUT VOIDING THE CONTRACTOR'S GUARANTEE BOND AND NOT RELIEVING THE CONTRACTOR OF HIS RESPONSIBILITIES DURING THE BONDING OR GUARANTEE PERIOD.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. INSTALL PIPING ACCORDING TO THE FOLLOWING REQUIREMENTS AND DIVISION 23 SECTIONS SPECIFYING PIPING SYSTEMS.
B. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

C. INSTALL PIPING AND DUCTS IN CONCEALED LOCATIONS, UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS

- D. INSTALL PIPING AND DUCTS INDICATED TO BE EXPOSED AND PIPING AND DUCTS IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
E. INSTALL PIPING AND DUCTS ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CLEANING PANEL REMOVAL AND INSTALLATION AND REMOVAL OF LIGHT FIXTURES, SENSORS, ETC.
F. INSTALL PIPING TO PERMIT VALVE SERVICING AT AN ACCESSIBLE LOCATION.
G. INSTALL PIPING FREE OF SAGS AND BENDS. PIPING TO BE INDIVIDUALLY OR TRAPEZE STYLE SUPPORTED FROM THE BUILDING STRUCTURE.
H. INSTALL FITTINGS FOR ALL CHANGES IN SIZE, DIRECTION AND BRANCH CONNECTIONS.
1. MECHANICAL TEES, MECHANICAL CROSSES, EXTRUDED TEES, TWIST-LOCKED JOINTS, AND PRESS JOINTS ARE NOT PERMITTED.

I. INSTALL PIPING AND DUCTS TO ALLOW APPLICATION OF INSULATION.

- J. GENERAL: LOCATE THE WORK AND COMPONENTS OF THE WORK ACCURATELY, IN CORRECT ALIGNMENT AND ELEVATION, AS INDICATED.
1. MAKE VERTICAL WORK PLUMB AND MAKE HORIZONTAL WORK LEVEL OR AT SPECIFIED SLOPE.
2. WHERE SPACE IS LIMITED, INSTALL COMPONENTS TO MAXIMIZE SPACE AVAILABLE FOR MAINTENANCE AND EASE OF REMOVAL FOR REPLACEMENT.
3. CONCEAL PIPES, DUCTS, AND WIRING IN FINISHED AREAS, UNLESS OTHERWISE INDICATED.
4. MAINTAIN MINIMUM HEADROOM CLEARANCE OF 8 FEET (2.4 M) IN ALL SPACES WITHOUT A SUSPENDED CEILING.
5. GENERALLY, PIPE INSTALLATIONS WITH CODE REQUIRED SLOPE ARE A HIGH PRIORITY, FOLLOWED BY DUCTWORK AND THEN PIPING. PIPING REQUIRING A SLOPE SHALL BE INSTALLED AS CLOSE TO THE BUILDING STRUCTURE AS POSSIBLE ON THE (HIGH) INLET END AND SLOPE UNIFORMLY TO THE (LOW) OUTLET END.

K. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS FOR INSTALLING ALL PRODUCTS IN APPLICATIONS INDICATED.

L. ANCHORS AND FASTENERS: PROVIDE ANCHORS AND FASTENERS AS REQUIRED TO ANCHOR EACH COMPONENT SECURELY IN PLACE, ACCURATELY LOCATED AND ALIGNED WITH OTHER PORTIONS OF THE WORK.

1. MOUNTING HEIGHTS: WHERE MOUNTING HEIGHTS ARE NOT INDICATED, MOUNT COMPONENTS AT HEIGHTS DIRECTED BY ARCHITECT.

2. INSTALL PIPING AT INDICATED SLOPES SHOWN ON THE DRAWINGS OR INDICATED IN EQUIPMENT SPECIFICATIONS.

3. ALLOW FOR BUILDING MOVEMENT, INCLUDING THERMAL EXPANSION AND CONTRACTION OF STRUCTURE.

4. COORDINATE INSTALLATION OF ANCHORAGES. FURNISH SETTING DRAWINGS, TEMPLATES, AND DIRECTIONS FOR INSTALLING ANCHORAGES, INCLUDING SLEEVES, CONCRETE INSERTS, ANCHOR BOLTS, AND ITEMS WITH INTEGRAL ANCHORS, THAT ARE TO BE EMBEDDED IN CONCRETE OR MASONRY. DELIVER SUCH ITEMS TO PROJECT SITE IN TIME FOR INSTALLATION.

3.3 PROTECTION AND CLEANING

- A. PROTECT ALL EQUIPMENT AGAINST DAMAGE FROM LEAKS OR ABUSE AND PAY THE COST OF REPAIR OR REPLACEMENT OF DUCTWORK, PIPING OR EQUIPMENT MADE NECESSARY BY FAILURE TO PROVIDE SUITABLE SAFEGUARDS OR PROTECTION.
B. REPAIR ALL DENTS AND SCRATCHES IN FACTORY PRIME OR FINISH COATS ON ALL EQUIPMENT. IF DAMAGE IS EXCESSIVE, REPLACEMENT MAY BE REQUIRED. THOROUGHLY CLEAN, REMOVE STICKERS AND OTHER FOREIGN MATTER.
C. AFTER ALL PIPING AND EQUIPMENT HAS BEEN INSPECTED AND APPROVED, THOROUGHLY CLEAN ALL EQUIPMENT, DUCTWORK, BARE PIPING AND INSULATION PROVIDED UNDER THIS WORK.

3.4 RUBBISH

- A. ALL RUBBISH RESULTING FROM THE WORK HEREIN SPECIFIED SHALL BE REMOVED FROM THE PREMISES BY THE TRADE WHICH PRODUCED IT, AS FAST AS IT ACCUMULATES.
B. ON COMPLETION OF HIS WORK, EACH CONTRACTOR SHALL REMOVE AND SEE THAT EACH OF HIS SUB-CONTRACTORS REMOVES FROM THE SITE ALL TOOLS, EQUIPMENT, SURPLUS MATERIALS AND RUBBISH PERTAINING TO HIS OWN OPERATIONS. EACH CONTRACTOR OR SUB-CONTRACTOR SHALL PAY ALL COSTS FOR EACH REMOVAL AND DISPOSITION AND SHALL COOPERATE WITH OTHER CONTRACTORS IN FINAL CLEANING.

3.5 EXISTING SERVICES

- A. ACTIVE SERVICES ENCOUNTERED IN WORK SHALL BE PROTECTED AND SUPPORTED. IF EXISTING SERVICES NOT ANTICIPATED RELOCATION, CONTACT THE ARCHITECT OR ENGINEER IMMEDIATELY. INACTIVE SERVICES ENCOUNTERED SHALL BE REMOVED OR DEACTIVATED AS SHOWN OR DIRECTED BY ARCHITECT OR ENGINEER. ALL COSTS FOR REPAIR OF DAMAGES TO ACTIVE SERVICES SHALL BE PAID BY THE CONTRACTOR CAUSING THE DAMAGE.

3.6 SHUTDOWNS

- A. GIVE 5 WORKING DAYS NOTICE TO ARCHITECT OR ENGINEER AND OWNER OF ANY ANTICIPATED SHUTDOWN REQUIREMENTS OF AN OPERATING SYSTEM. TIE-INS AND MODIFICATIONS TO EXISTING FACILITIES AND SERVICES MUST BE DONE WITH MINIMUM INTERRUPTION OF OWNER'S OPERATION AND DURING HOURS SO AFFECTING.

3.7 CONNECTIONS TO EXISTING STRUCTURES

- A. WHERE ALTERATIONS OR ADDITIONS TO AN EXISTING STRUCTURE ARE CONTEMPLATED, EACH CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL, REROUTING OR REPLACEMENT OF ALL EXISTING FACILITIES AS MAY BE NECESSARY TO PERMIT INSTALLATION OF NEW WORK OR ALTERATIONS TO OLD WORK.
B. WHERE EXISTING FACILITIES ARE PERMANENTLY ABANDONED, EACH OUTLET, BRANCH, ETC. SHALL BE REMOVED AND THE ROUGHING-IN PLUGGED OR CAPPED AT A POINT WELL BEHIND THE PROPOSED NEW FINISHED CLOSURES OR NEW FINISHED SURFACES.

3.8 SLEEVES AND COLLARS

- A. SLEEVES SHALL BE INSTALLED IN ALL INTERIOR BUILDING WALLS AND FLOORS WHERE PIPES OR DUCTS ARE TO PASS THROUGH. SLEEVES SHALL BE SET BY THIS CONTRACTOR.
B. PLAN WORK AHEAD AND ANTICIPATE DURING INITIAL STAGE OF CONSTRUCTION SUCH OPENINGS AS WILL BE REQUIRED TO ACCOMMODATE EQUIPMENT AND PIPING. COORDINATE WORK CLOSELY WITH THE GENERAL CONTRACTOR SO AS TO CONCEAL WORK IN THE FINISHED PORTIONS OF THE BUILDING.
C. PIPE SLEEVES SHALL BE COPPER OR BLACK STEEL OF SUCH SIZE AS TO ALLOW PIPE AND INSULATION TO PASS THROUGH, WITH A MINIMUM CLEARANCE OF 1/4" ON ALL SIDES.
D. WHERE PIPES PASS THROUGH EXTERIOR CONCRETE WALLS BELOW GRADE, SET SCHEDULE D GALVANIZED STEEL PIPE OR SPECIAL MANUFACTURED CASTINGS OR SLEEVES 1-1/2" LARGER THAN O.D. OF PIPE. GROUT AND OTHERWISE ADEQUATELY WATERPROOF OPENING AROUND SLEEVE.

E. A CASING SEAL SYSTEM AS MANUFACTURED BY THUNDERLINE CORP. UNDER THE TRADE NAME "TANK SEAL" OR EQUAL, SHALL BE USED TO SEAL PIPE TO SLEEVE.

F. DUCT SLEEVES TO BE MINIMUM 1/4" GAUGE STEEL AND TO BE FLUSH WITH WALLS OR FLOORS IN FINISHED AREAS OR 3 INCHES ABOVE FLOOR IN UNFINISHED AREAS.

G. SLEEVES THROUGH FIRE RATED CONSTRUCTION SHALL BE FIRESTOPPED PER DIVISION 07, SECTION "PENETRATION FIRESTOPPING" REQUIREMENTS.

H. SLEEVES TO BE SET FLUSH WITH WALL SURFACE, 1/8-INCH ABOVE FINISHED FLOOR OR 3 INCHES ABOVE FLOOR IN UNFINISHED AREA.

I. INSTALL CHROME PLATED COLLARS ON ALL BARE AND INSULATED PIPING IN FINISHED AREAS, AT ALL SLEEVED BUILDING WALLS, PARTITIONS, FLOORS, ETC.

J. INSTALL TRM RINGS ON ALL DUCTWORK AT ALL BUILDING WALLS, PARTITIONS, FLOORS, ETC., PENETRATIONS IN FINISHED AREAS, WHERE DUCTWORK IS EXPOSED.

3.9 CUTTING AND PATCHING

- A. THE CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING AND PATCHING OF BUILDING MATERIALS, PIPING, ETC. AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
B. GIVE THE GENERAL CONTRACTOR LOCATIONS AND SIZES OF ALL OPENINGS REQUIRED FOR THE INSTALLATION OF EQUIPMENT BEFORE CONSTRUCTION AND WALLS ARE STARTED. IF IT BECOMES NECESSARY TO CUT INTO NEW WORK BECAUSE OF THE FAILURE OF THE CONTRACTOR TO NOTIFY THE GENERAL CONTRACTOR, THEN THE GENERAL CONTRACTOR SHALL DO ANY NECESSARY CUTTING AND PATCHING AT THIS CONTRACTOR'S EXPENSE.
C. PATCHING MUST MATCH EXISTING SURFACES IN MATERIAL AND FINISH AND SHALL BE PERFORMED BY THE GENERAL CONTRACTOR AT THIS CONTRACTOR'S EXPENSE.
D. NO STRUCTURAL MEMBER SHALL BE CUT OR DRILLED WITHOUT THE APPROVAL OF THE ARCHITECT OR ENGINEER UNLESS SPECIFICALLY INDICATED IN THE CONTRACT DOCUMENTS.
E. ALL CUTTING AND CORE DRILLING SHALL BE AT THIS CONTRACTOR'S EXPENSE.

3.10 PROVISIONS FOR LATER INSTALLATIONS

- A. WHERE ANY HVAC WORK CANNOT BE INSTALLED AS THE STRUCTURE IS BEING ERECTED, THE CONTRACTOR FOR SUCH WORK SHALL PROVIDE AND ARRANGE FOR THE BUILDING-IN OF BOXES, SLEEVES, INSERTS OR DEVICES AS NECESSARY TO PERMIT INSTALLATION OF THE OMITTED WORK DURING LATER PHASES OF CONSTRUCTION. THIS CONTRACTOR SHALL ARRANGE FOR AND LAY OUT ANY CHANGES, HOLES OR OTHER OPENINGS WHICH MUST BE PROVIDED IN MASONRY, CONCRETE OR OTHER WORK.
B. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR INFORMING HIMSELF OF THE NATURE AND ARRANGEMENT OF THE MEMBERS, MATERIALS AND CONSTRUCTIONS TO WHICH HIS WORK ATTACHES OR PASSES THROUGH.

3.11 PAINTING

- A. ALL METAL WORK INSTALLED UNDER THIS CONTRACT WHICH REMAINS UNFINISHED TO BE PAINTED OR COAT OF PRIMER AS DESCRIBED BELOW. COLOR AS SELECTED BY ARCHITECT.
B. PAINTING WORK TO INCLUDE STEEL SUPPORTS, RODS, HANGERS, BOLTS, NUTS, BASE STEEL WHICH HAS NOT BEEN FACTORY COATED OR WHICH HAS SUFFERED FROM EXPOSURE, BARE PIPE AND FITTINGS, (EXCEPT BRASS VALVES AND FINISHED PARTS) AND INCIDENTAL METAL ITEM.
C. FINISH PAINTING SHALL BE BY THE GENERAL CONTRACTOR UNDER PROVISIONS OF DIVISION 09 UNLESS OTHERWISE SPECIFIED.
D. ALL BARE STEEL, FRAMES AND SUPPORTS EXPOSED TO THE ELEMENTS TO BE COATED WITH

PRIMER, FINISH COAT, AND THEN COVERED WITH COAT OF BITUMASTIC PAINT BY THIS CONTRACTOR.

3.12 PIPING & EQUIPMENT CLEANOUT PROCEDURES

- A. FLUSH OUT ALL PIPING SYSTEMS TO REMOVE DIRT AND GREASE FROM PIPES AND EQUIPMENT BEFORE SYSTEMS ARE PLACED IN OPERATION. BLOW DOWN STRAINERS AFTER EACH FLUSHING UNTIL IT REMAINS CLEAN. REMOVE AND CLEAN STRAINERS AFTER FINAL FLUSHING.
B. DUCTWORK AND AIR HANDLING EQUIPMENT ARE TO BE CLEANED OUT AND BLOWN OUT BEFORE PAINTING IS STARTED.
C. IF UNITS ARE OPERATED FOR TEMPORARY HEATING OR VENTILATION DURING TURNING OVER TO THE OWNER, FILTERS MUST BE IN UNITS AT ALL TIME FANS ARE OPERATED.

3.13 CONSTRUCTION FILTERS

- A. CONTRACTOR IS TO PROVIDE TEMPORARY FILTERS AT UNIT INLETS DURING CONSTRUCTION. FILTERS TO BE INSPECTED DAILY AND REPLACED AS NEEDED.

3.14 EXCAVATION AND BACKFILL

- A. EACH CONTRACTOR SHALL EXCAVATE AND BACKFILL ALL TRENCHES AND OTHER EXCAVATIONS REQUIRED FOR HIS WORK.
B. TRENCH WIDTH SHALL BE SUFFICIENT TO PERMIT PROPER INSTALLATION OF THE WORK AND BOTTOM OF TRENCHES EVENLY GRADED, WITH BELL HOLE PROVIDED TO ENSURE UNIFORM BEARING FOR PIPE. EXCAVATIONS BELOW REQUIRED DEPTHS SHALL BE REFILLED WITH SAND OR GRAVEL FIRMLY COMPACTED. ROCK ENCOUNTERED SHALL BE EXCAVATED THREE (3) INCHES BELOW THE LOWERMOST PART OF THE PIPE AND THE SPACE SO FORMED, REFILLED WITH SAND AND GRAVEL, AND WELL COMPACTED.
C. WHENEVER IN THE OPINION OF THE ARCHITECT, THE SOIL AT OR BELOW GRADE IS UNSUITABLE FOR SUPPORTING CONSTRUCTION INCLUDED UNDER THIS CONTRACT, SUCH PROVISIONS FOR PROPER FOUNDATIONS SHALL BE MADE, IN ADDITION TO THOSE SHOWN OR SPECIFIED, AS THE ARCHITECT MAY DIRECT, EQUITABLE ADJUSTMENT FOR SAME TO BE MADE AS NECESSARY TO SECURE COORDINATION.

D. TRENCHES SHALL BE SHEATHED OR BRACED IN ACCORDANCE WITH O.S.H.A. STANDARDS AND PUMPING OR BAILING PERFORMED AS NECESSARY TO PROTECT WORKMEN AND ADJACENT STRUCTURES AND TO PERMIT PROPER EXECUTION OF THE WORK.

- E. AFTER INSTALLED PIPING HAS BEEN TESTED, INSPECTED AND APPROVED BY THE ARCHITECT, CONTRACTOR SHALL BE BACKFILLED WITH EARTH TAMPED COMPACTLY INTO PLACE. (1) LAYER MAXIMUM, BACKFILL TO ROUGH GRADE WITHIN AREA OF GRADING WORK REQUIRED UNDER GENERAL CONTRACT, AND TO FINISH GRADE ELSEWHERE. BACKFILL ALL TRENCHES IN PAVED AREAS, OR AREAS TO BE PAVED WITH #9 MATERIAL. BACKFILL UNDER BUILDING TO BE #9 MATERIAL OR EARTH WELL TAMPED (1) LAYER MAXIMUM. REFER TO OTHER SECTIONS ON BURIED MATERIAL FOR SPECIAL REQUIREMENTS AND COMPACTION REQUIREMENTS.
F. SURPLUS EARTH SHALL BE DEPOSITED ON SITE (OR REMOVED FROM THE SITE) AS DIRECTED BY ARCHITECT.

G. PROTECT ALL UTILITIES SHOWN ON DRAWINGS OR ENCOUNTERED IN THE CONSTRUCTION WORK. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED BY THIS CONTRACTOR TO OWNER'S SATISFACTION, WITHOUT COST TO THE OWNER.

3.15 ACCESS DOORS

- A. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION MAINTENANCE AND REPAIR. FURNISH STEEL ACCESS DOORS AND FRAMES, MIN. 10" X 20". TO GENERAL CONTRACTOR FOR ALL LOCATIONS WHERE NECESSARY TO PROVIDE ACCESS TO CONCEALED VALVES, TRAPS, SPECIALTIES AND OTHER EQUIPMENT REQUIRING SERVICE OR INSPECTION. LOCATION, TYPE, SIZE AND NUMBER AS DETERMINED BY EACH CONTRACTOR TO SUIT EQUIPMENT AND EQUIPMENT.
B. GENERAL CONTRACTOR WILL INSTALL ACCESS DOORS AND FRAMES IN DESIGNATED LOCATIONS AFTER SUCH LOCATIONS ARE APPROVED BY ARCHITECT OR ENGINEER.
C. ACCESS DOORS SHALL BE FLUSH TYPE, MANUFACTURED FROM NO. 14 GAUGE STEEL COMPLETE WITH FLUSH FLANGE TYPE FRAMES MANUFACTURED FROM NO. 16 GAUGE STEEL PROVIDED WITH ANCHORS. ACCESS DOORS SHALL BE SUITABLE FOR INSTALLATION IN WALL OR CEILING MATERIALS SHOWN IN ROOM FINISH SCHEDULES.
D. ACCESS DOORS LOCATED IN FIRE-RATED WALLS, FLOORS, CEILING-FLOOR OR CEILING-ROOF ASSEMBLIES SHALL BE FIRE RATED, UNDERWRITERS' LABORATORY, INC. LISTED AND LABELED.

E. PRIME PAINT ENTIRE DOOR AND FRAME ASSEMBLY BEFORE LEAVING FACTORY.

F. DOORS AND FRAMES SHALL BE SIMILAR AND EQUAL TO THOSE MANUFACTURED BY MILCOR OR MAMI-CAREY.

3.16 REMODELING

- A. DEMOLITION AND REMODELING OF EXISTING HVAC EQUIPMENT.
1. REMOVE OR RELOCATE CERTAIN UNITS, PIPING AND/OR DUCTWORK FROM AREAS AS SHOWN ON THE DRAWINGS.
2. THE SALVAGE VALUE OF ITEMS TO BE REMOVED FROM THE SITE SHALL BE REFLECTED IN THE CONTRACTOR'S BID.
C. WHEN INDICATED, EQUIPMENT THAT IS REMOVED AND NOT REUSED SHALL BECOME THE PROPERTY OF THE OWNER.
D. CONTRACTOR OR SUBCONTRACTOR FOR SCHEDULING HIS WORK AND FOR RE-CONNECTING PIPING OR EQUIPMENT TO MAINTAIN THE EXISTING SYSTEM IN SERVICE WITH A MINIMUM OF INCONVENIENCE TO THE OWNER.
E. TAP PIPING AND DUCTS AS REQUIRED.
F. THE PATCHING OF OPENINGS IN EXISTING WALLS AND FLOORS SHALL BE DONE BY THE GENERAL CONTRACTOR.

END OF SECTION 23 05 00

SECTION 23 05 19 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. THIS SECTION INCLUDES:
1. STEM TYPE THERMOMETERS AND TAPS.
2. STATIC PRESSURE GAGES.

1.2 SUBMITTALS

- A. SUBMIT UNDER PROVISIONS OF DIVISION 01 SUBMITTALS.
B. PRODUCT DATA: INCLUDE A LIST, WHICH INDICATES USE, OPER

