ABBREVIATIONS

A	AMPERES
AC	AIR CONDITIONING
ACCU	AIR COOLED CONDENSING UNIT
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AL	ACOUSTICAL LINING
AP	ACCESS PANEL
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BTU	BRITISH THERMAL UNIT
BTUH	BTUH PER HOUR
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CLG	CEILING
COND	CONDENSATE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
DWG	DRAWING
CV	CONSTANT VOLUME
D	DROP
DB	DRY BULB
DIAM	DIAMETER
DN	DOWN
(E)	EXISTING TO REMAIN
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EG	EXHAUST GRILLE
EL	ELEVATION
ELEC	ELECTRIC
EQ	EQUAL
EWB	ENTERING WET BULB
EXH	EXHAUST
EXP	EXPANSION
EXIST	EXISTING
°F	DEGREES FAHRENHEIT
FA	FREE AREA (SQ.FT.)
FC	FLEXIBLE CONNECTION
FD	FIRE DAMPER
FLA	FULL LOAD AMPERES
FPM	FEET PER MINUTE
FPS	FEET PER SECOND

FT	FEET
G	GAUGE
HR	HOUR
HT	HEIGHT
HZ	FREQUENCY
IN	INCH OR INCHES
KW	KILOWATT
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LBD	LEAVING DRY BULB TEMPERATURE
LIN FT	LINEAR FEET
LRA	LOCKED ROTOR AMPS
MAX	MAXIMUM
MBH	THOUSAND BTUH PER HOUR
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
NO.	NUMBER
NTS	NOT TO SCALE
OED	OPEN ENDED DUCT
PD	PRESSURE DROP
PSI	POUNDS PER SQUARE INCH
R	RISE
RA	RETURN AIR
REFR	REFRIGERANT
RG	REFRIGERANT GAS
RL	REFRIGERANT LIQUID
RLA	RUNNING LOAD AMPS
RM	ROOM
ROT	ROTATION
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SP	STATIC PRESSURE
SPEC	SPECIFICATION
TEMP	TEMPERATURE
TYP	TYPICAL
V	VOLTS

SYMBOL LIST

	SINGLE LINE DUCTWORK OR EQUIPMENT – NEW
	SINGLE LINE DUCTWORK OR EQUIPMENT – EXISTING
	DUCTWORK OR EQUIPMENT TO BE REMOVED
	DUCTWORK WITH ACOUSTICAL LINING
	DUCTWORK UNDER POSITIVE PRESSURE (SUPPLY AIR OR FAN DISCHARGE)
	DUCT UNDER NEGATIVE PRESSURE (RETURN,EXHAUST, OR OUTSIDE AIR)
VD	VOLUME DAMPER
	CUBIC FEET PER MINUTE
	DIAMETER
	AIRFLOW DIRECTION
	POINT OF CONNECTION
	POINT OF DISCONNECTION
	VANED ELBOW
	RADIUS ELBOW
	SEE DUCT DETAILS FOR TYPE OF BRANCH CONNECTION
	VERTICAL DUCT DROP (IN DIRECTION OF AIRFLOW)
	VERTICAL DUCT RISE (IN DIRECTION OF AIRFLOW)
T	THERMOSTAT
	NEW PIPE WITH DIRECTION OF FLOW
	EXISTING PIPING
	PIPING TO BE REMOVED
	PIPE DROP
	PIPE RISE

MECHANICAL DRAWING LIST

GENERAL NOTES

1. GENERAL NOTES, SYMBOL LIST AND DETAILS ARE APPLICABLE TO ALL HVAC/MECHANICAL DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC. DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD. RELOCATE EXISTING WORK THAT INTERFERES WITH WORK OF THIS CONTRACT.
3. COORDINATE THIS WORK WITH THAT OF OTHER TRADES.
4. DIMENSIONS SHOWN ON PLAN ARE HORIZONTAL. DIMENSIONS SHOWN IN ELEVATION ARE VERTICAL EXCEPT IN WAY OF STRUCTURAL STEEL, DIMENSIONS ARE MEASURED PERPENDICULAR TO FLANGE.
5. NEITHER ACCURACY NOR COMPLETENESS OF SERVICES AND UTILITY LOCATIONS SHOWN ON DRAWINGS IS GUARANTEED. DETERMINE EXACT LOCATIONS OF EXISTING SERVICES AND UTILITIES IN FIELD, WHETHER OR NOT SHOWN ON DRAWINGS. EXERCISE CAUTION AND IDENTIFY LOCATIONS OF UNMARKED UTILITY LINES AS NECESSARY TO PERFORM WORK OF THIS SECTION.
6. PRODUCT INSTALLATION SHALL ADHERE TO MANUFACTURER'S REQUIREMENTS.
7. PROVIDE ACCESS PANELS FOR EQUIPMENT THAT REQUIRES SERVICE OR MAINTENANCE.
8. PROVIDE HANGERS, ANCHORS, INSERTS, SUPPLEMENTAL STEEL, AND SUPPORTS AS REQUIRED TO SUPPORT DUCTWORK, PIPING, AND EQUIPMENT FROM STRUCTURE.
9. RUN PIPING CONCEALED WITHIN WALLS, CEILINGS, OR SOFFITS, UNLESS OTHERWISE SPECIFIED AND CLEAR OF CEILING INSERTS. COORDINATE ROUTING WITH ARCHITECT AND CONSTRUCTION METHODS.
10. INSTALL THERMOSTATS 4'-6" ABOVE FINISHED FLOOR UNLESS OTHERWISE DIRECTED BY ARCHITECT.
11. SPECIFICATIONS ARE PART OF THESE DOCUMENTS AND SCOPE OF WORK.
12. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES.
13. PROVIDE 36" CLEARANCE IN FRONT OF ALL ELECTRIC CONTROL PANELS PER N.E.C. AND MFG. REQUIREMENTS.

DEMOLITION NOTES

1. THE CONTRACTOR SHALL INCLUDE IN HIS PRICE ALL COSTS ASSOCIATED WITH REMOVALS AND RELOCATIONS OF HVAC WORK AS DESCRIBED ON THE DRAWINGS AND IN THE SPECIFICATIONS WITH ALLOWANCES FOR EXPECTED OR UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN OPENED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION WILL BE ACCEPTED, EXCEPT IN CERTAIN CASES CONSIDERED JUSTIFIABLE BY THE OWNER/ENGINEER.
2. THE CONTRACTOR SHALL PERFORM DEMOLITION AND REMOVAL WORK WITH MINIMUM INTERFERENCE TO FUNCTIONING HVAC SYSTEMS. ALL AFFECTED SYSTEMS SHALL BE RECONNECTED AND RESTORED.
3. DEMOLITION AND REMOVAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER. THE CONTRACTOR SHALL PATCH, REPAIR OR OTHERWISE RESTORE ANY DAMAGED INTERIOR OR EXTERIOR BUILDING SURFACE TO ITS ORIGINAL CONDITION.
4. THE CONTRACTOR SHALL REMOVE ALL DUCT AND PIPING SUPPORTS, ETC. FROM PARTITIONS THAT ARE TO BE REMOVED. WHERE THE REMOVAL OF THESE ITEMS DISRUPTS EXISTING PIPING THAT IS TO REMAIN, THE CONTRACTOR SHALL INSTALL AND PROVIDE BYPASS CONNECTIONS AS NECESSARY.
5. ALL PIPING WHICH BECOMES EXPOSED DURING THE ALTERATION WORK SHALL BE REMOVED AND REROUTED CONCEALED BEHIND FINISHED SURFACES.
6. PORTIONS OF PIPING AND DUCTWORK TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK, BUT WHICH ARE REQUIRED TO REMAIN ACTIVE, SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED AND RECONNECTED.
7. THE CONTRACTOR SHALL NOTIFY THE OWNER, AT THE APPROPRIATE TIME, OF THE PROJECTED DEMOLITION AND PHASING SCHEDULE SO THAT REMOVAL OR RELOCATION OF AFFECTED UTILITIES MAY BE CARRIED OUT IN COORDINATION WITH THE PROJECT REQUIREMENTS.
8. ALL EXISTING MATERIAL AND EQUIPMENT IN USABLE CONDITION, WHICH IS TO BE REMOVED UNDER THIS CONTRACTOR, SHALL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE DISPOSED OF BY THE HVAC CONTRACTOR, AS DIRECTED BY THE OWNER.
9. ARRANGE TO WORK CONTINUOUSLY, INCLUDING OVERTIME IF REQUIRED, TO ASSURE THAT SYSTEMS WILL BE SHUT DOWN ONLY DURING THE TIME ACTUALLY REQUIRED TO MAKE THE NECESSARY CONNECTIONS TO THE EXISTING SYSTEMS.
10. THE SHUTDOWN OF EXISTING BUILDING HVAC SERVICES SHALL BE COORDINATED WITH THE OWNER. MAKE ARRANGEMENTS AT LEAST 5 BUSINESS DAYS PRIOR TO A SHUTDOWN.
11. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL REQUIREMENTS REGARDING DISPOSAL OR REFRIGERANTS.

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CYBER SECURITY LABORATORY RENOVATIONS

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MECHANICAL COVER SHEET

PROJECT NO.: 23095

DRAWING NO.:

M001

1 MECHANICAL CONSTRUCTION PLAN
SCALE: 1/4"=1'-0"

GENERAL NOTES:

1. ALL EXISTING MECHANICAL SYSTEMS ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED.
2. PITCH CONDENSATE DRAIN (CD) PIPING ½" FOR EVERY 10' OF PIPE IN THE DIRECTION OF FLOW.

KEY NOTES:

1. DISCHARGE CD PIPING INTO MOP SINK AT LEAST 3" ABOVE SINK TOP.
2. COMBINATION TEMPERATURE (TS) AND CO2 SENSOR IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED.
3. FURNISH AND INSTALL ACCU WITH A MANUFACTURER APPROVED UNIT STAND. INSTALL UNIT AT LEAST 18" ABOVE GRADE.
4. NEW PARTITION IS NOT FULL HEIGHT – REFER TO ARCHITECTURAL DRAWINGS.
5. PROVIDE 4'-2"W X 3'-6"D X 0'-4" H CONCRETE PAD. INSTALL PAD ON GRADE AND DEAD LEVEL IN BOTH DIRECTIONS. PAD SHALL EXTEND AT LEAST 3" BEYOND UNIT STAND FOOT PLATES ALL AROUND.
6. REFNET BRANCH PIPING KIT. TYPICAL.
7. DAISY CHAIN ALL FCU-A AND WIRE TO ONE REMOTE CONTROLLER.

SEQUENCE OF OPERATION:

1) ACCU-1/FCU-A
INDOOR UNIT SHALL OPERATE TO MAINTAIN SET POINT TEMPERATURE. A LOCAL 7-DAY PROGRAMMABLE WALL MOUNTED CONTROLLER SHALL ALLOW FOR SPACE TEMPERATURE ADJUSTMENT AND SCHEDULING OF SPACE. ONE CONTROLLER SHALL BE DAISY CHAINED TO (4) INDOOR UNITS.

COOLING MODE
SPACE SETPOINT TEMPERATURE SHALL BE SET AT 75°F (ADJUSTABLE).

HEATING MODE
SPACE SETPOINT TEMPERATURE SHALL BE SET AT 60°F (ADJUSTABLE).

VRF SYSTEM TO NOT RUN IN COOLING MODE WHEN EXISTING FIN TUBE RADIATOR IS IN OPERATION.

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MECHANICAL EXISTING/ CONSTRUCTION PLAN

PROJECT NO.: 23095

DRAWING NO.:

M100

one inch = one foot 0 6" 2
three quarters inch = one foot 0 6" 2
one half inch = one foot 0 4
one eighth inch = one foot 0 8 4
one quarter inch = one foot 0 8 4
three eighths inch = one foot 0 8 4
one eighth inch = one foot 0 8 4 16

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AIR COOLED CONDENSING UNIT (HEAT PUMP) SCHEDULE

TAG	LOCATION	SERVICE	NOMINAL COOLING CAPACITY (BTU/H)	NOMINAL HEATING CAPACITY (BTU/H)	EER	SEER	HSPF	ESP (IN. WC)	ELECTRICAL DATA				W X H X D (INCHES)	WEIGHT (LBS)	SOUND DATA (DBA)	MANUFACTURER AND MODEL	REMARKS
									V/P/C	MCA (AMPS)	MOP (AMPS)	RLA (AMPS)					
ACCU-1	GRADE – SEE PLANS	FCU-A	54,000	35,500	10.3	18.0	10	0.6	208/1/60	29.1	35.0	19.0	37.0 X 39.0 X 12.6	200	58	DAIKIN RXTQ48TAVJUA	SEE NOTES

NOTES:

FAN COIL UNIT SCHEDULE (INDOOR UNIT)

TAG	SERVICE	NOMINAL COOLING CAPACITY (BTU/H)	NOMINAL HEATING CAPACITY (BTU/H)	AIRFLOW (CFM)	FRESH AIR (CFM)	COOLING DATA				HEATING DATA		ELECTRICAL DATA			W X H X D (INCHES)	WEIGHT (LBS)	MANUFACTURER AND MODEL	REMARKS
						EAT		LAT		EAT	LAT	V/P/C	MCA (AMPS)	MOP (AMPS)				
						DB (°F)	DB (°F)	DB (°F)	DB (°F)	DB (°F)	DB (°F)							
FCU-A	AIR CONDITIONING OF CLASSROOMS S139 & S141	15,015	17,057	405	0	80.0	67.0	56.1	70.0	108.2		208/1/60	0.4	15	22.6 X 10.2 X 22.6	50	DAIKIN FXZQ15TAVJU	SEE REMARKS

NOTES: FURNISH AND INSTALL UNITS WITH THE FOLLOWING FEATURES AND ACCESSORIES
1. REMOTE CONTROLLER SIMILAR TO DAIKIN MODEL BRC1E73.
2. DECORATION PANEL WHITE SIMILAR TO DAIKIN MODEL BYFQ60C3W1W.
3. REFNET BRANCH PIPING KIT SIMILAR TO DAIKIN MODEL KHRP26A22T9.
4. PROVIDE BACNET CARD FOR TIE IN TO EXISTING BMS.

CONDENSATE PUMP

TAG	LOCATION	GPH (10 FT.)	HEAD (FT.)	SUCTION TEMP (°F)	POWER (HP)	VOLTS/PHASE	WEIGHT (LB)	MANUFACTURER AND MODEL	NOTES
CP-A	SEE PLANS	42	15	45	1/30	115V/1	5.5	LITTLE GIANT VCMX-20UL	1,2

NOTES: FURNISH UNIT WITH THE FOLLOWING FEATURES AND OPTIONS

1. THERMAL OVERLOAD PROTECTOR AND POLYETHYLENE SCREEN.
2. INTEGRAL FLOAT SWITCH, COPPER CHECK VALVE FOR ½" COPPER TUBING.
3. CONDENSATE PUMP TO BE HARD WIRED AND SUITABLE FOR USE IN PLENUMS.

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MECHANICAL SCHEDULES

PROJECT NO.: 23095

DRAWING NO.:

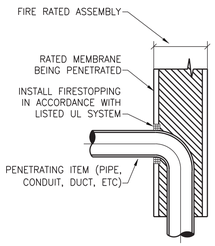
M200

GENERAL GUIDELINE FOR SELECTING APPROPRIATE FIRESTOPPING SYSTEMS:

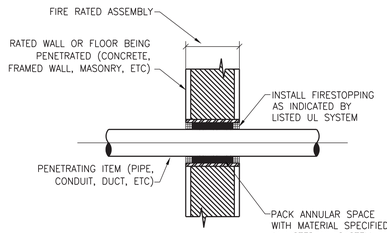
DETERMINE SYSTEM COMPONENTS:
- TYPE OF PENETRATION (MEMBRANE OR THROUGH)
- PENETRATING ITEM
- ASSEMBLY BEING PENETRATED
- MINIMUM AND MAXIMUM ANNULAR SPACES, POINTS OF CONTACT

DETERMINE RATING REQUIREMENTS:
- F-RATING, T-RATING, L-RATING, AND W-RATING

FOR EACH PENETRATION, SELECT A SYSTEM LISTED BY AN APPROVED TESTING AGENCY (UL, FM, ETC) THAT MEETS ALL OF THE ABOVE PARAMETERS



MEMBRANE PENETRATION



THROUGH PENETRATION

F-RATING: THE AMOUNT OF TIME (IN HOURS) BEFORE FLAMES CAN PASS THROUGH A PENETRATION FROM THE SIDE OF A WALL OR FLOOR EXPOSED TO FLAMES TO THE UNEXPOSED SIDE

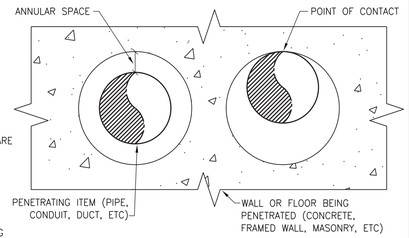
T-RATING: THE AMOUNT OF TIME (IN HOURS) BEFORE THE SURFACE OF AN ASSEMBLY AND/OR PENETRATING ITEM ON THE SIDE OF A WALL OR FLOOR NOT EXPOSED TO FLAMES RISES TO A TEMPERATURE OF 325°F

L-RATING: THE AMOUNT OF AIR/SMOKE (IN CUBIC FEET PER MINUTE PER SQUARE FOOT) THAT CAN LEAK THROUGH THE PENETRATION

W-RATING: A FIRESTOPPING PRODUCT'S ABILITY TO RESIST THE PASSAGE OF WATER THROUGH FLOOR ASSEMBLIES

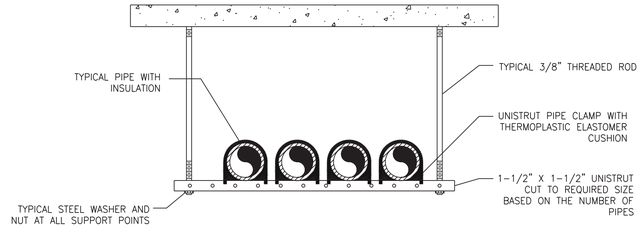
REFER TO PROJECT SPECIFICATIONS FOR RATINGS AND ADDITIONAL FIRESTOPPING REQUIREMENTS

DEFINITIONS AND NOTES



ANNULAR SPACE

FIRESTOPPING PENETRATIONS GUIDELINE



MULTIPLE REFRIGERANT PIPES SUPPORT

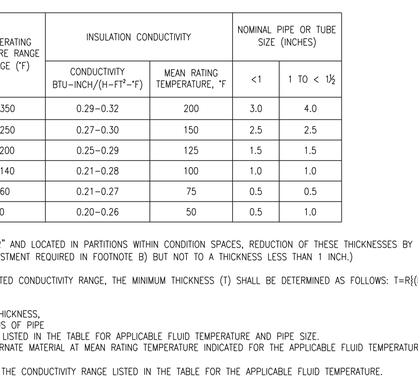
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (INCHES)	
	CONDUCTIVITY BTU-INCH/(H-FT²-°F)	MEAN RATING TEMPERATURE, °F	<1	1 TO < 1½
251-350	0.29-0.32	200	3.0	4.0
201-250	0.27-0.30	150	2.5	2.5
141-200	0.25-0.29	125	1.5	1.5
105-140	0.21-0.28	100	1.0	1.0
40-60	0.21-0.27	75	0.5	0.5
<40	0.20-0.26	50	0.5	1.0

A. FOR PIPING SMALLER THAN 1-1/2" AND LOCATED IN PARTITIONS WITHIN CONDITION SPACES, REDUCTION OF THESE THICKNESSES BY 1 INCH SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B) BUT NOT TO A THICKNESS LESS THAN 1 INCH.)

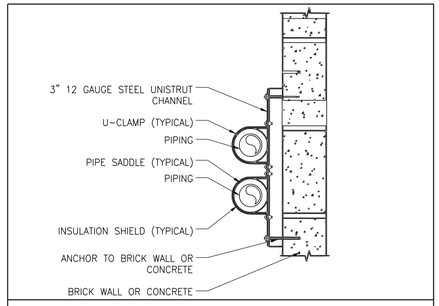
B. FOR INSULATION OUTSIDE THE STATED CONDUCTIVITY RANGE, THE MINIMUM THICKNESS (T) SHALL BE DETERMINED AS FOLLOWS: $T=R\{(L+t/R)K/k-1\}$

WHERE:
- T = MINIMUM INSULATION THICKNESS,
- R = ACTUAL OUTSIDE RADIUS OF PIPE
- t = INSULATION THICKNESS LISTED IN THE TABLE FOR APPLICABLE FLUID TEMPERATURE AND PIPE SIZE.
- K = CONDUCTIVITY OF ALTERNATE MATERIAL AT MEAN RATING TEMPERATURE INDICATED FOR THE APPLICABLE FLUID TEMPERATURE (BTU-in/h-FT²-°F)
- k = THE UPPER VALUE OF THE CONDUCTIVITY RANGE LISTED IN THE TABLE FOR THE APPLICABLE FLUID TEMPERATURE.

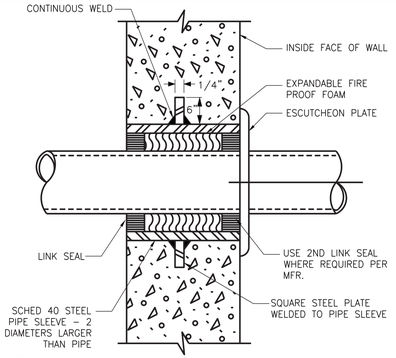
PIPING INSULATION DETAIL



TYPICAL OUTDOOR UNIT SUPPORT

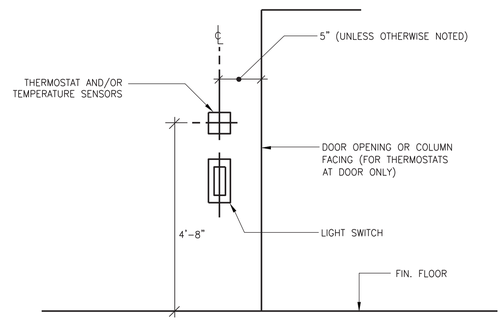


PIPE WALL SUPPORT



NOTES:
1. SLEEVE DETAIL APPLIES EQUALLY TO INSTALLATIONS BELOW OR ABOVE GRADE
2. SEE ARCHITECTURAL DRAWINGS FOR WALL THICKNESS.

PIPE SLEEVE AT OUTSIDE WALL



THERMOSTAT LOCATION

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MECHANICAL DETAILS

PROJECT NO.: 23095

DRAWING NO.:

M300

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one half inch = one foot 0 4
three eighths inch = one foot 0 4
one quarter inch = one foot 0 8
one eighth inch = one foot 0 8 16

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