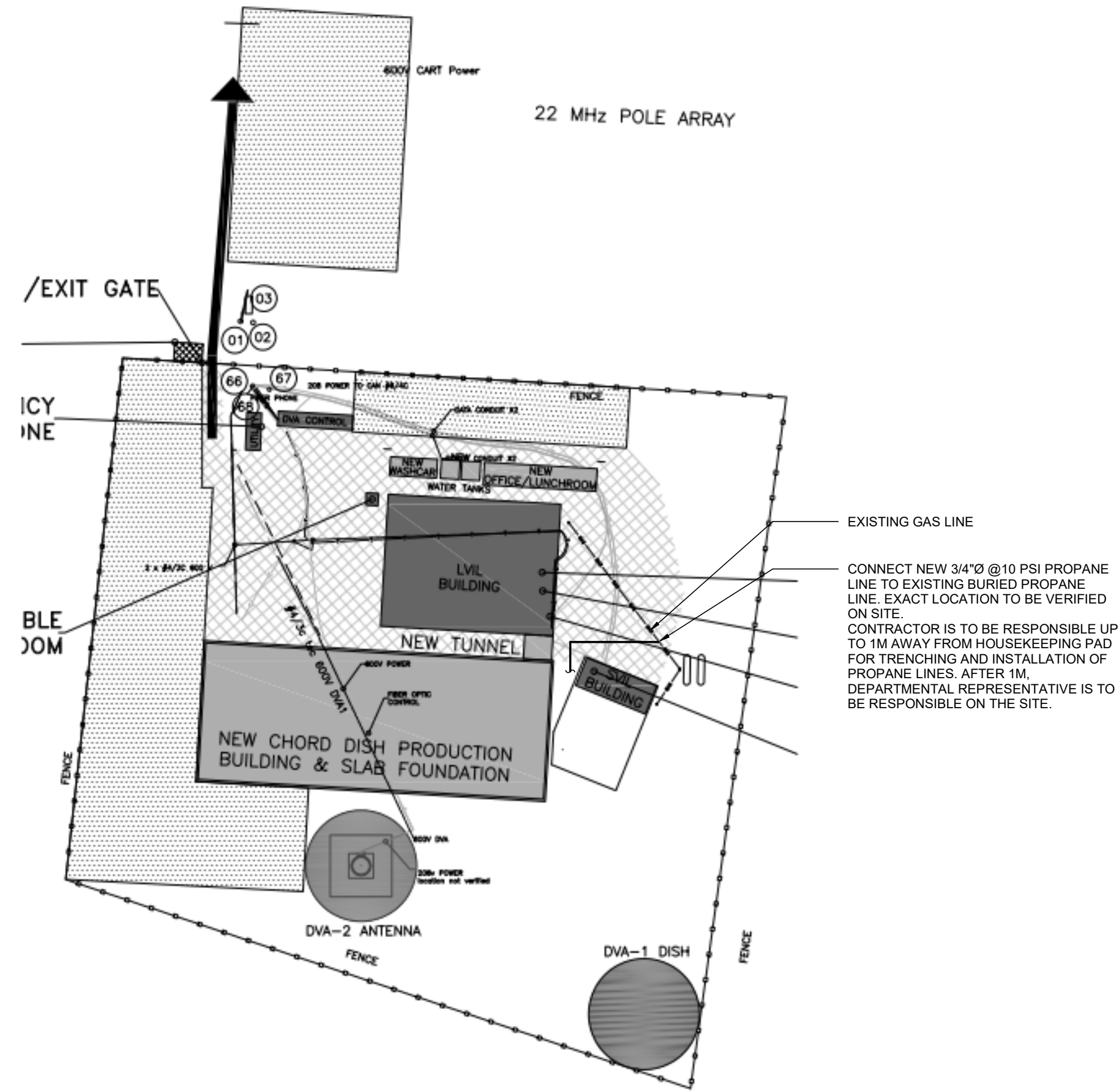


# DOMINION RADIO ASTROPHYSICAL OBSERVATORY (DRAO) DISH PRODUCTION FACILITY

**PROJECT DIRECTORY**  
OWNER:  
NRC-CNRC DRAO  
MECHANICAL:  
THE AME CONSULTING GROUP LTD.  
200-638 SMITHE STREET  
VANCOUVER, BC V6B 1E3

**CIVIC ADDRESS:**  
717 WHITE LAKE ROAD  
KALEDEN BC V0H 1R0



**1 SITE PLAN**  
M-1 SCALE: 1:750

## MECHANICAL ABBREVIATIONS

AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
ARCH	ARCHITECTURAL
BB	BASEBOARD HEATER
BDD	BACKDRAFT DAMPER
BF	BOTTLE FILLER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
CW	COMPLETE WITH
CB	CATCH BASIN
CD	CONTROL DAMPER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CLG	CEILING
CO	CLEANOUT
CONN	CONNECTION
CONT	CONTINUATION
CTE	CONNECT TO EXISTING
DB	DRY BULB
DCW	DOMESTIC COLD WATER
DDC	DIRECT DIGITAL CONTROL
DEG	DEGREE
DF	DRINKING FOUNTAIN
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RECIRCULATION
DI	DIAMETER
DN	DOWN
DW	DISH WASHER
DWG	DRAWING
E/A	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EFF	EFFICIENCY
ELEC	ELECTRICAL
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
F	FIRE MAIN
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FLA	FULL LOAD AMPS
FLR	FLOOR
GSB	GYPSUM WALL BOARD
HB	HOSE BIBB
HD	HUB DRAIN
HP	HORSEPOWER
HRR	HEAT RECOVERY RETURN
HRS	HEAT RECOVERY SUPPLY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
INV	INVERT
JS	JANITOR SINK
KG	KILOGRAMS
KPA	KILOPASCAL
KS	KITCHEN SINK
KW	KILOWATT
L	LITRES
L/S	LITRES PER SECOND
LAT	LEAVING AIR TEMPERATURE
LV	LAVATORY
LWT	LEAVING WATER TEMPERATURE
M	METRE
M/S	METRE PER SECOND
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MH	MANHOLE
MIN	MINIMUM
MM	MILLIMETRE
MU	MAKE-UP WATER
NC	NOSIE CRITERIA NORMALLY CLOSED
NFHB	NON FREEZE WALL HYDRANT
NF	NOT IN CONTACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
O/A	OUTDOOR AIR
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
PA	PASCAL
PDI	PLUMBING AND DRAINAGE INSTITUTE
POC	POINT OF CONNECTION
PRV	PRESSURE REDUCING VALVE
R/A	RETURN AIR
RF	RETURN FAN
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RWL	RAIN WATER LEADER
S/A	SUPPLY AIR
SF	SUPPLY FAN
SH	SHOWER
SK	SINK DRAIN ABOVE
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SR	SANITARY RISER
SS	STAINLESS STEEL
T/A	TRANSFER AIR
TAD	TRANSFER AIR DUCT
TBC	TO BE CONFIRMED
TBD	TO BE DETERMINED
TD	TRENCH DRAIN
THRU	THROUGH
TS	TAMPER SWITCH
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UR	URINAL
V	VENT
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THROUGH ROOF
W	WATER MAIN
W	WATT
WB	WET BULB
WC	WATER CLOSET
WCO	WALL CLEANOUT
WG	WATER GAUGE

### SYMBOL SCHEDULE

DUCTWORK	
	SUPPLY AIR DUCT UP
	RETURN AIR DUCT UP
	EXHAUST AIR DUCT UP
	OUTSIDE AIR DUCT UP
	SUPPLY AIR DUCT DOWN
	RETURN AIR DUCT DOWN
	EXHAUST AIR DUCT DOWN
	OUTSIDE AIR DUCT DOWN
	TURNING VANES
	ACOUSTIC INSULATION
	BALANCING DAMPER
	BACKDRAFT DAMPER
	MOTORIZED DAMPER
	FIRE DAMPER - VERTICAL
	FIRE DAMPER - HORIZONTAL
	DUCT CAP-OFF
	UNDER-CUT DOOR
SYSTEM MONITORING	
	ROOM TEMPERATURE SENSOR
	REVERSE ACTING TEMPERATURE SENSOR
	SWITCH
	HUMIDISTAT
	THERMOSTAT WITH COVER
	HEAT DETECTOR
	SMOKE DETECTOR
	CO <sub>2</sub> SENSOR
	CO SENSOR
EQUIPMENT TAGS	
	EQUIPMENT / FIXTURE TYPE
	QTY
	GRILLE TYPE
	NECK / GRILLE SIZE
	AIR VOLUME (L/S)
	QTY
	LINEAR DIFFUSER TYPE
	DIFFUSER LENGTH
	NECK / GRILLE SIZE
	AIR VOLUME (L/S)
	DETAIL NUMBER
	DRAWING NUMBER
RENOVATION	
	EXISTING MECHANICAL SERVICE
	DEMOLISH

### GENERAL NOTES

- IN GENERAL, PROJECT INTENT IS TO PROVIDE 2 NEW AIR HANDLING UNITS (RTU) TO SERVE THE NEW SPANMASTER BUILDING. THE RTUS SHALL MAINTAIN PROPER TEMPERATURE AND VENTILATION TO SUPPORT THE FACILITIES MANUFACTURING PROCESS. THE SITE IS HYPER SENSITIVE TO RADIO FREQUENCY INTERFERENCE (RFI) AND ITS CRITICAL FOR THE CONTRACTOR AND EQUIPMENT MANUFACTURER TO UNDERSTAND THE AFFECTS OF ANY NEW EQUIPMENT THAT EMITS RFI.
- THE EXISTING DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS.
- COORDINATE THE DRAWINGS WITH THE SPECIFICATIONS. IN CASES WHERE CONFLICTS OCCUR THE MOST STRINGENT REQUIREMENT SHALL APPLY.
- MAGNITUDE OF SCOPE OF WORK ON THIS PROJECT SHALL NOT BE BASED SOLELY ON PREPARED CONSTRUCTION DOCUMENTS (DRAWINGS AND SPECIFICATIONS), AS THESE DOCUMENTS ARE OF A DIAGRAMMATIC AND GENERALLY DESCRIPTIVE NATURE, AND LIMITED IN THE AMOUNT OF DETAILS SPECIFIC TO EXISTING SITE CONDITIONS. THEREFORE, A 'SITE WALK-THROUGH' IS STRICTLY 'MANDATORY', PRIOR TO PRICING. FURTHER SITE VERIFICATION WILL BE ALSO REQUIRED UPON CONTRACT AWARD.
- 'MANDATORY SITE WALK-THROUGH' SHOULD INCLUDE NOT ONLY 'PRIME' MECHANICAL TRADES (SUCH AS MECHANICAL CONTRACTORS), BUT ALSO SUB-TRADES (AT A MINIMUM SHEET METAL CONTRACTOR, ELECTRICAL CONTRACTOR, CONTROL CONTRACTOR, AND STEEL CONTRACTOR ARE REQUIRED TO ATTEND 'MANDATORY SITE WALK-THROUGH' AS WELL).
- MECHANICAL CONTRACTOR WILL BE RESPONSIBLE FOR HIRING ALL OTHER REQUIRED TRADES TO COMPLETE THE PROJECT, AND WILL BE RESPONSIBLE FOR OVERSEEING THE WORK OF SUB-TRADES AND ENSURING THEIR COMPLIANCE WITH SITE SAFETY REGULATIONS.
- THE ELECTRICAL SCOPE OF WORK SHALL BE CARRIED BY THE MECHANICAL CONTRACTOR AND SHALL BE DESIGN BUILD BY THE ELECTRICAL CONTRACTOR. ALL NEW ELECTRICAL EQUIPMENT SHALL BE LABELLED TO MAINTAIN CONSISTENCY WITH THE EXISTING LABELLING SYSTEM IN THE BUILDING. ALL DISCONNECTS SHALL BE PROVIDED WITH LAMACOID LABELS. COORDINATE WITH OPERATIONS STAFF AS REQUIRED.
- CONTRACTOR IS RESPONSIBLE FOR REVIEW AND VERIFICATION OF ACTUAL ONSITE CONDITIONS, AND EQUIPMENT LOCATIONS.
- CONTRACTOR TO REFER TO 'ANVIL' PRODUCT CATALOGUE FOR ALL HANGER & SUPPORT FIGURES.
- ALLOW FOR DEMOLITION BINS. COORDINATE WITH PERSONNEL.
- PROVIDE 100MM HIGH CONCRETE CURBS FOR ALL FLOOR MOUNTED MECHANICAL EQUIPMENT.
- NBC-2020 SHOULD BE REFERENCED.

### SHEET METAL WORK:

- ALLOW FOR ALL SHEET METAL WORK TO ACCOMMODATE INSTALLATION OF "NEW" AND "TEMPORARY" SYSTEMS (AS WELL AS EXISTING SYSTEMS THAT ARE REMOVED AND RE-INSTALLED). REFER TO DRAWINGS AND SPECIFICATION FOR ADDITIONAL INFORMATION ON SCOPE OF WORK.
- ALLOW FOR INSTALLATION OF "ACCESS DOORS" AS REQUIRED TO SERVICE HVAC EQUIPMENT, REGARDLESS IF DRAWINGS CALL FOR THEM OR NOT. ALSO PROVIDE A MEAN OF ACCESS (FOR SERVICING AND MAINTENANCE) FOR EXISTING EQUIPMENT, AS REQUIRED, AS A RESULT OF NEW EQUIPMENT INSTALLATIONS.
- ALL SHEET METAL WORK IS TO BE INSTALLED IN ACCORDANCE WITH THE LATEST "SMACNA" STANDARD.

### INSULATION WORK:

- PROVIDE INSULATION AND LABELLING FOR ALL NEW PIPING.
- PROVIDE INSULATION FOR ALL NEW PIPING, C/W CANVAS JACKETING IF INSIDE, OR C/W ALUMINUM JACKETING IF LOCATED OUTSIDE.
- PROVIDE INSULATION ON ALL NEW EXTERIOR DUCTWORK. IN GENERAL ALL NEW DUCTWORK IS TO BE ACOUSTICALLY INTERNALLY LINED EITHER BY "FIBERGLASS-FREE" INTERNAL LINER OR TO PROVIDE ALPHA CLOTHING OVER FIBERGLASS INTERNAL LINER.
- REFER TO DRAWINGS AND MECHANICAL SPECIFICATION FOR ANY ADDITIONAL REQUIREMENTS ON INSULATION SCOPE OF WORK.

### FIRE STOPPING, ETC.:

- PROVIDE FIRE STOPPING AND SEALING FOR ALL PENETRATIONS THROUGH FIRE-RATED AND SMOKE-RATED ASSEMBLIES. NO PIPING IS TO BE INSTALLED RUNNING IN FIRE-RATED VERTICAL SHAFTS. REFER TO MECHANICAL SPECIFICATION FOR ADDITIONAL INFORMATION ON FIRE STOPPING REQUIREMENTS.
- ALL MATERIALS AND INSULATION SHALL COMPLY WITH NCC CODE REQUIREMENTS (FLAME SPREAD AND SMOKE DEVELOPMENT REQUIREMENTS; 25/60 RATING).

### COMMISSIONING:

- ALL NEW SYSTEMS ARE TO BE COMMISSIONED.
- CONTRACTOR TO PROVIDE OWN COMMISSIONING AGENT. THE COMMISSIONING AGENT IS RESPONSIBLE TO PREPARE THE COMMISSIONING FORM PRIOR TO THE COMMISSIONING AND ADJUST CONTROL SEQUENCE BASED ON THE PROJECT SPECIFICS. DEPARTMENTAL REPRESENTATIVE TO WITNESS AND PERFORM SPOT CHECKS TO ENSURE THAT COMMISSIONING HAS BEEN PROPERLY IMPLEMENTED. COMMISSIONING AGENT HAS AN ESSENTIAL ROLE IN COORDINATING AND WORKING CLOSELY WITH ALL INVOLVED TRADES/PARTIES, ENSURING THAT PROJECT (SYSTEMS) MEETS DESIGN INTENT FROM OPERATIONAL AND FUNCTIONALITY PROSPECTIVES AND MEETS CONSTRUCTION SCHEDULE. THEREFORE COMMISSIONING AGENT SHALL ALLOW FOR ADEQUATE TIME THAT COMMISSIONING PROCESS WILL TAKE FOR A PROJECT OF THIS NATURE. THIS PROJECT HOLDS A CERTAIN LEVEL OF COMPLEXITY DUE TO PHASING AND INTEGRATION FEATURES.
- BOTH RTU-1 AND RTU-2 SHALL RETAIN ALL EXISTING CONTROL POINTS FROM THE EXISTING BAS AND PROVIDE NEW POINTS AS REQUIRED TO MEET DESIGN INTENT. REFER TO DETAIL 3M-3 FOR EXISTING CONTROL POINTS. AT A MINIMUM, NEW CONTROL POINTS WILL BE REQUIRED FOR THE REVERSING VALVE.
- THE NEW RTUS SHALL MIRROR THE EXISTING RTU SEQUENCE OF OPERATION SCHEDULE. PROVIDE NEW/MODIFY THE EXISTING LOGIC SUCH THAT THE 1ST STAGE OF HEATING WILL BE VIA HEAT PUMP UNTIL THE AMBIENT TEMPERATURE IS BEYOND THE OPERATING RANGE THEN STAGE 2 HEATING WILL BE VIA PROPANE FIRED SECTION TO MAINTAIN SET-POINT. THE BMS WILL COMMAND THE REVERSING VALVE POSITION BASED ON THE OUTDOOR AIR TEMPERATURE.

### BALANCING:

- NOT USED
- PRIOR TO ANY NEW WORK STARTING, RECORD EXISTING AIR FLOWS ON ALL EXISTING TERMINALS BEING PART OF EXISTING SUPPLY AND EXHAUST SYSTEMS THAT ARE TO BE REMOVED AND INSTALLED AS NEW. ONCE THE NEW SYSTEM IS INSTALLED, BALANCE SYSTEM TO EXISTING FLOWS (OR TO NEW FLOWS), AS INSTRUCTED BY ENGINEER OR INSTRUCTED ON DRAWINGS.

### CONTROLS:

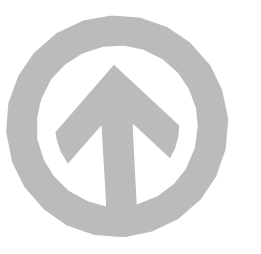
- CONTROLS ON THIS PROJECT SHALL BE SOLELY "RELIABLE CONTROLS" PRODUCT (TO MATCH BASE BUILDING CONTROLS).
- THE CONTROLS CONTRACTOR MUST BE ABLE TO RESPOND TO THE SITE WITHIN A 90 MINUTES TIMEFRAME UPON BEING CONTACTED, 24/7 AND BE WITHIN A 90KM OF THE PROJECT SITE.
- CONTROLS CONTRACTOR TO ALLOW FOR ANY CONTROLS WORK (NOT BEING MENTIONED BELOW OR LISTED IN "DDC POINTS LIST") THAT THEY ANTICIPATE WOULD BE REQUIRED TO MEET DESIGN INTENT. REFER TO DRAWINGS AND SPECIFICATION FOR DESIGN INTENT.
- CONTROLS WORK SHALL INCLUDE NOT ONLY CONTROLS ASSOCIATED WITH NEW EQUIPMENT INSTALLATION, BUT SHALL ALSO INCLUDE ANY OTHER REQUIRED/NECESSARY WORK RELATED TO THE DEMOLITION OF EXISTING SYSTEMS AND ASSOCIATED CONTROLS TO ACCOMMODATE NEW EQUIPMENT INSTALLATION AND TO MEET DESIGN INTENT.
- CONTROLS WORK SHALL ALSO INCLUDE CREATION OF NEW DDC GRAPHICS, TREND LOGS, SEQUENCES, ETC. AS WELL AS ANY REQUIRE OF ANY NECESSARY EXISTING CONTROL SEQUENCES, TREND LOGS AND DDC GRAPHICS TO MEET DESIGN INTENT.
- CONTROLS CONTRACTOR TO RETAIN ELECTRICAL CONTRACTOR AS REQUIRED FOR ALL REQUIRED (IF ANY) NEW ELECTRICAL WORK ASSOCIATED WITH THIS PROJECT SCOPE OF WORK.

### MECHANICAL DRAWING LIST

DRAWINGS NO.	DESCRIPTION
M-1	COVER SHEET
M-2	MECHANICAL EQUIPMENT SCHEDULE
M-3	HVAC PLAN
M-4	MECHANICAL DETAILS
M-5	MECHANICAL SECTION

### RFI MITIGATION/SHIELDING REQUIREMENTS

1. RFI MITIGATION AND SHIELDING REQUIREMENTS IS TO BE DONE BY DEPARTMENTAL REPRESENTATIVE.



No.	DATE	REVISION
1	01-27-2023	ISSUED FOR COORDINATION
2	02-03-2023	ISSUED FOR TENDER
3	06-05-2023	REISSUED FOR TENDER

PROJECT TITLE

## DRAO-DISH PRODUCTION FACILITY

DRAWING NUMBER

# M-1

DRAWINGS ARE NOT TO BE SCALED.  
ALL DIMENSIONS SHALL BE VERIFIED ON JOB

DRAWING TITLE

## COVER SHEET

START DATE: 2022-12-02  
PROJECT NO.: 447b-002-22  
SCALE: AS NOTED  
DRAWN: F.A.  
CHECKED: N.Y.

No.	DATE	REVISION
1	01-27-2023	ISSUED FOR COORDINATION
2	02-03-2023	ISSUED FOR TENDER
3	06-05-2023	REISSUED FOR TENDER

PROJECT TITLE

**DRAO-DISH PRODUCTION FACILITY**

DRAWING NUMBER

**M-2**

DRAWINGS ARE NOT TO BE SCALED. ALL DIMENSIONS SHALL BE VERIFIED ON JOB.

DRAWING TITLE

**MECHANICAL EQUIPMENT SCHEDULE**

START DATE	2022-12-02
PROJECT NO.	447b-002-22
SCALE	NO SCALE
DRAWN	F.A
CHECKED	N.Y

**DIFFUSERS AND GRILLES**

EQUIPMENT TAG	DESCRIPTION/TYPE	MANUFACTURER	SERVICE	MODEL NUMBER	NOTES
S-1	DOUBLE DEFLECTION, LOUVERED GRILLE	EH PRICE	SUPPLY	520D	ALL

NOTES:  
1 PROVIDE DIFFUSERS AND GRILLES WITH BORDER STYLES THAT ARE COMPATIBLE WITH ADJACENT WALLS AND CEILING SYSTEMS REFER TO ARCHITECTURAL DRAWINGS.  
2 COMPLETE WITH ACOUSTICALLY LINED SHEET METAL RETURN AIR PLENUM

**PRV SCHEDULE**

PRV TAG	LOCATION	SERVICE	MAKE	MODEL	PIPE SIZE INC	UPSTREAM PRESSURE (PSI)	DOWNSTREAM PRESSURE (INCH WC)	NOTES
PRV-1	RTU-1	PROPANE	FISHER	HSRL-BFC	3/4"	10	9-13	ALL
PRV-2	RTU-2	PROPANE	FISHER	HSRL-BFC	3/4"	10	9-13	ALL

NOTES:  
1 INPUT HEATING CAPACITY OF RTU-1 AND RTU-2 IS 320MBH.  
2 MIN GAS SUPPLY PRESSURE FOR RTU-1 AND RTU-2 IS 4.5-INCH WC.  
3 MAX GAS SUPPLY PRESSURE FOR RTU-1 AND RTU-2 IS 14-INCH WC.  
4 ALL GAS PIPING JOINTS PROPERLY SEALED.  
5 GAS PIPING LEAK CHECKED WITH A SOAP SOLUTION.  
6 DRIP LEG INSTALLED IN THE GAS PIPING NEAR THE UNIT.

**FANS**

EQUIPMENT TAG	QTY	SERVICE	LOCATION	TYPE	MANUFACTURER	MODEL	AIR FLOW (CFM)	E. S. P. (IN.WG)	FAN (RPM)	MOTOR SIZE	DRIVE TYPE	SOUND LEVEL (SONES)	WEIGHT (LBS)	NOTES
CF-1	1	SPANMASTER BUILDING	SPANMASTER BUILDING	CEILING	BIG ASS FAN	ESSENCE	-	-	107	-	-	2	81.0	ALL
CF-2	1	SPANMASTER BUILDING	SPANMASTER BUILDING	CEILING	BIG ASS FAN	ESSENCE	-	-	107	-	-	2	81.0	ALL
CF-3	1	SPANMASTER BUILDING	SPANMASTER BUILDING	CEILING	BIG ASS FAN	ESSENCE	-	-	107	-	-	2	81.0	ALL
CF-4	1	SPANMASTER BUILDING	SPANMASTER BUILDING	CEILING	BIG ASS FAN	ESSENCE	-	-	107	-	-	2	81.0	ALL
CF-5	1	SPANMASTER BUILDING	SPANMASTER BUILDING	CEILING	BIG ASS FAN	ESSENCE	-	-	107	-	-	2	81.0	ALL

NOTES  
1. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.  
2. PROVIDE DDC/BMS INTERFACE  
3. PROVIDE VIBRATION ISOLATION  
4. PROVIDE MOUNTING ACCESSORIES

**MECHANICAL MOTORLIST**

EQUIPMENT TAG	QTY	UNIT DESCRIPTION	UNIT LOCATION	ELECTRICAL LOAD				VOLT	PH	EQUIPMENT				STARTER				DISCONNECT				CONTROL				NOTES
				MCA	FLA	KW	HP			S	I	C	S	I	C	TYPE	S	I	C	S	I	C	TYPE			
RTU-1	1	ROOF TOP UNIT	OUTSIDE	108	8.8	-	-	208	3	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	MECH.	BMS	1		
RTU-2	1	ROOF TOP UNIT	OUTSIDE	108	8.8	-	-	208	3	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	MECH.	BMS	1		
CF-1	1	CEILING FAN	SPANMASTER BUILDING	10	5.3	-	-	110	1	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	ELEC.	BMS	1		
CF-2	1	CEILING FAN	SPANMASTER BUILDING	10	5.3	-	-	110	1	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	ELEC.	BMS	1		
CF-3	1	CEILING FAN	SPANMASTER BUILDING	10	5.3	-	-	110	1	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	ELEC.	BMS	1		
CF-4	1	CEILING FAN	SPANMASTER BUILDING	10	5.3	-	-	110	1	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	ELEC.	BMS	1		
CF-5	1	CEILING FAN	SPANMASTER BUILDING	10	5.3	-	-	110	1	MECH.	MECH.	ELEC.	MECH.	MECH.	ELEC.	INT.	ELEC.	ELEC.	ELEC.	MECH.	MECH.	ELEC.	BMS	1		

**SUPPLIER / INSTALL / WIRE CODES:**  
M = MECHANICAL  
E = ELECTRICAL  
G = GENERAL CONTRACTOR  
S = SUPPLIED BY  
I = INSTALLED BY  
C = CONNECTED BY

**STARTER CODES:**  
MAN = MANUAL STARTER  
HOA = MAGNETIC STARTER W/ HAND/OFF/AUTO SWITCH W/ AUX. CONTACTS  
MAG = MAGNETIC STARTER C/W AUX STATUS CONTACTS  
MRR = MOTOR RATED RELAY, 24 VAC COIL & MOTOR PROTECTION SWITCH  
PCS = PACKAGED CONTROL SYSTEM  
VFD = VARIABLE FREQUENCY DRIVE  
RVS = REDUCED VOLTAGE STARTER  
WS = WALL SWITCH  
CP = CONTROL PANEL

**CONTROL DEVICE CODES:**  
AQUA = PUMP CONTROLLED BY AQUASTAT  
BMS = BLDG MANAGEMENT SYSTEM  
ES = END SWITCH  
ET = LINE VOLTAGE T'STAT  
FS = FLOW SWITCH  
GS = GAS SENSOR  
H = HUMIDITY SENSOR  
I = INTERLOCK, SEE NOTES  
LIGHT = WIRED TO LIGHT SWITCH  
LS = LEVEL SWITCH  
OS = OCCUPANT SENSOR  
PS = PRESSURE SWITCH  
RSTAT = REVERSE ACTING THERMOSTAT  
TC = TIME CLOCK  
T = LOW VOLTAGE T'STAT OR SENSOR  
TS = TAMPER SWITCH  
VS = VARIABLE SPEED SWITCH  
WS = WALL SWITCH

**ELECTRICAL LOAD CODES:**  
BHP = BREAK HORSEPOWER  
FLA = UNIT FULL LOAD AMPS  
HP = UNIT OR MOTOR HORSE POWER  
PH = POWER PHASE  
MCA = MINIMUM CIRCUIT AMPS  
VOLT = REQUIRED SUPPLY VOLTAGE

**MISCELLANEOUS CODES:**  
FRAC = FRACTIONAL HORSEPOWER  
INT = INTEGRAL PART OF UNIT

**GENERAL NOTES:**  
A. ALL FIRE ALARM DEVICES WIRED BY ELECTRICAL  
B. CONTROL PANELS ARE SHIPPED LOSS & REQUIRE FIELD WIRING  
C. PCS EQUIPMENT REQUIRES SINGLE SOURCE POWER CONNECTION, UNLESS NOTED OTHERWISE  
D. CP, VFD EQUIPMENT REQUIRES POWER WIRING TO AND FROM CONTROL PANEL TO CONTROLLED EQUIPMENT

**NOTES:**  
1. SINGLE POINT POWER CONNECTION (EXCEPT FOR LIGHTS).

**ROOFTOP UNIT SCHEDULE**

TAG	RTU-1	RTU-2
LOCATION	OUTSIDE	OUTSIDE
SERVICE	SPANMASTER BUILDING	SPANMASTER BUILDING
MANUFACTURER	TRANE	TRANE
SYSTEM TYPE	PACKAGED	PACKAGED
SIZE (TONS)	20	20
MODEL	DSJ240A3S0M**B000	DSJ240A3S0M**B000
VOLT (V/PH/CYC)	208/3/60	208/3/60
MCA	108.0	108.0
<b>SUPPLY FAN</b>		
NORMAL VOLUME (CFM)	8,000	8,000
MINIMUM OUTDOOR AIR (CFM)	1,295	1,295
EXTERNAL STATIC (INCH)	1.08	1.08
FAN TYPE	DOUBLE INLET, FORWARD CURVED	DOUBLE INLET, FORWARD CURVED
FAN SPEED (RPM)	1,371	1,371
MOTOR (HP)	3.1	3.1
BRAKE HORSEPOWER (HP)	3.277	3.277
VSD (VARIABLE SPEED DRIVE)	NO	NO
<b>HEATING SECTION (PROPANE)</b>		
INPUT CAPACITY (MBH)	320	320
OUTPUT CAPACITY (MBH)	295.2	295.2
TURNDOWN RATIO	10	10
OAT (°F)	1.4	1.4
RAT (°F)	70	70
EAT (°F)	70	70
LAT (°F)	99.7	99.7
TEMPERATURE RISE (DEG. F)	29.7	29.7
<b>HEATING SECTION (HEAT PUMP)</b>	HEAT PUMP	HEAT PUMP
TOTAL CAPACITY (MBH)	226.66	226.66
OAT (°F)	1.4	1.4
RAT (°F)	70	70
EAT (°F)	70	70
LAT DB (°F)	100.5	105.5
C.O.P. @17F	2.05	2.05
C.O.P. @47F	3.2	3.2
LOW AMBIENT CUT-OFF (°F)	1.4	1.4
<b>COOLING SECTION</b>		
TOTAL CAPACITY (MBH)	247.14	247.14
SENSIBLE CAPACITY (MBH)	191.16	191.16
AIR VELOCITY (FPM)	500	500
OAT DB (°F)	91.4	91.4
OAT WB (°F)	79	79
RAT DB (°F)	75	75
RAT WB (°F)	63	63
EAT DB (°F)	80	80
EAT WB (°F)	67	67
LAT DB (°F)	57.86	57.86
LAT WB (°F)	56.99	56.99
AMBIENT TEMP (°F)	95	95
EER	9.3	9.3
IEER	12.3	12.3
REFRIGERANT	R-410	R-410
<b>FILTER</b>		
FILTER	MERV 13	MERV 13
<b>DIMENSIONS</b>		
L x W x H (IN)	5.5x7.25x10.25	5.5x7.25x10.25
WEIGHT (LBS)	2,818	2,818
<b>NOTES</b>	ALL	ALL

NOTES:  
1. FOR OUTDOOR, GROUND MOUNTED INSTALLATION (HORIZONTAL DISCHARGE)  
2. NG TO LP CONVERSION KIT  
3. ULTRA LOW LEAK ECONOMIZER SECTION, BAROMETRIC RELIEF DAMPER, RAIN HOOD  
4. BACNET INTERFACE (RELIABLE BAS)  
5. FILTER RACK KIT  
6. FLUE DISCHARGE DEFLECTOR  
7. RAINHOOD, BIRDSCREEN ON INTAKE  
8. CONSTAND SPEED MOTOR  
9. SINGLE POINT POWER CONNECTION  
10. 10 YEAR WARRANTY  
11. AHR1 RATED, UL/C LISTED, ISO 9001, ASHRAE 90.1 COMPLIANT  
12. INSULATED UNIT CABINET  
13. FIELD SUPPLIED CONDENSATE TRAP  
14. PROVIDE LOW AMBIENT KIT (DOWN TO -17°C)  
15. ACTUATORS SHALL BE BELIMO LF24-SR  
16. PROVIDE CURB FOR GROUND MOUNTED INSTALLATION  
17. SEE MECHANICAL SPECIFICATION FOR FURTHER DETAILS  
18. NOT USED  
19. WARRANTY SHALL NOT BE AFFECTED BY RFI SHIELDING INSTALLATION UNLESS CLAIM IS DETERMINED TO BE CAUSED FROM SHIELDING  
20. PROVIDE A POWERED CONVENIENCE OUTLET AT THE UNIT.



HALF-SIZE PLOT  
 SCALE NOTED AT 50%

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No.	DATE	REVISION
1	01-27-2023	ISSUED FOR COORDINATION
2	02-03-2023	ISSUED FOR TENDER
3	06-05-2023	REISSUED FOR TENDER

PROJECT TITLE

**DRAO-DISH  
 PRODUCTION  
 FACILITY**

DRAWING NUMBER

**M-3**

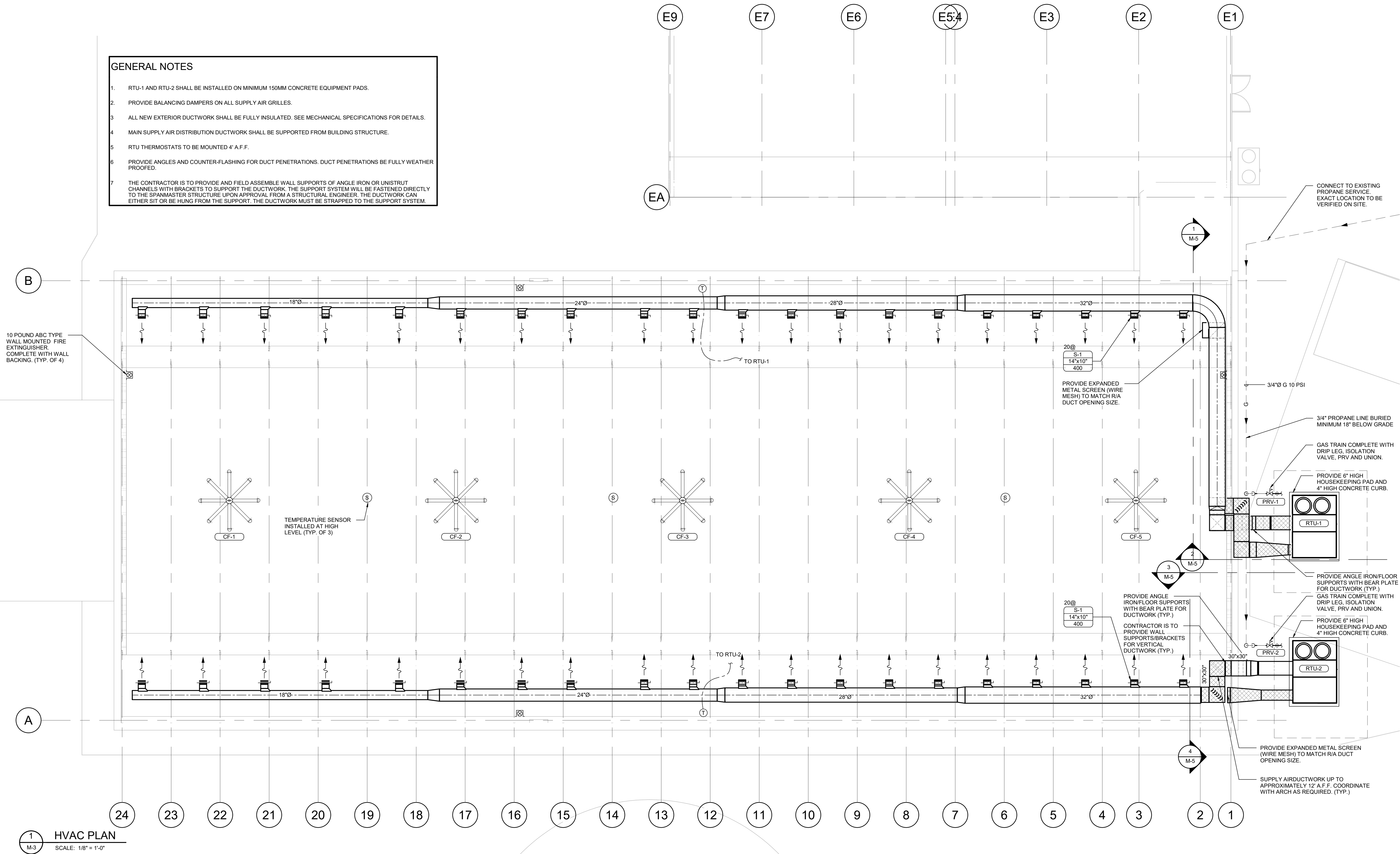
DRAWING TITLE

**HVAC PLAN**

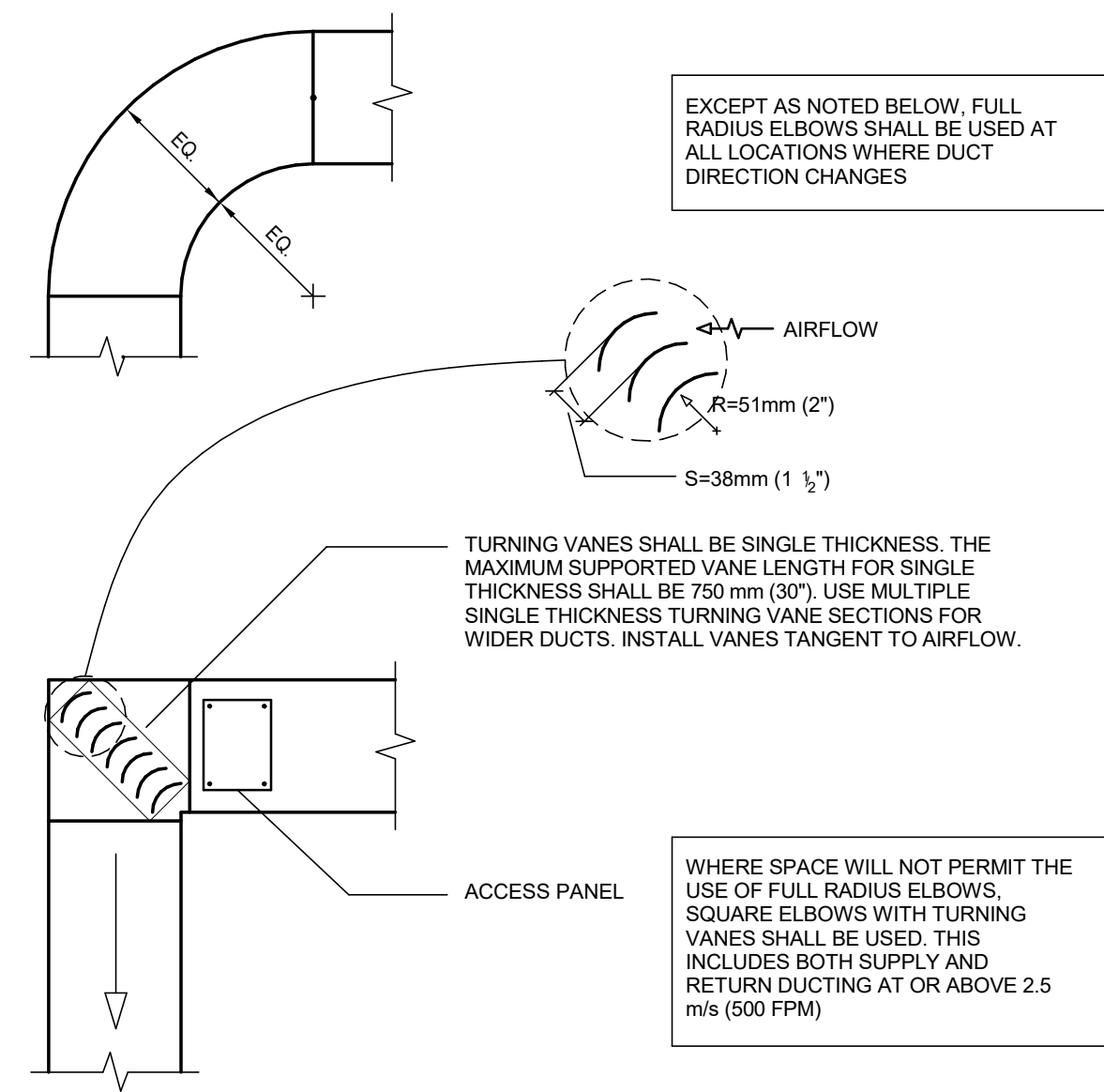
START DATE	2022-12-02
PROJECT NO.	447b-002-22
SCALE	1/8" = 1'-0"
DRAWN	F.A.
CHECKED	N.Y.

**GENERAL NOTES**

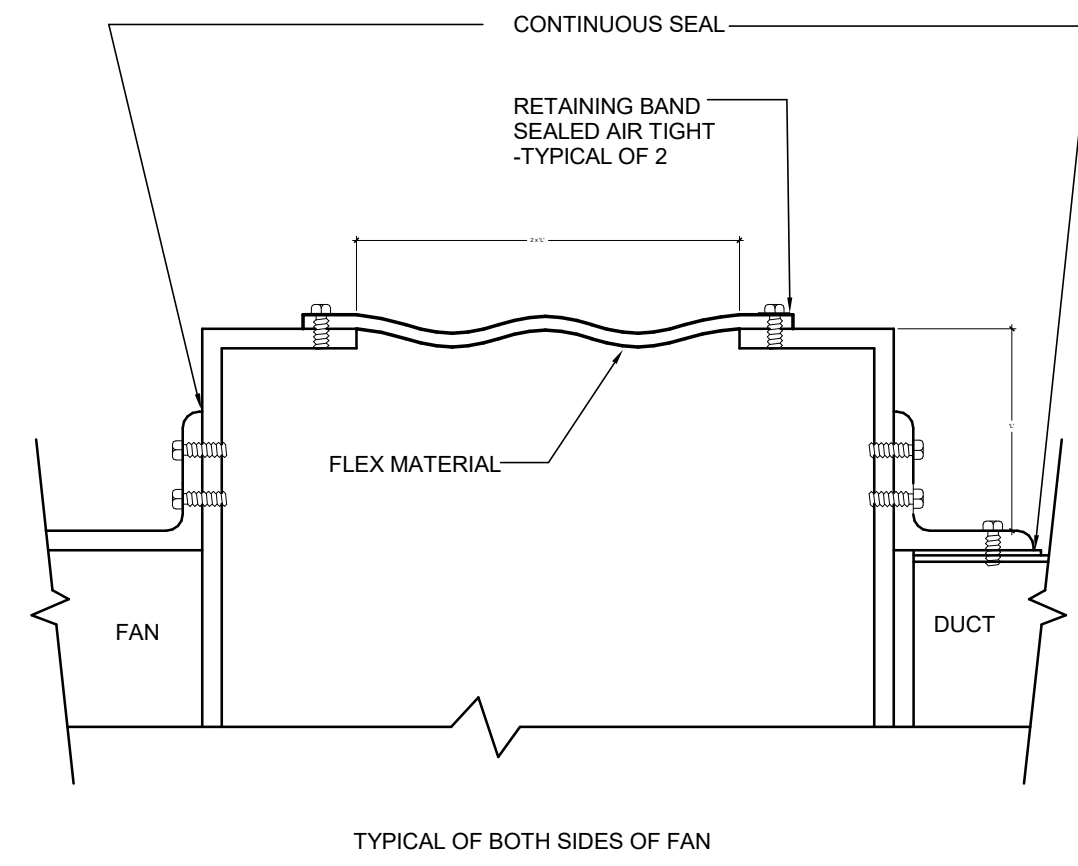
1. RTU-1 AND RTU-2 SHALL BE INSTALLED ON MINIMUM 150MM CONCRETE EQUIPMENT PADS.
2. PROVIDE BALANCING DAMPERS ON ALL SUPPLY AIR GRILLES.
3. ALL NEW EXTERIOR DUCTWORK SHALL BE FULLY INSULATED. SEE MECHANICAL SPECIFICATIONS FOR DETAILS.
4. MAIN SUPPLY AIR DISTRIBUTION DUCTWORK SHALL BE SUPPORTED FROM BUILDING STRUCTURE.
5. RTU THERMOSTATS TO BE MOUNTED 4' A.F.F.
6. PROVIDE ANGLES AND COUNTER-FLASHING FOR DUCT PENETRATIONS. DUCT PENETRATIONS BE FULLY WEATHER PROOFED.
7. THE CONTRACTOR IS TO PROVIDE AND FIELD ASSEMBLE WALL SUPPORTS OF ANGLE IRON OR UNISTRUT CHANNELS WITH BRACKETS TO SUPPORT THE DUCTWORK. THE SUPPORT SYSTEM WILL BE FASTENED DIRECTLY TO THE SPANMASTER STRUCTURE UPON APPROVAL FROM A STRUCTURAL ENGINEER. THE DUCTWORK CAN EITHER SIT OR BE HUNG FROM THE SUPPORT. THE DUCTWORK MUST BE STRAPPED TO THE SUPPORT SYSTEM.



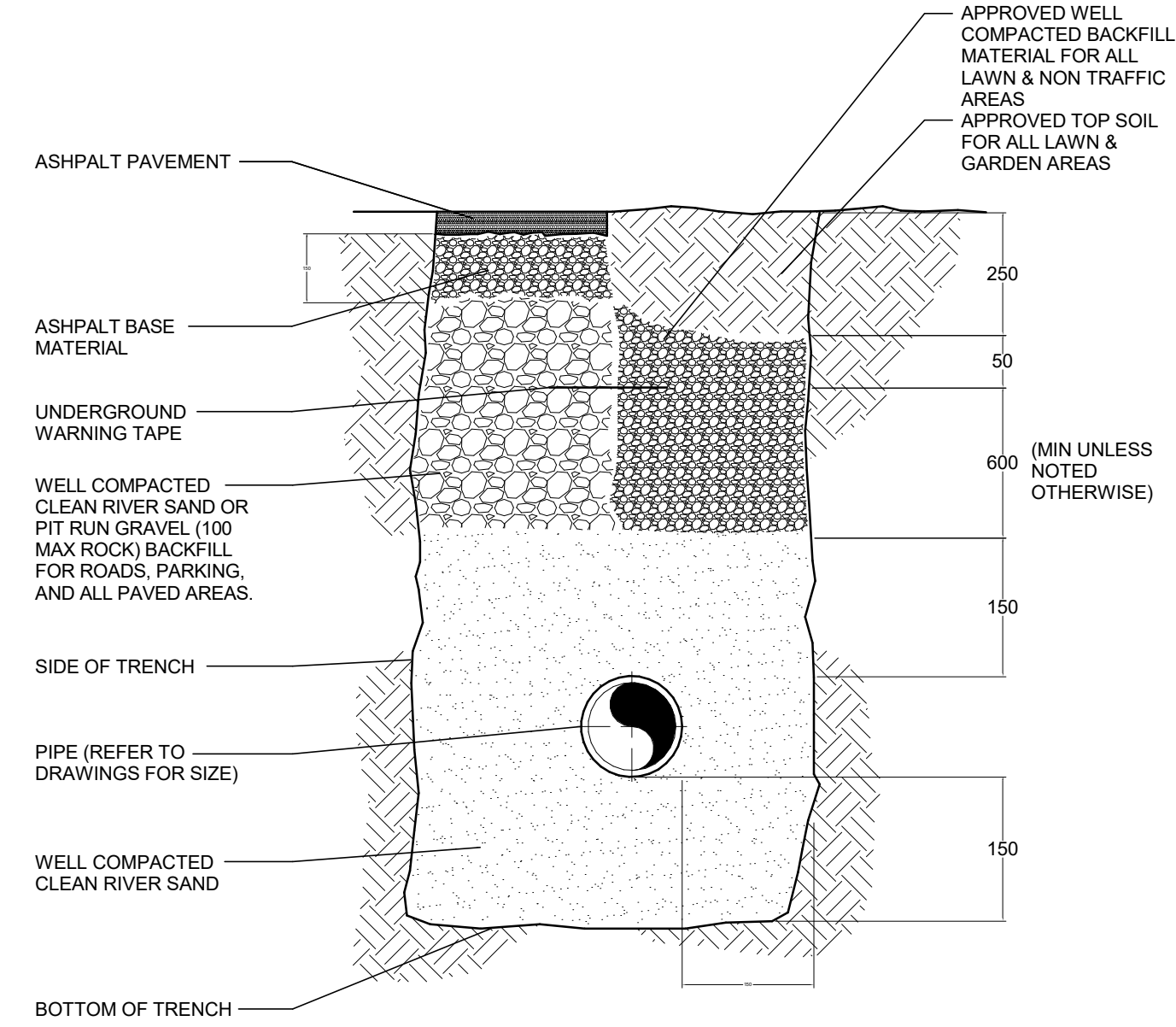
**1 HVAC PLAN**  
 M-3  
 SCALE: 1/8" = 1'-0"



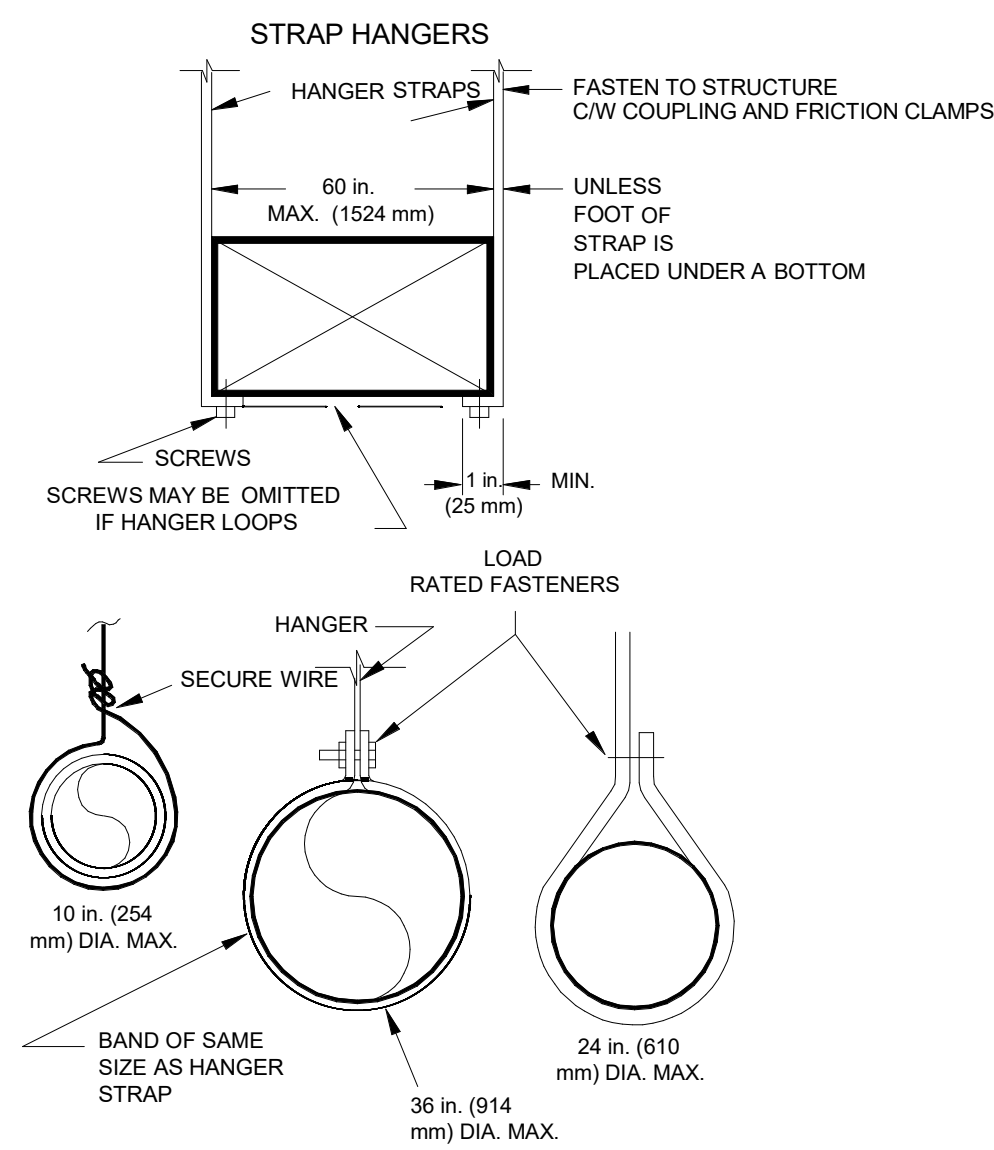
1 DUCT ELBOW DETAILS  
M4 SCALE: NTS



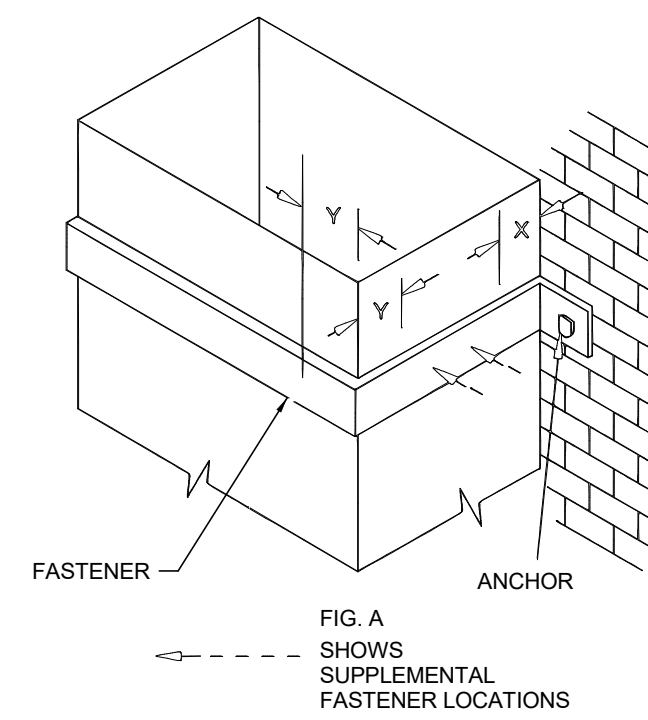
2 FAN/DUCT FLEXIBLE CONNECTION  
M4 SCALE: NTS



3 GAS PIPE BEDDING  
M4 SCALE: NTS



4 DUCT LOWER HANGER ATTACHMENT DETAILS  
M4 SCALE: NTS

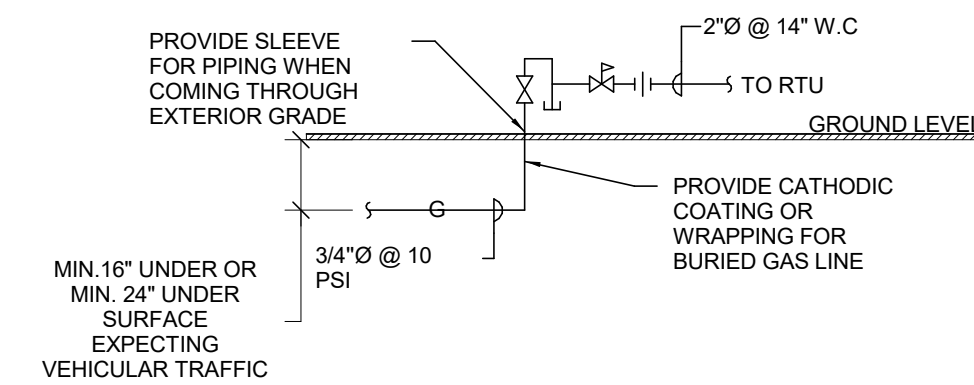


5 DUCT SUPPORT FROM WALL  
M4 SCALE: NTS

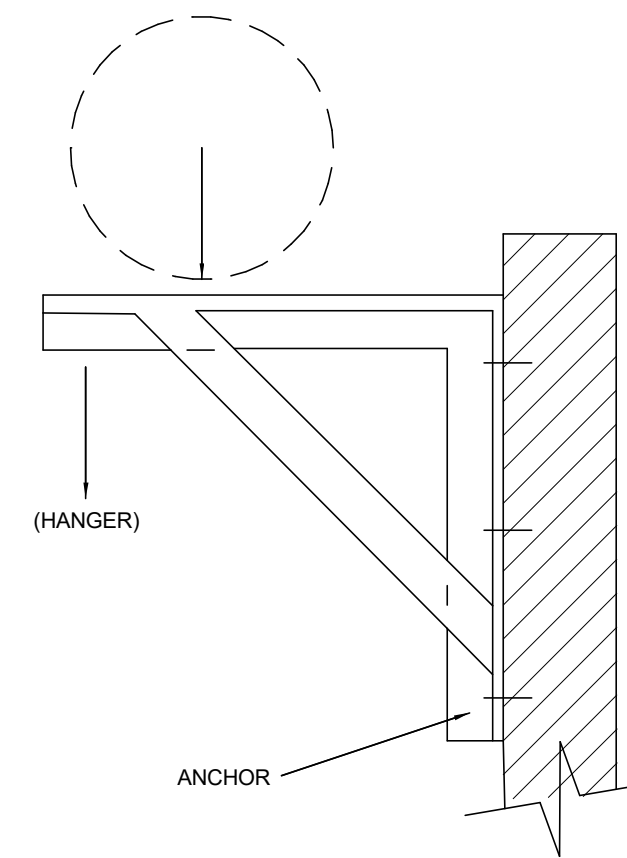
FIG. A SUGGESTED SIZING

DUCT SIZE	BAND SIZE	ALLOWABLE LOAD PER FASTENER
18" X 12"	1-1/2" X 16 GA.	25 LBS
24" X 20"	1" X 1/8"	35 LBS
		50 LBS

\*WELD, BOLT OR NO. 8 SCREW (MIN.) DEVIATION PERMITTED BY OTHER ANALYSIS. X=1"; ADD OTHERS TO ACCOMMODATE LOAD. MINIMUM OF 3 ON 24" WIDTH AND UP. ADD ALONG SIDES NEAREST ANCHORS.



6 PROPANE GAS TRAIN DETAIL  
M4 SCALE: NTS



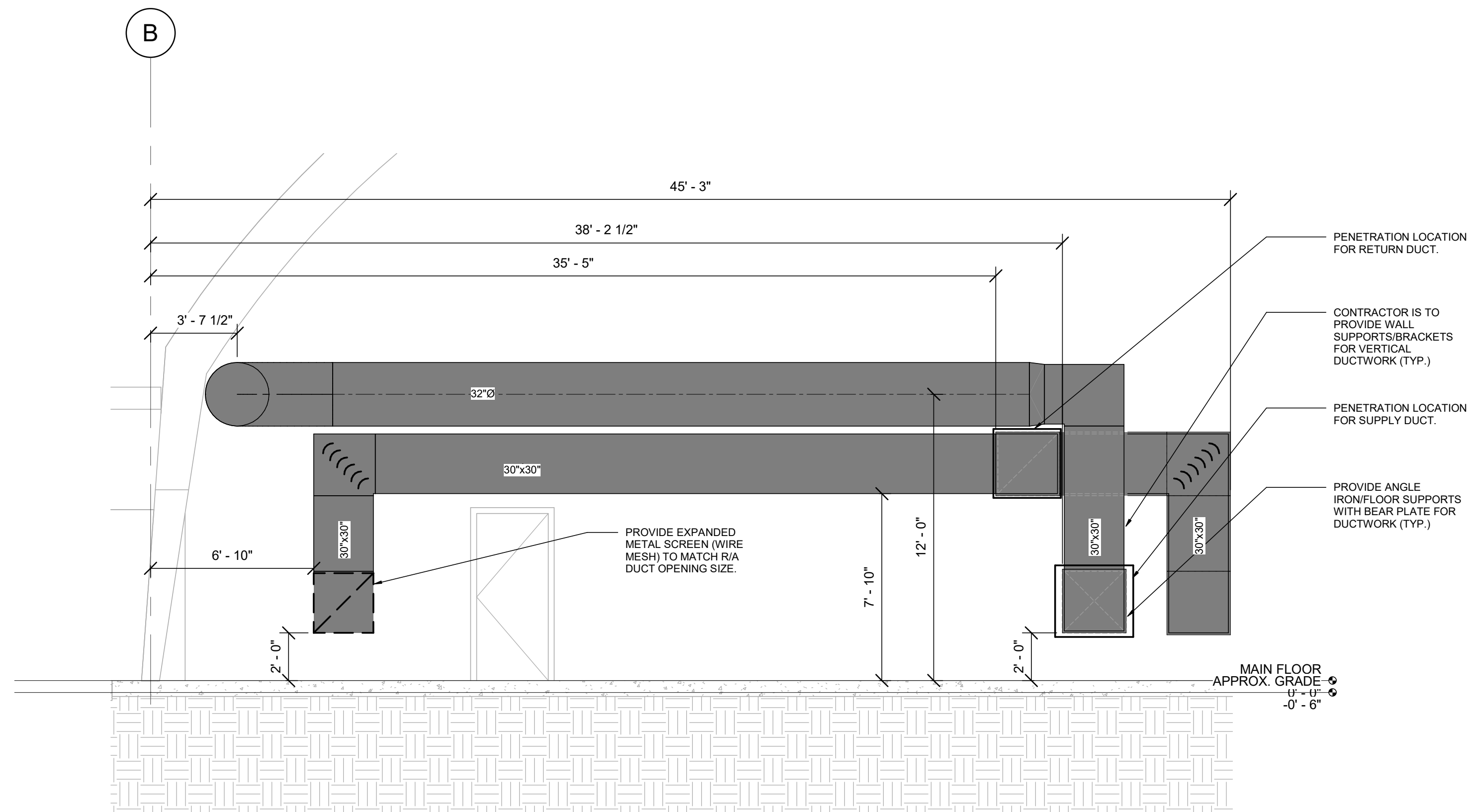
7 DUCT SUPPORT DETAILS  
M4 SCALE: NTS

SEE KNEE BRACKET TABLES IN THE ROUND INDUSTRIAL STDS.

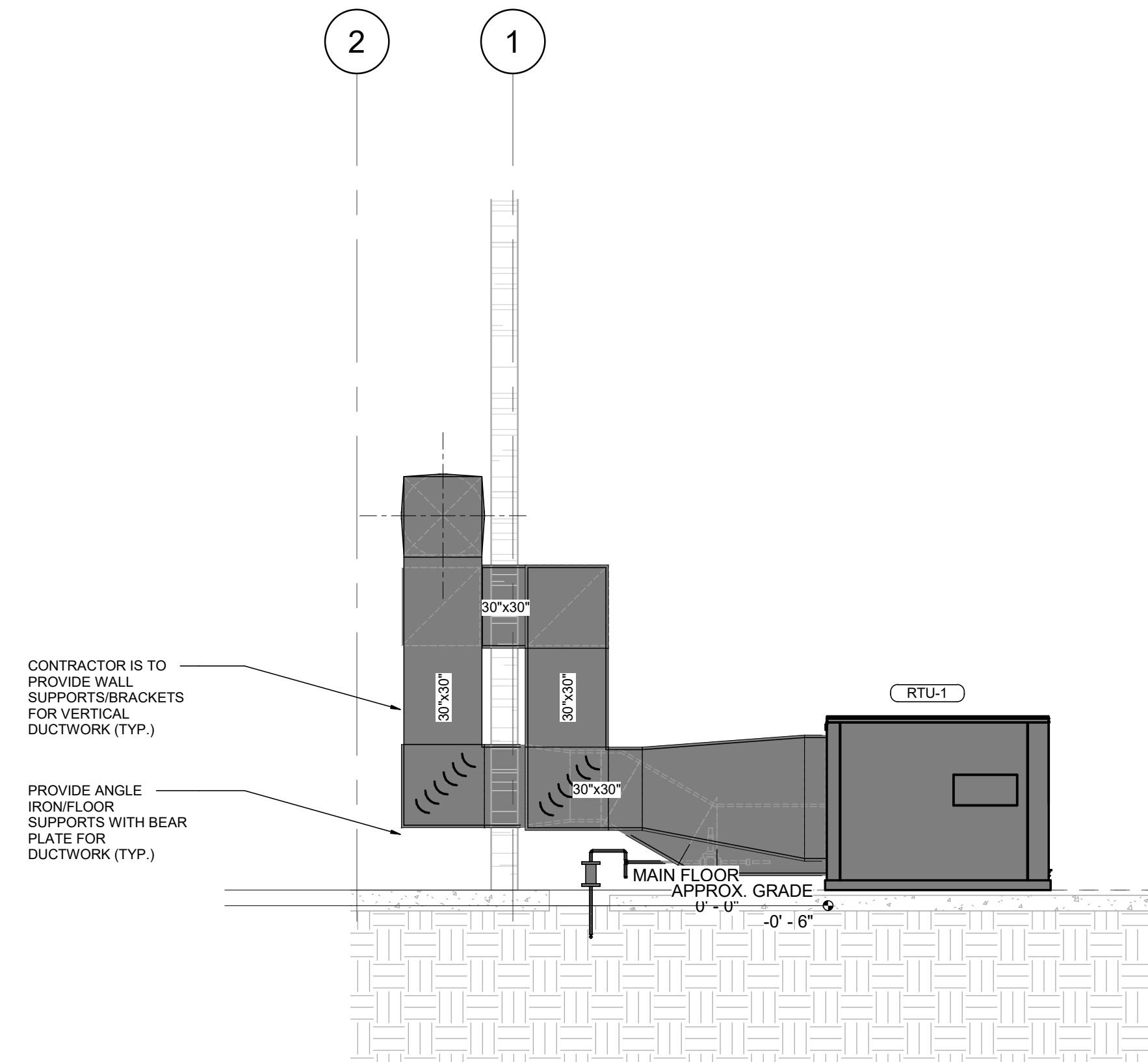
FIG. SUGGESTED SIZING

DUCT SIZE	ANGLE
30" x 12"	1" x 1/2" x 1/8"
36" x 18"	1" x 1/2" x 1/8"
42" x 24"	1 1/4" x 1 1/4" x 1/8"
48" x 30"	1 1/4" x 1 1/4" x 1/8"

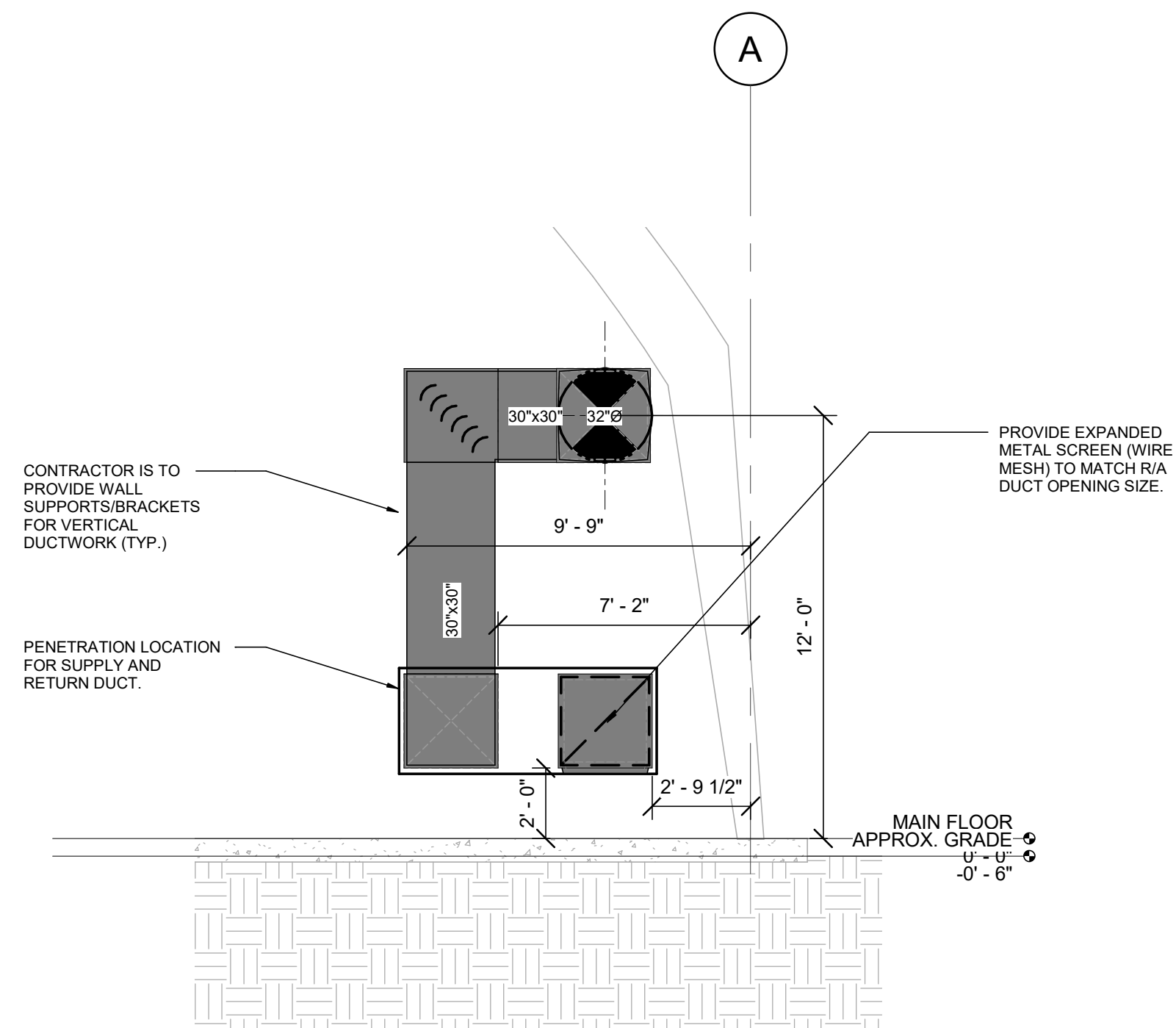
No.	DATE	REVISION
1	01-27-2023	ISSUED FOR COORDINATION
2	02-03-2023	ISSUED FOR TENDER
3	06-05-2023	REISSUED FOR TENDER



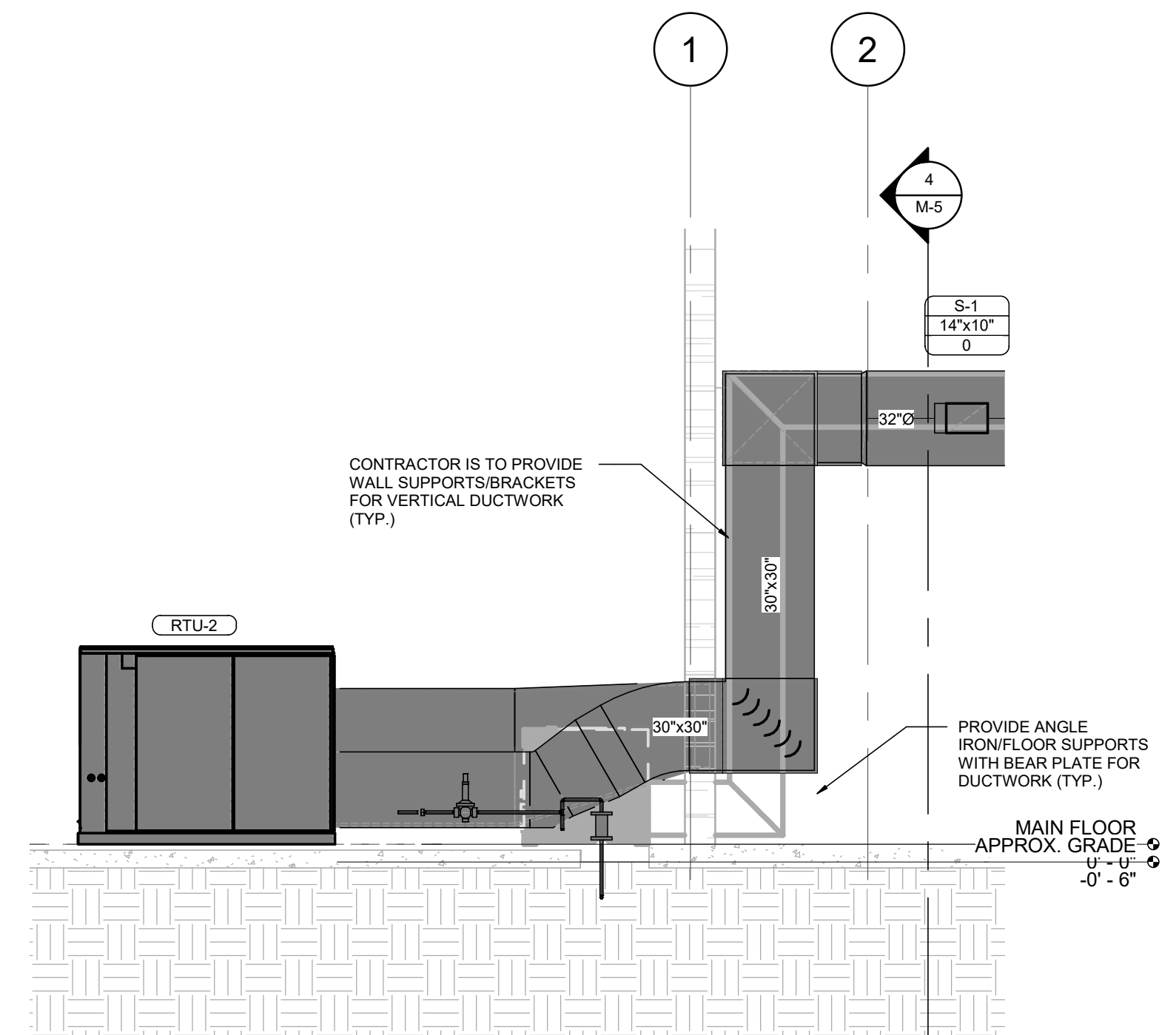
1 MECHANICAL SECTION  
M-5 SCALE: 1/4" = 1'-0"



2 MECHANICAL SECTION  
M-5 SCALE: 1/4" = 1'-0"



4 MECHANICAL SECTION  
M-5 SCALE: 1/4" = 1'-0"



3 MECHANICAL SECTION  
M-5 SCALE: 1/4" = 1'-0"

No.	DATE	REVISION
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2	02-03-2023	ISSUED FOR TENDER
3	06-05-2023	REISSUED FOR TENDER

PROJECT TITLE

**DRAO-DISH  
PRODUCTION  
FACILITY**

DRAWING NUMBER

**M-5**

DRAWING TITLE

**MECHANICAL  
SECTION**

START DATE	2022-12-02
PROJECT NO.	447b-002-22
SCALE	1/4" = 1'-0"
DRAWN	FA
CHECKED	NY