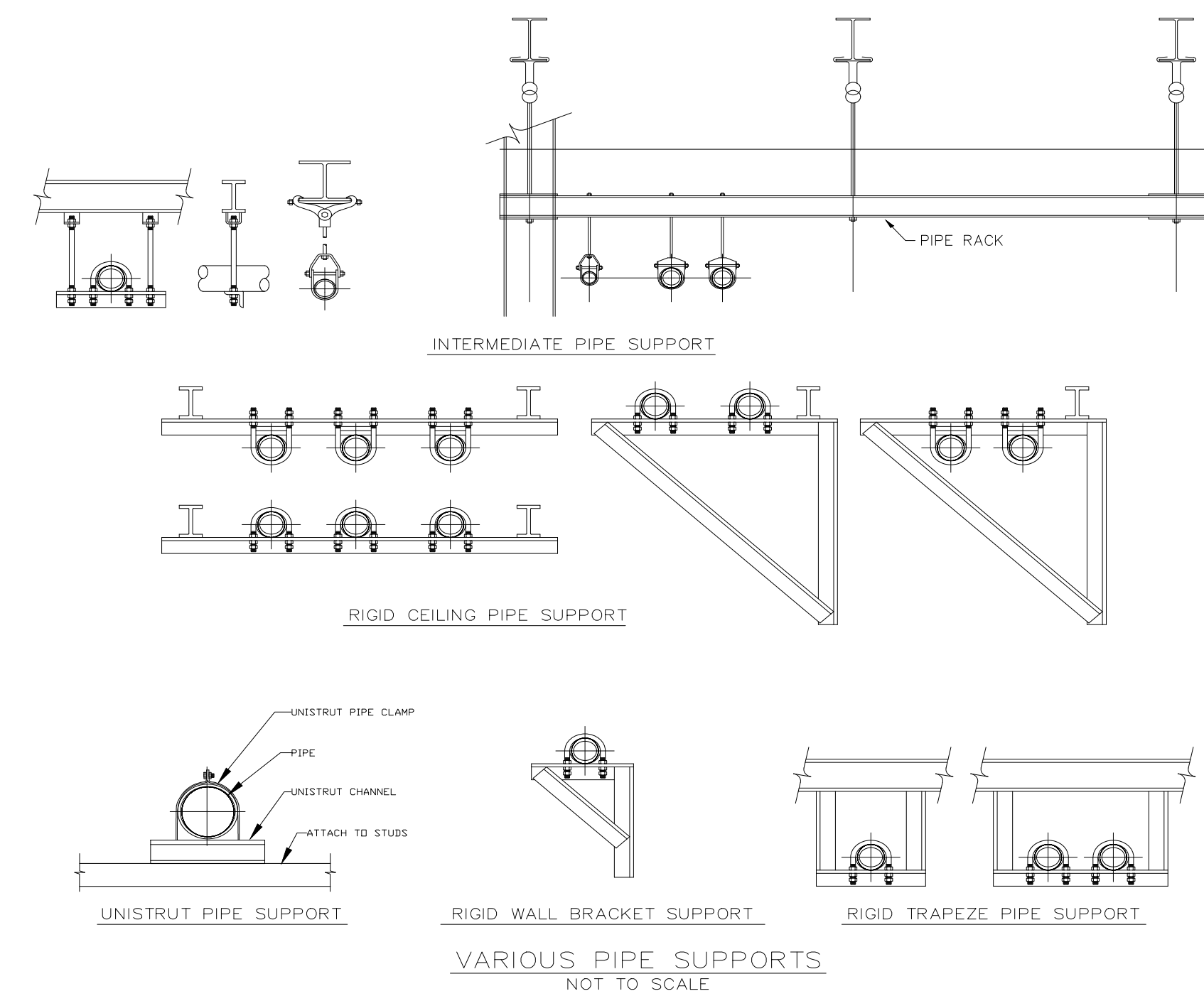


GENERAL SYSTEMS NOTES-

- F1. THIS IS A NOVEC 1230 "CLEAN AGENT" FIRE SUPPRESSION SYSTEM WITH A CONVENTIONAL DEDICATED FUNCTION LOCAL FIRE ALARM SYSTEM UL-LISTED FOR AGENT RELEASE. THE NEW SUPPRESSION SYSTEM WILL PROTECT THE SERVER ROOM #011 AND THE SERVER ROOM'S SUB-FLOOR. SEE NOTE F19.
- F2. SYSTEM IS DESIGNED AND WILL BE MAINTAINED PER NFPA 72 (2013 EDITION), NFPA 2001 (2015 EDITION) & THE IFC (2015 EDITION).
- F3. DESIGN CONCENTRATION SHALL BE MINIMUM REQUIRED FOR CLASS "C" HAZARDS PER NFPA 2001; FK 5-1-12 (Novec 1230)- 4.5%.
- F4. CONTRACTOR TO PROVIDE FULL BATTERY & VOLTAGE DROP CALCULATIONS FOR SUBMITTAL & RECORD DOCUMENTS. THE SYSTEM SHALL BE PROVIDED WITH 24 HOURS OF STAND-BY WITH 5 MINUTES OF ALARM TIME.
- F5. SHOP DRAWINGS, CALCULATIONS AND MANUFACTURER'S DATA SHEETS SHALL BE SUBMITTED FOR APPROVAL TO FOSTER ENGINEERING BEFORE SYSTEM INSTALLATION. THE CONTRACTOR SHALL SUBMIT ALL DOCUMENTS ELECTRONICALLY IN PDF FORMAT. DOCUMENT PROTECTION (IF USED) MUST ALLOW FOR MARKUPS BY FOSTER ENGINEERING.
- F6. ALL SYSTEM DEVICES AND CIRCUITS WILL BE TESTED IN ACCORDANCE WITH NFPA 72 & THE IFC.
- F7. A RECORD OF COMPLETION WITH THE APPROVED DRAWINGS AND SPECS WILL BE PROVIDED IN ACCORDANCE WITH NFPA 72 & THE IFC.
- F8. INSTRUCTIONS FOR OPERATING, TESTING AND MAINTENANCE WITH THE RECORD DRAWINGS AND SPECIFICATIONS WILL BE PROVIDED AT AN APPROVED LOCATION PER THE IFC. UPON FINAL ACCEPTANCE OF THIS SYSTEM, THESE DRAWINGS, THE OWNER'S MANUAL, THE DEVICE DATA SHEETS AND ALL OTHER APPLICABLE DOCUMENTATION WILL BE DELIVERED TO THE FACILITY REPRESENTATIVE. THE CLOSEOUT DOCUMENTS SHALL INCLUDE ONE (1) ELECTRONIC COPY AND ONE (1) PRINTED COPY OF THE APPROVED SHOP DRAWINGS.
- F9. THERE APPEAR TO BE NO KNOWN AREAS OF CONCERN FOR FALSE ALARM.
- F10. ABORT SWITCH MUST BE "DEAD MAN" STYLE, SHALL ONLY DELAY SYSTEM DISCHARGE AND SHALL NOT RESET COUNTDOWN.
- F11. SEE PIPE INSTALLATION NOTES FOR PIPING INFORMATION.
- F12. A ROOM INTEGRITY TEST WAS PERFORMED IN NOVEMBER OF 2014. AT THAT TIME THE ROOM WAS SATISFACTORY FOR RETENTION TIME AND PEAK POSITIVE PRESSURES. THE PEAK NEGATIVE PRESSURE RESULTS REQUIRED THAT AN ADDITIONAL 788 SQUARE INCHES OF VENTING BE PROVIDED. THE ROOM CONSTRUCTION HAS BEEN ALTERED SINCE THE ORIGINAL TEST. A FOLLOW UP FAN TEST SHALL BE PERFORMED BY THE CONTRACTOR TO RE-ESTABLISH THE ENCLOSURE INTEGRITY.

F13. SEISMIC NOTES--

- A FLEXIBLE CONNECTION MUST BE USED TO CONNECT THE AGENT CYLINDER TO THE DISCHARGE PIPING.
 - THE AGENT CYLINDER MUST BE RESTRAINED USING TWO (2) STRAPS THAT MUST BE ATTACHED TO A MINIMUM OF THREE (3) WALL STUDS.
 - MAINTAIN A MAXIMUM DISTANCE OF 12" FROM THE POINT OF ATTACHMENT TO THE STRUCTURE AND THE TOP OF ALL HORIZONTAL OVERHEAD PIPING.
- F14. PER NFPA 2001-4.3.1.3 ALL INITIATING AND RELEASING CIRCUITS SHALL BE INSTALLED IN RACEWAYS.
 - F15. CONTRACTOR SHALL PROVIDE TWO (2) SIXTY MINUTE TRAINING SESSIONS FOR STAFF. USC WILL SET THE TIME AND DATE FOR TRAINING SESSIONS.
 - F16. CONTRACTOR TO INCLUDE SYSTEMS FIRST YEAR'S SERVICE AND MAINTENANCE IN THEIR BASE BID.
 - F17. CONTRACTOR TO PROVIDE USC WITH AN OPTION FOR THE FOR SYSTEMS 2ND YEAR SERVICE AND MAINTENANCE.
 - F18. CONTRACTOR TO REUSE EXISTING PIPING WHICH IS SERVICEABLE. SEE OWNER'S NOTE # 1.
 - F19. THIS PROJECT SHALL INCLUDE THE INSTALLATION OF A NEW CONVENTIONAL RELEASING PANEL CONTROL UNIT COMPATIBLE WITH THE NEW CLEAN AGENT SUPPRESSION SYSTEM. THE NEW RELEASING PANEL SHALL FUNCTION AS A SUB-PANEL TO THE EXISTING EDWARDS EST3 BUILDING FIRE ALARM CONTROL UNIT. THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR CONTRACTING A LICENSED EST DISTRIBUTOR TO COMPLETE THE FOLLOWING--
 - THE EXISTING EST3 CONTROL UNIT SHALL BE REPROGRAMMED TO "CORRELATE" THE EXISTING SMOKE DETECTION IN THE SERVER ROOM 011 & SUBFLOOR APPROPRIATELY FOR "CROSS-ZONED" DETECTION.
 - ONE HALF OF THE EXISTING SMOKE DETECTORS (EVERY OTHER DETECTOR) IN THE SERVER ROOM 011 AND ITS SUB-FLOOR SHALL BE CORRELATED TO "CLEAN AGENT DETECTION ZONE 1".
 - THE REMAINING SMOKE DETECTORS IN THE SERVER ROOM 011 AND ITS SUB-FLOOR SHALL BE CORRELATED TO "CLEAN AGENT DETECTION ZONE 2".
 - TWO (2) NEW EST ADDRESSABLE RELAYS SHALL BE INSTALLED AND PROGRAMMED AS A PART OF THIS PROJECT. THEY SHALL BE INSTALLED IMMEDIATELY ABOVE THE NEW RELEASING CONTROL PANEL (SEE THE PARTIAL RISER DIAGRAM FOR ADDITIONAL INFORMATION).
 - ONE RELAY SHALL BE CORRELATED TO SWITCH STATE UPON ACTIVATION OF ANY DETECTOR IN "CLEAN AGENT DETECTION ZONE 1". THE NEW RELEASING CONTROL UNIT'S DETECTION ON-BOARD DETECTION ZONE 1 SHALL SUPERVISE THE NORMALLY OPEN SIDE OF THE ADDRESSABLE RELAY CORRELATED WITH THE EST "CLEAN AGENT DETECTION ZONE 1".
 - ONE RELAY SHALL BE CORRELATED TO SWITCH STATE UPON ACTIVATION OF ANY DETECTOR IN "CLEAN AGENT DETECTION ZONE 2". THE NEW RELEASING CONTROL UNIT'S ON-BOARD DETECTION ZONE 2 SHALL SUPERVISE THE NORMALLY OPEN SIDE OF THE ADDRESSABLE RELAY CORRELATED WITH EST "CLEAN AGENT DETECTION ZONE 2".
 - F20. ANY EXISTING DISCHARGE PIPING THAT WILL BE REUSED IN THE NEW SYSTEM SHALL BE PRESSURE TESTED PER NFPA 2001 (7.7.2.2.12.1) PRIOR TO THE BEGINNING OF THE INSTALLATION OF THE FIRE SUPPRESSION SYSTEM. USC SHALL BE NOTIFIED IF ANY PART OF THE DISCHARGE PIPE FAILS THE PRESSURE TEST.



INSTALLATION NOTES FOR CLEAN AGENT SYSTEM

THESE SPECIFICATIONS ARE TO APPLY TO ALL INSTALLATIONS OF CLEAN AGENT FIRE EXTINGUISHER SYSTEMS.

1. ALL PIPE SHALL CONFORM WITH NFPA 2001 SECTION 4.2.1.
2. JOINTS & FITTINGS SHALL COMPLY WITH NFPA 2001 SECTIONS 4.2.2 & 4.2.3.
3. PIPE GRADES MUST BE SUITABLE FOR THE PRESSURES CALCULATED BY MANUFACTURER'S FM-200 FLOW CALCULATION PROGRAM. CONSULT THE CHART IN THE MANUFACTURER'S DESIGN MANUAL OR NFPA 2001, FOR MAXIMUM PIPE PRESSURES FOR THE DIFFERENT PIPE GRADES.
4. SEE NOTE F-13 IN GENERAL NOTES.
5. ALL FITTINGS USED TO CONSTRUCT THE MANIFOLD, INCLUDING FITTINGS BEFORE THE ORIFICE UNION TO BE BLACK FORGED STEEL 2000 LB. OR 3000 LB. ANSI B-16.11.
6. PIPE LENGTHS GIVEN ARE FROM CENTER TO CENTER OF FITTINGS.
7. ANY DEVIATIONS FROM THE ARRANGEMENT SHOWN ON THE SHOP DRAWINGS WILL REQUIRE A COMPLETE REVIEW OF THE FLOW CALCULATIONS BY THE CONTRACTOR.
8. REAM AND CLEAN EACH PIPE SECTION INTERNALLY AFTER PREPARATION AND BEFORE ASSEMBLY BY MEANS OF SWABBING, UTILIZING A SUITABLE NON-FLAMMABLE CLEANER. THE PIPING NETWORK SHALL BE FREE OF PARTICULATE MATTER AND OIL RESIDUE BEFORE INSTALLATION OF NOZZLES OR DISCHARGE DEVICES.
9. ALL DEAD END PIPE LINES TO BE PROVIDED WITH A DIRT TRAP.

Table & Maximum Distance Between Pipework Supports

Pipe Size (in.)	Maximum Distance Between Supports (feet)
3/8	5.0
3/4	6.0
1	7.0
1 1/4	8.0
1 1/2	9.0
2	11.0
3	12.0
4	14.0
6	17.0

PIPING INFORMATION

OWNER'S NOTES

1. ALL BIDDING CONTRACTOR'S SHOULD SURVEY THE SITE TO FAMILIARIZE THEMSELVES WITH THE EXISTING DISCHARGE PIPE. THE BIDDERS CAN UTILIZE THE DRAWINGS PREPARED IN 2009 BY DWG CONSULTING ENGINEERS. THE CONTRACTOR SHALL SHOW THEIR BASE BID WITH A DEDUCT FOR REUSING THE EXISTING PIPE.
2. LOCATE THE REMOTE ANNUNCIATOR IN THE OPERATIONS COMMAND CENTER ON THE WALL NEXT TO THE OPERATOR'S STATION.

SEQUENCE OF EVENTS

1. Activation of an existing EST smoke detector correlated with "Clean Agent Detection Zone 1" shall:
 - a. Illuminate the "ALARM" lamp on the EST3 control panel face.
 - b. Cause the new addressable relay correlated with "Clean Agent Detection Zone 1" to switch state triggering the clean agent on-board detection zone 1.
 - c. Energize the clean agent control panel alarm bell.
 - d. Transfer the on-board alarm relay contact on the new clean agent control unit.
2. Activation of an existing EST smoke detector correlated with "Clean Agent Detection Zone 2" shall:
 - a. Cause the new addressable relay correlated with "Clean Agent Detection Zone 2" to switch state triggering the clean agent on-board detection zone 2.
 - b. Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
 - c. Energize horn/strobe device, pre-discharge.
 - d. Start time-delay sequence (30 seconds).
 - e. Transfer pre-discharge relay contact.
3. After the 30 Second Time Delay Reaches Zero the following shall occur:
 - a. Discharge Agent into protected space.
 - b. Illuminate "DISCHARGE" lamp on the control panel face.
 - c. Activate Pre-discharge Horn-strobe on steady.
 - d. Energize discharge warning strobe outside the hazard.
4. Abort Switch Operation: Countdown will continue during the abort activation. Release of agent will occur when both the countdown is complete and the abort switch is deactivated (UL requires a 10 second countdown after the abort has been released).
5. Manual Pull Operation:
 - a. Agent is discharged immediately. Horn/Strobe is activated on steady.
 - b. Illuminate "DISCHARGE" lamp on the control panel face.
 - c. Transfer the on-board alarm relay contact on the new clean agent control unit.
 - d. Energize discharge warning strobe outside the hazard.

SEQUENCE OF OPERATION MATRIX

INPUTS	OUTPUTS																	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S
1. MANUAL PULL STATION ACTIVATION	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2. MANUAL TANK ACTUATOR ACTIVATION	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
3. 1ST DETECTOR IN ALARM: EITHER ZONE 1 OR 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
4. 2ND DETECTOR IN ALARM: BOTH ZONE 1 AND 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5. 30 SECOND TIME DELAY REACHES ZERO	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6. ABORT BUTTON DEPRESSED DURING COUNTDOWN**	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
7. NOTIFICATION APPLIANCE CIRCUIT SHORT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8. D.F.C.U. A.C. POWER FAILURE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
9. D.F.C.U. SYSTEM LOW BATTERY	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10. SPED. ENLIGHT.	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
11. GROUND FAULT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
12. RELEASING CIRCUIT DISABLE SWITCH DISABLED	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

** SUPPRESSION CONTROL PANELS MUST BE RESET DURING ABORT SWITCH OPERATION. RELEASE OF ABORT SWITCH DURING THE 30 SECOND TIME DELAY WILL ALLOW THE COUNTDOWN TO CONTINUE COUNTING DOWN TO ZERO THEN HOLD. THE AGENT DISCHARGE OCCURS WHEN COUNTDOWN REACHES ZERO.

SYSTEM SYMBOLS

SEE "DEVICE MOUNTING HEIGHT" DETAIL

DFCU	AGENT RELEASE CONTROL UNIT
FAA	REMOTE ANNUNCIATOR
F	FM-200 MANUAL RELEASE STATION
A	FM-200 DISCHARGE ABORT
cd	FIRE ALARM HORN STROBE- CLEAN AGENT NOTIFICATION DEVICES SHALL BE MARKED "AGENT" AND PROVIDED WITH A RED LENS COVER. ("C" INDICATES A CEILING MOUNT DEVICE.)
cd	FIRE ALARM STROBE- CLEAN AGENT NOTIFICATION DEVICES SHALL BE MARKED "AGENT" AND PROVIDED WITH A RED LENS COVER. ("C" INDICATES A CEILING MOUNT DEVICE.)
AB	4" ALARM BELL
S	EXISTING ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR
RM	ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR (BUILDING FIRE ALARM CONTROL UNIT)
KS	KEYED MAINTENANCE SWITCH
EA	ELECTRIC ACTUATOR
☼	360 DEGREE, FM-200 DISCHARGE NOZZLE

VOLUMETRIC & AGENT QTY CALCULATIONS

CALC NOTES

1. HAND CALCULATIONS FOR THE MINIMUM AGENT QTY FOR NOVEC 1230 ARE SHOWN AS AN EXAMPLE OF HOW TO PROPERLY DETERMINE THE MINIMUM AMOUNT OF AGENT NEEDED. OTHER AGENTS THAT MEET THIS PROJECT'S SPECIFICATIONS MAY BE UTILIZED.
2. THE MINIMUM CLEAN AGENT REQUIRED IS BASED ON AGENT CONCENTRATIONS LISTED IN GENERAL NOTE "F3". THE TOTAL MINIMUM AGENT REQUIRED IS BASED ON THE ROOM VOLUME ONLY. SEE THE CONTRACTOR'S HYDRAULIC CALCULATION RESULTS FOR ACTUAL AGENT AMOUNT REQUIRED.

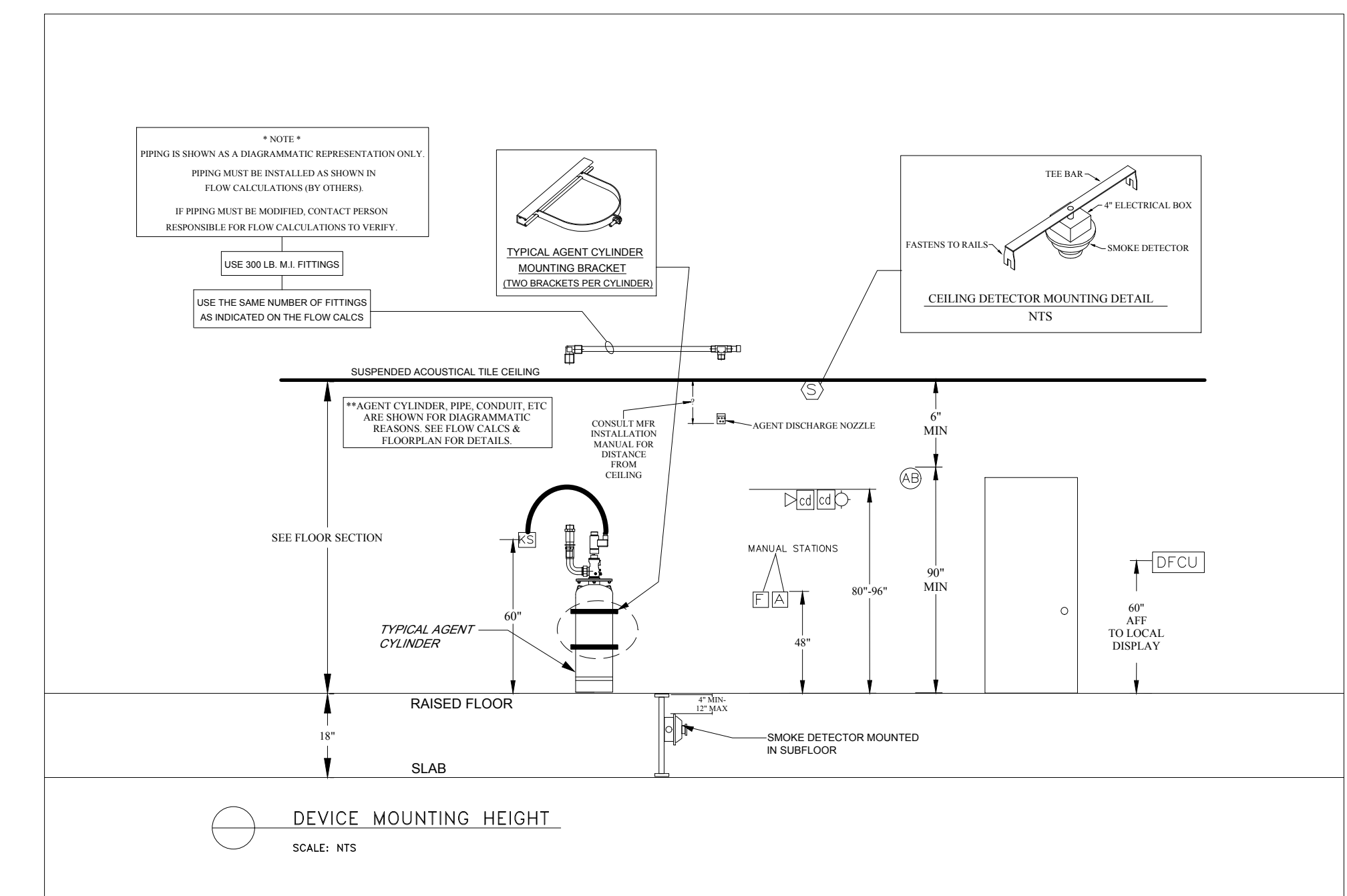
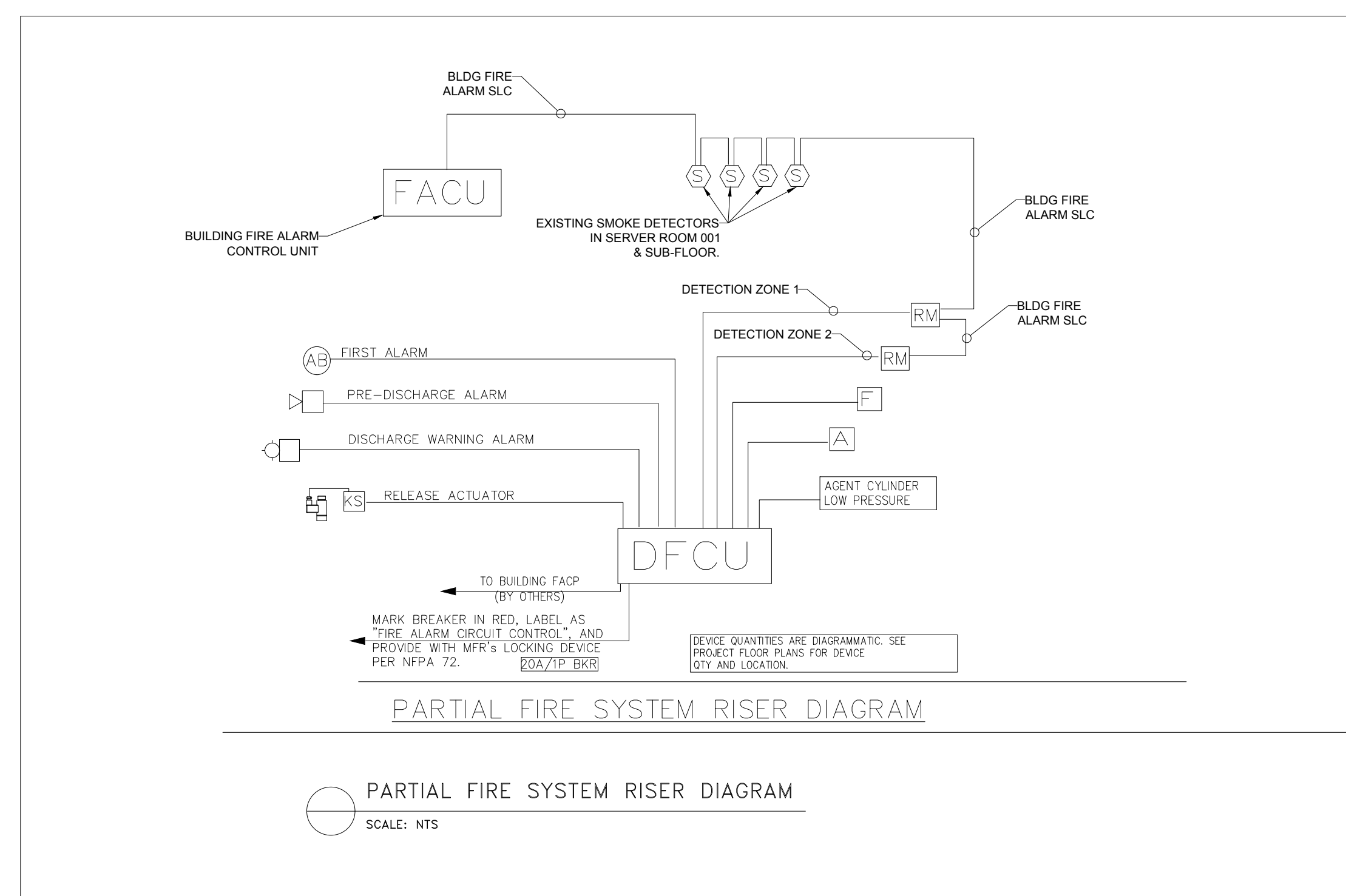
ABOVE RAISED FLOOR VOLUME & AGENT QTY CALCULATION (Novec 1230)

ABOVE RAISED FLOOR, PLAN WEST OF SOFFIT- 6,340 sq ft x 10'-3" h = 64,985 cu ft
 ABOVE RAISED FLOOR, PLAN EAST OF SOFFIT- 3,803 sq ft x 7'-5" h = 37,397 cu ft
 TOTAL VOLUME ABOVE RAISED FLOOR= 102,382 cu ft
 Above Raised Floor Minimum Agent Calculation
 4.5% @ 70F
 $W = ((V/S)^c) (100-c)$
 $= (102,382 / (0.9856 + 0.0024411))^c * (% / (100-%))$
 $= (102,382 / (0.9856 + (0.00244 * 70))) * (4.5 / (100-4.5))$
 $= (102,382 / 1.15647) * (0.04712)$
 $= (88,530) * (0.04712) = 4,171.5336 => 4,172 Lbs$
 MINIMUM NOVEC 1230 REQUIRED ABOVE THE RAISED FLOOR- 4,172 Lbs.

BELOW RAISED FLOOR VOLUME & AGENT QTY CALCULATION (Novec 1230)

BELOW RAISED FLOOR- 10,143 sq ft x 18" h = 15,215 cu ft
 Below Raised Floor Minimum Agent Calculation
 4.5% @ 70F
 $W = ((V/S)^c) (100-c)$
 $= (15,215 / (0.9856 + 0.0024411))^c * (% / (100-%))$
 $= (15,215 / (0.9856 + (0.00244 * 70))) * (4.5 / (100-4.5))$
 $= (15,215 / 1.15647) * (0.04712)$
 $= (13,157) * (0.04712) = 619.95784 => 620 Lbs$
 MINIMUM NOVEC 1230 REQUIRED BELOW THE RAISED FLOOR- 620 Lbs.

TOTAL PROTECTED VOLUME= 117,597 cu ft
 TOTAL MINIMUM AGENT REQUIRED- 4,792 Lbs.



NO.	REVISION	DATE
1	NOTES (OWNER'S MEETING)	12/8/14
2	ROOM CHANGES	4/16/18
3	SYSTEM CHANGES	6/13/18



UNIVERSITY OF SOUTH CAROLINA
COMPUTER CENTER ANNEX BUILDING
514 SOUTH MAIN STREET
COLUMBIA, SOUTH CAROLINA
CLEAN AGENT FIRE SUPPRESSION SYSTEM

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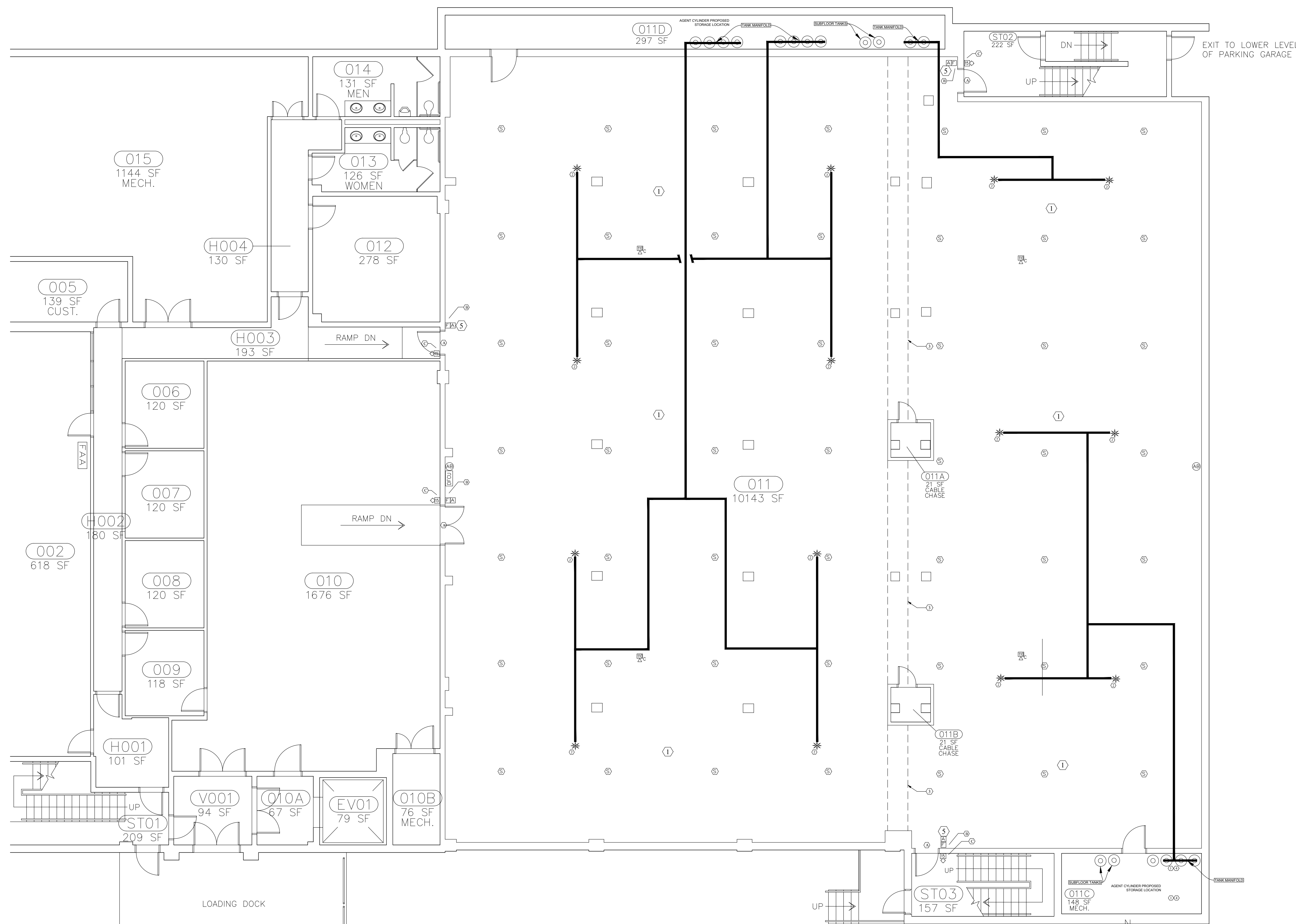
DATE
 DECEMBER 5, 2014

SHEET SIZE- 30 x 42

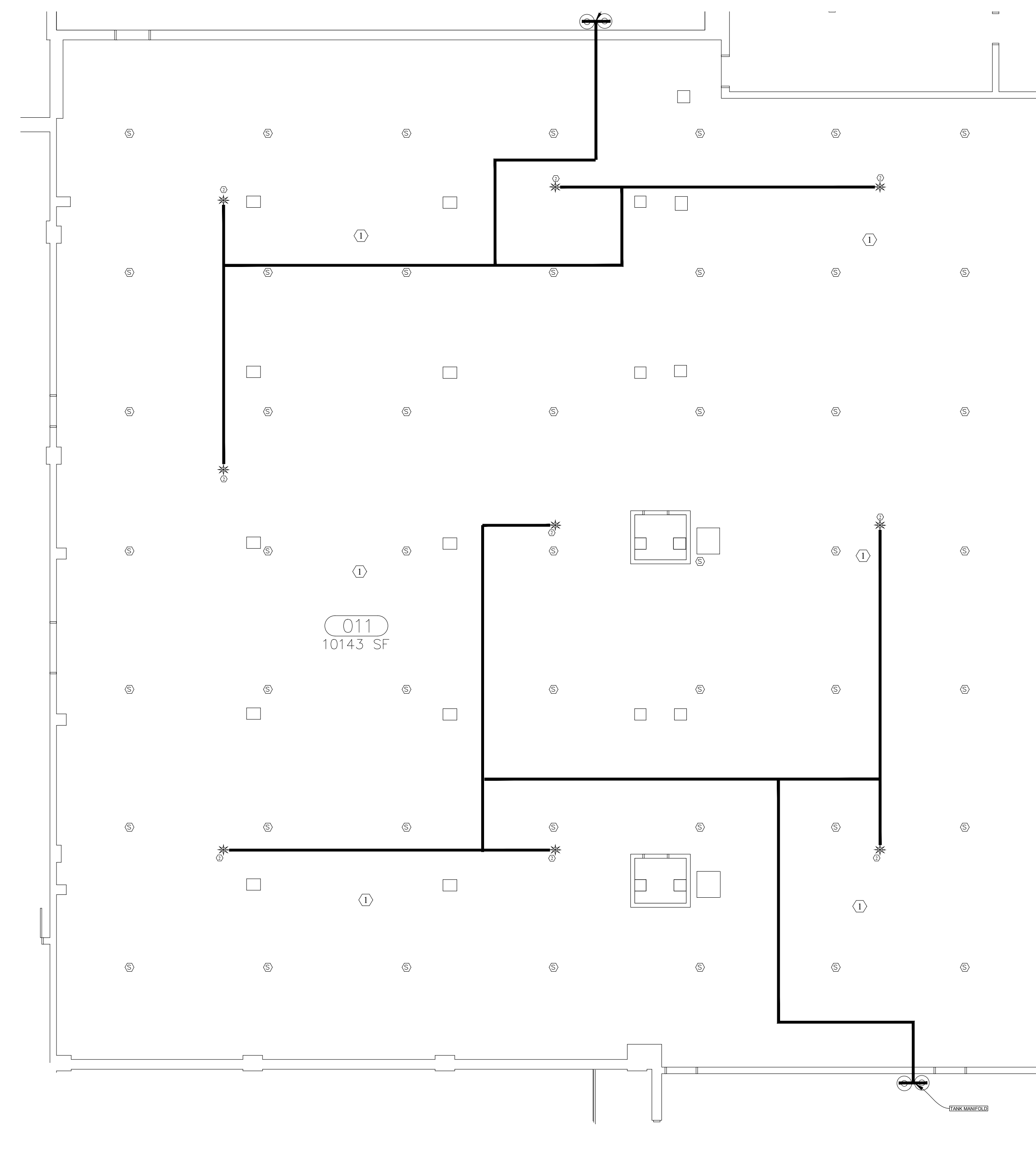
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DRAWING

1 of 2

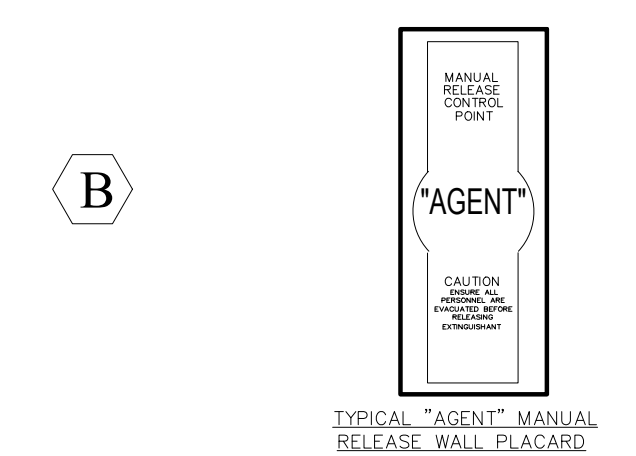
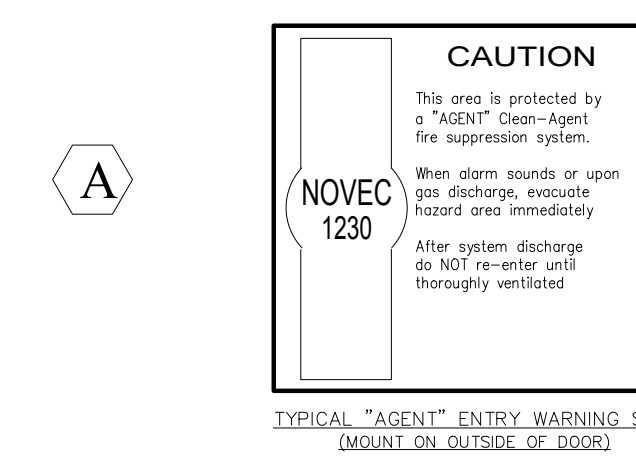
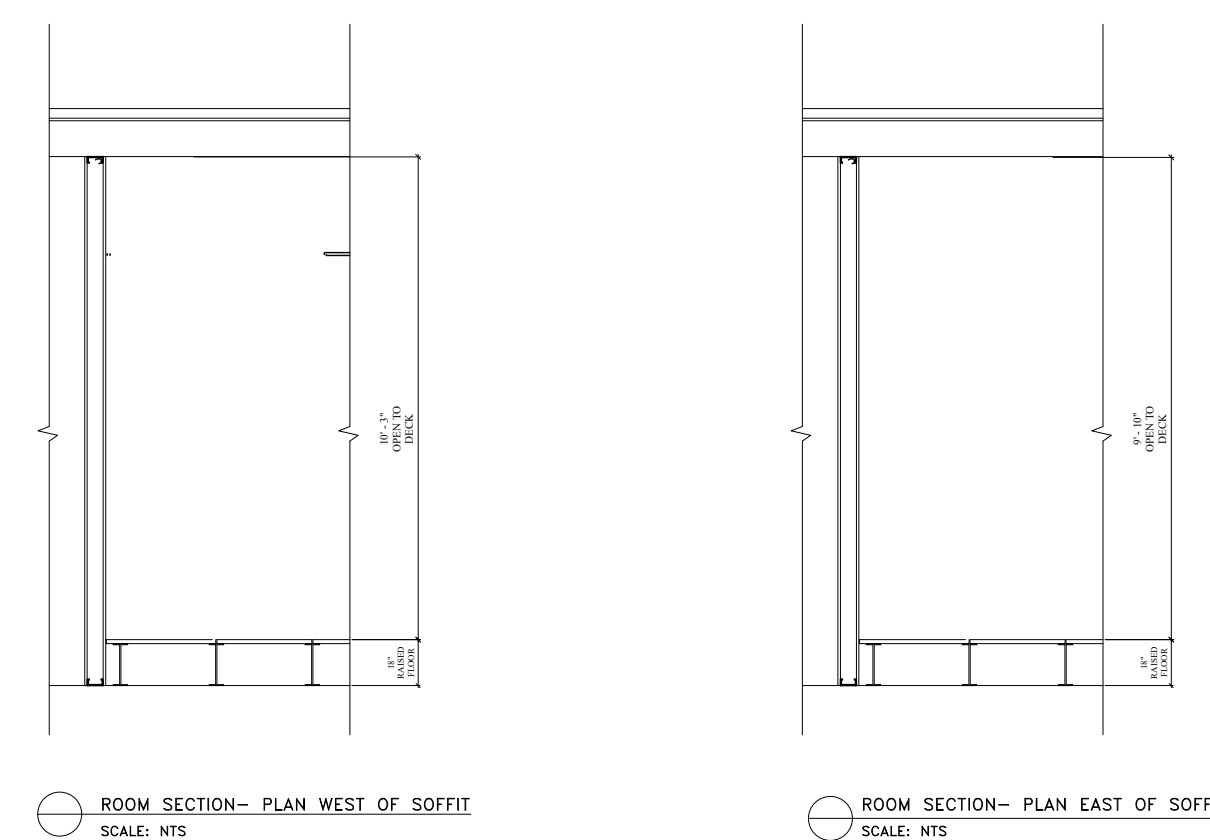


CLEAN AGENT FIRE SUPPRESSION SYSTEM FLOOR PLAN
SCALE: 1/8" = 1'-0"



CLEAN AGENT FIRE SUPPRESSION SYSTEM SUB-FLOOR PLAN
SCALE: 1/8" = 1'-0"

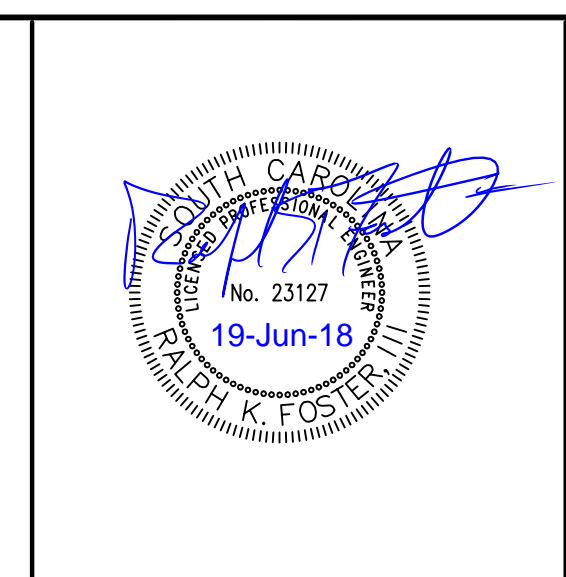
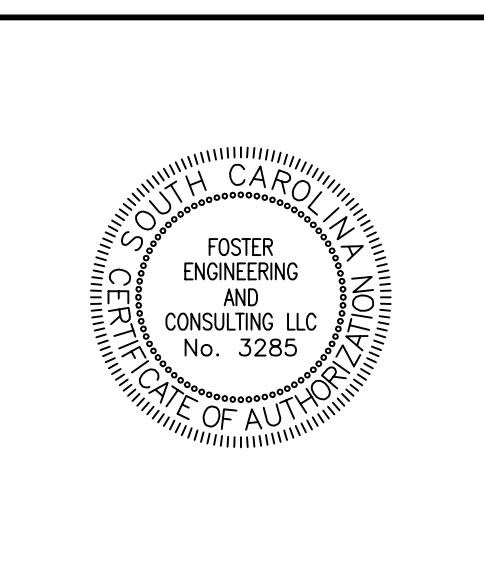
- 1 LOCATION OF EXISTING DETECTORS IS SHOWN FOR INFORMATIONAL & DIAGRAMMATIC PURPOSES. THE EXISTING DETECTORS ARE A PART OF THE EST3 BUILDING FIRE ALARM SYSTEM. SEE NOTE F19.
- 2 AGENT DISCHARGE PIPING & NOZZLE- THE APPROXIMATE PIPE NETWORK AS WELL AS THE QUANTITY AND PLACEMENT OF NOZZLES SHOWN IS BASED ON PRELIMINARY CALCULATIONS. THE CONTRACTOR SHALL CONFIRM THE LOCATION AND QTY OF NOZZLES REQUIRED WITH THE CALCULATION SOFTWARE PROVIDED BY THE MANUFACTURER OF THE SUPPRESSION SYSTEM THAT IS BEING INSTALLED. CONSULT MANUFACTURER'S INSTALLATION MANUAL TO ENSURE THAT THE NOZZLE MAXIMUM RADIUS AND COVERAGE AREA IS NOT EXCEEDED. THE PIPE NETWORKS SHOWN HERE ARE BASED ON SUCCESSFUL HYDRAULIC CALCULATIONS.
*NOTE THAT THE PRELIMINARY CALCULATIONS WERE ONLY SUCCESSFUL UTILIZING A HIGHER PRESSURE CYLINDER. THE STANDARD 360psi CYLINDERS WOULD NOT SUCCESSFULLY CALCULATE DUE TO THE DISTANCES OF PIPE REQUIRED FOR THE SYSTEM WITH THE PREFERRED TANK LOCATIONS SHOWN.
- 3 THE SOFFIT IS 2'-0" WIDE. THE HEIGHT FROM THE BOTTOM OF THE SOFFIT TO THE CEILING IS APPROXIMATELY 105" ON THE PLAN WEST SIDE AND 7" ON THE PLAN EAST SIDE. THE INSTALLING CONTRACTOR SHALL CONFIRM THAT THE NOZZLE QTY AND LOCATION IS SUFFICIENT AND THAT THE SOFFIT DOES NOT INTERFERE WITH THAT MANUFACTURER'S NOZZLE'S DISCHARGE PATTERN. THE SOFFIT DOES NOT CREATE A "BEAM POCKET" WHEN CONSIDERING THE SMOKE DETECTOR COVERAGE AREA.
- 4 THE QTY OF AGENT CYLINDERS IS AN ESTIMATION BASED ON PRELIMINARY CALCULATIONS. THE INSTALLING CONTRACTOR SHALL DETERMINE THE ACTUAL CYLINDER QTY AND CONFIRM THE FINAL CYLINDER STORAGE LOCATION WITH THE UNIVERSITY.
- 5 NEW MANUAL RELEASE STATIONS AND ABORT STATIONS SHALL BE INSTALLED AS PART OF THIS PROJECT. THE NEW MANUAL STATIONS SHALL BE TIED BACK DIRECTLY TO THE NEW SUPPRESSION CONTROL UNIT.



SIGN KEY
SCALE: NTS



NO.	REVISION	DATE
1	NOTES (OWNER'S MEETING)	12/8/14
2	ROOM CHANGES	4/16/18
3	SYSTEM CHANGES	6/13/18



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CA2
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 2 of 2