

GENERAL ELECTRICAL NOTES:

1. FIRE ALARM SYSTEM SHALL BE INSTALLED AND TESTED IN STRICT ACCORDANCE WITH NFPA 72, 2019 EDITION, "NATIONAL FIRE ALARM CODE," NFPA 70, 2017 EDITION, "NATIONAL ELECTRICAL CODE," AND INTERNATIONAL BUILDING CODE (IBC) 2018 EDITION, NFPA 2001, 2018 EDITION, "STANDARD ON CLEAN AGENT FIRE EXTINGUISHING SYSTEMS," AS WELL AS STATE AND LOCAL BUILDING CODES AND STANDARDS.
2. FIRE ALARM CONDUCTORS AND CABLES SHALL BE INSTALLED IN STRICT ACCORDANCE WITH NFPA 70, 2017 EDITION NATIONAL ELECTRICAL CODE AND SPECIFICALLY WITH ARTICLES 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790, 1800, 1810, 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060, 2070, 2080, 2090, 2100, 2110, 2120, 2130, 2140, 2150, 2160, 2170, 2180, 2190, 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3. FIRE ALARM CONDUCTORS AND CABLES SHALL BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. CONDUCTORS AND CABLES SHALL BE SUPPORTED BY THE BUILDING STRUCTURE IN SUCH A MANNER THAT THE CABLE WILL NOT BE DAMAGED BY NORMAL BUILDING USE.
4. THE INSTALLING ELECTRICAL CONTRACTOR MUST PROVIDE THE FIRE ALARM CONTRACTOR (KELLER FIRE & SAFETY) WITH ACCURATE MARKED UP DRAWINGS SHOWING ALL JUNCTION BOXES, TERMINAL CABINETS, DEVICE LOCATIONS, WIRE ROUTING, ETC. FOR THE USE IN MAKING OF "RECORD DRAWINGS". FINAL PAYMENT WILL NOT BE AUTHORIZED UNTIL THE RECORD DOCUMENTS HAVE BEEN RECEIVED AND APPROVED.
5. CONDUIT ROUTING AND CONDUIT SIZE SHALL BE DETERMINED BY THE CONTRACTOR, IN CONJUNCTION WITH NFPA 70 (NEC), AND INDICATED ON THE RECORD DRAWINGS. CONDUIT FILL SHALL NOT EXCEED 40%.
6. PRIMARY POWER SOURCE (120VAC) TO FACT AND POWER SUPPLIES MUST BE ON A DEDICATED BRANCH CIRCUIT FROM THE EMERGENCY GENERATOR (IF APPLICABLE), WITH DISCONNECT MEANS MARKED "FIRE ALARM CONTROL CIRCUIT". THE LOCATION OF THE DISCONNECT MUST BE IDENTIFIED AT THE FACT AND ALL POWER SUPPLIES. A FIRE ALARM CIRCUIT BREAKERS MUST BE CLEARLY MARKED AND MECHANICALLY SECURED TO PREVENT ANY UNAUTHORIZED TAMPERING.
7. DEVICE POLARITY MUST BE OBSERVED ON ALL DC CIRCUITS (SLC, IAC, NAC, AND AUXILIARY POWER).
8. ALL INITIATING AND NOTIFICATION CIRCUIT WIRING MUST BE SUPERVISED.
9. ALL WIRING, INCLUDING SHIELDS, MUST BE DRY AND FREE OF SHORTS AND GROUNDS.
10. INITIATING DEVICES SHALL BE SUPPORTED INDEPENDENTLY OF THESE ATTACHMENT TO FIRE ALARM CIRCUIT CONDUCTORS.
11. FIRE ALARM CIRCUITS SHALL BE IDENTIFIED AT TERMINAL AND JUNCTION LOCATIONS, IN A MANNER THAT WILL PREVENT UNINTENTIONAL INTERFERENCE WITH THE SIGNALING LINE CIRCUIT (SLC) DURING TESTING AND SERVICING (NEC ARTICLE 760-10).
12. SMOKE DETECTORS SHALL BE MOUNTED IN ACCORDANCE WITH NFPA 72. DETECTORS SHALL NOT BE LOCATED IN A DIRECT AIR FLOW NOR WITHIN 3 FEET (1 METER) FROM AN AIR SUPPLY DIFFUSER OR RETURN AIR OPENING. FURTHER, DETECTORS SHALL NOT BE INSTALLED WITHIN 1 FOOT OF LIGHT FIXTURES.
13. DETECTORS SHALL NOT BE INSTALLED UNTIL AFTER THE CONSTRUCTION CLEANUP OF ALL TRADES IS COMPLETE AND FINAL.
14. ALL FIRE ALARM DEVICES MUST BE INSTALLED IN A PROPER BACK BOX. NO DEVICE SHALL BE INSTALLED WITHOUT A BACK BOX.
15. POWER-LIMITED FIRE ALARM CIRCUIT CONDUCTORS AND CABLES (NEC ARTICLE 760-71) SHALL BE INSTALLED AS FOLLOWS:
- A. IN RACEWAY OR EXPOSED ON THE SURFACE OF CEILING AND SIDE WALLS OR "FISHED" IN CONCEALED SPACES. CABLE SPICES OR TERMINATIONS SHALL BE MADE IN LISTED FITTINGS, BOXES ENCLOSURES, FIRE ALARM DEVICES, OR UTILIZATION EQUIPMENT. WHERE INSTALLED EXPOSED, CABLES SHALL BE ADEQUATELY SUPPORTED AND INSTALLED IN SUCH A WAY THAT MAXIMUM PROTECTION AGAINST PHYSICAL DAMAGE IS AFFORDED BY BUILDING CONSTRUCTION SUCH AS BASEBOARDS, DOOR FRAMES, LEDGES, ETC. WHERE LOCATED WITHIN 7 FEET (2.13 METERS) OF THE FLOOR, CABLES SHALL BE SECURELY FASTENED IN AN APPROVED MANNER AT INTERVALS OF NOT MORE THAN 18 INCHES.
- B. IN METAL RACEWAYS OR RIGID NONMETALLIC CONDUIT WHERE PASSING THROUGH A FLOOR OR WALL TO A HEIGHT OF 7 FEET (2.13 METERS) ABOVE THE FLOOR, UNLESS ADEQUATE PROTECTION CAN BE AFFORDED BY BUILDING CONSTRUCTION SUCH AS DETAILED IN (A) ABOVE, OR UNLESS A EQUIVALENT SOLID GUARD IS PROVIDED.
- C. IN RIGID METAL CONDUIT, RIGID NONMETALLIC CONDUIT, INTERMEDIATE METAL CONDUIT, OR ELECTRICAL METALLIC TUBING WHERE INSTALLED IN HOSTWIMYS. (EXCEPTION: AS PROVIDED IN NEC SECTION 620-71 FOR ELEVATORS AND SIMILAR EQUIPMENT)
16. ALL DEVICES SHALL BE LABELED WITH THEIR ADDRESS OR CIRCUIT NUMBER.
17. POWER-LIMITED CIRCUIT CABLES AND CONDUCTORS SHALL NOT BE PLACED IN ANY CABLE, CABLE TRAY, COMPARTMENT, ENCLOSURE, OUTLET BOX, RACEWAY, OR SIMILAR FITTING WITH CONDUCTORS OF ELECTRIC LIGHT, POWER, CLASS 1 NONPOWER-LIMITED FIRE ALARM CIRCUIT CONDUCTORS, OR MEDIUM POWER NETWORK-POWER BAND COMMUNICATIONS CIRCUITS (NEC ARTICLE 760-54).
18. POWER-LIMITED CIRCUIT CONDUCTORS SHALL NOT BE STRAPPED, TAPED OR ATTACHED BY ANY MEANS TO THE EXTERIOR OF ANY CONDUIT OR OTHER RACEWAY AS A MEANS OF SUPPORT.
19. INITIATING DEVICE CIRCUITS (DDC) AND NOTIFICATION APPLANCE CIRCUITS (NAC), ARE TWO WIRE CLASS "B". NO "T-TAPPING" IS ALLOWED ON ANY OF THESE CIRCUITS.
20. AUXILIARY POWER CIRCUITS ARE TWO WIRE CIRCUITS THAT CAN BE T-TAPPED AS REQUIRED.
21. SIGNALING LINE CIRCUITS (SLC) DESIGNATED AS CLASS "B" ARE TWO WIRE DATA COMMUNICATIONS CIRCUITS. T-TAPPING IS ALLOWED ONLY AT JUNCTION BOXES AND SLC DEVICES, BUT SHALL BE KEPT TO A MINIMUM.
22. SIGNALING LINE CIRCUITS (SLC) DESIGNATED AS CLASS "A" ARE TWO WIRE DATA COMMUNICATIONS CIRCUITS. NO T-TAPPING IS PERMITTED. THE OUTGOING AND RETURN CONDUCTORS OF A CLASS "A" CIRCUIT, EXITING FROM AND RETURNING TO THE CONTROL UNIT, RESPECTIVELY, MUST BE ROUTED SEPARATELY. THE OUTGOING AND RETURN (REDUNDANT) CIRCUIT CONDUCTORS SHALL NOT BE RUN IN THE SAME CABLE ASSEMBLY, ENCLOSURE, OR RACEWAY. THE OUTGOING AND RETURN CIRCUIT CONDUCTORS SHALL BE PERMITTED TO BE RUN IN THE SAME CABLE ASSEMBLY, ENCLOSURE, OR RACEWAY ONLY UNDER THE FOLLOWING CONDITIONS:
- FOR A DISTANCE OF 10 FEET (3 METERS) WHERE THE OUTGOING AND RETURN CONDUCTORS ENTER OR EXIT THE INITIATING DEVICE, NOTIFICATION APPLANCE, OR CONTROL UNIT ENCLOSURES.
 - SINGLE CONDUIT/RACEWAY DROPS (UNLIMITED LENGTH) TO INDIVIDUAL DEVICES OR APPLANCES.
 - SINGLE CONDUIT/RACEWAY DROPS TO MULTIPLE DEVICES OR APPLANCES INSTALLED WITH A SINGLE ROOM NOT EXCEEDING 1000 FEET (92.9 METERS) IN AREA.
23. OPENINGS AROUND ELECTRICAL PENETRATIONS THROUGH FIRE-RESISTANT/RATED WALLS, PARTITIONS, FLOORS OR CEILINGS SHALL BE FIRE STOPPED USING APPROVED METHODS TO MAINTAIN THE FIRE RESISTANCE RATING.

GENERAL ENCLOSURE NOTES:

- 1.1. A FIXED ENCLOSURE SHALL BE PROVIDED ABOUT THE HAZARD THAT ALLOWS THE SPECIFIED AGENT CONCENTRATION TO BE ACHIEVED AND MAINTAINED FOR A SPECIFIED PERIOD OF TIME, USUALLY 10 MINUTES. REQUIRED HOLDING PERIOD SHALL BE DETERMINED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
- 1.2. THE FOLLOWING ITEMS COVER ENCLOSURE LEAKAGE IN A GENERAL FASHION, AND SHOULD BE ADHERED TO IN ORDER FOR THE ENCLOSURE TO RETAIN THE AGENT CONCENTRATION. ENCLOSURE LEAKAGE SHALL BE ELIMINATED TO AT LEAST THE DEGREE NECESSARY TO ENABLE THE ENCLOSURE TO PASS A DOOR FAN CONDUCTED IN ACCORDANCE WITH NFPA 2001, ENCLOSURE INTEGRITY PROCEDURE.
- 1.2.1. WHERE POSSIBLE, THE PERIMETER WALLS OF THE PROTECTED ENCLOSURE SHALL EXTEND FROM THE STRUCTURAL FLOOR TO THE STRUCTURAL FLOOR ABOVE, OR THE ROOF.
- 1.2.2. WHERE AN UNDERFLOOR SPACE CONTIGUES OUT OF THE CLEAN AGENT PROTECTED AREA INTO ADJACING ROOMS, AIRTIGHT PARTITIONS SHALL BE INSTALLED UNDER THE FLOOR DIRECTLY UNDER ABOVE-FLOOR BORDER PARTITIONS. THESE PARTITIONS SHALL BE CAULKED TOP AND BOTTOM. IF A REMOVABLE FLOOR TILE EXTENDS UNDER A DOORWAY OVER SUCH A PARTITION, IT SHALL EITHER BE PERMANENTLY SEALED IN PLACE, INSTALLED WITH A FLEXIBLE SEAL BETWEEN IT AND THE WALL BELOW, OR THE TILE SHALL BE DISCONTINUED AT THE DOORWAY WITH A PERMANENT AIRTIGHT LEDGE CREATED UP TO WHICH THE FLOOR TILES ABUT. IF ADJACING ROOMS SHARE THE SAME UNDER FLOOR AIR HANDLERS, THEN THE PARTITIONS SHALL HAVE DAMPERS INSTALLED OF THE SAME TYPE AS REQUIRED FOR DUCTWORK.
- 1.2.3. ALL HOLES, CRACKS, OR PENETRATIONS LEADING INTO OR OUT OF THE PROTECTED AREA SHALL BE SEALED. PIPE CHASES AND WIRE TROUSERS SHALL BE SEALED AROUND BOTH THE OUTSIDE AND INSIDE AT A POINT WHERE THEY PASS THROUGH THE ENVELOPE OF THE PROTECTED ZONE. ALL WALLS SHALL BE CAULKED AROUND THE INSIDE PERIMETER OF THE ROOM WHERE THE WALLS REST ON THE FLOOR SLAB AND WHERE THE WALLS INTERSECT THE CEILING SLAB OR ROOF ABOVE.
- 1.2.4. POROUS BLOCK WALLS SHALL BE SEALED SLAB-TO-SLAB TO PREVENT GAS FROM PASSING THROUGH THE BLOCK. MULTIPLE COATS OF PAINT MAY BE REQUIRED.
- 1.2.5. ALL DOORS SHALL HAVE DOOR SWEEPS OR DROP SEALS ON THE BOTTOMS, WEATHER STRIPPING AROUND THE JAMES, LATCHING MECHANISMS AND DOOR CLOSER HARDWARE. IN ADDITION, DOUBLE DOORS SHALL HAVE A WEATHER-STRIPPED ASTRAGAL TO PREVENT LEAKAGE BETWEEN DOORS AND A COORDINATOR TO ASSURE PROPER SEQUENCE OF CLOSURE.
- 1.2.6. WINDOWS SHALL HAVE SOLID WEATHER-STRIPPING AROUND ALL JOINTS. GLASS TO FRAME AND FRAME TO WALL JOINTS SHALL BE SEALED.
- 1.2.7. ALL FLOOR DRAINS SHALL HAVE TRAPS DESIGNED TO HAVE WATER OR OTHER COMPATIBLE LIQUID IN THEM AT ALL TIMES.
- 1.2.8. ALL UNUSED AND OUT-OF-SERVICE DUCTWORK LEADING INTO OR FROM A PROTECTED AREA SHALL BE PERMANENTLY SEALED OFF (AIR TIGHT) WITH METAL PLATES CAULKED IN PLACE AT THE POINT WHERE THEY BREACH THE ENVELOPE OF THE PROTECTED ZONE.
- 1.2.9. HEAVY CEILING TILES SHALL BE USED THROUGHOUT THE PROTECTED AREA TO HELP PREVENT THE DISPLACEMENT OF THE TILES DURING DISCHARGE. WHERE NECESSARY, CEILING TILES SHALL BE CLIPPED TO PREVENT DISPLACEMENT, ESPECIALLY TILES NEAR DISCHARGE NOZZLES.
- 1.2.10. DUCTWORK LEADING INTO OR FROM THE PROTECTED AREA SHALL HAVE GASKETED, LOW LEAK, SPRING- LOADED OR MOTOR-OPERATED, AGENT/SMOKE TYPE DAMPERS WITH FLEXIBLE SEALS. RIGID METAL TO METAL BLADE SEALS SHALL NOT BE USED. THE DAMPERS SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO THE DUCTS POINT OF ENTRY INTO THE ROOM. ALL DUCT JOINTS BETWEEN THE DAMPER AND THE DUCT ENTRY POINT SHALL BE SEALED. THE GAP BETWEEN THE DAMPER FRAME AND THE DUCT WALL SHALL BE SEALED.
- 1.2.11. FORCED-AIR VENTILATING SYSTEMS SHALL BE SHUT DOWN OR CLOSED AUTOMATICALLY WHERE THEIR CONTINUED OPERATION WOULD ADVERSELY AFFECT THE PERFORMANCE OF THE FIRE EXTINGUISHING SYSTEM OR RESULT IN PROPAGATION OF THE FIRE. COMPLETELY SELF-CONTAINED RECIRCULATING VENTILATION SYSTEMS SHALL NOT BE REQUIRED TO BE SHUT DOWN.
2. APPROVAL/ACCEPTANCE OF ENCLOSURE INTEGRITY:
- 2.1. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR OVERALL ROOM TIGHTNESS, UNLESS SPECIFIED OTHERWISE. THE G.C. IN TURN MUST REQUIRE THAT ALL HIS SUBCONTRACTORS PERFORM THE NECESSARY SEALING, WHICH RELATES TO THEIR WORK. ANY WORK BEING DONE ON THE INSTALLATION BY SECOND LEVEL CONTRACTORS (E.G. CABLE PULLERS) NOT OPERATING UNDER THE G.C. MUST ALSO BE SUBJECTED TO THIS REQUIREMENT UNDER THEIR CONTRACTS. WHERE NO G.C. IS INVOLVED WITH THE PROJECT THE OWNER WILL BE REQUIRED TO ARRANGE FOR SEALING OF THE ROOM.
- 2.2. UPON COMPLETION OF THE ENCLOSURE BY ALL TRADES INVOLVED (E.G. DOORS AND DAMPERS INSTALLED, ALL PENETRATIONS SEALED), THE CLEAN AGENT CONTRACTOR SHALL CONDUIT AND ENCLOSURE INTEGRITY TEST IN CONFORMANCE WITH NFPA 2001, IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE AND THE GENERAL CONTRACTOR (IF APPLICABLE). SHOULD THE TEST BE UNSUCCESSFUL, AND INSPECTION SHALL BE CONDUCTED AND A REPORT AND A PLAN VIEW OF THE ENCLOSURE IDENTIFYING THE LOCATION AND NATURE OF LEAKS UNCOVERED SHALL BE SUBMITTED. IF MORE THAN TWO TESTS ARE REQUIRED, ADDITIONAL TESTS SHALL BE AT THE EXPENSE OF THE GENERAL CONTRACTOR OR OWNER.
- 2.3. UPON SUCCESSFUL COMPLETION OF THE DOOR FAN TEST BEFORE THE GENERAL CONTRACTOR AND OWNER, A FINAL ENCLOSURE INTEGRITY TEST PER NFPA 2001 SHALL BE CONDUCTED IN THE PRESENCE OF THE AHJ OR HIS/HER REPRESENTATIVE. THE CONTRACTOR SHALL PROVIDE A TEST REPORT, INCLUDING A COPY OF THE RECORDED MEASUREMENTS. ADEQUATE NOTICE SHALL BE GIVEN TO THE AHJ OR ITS REPRESENTATIVE TO ENABLE EITHER OR BOTH TO ATTEND.
3. MAINTAINING ENCLOSURE INTEGRITY:
- 3.1. THE INTEGRITY OF THE ENCLOSURE MUST BE MAINTAINED TO INSURE THE CLEAN AGENT SYSTEMS ABILITY TO PROPERLY PROTECT THE HAZARD VOLUME. AT LEAST EVERY 12 MONTHS, THE ENCLOSURE SHALL BE THOROUGHLY INSPECTED TO DETERMINE IF PENETRATIONS OR OTHER CHANGES HAVE OCCURRED THAT COULD ADVERSELY AFFECT AGENT LEAKAGE OR CHANGE VOLUME OF HAZARD OR BOTH. WHERE THE INSPECTION INDICATES CONDITIONS THAT COULD RESULT IN INABILITY TO MAINTAIN THE CLEAN AGENT CONCENTRATION, THEY SHALL BE CORRECTED. IF UNCERTAINTY STILL EXISTS, THE ENCLOSURE SHALL BE RETESTED FOR INTEGRITY IN ACCORDANCE WITH NFPA 2001. YEARLY ENCLOSURE INSPECTION MUST BE REQUESTED TO BE INCLUDED AS PART OF THE INITIAL INSTALLATION.

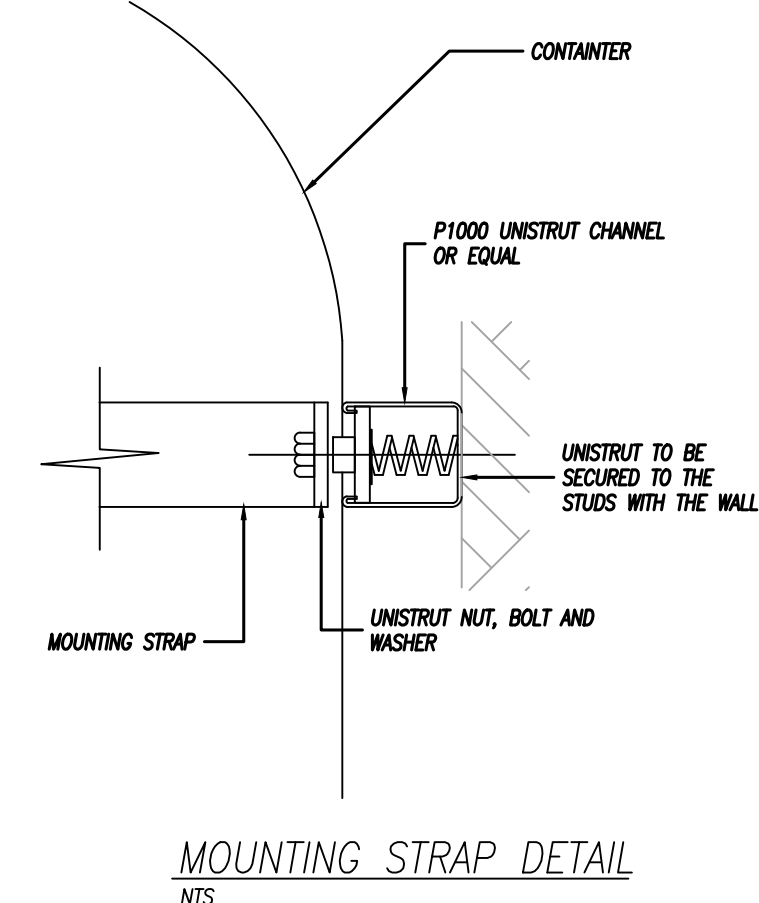
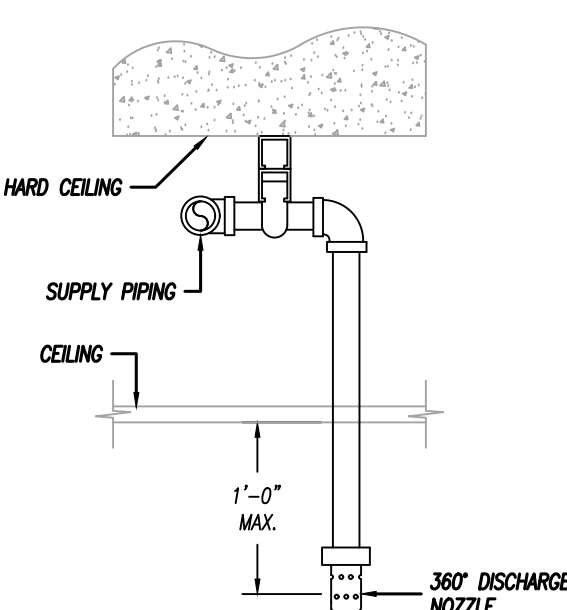
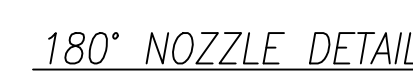
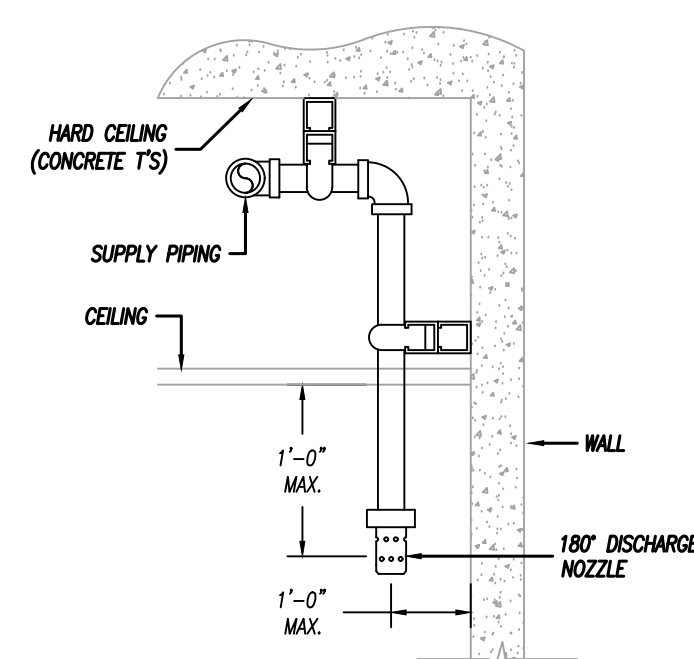
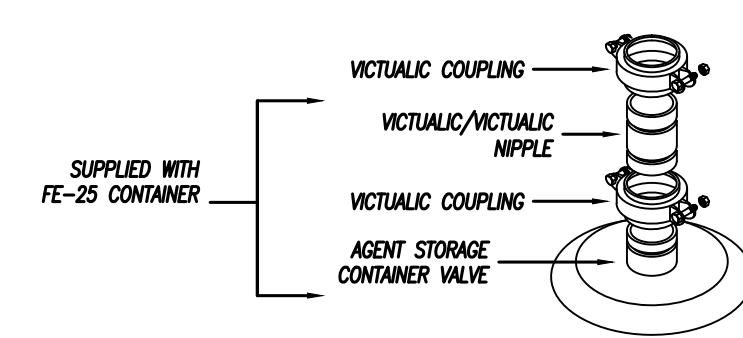
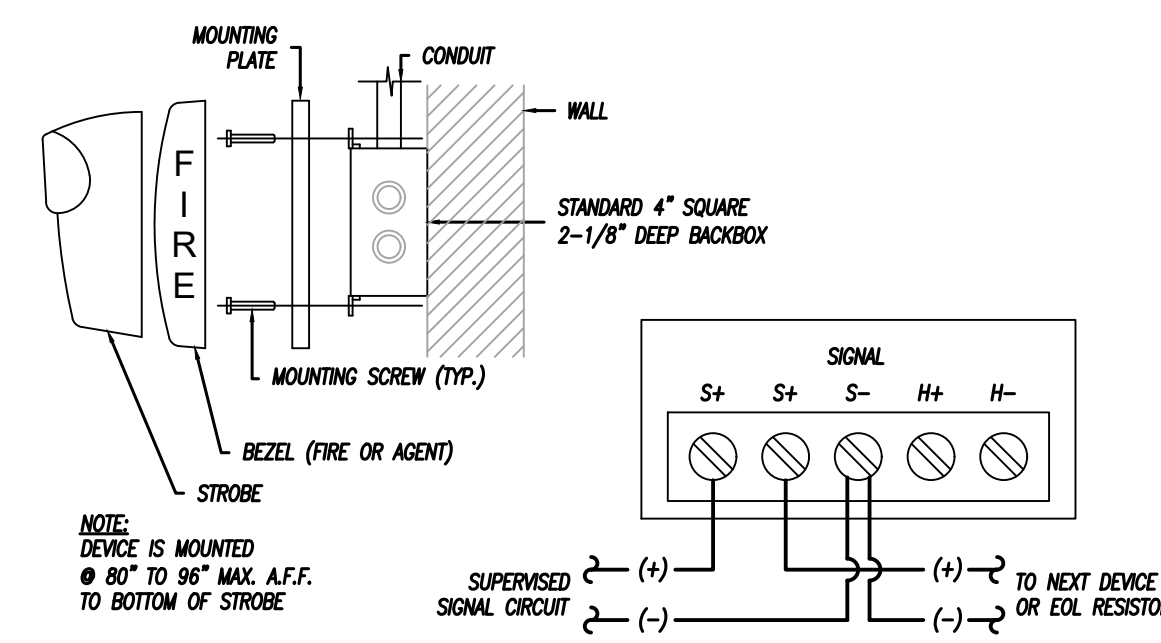
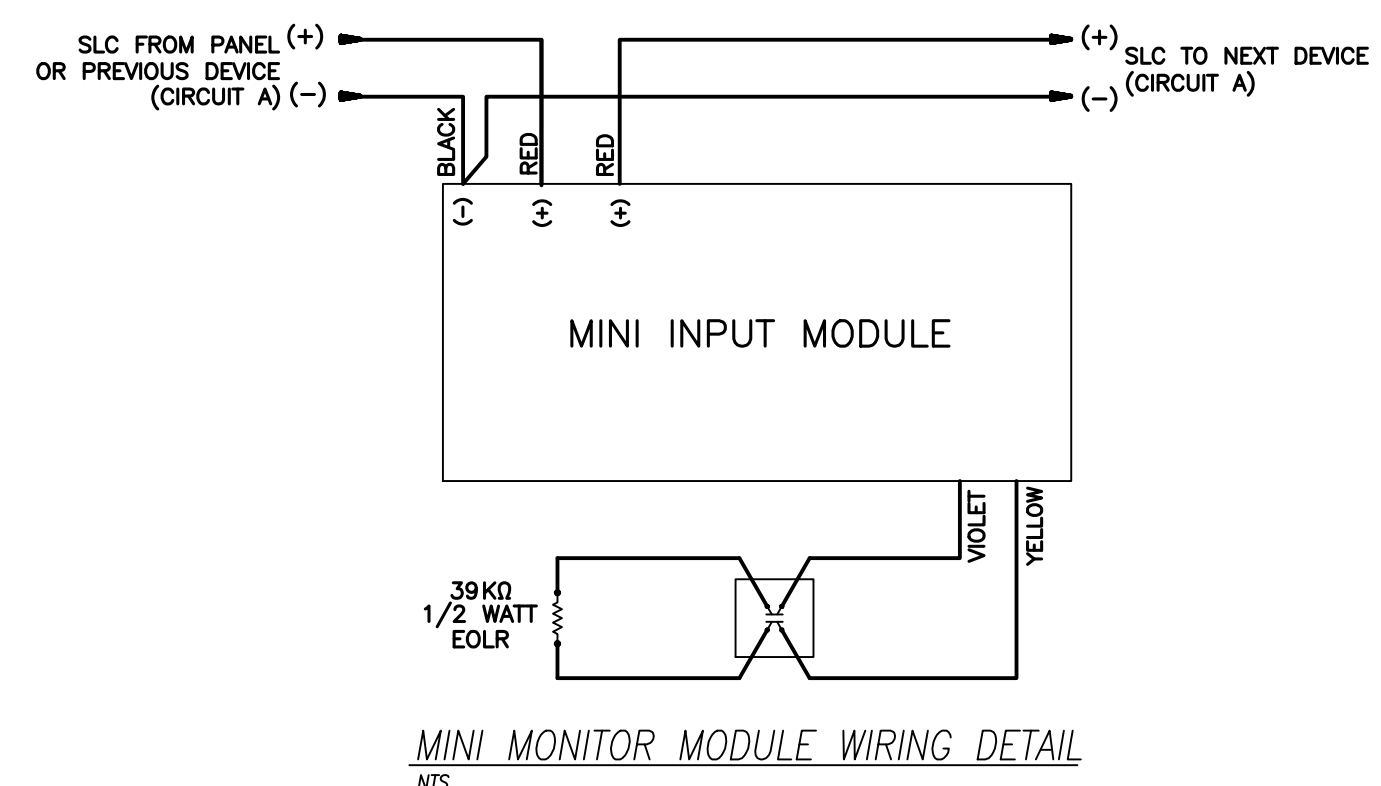
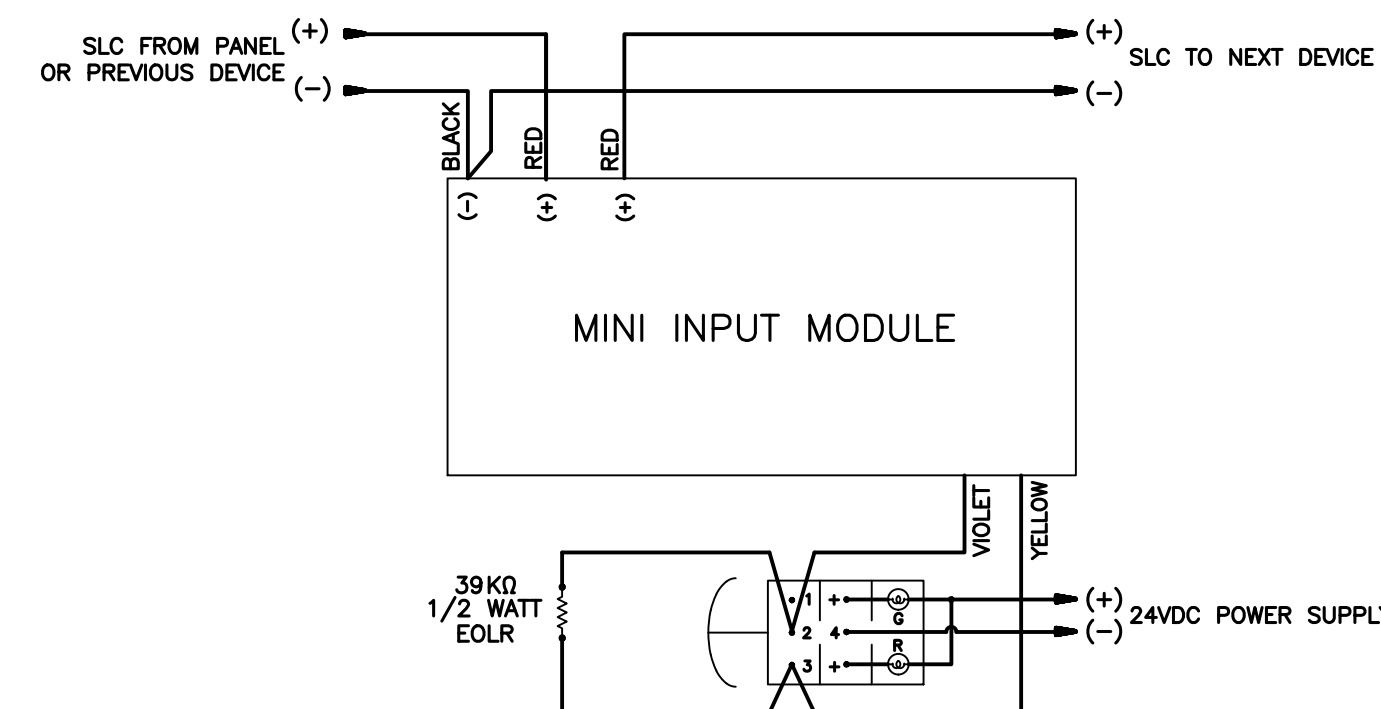
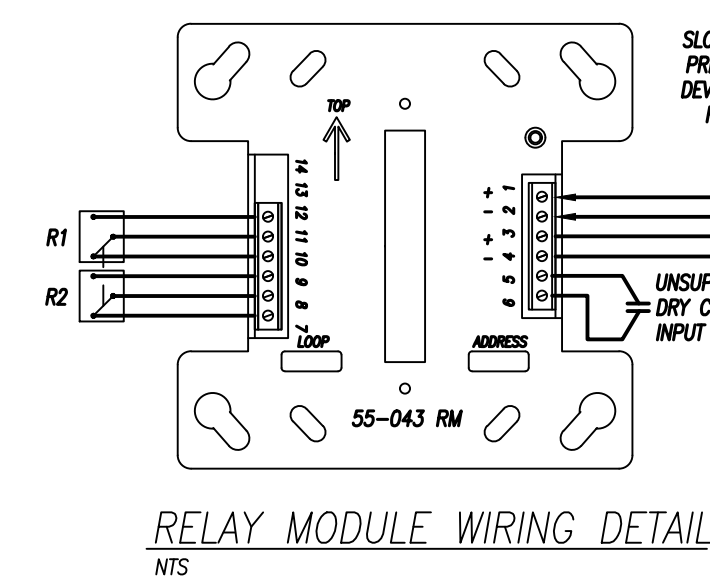
GENERAL PIPING NOTES:

1. DISTRIBUTION PIPING:
- 1.1. PIPING SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 2001, 2018 EDITION, STANDARD FOR CLEAN AGENT EXTINGUISHING SYSTEMS, STATE AND LOCAL STANDARDS, WHERE A CONFLICT EXISTS BETWEEN STANDARDS, THE MOST STRINGENT SHALL APPLY.
- 1.2. PIPING SHALL BE INSTALLED IN STRICT ACCORDANCE TO THE SYSTEM DESIGN DRAWINGS AND CALCULATIONS. PREPARED FOR THE PROJECT. ALL PIPING CHANGES MUST BE APPROVED BEFORE INSTALLATION OF MATERIALS.
- 1.3. PIPING SHOULD BE INSTALLED IN ACCORDANCE WITH GOOD COMMERCIAL PRACTICE. CARE SHOULD BE TAKEN TO AVOID POSSIBLE RESTRICTIONS DUE TO FOREIGN MATTER, FAULTY FABRICATION, OR IMPROPER INSTALLATION.
- 1.4. PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE SEALED WITH AN APPROVED FIRE STOPPING COMPOUND.
- 1.5. PIPE ACCEPTABLE FOR USE IN CLEAN AGENT EXTINGUISHING SYSTEMS INCLUDE THE FOLLOWING:
- TABLE 1.E
ACCEPTABLE PIPE
- | SCHEDULE | GRADE | TYPE | NPS PIPE SIZE |
|----------|-------------|----------|---------------|
| 40 | ASTM A-106C | SEAMLESS | 1/2" THRU 8" |
| | ASTM A-53B | SEAMLESS | 1/2" THRU 8" |
| | ASTM A-106B | SEAMLESS | 1/2" THRU 8" |
| | ASTM A-53B | ERW | 1/2" THRU 8" |
| | ASTM A-53A | SEAMLESS | 1/2" THRU 8" |
| | ASTM A-106A | SEAMLESS | 1/2" THRU 8" |
| | ASTM A-53A | ERW | 1/2" THRU 8" |
| | ASTM A-53F | FURNACE | 1/2" THRU 8" |
- NOTE:
ALL PIPE IS SUITABLE FOR USE WITH THREADED, ROLLED GROOVE OR WELDED END CONNECTIONS.
- 1.6. CAST-IRON PIPE, STEEL PIPE CONFORMING TO ASTM A-120, OR NONMETALLIC PIPE SHALL NOT BE USED.
- 1.7. EACH PIPE SECTION SHALL BE CLEANED INTERNALLY AFTER PREPARATION AND BEFORE ASSEMBLY BY MEANS OF SWABING, UTILIZING A SUITABLE NONFLAMMABLE CLEANER. THE PIPE NETWORK SHALL BE FREE OF PARTICULATE MATTER AND OIL RESIDUE BEFORE INSTALLATION OF NOZZLES OR DISCHARGE DEVICES.
- 1.8. STENCILED PIPE IDENTIFICATION SHALL NOT BE PAINTED OVER, CONCEALED, OR REMOVED PRIOR TO APPROVAL BY THE AUTHORITY HAVING JURISDICTION.
- 1.9. PIPE JOINTS OTHER THAN THREADED, WELDED, BRAZED, FLARED, COMPRESSION, OR FLANGED TYPE SHALL BE LISTED OR APPROVED.
2. FITTINGS:
- 2.1. FITTINGS SHALL BE CLASS 300 MALLEABLE OR DUCTILE IRON FOR PIPE SIZES UP TO AND INCLUDING 3-INCH NPS. 1,000 LB. RATED DUCTILE IRON OR FORGED STEEL FITTINGS SHALL BE USED FOR PIPE SIZES LARGER THAN 3-INCH NPS. CLASS 300 FLANGED JOINTS CAN BE USED FOR ALL PIPE SIZES. GROOVED FITTINGS MUST BE ABLE TO WITHSTAND A MINIMUM DESIGN PRESSURE OF 416 PSI FOR ALL HALOCARBON AGENTS EXCEPT HFC-23.
- 2.2. CAST-IRON AND CLASS 150-LB. FITTINGS SHALL NOT BE USED.
- 2.3. ALL THREADS USED IN JOINTS AND FITTINGS SHALL CONFORM TO ANSI B1.20.1 (STANDARD FOR PIPE THREADS, GENERAL PURPOSE). JOINT COMPOUND, TAPE, OR THREAD LUBRICANT SHALL BE APPLIED ONLY TO THE MALE THREADS OF THE JOINT.
- 2.4. WELDING OR BRAZING ALLOYS SHALL HAVE A MELTING POINT ABOVE 1000°F (538°C).
- 2.5. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH SECTION IX, "QUALIFICATION STANDARD FOR WELDING AND BRAZING PROCEDURES, WELDERS, BRAZERS AND WELDING AND BRAZING OPERATORS," OF THE ASME BOILER AND PRESSURE VESSEL CODE.
3. PIPE HANGERS AND SUPPORTS:
- 3.1. CONVENTIONAL HANGER DESIGN WHICH IS GENERALLY ACCEPTED AS GOOD PRACTICE, USING STANDARD STOCK OR PRODUCTION UNITS, AS MANUFACTURED BY RECOGNIZED MANUFACTURERS, SHALL BE UTILIZED WHENEVER POSSIBLE.
- 3.2. ALL PIPING MUST BE SOLIDLY ANCHORED TO WALLS, CEILING STRUCTURE, FLOORS, OR COLUMNS BY ANGLE IRON BRACKETS, CHANNELS/STRIPS OR EQUIVALENT BRACKETS WHERE ANCHORING OR LATERAL SHOCK MAY OCCUR. PARTICULAR ATTENTION MUST BE PAID TO THE BRACING OF ALL CHANGES IN PIPING DIRECTION, NOZZLE PIPING OR HEADER PIPING. AS A MINIMUM, RIGID PIPE SUPPORTS SHALL BE PROVIDED AT ALL LOCATIONS WHERE PIPING CHANGES DIRECTION.
- 3.3. PIPE SUPPORT COMPONENTS SHALL BE STEEL AND ADEQUATE TO SUPPORT THE PIPE IN RESPONSE TO MOVEMENTS CREATED BY CHANGING THERMAL CONDITIONS, AND TO ALLOW FOR FREE AND AMPLE MOVEMENT FOR CONTRACTION EXCEPT WHERE ANCHORED THEREBY PREVENTING EXCESSIVE STRESS. CONSIDERATION SHOULD BE GIVEN TO AVOIDANCE OF RIGIDLY RESTRAINING BOTH ENDS OF LONG PIPE RUNS SUBJECT TO THERMAL EXPANSION OR CONTRACTION. EITHER ONE OR THE OTHER END OF THE PIPE RUN SHOULD BE SUPPORTED WITH AN INTERMEDIATE TYPE HANGER WHICH WILL ALLOW FREE MOVEMENT OF THE PIPING AND TO AVOID BUCKLING OR SEPARATION DUE TO EXPANSION OR CONTRACTION.
- 3.4. WHERE ROD TYPE HANGERS ARE PERMITTED FOR INTERMEDIATE SUPPORT BETWEEN RIGID SUPPORTS, THEY SHALL BE STEEL CLEVIS OR STEEL BAND HANGERS OF THE PROPER SIZE FOR THE SUPPORTED PIPE AND WITH SOLID BAR-TYPE HANGER ROD. HANGER RODS SHALL NOT BE SUBJECTED TO STRESSES DUE TO BENDING.
- 3.5. GROOVED PIPE, FITTINGS, AND COUPLINGS MUST BE SUPPORTED AND ANCHORED EXACTLY PER THE MANUFACTURER'S SPECIFICATION. INSTALLATION SHALL BE SUCH AS TO ALLOW FOR CONTRACTION OVER THE ANTICIPATED TEMPERATURE RANGE AND PRESSURE THRUSTS. AS A MINIMUM, TWO HANGERS SHALL BE PROVIDED PER LENGTH OF GROOVED PIPE TO AVOID INJURY OR ACCIDENT DURING INSTALLATION OR MAINTENANCE OF PIPING. NO GROOVED PIPE LENGTH SHOULD BE LEFT UNSUPPORTED BETWEEN ANY TWO COUPLINGS.
- 3.6. CAST IRON SUPPORTS, CONDUIT CLAMPS OR "C" CLAMPS SHALL NOT BE USED TO SUPPORT PIPING. ALL PARTS OF THE SUPPORTING EQUIPMENT SHALL BE FABRICATED, ASSEMBLED AND INSTALLED SO THAT THEY WILL NOT BE DISENGAGED BY MOVEMENT OF THE SUPPORTED PIPE. DRILLING, WELDING OR THE USE OF BEAM CLAMPS ARE ACCEPTABLE MEANS OF ATTACHING HANGERS TO THE BUILDING STRUCTURE. A PIPELINE IS NOT TO BE SUPPORTED FROM ANOTHER PIPELINE.
- 3.7. ALL PIPE SUPPORTS SHALL BE INSTALLED TO AVOID INTERFERENCE WITH OTHER PIPING, HANGERS, ELECTRICAL CONDUIT, AND SUPPORTS OF BUILDING STRUCTURE AND EQUIPMENT.
- 3.8. SUPPORTS SHALL BE SUFFICIENTLY CLOSE TOGETHER TO AVOID EXCESSIVE BENDING STRESSES FROM CONCENTRATED LOADS BETWEEN SUPPORTS. REFER TO THE FOLLOWING TABLE.

TABLE 3.H MAXIMUM HANGER SPACING BETWEEN PIPE SUPPORTS				
PIPE SIZE (NPS)	FT. (MAX.)	W. (MAX.)	ROD DIA.	NOTES:
1/2"	7	2.1	3/8"	1. VALUES LISTED IN THIS TABLE ARE SUITABLE FOR SCREWED, WELDED, OR GROOVED PIPE.
3/4"	7	2.1	3/8"	2. A HANGER SHALL BE INSTALLED BETWEEN FITTINGS WHEN THE FITTINGS ARE MORE THAN 2-FEET APART.
1"	7	2.1	3/8"	3. A HANGER SHALL BE INSTALLED A MAXIMUM OF 1-FOOT HORIZONTALLY FROM DISCHARGE NOZZLES.
1 1/2"	7	2.1	3/8"	4. RIGID PIPE SUPPORTS ARE REQUIRED AT EACH FITTING, TEE AND DISCHARGE NOZZLE.
2"	10	3.0	3/8"	5. CONSULT ASME B31.1, POWER PIPING CODE FOR FURTHER GUIDANCE.
2 1/2"	11	3.4	1/2"	
3"	12	3.7	1/2"	
4"	14	4.3	5/8"	
5"	16	4.9	5/8"	
6"	17	5.2	3/4"	
8"	19	5.8	3/4"	

SCOPE OF WORK

KELLER FIRE & SAFETY SHALL PROVIDE CENTURY FIRE WITH A FIRE,



EQUIPMENT SCHEDULE						
SYMBOL	QTY	PART NUMBER	MFG	BACKBOX	MOUNTING HEIGHT	DESCRIPTION
	1	10-069-R-1	FKE	21 1/2" W x 14 1/2" H x 4"D	72" AFF. TOP OF CABINET	OXYGEN-A FIRE SUPPRESSION CONTROL PANEL
	1	10-2204	FKE	N/A	N/A	CSMA RELAY CARD
	1	DIKOP10251	DIETK	N/A	N/A	SURGE PROTECTOR, 120V
	2	PS-12180	POWERSONIC	N/A	N/A	12V 15AH BATTERY
	10	63-1052	FKE	4" SQUARE	N/A	PHOTOELECTRIC SMOKE DETECTOR
	10	63-1054	FKE	4" SQUARE	N/A	STANDARD DETECTOR BASE
	1	GENM-WAYM	GENCOM	4" SQUARE	44" AFF. TO BOTTOM OF BOX	KEYED MAINTENANCE SWITCH
	1	55-045	FKE	BEHIND DEVICE	N/A	MINIATURE MOTOR MODULE
	1	20-1343	FKE	4" SQUARE	44" AFF. TO BOTTOM OF BOX	MANUAL RELEASE SWITCH
	1	10-2965	FKE	4" SQUARE	44" AFF. TO BOTTOM OF BOX	SYSTEM ABORT SWITCH
	1	55-045	FKE	BEHIND DEVICE	N/A	MINIATURE MOTOR MODULE
	1	10-2699	FKE	4" SQUARE	44" AFF. TO BOTTOM OF BOX	DISCONNECT SWITCH
	1	55-045	FKE	BEHIND DEVICE	N/A	MINIATURE MOTOR MODULE
	6	55-041	FKE	4" SQUARE	N/A	MONITOR MODULE
	1	55-042	FKE	4" SQUARE	N/A	SUPERVISED CONTROL MODULE
	1	55-043	FKE	4" SQUARE	N/A	RELAY MODULE
	1	55-052	FKE	4" SQUARE	N/A	RELEASE CONTROL MODULE
	1	10-2360	FKE	N/A	N/A	SOLENOID DIODE
	2	DECS24WR	GENTEX	4" SQUARE	84" AFF. TO BOTTOM OF BOX	HORN/STROBE, RED HOUSING
	1	DECS34WR	GENTEX	4" SQUARE	84" AFF. TO BOTTOM OF BOX	STROBE, RED HOUSING
	3	AGSM-R-R	GENTEX	N/A	N/A	"AGSM" BEZEL
	2	SEE AGSM CHART	FKE	N/A	N/A	AGSM STORAGE CYLINDER
	2	02-14702	FKE	N/A	N/A	"REST TOL"
	2	20-2178	FKE	N/A	N/A	3" WC-10-WC ADAPTER
	2	SEE NOZZLE CHART	FKE	N/A	N/A	AGSM DISCHARGE NOZZLE
	2	20-2778	FKE	N/A	N/A	IMPULSE VALVE OPERATOR KIT
	2	02-15001	FKE	N/A	N/A	LOW PRESSURE SWITCH
	2	02-12534	FKE	N/A	N/A	DISCHARGE PRESSURE SWITCH
	2	02-14263	FKE	N/A	N/A	IMPULSE VALVE OPERATOR SUPERVISOR
	2	02-15997	FKE	N/A	N/A	"IF ACTIVE, EXT IMMEDIATELY" SIGN
	1	02-16000	FKE	N/A	N/A	"ABORT, PUSH & HOLD" SIGN
	1	02-15998	FKE	N/A	N/A	"NOVEC 1230 RELEASE" SIGN
	1	02-15996	FKE	N/A	N/A	"IF ACTIVE, DO NOT ENTER" SIGN
	1	02-15995	FKE	N/A	N/A	CAUTION - AREA PROTECTED BY NOVEC 1230V SIGN

CIRCUIT SCHEDULE			
CIRCUIT	CABLE/WIRE DESCRIPTION	FUNCTION	REMARKS
A1	TWO #14 AWG THIN IN CONDUIT	CA AUDIBLE CIRCUIT 1	PRE-DISCHARGE HORN (RED/BLACK)
L1	TWO #14 AWG THIN IN CONDUIT	SIGNALLING LINE CIRCUIT 1	WARNING DEVICES (RED/BLACK)
M	TWO #14 AWG THIN IN CONDUIT	MONITORING CIRCUIT	TYPICAL MONITOR MODULE CONNECTION TO MONITORED DEVICE (RED/BLACK)
P1	TWO #14 AWG THIN IN CONDUIT	POWER CIRCUIT 1	CONTROL MODULES 24VDC POWER (PINK/PURPLE)
R1	TWO #14 AWG THIN IN CONDUIT	RELEASE CIRCUIT 1	RELEASE ACTUATION (YELLOW/GRAY)
V1	TWO #14 AWG THIN IN CONDUIT	CA VISUAL CIRCUIT 1	PRE-DISCHARGE STROBE (WHITE/BLUE)
V2	TWO #14 AWG THIN IN CONDUIT	CA VISUAL CIRCUIT 2	DISCHARGE STROBE (ORANGE/BROWN)

MODULE SCHEDULE		
ADDRESS	DEVICE TYPE	DESCRIPTION
1-013	55-042	RELAY CONTROL, MODULE, COT. A1
1-014	55-043	SUPERSED CONTROL, COT. RT1
1-015	55-043	FAN SHUTDOWN CONTROL
1-016	55-045	KEYED MAINTENANCE CONTROL
1-017	55-045	DISCONNECT SWITCH, COT. RT1
1-018	55-041	ASC-2 DISCHARGE PRESSURE SWITCH
1-019	55-041	ASC-2 LOW PRESSURE SWITCH
1-020	55-041	ASC-2 IMPULSE VALVE OPERATOR SUPPLY
1-021	55-041	ASC-1 DISCHARGE PRESSURE SWITCH
1-022	55-041	ASC-1 LOW PRESSURE SWITCH
1-023	55-041	ASC-1 IMPULSE VALVE OPERATOR SUPPLY
1-024	20-1143	MANUAL RELEASE
1-025	55-045	ABORT SWITCH

AGENT REQUIREMENT CALCULATIONS										
HAZARD DESCRIPTION	HAZARD CLASS	NORMALLY OCCUPIED	AREA SQ.FT.	HEIGHT	VOLUME CU.FT.	MINIMUM REQUIRED CONCENTRATION	DESIGN CONCENTRATION	AGENT REQUIRED	AGENT SUPPLIED	MAXIMUM CONCENTRATION
UPS 147	A/C	Y	188.63	20'-0"	3792.5	4.5% @ 70°F	6.7% @ 70°F	232g	232g	6.6% @ 70°F
SERVERS 146	A/C	Y	738.38	20'-0"	14767.5	4.5% @ 70°F	6.6% @ 70°F	914g	914g	6.6% @ 70°F
SERVERS 146 SUBTOTAL	A/C	N	738.38	1'-0"	738.38	4.5% @ 70°F	6.7% @ 70°F	46g	50g	7.3% @ 70°F

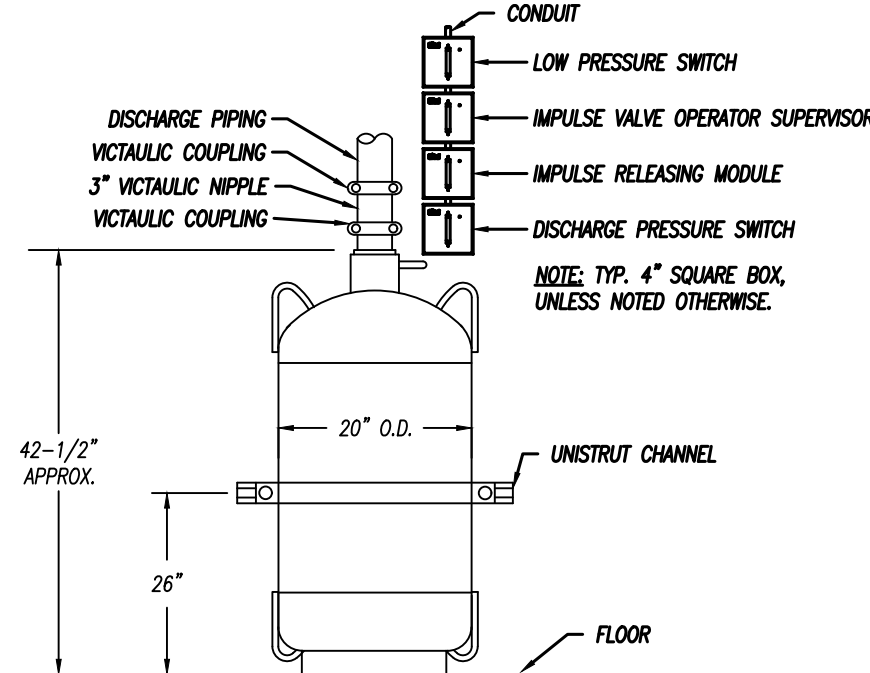
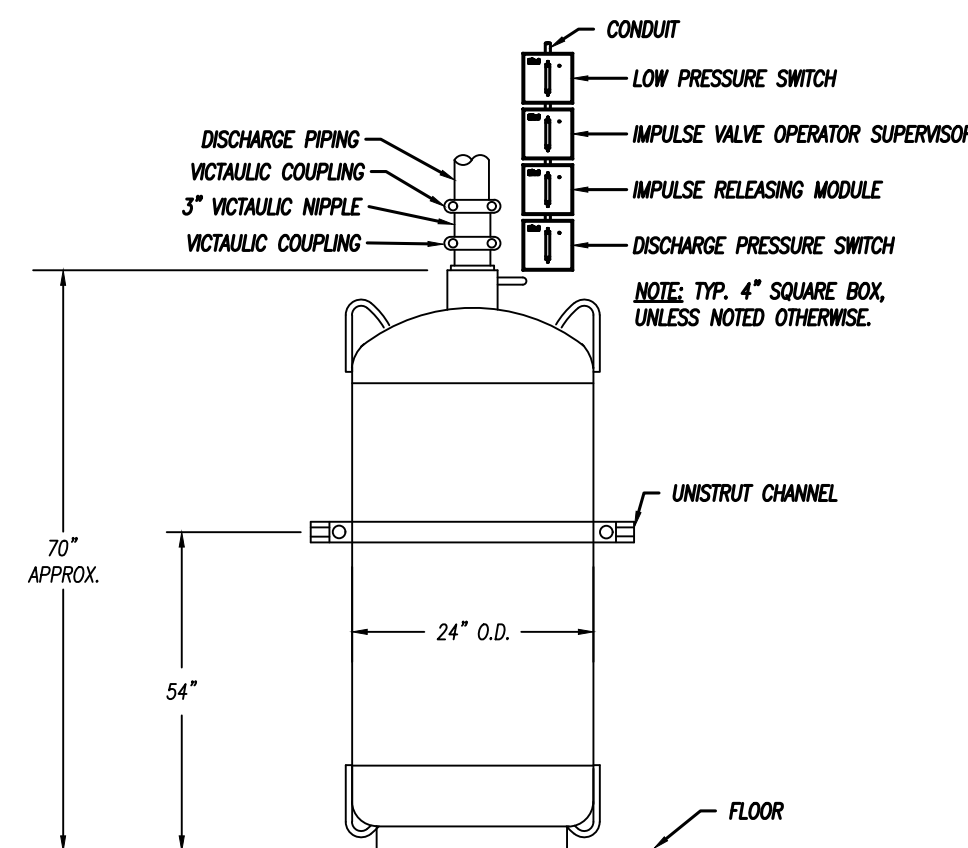
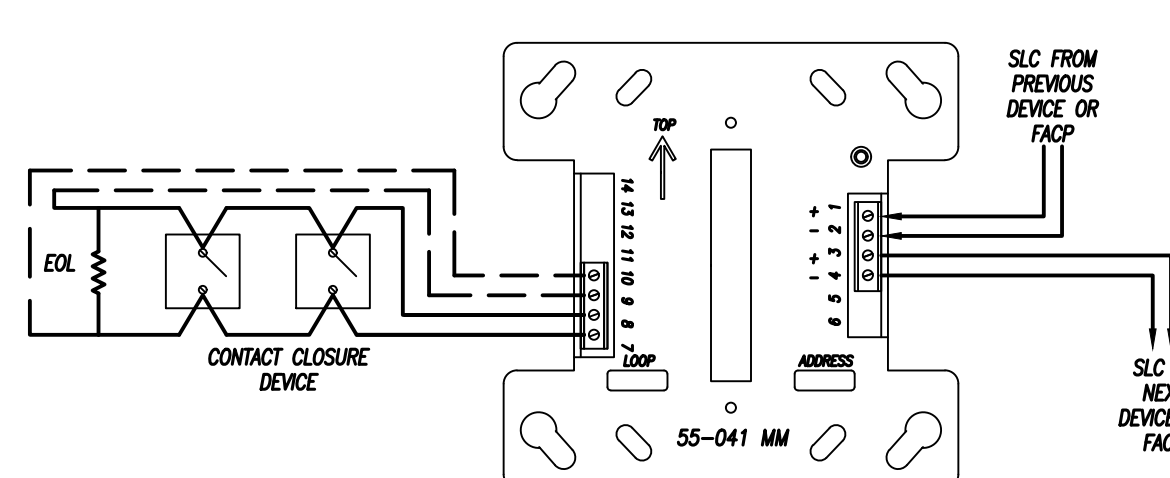
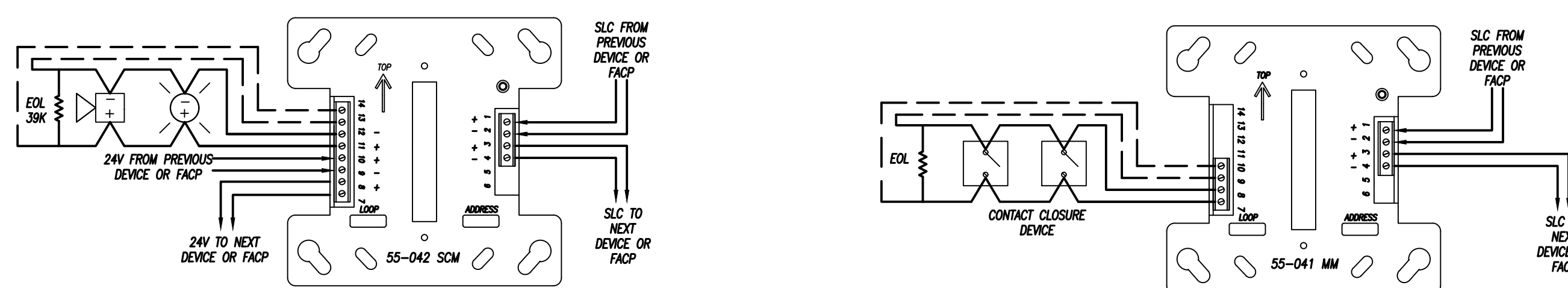
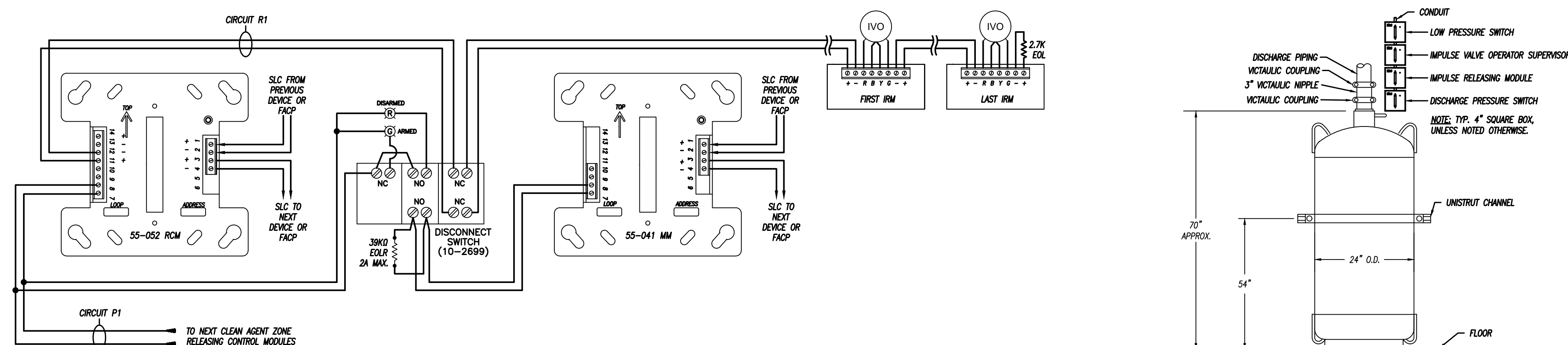
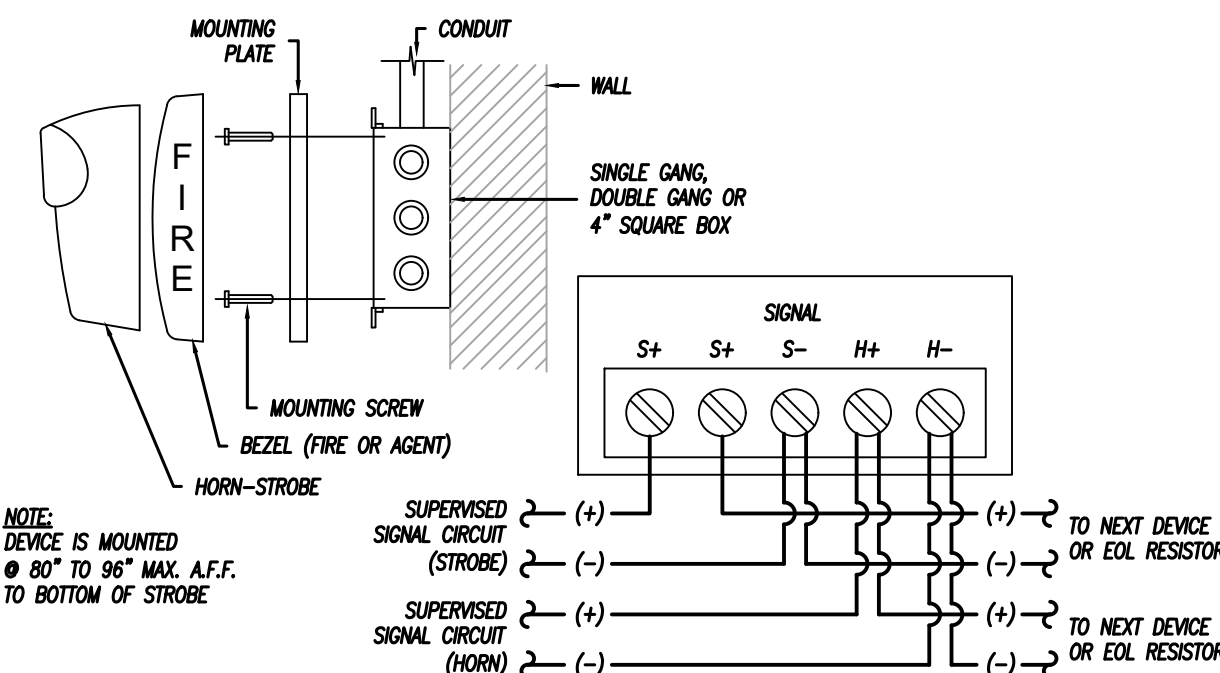
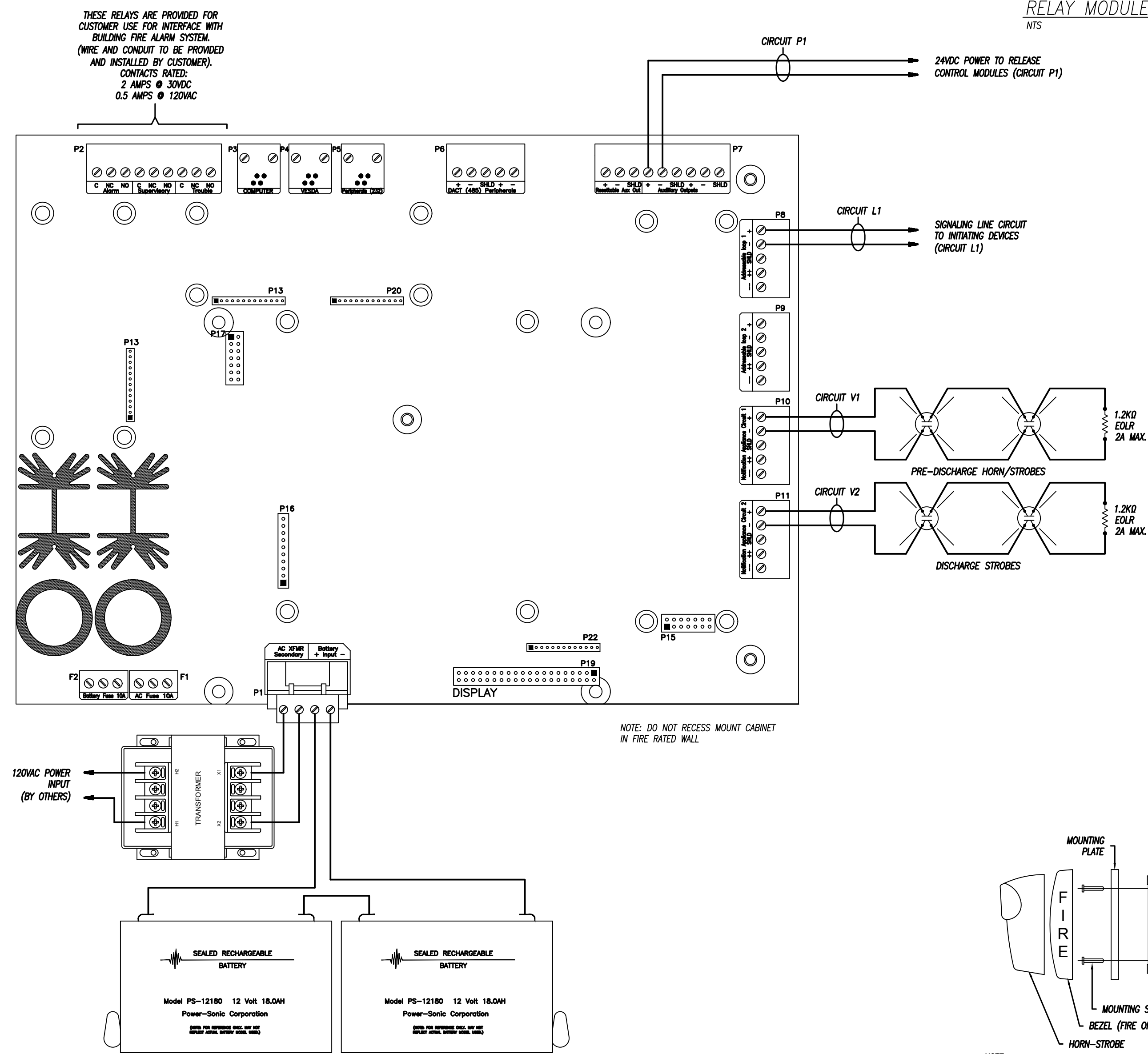
AGENT STORAGE CONTAINER CHART						
CONTAINER NUMBER	ENCLOSURE NAME	ZONE NUMBER	CONTAINER SIZE	OUTLET SIZE	CONTAINER PART NUMBER	AGENT WEIGHT
ASC-1	SERVERS 146	1	1000#	0'-3"	70-367	91#
ASC-2	SERVERS 146 SUBFLOOR & UPS 147	1	375#	0'-3"	70-365	282#

NOZZLE CHART					
CYLINDER NUMBER	ENCLOSURE NAME	NOZZLE NUMBER	STYLE	DRILL DIAMETER (IN.)	AGENT WEIGHT
ASC-1	SENTERS 146	101	360°	1-1/2"	80-124-150-1179 228.7#
ASC-1	SENTERS 146	102	360°	1-1/2"	80-124-150-1179 228.5#
ASC-1	SENTERS 146	103	360°	1-1/2"	80-124-150-1179 228.7#
ASC-1	SENTERS 146	104	360°	1-1/2"	80-124-150-1179 228.5#
ASC-2	UPS 147	201	180°	1-1/4"	80-122-125-06875 113.6#
ASC-2	UPS 147	202	180°	1-1/4"	80-122-125-06875 113.6#
ASC-2	SENTERS 146 SUBFLOOR	301	180°	3/4"	80-122-075-50000 50#



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Gregory Gladfelter PE assumes design responsibility for this project for only the fire alarm or special hazards discipline. All other drawings would be considered the work of others. Further drawings in this project are may contain drawing information, including but not limited to architectural plans, sections and elevations, site plans and surveys and other information pertinent to achieving the fire alarm or special hazards work which is furnished by others, generally obtained by survey or light tape. Gregory Gladfelter PE assumes no responsibility or liability for the accuracy or regulatory compliance for work prepared by others even though shown on a FAFS drawing. Gregory Gladfelter PE assumes responsibility for the design of the fire alarm or special hazards discipline contained herein and the drawings thereon.

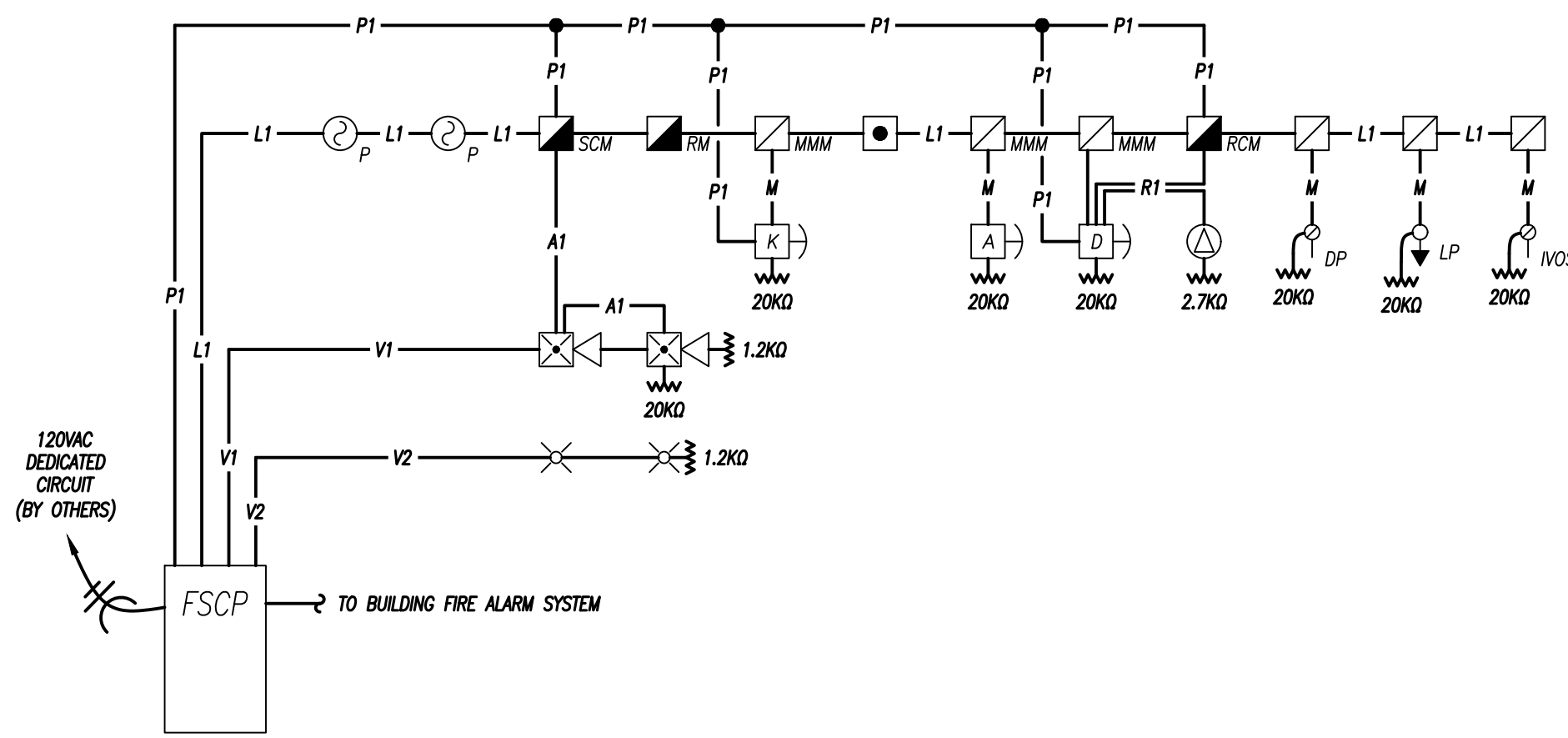


GENERAL NOTES

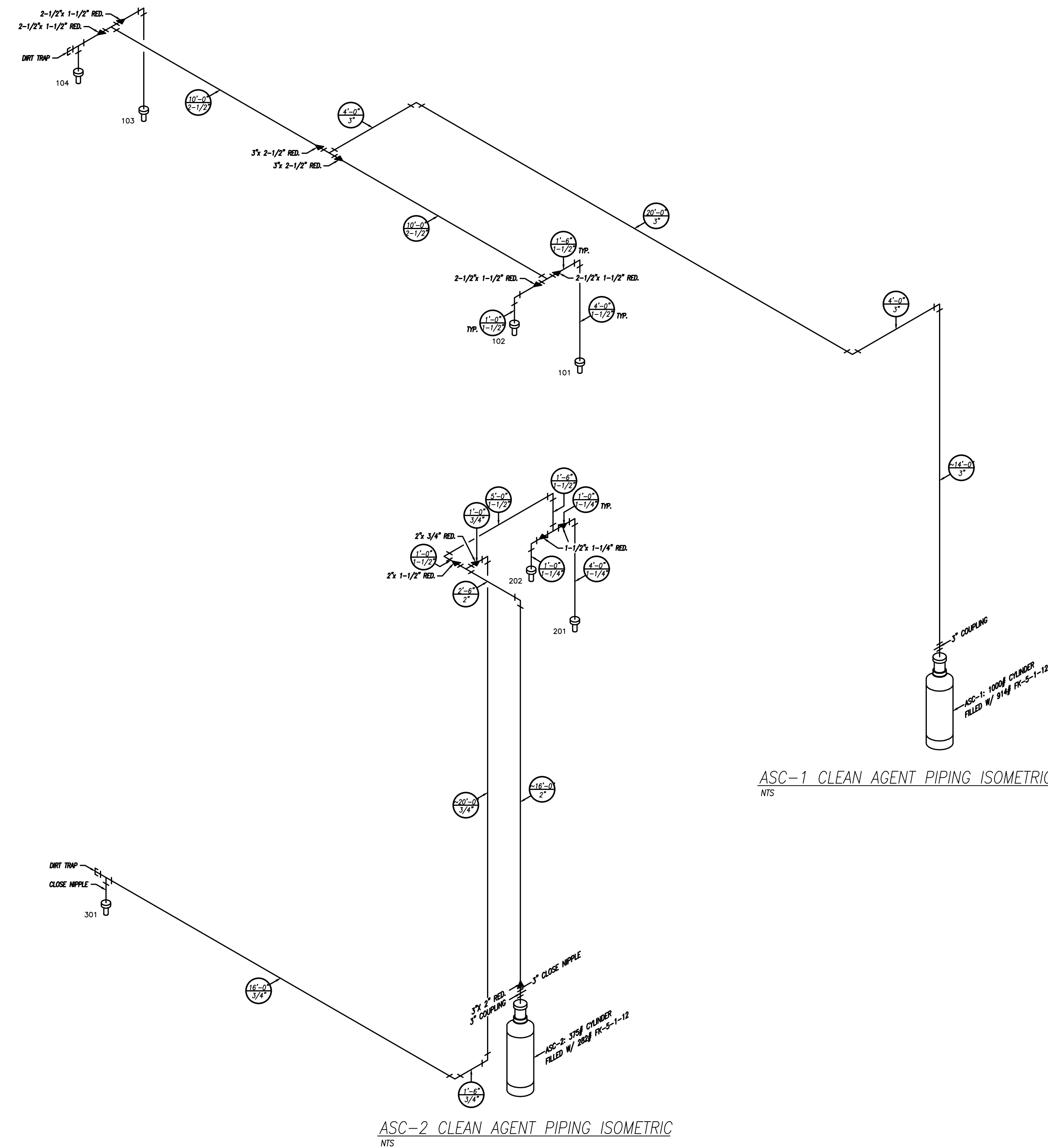
1. DRAWINGS ARE SCHEMATIC BY NATURE AND MAY NOT REFLECT EXACT FIELD LOCATIONS. AT PROJECT CLOSEOUT, THE INSTALLING CONTRACTOR SHALL SUBMIT ONE SET OF RECORD PRINTS HAVING ALL CHANGES NEATLY TRANSFERRED FROM THE FIELD SET TO A NEW SET. A CLEAN SET OF SHOP DRAWINGS WILL BE PROVIDED FOR THIS PURPOSE. FINAL PAYMENT WILL NOT BE AUTHORIZED UNTIL THE RECORD DOCUMENTS HAVE BEEN RECEIVED AND APPROVED.

KEYED NOTES

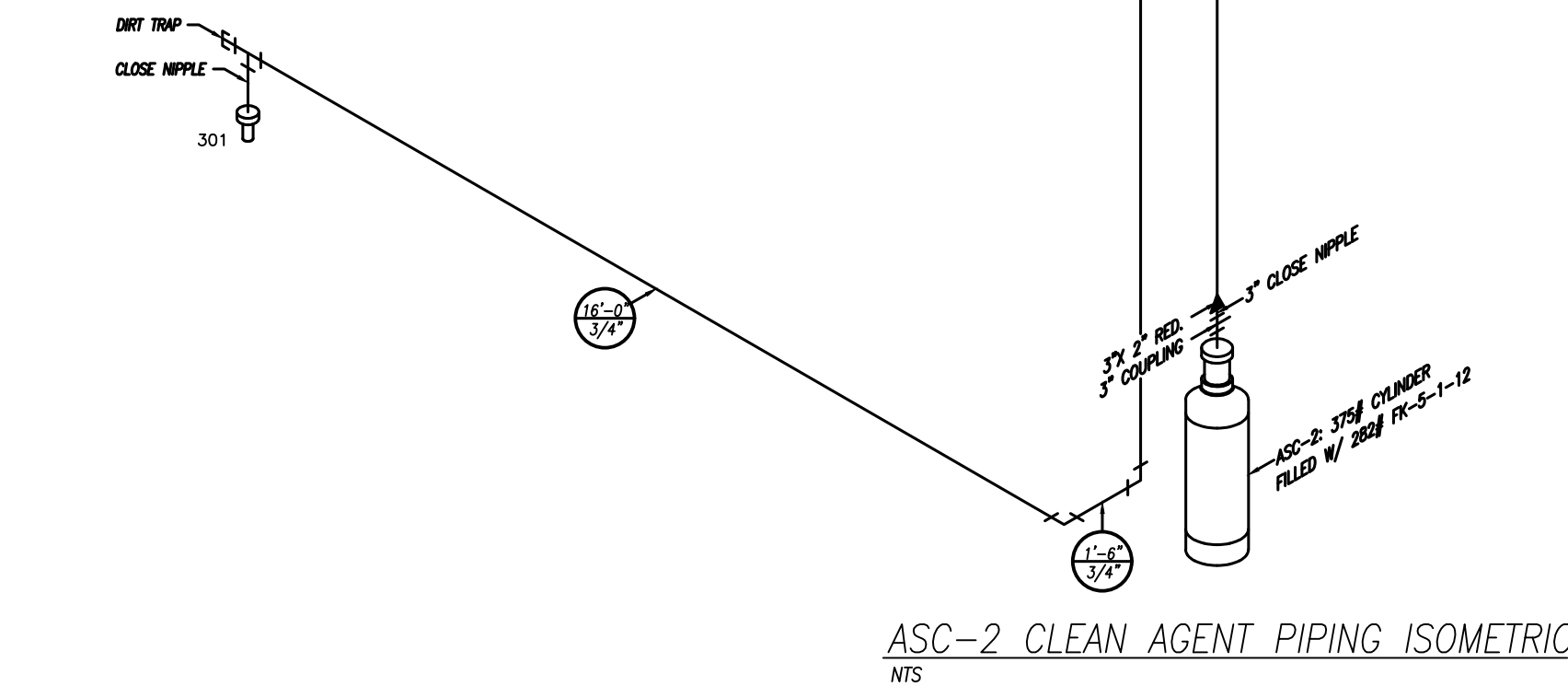
- 1 FIRE SUPPRESSION CONTROL PANEL, REQUIRES 120VAC DEDICATED CIRCUIT (BY OTHERS).
- 2 RELAY MODULE PROVIDED FOR AIR HANDLING SHUTDOWN.
- 3 SMOKE DETECTOR INDICATED SHALL BE MOUNTED IN THE RAISED FLOOR.
- 4 DISCHARGE NOZZLE INDICATED SHALL BE MOUNTED IN THE RAISED FLOOR.



GENERALIZED RISER DIAGRAM
NTS



ASC-1 CLEAN AGENT PIPING ISOMETRIC
NTS



ASC-2 CLEAN AGENT PIPING ISOMETRIC
NTS

