MONTANA STATE UNIVERSITY - BOZEMAN

MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

PPA #21-0138

100% CONSTRUCTION DOCUMENT BID SET

AUGUST 12, 2022

DRAWING INDEX

AREA OF WORK

SERVICE DRIVE

1 FA0.0 MONTANA STATE UNIVERSITY VICINITY MAP
NO SCALE

MSU BOZEMAN
FACILITIES
P.O. BOX 72760
BOZEMAN, MT 59717
ATTN: LORAS O'TOOLE

DESIGN TEAM:
COFFMAN ENGINEERS, INC
2011 N. 22ND AVE, SUITE 4
BOZEMAN, MT 59718
ATTN: JASON ANDERSON, P.E.

AUTHORITY HAVING JURISDICTION
CITY OF BOZEMAN
FIRE MARSHALL
121 N. ROUSE AVE,
BOZEMAN, MT 59715

STAGING NOTES:

1. CONSTRUCTION STAGING AREA: FENCE TO ENCLOSE ALL AREAS AS CONSTRUCTION STAGING AREAS USED AS CONSTRUCTION STAGING AREAS. PROVIDE A FENCE WHICH PREVENTS PEDESTRIANS FROM ENTERING THE CONSTRUCTION STAGING AREA. THE CONTRACTOR NEED NOT MAKE USE OF THE ENTIRE CONSTRUCTION STAGING AREA SHOWN. ALL CONSTRUCTION STAGING AREAS WHICH ARE DAMAGED SHALL BE REPLACED WHEN CONSTRUCTION IS COMPLETE.
2. DO NOT BLOCK ANY ROADS OR SIDEWALKS.
3. CONTRACTOR TO ACCESS SITE FROM 11TH AVENUE THROUGH THE SERVICE DRIVE.
4. CONTRACTOR IS RESPONSIBLE FOR PURCHASING PARKING PERMITS FROM MONTANA STATE UNIVERSITY FOR ITS CREW.
5. CONTRACTOR TO OBTAIN APPROVAL OF CONSTRUCTION STAGING SET-UP FROM MONTANA STATE UNIVERSITY CONSTRUCTION INSPECTOR BEFORE BEGINNING CONSTRUCTION.
6. DO NOT BLOCK ACCESS TO ANY GARBAGE DUMPSTERS.

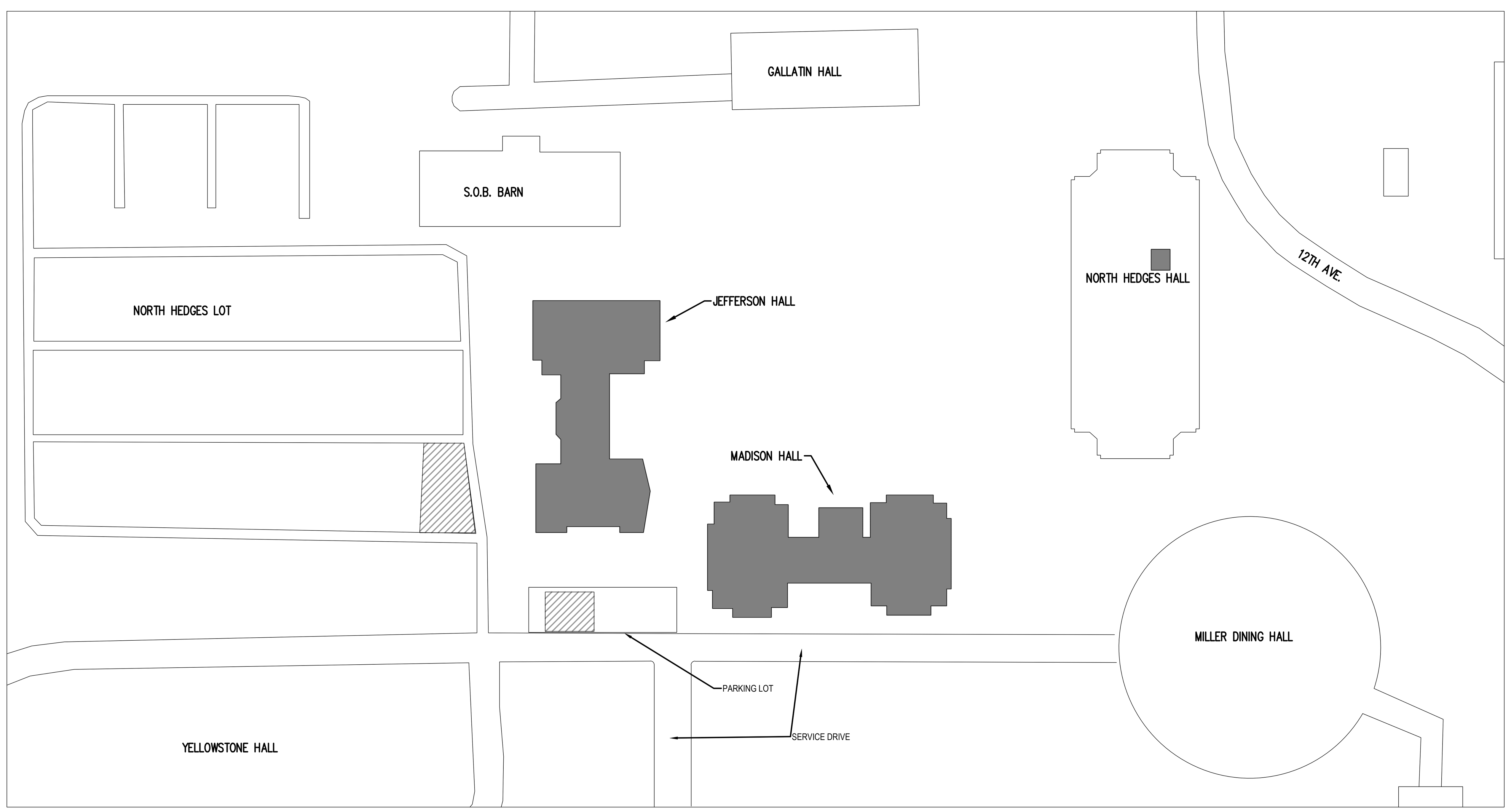
THE SAFETY MEASURES REQUIRED OF THE CONTRACTOR ARE OUTLINED MORE FULLY IN THE SPECIFICATIONS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SAFETY AND SHALL TAKE WHATEVER ADDITIONAL MEASURES ARE NECESSARY TO ENSURE THE HEALTH AND SAFETY OF THE CONTRACTOR'S EMPLOYEES, SUBCONTRACTORS, AND BUILDING OCCUPANTS, OF PEDESTRIANS AT OR NEAR THE CONSTRUCTION SITE AND ACCESS ROUTES, AND OF ALL OTHER PERSONS IN AREAS AFFECTED BY THE CONTRACTOR'S ACTIVITIES.

STAGING LEGEND:

AREAS NOT DEFINED BELOW ARE NOT IN THE CONTRACT (NIC) AND SHALL NOT BE USED BY THE CONTRACTOR, MACHINERY, OR PERSONNEL DURING THE TERM OF THE CONTRACT.

(hatched) CONSTRUCTION STAGING AREA: SITE SHOWN IS THE MAXIMUM AREA AVAILABLE TO THE CONTRACTOR FOR MATERIAL STORAGE, EQUIPMENT STORAGE, AND OTHER ACTIVITIES RELATED TO CONSTRUCTION. ALL AREAS USED FOR CONSTRUCTION OR AREAS DAMAGED DURING THE EXECUTION OF THIS CONTRACT SHALL BE REPAIRED AND IF NECESSARY RESODDED OR REPAVED WHEN CONSTRUCTION IS COMPLETED. EXISTING TREES AND SIDEWALKS SHALL BE PROTECTED FROM DAMAGE AND SHALL BE REPLACED IF DAMAGED. NO PARKING IN THE STAGING AREA OR ACCESS ROUTE. SEE PARKING MAP FOR PARKING AREA. ALL VEHICLES OTHER THAN DUMP TRUCK AND MATERIALS DELIVERY TRUCK MUST HAVE VALID PARKING PERMIT AND BE PARKED IN DESIGNATED MSU BOZEMAN PARKING LOT. ALL VEHICLES TO LEAVE STAGING AREA IMMEDIATELY AFTER COMPLETING INTENDED TASK. CONTRACTOR WILL BE RESPONSIBLE TO REPAIR OR REPLACE DAMAGED AREAS OF BUILDINGS AND/OR LANDSCAPING.

(solid) CONSTRUCTION SCOPE OF WORK



2 FA0.0 STAGING MAP
NO SCALE

MONTANA STATE UNIVERSITY

MSU-CPDC
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

COVER SHEET, DRAWING INDEX, NOTES

SHEET

FA0.0

DATE

08-12-2022

FIRE ALARM NOTES:

1. FIRE ALARM SYSTEM SHALL COMPLY WITH:
   A. NFPA 13 (FIRE SPRINKLER CODE), 2019
   B. NFPA 70 (NATIONAL ELECTRIC CODE), 2020
   C. NFPA 72 (FIRE ALARM CODE), 2019
   D. IBC (INTERNATIONAL BUILDING CODE), 2021
   E. IFC (INTERNATIONAL FIRE CODE), 2012
   F. IMC (INTERNATIONAL MECHANICAL CODE), 2021
   G. ADA/ABA, 2021
   H. PROJECT SPECIFICATIONS
   I. LOCAL AND STATE AHJ REQUIREMENTS
2. THESE DRAWINGS REPRESENT ENGINEERED FINALIZED SHOP DRAWINGS READY FOR INSTALLATION. THE CONTRACTOR SHALL PROVIDE RED-LINE FIELD ASBUILTS TO THE FIRE PROTECTION ENGINEER. THE FIRE PROTECTION ENGINEER WILL PREPARE AND PROVIDE RECORD DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR COMPLETED NFPA 72 INSPECTION & TESTING, RECORD OF COMPLETION FORMS AND AND PROVIDE OPERATION & MAINTENANCE MANUALS TO THE OWNER REPRESENTATIVE.
3. COORDINATE THE EXACT DEVICE LOCATIONS WITH ELECTRICAL AND MECHANICAL SYSTEM EQUIPMENT AND BUILDING ARCHITECTURAL FEATURES. INSTALLING CONTRACTOR SHALL CONSULT/CONFIRM ANY NECESSARY DEVIATION OF DEVICE BOX PLACEMENT OR CONDUIT/CIRCUIT ROUTING WITH THE DESIGNER OF RECORD PRIOR TO IMPLEMENTING CHANGES IN THE FIELD.
4. WHEN AND WHERE CONDUIT IS USED. FIRE ALARM CONDUIT SHALL BE FACTORY RED 3/4" MINIMUM UNLESS OTHERWISE NOTED. CONCEAL CONDUITS IN WALL AND CEILING SPACES WHEREVER FEASIBLE. SURFACE CONDUIT IN FINISHED AREAS SHALL BE 3/4" MINIMUM UNLESS OTHERWISE NOTED AND PAINTED TO MATCH SURROUNDINGS.
5. MINIMUM CIRCUIT PERFORMANCE REQUIREMENTS:
   IDC - INITIATING DEVICE CIRCUIT SHALL BE CLASS B.
   NAC - NOTIFICATION APPLICATION CIRCUIT SHALL BE CLASS B.
   SLC - SIGNALING LINE CIRCUIT SHALL BE CLASS B. NO MORE THAN 12 T-TAPS ON ANY ONE SLC
6. "T" TAPPING OF ANY NAC OR IDC CIRCUIT IS PROHIBITED.
7. ALL NOTIFICATION APPLIANCES SHALL OPERATE IN SYNCHRONIZATION AS REQUIRED BY NFPA 72.
8. PAINT FIRE ALARM JUNCTION BOXES AND COVERS RED. BOTH SIDES OF COVER PLATES SHALL BE PAINTED RED.
9. FIRE ALARM EQUIPMENT CABINETS, BOXES, AND DEVICES SHALL HAVE TAGS PERMANENTLY AFFIXED TO THE FACE . LABEL EACH DEVICE USING SELF-ADHESIVE LASER PRINTED COMMERCIALLY AVAILABLE ID TAGS IN A 24PT FONT. ADDRESSABLE DEVICES SHALL BE LABELED WITH ADDRESS. NOTIFICATION APPLIANCES SHALL BE LABELED WITH THEIR ASSOCIATED NAC IDENTIFIER MATCHING THAT ON THESE PLANS. LABEL ALL MONITOR AND RELAY MODULES WITH ASSOCIATED FUNCTION. LABEL REMOTE TEST SWITCHES WITH ASSOCIATED DUCT DETECTOR ADDRESS AND AIR HANDLER DESIGNATION.
10. DO NOT SPLICE FIRE ALARM CONDUCTORS EXCEPT WHERE INDICATED ON THESE DRAWINGS. ALL FIRE ALARM WIRING SHALL ONLY BE TERMINATED AT A DEVICE OR APPROVED TERMINAL BLOCK LOCATION ONLY.

ELECTRICAL NOTES:

1. THE CONTRACTOR SHALL COMPLY WITH THE CONSTRUCTION PRACTICES AND REQUIREMENTS OF THE REFERENCED EDITION OF THE NATIONAL ELECTRIC CODE (2011 NFPA 70), CURRENT NATIONAL ELECTRICAL SAFETY CODE, AND INSTRUCTIONS OF MANUFACTURERS OF EQUIPMENT AND MATERIALS SUPPLIED FOR THE PROJECT.
2. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL JUNCTION AND PULL BOXES REQUIRED FOR THE INSTALLATION OF ELECTRICAL DEVICES AND EQUIPMENT, WHETHER OR NOT SPECIFICALLY INDICATED ON THE PLANS. SIZING OF THESE BOXES SHALL BE PER THE NATIONAL ELECTRICAL CODE.
3. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE GENERAL CONTRACTOR QUALITY CONTROL REPRESENTATIVE PRIOR TO MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS.
4. SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE GENERAL CONTRACTOR. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
5. REPAIR ANY DAMAGE TO EXISTING CONSTRUCTION RESULTING FROM THE INSTALLATION OF ELECTRICAL ITEMS. THE AREAS REPAIRED SHALL MATCH THE ADJACENT SURFACES IN TEXTURE AND COLOR.
6. ALL EXPOSED AND CONCEALED CONDUITS SHALL BE EMT (ELECTRICAL METALLIC TUBING). ALL UNDERGROUND CONDUIT SHALL BE PVC CONDUIT SCHEDULE 40, UNLESS NOTED OTHERWISE. USE FLEXIBLE METAL CONDUIT AND SEAL-TIGHT WHERE APPLICABLE.
7. ALL EQUIPMENT SHALL BE CAPABLE OF FITTING IN THE SPACES LOCATED WHILE MEETING THE MANUFACTURER'S RECOMMENDED ACCESS REQUIREMENTS. REVIEW ALL PLACES WHERE EQUIPMENT IS TO BE INSTALLED PRIOR TO ORDERING OF EQUIPMENT AND NOTIFY THE CONTRACTING OFFICER OF ANY INADEQUATE CLEARANCES OR CONDITIONS THAT WILL PREVENT THE PROPER INSTALLATION, MAINTENANCE, AND OPERATIONS OF THE EQUIPMENT.
8. PROVIDE ACCESS PANELS TO ALL CONCEALED TRANSFORMERS, DEVICES, JUNCTION BOXES AND EQUIPMENT. COORDINATE THE LOCATION OF ACCESS PANELS TO INSURE THAT THE EQUIPMENT CAN BE MAINTAINED ADEQUATELY.
9. ALL EQUIPMENT AND CABLE SHALL BE PROPERLY RATED FOR THE CONDITIONS IN WHICH IT IS INSTALLED.
10. ALL 120VAC CIRCUIT BREAKERS SERVING FIRE ALARM EQUIPMENT SHALL BE RED AND LOCKABLE.
11. ANY PENETRATION OF THE BUILDING VAPOR BARRIER SYSTEM SHALL BE APPROPRIATELY SEALED TO RETAIN THE INTEGRITY OF THE SYSTEM. THIS INCLUDES BUT IS NOT LIMITED TO CONDUITS AND BACKS OF ELECTRICAL BOXES.

SYSTEM OPERATIONAL MATRIX

SYSTEM INPUTS		ANNUNCIATEALARM AT FACP @ REMOTE	ANNUNCIATE TROUBLE AT FACP AND REMOTE ANN	ANNUNCIATE SUPERVISORY AT FACP AND REMOTE	RECORD EVENT IN SYSTEM MEMORY	ACTIVATE LOW FREQUENCY SOUNDERS IN DWELLING UNIT	ACTIVATE ADA STROBES	ACTIVAE HORN STROBES IN COMMONS	TRANSMIT SIGNAT TO OFF PREMISIS MONITORING	RELEASE DOOR HOLDERS	CLOSE FIRE SMOKE DAMPERS	SHUT DOWN ACCOSCIATE AHU	RECALL ELEVATOR TO PRIMARY EVAC FLOOR	RECALL ELEVATOR TO ALTERNATE EVAC FLOOR	ACTIVATE FLASHING FIREMANS HAT	ACTIVATE ELEVATOR SHUNT TRIP
	SYSTEM OUTPUTS	ANNUNCIATION				NOTIFICATION				CONTROLS						
ALARMS	SPRINKLER WATER FLOW	X			X	X	X	X	X	X						
ALARMS	MANUAL PULL STATION ACTIVATION	X			X	X	X	X	X	X						
ALARMS	SMOKE DETECTOR DWELLING UNIT COMMON CORRIDOR	X			X	X	X	X	X	X	X	X				
ALARMS	SMOKE DETECTOR COMMON	X			X	X	X	X	X	X						
ALARMS	HEAT DETECTOR COMMON	X			X	X	X	X	X	X						
ALARMS	SMOKE DETECTOR PRIMARY FLOOR	X			X	X	X	X	X	X				X		
ALARMS	SMOKE DETECTOR ALTERNATE FLOORS	X			X	X	X	X	X	X			X			
ALARMS	SMOKE DETECTOR EMR, SHAFT	X			X	X	X	X	X	X			X		X	
ALARMS	CO DETECTOR	X			X	X	X	X	X	X						
ALARMS	HEAT DETECTOR EMR	X			X	X	X	X	X	X						X
SUPERVISORY	SPRINKLER TAMPER			X	X				X							
SUPERVISORY	DUCT DETECTOR			X	X				X			X				
SUPERVISORY	SMOKE IN ADA DWELLING UNIT			X	X	X	X		X							
SUPERVISORY	SMOKE IN DWELLING UNIT			X	X	X			X							
SUPERVISORY	LOSS OF SHUNT TRIP POWER			X	X				X							
TROUBLE	SLC CKT OPEN, GROUND OR SHORT		X		X				X							
TROUBLE	ACTIVATION OF LOOP ISOLATOR		X		X				X							
TROUBLE	NAC CKT OPEN GROUND OF SHORT		X		X				X							
TROUBLE	AUDIBLE BASE CKT OPEN, SHORT OR GROUND		X		X				X							
TROUBLE	BATTERY FAULT ON FACP OR BPS		X		X				X							
TROUBLE	FACP CPU FAIL		X		X				X							
TROUBLE	A/C FAIL OR BROWNOUT FACP OR BPS		X		X				X							

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRCUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

NOTIFICATION APPLIANCE DEVICE ANNOTATION

N1-1
15cd

'N1' = STROBE NAC #
'-1' = APPLIANCE #
#cd = STROBE INTENSITY SETTING IN CANDELA

SCOPE OF WORK

THE EXISTING MXL SYSTEM WILL BE REMOVED AND REPLACED WITH A NEW EST4 SYSTEM. THE BUILDING WILL BE UNOCCUPIED AND THE EXISTING SYSTEM WILL BE REMOVED PRIOR TO THE NEW SYSTEM INSTALLATION. EXISTING CONDUIT PATHS AND BOXES TO BE RE-USED.

THIS BUILDING IS A GROUP R-2 OCCUPANCY AND WILL FOLLOW IBC 907.2.9

1. AUTOMATIC SMOKE DETECTION SHALL BE PROVIDED IN ACCORDANCE WITH IBC 907.2.9.3, 907.2.10.2 AND 907.2.10.7.
2. AUDIBLE AND VISUAL NOTIFICATION SHALL BE PROVIDED IN ACCORDANCE WITH IBC 907.5.2.3.1.

ACRONYMS/ABBREVIATIONS:

1. AFF ABOVE FINISHED FLOOR
2. AC ALTERNATING CURRENT
3. AWG AMERICAN WIRE GAGE
4. BFC BELOW FINISHED CEILING
5. CD CANDELA
6. CKT CIRCUIT BREAKER
7. C CONDUIT
8. DB DECIBEL
9. DED DEDICATED
10. DC DIRECT CURRENT
11. EMT ELECTRICAL METALLIC TUBING
12. EOL END OF LINE RESISTOR
13. EOLR END OF LINE RELAY
14. XP EXPLOSION PROOF
15. FA FIRE ALARM
16. FPL FIRE ALARM POWER LIMITED
17. HVAC HEATING VENTILATING AIR CONDITIONING
18. HZ HERTZ
19. IAW IN ACCORDANCE WITH
20. IDC INITIATING DEVICE CIRCUIT
21. LV LOW VOLTAGE
22. NAC NOTIFICATION APPLIANCE CIRCUIT
23. NEMA NATIONAL ELECTRICAL MANUFACTURER ASSOC.
24. NEC NATIONAL ELECTRIC CODE
25. NIC NOT IN CONTRACT
26. NTS NOT TO SCALE
27. RGS RIGID GALVANIZED STEEL CONDUIT
28. SLC SIGNALING LINE CIRCUIT
29. SPDT SINGLE THROW DOUBLE THROW
30. SPST SINGLE THROW SINGLE THROW
31. TSP TWISTED SHIELDED PAIR
32. UTP UNSHIELDED TWISTED PAIR
33. UL UNDERWRITERS LABORATORIES
34. V VOLT
35. WP WEATHERPROOF
36. W/ WITH
37. W/O WITHOUT

DEVICE LEGEND

SYMBOL	QTY	MANUFACTER	PART NUMBER	DESCRIPTION	ROUGH-IN
FACP	2	EDWARDS	EST4 UCSD	EST4 FACP	INCLUDES CABINET TO BE MOUNTED 72" A.A.F. MAX NO CONDUIT TO ENTER BOTTOM OF CABINET
	2	EDWARDS	3CHAS7	MOUNTING CHASSIS	
	2	EDWARDS	3-CAB7B W/ 4-CAB16DR	CABINET W/ DOOR	
	2	EDWARDS	3-SDDC1	DUAL SIGNATURE DRIVER	
	2	EDWARDS	4-PPS/M	POWER SUPPLY	
	2	EDWARDS	3-MODCOM	MODEM COMMUNICATOR AND DIALER	
	2	EDWARDS	4-USBHUB	MULTI-PORT USB HUB MODULE	
	2	EDWARDS	3-BTSEN	BATTERY CABINET, POWER BUS AND 50A BREAKER	
	2	EDWARDS	3-RCC7R	BATTERY CABINET	
	4	EDWARDS	12V50A	50 AH BATTERY	
	2	EDWARDS	4-24L24S	CNTRL DISPLAY, 24LED, 24 SWITCH	
	2	EDWARDS	4-LCDLE	DISPLAY, LCD W/ CABLE	
NAC	2	EDWARDS	4-CPU	MAIN CPU	
	6	EDWARDS	BPS10A	REMOTE BOSSTER POWER SUPPLY,6 10A, 120 VAC, RED	
	6	EDWARDS	BPS10A MAINBOARD	MAINBOARD FOR BPS10 ASSY	
FAA	12	EDWARDS	12V10A	10 AH BATTERY	
	4	EDWARDS	4-4ANNMT	REMOTE ANNUNCIATOR CABINET	TO BE MOUNTED IN PLACE OF OLD ANNUNCIATORS
	4	EDWARDS	4-2ANN	COLOR DISPLAY FOR REMOTE ANNUNCIATOR	
	4	EDWARDS	4-ANNCPU	ANNUNCIATOR CPU	
F	1	EDWARDS	4-NET-TP	NETWORK CARD	
135F		EDWARDS	SIGA-278	DOUBLE ACTION FIRE ALARM STATION	
		EDWARDS	SIGA-HFD W SIGA SB4 BASE	HEAT DETCTOR, 135DEG FIXED W STANDARD BASE	
LFSB		EDWARDS	SIGA-OSD W/SIGA-SB4 BASE	OPTICAL SMOKE DETECTOR W/ STANDARD BASE	FOR NEW INSTALL OF HALLWAY DETECTORS USE WIRE MOULD BOX
MC 135F CO		EDWARDS	SIGA OSD W/SIGA AB4G-LF BASE	OPTICAL SMOKE DETECTOR WTH LOW FRQUENCE AUDIBLE BASE	AUDIBLE BASE REQUIRES DEEP 4'SQ BOX,EXISTING MUD RINGS TO BE REMOVED
		EDWARDS	SIGA OSHCD W/SIGA-SB BASE	MULTI CRITERIA DETECTOR WITH HEAT AND CO SENSORS AND STANDARD BASE	
		EDWARDS	SIGA -SD	DUCT DETECTOR	
		EDWARDS	SD-T60	DUCT SAMPLING TUBE 60 "	
		EDWARDS	SD--TRK	REMOTE TEST STATION (KEYED)	
		EDWARDS	SIGA-IB	ISOLATOR BASE	
C		EDWARDS	SIGA-TCDR	PATTERN GENERATOR	
AIM		EDWARDS	SIGA-CC-1	SINGLE INPUT MODULE	
M		EDWARDS	SIGA-MCC1	SINGLE IMPUT MODULE UIO	
AOM		EDWARDS	SIGA-CR	CONTROL RELAY	
R		EDWARDS	SIGA-MCR	CONTROL RELAY UIO	
C SA		EDWARDS	SIGA-CC1S	SYNC MODULE	
DM		EDWARDS	SIGA-WTM	WATHERFLOW/TAMPER MODULE	
IM		EDWARDS	SIGA-IM2	ISOLATOR MODULE	
		EDWARDS	SIGA-UIO6R	UNIVERSAL INPUT OUTPUT MODULE BOARD	
		EDWARDS	MFC-A	CABINET, MULTI-FUNCTION	
M		EDWARDS	SIGA RM-1	RISER MODULE	
20 WP F		SYSTEM SENSOR	P2RK-120	120 VAC WEATHERPROOF HORN/STROBE	
F		EDWARDS	G4AVWF W/ GP-10 BASE	HORN/STROBE ,WALL, WHITE, "FIRE"	
		EDWARDS	G4VWF W/ GP-10 BASE	STROBE, WALL, WHITE, "FIRE"	
			EXISTING CONDUIT/ DEMO WIRE		CONDUIT TO REMAIN IN PLACE, WIRE TO BE REMOVED
			EXISTING CONDUIT/NEW WIRE		EXISTING CONDUIT WITH NEW WIRE
			NEW CONDUIT /NEW WIRE		3/4" RED EMT
			WIREMOLD	SURFACE MOUNT WIRE MOULD TO NEW SMOKE DETECTORS IN HALLWAY	FIELD LOCATE WIRE MOULD RUNS BEGIN CIRCUITS AS INDICATED
			FIRE BARRIER		ONE HOUR FIRE RESISTIVE CORRIDOR WALL, EXIT ENCLOSURE, MECHANICAL SHAFT WALL OR CEILING ASSEMBLY

MONTANA STATE UNIVERSITY

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

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ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

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1	-	-
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MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

GENERAL NOTES & LEGEND

SHEET

FA0.1

DATE

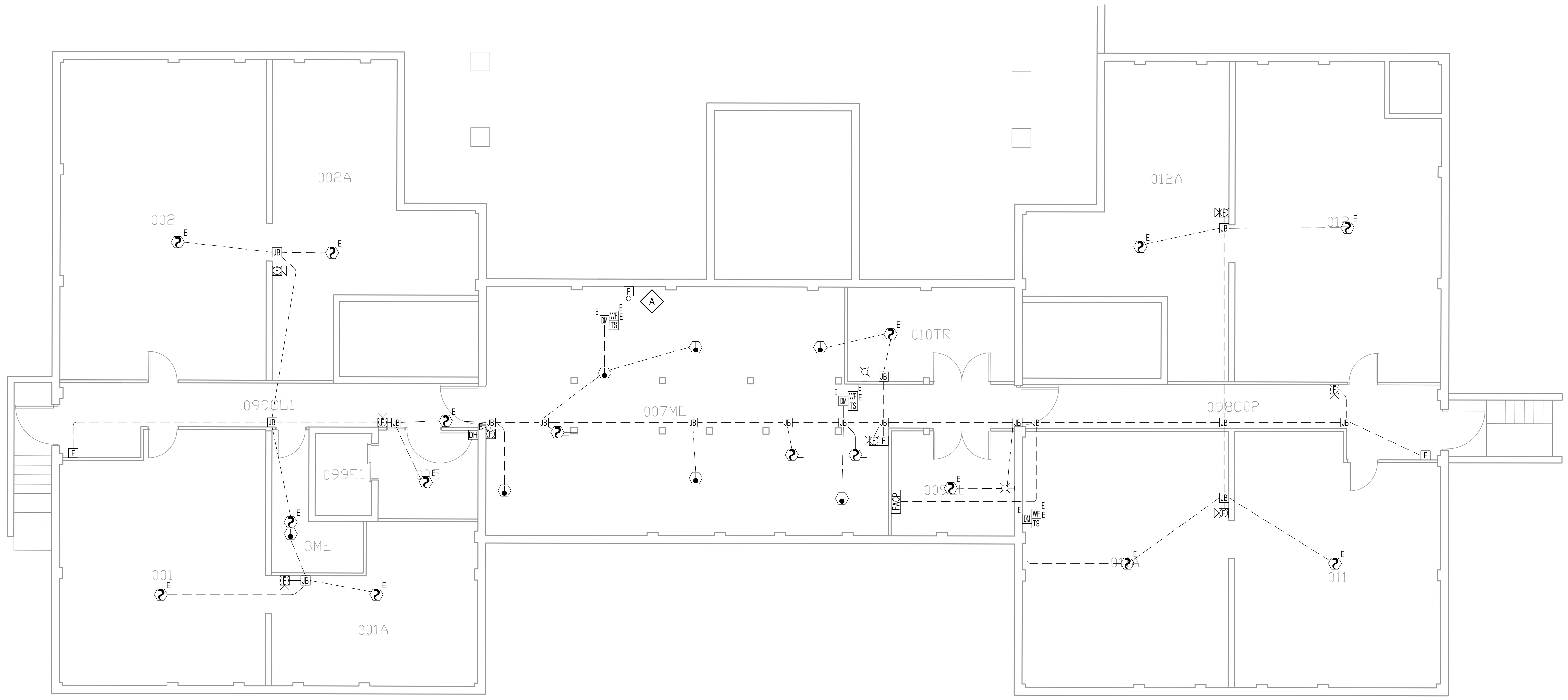
08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
2. DEMO ALL EXISTING CIRCUITS. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS CONCIELED ABOVE CEILING.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.

SHEET NOTES

(A) PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 FA1.0 MADISON BASEMENT FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MONTANA
JASON A. ANDERSON
No. 11805PE
PROFESSIONAL ENGINEER LICENSED

PPA 21-0138

SHEET TITLE

MADISON BASEMENT FIRE ALARM DEMO PLAN

SHEET

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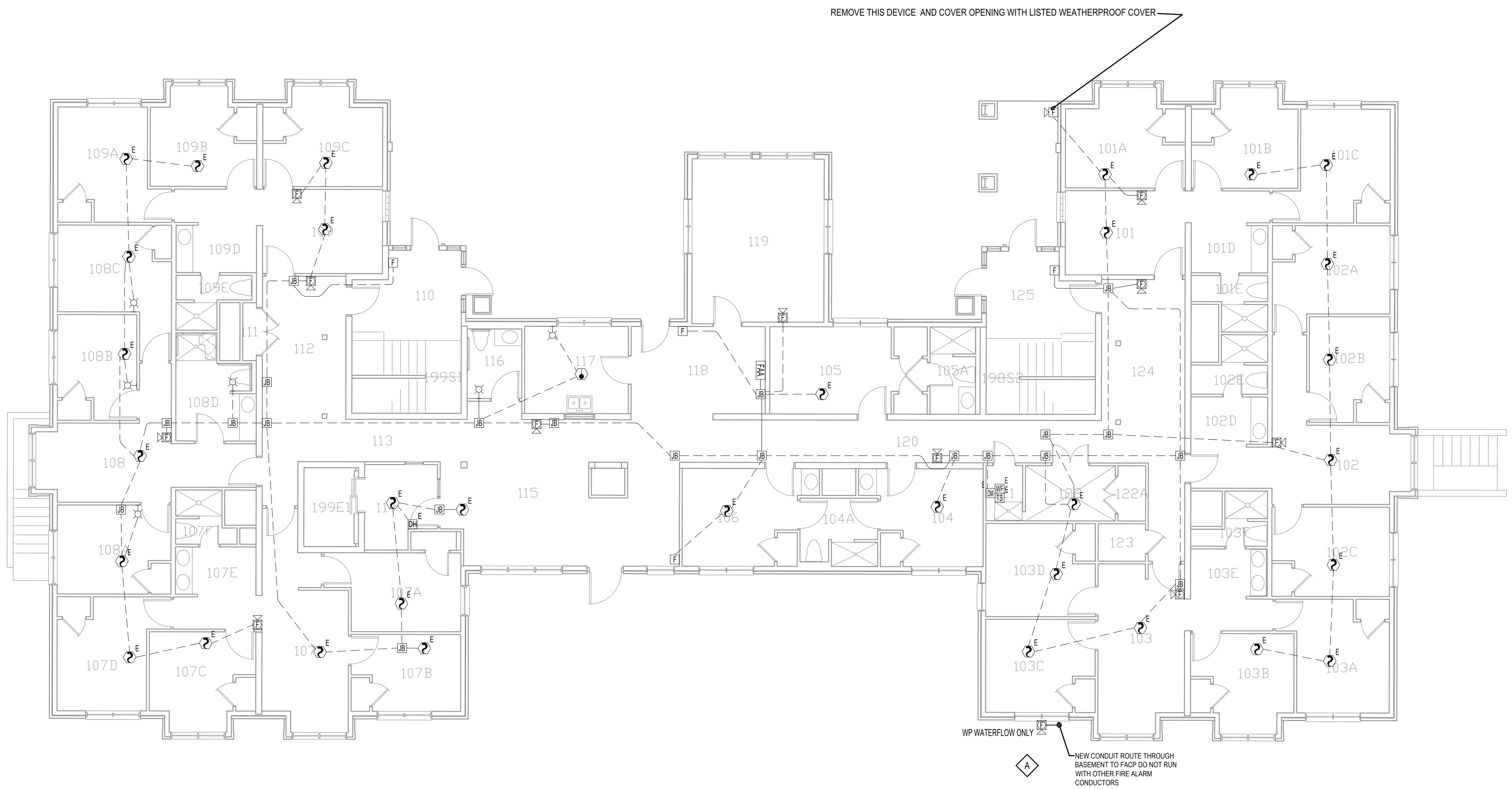

1 / FA1.1 — MADISON MAIN FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MONTANA — JASON A. ANDERSON No. 11805PE — LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

MADISON
MAIN FLOOR
FIRE ALARM
DEMO PLAN

SHEET

FA1.1

DATE

08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
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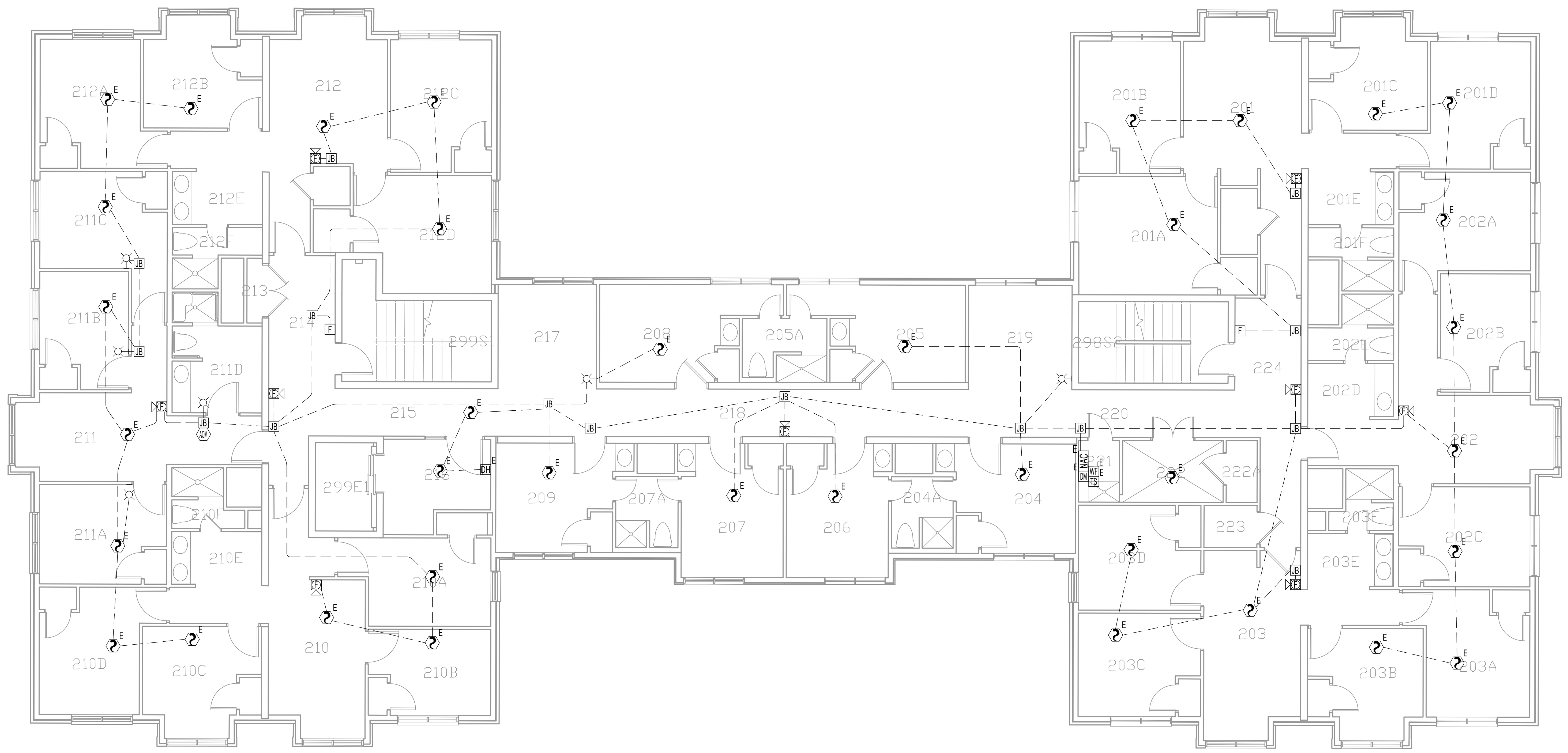

1 FA1.2 MADISON SECOND FLOORPLAN - FIRE ALARM DEMO PLAN
1/8" = 1'-0"

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

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2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

MADISON SECOND FLOOR FIRE ALARM DEMO PLAN

SHEET
FA1.2

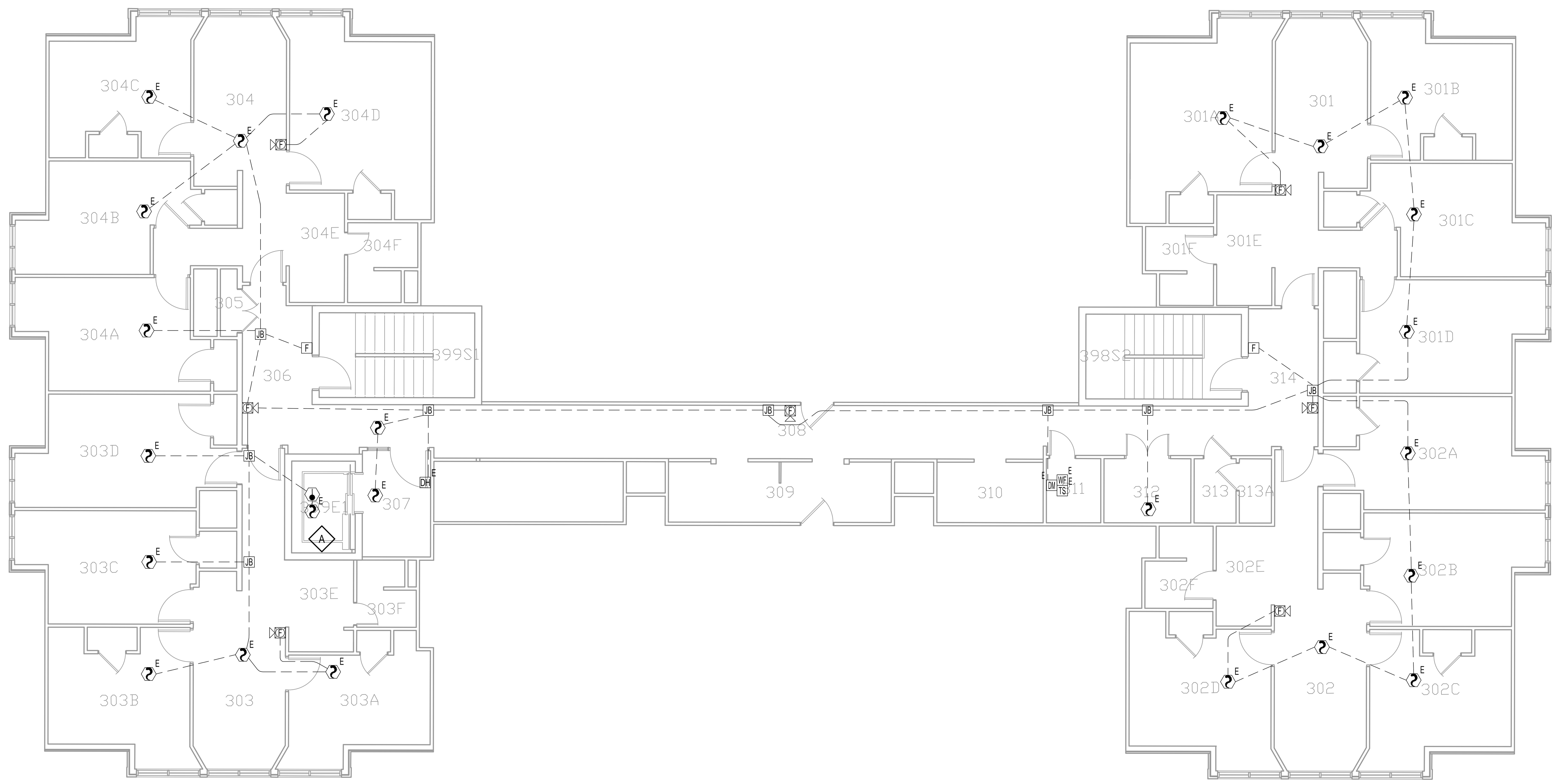
DATE
08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
2. DEMO ALL EXISTING CIRCUITS, NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS CONCIELED ABOVE CEILING.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.

SHEET NOTES

(A) EXISTING CONDUIT WIRING FOR SHUNT TRIP BREAKER AND POWER TO BREAKER TO REMAIN.



1 FA1.3 MADISON THIRD FLOORPLAN - FIRE ALARM DEMO PLAN
1/8" = 1'-0"

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA
JASON A. ANDERSON
No. 11805PE
LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

MADISON
THIRD FLOOR
FIRE ALARM
DEMO PLAN

SHEET

FA1.3

DATE

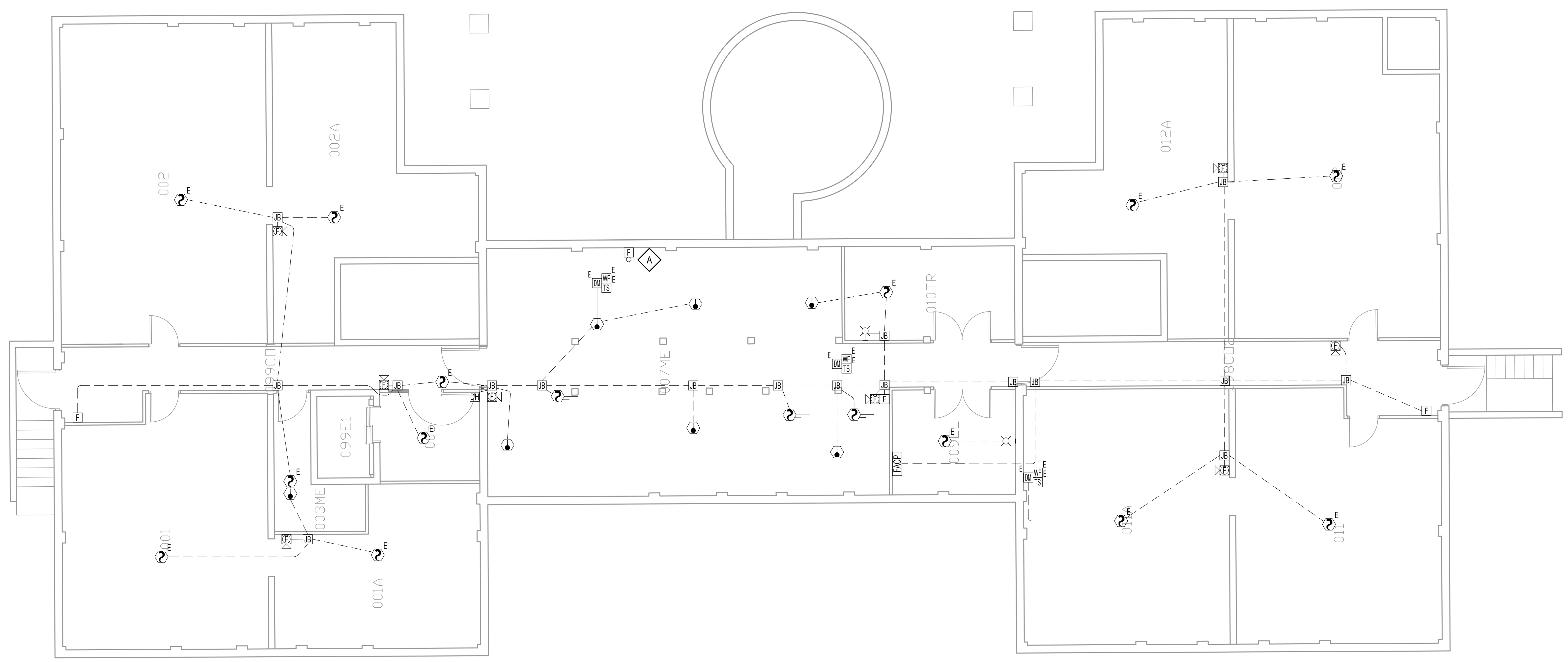
08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING FIRE ALARM DEVICES AND EQUIPMENT UNLESS OTHERWISE NOTED.
2. DEMO ALL EXISTING CIRCUITS. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.

SHEET NOTES

(A) PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 FA2.0 JEFFERSON BASEMENT FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS

REVIEWED BY: JAA

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1	-	-
2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

JEFFERSON BASEMENT FIRE ALARM DEMO PLAN

SHEET

FA2.0

DATE

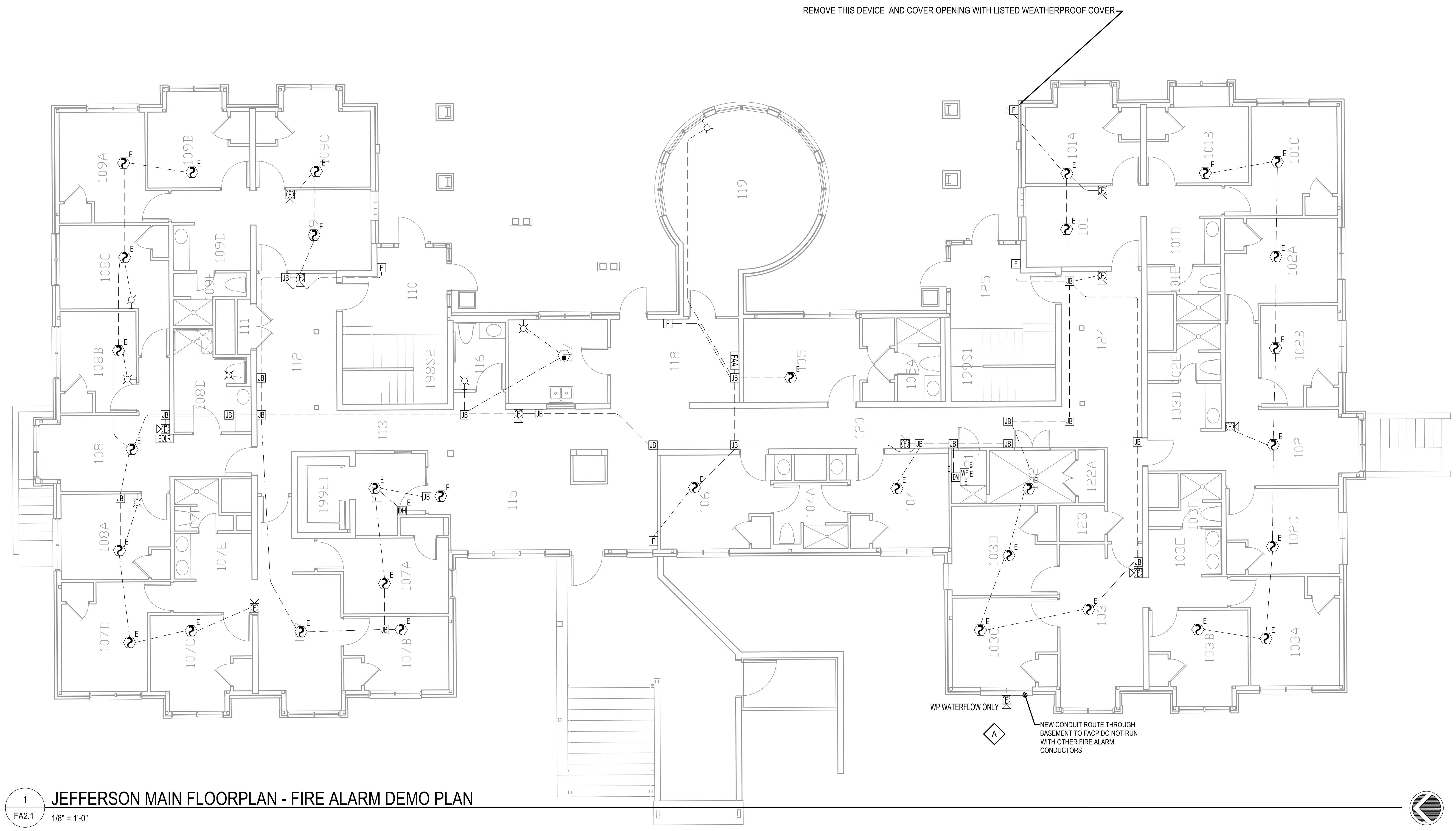
08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
2. DEMO ALL EXISTING CIRCUITS. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS CONCIELED ABOVE CEILING.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.

SHEET NOTES

(A) PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 / FA2.1 JEFFERSON MAIN FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS		
REVIEWED BY: JAA		
REV.	DESCRIPTION	DATE
1	-	-
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3	-	-

JASON A. ANDERSON No. 11805PE MONTANA LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

JEFFERSON MAIN FLOOR FIRE ALARM DEMO PLAN

SHEET

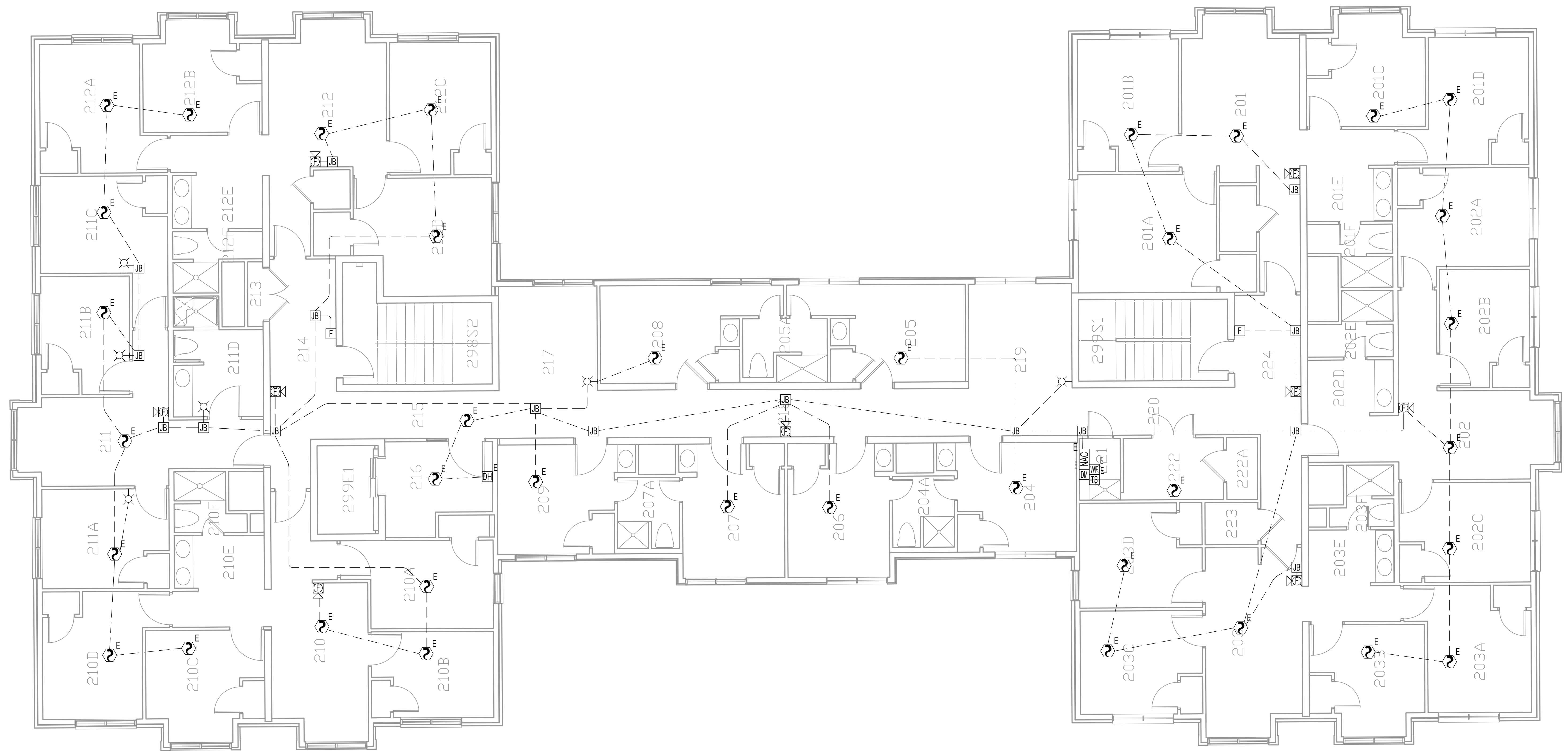
FA2.1

DATE

08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
2. DEMO ALL EXISTING CIRCUITS. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS CONCIELED ABOVE CEILING.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.



1 FA2.2 JEFFERSON SECOND FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

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ph 406.582.1936
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DRAWN BY: RAS

REVIEWED BY: JAA

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2	-	-
3	-	-

MONTANA
JASON A. ANDERSON
No. 11805PE
LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

JEFFERSON SECOND FLOOR FIRE ALARM DEMO PLAN

SHEET

FA2.2

DATE

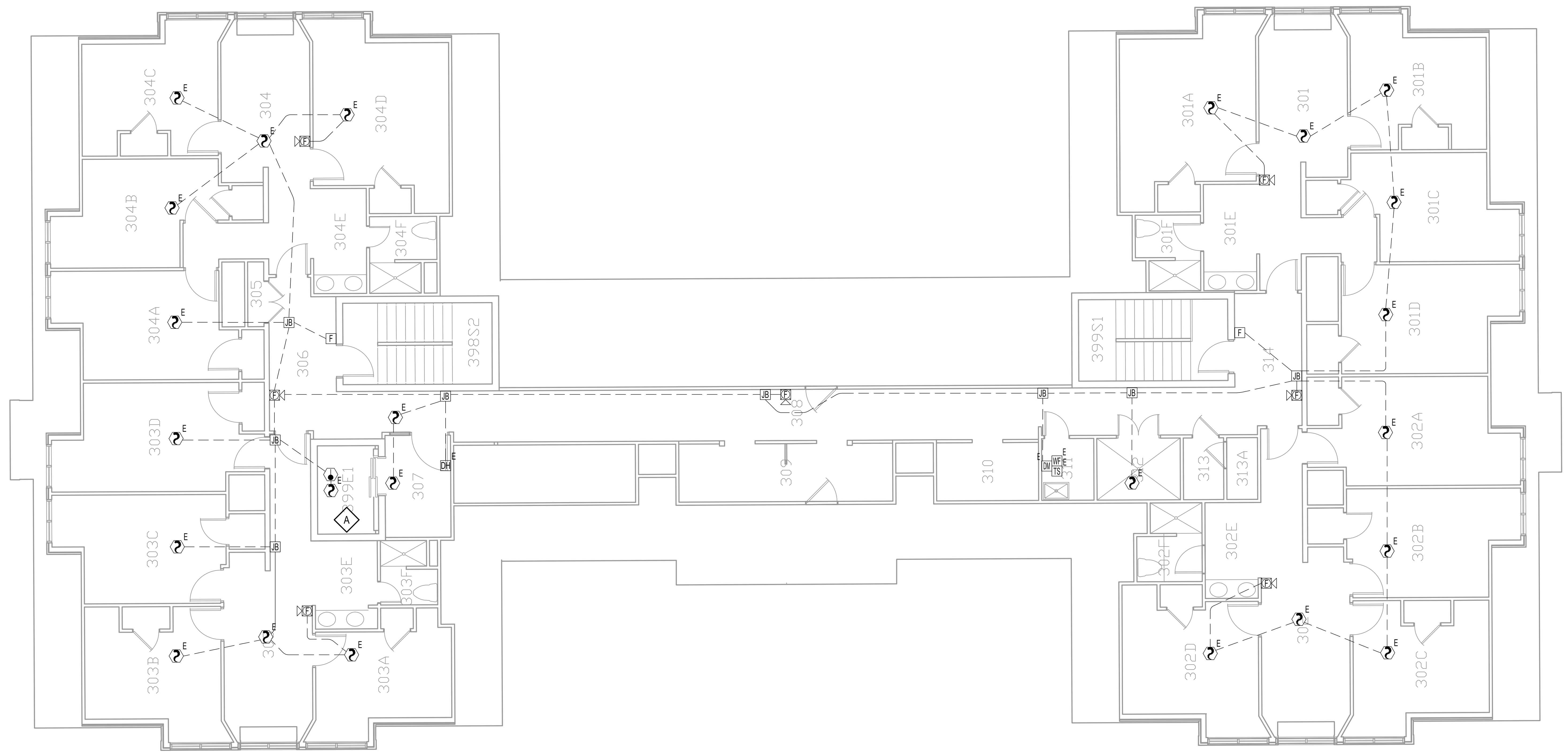
08-12-2022

GENERAL NOTES

1. DEMO ALL EXISTING DEVICES AND EQUIPMENT
2. DEMO ALL EXISTING CIRCUITS, NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS CONCIELED ABOVE CEILING.
3. EXISTING CONDUIT PATHS TO REMAIN AND BE RE-USED.

SHEET NOTES

(A) EXISTING CONDUIT WIRING FOR SHUNT TRIP BREAKER AND POWER TO BREAKER TO REMAIN.



1 FA2.3 JEFFERSON THIRD FLOORPLAN - FIRE ALARM DEMO PLAN

1/8" = 1'-0"

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS

REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
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MONTANA
JASON A. ANDERSON
No. 11805PE
LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

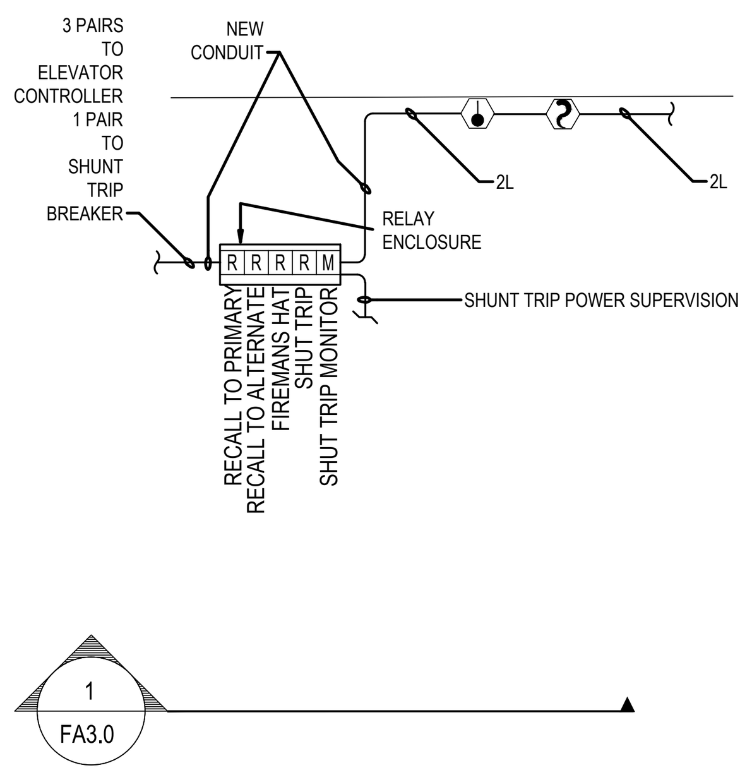
JEFFERSON THIRD FLOOR FIRE ALARM DEMO PLAN

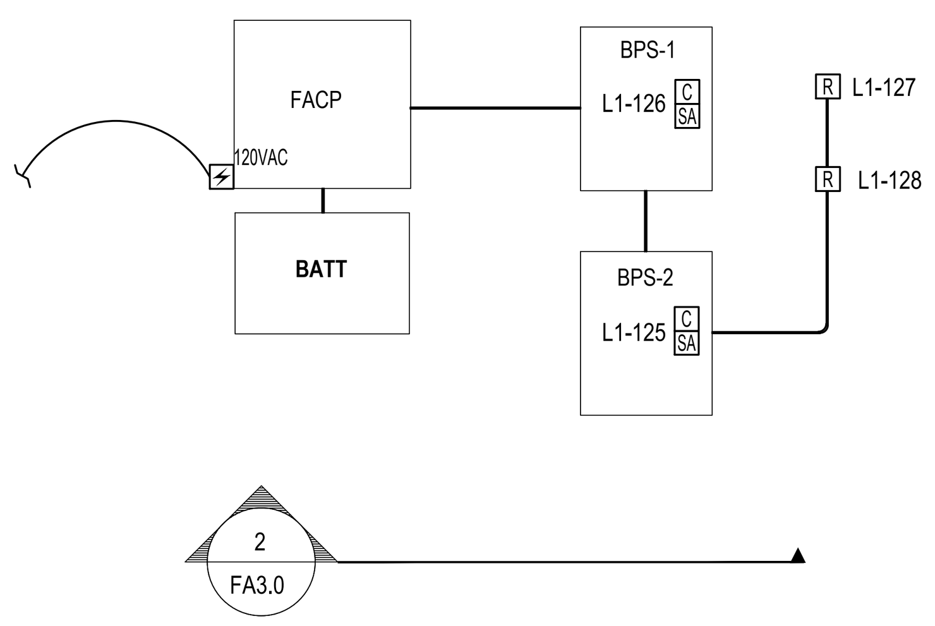
SHEET

FA2.3

DATE

08-12-2022



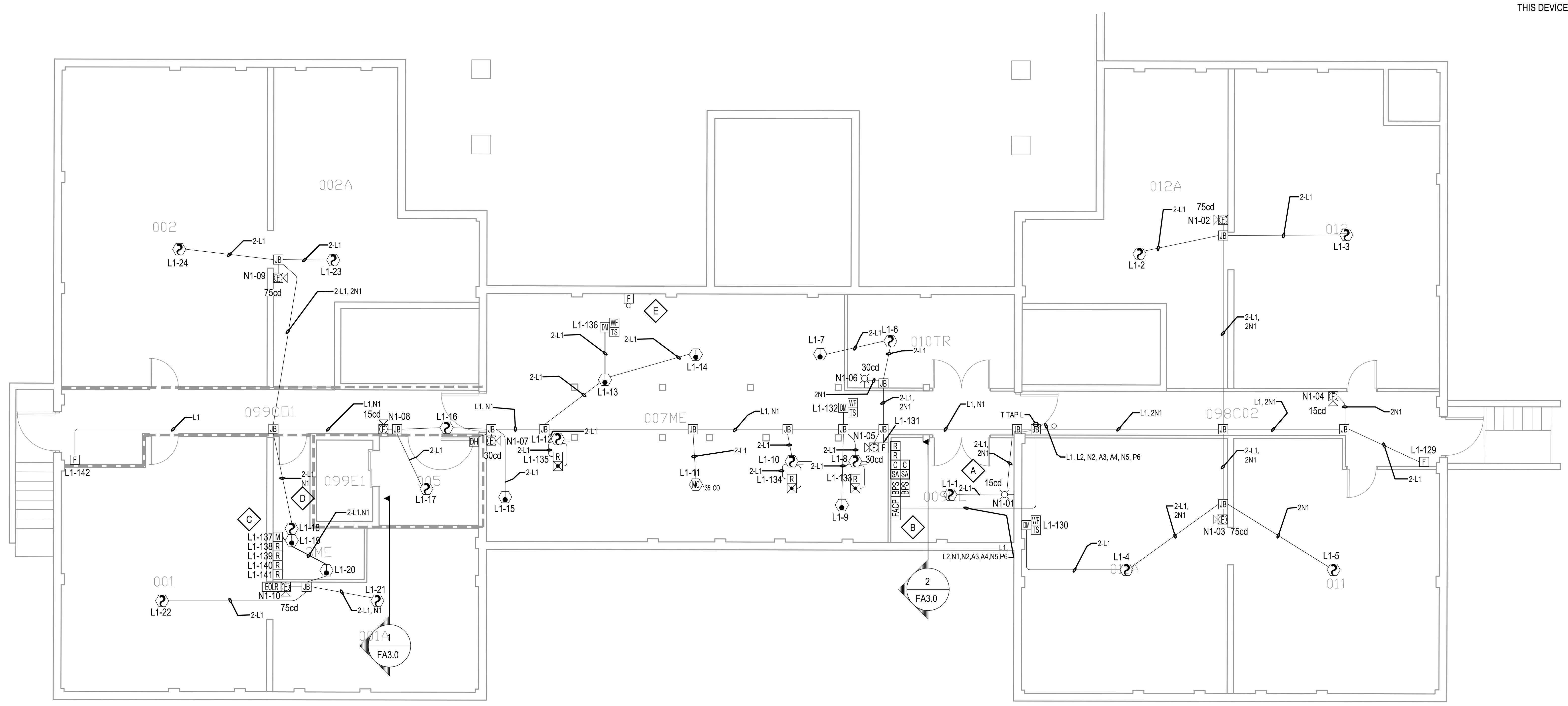


GENERAL NOTES

1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS.

SHEET NOTES

- A: EXISTING CIRCUIT TO HVAC CONTROLS FOR SMOKE DAMPER SHUTDOWN TO REMAIN.
- B: EXISTING CIRCUITS ROUTED TO NORTH HEDGES TO REMAIN. EXISTING WIRING TO BE REUSED.
- C: EXISTING RELAYS FOR ELEVATOR RECALL WILL NEED TO BE RELOCATED TO RELAYS IN EMR
- D: FIELD LOCATE HEAT DETECTORS IN ELEVATOR CONTROL ROOMS TO MACH QUANTITY OF SPRINKLER HEAD AND SPACE 24" FROM EACH SPRINKLER HEAD
- E: PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 FA3.0 — MADISON BASEMENT FLOORPLAN - FIRE ALARM NEW PLAN

1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRCUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA — JASON A. ANDERSON No. 11805PE — LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

MADISON BASEMENT FIRE ALARM NEW PLAN

SHEET

FA3.0

DATE

08-12-2022

GENERAL NOTES

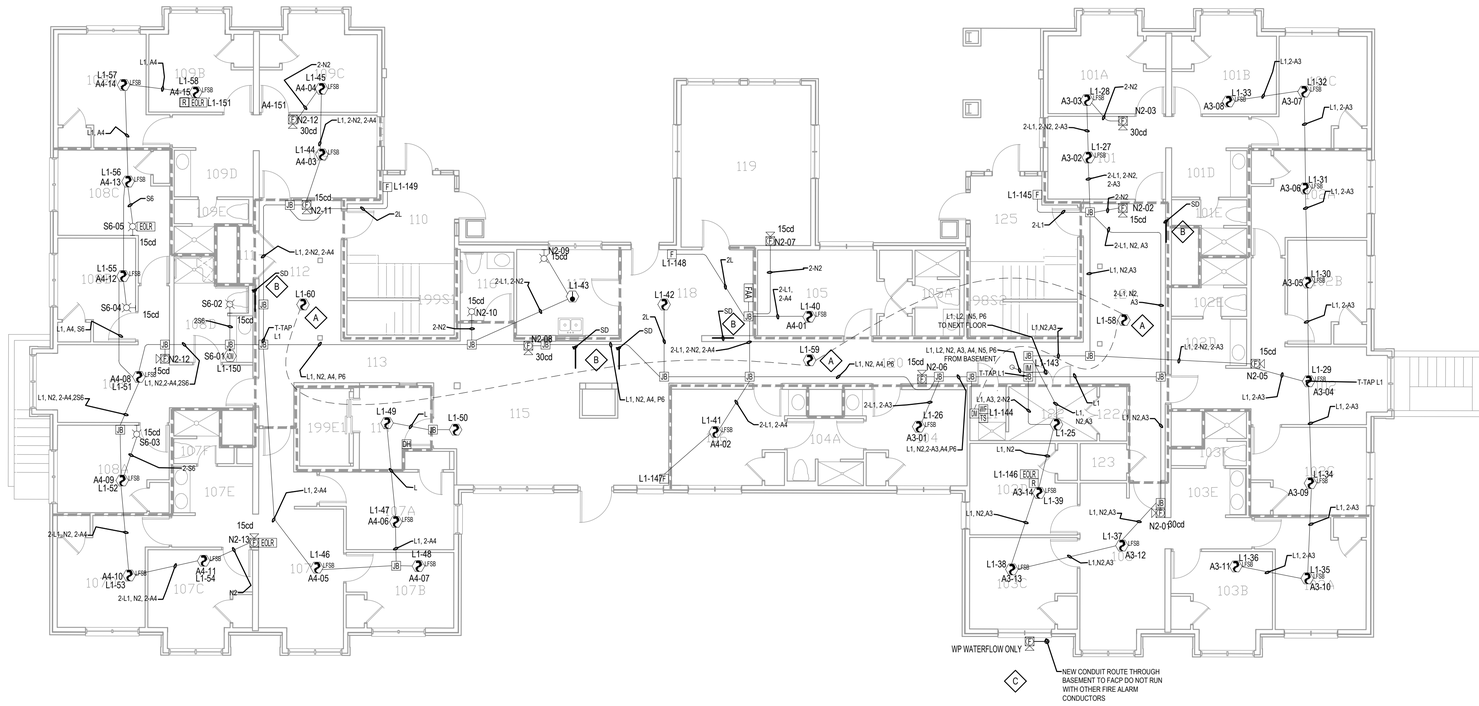
1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS UNLESS OTHERWISE NOTED.

SHEET NOTES

A WIRING TO NEW DETECTION IN CORRIDOR TO BE INSTALLED IN WIRE MOLD INSTALLED AT CEILING. LOCATION OF WIRE RUNS ARE ILLUSTRATIVE ONLY. START CIRCUIT RUN AT EXPOSED BOX AND RUN IN WIRE MOLD ALONG CEILING

B APPROXIMATE LOCATION OF SMOKE DAMPERS

C PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1
FA3.1
MADISON MAIN FLOORPLAN - FIRE ALARM NEW PLAN
1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRDUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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UNIVERSITY
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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN
ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A.
ANDERSON
No. 11805PE

PPA 21-0138

SHEET TITLE

MADISON
MAIN FLOOR
FIRE ALARM
NEW PLAN

SHEET
FA3.1

DATE
08-12-2022

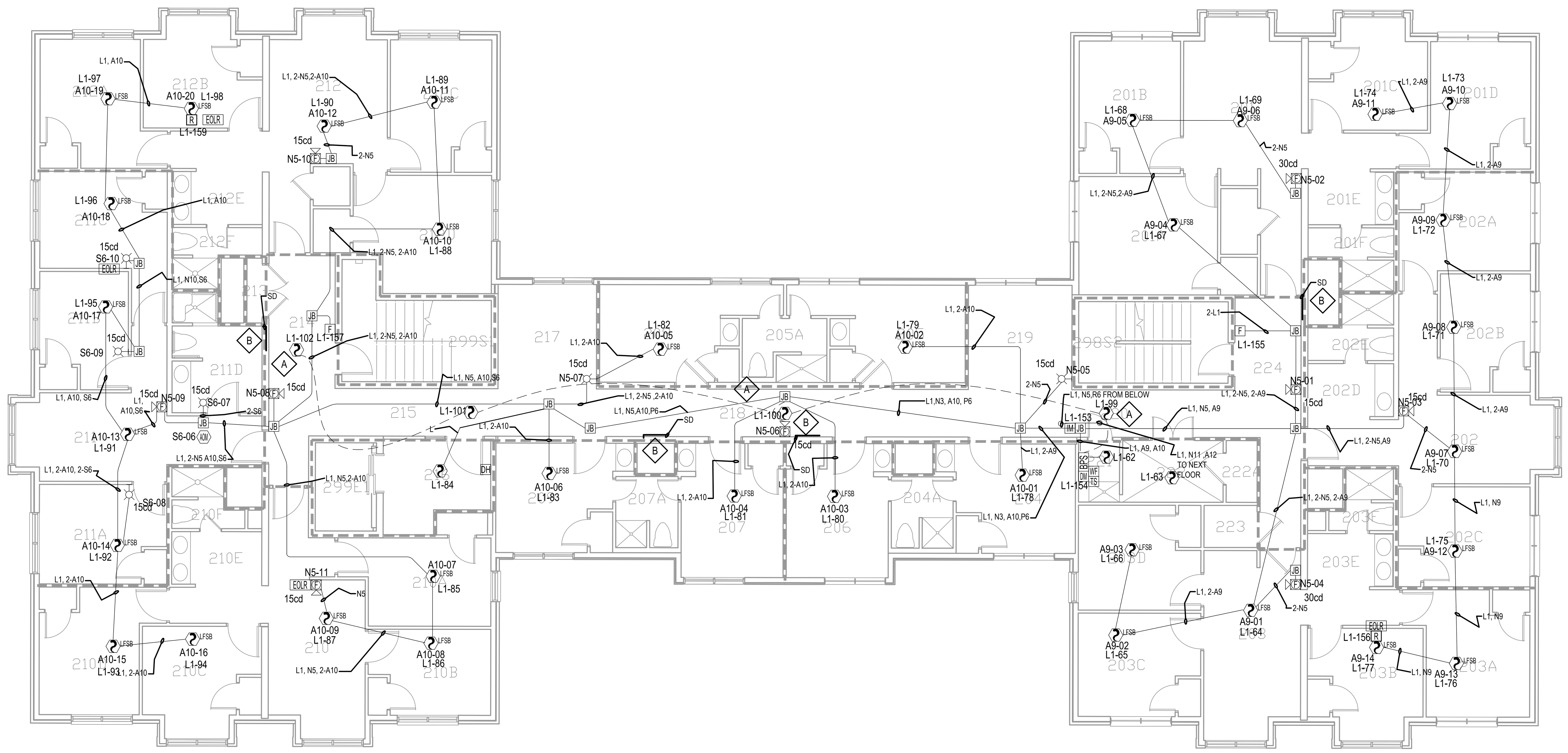
GENERAL NOTES

1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS UNLESS OTHERWISE NOTED.

SHEET NOTES

A. WIRING TO NEW DETECTION IN CORRIDOR TO BE INSTALLED IN WIRE MOLD INSTALLED AT CEILING. LOCATION OF WIRE RUNS ARE ILLUSTRATIVE ONLY. START CIRCUIT RUN AT EXPOSED BOX AND RUN IN WIRE MOULD ALONG CEILING

B. APPROXIMATE LOCATION OF EXISTING SMOKE DAMPERS



1 FA3.2 MADISON SECOND FLOORPLAN - FIRE ALARM NEW PLAN
1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRCUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER MONTANA

PPA 21-0138

SHEET TITLE

MADISON SECOND FLOOR FIRE ALARM NEW PLAN

SHEET

FA3.2

DATE

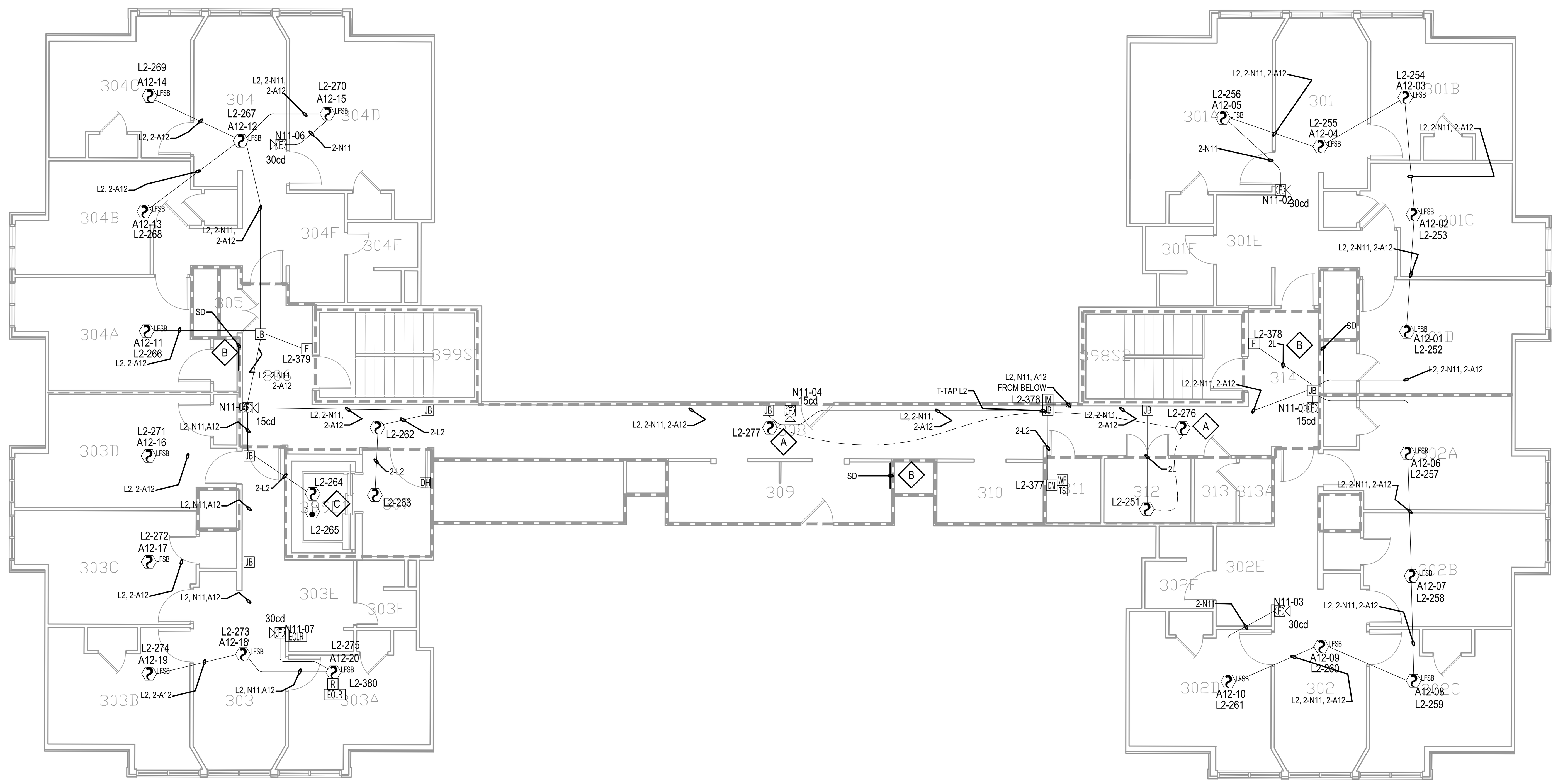
08-12-2022

GENERAL NOTES

1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS UNLESS OTHERWISE NOTED.

SHEET NOTES

- (A) WIRING TO NEW DETECTION IN CORRIDOR TO BE INSTALLED IN WIRE MOLD INSTALLED AT CEILING. LOCATION OF WIRE RUNS ARE ILLUSTRATIVE ONLY. START CIRCUIT RUN AT EXPOSED BOX AND RUN IN WIRE MOLD ALONG CEILING
- (B) APPROXIMATE LOCATION OF EXISTING SMOKE DAMPERS
- (C) COORDINATION WITH ELEVATOR CONTRACTOR FOR ACCESS TO ELEVATOR SHAFT IS THE RESPONSIBILITY OF THIS CONTRACTOR



1 FA3.3 MADISON THIRD FLOORPLAN - FIRE ALARM NEW PLAN

1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRDUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

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JASON A. ANDERSON
No. 11805PE
LICENSED PROFESSIONAL ENGINEER
MONTANA

PPA 21-0138

SHEET TITLE

MADISON THIRD FLOOR FIRE ALARM NEW PLAN

SHEET

FA3.3

DATE

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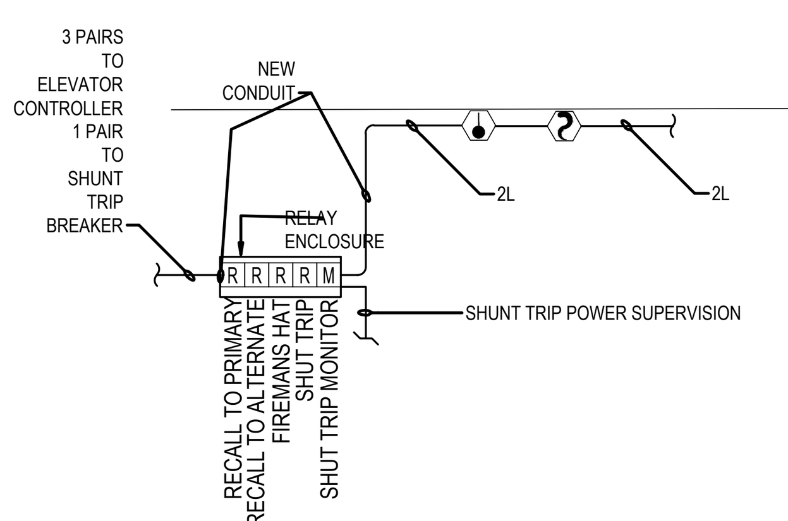
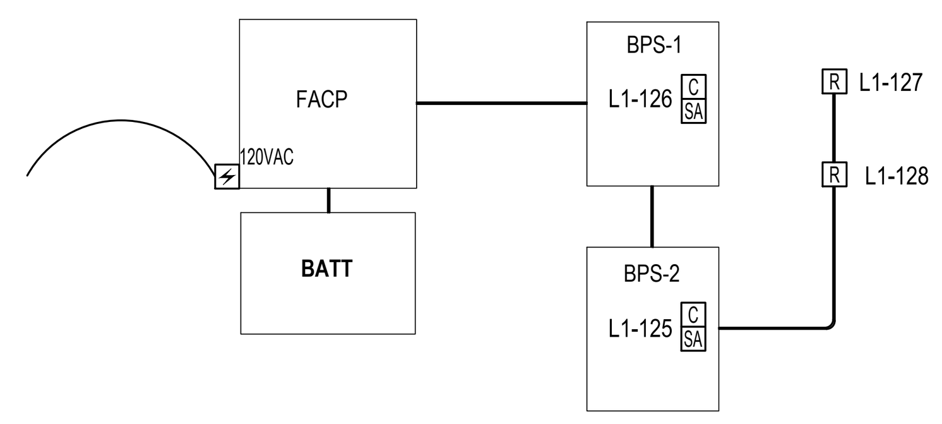


1 FA4.0



2 FA4.0

GENERAL NOTES

1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS.

SHEET NOTES

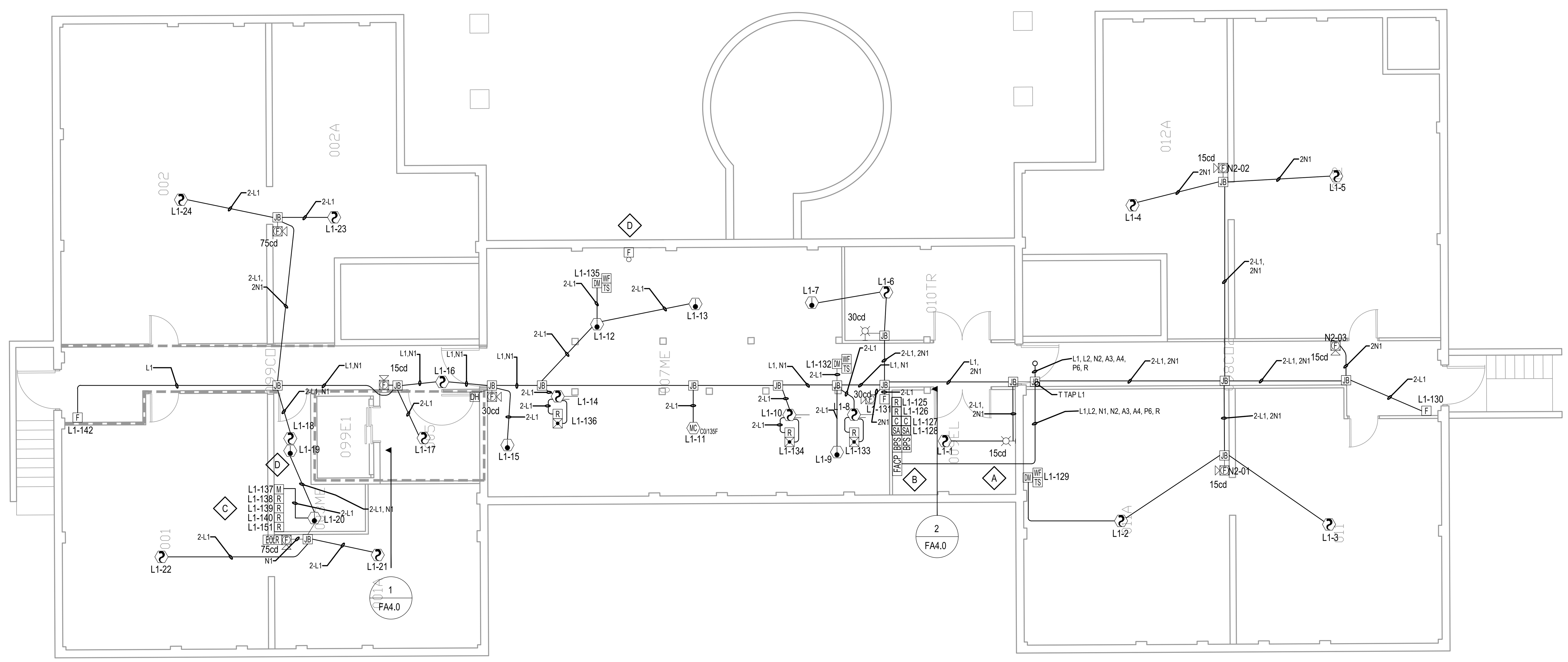
A. EXISTING CIRCUIT TO HVAC CONTROLS FOR SMOKE DAMPER SHUTDOWN TO REMAIN.

B. EXISTING CIRCUITS ROUTED TO NORTH HEDGES TO REMAIN. EXISTING WIRING TO BE REUSED.

C. EXISTING RELAYS FOR ELEVATOR RECALL WILL NEED TO BE RELOCATED TO RELAYS IN EMR

D. FIELD LOCATE HEAT DETECTORS IN ELEVATOR CONTROL ROOMS TO MACH QUANTITY OF SPRINKLER HEAD AND SPACE 24" FROM EACH SPRINKLER HEAD

E. PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 FA4.0 JEFFERSON BASEMENT FLOORPLAN - FIRE ALARM NEW PLAN
1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRDUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

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FAX: 406.994.5665

MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
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3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

JEFFERSON BASEMENT FIRE ALARM NEW PLAN

SHEET
FA4.0

DATE
08-12-2022

GENERAL NOTES

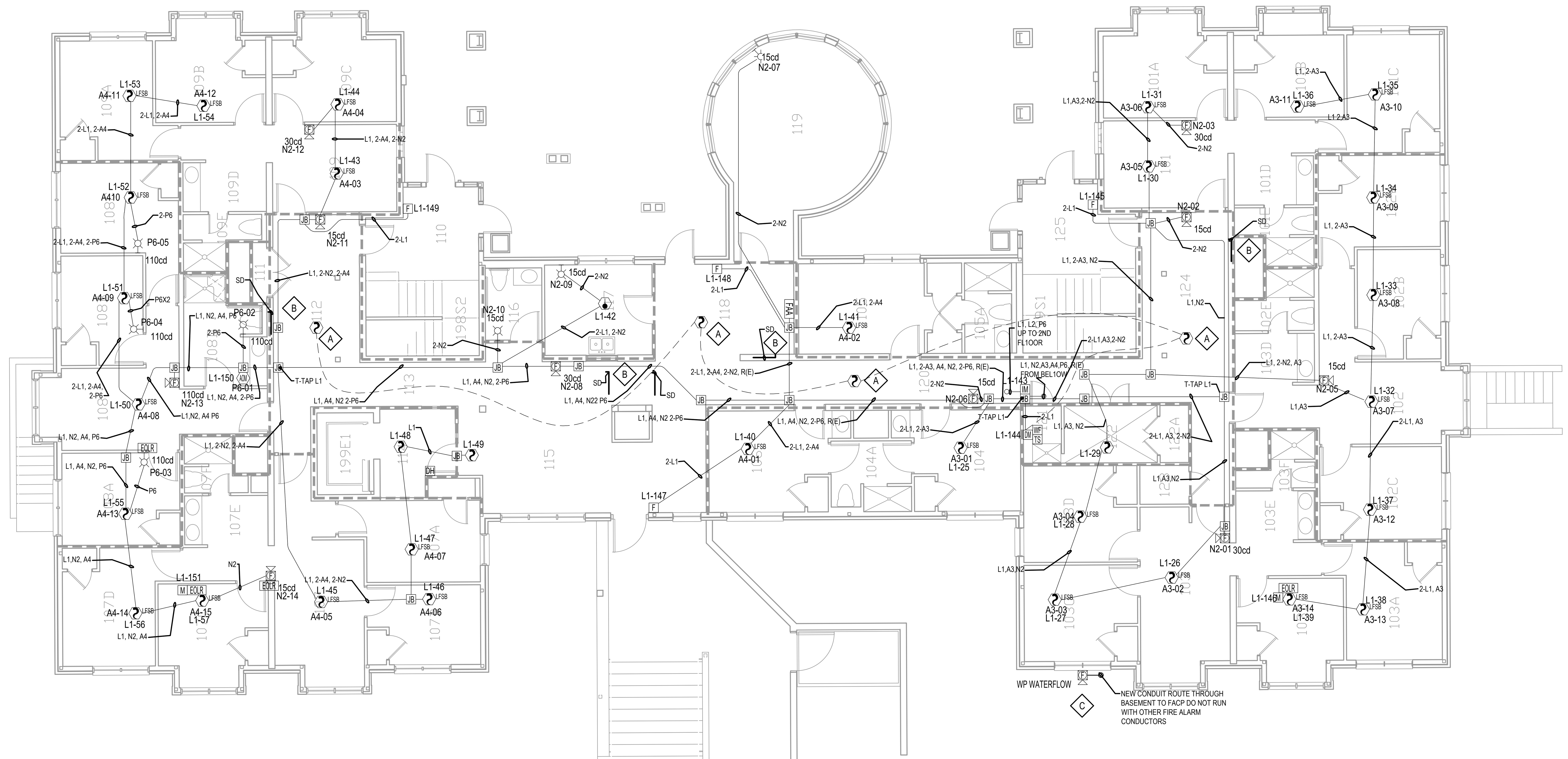
1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS UNLESS OTHERWISE NOTED.

SHEET NOTES

A. WIRING TO NEW DETECTION IN CORRIDOR TO BE INSTALLED IN WIRE MOLD INSTALLED AT CEILING. LOCATION OF WIRE RUNS ARE ILLUSTRATIVE ONLY. START CIRCUIT RUN AT EXPOSED BOX AND RUN IN WIRE MOLD ALONG CEILING

B. APPROXIMATE LOCATION OF SMOKE DAMPERS

C. PRIOR TO FIRE ALARM BEING DEMOED RELOCATE 120VAC BELL CIRCUIT TO OUTSIDE AT FDC AND INSTALL 120V HORN STROBE. ONCE FIRE ALARM UPGRADE IS COMPLETED AND BUILDING IS PROTECTED CHANGE THIS DEVICE TO 24V NAC SET TO WATERFLOW ONLY



1 FA4.1 JEFFERSON MAIN FLOORPLAN - FIRE ALARM NEW PLAN
1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRCUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

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MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE
JEFFERSON MAIN FLOOR FIRE ALARM NEW PLAN

SHEET
FA4.1

DATE
08-12-2022

GENERAL NOTES

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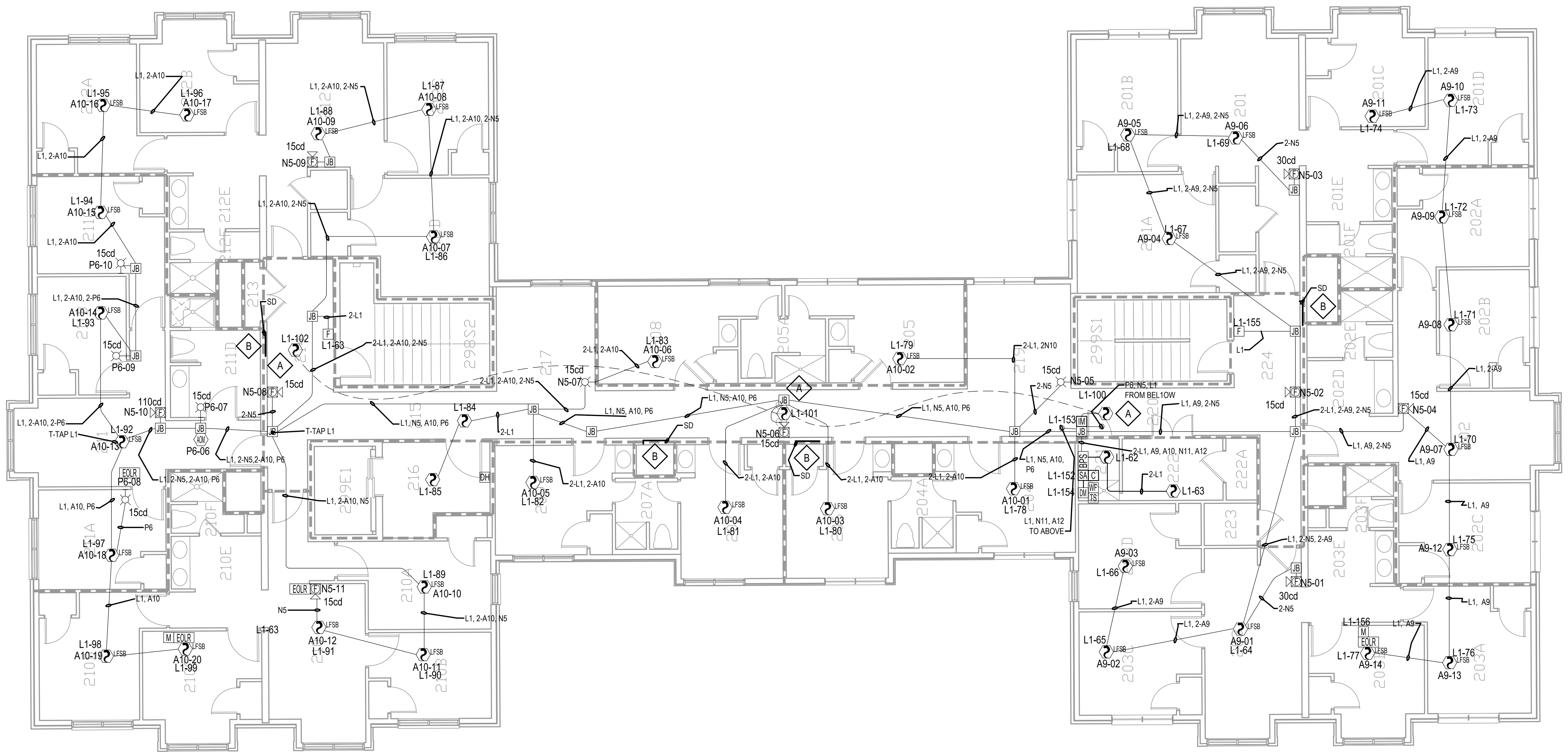
(B) APPROXIMATE LOCATION OF EXISTING SMOKE DAMPERS



1 / FA4.2 JEFFERSON SECOND FLOORPLAN - FIRE ALARM NEW PLAN

1/8" = 1'-0"

WIRE AND CABLE LEGEND

TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRCUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE PROFESSIONAL ENGINEER LICENSED

PPA 21-0138

SHEET TITLE

JEFFERSON SECOND FLOOR FIRE ALARM NEW PLAN

SHEET

FA4.2

DATE

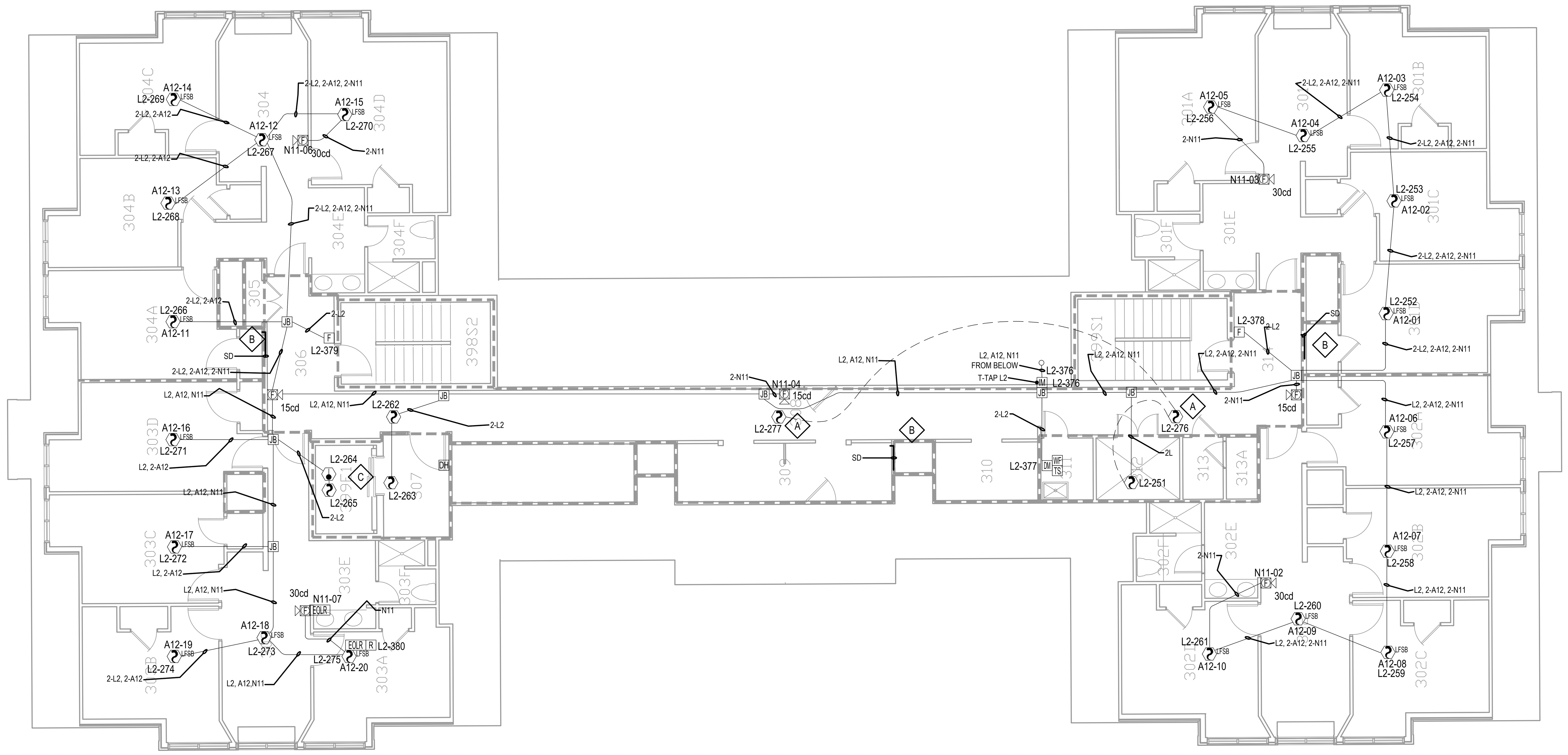
08-12-2022

GENERAL NOTES

1. NEW DEVICES TO BE EDWARDS PLACED IN SAME LOCATIONS AS DEMOED DEVICES.
2. NEW CIRCUITS TO FOLLOW EXISTING CONDUIT PATHS UNLESS OTHERWISE NOTED.

SHEET NOTES

- (A) WIRING TO NEW DETECTION IN CORRIDOR TO BE INSTALLED IN WIRE MOLD INSTALLED AT CEILING. LOCATION OF WIRE RUNS ARE ILLUSTRATIVE ONLY. START CIRCUIT RUN AT EXPOSED BOX AND RUN IN WIRE MOULD ALONG CEILING
- (B) APPROXIMATE LOCATION OF SMOKE DAMPERS
- (C) COORDINATION WITH ELEVATOR CONTRACTOR FOR ACCESS TO ELEVATOR SHAFT IS THE RESPONSIBILITY OF THIS CONTRACTOR



1 FA4.3 JEFFERSON THIRD FLOORPLAN - FIRE ALARM NEW PLAN
1/8" = 1'-0"

WIRE AND CABLE LEGEND		
TAG	TYPE	CIRCUIT DESCRIPTION
A	2 #14 THHN/ 14/2 FPLP	AUDIBLE BASE POWER
L	18/2 FPLP	SIGNAL LINE CIRDUIT
N	2 #14 THHN/14-2FPLP	NOTIFICATION CIRCUIT
P	2 #14 THHN/14-2FPLP	24VDC AUX POWER FOR ADA STROBES
R	16/4 SHIELDED TWISTED	REMOTE ANNUNCIATOR CABLE

INSTALLING CONTRACTOR SHALL PROVIDE COLOR CODED CABLING FOR DIFFERENT CIRCUIT TYPES AND MAINTAIN COLOR CODE THROUGHT EACH CIRCUIT.

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER MONTANA

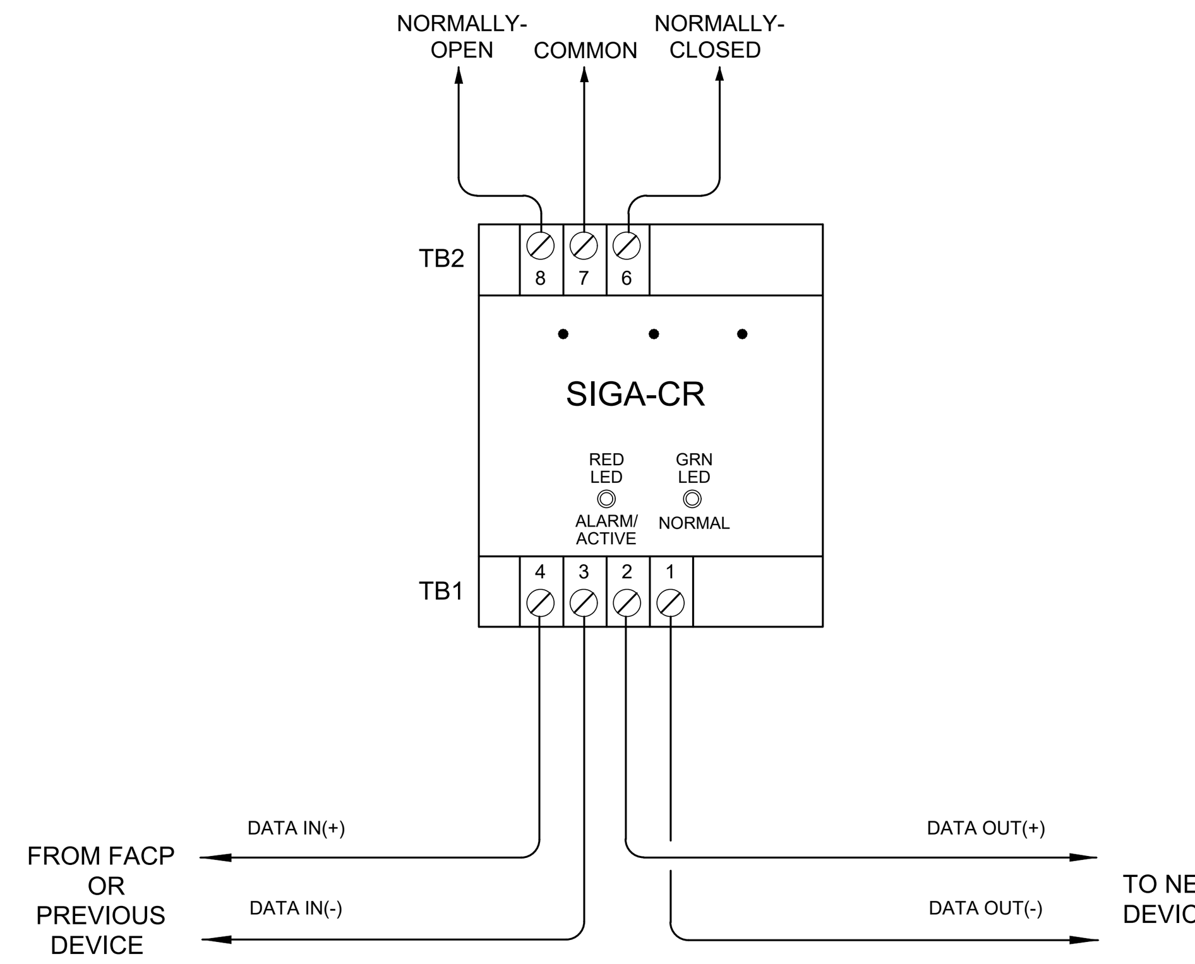
PPA 21-0138

SHEET TITLE

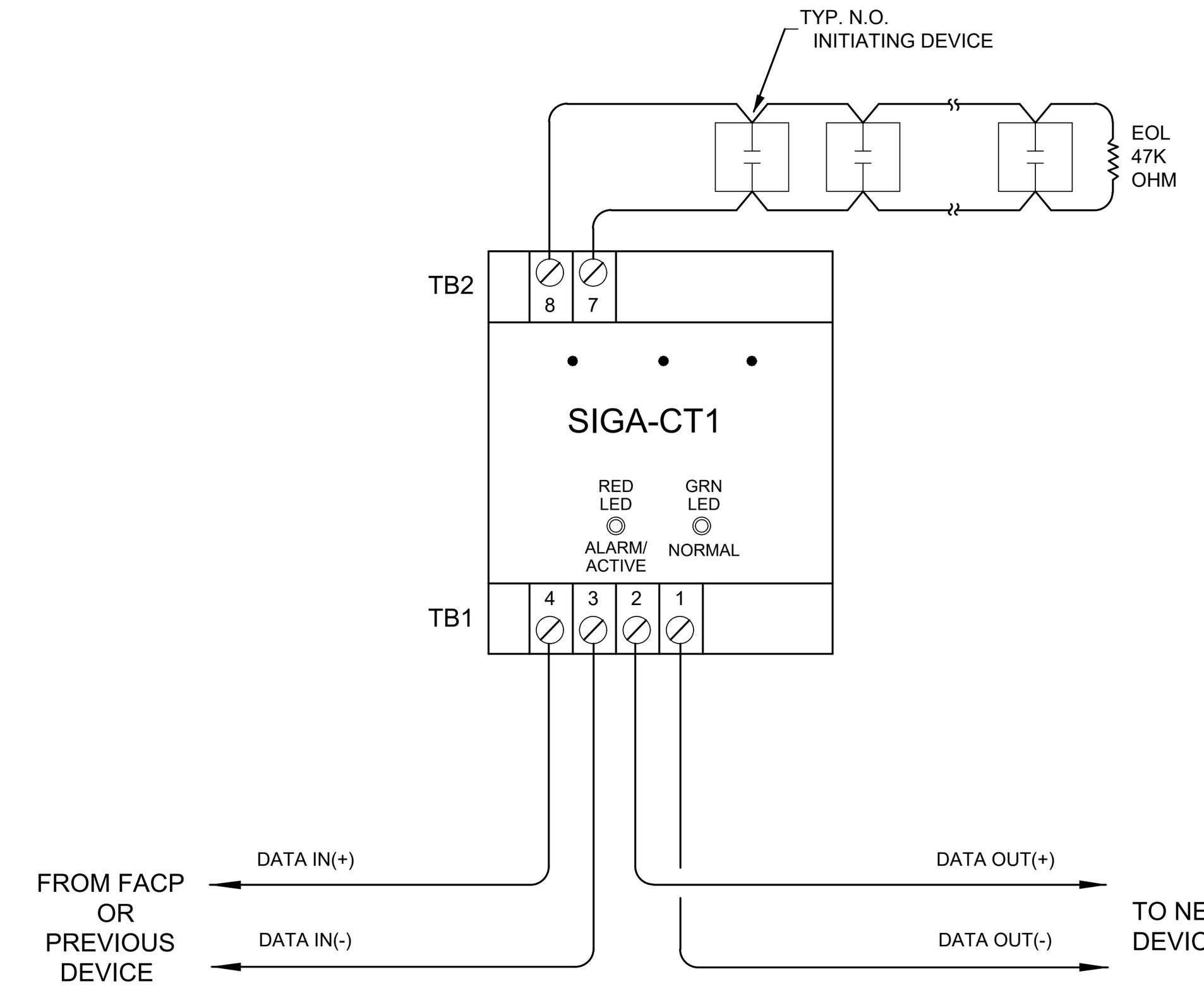
JEFFERSON THIRD FLOOR FIRE ALARM NEW PLAN

SHEET
FA4.3

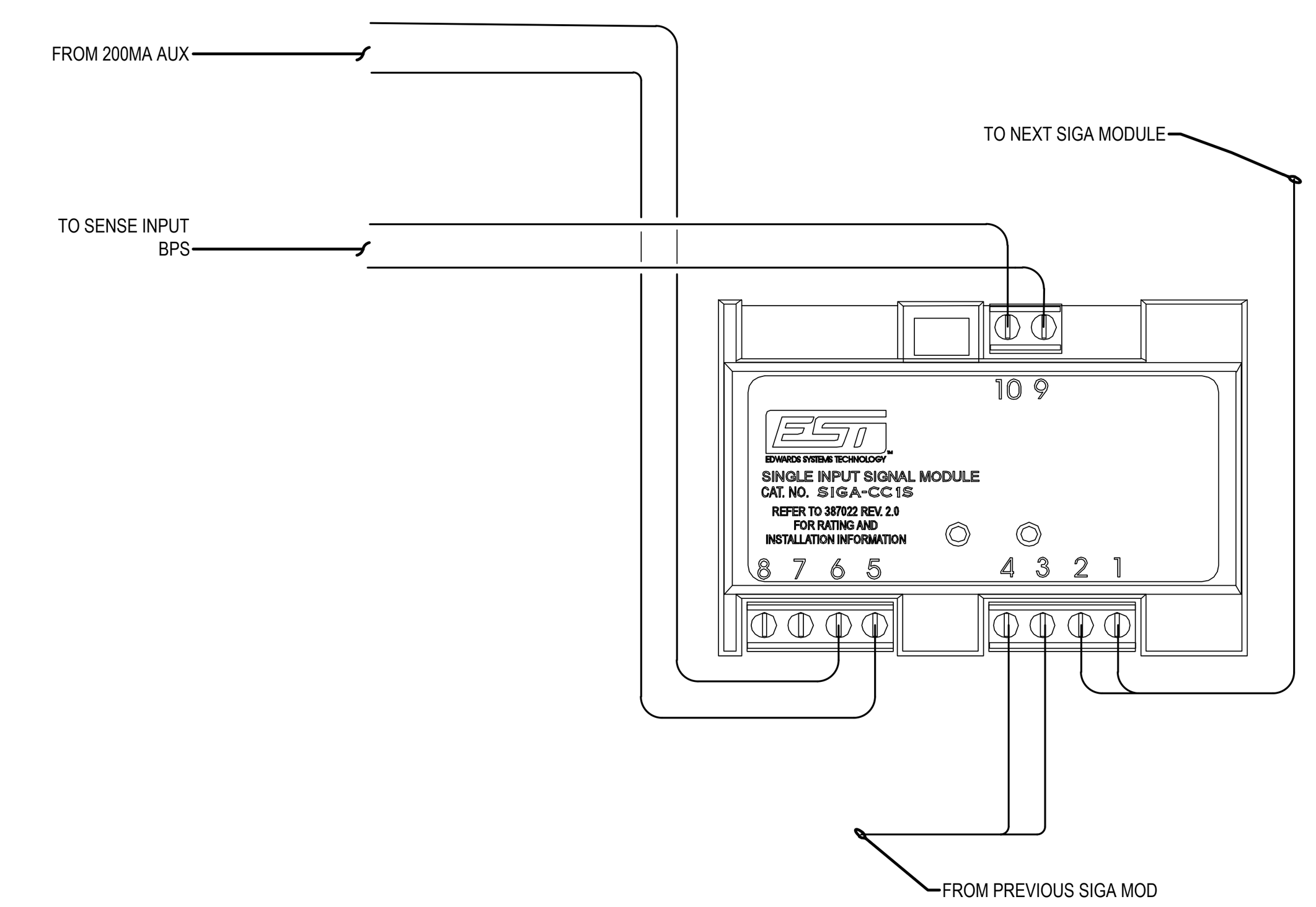
DATE
08-12-2022



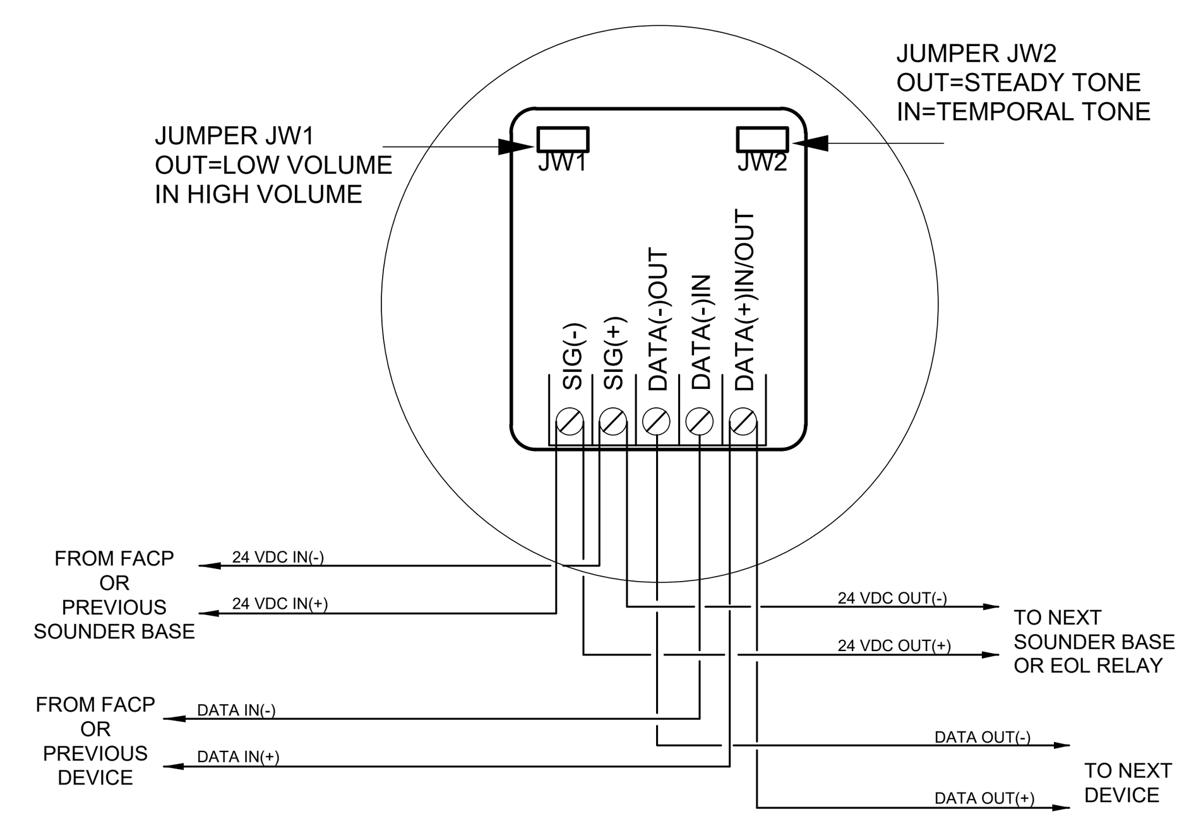
1 FA5.0 CONTROL RELAY - SIGA-CR
NO SCALE



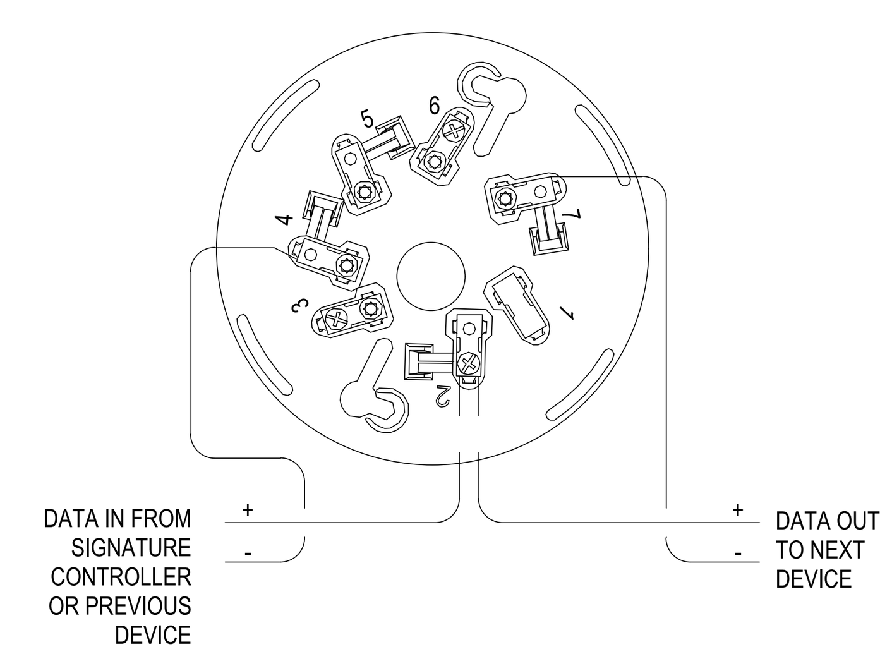
2 FA5.0 INPUT MODULE - SIGA-CT1
NO SCALE



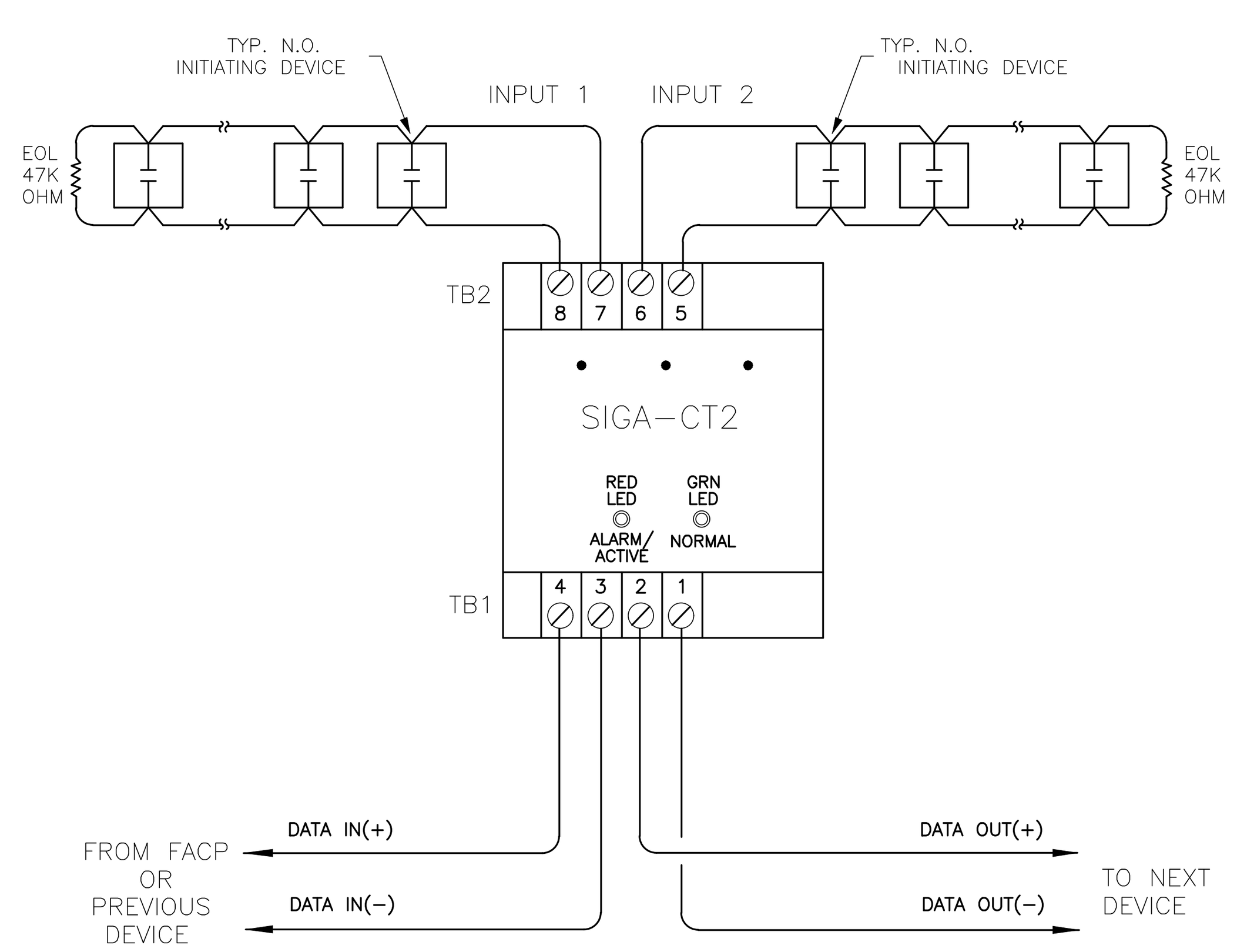
5 FA5.0 SIGA- CC1S SYNC/OUTPUT MODULE
NO SCALE



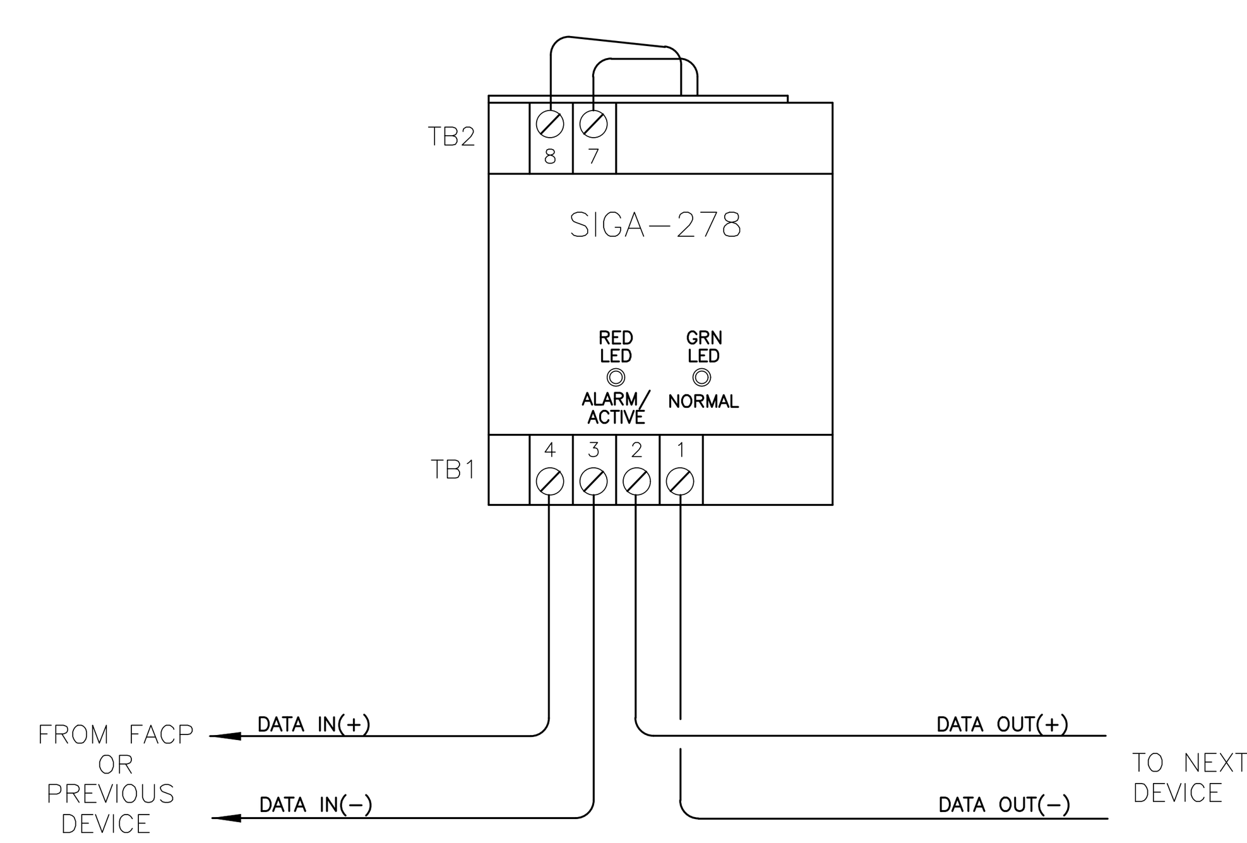
4 FA5.0 SMOKE DETECTOR SIGA-OSD ON SIGA-AB4G-LF
NO SCALE



3 FA5.0 HEAT DETECTOR SIGA-HFD ON SIGA-SB4
SMOKE DETECTOR SIGA-OSD ON SIGA-SB4
NO SCALE



6 FA5.0 SIGA-CT-2 DUAL INPUT MODULE
NO SCALE



7 FA5.0 SIGA-278 MANUAL PULL STATION
NO SCALE

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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER MONTANA

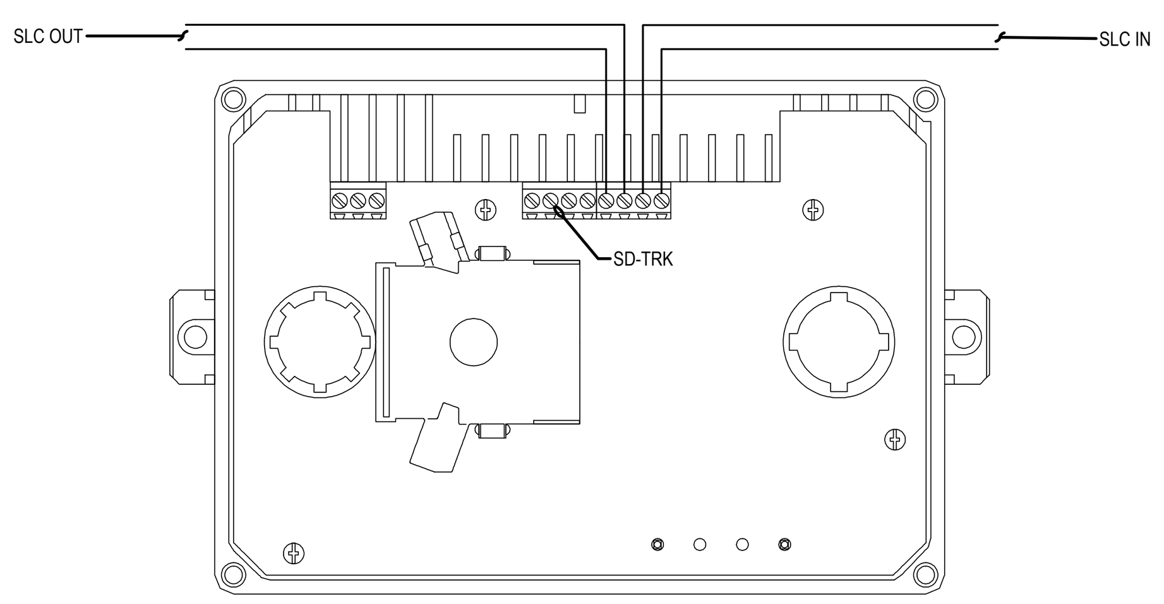
PPA 21-0138

SHEET TITLE

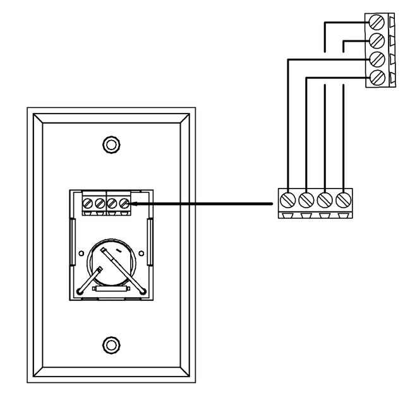
TYPICAL WIRING DIAGRAMS

SHEET
FA5.0

DATE
08-12-2022



1 / FA5.1 **SIGA-SD DUCT SMOKE DETECTOR**
NO SCALE



5 / FA5.0 **SD-TRK DUCT TEST SWITCH (KEY)**
NO SCALE

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

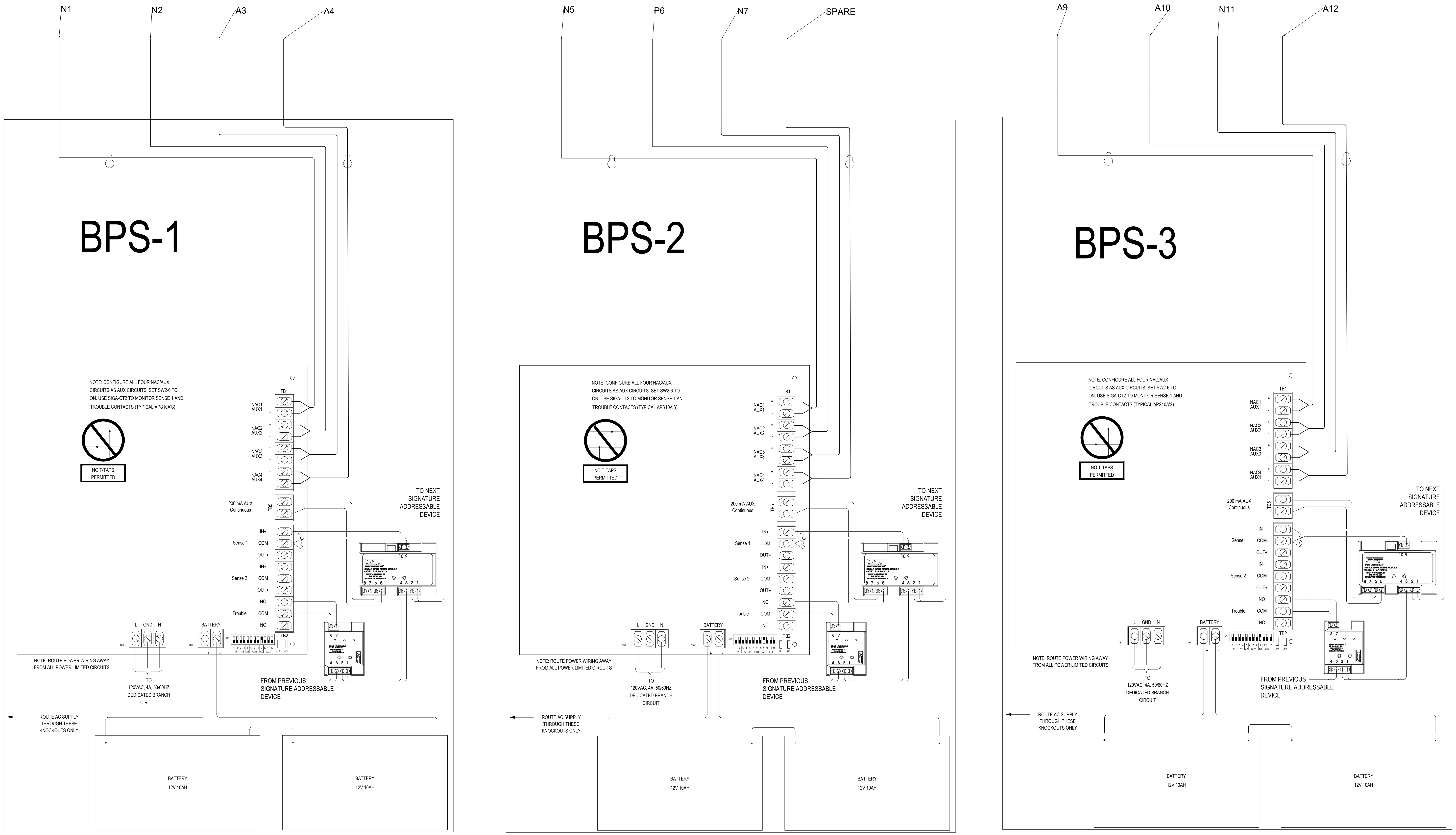
PPA 21-0138

SHEET TITLE

TYPICAL WIRING DIAGRAMS

SHEET
FA5.1

DATE
08-12-2022



1
FA5.2

NAC-1 TO NAC-12 (EST BPS10A) - HORN/STROBE, AUX POWER SUPPLY

DIAGRAMMATIC

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

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REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

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SHEET TITLE

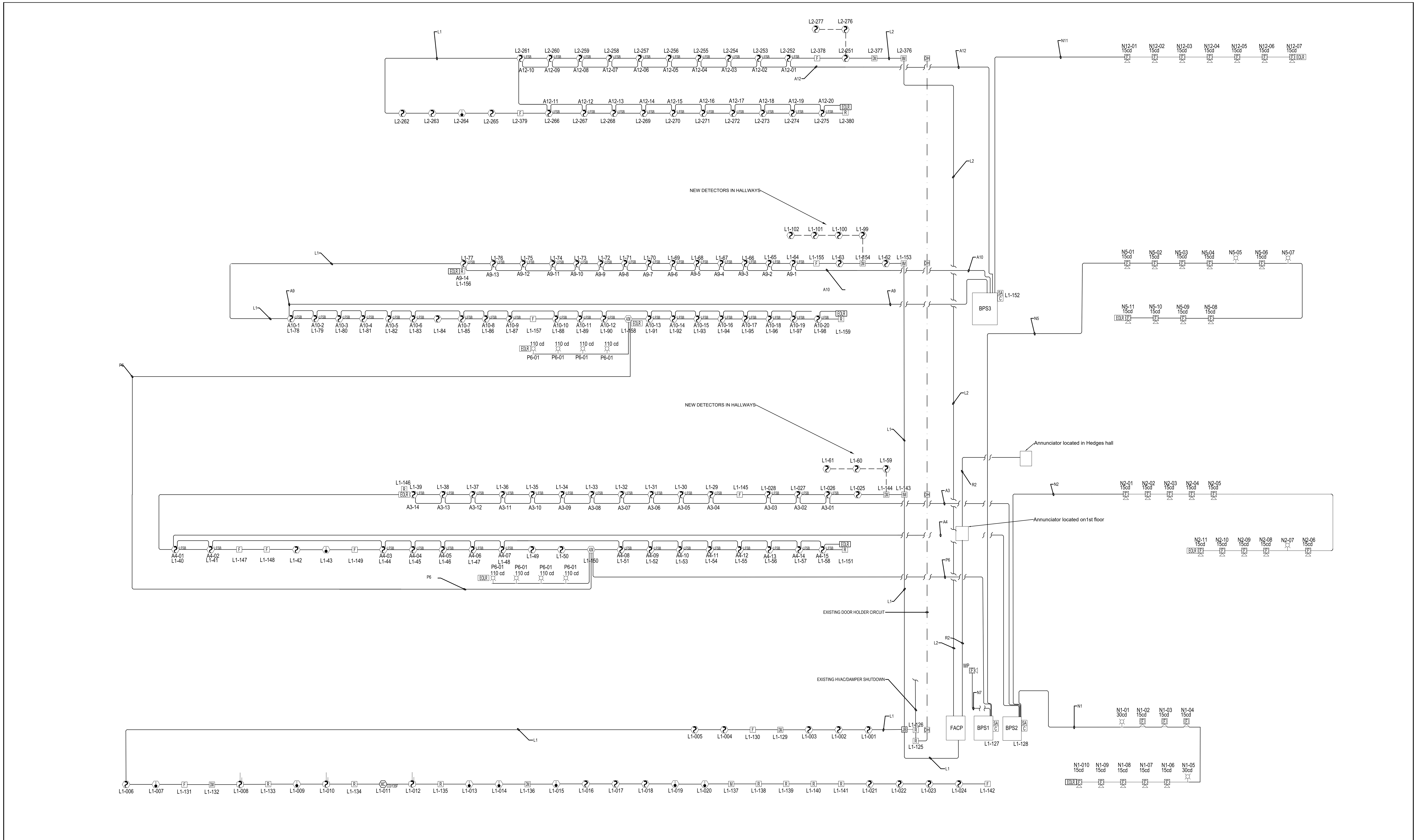
POWER SUPPLY TYPICALS

SHEET

FA5.2

DATE

08-12-2022



1
FA6.0

MADISON FIRE ALARM RISER DIAGRAM

NO SCALE

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

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JASON A. ANDERSON
No. 11805PE
PROFESSIONAL ENGINEER
LICENSED

PPA 21-0138

SHEET TITLE

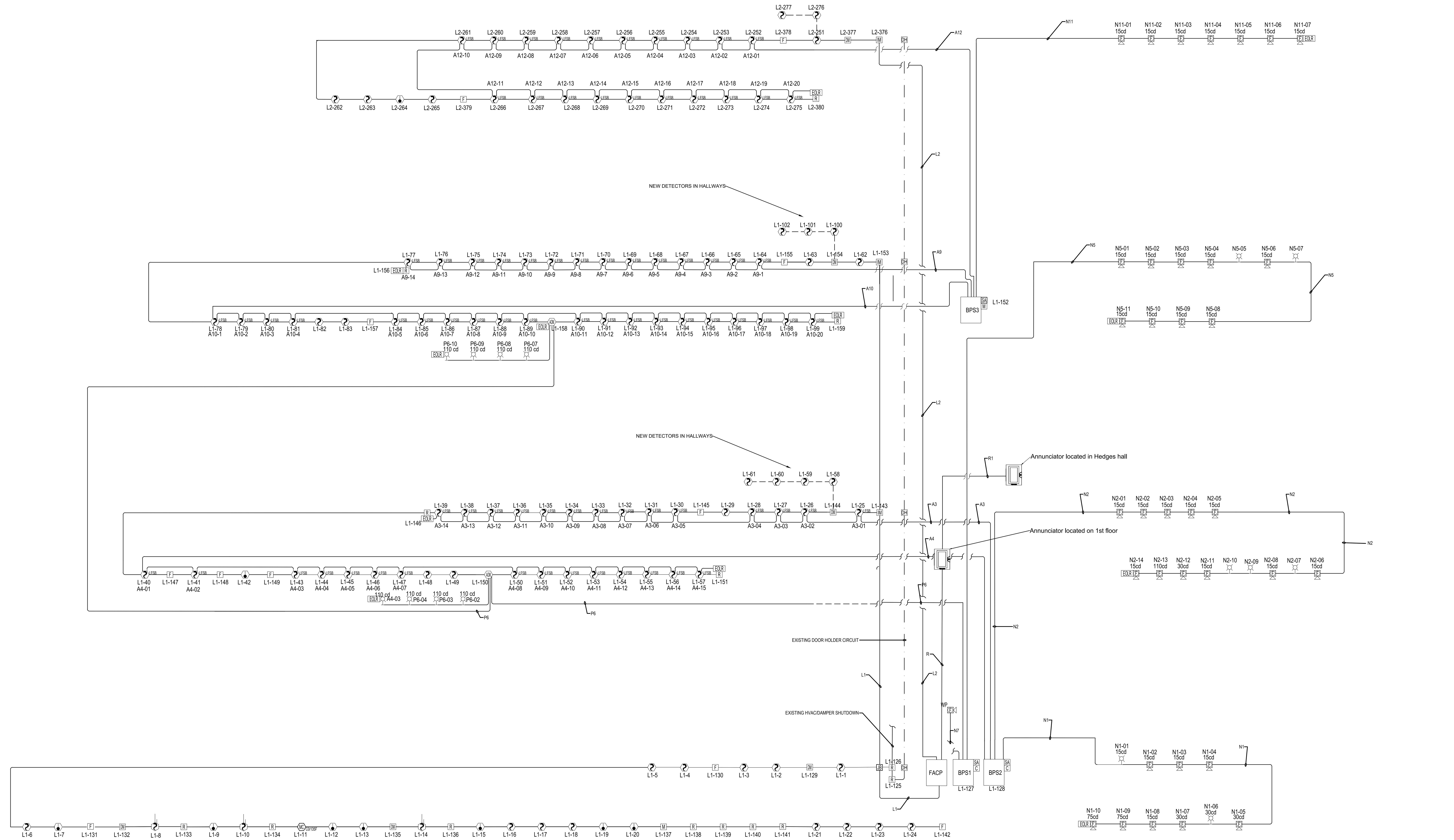
MADISON
FIRE ALARM
RISER
DIAGRAM

SHEET

FA6.0

DATE

08-12-2022



1 FA6.1 JEFFERSON f FIRE ALARM RISER DIAGRAM

NO SCALE

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS

REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA JASON A. ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE

JEFFERSON FIRE ALARM RISER DIAGRAM

SHEET

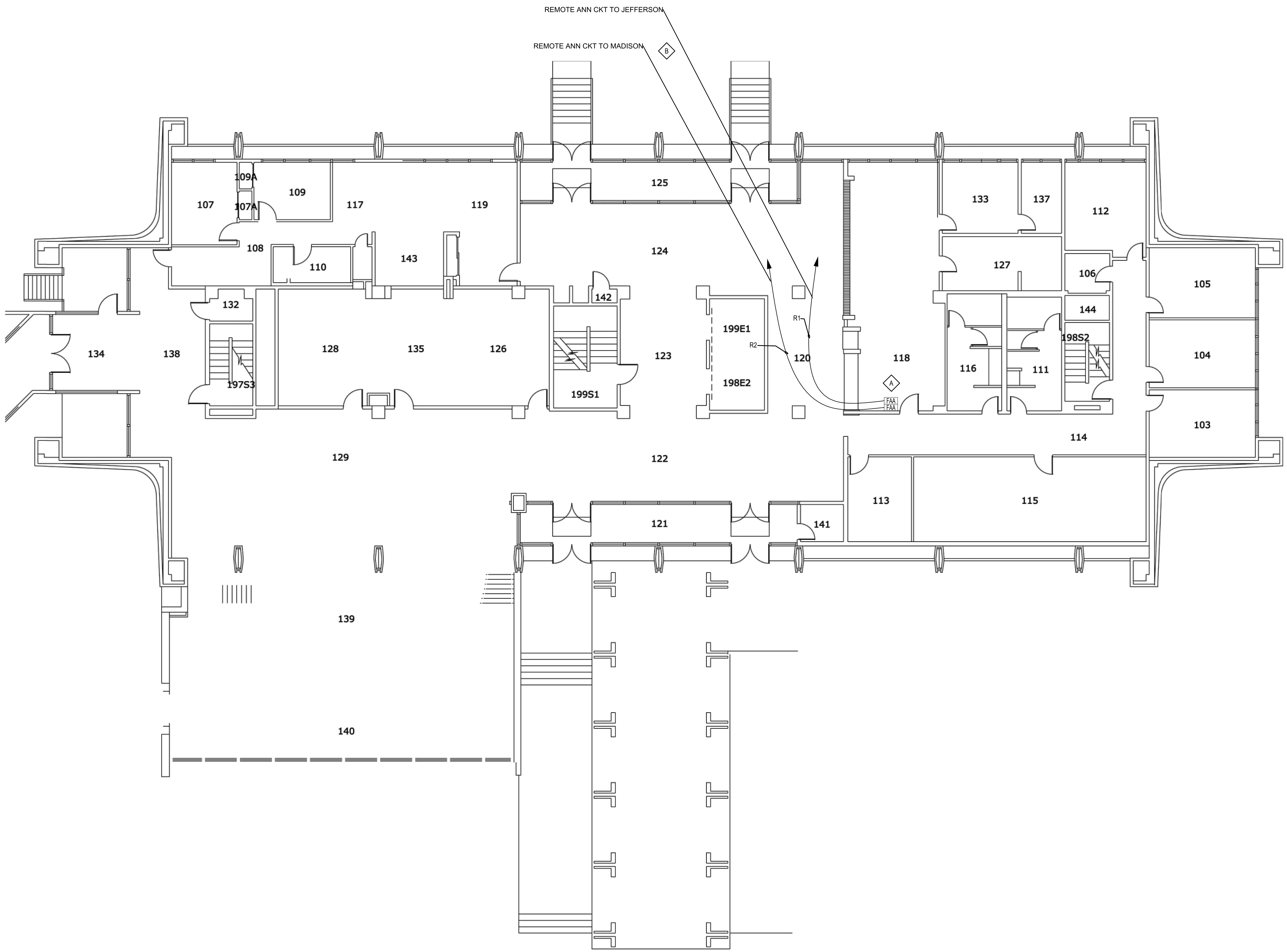
FA6.1

DATE

08-12-2022

SHEET NOTES

- (A) OLD ANNUNCIATORS TO BE REMOVED AND REPLACED WITH NEW
- (B) EXISTING WIRE AND CONDUIT PATH TO BE REUSED IF POSSIBLE



1 / FA6.2 — NORTH HEDGES REMOTE ANNUNCIATOR PLACEMENT
NO SCALE

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MADISON AND JEFFERSON HALL FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON No. 11805PE — MONTANA LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE
NORTH HEDGES REMOTE ANNUNCIATOR LOCATIONS

SHEET
FA6.2

DATE
08-12-2022

Project Name: MSU MadisonJefferson
Date: 2/8/2018
Circuit Number: NAC 1 BPS 1
Area Covered: BASEMENT
Nominal System Voltage: 24
Minimum Allowed Device Voltage: 21.6
Total Circuit Current: 0.478

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	160	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.478	468	0.49

End of Line Voltage: 23.51
Percent Drop: 2.04%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.094 14=2.575
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.028	32	23.92	0.079	0.33%
Device 2	0.050	49	23.81	0.192	0.80%
Device 3	0.050	31	23.74	0.256	1.07%
Device 4	0.050	26	23.70	0.303	1.26%
Device 5	0.050	54	23.61	0.386	1.61%
Device 6	0.050	10	23.60	0.399	1.66%
Device 7	0.050	50	23.55	0.451	1.88%
Device 8	0.050	13	23.54	0.461	1.92%
Device 9	0.050	33	23.52	0.478	1.99%
Device 10	0.050	42	23.51	0.489	2.04%
Device 11			23.51	0.489	2.04%
Device 12			23.51	0.489	2.04%
Device 13			23.51	0.489	2.04%
Device 14			23.51	0.489	2.04%
Device 15			23.51	0.489	2.04%
Device 16			23.51	0.489	2.04%
Device 17			23.51	0.489	2.04%
Device 18			23.51	0.489	2.04%
Device 19			23.51	0.489	2.04%
Device 20			23.51	0.489	2.04%
Totals	0.478	468	End of Line Voltage		23.51

Device Manufacturer: EDWARDS

	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028
G4AVRF	ALL	0.050

Device Manufacturer: EDWARDS

	Candela	UL Max Current @16VDC

1
FA8.0
MADISON NAC1 LOAD/LOSS CALCULATION- BPS-1
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 2 BPS 1
Area Covered: 1ST FLOOR MADISON
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 0.606

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	45	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.606	494	0.95

End of Line Voltage: 19.45
Percent Drop: 4.63%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	45	20.23	0.167	0.82%
Device 2	0.050	44	20.08	0.318	1.56%
Device 3	0.050	20	20.02	0.380	1.86%
Device 4	0.050	13	19.98	0.416	2.04%
Device 5	0.050	57	19.84	0.558	2.74%
Device 6	0.050	53	19.73	0.674	3.30%
Device 7	0.050	35	19.66	0.740	3.63%
Device 8	0.050	40	19.60	0.803	3.94%
Device 9	0.028	25	19.57	0.834	4.09%
Device 10	0.028	23	19.54	0.860	4.21%
Device 11	0.050	46	19.50	0.902	4.42%
Device 12	0.050	49	19.47	0.932	4.57%
Device 13	0.050	44	19.45	0.945	4.63%
Device 14			19.45	0.945	4.63%
Device 15			19.45	0.945	4.63%
Device 16			19.45	0.945	4.63%
Device 17			19.45	0.945	4.63%
Device 18			19.45	0.945	4.63%
Device 19			19.45	0.945	4.63%
Device 20			19.45	0.945	4.63%
Totals	0.606	494	End of Line Voltage		19.45

Device Manufacturer: EDWARDS
Genesis G4 Series

	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028
G4AVRF	ALL	0.050

Device Manufacturer

	Candela	UL Max Current @16VDC

2
FA7.0
MADISON NAC 2 LOAD/LOSS CALCULATION- BPS-1
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 3 (AUX) BPS 1
Area Covered: AUDIBLE BASES 1ST FLOOR WEST
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 1.140

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	50	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.140	361	1.57

End of Line Voltage: 18.83
Percent Drop: 7.67%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	50	20.05	0.350	1.72%
Device 2	0.076	54	19.70	0.703	3.44%
Device 3	0.076	6	19.66	0.739	3.62%
Device 4	0.076	53	19.36	1.036	5.08%
Device 5	0.076	10	19.31	1.087	5.33%
Device 6	0.076	10	19.27	1.134	5.56%
Device 7	0.076	10	19.22	1.176	5.76%
Device 8	0.076	9	19.19	1.210	5.93%
Device 9	0.076	52	19.02	1.379	6.76%
Device 10	0.076	8	19.00	1.402	6.87%
Device 11	0.076	7	18.98	1.418	6.95%
Device 12	0.076	64	18.86	1.538	7.54%
Device 13	0.076	12	18.85	1.554	7.62%
Device 14	0.076	8	18.84	1.562	7.66%
Device 15	0.076	8	18.83	1.566	7.67%
Device 16			18.83	1.566	7.67%
Device 17			18.83	1.566	7.67%
Device 18			18.83	1.566	7.67%
Device 19			18.83	1.566	7.67%
Device 20			18.83	1.566	7.67%
Totals	1.140	361	End of Line Voltage		18.83

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer

	Candela	UL Max Current @16VDC

3
FA7.0
MADISON AUX 3 LOAD/LOSS CALCULATION- BPS-1
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 4 (AUX) BPS 1
Area Covered: AUDIBLE BASES 1ST FLOOR EAST
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 1.064

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	26	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.064	360	1.67

End of Line Voltage: 18.73
Percent Drop: 8.21%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	56	20.03	0.366	1.79%
Device 2	0.076	21	19.91	0.493	2.42%
Device 3	0.076	87	19.42	0.980	4.81%
Device 4	0.076	7	19.38	1.016	4.98%
Device 5	0.076	56	19.12	1.278	6.26%
Device 6	0.076	12	19.07	1.328	6.51%
Device 7	0.076	8	19.04	1.358	6.66%
Device 8	0.076	54	18.87	1.534	7.52%
Device 9	0.076	11	18.83	1.565	7.67%
Device 10	0.076	9	18.81	1.586	7.78%
Device 11	0.076	8	18.80	1.601	7.85%
Device 12	0.076	43	18.74	1.661	8.14%
Device 13	0.076	9	18.73	1.670	8.18%
Device 14	0.076	9	18.73	1.674	8.21%
Device 15			18.73	1.674	8.21%
Device 16			18.73	1.674	8.21%
Device 17			18.73	1.674	8.21%
Device 18			18.73	1.674	8.21%
Device 19			18.73	1.674	8.21%
Device 20			18.73	1.674	8.21%
Totals	1.064	360	End of Line Voltage		18.73

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer

	Candela	UL Max Current @16VDC

4
FA7.0
MADISON AUX 4 LOAD/LOSS CALCULATION- BPS-1
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 5 BPS 2
Area Covered: 2ND FLOOR MADISON
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 0.456

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	27	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.456	406	0.61

End of Line Voltage: 19.79
Percent Drop: 3.00%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	27	20.32	0.076	0.37%
Device 2	0.050	55	20.19	0.213	1.04%
Device 3	0.050	41	20.10	0.302	1.48%
Device 4	0.050	38	20.03	0.374	1.83%
Device 5	0.028	61	19.93	0.470	2.30%
Device 6	0.050	32	19.89	0.514	2.52%
Device 7	0.028	34	19.85	0.552	2.70%
Device 8	0.050	36	19.82	0.585	2.87%
Device 9	0.050	10	19.81	0.591	2.90%
Device 10	0.050	72	19.79	0.613	3.00%
Device 11	.		19.79	0.613	3.00%
Device 12			19.79	0.613	3.00%
Device 13			19.79	0.613	3.00%
Device 14			19.79	0.613	3.00%
Device 15			19.79	0.613	3.00%
Device 16			19.79	0.613	3.00%
Device 17			19.79	0.613	3.00%
Device 18			19.79	0.613	3.00%
Device 19			19.79	0.613	3.00%
Device 20			19.79	0.613	3.00%
Totals	0.456	406	End of Line Voltage		19.79

Device Manufacturer: EDWARDS

	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028
G4AVRF	ALL	0.050

Device Manufacturer

	Candela	UL Max Current @16VDC

5
FA7.0
MADISON NAC 5 LOAD/LOSS CALCULATION- BPS-2
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 6(AUX) BPS 2
Area Covered: ADA STROBES
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 0.264

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	37	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.264	330	0.40

End of Line Voltage: 20.00
Percent Drop: 1.94%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.020	91	20.25	0.148	0.72%
Device 2	0.028	5	20.25	0.155	0.76%
Device 3	0.028	34	20.20	0.200	0.98%
Device 4	0.028	34	20.16	0.239	1.17%
Device 5	0.028	19	20.14	0.258	1.26%
Device 6	0.020	142	20.03	0.373	1.83%
Device 7	0.028	4	20.02	0.376	1.84%
Device 8	0.028	18	20.01	0.385	1.89%
Device 9	0.028	26	20.01	0.394	1.93%
Device 10	0.028	11	20.00	0.396	1.94%
Device 11			20.00	0.396	1.94%
Device 12			20.00	0.396	1.94%
Device 13			20.00	0.396	1.94%
Device 14			20.00	0.396	1.94%
Device 15			20.00	0.396	1.94%
Device 16			20.00	0.396	1.94%
Device 17			20.00	0.396	1.94%
Device 18			20.00	0.396	1.94%
Device 19			20.00	0.396	1.94%
Device 20			20.00	0.396	1.94%
Totals	0.264	330	End of Line Voltage		20.00

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
G4VWF	ALL	0.028
E-NAC MODULE	NA	0.020

Device Manufacturer

	Candela	UL Max Current @16VDC

6
FA7.0
MADISON AUX 6 LOAD/LOSS CALCULATION- BPS-2
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 9 (AUX) BPS 3
Area Covered: AUDIBLE BASES 2ND FLOOR WEST
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 1.064

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	43	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.064	319	1.25

End of Line Voltage: 19.15
Percent Drop: 6.12%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	43	20.12	0.281	1.38%
Device 2	0.076	13	20.04	0.360	1.76%
Device 3	0.076	9	19.99	0.410	2.01%
Device 4	0.076	62	19.67	0.728	3.57%
Device 5	0.076	10	19.62	0.775	3.80%
Device 6	0.076	10	19.58	0.817	4.01%
Device 7	0.076	65	19.34	1.060	5.19%
Device 8	0.076	12	19.30	1.099	5.39%
Device 9	0.076	11	19.27	1.130	5.54%
Device 10	0.076	10	19.25	1.153	5.65%
Device 11	0.076	7	19.23	1.166	5.72%
Device 12	0.076	49	19.17	1.235	6.05%
Device 13	0.076	10	19.16	1.244	6.10%
Device 14	0.076	8	19.15	1.248	6.12%
Device 15			19.15	1.248	6.12%
Device 16			19.15	1.248	6.12%
Device 17			19.15	1.248	6.12%
Device 18			19.15	1.248	6.12%
Device 19			19.15	1.248	6.12%
Device 20			19.15	1.248	6.12%
Totals	1.064	319	End of Line Voltage		19.15

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer

	Candela	UL Max Current @16VDC

7
FA7.0
MADISON AUX 9 LOAD/LOSS CALCULATION- BPS-3
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC10 (AUX) BPS 3
Area Covered: AUDIBLE BASES 2ND FLOOR EAST
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 1.368

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	43	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.368	511	2.43

End of Line Voltage: 17.97
Percent Drop: 11.89%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	13	20.29	0.109	0.54%
Device 2	0.076	24	20.10	0.300	1.47%
Device 3	0.076	76	19.53	0.867	4.25%
Device 4	0.076	20	19.39	1.007	4.94%
Device 5	0.076	61	18.99	1.406	6.89%
Device 6	0.076	6	18.96	1.442	7.07%
Device 7	0.076	10	18.90	1.498	7.34%
Device 8	0.076	75	18.52	1.883	9.23%
Device 9	0.076	11	18.47	1.934	9.48%
Device 10	0.076	11	18.42	1.980	9.71%
Device 11	0.076	68	18.17	2.234	10.95%
Device 12	0.076	10	18.13	2.267	11.11%
Device 13	0.076	9	18.11	2.292	11.24%
Device 14	0.076	7	18.09	2.308	11.32%
Device 15	0.076	40	18.02	2.383	11.68%
Device 16	0.076	21	17.99	2.413	11.83%
Device 17	0.076	10	17.98	2.422	11.87%
Device 18	0.076	9	17.97	2.426	11.89%
Device 19			17.97	2.426	11.89%
Device 20			17.97	2.426	11.89%
Totals	1.368	511	End of Line Voltage		17.97

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer

	Candela	UL Max Current @16VDC

8
FA7.0
MADISON NAC 10 LOAD/LOSS CALCULATION- BPS-3
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 11 BPS 3
Area Covered: 3RD FLOOR MADISON
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 0.350

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	26	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.350	506	0.61

End of Line Voltage: 19.79
Percent Drop: 2.99%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	26	20.34	0.056	0.27%
Device 2	0.050	65	20.22	0.176	0.86%
Device 3	0.050	127	20.03	0.371	1.82%
Device 4	0.050	117	19.89	0.514	2.52%
Device 5	0.050	51	19.84	0.561	2.75%
Device 6	0.050	40	19.81	0.586	2.87%
Device 7	0.050	80	19.79	0.610	2.99%
Device 8			19.79	0.610	2.99%
Device 9			19.79	0.610	2.99%
Device 10			19.79	0.610	2.99%
Device 11			19.79	0.610	2.99%
Device 12			19.79	0.610	2.99%
Device 13			19.79	0.610	2.99%
Device 14			19.79	0.610	2.99%
Device 15			19.79	0.610	2.99%
Device 16			19.79	0.610	2.99%
Device 17			19.79	0.610	2.99%
Device 18			19.79	0.610	2.99%
Device 19			19.79	0.610	2.99%
Device 20			19.79	0.610	2.99%
Totals	0.350	506	End of Line Voltage		19.79

Device Manufacturer: EDWARDS

	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028
G4AVRF	ALL	0.050

Device Manufacturer

	Candela	UL Max Current @16VDC

9
FA7.0
MADISON NAC 11 LOAD/LOSS CALCULATION- BPS-3
NO SCALE

Project Name: MSU Madison Jefferson
Date: 9.20.2019
Circuit Number: NAC 12 (AUX) BPS 3
Area Covered: AUDIBLE BASES 3RD FLOOR
Nominal System Voltage: 20.4
Minimum Allowed Device Voltage: 16
Total Circuit Current: 1.520

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	37	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method
CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.520	558	2.69

End of Line Voltage: 17.71
Percent Drop: 13.18%

Standard Wire Resistance in Ohms per 1000 feet.
16=4.89 14=3.07
Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	37	20.05	0.345	1.69%
Device 2	0.076	11	19.96	0.443	2.17%
Device 3	0.076	11	19.86	0.535	2.62%
Device 4	0.076	10	19.79	0.615	3.01%
Device 5	0.076	10	19.71	0.689	3.38%
Device 6	0.076	68	19.23	1.165	5.71%
Device 7	0.076	12	19.16	1.244	6.10%
Device 8	0.076	10	19.10	1.304	6.39%
Device 9	0.076	9	19.05	1.355	6.64%
Device 10	0.076	9	19.00	1.401	6.87%
Device 11	0.076	173	18.19	2.208	10.82%
Device 12	0.076	28	18.07	2.326	11.40%
Device 13	0.076	11	18.03	2.367	11.60%
Device 14	0.076	20	17.97	2.432	11.92%
Device 15	0.076	19	17.91	2.485	12.18%
Device 16	0.076	46	17.81	2.593	12.71%
Device 17	0.076	29	17.75	2.647	12.97%
Device 18	0.076	18	17.73	2.672	13.10%
Device 19	0.076	9	17.72	2.680	13.14%
Device 20	0.076	18	17.71	2.689	13.18%
Totals	1.520	558	End of Line Voltage		17.71

Device Manufacturer: EDWARDS
LOW FREQUENCY AUDIBLE BASE

	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer

	Candela	UL Max Current @16VDC

10
FA7.0
MADISON NAC 12 LOAD/LOSS CALCULATION- BPS-3
NO SCALE

MADISON BASEMENT BPS 1

Supervisory (AUX1, AUX2, AUX3, AUX4)
Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
Aux 1				3000mA max per ckt
Aux 2				
Aux 3				
Aux 4				
Number of ckts set to AUX:	0		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC1, NAC2, NAC3, NAC4)

Circuit			Current (mA)	
BASEMENT NAC 1			338	3000mA max per ckt
1ST FLOOR NAC 2			496	
1ST FL AUDIBLE BASE WEST			1140	
1ST FL AUDIBLE BASE EAST			1064	
Total NAC current:				3038
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				3379
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				281.58
Total battery mAH required (M+F):				1985.58
Preliminary total battery AH required (N/1000):				1.99
Final battery AH requirement (O x 1.2):				2.38
BATTERY INSTALLED				8.0AH

MADISON BASEMENT BPS 2

Supervisory (AUX1, AUX2, AUX3, AUX4)
Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
Aux 1				3000mA max per ckt
Aux 2				
Aux 3				
Aux 4				
Number of ckts set to AUX:	0		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC1, NAC2, NAC3, NAC4)

Circuit			Current (mA)	
2ND FLOOR NAC			466	3000mA max per ckt
ADA STROBES			264	
DOOR HOLDER			160	
SPARE			0	
Total NAC current:				890
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				1231
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				102.58
Total battery mAH required (M+F):				1806.58
Preliminary total battery AH required (N/1000):				1.81
Final battery AH requirement (O x 1.2):				2.17
BATTERY INSTALLED				8.0AH

MADISON 2ND FL BPS 3

Supervisory (AUX1, AUX2, AUX3, AUX4)
Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
				3000mA max per ckt
Aux 2				
DOOR HOLDER			0	
Aux 4				
Number of ckts set to AUX:	0		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC1, NAC2, NAC3, NAC4)

Circuit			Current (mA)	
2ND FL AUDIBLE BASE EAST			1368	3000mA max per ckt
2ND FL AUDIBLE BASE WEST			1064	
3RD FL NAC			280	
3RD FL AUDIBLE BASE			1520	
Total NAC current:				4232
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				4573
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				381.08
Total battery mAH required (M+F):				2085.08
Preliminary total battery AH required (N/1000):				2.09
Final battery AH requirement (O x 1.2):				2.50
BATTERY INSTALLED				8.0AH

11
FA7.0
MADISON NAC BOOSTER PANELS 24HRS./5MIN.
NO SCALE

MONTANA STATE UNIVERSITY

MSU-CPDC
MONTANA STATE
UNIVERSITY
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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON
No. 11805PE

PPA 21-0138

SHEET TITLE
MADISON
NAC AND
BATTERY
CALCULATIONS

SHEET
FA7.0

DATE
08-12-2022

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 1 BPS-1		
Area Covered	JEFFERSON BASEMENT		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.528	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.528	364	0.57
End of Line Voltage		20.03
Percent Drop		2.77%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.028	32	20.51	0.087	0.42%
Device 2	0.050	37	20.42	0.182	0.88%
Device 3	0.050	39	20.33	0.273	1.32%
Device 4	0.050	26	20.27	0.326	1.58%
Device 5	0.050	53	20.18	0.422	2.05%
Device 6	0.050	8	20.17	0.434	2.11%
Device 7	0.050	59	20.09	0.510	2.48%
Device 8	0.050	23	20.07	0.534	2.59%
Device 9	0.050	13	20.06	0.544	2.64%
Device 10	0.050	33	20.04	0.561	2.72%
Device 11	0.050	41	20.03	0.571	2.77%
Device 12			20.03	0.571	2.77%
Device 13			20.03	0.571	2.77%
Device 14			20.03	0.571	2.77%
Device 15			20.03	0.571	2.77%
Device 16			20.03	0.571	2.77%
Device 17			20.03	0.571	2.77%
Device 18			20.03	0.571	2.77%
Device 19			20.03	0.571	2.77%
Device 20			20.03	0.571	2.77%
Totals	0.528	364	End of Line Voltage		20.03

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4VWF	ALL	0.028

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4AVWF	ALL	0.050

1 FA7.1 JEFFERSON NAC 1 LOAD/LOSS CALCULATION- BPS-1

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 2 BPS 1		
Area Covered	JEFFERSON 1ST FL NAC		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.656	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.656	488	0.86
End of Line Voltage		19.74
Percent Drop		4.17%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	36	20.48	0.122	0.59%
Device 2	0.050	44	20.34	0.259	1.26%
Device 3	0.050	21	20.28	0.319	1.55%
Device 4	0.050	15	20.24	0.358	1.74%
Device 5	0.050	56	20.11	0.490	2.38%
Device 6	0.050	37	20.03	0.567	2.75%
Device 7	0.050	38	19.96	0.637	3.09%
Device 8	0.050	44	19.89	0.706	3.43%
Device 9	0.028	24	19.86	0.738	3.58%
Device 10	0.028	21	19.84	0.762	3.70%
Device 11	0.050	46	19.79	0.810	3.93%
Device 12	0.050	18	19.78	0.824	4.00%
Device 13	0.050	49	19.75	0.849	4.12%
Device 14	0.050	43	19.74	0.860	4.17%
Device 15			19.74	0.860	4.17%
Device 16			19.74	0.860	4.17%
Device 17			19.74	0.860	4.17%
Device 18			19.74	0.860	4.17%
Device 19			19.74	0.860	4.17%
Device 20			19.74	0.860	4.17%
Totals	0.656	488	End of Line Voltage		19.74

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4VWF	ALL	0.028

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4AVWF	ALL	0.050

2 FA7.1 JEFFERSON NAC 2 LOAD/LOSS CALCULATION- BPS-1

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 3 BPS 1		
Area Covered	JEFFERSON 1ST FL A/B WEST		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	1.140	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.140	395	1.46
End of Line Voltage		19.14
Percent Drop		7.09%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	32	20.41	0.188	0.91%
Device 2	0.076	21	20.30	0.303	1.47%
Device 3	0.076	94	19.82	0.781	3.79%
Device 4	0.076	8	19.78	0.819	3.97%
Device 5	0.076	57	19.54	1.064	5.17%
Device 6	0.076	11	19.49	1.107	5.38%
Device 7	0.076	6	19.47	1.128	5.48%
Device 8	0.076	53	19.31	1.294	6.28%
Device 9	0.076	12	19.27	1.327	6.44%
Device 10	0.076	11	19.25	1.353	6.57%
Device 11	0.076	11	19.23	1.375	6.67%
Device 12	0.076	8	19.21	1.387	6.73%
Device 13	0.076	52	19.15	1.448	7.03%
Device 14	0.076	11	19.14	1.457	7.07%
Device 15	0.076	8	19.14	1.460	7.09%
Device 16			19.14	1.460	7.09%
Device 17			19.14	1.460	7.09%
Device 18			19.14	1.460	7.09%
Device 19			19.14	1.460	7.09%
Device 20			19.14	1.460	7.09%
Totals	1.140	395	End of Line Voltage		19.14

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

3 FA7.1 JEFFERSON AUX 3 LOAD/LOSS CALCULATION- BPS-1

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 4 BPS 1		
Area Covered	JEFFERSON 1ST FL A/B EAST		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.836	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.836	232	0.56
End of Line Voltage		20.04
Percent Drop		2.74%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	10	20.56	0.043	0.21%
Device 2	0.076	42	20.39	0.207	1.01%
Device 3	0.076	13	20.35	0.253	1.23%
Device 4	0.076	9	20.32	0.281	1.37%
Device 5	0.076	46	20.19	0.407	1.98%
Device 6	0.076	7	20.18	0.424	2.06%
Device 7	0.076	52	20.07	0.526	2.55%
Device 8	0.076	12	20.06	0.544	2.64%
Device 9	0.076	11	20.04	0.557	2.71%
Device 10	0.076	8	20.04	0.564	2.74%
Device 11	0.076		20.04	0.564	2.74%
Device 12			20.04	0.564	2.74%
Device 13			20.04	0.564	2.74%
Device 14			20.04	0.564	2.74%
Device 15			20.04	0.564	2.74%
Device 16			20.04	0.564	2.74%
Device 17			20.04	0.564	2.74%
Device 18			20.04	0.564	2.74%
Device 19			20.04	0.564	2.74%
Device 20			20.04	0.564	2.74%
Totals	0.836	232	End of Line Voltage		20.04

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

4 FA8.1 JEFFERSON AUX 4 LOAD/LOSS CALCULATION- BPS-1

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 5 BPS-2		
Area Covered	JEFFERSON 2ND FL NAC		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.506	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.506	519	0.68
End of Line Voltage		19.92
Percent Drop		3.31%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	40	20.50	0.104	0.51%
Device 2	0.050	18	20.45	0.147	0.71%
Device 3	0.050	52	20.34	0.255	1.24%
Device 4	0.050	69	20.22	0.382	1.85%
Device 5	0.028	46	20.15	0.454	2.21%
Device 6	0.050	32	20.10	0.500	2.43%
Device 7	0.028	36	20.06	0.542	2.63%
Device 8	0.050	35	20.02	0.578	2.81%
Device 9	0.050	65	19.97	0.629	3.05%
Device 10	0.050	71	19.93	0.665	3.23%
Device 11	0.050	63	19.92	0.681	3.31%
Device 12			19.92	0.681	3.31%
Device 13			19.92	0.681	3.31%
Device 14			19.92	0.681	3.31%
Device 15			19.92	0.681	3.31%
Device 16			19.92	0.681	3.31%
Device 17			19.92	0.681	3.31%
Device 18			19.92	0.681	3.31%
Device 19			19.92	0.681	3.31%
Device 20			19.92	0.681	3.31%
Totals	0.506	519	End of Line Voltage		19.92

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4AVRF	ALL	0.050

5 FA7.1 JEFFERSON NAC 5 LOAD/LOSS CALCULATION- BPS-2

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 6 BPS 2		
Area Covered	JEFFERSON ADA STROBES		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.264	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.264	380	0.39
End of Line Voltage		20.21
Percent Drop		1.89%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.020	110	20.45	0.150	0.73%
Device 2	0.028	6	20.44	0.157	0.76%
Device 3	0.028	34	20.41	0.195	0.95%
Device 4	0.028	34	20.37	0.228	1.11%
Device 5	0.028	19	20.36	0.243	1.18%
Device 6	0.020	177	20.24	0.364	1.77%
Device 7	0.028	4	20.23	0.366	1.78%
Device 8	0.028	27	20.22	0.378	1.83%
Device 9	0.028	35	20.21	0.388	1.88%
Device 10	0.028	12	20.21	0.390	1.89%
Device 11			20.21	0.390	1.89%
Device 12			20.21	0.390	1.89%
Device 13			20.21	0.390	1.89%
Device 14			20.21	0.390	1.89%
Device 15			20.21	0.390	1.89%
Device 16			20.21	0.390	1.89%
Device 17			20.21	0.390	1.89%
Device 18			20.21	0.390	1.89%
Device 19			20.21	0.390	1.89%
Device 20			20.21	0.390	1.89%
Totals	0.264	380	End of Line Voltage		20.21

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028
E-NAC MODULE	NA	0.020

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

6 FA7.1 JEFFERSON AUX 6 LOAD/LOSS CALCULATION- BPS-2

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 9 BPS 3		
Area Covered	JEFFERSON AB 2ND FL WEST		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	1.520	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.520	595	2.59
End of Line Voltage		18.01
Percent Drop		12.56%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	15	20.48	0.117	0.57%
Device 2	0.076	23	20.31	0.288	1.40%
Device 3	0.076	54	19.93	0.669	3.25%
Device 4	0.076	26	19.76	0.842	4.09%
Device 5	0.076	46	19.47	1.130	5.49%
Device 6	0.076	22	19.34	1.259	6.11%
Device 7	0.076	71	18.95	1.648	8.00%
Device 8	0.076	13	18.89	1.714	8.32%
Device 9	0.076	12	18.83	1.771	8.60%
Device 10	0.076	83	18.47	2.128	10.33%
Device 11	0.076	7	18.44	2.155	10.46%
Device 12	0.076	11	18.41	2.194	10.65%
Device 13	0.076	60	18.22	2.382	11.56%
Device 14	0.076	13	18.18	2.418	11.74%
Device 15	0.076	21	18.13	2.467	11.98%
Device 16	0.076	11	18.11	2.489	12.08%
Device 17	0.076	9	18.10	2.503	12.15%
Device 18	0.076	63	18.02	2.577	12.51%
Device 19	0.076	10	18.02	2.584	12.55%
Device 20	0.076	8	18.01	2.588	12.56%
Totals	1.520	595	End of Line Voltage		18.01

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

7 FA7.1 JEFFERSON NAC 9 LOAD/LOSS CALCULATION- BPS-3

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 10 BPS 3		
Area Covered	JEFFERSON AB 2ND FL EAST		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	1.140	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.140	324	1.22
End of Line Voltage		19.38
Percent Drop		5.95%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	43	20.35	0.252	1.23%
Device 2	0.076	14	20.27	0.329	1.60%
Device 3	0.076	9	20.23	0.375	1.82%
Device 4	0.076	67	19.91	0.690	3.35%
Device 5	0.076	11	19.86	0.737	3.58%
Device 6	0.076	11	19.82	0.780	3.79%
Device 7	0.076	66	19.59	1.013	4.92%
Device 8	0.076	13	19.55	1.053	5.11%
Device 9	0.076	11	19.52	1.083	5.26%
Device 10	0.076	11	19.49	1.109	5.38%
Device 11	0.076	8	19.48	1.125	5.46%
Device 12	0.076	51	19.40	1.205	5.85%
Device 13	0.076	11	19.38	1.218	5.91%
Device 14	0.076	9	19.38	1.225	5.95%
Device 15	0.076		19.38	1.225	5.95%
Device 16			19.38	1.225	5.95%
Device 17			19.38	1.225	5.95%
Device 18			19.38	1.225	5.95%
Device 19			19.38	1.225	5.95%
Device 20			19.38	1.225	5.95%
Totals	1.140	324	End of Line Voltage		19.38

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

8 FA7.1 JEFFERSON NAC 10 LOAD/LOSS CALCULATION- BPS-3

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 11 BPS-3		
Area Covered	JEFFERSON 3RD FL NAC		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	0.350	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
0.350	512	0.55
End of Line Voltage		20.05
Percent Drop		2.69%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.050	48	20.51	0.087	0.42%
Device 2	0.050	67	20.41	0.190	0.92%
Device 3	0.050	127	20.25	0.354	1.72%
Device 4	0.050	116	20.13	0.473	2.30%
Device 5	0.050	50	20.09	0.512	2.48%
Device 6	0.050	41	20.07	0.533	2.59%
Device 7	0.050	79	20.05	0.553	2.69%
Device 8			20.05	0.553	2.69%
Device 9			20.05	0.553	2.69%
Device 10			20.05	0.553	2.69%
Device 11			20.05	0.553	2.69%
Device 12			20.05	0.553	2.69%
Device 13			20.05	0.553	2.69%
Device 14			20.05	0.553	2.69%
Device 15			20.05	0.553	2.69%
Device 16			20.05	0.553	2.69%
Device 17			20.05	0.553	2.69%
Device 18			20.05	0.553	2.69%
Device 19			20.05	0.553	2.69%
Device 20			20.05	0.553	2.69%
Totals	0.350	512	End of Line Voltage		20.05

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4VRF	ALL	0.028

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
G4AVRF	ALL	0.050

9 FA7.1 JEFFERSON NAC 11 LOAD/LOSS CALCULATION- BPS-3

NO SCALE

Project Name	MSU MadisonJefferson		
Date	2/8/2018		
Circuit Number	NAC 12 BPS 3		
Area Covered	JEFFERSON AB 3RD FL		
Nominal System Voltage	20.6		
Minimum Allowed Device Voltage	16		
Total Circuit Current	1.520	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	32	14	2.575
Wire Gauge for balance of circuit		14	2.575

Point to Point Method

CIRCUIT IS WITHIN LIMITS

Totals Current	Totals Distance	Voltage Drop
1.520	566	2.32
End of Line Voltage		18.28
Percent Drop		11.26%

Standard Wire Resistance in Ohms per 1000 feet.

16=4.094 14=2.575

Note: Wire resistance is doubled in the calculations for two wires (Positive and Negative)

Device Number	Device Current	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.076	39	20.29	0.305	1.48%
Device 2	0.076	11	20.21	0.387	1.88%
Device 3	0.076	12	20.13	0.472	2.29%
Device 4	0.076	10	20.06	0.538	2.61%
Device 5	0.076	10	20.00	0.601	2.92%
Device 6	0.076	72	19.58	1.024	4.97%
Device 7	0.076	11	19.52	1.084	5.26%
Device 8	0.076	10	19.47	1.135	5.51%
Device 9	0.076	10	19.42	1.182	5.74%
Device 10	0.076	10	19.38	1.225	5.95%
Device 11	0.076	173	18.70	1.902	9.23%
Device 12	0.076	30	18.59	2.007	9.75%
Device 13	0.076	11	18.56	2.042	9.91%
Device 14	0.076	20	18.50	2.097	10.18%
Device 15	0.076	19	18.46	2.141	10.39%
Device 16	0.076	48	18.36	2.235	10.85%
Device 17	0.076	30	18.32	2.282	11.08%
Device 18	0.076	19	18.30	2.305	11.19%
Device 19	0.076	9	18.29	2.312	11.22%
Device 20	0.076	19	18.28	2.319	11.26%
Totals	1.520	566	End of Line Voltage		18.28

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC
AB4G-LF	N/A	0.076

Device Manufacturer	EDWARDS	
	Candela	UL Max Current @16VDC

10 FA7.1 JEFFERSON AUX 12 LOAD/LOSS CALCULATION- BPS-3

NO SCALE

JEFFERSON BASEMENT BPS 1

Supervisory (AUX1, AUX2, AUX3, AUX4)

Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
Aux 1				
Aux 2				
Aux 3				
Aux 4				
Number of ckts set to AUX:	2		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC1, NAC2, NAC3, NAC4)

Circuit			Current (mA)	
BASEMENT NAC 1			388	
1ST FLOOR NAC 2			536	
1ST FL AUDIBLE BASE WEST			1140	
1ST FL AUDIBLE BASE EAST			836	
Total NAC current:				2900
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				3241
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				270.08
Total battery mAH required (M+F):				1974.08
Preliminary total battery AH required (N/1000):				1.97
Final battery AH requirement (O x 1.2):				2.37
BATTERY INSTALLED				8.0AH

JEFFERSON BASEMENT BPS 2

Supervisory (AUX1, AUX2, AUX3, AUX4)

Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
Aux 1				
Aux 2				
Aux 3				
Aux 4				
Number of ckts set to AUX:	0		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC5, NAC6, NAC7, NAC8)

Circuit			Current (mA)	
2ND FL NAC			388	
ADA STROBES			264	
DOOR HOLDERS			160	
SPARE			0	
Total NAC current:				812
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				1153
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				96.08
Total battery mAH required (M+F):				1800.08
Preliminary total battery AH required (N/1000):				1.80
Final battery AH requirement (O x 1.2):				2.16
BATTERY INSTALLED				8.0AH

JEFFERSON 2ND FLOOR BPS 3

Supervisory (AUX1, AUX2, AUX3, AUX4)

Note: Only add auxiliary current if SW2-7 is OFF. Aux output stays on after AC power failure.

Circuit			Current (mA)	
Aux 1				
Aux 2				
DOOR HOLDER			0	
Aux 4				
Number of ckts set to AUX:	0		0	
Total AUX current (if switch SW2-7 is off):				0

Supervisory current max = 6A for EBPS6A; 8A for EBPS10A

200 mA AUX

			Current (mA)	
Total 200 mA AUX current:				1
Rated base BPS supervisory current:				70
Total supervisory current (A+B+C):				71
Hours of supervisory:				24
Supervisory mAH required (DxE):				1704

Alarm (NAC9, NAC10, NAC11, NAC12)

Circuit			Current (mA)	
2ND FL AUDIBLE BASE WEST			1520	
2ND FL AUDIBLE BASE EAST			1140	
3RD FL NAC			280	
3RD FL AUDIBLE BASE			1520	
Total NAC current:				4460
Rated base BPS alarm current:				270
Total alarm current (D+G+H):				4801
Minutes of alarm:				5
Hours of alarm (K/60):				0.08
Alarm mAH required (JxL):				400.08
Total battery mAH required (M+F):				2104.08
Preliminary total battery AH required (N/1000):				2.10
Final battery AH requirement (O x 1.2):				2.52
BATTERY INSTALLED				8.0AH

11 FA7.1 JEFFERSON NAC BOOSTER PANELS 24HRS./5MIN.

NO SCALE

MONTANA STATE UNIVERSITY

MSU-CPDC

MONTANA STATE
UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
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MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

JASON A. ANDERSON No. 11805PE

PPA 21-0138

SHEET TITLE

JEFFERSON
NAC AND
BATTERY
CALCULATIONS

SHEET

FA7.1

DATE

08-12-2022

BATTERY SIZING CALCULATIONS

Project Name: MADISON/JEFFERSON FA
Project Number: 212098

Panel Name: MADISON
Area Served:

Requirement for standby current (hours):	24	hrs.
Requirement for alarm current (minutes):	5	min.
Spare Battery Capacity (percentage):	20%	%

Design Supervison Current =	34.30	amp-hr
Design Alarm Current =	0.14	amp-hr
Additional Capacity Current =	6.89	amp-hr
Battery AH requirement =	41.33	amp-hr
Battey Provided	45.00	amp-hr

PANEL EQUIPMENT

Quantity	Device	Standby (ma) Current	Alarm (ma) Current	TOTAL (ma) Standby Current	TOTAL (ma) Alarm Current
1	4-CPU/3-PPS	211	211	211	211
	4-AUDTELS	85	101	0	0
1	4-ANNCPU	125	125	125	125
	4-ANNAUDTEL	98	98	0	0
	4-CPUGRPH	123	123	0	0
	3-BPS/M(230)	50	50	0	0
	3-BBC/M	70	70	0	0
	4-24L series	3	5.6	0	0
	3-xx series	2	2	0	0
	3-LDSM	5	5	0	0
1	4-LCD	40	93	40	93
	4-LCDAUDTEL	40	93	0	0
	4-3LCD	40	93	0	0
	4-NET-TP(-HC)	32	32	0	0
	4-NET-CAT/4-FWAL-CAT	27	27	0	0
	4-NET-SM/4-FWAL-SM	35	35	0	0
	4-NET-MM/4-FWAL-MM	35	35	0	0
	4-NET-SMH/4-FWAL-SMH	35	35	0	0
	4-NET-SMU/4-FWAL-SMU	35	35	0	0
	4-NET-SMD/4-FWAL-SMD	35	35	0	0
	4-FWAL-1/2/3/4	92	92	0	0
1	4-USBHUB	44	44	44	44
	4-NET-AD	92	92	0	0
	4-NET-XT	110	110	0	0
	4-MIC	8	38	0	0
	4-FT	9	168	0	0
1	4-COMREL	0	8	0	8
	3-SSDC1	144	204	0	0
1	3-SDDC1	264	336	264	336
	3-IDC8/4	144	204	0	0
	3-OPS	53	147	0	0
1	3-MODCOM	60	95	60	95
	3-MODCOMP	60	95	0	0
	CDR-3	60	100	0	0
	3-ZA20B/A	62	1120	0	0
	3-ZA40B/A	62	2480	0	0
	3-ZA95	85	5540	0	0
	3-BPS/M	50	50	0	0
	3-BBC/M	70	70	0	0
	Remote Annunciators			0	0
2	4-ANNCPU	125	125	250	250
	4-LCDANN	40	93	0	0
	4-24L	3	5.6	0	0
	4-24L12S	3	5.6	0	0
	4-24L18S	3	5.6	0	0
3	4-24L24S	3	5.6	9	16.8
2	4-2ANN	165	218	330	436
	4-4ANN	125	125	0	0
	4-6ANN	125	125	0	0
	4-8ANN	125	125	0	0
	4-16ANN	125	125	0	0
	4-24ANN	125	125	0	0
	4-ANNAUDTEL	98	98	0	0
	4-LCDAUDTELANN	40	93	0	0
	4-MIC	8	38	0	0
	4-FT	9	168	0	0
	4-NET-CAT	27	27	0	0
3	4-NET-TP	32	32	96	96
	4-NET-TP-HC	32	32	0	0
	4-NET-MM	35	35	0	0
	4-NET-SM	35	35	0	0
	4-NET-SMD	35	35	0	0
	4-NET-SMH	35	35	0	0
	4-NET-SMU	35	35	0	0
	PANEL TOTALS			1429	1710.8

FIELD EQUIPMENT

Quantity	Device	Standby (ma) Current	Alarm (ma) Current	TOTAL (ma) Standby Current	TOTAL (ma) Alarm Current
					0
					0
					0
					0
					0
					0
	FIELD TOTALS			0	0

BATTERY SIZING CALCULATIONS

Project Name: MADISON/JEFFERSON FA
Project Number: 212098

Panel Name: JEFFERSON
Area Served:

Requirement for standby current (hours):	24	hrs.
Requirement for alarm current (minutes):	5	min.
Spare Battery Capacity (percentage):	20%	%

Design Supervison Current =	34.30	amp-hr
Design Alarm Current =	0.14	amp-hr
Additional Capacity Current =	6.89	amp-hr
Battery AH requirement =	41.33	amp-hr
Battey Provided	45.00	amp-hr

PANEL EQUIPMENT

Quantity	Device	Standby (ma) Current	Alarm (ma) Current	TOTAL (ma) Standby Current	TOTAL (ma) Alarm Current
1	4-CPU/3-PPS	211	211	211	211
	4-AUDTELS	85	101	0	0
1	4-ANNCPU	125	125	125	125
	4-ANNAUDTEL	98	98	0	0
	4-CPUGRPH	123	123	0	0
	3-BPS/M(230)	50	50	0	0
	3-BBC/M	70	70	0	0
	4-24L series	3	5.6	0	0
	3-xx series	2	2	0	0
	3-LDSM	5	5	0	0
1	4-LCD	40	93	40	93
	4-LCDAUDTEL	40	93	0	0
	4-3LCD	40	93	0	0
	4-NET-TP(-HC)	32	32	0	0
	4-NET-CAT/4-FWAL-CAT	27	27	0	0
	4-NET-SM/4-FWAL-SM	35	35	0	0
	4-NET-MM/4-FWAL-MM	35	35	0	0
	4-NET-SMH/4-FWAL-SMH	35	35	0	0
	4-NET-SMU/4-FWAL-SMU	35	35	0	0
	4-NET-SMD/4-FWAL-SMD	35	35	0	0
	4-FWAL-1/2/3/4	92	92	0	0
1	4-USBHUB	44	44	44	44
	4-NET-AD	92	92	0	0
	4-NET-XT	110	110	0	0
	4-MIC	8	38	0	0
	4-FT	9	168	0	0
1	4-COMREL	0	8	0	8
	3-SSDC1	144	204	0	0
1	3-SDDC1	264	336	264	336
	3-IDC8/4	144	204	0	0
	3-OPS	53	147	0	0
1	3-MODCOM	60	95	60	95
	3-MODCOMP	60	95	0	0
	CDR-3	60	100	0	0
	3-ZA20B/A	62	1120	0	0
	3-ZA40B/A	62	2480	0	0
	3-ZA95	85	5540	0	0
	3-BPS/M	50	50	0	0
	3-BBC/M	70	70	0	0
	Remote Annunciators			0	0
2	4-ANNCPU	125	125	250	250
	4-LCDANN	40	93	0	0
	4-24L	3	5.6	0	0
	4-24L12S	3	5.6	0	0
	4-24L18S	3	5.6	0	0
3	4-24L24S	3	5.6	9	16.8
2	4-2ANN	165	218	330	436
	4-4ANN	125	125	0	0
	4-6ANN	125	125	0	0
	4-8ANN	125	125	0	0
	4-16ANN	125	125	0	0
	4-24ANN	125	125	0	0
	4-ANNAUDTEL	98	98	0	0
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	4-MIC	8	38	0	0
	4-FT	9	168	0	0
	4-NET-CAT	27	27	0	0
3	4-NET-TP	32	32	96	96
	4-NET-TP-HC	32	32	0	0
	4-NET-MM	35	35	0	0
	4-NET-SM	35	35	0	0
	4-NET-SMD	35	35	0	0
	4-NET-SMH	35	35	0	0
	4-NET-SMU	35	35	0	0
	PANEL TOTALS			1429	1710.8

FIELD EQUIPMENT

Quantity	Device	Standby (ma) Current	Alarm (ma) Current	TOTAL (ma) Standby Current	TOTAL (ma) Alarm Current
					0
					0
					0
					0
					0
					0
	FIELD TOTALS			0	0

1 / FA7.2 **FIRE ALARM PANEL POWER/BATTERY CALCULATIONS**
NO SCALE

Aug 12, 2022 - 1:55pm - 212098 MSU Madison-Jefferson FA Replace - Master -100% bid.dwg
C:\Users\RANDY~1.SAI\AppData\Local\Temp\AcPublish_21852\

MONTANA STATE UNIVERSITY
MSU-CPDC
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MADISON AND JEFFERSON HALL
FIRE ALARM REPLACEMENT

COFFMAN ENGINEERS
751 Osterman Dr., Suite 104
Bozeman, MT 59715
ph 406.582.1936
www.coffman.com

DRAWN BY: RAS
REVIEWED BY: JAA

REV.	DESCRIPTION	DATE
1	-	-
2	-	-
3	-	-

MONTANA — JASON A. ANDERSON No. 11805PE — LICENSED PROFESSIONAL ENGINEER

PPA 21-0138

SHEET TITLE
FACP POWER/BATTERY CALCS

SHEET
FA7.2

DATE
08-12-2022