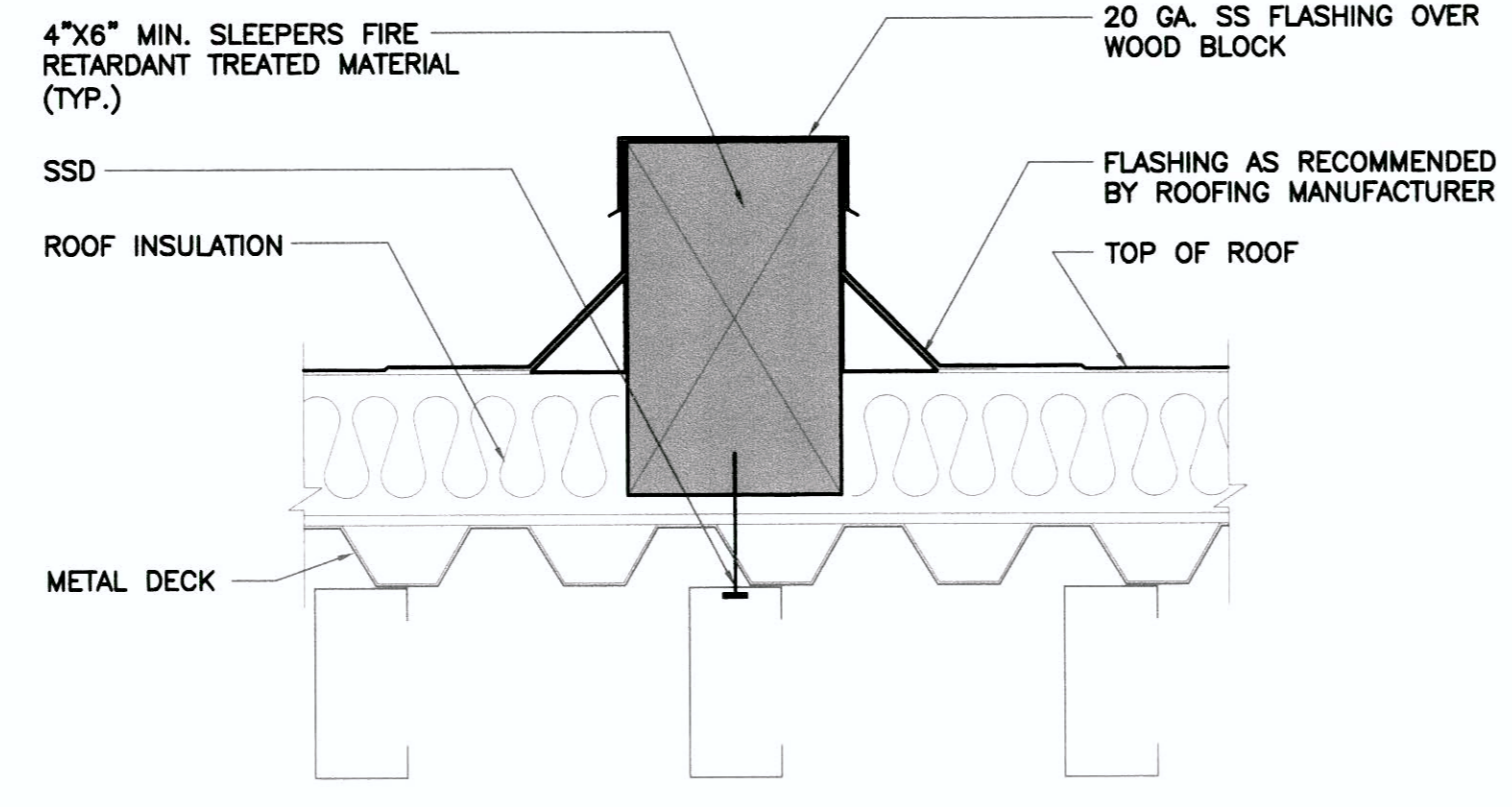


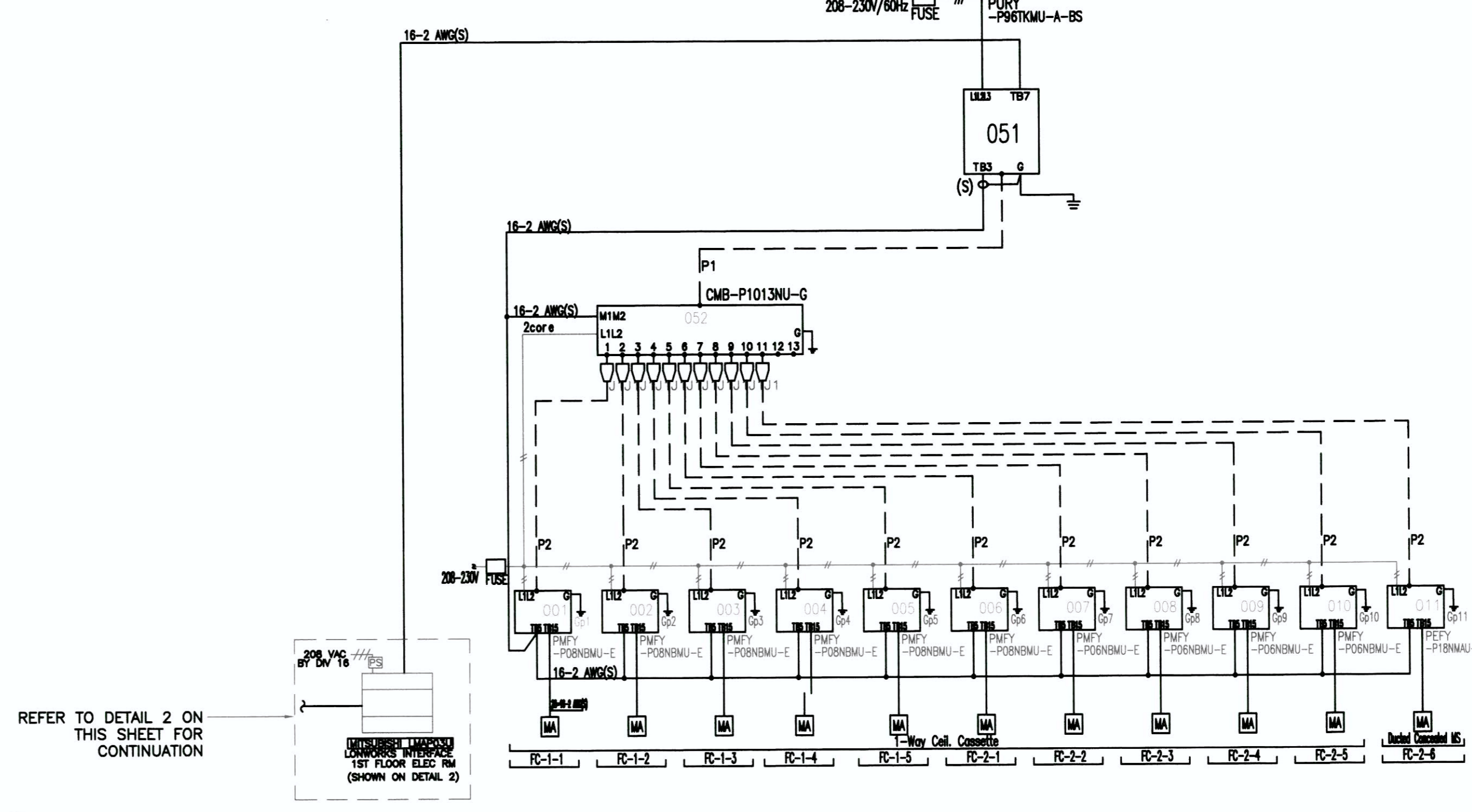
- NOTES:**
1. DUCT PENETRATIONS SHALL COMPLY WITH ALL OF THE REQUIREMENTS OF SECTION 716.5.4 OF THE 2010 CBC.
 2. CUT WALL ALLOWING 1/4" VOID FULL PERIMETER OF DUCT.
 3. CAULK VOID W/PRESSTITE 579.64
 4. TAPE & TOP OVER CAULKED JOINT.
 5. COAT OUTSIDE OF DUCTS W/SOUNDCOAT GP-1 THICKNESS TO BE 1 1/2 TIMES METAL THICKNESS.
 6. LINE DUCTS W/1" THICK JOHNS-MANVILLE MICROCOUSTIC.

6 DUCT PENETRATION THRU WALL & FLOOR N.T.S.



- NOTES:**
1. 2-HRS ROOF ASSEMBLY SHALL BE MAINTAINED.
 2. SAD AND SSD FOR ADDITIONAL INFORMATION.

3 ROOF CURB SUPPORT N.T.S.



REFER TO DETAIL 2 ON THIS SHEET FOR CONTINUATION

1 SPLIT SYSTEM SCHEMATIC AND CONTROL N.T.S.

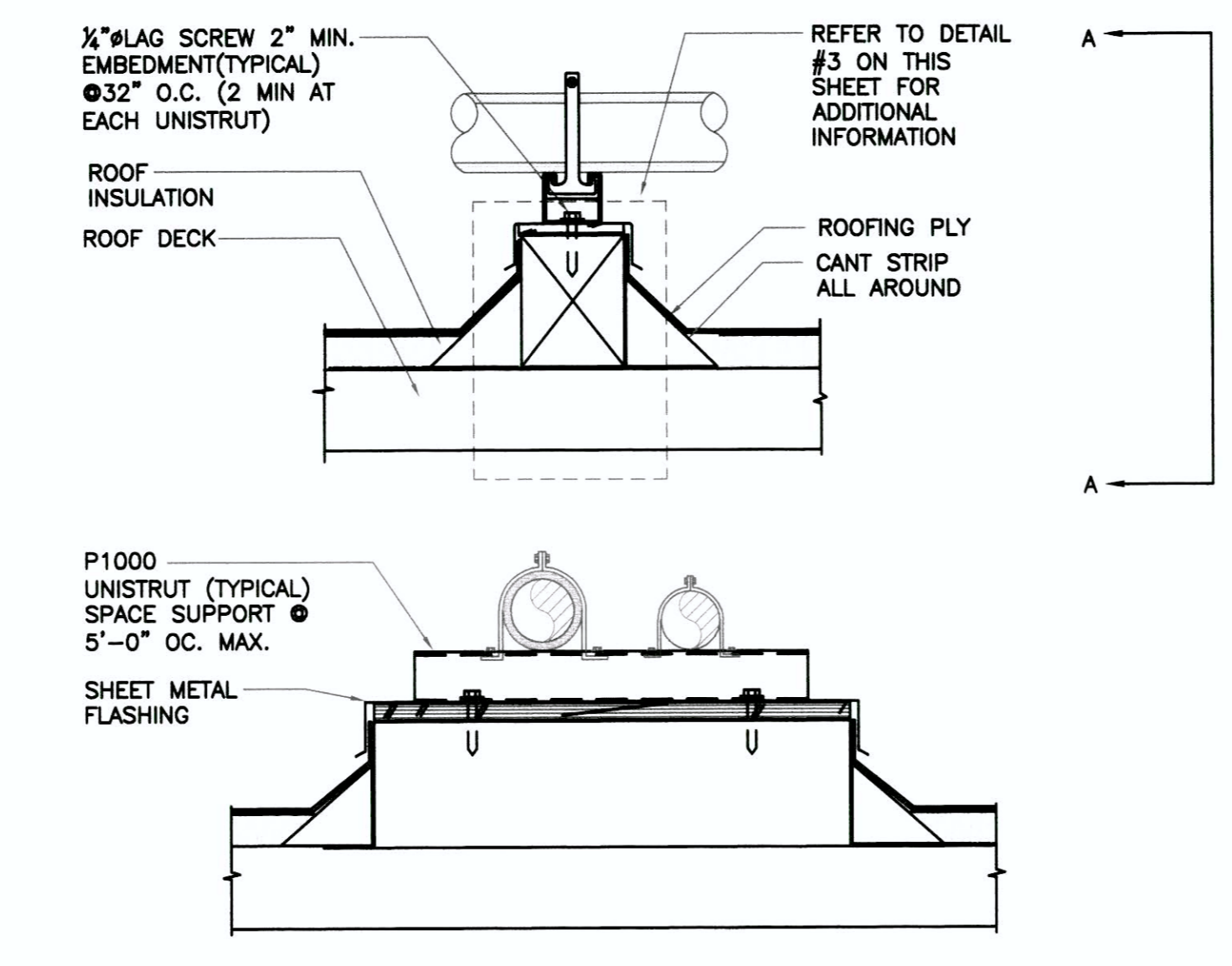
Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.
 1.25mm(1/8 IN) : 1.25mm(1/8 IN) or more, 0.75mm(3/32 IN) : between 0.5mm(1/16 IN) and 0.75mm(3/32 IN)

DIAGRAM SYMBOL	LEGEND
DISP	DISPERSION
---	PIPE
---	CONTROL WIRE
---	REF. PIPE

The symbol of replace judgment

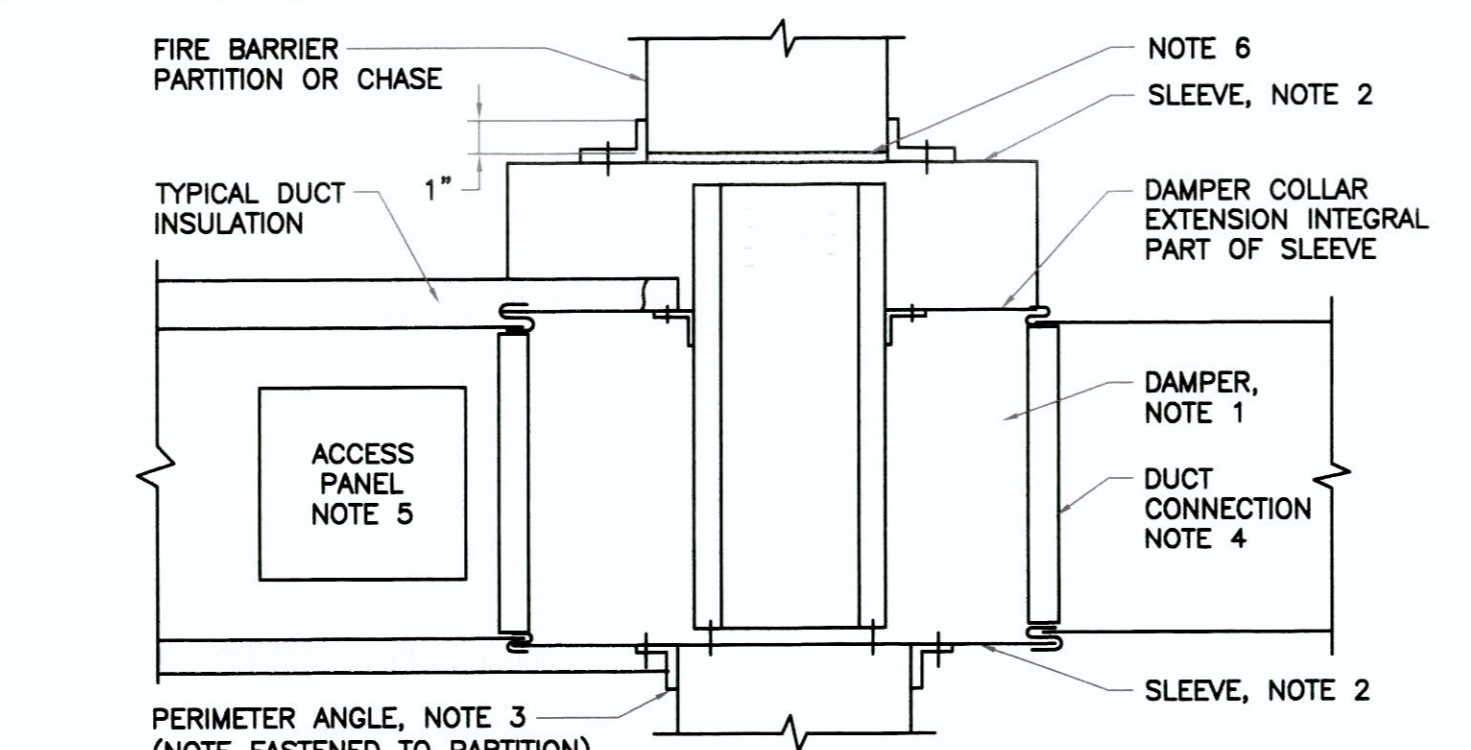
Symbol	Definition
#1	Standard
#2	Usable (Unit performance will be affected)
#3	Usable (Refrigerant charge will be limited)
#4	Usable (Piping length will be limited)
#5	Piping length and vertical separation will be limited

PIPING LIST
Sheet No. 10/24/AS/RS/SC
Sheet No. 10/24/AS/RS/SC
Sheet No. 10/24/AS/RS/SC
Sheet No. 10/24/AS/RS/SC



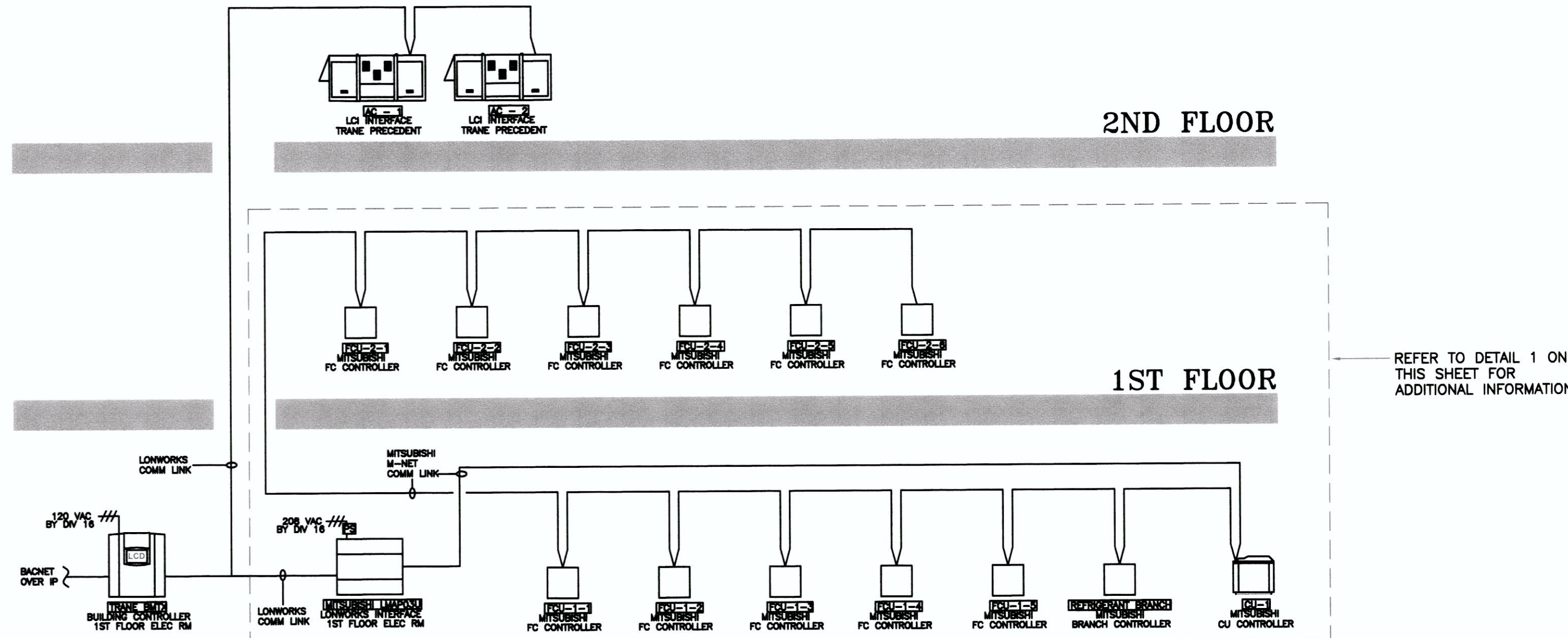
- NOTES:**
1. SAD AND SSD FOR ADDITIONAL INFORMATION.

4 PIPE SUPPORT ON ROOF (UP TO 2 1/2"φ) N.T.S.



- NOTES:**
1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION, IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR AND NOT OUTSIDE THE PENETRATION.
 2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
 3. PERIMETER ANGLES: GALVANIZED STEEL, NOT LESS THAN 1 1/2"x1 1/2" [40x40mm], 14 GAGE, TO PROVIDE 1" [25mm] MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
 4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA.
 5. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK OR LINKS.
 6. PROVIDE 1/4" TO 1/2" [6 TO 15mm] CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRESTOP FIBER.
 7. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH 3" [75mm] HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

5 SECTION THROUGH FIRE DAMPER INSTALLATION N.T.S.



- NOTES:**
1. FIELD COORDINATE EXISTING CENTRAL CAMPUS CONTROL PROTOCOL WITH FACILITY ENGINEERING PRIOR TO PERFORMING THE WORK. PROVIDE AND INSTALL ALL HARD WARE AND SOFTWARE REQUIRED FOR PROPER INTERFACE.
 2. THE CONTROLS ARCHITECTURE DIAGRAM SHOULD BE USED IN CONJUNCTION WITH THE DETAIL DRAWINGS AND SPECIFICATION IN ORDER PROVIDE AN ACCURATE DESCRIPTION OF THE CONTROLS SYSTEM.
 3. IT IS THE RESPONSIBILITY OF THE CONTROLS CONTRACTOR TO CARRY THE COST OF ANY AND ALL LABOR AND MATERIALS NECESSARY TO INTERFACE WITH ANY OTHER EQUIPMENT.
 4. NOT ALL REQUIRED POINTS ARE AVAILABLE THROUGH ROOFTOP CONTROL INTERFACE OR MITSUBISHI LONWORKS INTERFACE. CONTROLS CONTRACTOR RESPONSIBLE FOR FIELD WIRING AND CONTROLLING ALL NECESSARY POINTS THAT ARE NOT AVAILABLE.
 5. DO NOT BUNDLE SWITCHED 120VAC WIRING TOGETHER WITH SENSOR WIRING OR LOW VOLTAGE (24VAC) OR COMMUNICATION CABLE.
- SEQUENCE OF OPERATION - PACKAGED ROOFTOP UNITS(ONLY)**
- A. EACH AC SHALL BE CONTROLLED BY A STAND-ALONE MICROPROCESSOR BASED CONTROLLER WITH A LONWORKS BAS INTERFACE AND RESIDENT CONTROL LOGIC AND THE BAS SHALL PERFORM THE FOLLOWING ROOFTOP CONTROL STRATEGIES, PROVIDE THE POINTS LIST AND PROVIDE THE SPECIFIED MONITORING AND DIAGNOSTICS.**
 1. OCCUPIED MODE - ALL UNIT FUNCTIONS WILL BE ENABLED FOR NORMAL HEATING AND COOLING OPERATION. UNIT DEFAULTS TO THERMOSTAT MODE WHEN COMMUNICATION WITH BAS IS LOST.
 2. NORMAL OPERATION - WHEN IN OCCUPIED MODE AS DESCRIBED ABOVE, THE DEDICATED UNIT CONTROL SHALL OPERATE STAGES OF HEATING AND COOLING TO MAINTAIN SPACE TEMPERATURE SETPOINT. SETPOINTS SHALL BE RESET THROUGH BAS BY THE OPERATOR.
 - B. STARTING MODE - WHEN THE UNIT IS TURNED ON BY THE BAS FOR OPTIMAL START, HEATING OR COOLING IS PROVIDED AS REQUIRED. THE OUTSIDE AIR DAMPERS, IF PROVIDED, REMAINS CLOSED, IN HEATING MODE, UNTIL OCCUPIED TIME.**
 - C. COAST DOWN MODE - WHEN THE UNIT IS TURNED "OFF" BY THE BAS FOR OPTIMAL STOP, THE SUPPLY FAN REMAINS "ON", THE OUTSIDE AIR DAMPER REMAINS OPEN FOR VENTILATION, AND A SETPOINT OFFSET IS INITIATED TO LIMIT HEATING AND COOLING. SPACE COMFORT IS PROTECTED BY THE USER DEFINED SETPOINT OFFSET.**
 - D. DUTY CYCLE MODE - WHEN THE UNIT IS DUTY CYCLED "OFF" IT IS PUT IN A USER-DEFINED DUTY CYCLE MODE. USER DEFINES MAX/MIN TEMPERATURE LIMITS TO ENSURE OCCUPANT COMFORT AND OVERRIDE DUTY CYCLE IF LIMITS ARE EXCEEDED.**
 - E. DEMAND LIMIT MODE - THROUGH THE BAS A USER DEFINED DEMAND LIMIT MODE SHALL BE AVAILABLE. USER DEFINES MAXIMUM OFF TIME AND TEMPERATURE TO ENSURE OCCUPANT COMFORT.**
 - F. NIGHT SETBACK TEMPERATURE CONTROL - WHEN THE BAS SELECTS UNOCCUPIED MODE, THE UNIT SHALL BE CONTROLLED TO MAINTAIN USER DEFINED UNOCCUPIED HEATING AND COOLING SETPOINTS. THE OUTDOOR AIR DAMPER REMAINS CLOSED DURING HEATING NIGHT SETBACK OPERATION, IF PROVIDED.**
 - G. NIGHTTIME FREE-COOL PURGE MODE - AN "ECONOMIZER ONLY" COOLING CYCLE SHALL BE PROVIDED DURING UNOCCUPIED HOURS WHEN OUTDOOR AIR CONDITIONS ARE SUITABLE AND THE ZONE REQUIRES COOLING.**
 - H. LOW AMBIENT COMPRESSOR LOCKOUT - COMPRESSOR OPERATION SHALL BE DISABLED BELOW A USER DEFINED OUTDOOR AIR TEMPERATURE.**
 - I. TIMED OVERRIDE - WHEN A TIMED OVERRIDE IS INITIATED BY THE USER, THE UNIT WILL RETURN TO ITS USER DEFINED NORMAL OCCUPIED MODE FOR THE USER DETERMINED PERIOD OF TIME.**
 - J. FIRE SHUTDOWN - THE UNIT WILL SHUT DOWN IN RESPONSE TO A CUSTOMER SUPPLIED CONTACT CLOSURE TO THE BAS INDICATING THE PRESENCE OF A FIRE OR OTHER EMERGENCY CONDITION.**
 - K. MANUAL SETTING OF HEAT OR COOL MODE - BAS OPERATOR SHALL BE ABLE TO SELECT THE FOLLOWING UNIT OPERATING MODES:**
 1. HEATING
 2. COOLING
 3. EMERGENCY HEAT (HEAT PUMP).
 - L. DEFAULT MODE SHALL BE AUTOMATIC CHANGEOVER.**
 - M. HEAT PUMP AUXILIARY HEAT LOCKOUT - HEAT PUMP AUXILIARY HEAT OPERATION SHALL BE PREVENTED ABOVE A USER DEFINED OUTDOOR AIR TEMPERATURE.**
 - N. EMERGENCY HEAT MODE - SHALL BE SELECTABLE AT BAS. IN EMERGENCY HEAT MODE, COMPRESSORS SHALL BE LOCKED OUT AND AUXILIARY HEAT SHALL CONTROL FOR SPACE COMFORT.**
 - O. UNIT STATUS REPORT - FOR EACH PRTU UNIT, THE BAS SHALL PROVIDE AN OPERATING STATUS SUMMARY OF ALL SENSED VALUES (ZONE TEMPERATURE, DISCHARGE TEMPERATURE, ETC.) SETPOINTS AND MODES.**
 - P. DIAGNOSTIC/PROTECTION - THE BAS SYSTEM SHALL BE ABLE TO ALARM FROM ALL SENSED POINTS FROM THE ROOFTOP UNITS AND DIAGNOSTIC ALARMS SENSED BY THE UNIT CONTROLLER. ALARM LIMITS SHALL BE DESIGNATED FOR ALL SENSED POINTS.**

2 BUILDING AUTOMATION SYSTEM CONTROL RISER DIAGRAM N.T.S.

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MECHANICAL:	HTC ENGINEERS; 1529 CYPRESS ST., SUITE 103; WALNUT CREEK, CA 94596
ELECTRICAL:	BAY AREA CONSULTING ENGINEERS; 311 CALIFORNIA STREET, SUITE 720, SAN FRANCISCO, CA 94104
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ESTIMATING:	CUMMING CORPORATION; 1970 BROADWAY, SUITE 630; OAKLAND, CA 94612
SURVEYORS:	MARTIN M. RON ASSOCIATES, INC.; 859 HARRISON ST., SUITE 200; SAN FRANCISCO, CA 94107
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ARCHITECT/ENGINEERS:

Architecture | Engineering | Planning
 Hammel, Green and Abrahamson, Inc.
 445 Bush Street - Fourth Floor
 San Francisco, California USA 94108
 Telephone 415.962.2592
 Facsimile 415.962.2598

Drawing Title	BLDG 22 - HVAC - CONTROLS AND DETAILS.
Scale:	
Approved: Project Director	

Project Title	VA Medical Center Seismic Replacement and Retrofit
Project Number	2941-001-00
Building Number	9, 10 & 22
Location	San Francisco, CA
Date	10/22/2012
Checked	WHA
Drawn	MR
Drawing Number	M302

Office of Facilities Management

one eighth inch = one foot
 one quarter inch = one foot
 one half inch = one foot
 three eighths inch = one foot
 three quarters inch = one foot
 one inch = one foot
 one and one eighth inch = one foot
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