DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX ROAD
CHARLOTTE, NC 28269

JANUARY 10, 2023

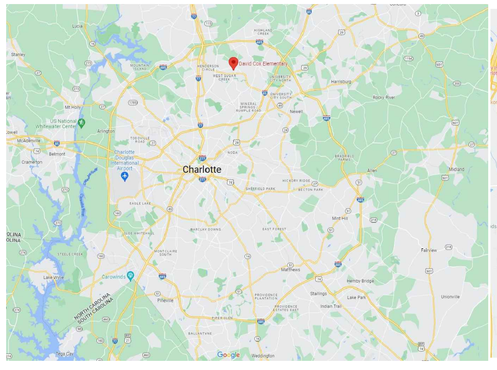
PROJECT TEAM

MECHANICAL ENGINEER: OPTIMA ENGINEERING
STEVE DALEY, PE
1927 SOUTH TRYON STREET, ST 300
CHARLOTTE, NC, 28203
704-388-1292

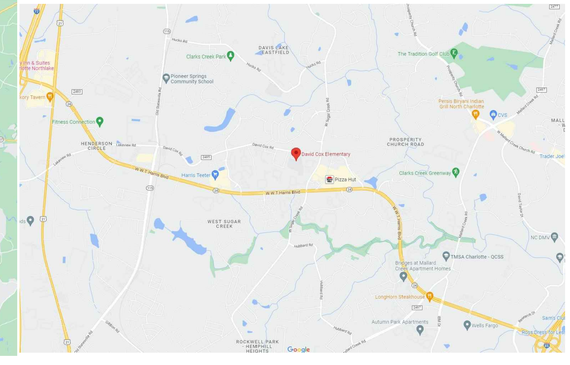
ELECTRICAL ENGINEER: OPTIMA ENGINEERING
BRIAN THOMPSON, PE
1927 SOUTH TRYON STREET, ST 300
CHARLOTTE, NC, 28203
704-388-1292

DRAWING LIST

AREA MAP



LOCATION SITE MAP



MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE, NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: (704) 388-1292 WWW.OPTIMA-ENG.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

SHEET TITLE:
COVER SHEET

DWG #:
COVER

SHEET NO: OF

MECHANICAL GENERAL NOTES

SEE SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS. THESE GENERAL NOTES ARE INTENDED TO SUPPLEMENT THE SPECIFICATIONS. IN THE EVENT THAT THE VERBIAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY AT THE ENGINEER'S DISCRETION.

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION INCLUDING RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED) AND O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS.
4. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
5. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE.
6. ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.
7. INSTALL ROOM TEMPERATURE SENSOR IN EXISTING WALL BOX. INSTALL THE TOP OF ALL THERMOSTATS AND SWITCHES AT 4'–0" (MAXIMUM) ABOVE FINISH FLOOR. EXTEND CONTROLS MOUNTING AS REQUIRED TOO ACHIEVE DEVICE MAXIMUM HEIGHT. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION. ANY DEVICE ON A PERIMETER WALL SHALL BE MOUNTED ON A FOAM–FILLED ELECTRICAL BOX, WITH ALL GAPS BETWEEN BOX AND WALL SEALED TO PREVENT INFILTRATION.
8. ALL MECHANICAL EQUIPMENT SHALL BE U.L. LISTED AND LABELED AS A COMPLETE PACKAGE, NOT THROUGH INDIVIDUAL COMPONENTS OR PARTS. PROVIDE REQUIRED 3RD PARTY FIELD UL LISTING SERVICES AS REQUIRED TO COMPLY.

MECHANICAL DEMOLITION NOTES

1. THE MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BEGINNING WORK TO DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID.
2. IT IS THE MECHANICAL CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL EXISTING DUCTWORK AND PIPING. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND MECHANICAL PLANS SHOULD BE BROUGHT TO THE ATTENTION OF THE MECHANICAL ENGINEER.
3. THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL EXISTING SMOKE DAMPERS ARE LOCATED WHERE INDICATED ON DRAWINGS.
4. FOR ALL EXISTING HVAC EQUIPMENT AND DUCTWORK NOTED TO REMAIN AND SERVING AREA OF RENOVATION, MECHANICAL CONTRACTOR SHALL INSPECT EQUIPMENT (AND ANY ASSOCIATED CONTROLS, VALVES, DAMPERS, ETC.) TO VERIFY PROPER WORKING ORDER. MECHANICAL CONTRACTOR TO SERVICE AND CLEAN EXISTING HVAC UNITS TO ENSURE DESIGN AIRFLOW AND COOLING/HEATING CAPACITIES ARE OBTAINED. ANY EQUIPMENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROJECT COMPLETION. PROVIDE CLEAN FILTERS IN ALL UNITS AT COMPLETION OF PROJECT.

TESTING, ADJUSTING, AND BALANCING

1. CONTRACTOR SHALL PROVIDE A PRE–DEMOLITION TEST AND BALANCE REPORT AND CONTROLS DIAGNOSTICS REPORT ON THE EXISTING SYSTEMS INDICATED TO REMAIN: AHU–X, UH–X,FC–X,EF–X, CH–X, ETC. REPORT SHALL INCLUDE AIR AND WATER FLOWS; ENTERING AND LEAVING AIR CONDITIONS; EXTERNAL AND TOTAL STATIC PRESSURES, AND ALL PERFORMANCE AND CONTROLS DEFICIENCIES DISCOVERED. ANY EQUIPMENT OR COMPONENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER. SUMMATION OF GRILLES IS AN ACCEPTABLE ALTERNATIVE TO DUCT TRAVERSE READINGS.
   PRE–DEMOLITION TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR. CONTROLS DIAGNOSTICS REPORT SHALL BE COMPLETED BY THE CONTROLS CONTRACTOR. REPORTS SHALL BE SUBMITTED FOR REVIEW DURING SHOP SUBMITTAL PROCESS.
2. THE CONTRACTOR SHALL BALANCE ALL MECHANICAL SYSTEMS TO THE PERFORMANCE SPECIFICATIONS INDICATED ON PLANS AND PROVIDE THE ENGINEER WITH THREE COPIES OF A COMPLETE TEST AND BALANCE REPORT. THE REPORT IS TO BE ISSUED A MINIMUM OF TWO WEEKS PRIOR TO PROJECT COMPLETION. THE TEST AND BALANCE REPORT WILL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER. ANY ADDITIONAL TESTING, ADJUSTING AND BALANCING REQUIRED (AT ENGINEER'S REQUEST) AFTER REVIEW OF THE INITIAL REPORT SHALL BE PROVIDED AT NO ADDITIONAL COST. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.
3. CONDUCT TESTING AND BALANCING IN ACCORDANCE WITH TECHNICAL PORTIONS OF THE AABC "NATIONAL STANDARDS FOR TESTING AND BALANCING HVAC SYSTEMS", LATEST EDITION.
4. INSTRUMENTS USED FOR BALANCING MUST HAVE BEEN CALIBRATED WITHIN A PERIOD OF SIX (6) MONTHS PRIOR TO BALANCING. SUBMIT SERIAL NUMBERS, AND DATES OF CALIBRATION OF ALL INSTRUMENTS TO BE USED PRIOR TO THE START OF WORK.
5. SET HVAC SYSTEM AIRFLOW AND WATER FLOW RATES WITHIN THE FOLLOWING TOLERANCES:
   - 5.1. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: MINUS 5 TO PLUS 10 PERCENT.
   - 5.2. AIR OUTLETS AND INLETS: 0 TO MINUS 10 PERCENT.
   - 5.3. HEATING–WATER FLOW RATE: 0 TO MINUS 10 PERCENT.
   - 5.4. COOLING–WATER FLOW RATE: 0 TO MINUS 5 PERCENT.
6. REFER TO SPECIFICATION SECTIONS 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC, 230800 – MECHANICAL SYSTEM COMMISSIONING AND CONTRACT DRAWINGS IN THEIR ENTIRETY FOR ADDITIONAL REQUIREMENTS.

2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY – MECHANICAL SUMMARY

C401 METHOD OF COMPLIANCE

- ■ 2018 NCECC CHAPTER 5
- ☐ COMCHECK PROVIDED (2018 NCECC)
- ☐ ASHRAE 90.1–2013 PRESCRIPTIVE
- ☐ COMCHECK PROVIDED (90.1–2013)
- ☐ ASHRAE 90.1–2013 PERFORMANCE
- ☐ ENERGY MODELING DATA PROVIDED
- ☐ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

NOT APPLICABLE
MECHANICAL WORK WITHIN AN EXISTING BUILDING. BUILDING AUTOMATION SYSTEM RENOVATION, CHANGEOUT OF EXISTING PNEUMATIC CONTROLS WITH ELECTRONIC DDC.

C301 CLIMATE ZONE

3A – MECKLENBURG COUNTY, NORTH CAROLINA

DESIGN CONDITIONS

EXTERIOR (ASHRAE 90.1–2013 TABLE D–1)

winter dry bulb	18° F.
summer dry bulb	91° F.
summer wet bulb	74° F.

INTERIOR (2018 NCECC SECTION C302.1)

winter dry bulb	72° F.
summer dry bulb	75° F.

C403.2 HEATING & COOLING LOADS AND EQUIPMENT & SYSTEM SIZING

BUILDING HEATING LOAD	EXISTING TO REMAIN
BUILDING COOLING LOAD	EXISTING TO REMAIN
INSTALLED HEATING CAPACITY	EXISTING TO REMAIN
INSTALLED COOLING CAPACITY	EXISTING TO REMAIN

C403.2.3 & C406.2 – REQUIRED & INCREASED HVAC EQUIPMENT PERFORMANCE

SYSTEM DESCRIPTION – BUILDING AUTOMATION SYSTEM RENOVATION, CHANGEOUT OF EXISTING PNEUMATIC CONTROLS WITH ELECTRONIC DDC.

C403.2.4 THRU C403.2.11

■ NOT APPLICABLE THIS PROJECT

C403.2.12 – AIR SYSTEM DESIGN AND CONTROL

■ NOT APPLICABLE THIS PROJECT

C403.3 – ECONOMIZERS (PRESCRIPTIVE)

■ NOT APPLICABLE THIS PROJECT

C403.4 – HYDRONIC AND MULTIPLE–ZONE HVAC SYSTEMS CONTROL AND EQUIPMENT (PRESCRIPTIVE)

■ NOT APPLICABLE THIS PROJECT

C405.8 – ELECTRICAL MOTORS (MANDATORY REQUIREMENTS).

■ NOT APPLICABLE THIS PROJECT

C408 – SYSTEM COMMISSIONING

- ☐ BUILDING IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.
- ■ BUILDING IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.

COMMISSIONING NOTE

THIS PROJECT INCLUDES A THIRD PARTY COMMISSIONING AGENT CONTRACTED BY THE OWNER. THE CONTRACTOR SHALL COORDINATE WITH OWNER'S COMMISSIONING AGENT AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT. SEE COMMISSIONING REQUIREMENTS IN THE PROJECT MANUAL FOR FURTHER INFORMATION.

EQUIVALENT MANUFACTURERS LISTING

LISTING OF MANUFACTURER'S NAME DOES NOT GUARANTEE APPROVAL. ALL EQUIPMENT MUST MEET OR EXCEED QUALITY AND CAPACITIES OF SPECIFIED EQUIPMENT. FINAL APPROVAL WILL BE BASED ON EQUIPMENT SUBMITTALS. ANY MANUFACTURER NOT LISTED BUT WISHING TO BID THIS PROJECT SHALL SUBMIT A WRITTEN REQUEST A MINIMUM OF 7 DAYS PRIOR TO BID DATE OR AS INDICATED IN THE SPECIFICATIONS, PRIOR APPROVAL IS REQUIRED FOR ALL MANUFACTURERS NOT LISTED.

(ALPHABETICAL ORDER)

DDC CONTROLS :SEE SPECIFICATION SECTION 23 0900 PART 2.1.A

NOTE:
ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	ABBR.
CHS	EX CHILLED WATER SUPPLY	CHS
CHR	EX CHILLED WATER RETURN	CHR
HWS	EX HOT WATER SUPPLY	HWS
HWR	EX HOT WATER RETURN	HWR
DTS	EX DUAL TEMPERATURE WATER SUPPLY	DTS
DTR	EX DUAL TEMPERATURE WATER RETURN	DTR
CW	EX COLD WATER MAKE–UP	CW
	EX BUTTERFLY VALVE	
	EX 3–PIECE BALL VALVE	
	EX CHECK VALVE	
	EX STRAINER WITH BLOWDOWN	
	EX BALANCING VALVE	
	EX B&G CIRCUIT SETTER	
	EX GATE VALVE	
	EX UNION	
	EX THERMOMETER	
	EX PRESSURE GAGE & COCK	
	EX GAGE COCK	
	EX FLOW SWITCH	
	EX SUPPLY AIR DIFFUSER	
	EX RETURN AIR GRILLE	
	EX EXHAUST AIR GRILLE	
	EXISTING DOUBLE LINE DUCTWORK	
	EXISTING SINGLE LINE DUCTWORK	
	EXISTING MECHANICAL TO BE REMOVED	
20/14ø	20"x14" FLAT OVAL DUCT	
20x14	20"x14" RECTANGULAR DUCT	
8"ø	8" DIAMETER ROUND DUCT	
	POINT OF EXISTING TO NEW CONNECTION	
FD	EX FIRE DAMPER	
FS/D	EX COMBINATION FIRE/SMOKE DAMPER	
SD	EX SMOKE DAMPER	
S	SWITCH (4'–0" AFF TO TOP)	
M	MOTORIZED DAMPER	
DD	EX RETURN AIR DUCT DETECTOR	
T	SPACE TEMPERATURE SENSOR	
H	SPACE HUMIDITY SENSOR	
Z	ZONE TEMPERATURE SENSOR	
SCU	STAND ALONE CONTROL ELEMENT	
CO	CARBON MONOXIDE SENSOR	
T1	DISCHARGE AIR SENSOR	
T2	MIXED AIR SENSOR	
T3	RETURN AIR SENSOR	
T4	OUTSIDE AIR SENSOR	
EA	ELECTRONIC ACTUATOR	
LL	LOW LIMIT	
DP	FILTER STATUS	
ECV1	CHW CONTROL VALVE	
ECV2	HW CONTROL VALVE	
ECV3	DT CONTROL VALVE	
V1	COOLING ACTUATOR (0–10V)	
W1	HEATING ACTUATOR (0–10V)	
Y1	DUAL TEMP ACTUATOR (0–10V)	
FS	FREEZE STAT	
FSS	FAN S/S	
FSP	SPEED	
FPR	FAN PROOF	
SFSS1	SUPPLY FAN S/S LOW SPEED* RELAY IN STARTER	
SFSS2	SUPPLY FAN S/S HIGH SPEED* RELAY IN STARTER	
CO2	RETURN AIR CO2 SENSOR	
OAF	OUTSIDE AIRFLOW MONITOR	
EAC	ELECTRONIC AIR CLEANER (ION GENERATOR)	
	2–WAY CONTROL VALVE	
	3–WAY CONTROL VALVE	
M.C.	MECHANICAL CONTRACTOR	
E.C.	ELECTRICAL CONTRACTOR	
P.C.	PLUMBING CONTRACTOR	
N.I.C.	NOT IN CONTRACT	
EX	EXISTING	
AFF	ABOVE FINISHED FLOOR	
DN	DOWN	
UP	UP	

DRAWING LIST

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FIRE PROTECTION • TECHOLOGY DESIGN
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150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: 704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914
optima engineering

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027385 STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL LEGEND, NOTES AND SCHEDULES

DWG #:
M100

OPTIMA ENGINEERING
MECHANICAL • ELECTRICAL • PLUMBING • FIRE PROTECTION • LIGHTING DESIGN

EXISTING UNIT VENTILATOR SCHEDULE (DUAL TEMP COILS)

(FOR INFORMATION ONLY)

SYMBOL		CFM	O.A. CFM	E.S.P.	Cooling Capacity		Heating Capacity	COIL				MOTOR (ELECTRICAL DATA)		MANUFACTURER	* CONTROL DIAGRAM	** FAN SPEED CONTROL
					TC (BTUH)	SHC (BTUH)	BTUH	GPM	RUNOUT	P.D.	S.P.	H.P.	VOLTAGE	TRANE	#/M500	#/M501
UV	20A	1490	500		58640	42017	33300	11.7	1	7.1	0.11	1/4	120/1	TUVA15	8	2
UV	20B	1490	500		58640	42017	33300	11.7	1	7.1	0.11	1/4	120/1	TUVA15	8	2
UV	20B	1490	500		58640	42017	33300	11.7	1	7.1	0.11	1/4	120/1	TUVA15	8	2
UV	20C	1490	500		58640	42017	33300	11.7	1	7.1	0.11	1/4	120/1	TUVA15	8	2
UV	A01	1210	125		47400	33163	21300	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	A05	1210	125		44580	31482	19400	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A07	1210	125		44580	31482	17300	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A08	1210	125		47400	33163	18100	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	A09	1210	125		47400	33163	18100	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	A14	1210	125		44580	31482	17300	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A16	1210	125		47400	33163	18100	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	A19	1210	125		47400	33163	18100	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	A21	1210	125		44580	31482	17300	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A23	1210	125		44580	31482	17300	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A26	1210	125		44580	31482	19400	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	A28	1210	125		47400	33163	18100	9.5	1	12.5	0.13	1/4	120/1	TUVA12	8	2
UV	B21A	1490	570		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	8	2
UV	B21B	1490	570		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	8	2
UV	B21C	1490	0		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	9	2
UV	B21D	1490	570		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	8	2
UV	B21E	1490	570		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	8	2
UV	B23A	1010	75		33730	25128	12300	6.7	1	10.2	0.11	1/4	120/1	TUVA10	8	2
UV	B23B	1010	75		33730	25128	12300	6.7	1	10.2	0.11	1/4	120/1	TUVA10	8	2
UV	B24	1010	0		33730	25128	2600	6.7	1	10.2	0.11	1/4	120/1	TUVA10	9	2
UV	C21F	1490	0		59800	41225	24800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	9	2
UV	C34A	1210	0	0.10	45230	32099	22000	9.0	1	4.2	0.17	1/4	120/1	TUVA12	9	2
UV	C34B	1210	0	0.10	45230	32099	22000	9.0	1	4.2	0.17	1/4	120/1	TUVA12	9	2
UV	D01	740	75		22570	16909	8600	4.5	1	4.0	0.08	1/4	120/1	TUVA10	8	2
UV	D02	740	75		22570	16909	5700	4.5	1	4.0	0.08	1/4	120/1	TUVA10	8	2
UV	D05	740	75		22570	16909	8600	4.5	1	4.0	0.08	1/4	120/1	TUVA10	8	2
UV	D06	1210	125		41310	29447	16000	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D07	1210	125		41310	29447	16000	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D08	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D09	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D13	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D14	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D15	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D16	1210	125		41310	29447	16200	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	D19	1210	125		44580	31482	19700	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	D20	1210	125		44580	31482	19700	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E02	1210	125		41310	29447	17700	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	E03	1210	125		41310	29447	17500	8.2	1	9.9	0.09	1/4	120/1	TUVA12	8	2
UV	E06A	1490	125		59800	41225	15800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	8	2
UV	E06B	1490	0		59800	41225	15800	12.4	1	8.6	0.18	1/4	120/1	TUVA15	9	2
UV	E07	1210	125		44580	31482	16400	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E08	1210	125		44580	31482	16400	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E09	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E10	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E14	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E15	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E16	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E17	1210	125		44580	31482	16600	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2
UV	E20	1210	125		44590	33149	19800	8.4	1	3.7	0.16	1/4	120/1	TUVA12	8	2
UV	E21	1210	125		44580	31482	19800	8.9	1	11.3	0.11	1/4	120/1	TUVA12	8	2

* SEE DRAWING M500 FOR CONTROL DIAGRAM FOR EACH UNIT

** SEE DRAWING M501 FOR FAN SPEED SWITCH DIAGRAM FOR EACH UNIT

EXISTING FAN COIL UNIT SCHEDULE (DUAL TEMP COILS)

(FOR INFORMATION ONLY)

SYMBOL		CFM	O.A. CFM	E.S.P.	Cooling Capacity		Heating Capacity	COIL				MOTOR (ELECTRICAL DATA)		MANUFACTURER	* CONTROL DIAGRAM	** FAN SPEED CONTROL
					TC (BTUH)	SHC (BTUH)	BTUH	GPM	RUNOUT	P.D.	S.P.	WATTS	VOLTAGE	TRANE	#/M500	#/M501
FC	A04	190			4600	4100	13600	1.0	1/2	0.7	0.08	55	120/1	D16A002	9	3
FC	A11	190			4600	4100	13600	1.0	1/2	0.7	0.08	55	120/1	D16A002	9	3
FC	A20	190			4600	4100	13600	1.0	1/2	0.7	0.08	55	120/1	D16A002	9	3
FC	A27	190			4600	4100	13600	1.0	1/2	0.7	0.08	55	120/1	D16A002	9	3
FC	B01	468	300	0.10	16500	11920	39670	4.0	1/2	18.9	0.102	80	120/1	E34A006	10	3
FC	B05	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	B07A	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	B07B	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	B07C	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	B12	190			5800	4500	14300	1.0	1/2	1.7	0.077	55	120/1	D16A002	9	3
FC	B18	410	150	0.10	16500	11500	29100	3.3	1/2	15.9	0.09	80	120/1	E34A006	10	3
FC	B19	190			4600	4100	13600	1.0	1/2	0.7	0.08	55	120/1	D16A002	9	3
FC	B26	320		0.10	9500	7200	19100	2.2	1/2	3.7	0.096	55	120/1	E34A004	10	3
FC	C01A	279			8400	6500	18600	1.5	1/2	4.4	0.053	60	120/1	E36A003	9	3
FC	C01B	190			5800	4500	14300	1.0	1/2	1.7	0.077	55	120/1	E36A002	9	3
FC	C02	410	80	0.10	14700	10700	27200	2.8	1/2	11.8	0.086	80	120/1	E34A006	11	3
FC	C03	410	20	0.10	14700	10500	25500	3.4	1/2	16.8	0.086	80	120/1	E34D006	11	3
FC	C04	320	60	0.10	10500	7700	21200	2.3	1/2	4.0	0.096	55	120/1	E34A004	11	3
FC	C08	162	10	0.10	5800	4300	13300	1.2	1/2	2.3	0.121	55	120/1	E34A002	11	3
FC	C09	245	10	0.10	7900	6000	17600	1.4	1/2	3.9	0.108	60	120/1	E34A003	11	3
FC	C11	245	10	0.10	7900	6000	17600	1.4	1/2	3.9	0.108	60	120/1	E34A003	11	3
FC	C15	162	5	0.10	4400	3700	12600	1.0	1/2	0.7	0.121	55	120/1	E34A002	10	3
FC	C16	162	5	0.10	4400	3700	12600	1.0	1/2	0.7	0.121	55	120/1	E34A002	11	3
FC	C19	162	5	0.10	4400	3700	12600	1.0	1/2	0.7	0.121	55	120/1	E34A002	11	3
FC	C21	162	10	0.10	4400	3700	12700	1.0	1/2	0.7	0.121	55	120/1	E34A002	11	3
FC	C22	162		0.10	5400	4000	12800	1.0	1/2	1.7	0.121	55	120/1	E36A002	11	3
FC	C28	162	10	0.10	5900	4000	12700	1.3	1/2	1.1	0.121	55	120/1	E34A002	11	3
FC	C29	320	20	0.10	9500	7300	19800	2.0	1/2	3.1	0.096	55	120/1	E34A004	11	3
FC	C30	162	10	0.10	4400	3700	12700	1.0	1/2	0.7	0.121	55	120/1	E34A002	11	3
FC	C31	162	10	0.10	4400	3700	12700	1.0	1/2	0.7	0.121	55	120/1	E34A002	11	3
FC	C32	320	10	0.10	9700	7100	19600	1.3	1/2	2.8	0.096	55	120/1	E34A004	11	3
FC	C33	286	10	0.10	9100	6800	18900	1.9	1/2	4.4	0.082	55	120/1	E34A004	11	3
FC	C36	320	10	0.10	9300	7100	19600	1.9	1/2	2.8	0.096	55	120/1	E34A004	9	3
FC	C37	162		0.10	4300	3600	12700	1.0	1/2	0.7	0.121	55	120/1	E34A002	9	3
FC	C38	410	20	0.10	14100	10300	25500	2.9	1/2	12.5	0.086	80	120/1	E34A006	9	3
FC	C45A	468		0.10	15500	10900	24100	7.0	1/2	53.0	0.102	80	120/1	E36A006	9	3
FC	C45B	468		0.10	15500	10900	24100	7.0	1/2	53.0	0.102	80	120/1	E36A006	9	3
FC	C45C	468		0.10	15500	10900	24100	7.0	1/2	53.0	0.102	80	120/1	E36A006	9	3
FC	C45D	162		0.10	4300	3600	12700	1.0	1/2	0.7	0.121	55	120/1	E36A002	9	3
FC	C45E	162		0.10	4300	3600	12300	1.0	1/2	0.7	0.121	55	120/1	E36A002	9	3
FC	D10	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	D12	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	D17	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	D18	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	E01	464			14900	11100	26400	3.0	1/2	13.4	0.051	80	120/1	D16A006	9	3
FC	E11	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	E13	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	E18	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3
FC	E19	190			4600	4100	13600	1.0	1/2	0.7	0.077	55	120/1	D16A002	9	3

* SEE DRAWING M500 FOR CONTROL DIAGRAM FOR EACH UNIT

** SEE DRAWING M501 FOR FAN SPEED SWITCH DIAGRAM FOR EACH UNIT

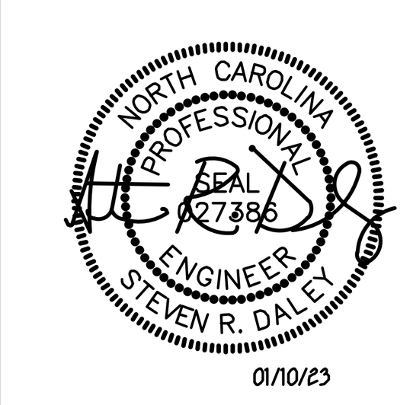
EXISTING PUMP SCHEDULE

(FOR INFORMATION ONLY)

SYMBOL		SERVICE	TYPE	GPM	HEAD (FT H2O)	RPM	HP	VOLTAGE
P	1A	DTS MAIN LOOP	BASE MTD END SUCTION	220.00	75	1750	7.5	460/3
P	1B	DTS MAIN LOOP	BASE MTD END SUCTION	220.00	75	1750	7.5	460/3

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: 704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914
optima engineering

SEAL:



DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

SHEET TITLE:
MECHANICAL SCHEDULES

DWG #: M101

SHEET NO: 2 OF 14

OPTIMA ENGINEERING
MECHANICAL • ELECTRICAL • PLUMBING • FIRE PROTECTION • LIGHTING DESIGN

1.1 ZONE PROGRAM CONTROL
Each of the (10) zones is automatically started and stopped by an optimized scheduling program in Building Automation System (BAS).
See drawing M103 for Zone Control Schedule.
Activation of zones from unoccupied to occupied shall be staggered to minimize electrcial current inrush.
During "occupied" periods, the zones operate continuously, and the room thermostats maintain normal space temperatures.
During "unoccupied" periods, the BAS uses space temperature sensors to cycle the zones as required to prevent space temperature from falling below a low limit setpoint (ADJ.).

All systems shall have the capability for basic functionality in Local Mode should the BAS fail. See details on drawing M500 and M501 for additional information.

1.2 DUAL TEMPERATURE SYSTEM
The Building Automation System (BAS) shall perform the following Central Plant Dual Temperature System (DTS) control strategies, appropriate to the given occupancy mode of the system, as determined by the user-adjustable time-of-day schedule for the system. Optimal start and unoccupied mode applies only to HVACU with time of day scheduled operation. Verify time schedule during Owner's training.

All setpoint control points shall be adjustable through the BAS.

When any of the zones operates, the dual temperature pumps P-1A & P-1B are energized (ADJ.) by the software to supply the whole system.
When Outdoor Air Temperature is below 39° F (ADJ.), dual temperature pumps P-1A & P-1B shall be energized.

When Outdoor Air Temperature is above 38° F (ADJ.) and the dual temperature system is indexed to "winter", dual temperature pumps P-1A & P-1B shall operate as "lead" and "lag" pumps. When the BAS calls for operation of the main pumps P-1A & P-1B, the "lead" pump runs continuously but the "lag" pump runs only if outside air temperature is below 39° F (ADJ.) or if "lead" pump fails.
When Outdoor Air Temperature is above 38° F (ADJ.) and the dual temperature system is indexed to "summer", dual temperature pumps P-1A & P-1B shall operate as "lead" and "lag" pumps. When the BAS calls for operation of the main pumps P-1A & P-1B, the "lead" pump runs continuously but the "lag" pump runs if the "lead" pump fails or if dual temperature system pressure, as measured by differential pressure transmitters are below setpoint in software.

The "lead" and "lag" pumps are automatically switched weekly through BAS.
P-1A and P-1B run status shall be reported to the BAS.

Dual Temperature Water Distribution (Secondary) Pump Start/Stop:
The BAS controller shall start a Dual Temperature water pump (Pump P-1A or P-1B) through a contact closure of the pump's variable frequency drive (VFD) run-enable contacts.

Dual Temperature Water Distribution (Secondary) Pump Status:
The BAS controller shall detect Dual Temperature water pump (Pump P-1A or P-1B) run status by the VFD RUN Output.

Dual Temperature Water Distribution (Secondary) Pump Lead/Lag:
The Dual Temperature water pump lead/lag sequence shall be based on a weekly schedule. From the BAS controller human-interface panel or a BAS workstation, an operator shall be able to manually change the lead/lag sequence.
If the lead pump speed falls below 40% (adj.) for five minutes (adj.) the lag pump shall be disabled.

Dual Temperature Water Distribution (Secondary) Pump Failure:
If the lead start/stop relay is enabled and the VFD RUN Output is off for more than 30 seconds (adj.), the BAS controller shall annunciate a Dual Temperature water pump failure alarm to the BAS workstation and starts the lag pump. When a pump failure exists, lead/lag automation shall be disabled and the currently running pump becomes the lead pump. Once the problem has been corrected, the operator shall be able to clear the alarm failure from the BAS controller or BAS workstation. This action shall re-enable the lead/lag sequence.

Dual Temperature Water Distribution (Secondary) Pump Speed:
The BAS controller shall monitor the Dual Temperature water system differential pressure sensors. When the pump VFD is enabled, the BAS controller shall control the analog speed signal sent to the pump VFD to maintain a hot water differential pressure setpoint of 15.0 psig (adj.).

Dual Temperature System/Winter
Summer/Winter Operating mode shall be selectable as Automatic or Manual through the BAS.

The operating mode of the dual temperature system is indexed to "winter" or "summer" operation through BAS.
When the system is indexed for "winter" operation and any of the dual temperature pumps P-1A or P-1B operates as described above, boilers B-1 and B-2 are activated by BAS and hot water pumps HWP-1 and HWP-2 are enabled by the boiler.

Cooling to Heating Switchover Sequence
When the Auto-Switchover Process is enabled via the Auto/Manual Point, and the Building is in Occupied Mode, and the Outdoor Air Temperature is below the Outdoor Air Winter Setpoint, less than 50° F (ADJ.) for a period of Two (2) Hour (ADJ), and the Building Average Zone Temperature (Based on the average of Zone Control Z-1 through Z-10 temperatures) is below the Winter Setpoint for a period of Two (2) Hours (ADJ), the system shall automatically switch from Summer mode to Winter mode. The chillers will be disabled. The boiler will then be commanded ON and the system will then rely on the Anti-Shock setpoint process to begin heating the water. The rooms will be set to Winter mode.
In auto change over, the last season shall remain enabled until reaching changeover set points.

Anti-Shock setpoint process (Heating)
If Dual Temperature Return water temperature is below 60° F (ADJ.), Valves V-VBLR1 and V-VBLR2 shall be open to bypass, circulating water only through boilers B-1 AND B-2. Once Boiler 1 and Boiler 2 Hot Water Return Temperatures are greater than 140°F (ADJ.), Valves V-VBLR1 and V-VBLR2 shall modulate to a partially open position (50% open (ADJ.)) to circulate from the building loop, maintaining the Dual Temperature supply temperature (TC-HWS). Once Dual Temperature Supply Temperature is above 110°F (ADJ.), Valves V-VBLR1 and V-VBLR2 shall be allowed to fully modulate.
Heating Anti-shock process shall be interlocked with Chiller(s) such that chillers shall not be called to operate when Anti-Shock process (Heating) is activated.

Valves V-VBLR1 and VVBLR2 shall be provided with end switches to prove valve position for Anti-Shock setpoint process (Cooling).

The Boiler water systems shall be enabled via a point controlled by a higher-level BAS.
The Boiler enable sequence shall also work locally from the HOA switch on the BAS enable relay.
The Boiler shall be enabled whenever Outside Air Temperature is below 70° F (ADJ.).

Boilers shall operate on a Lead/Lag sequence.

Boiler B-1 is associated with boiler pump HWP-1 and Hot Water bypass valve V-VBLR1.
Boiler B-2 is associated with boiler pump HWP-2 and Hot Water bypass valve V-VBLR2.

Controls on the boiler shall control the associated boiler pump and stage the burner as required to maintain constant water temperature in the boiler.
The Lead boiler shall start its associated boiler pump. Once boiler pump, P-1A and/or P-1B has been proven, status shall be reported to the BAS. After a Five (5) minute (ADJ.) delay, the burner shall be available to fire.
Boiler pump shall run for Five (5) minutes after the BAS has disabled the boiler and the burner is cycled off.
The boiler pumps and the boilers operate continuously whenever outside air temperature is below 20° F.

When boiler pump starts, and the system is in the "winter" mode, the associated Hot Water bypass valve opens to the system when the HW Temperature is above Anti-Shock Setpoint.
Dual temperature supply transmitter TT-DTS and controller TC-HWS then modulate Hot Water bypass valve as required to maintain constant supply water temperature.

The setpoint of TC-HWS is reset by outside air temperature transmitter TT-OA according to the following:
Upon outside air temperature rising above 40° F (ADJ.), the hot water supply temperature setpoint shall linearly reset from 160° F (ADJ.) to 110° F (ADJ.) at 60° F (ADJ.) and above, based on hot water return temperature increasing.
The reset temps listed above are for the building loop. The primary loop (boiler recirculation loop) temperature shall not fall below 140° F (ADJ.) to prevent condensation in the boiler from occurring.

As outside temperature falls, the setpoint is raised.
During start-up or changeover from "summer" to "winter", transmitter TT-HWR and controller TC- HWR can overcall TC-HWS as required to limit return water temperature to the boilers to 140°F (ADJ.) minimum by modulating the associated Hot Water bypass valves closed to the system and open to bypass.
As the system return rises above the setpoint of TC-HWR, TC-HWS has full control of the Hot Water bypass valves.
At the same time, Valves V-VCHLR1 and V-VCHLR2 are closed to the system while CWP-1 & CWP-2 and the chillers are inoperative.

1.2 DUAL TEMPERATURE SYSTEM (Cont.)

Dual Temperature System/Summer
Summer/Winter Operating mode shall be selectable as Automatic or Manual through the BAS.

When the system is indexed for "summer" operation and the BAS calls for operation of the main pumps P-1A & P-1B as described above, the "lead" pump operates continuously.

Heating to cooling switchover sequence
When the Auto-Switchover Process is enabled via the Auto/Manual Point, and the building is in Occupied Mode, and the Outdoor Air Temperature is above the Outdoor Air Summer Setpoint for a period of Two (2) Hours (ADJ), and the Building Average Zone Temperature (Based on the average of Zone Control Z-1 through Z-10 temperatures) is above the Summer Setpoint for a period of Two (2) Hours (ADJ), the system shall automatically switch from Winter mode to Summer mode. The boilers will be disabled and the associated bypass valves shall remain in bypass. The chillers will then be commanded ON and the system will then rely on the Anti-Shock setpoint process to begin cooling the water. Once the dual temperature system reaches the cooling anti-shock setpoint, the rooms will be set to Summer mode.
In auto change over, the last season shall remain enabled until reaching changeover set points.

Anti-Shock setpoint process (Cooling) – Heating to Cooling Switchover sequence (Chiller Protection)
When the system switches from boilers (heating) to chillers (cooling), the chillers must be protected from extremely hot water entering the chillers. This is accomplished by carefully managing the 3-way chiller anti-shock valves (Valves V-VCHLR1 AND V-VCHLR2) and setpoint. When the switchover begins, typically the dual temperature water is in the 100°F to 120°F range, but the chiller can only tolerate a maximum input temperature of apx 75°F. At the moment the plant is commanded to Summer mode, the chillers will be commanded to start and begin to chill the water that is in the primary piping loop and isolated from the secondary water by the chiller anti-shock valves (Valves V-VCHLR1 AND V-VCHLR2). The chiller anti-shock valves (Valves V-VCHLR1 AND V-VCHLR2) are then controlled via a span module such that only a small amount of the secondary water is introduced into the primary loop. The process variable for the span module is the chiller anti-shock temperature.
If Dual Temperature Return water temperature is above 75° F (ADJ.), Valves Valves V-VCHLR1 AND V-VCHLR2 shall be open to bypass, circulating water only through chillers ACRU-1 & ACRU-2. Once Chilled Water Supply Temperature reaches 45°F (ADJ.), Valves Valves V-VCHLR1 AND V-VCHLR2 shall modulate to a partially open position (50% open (ADJ.)) to circulate from the building loop, maintaining 60°F (ADJ.) chiller return temperature. Once Dual Temperature Supply Temperature is below 60°F (ADJ.), Valves Valves V-VCHLR1 AND V-VCHLR2 shall be allowed to fully modulate.
Cooling Anti-shock process shall be interlocked with Boiler such that Boiler shall not be called to operate when Anti-Shock process (Cooling) is activated.
Valves V-VCHLR1 AND V-VCHLR2 shall be provided with end switches to prove valve position for Anti-Shock setpoint process (Heating).

The chilled water system shall be enabled via a point controlled by a higher-level BAS.

Chiller ACC-1 is associated with pump CWP-1 and Chilled Water bypass valve V-VCHLR1.
Chiller ACC-2 is associated with pump CWP-2 and Chilled Water bypass valve V-VCHLR2.

Starting and stopping of chillers ACC-1 & ACC-2 is controlled by the BAS.
On a call for operation of a chiller, internal interlocks on that chiller start its associated chilled water pump. Run status for CWP-1 and CWP-2 shall be reported to the BAS.
The integral flow switch FS-C1 or FS-C2 proves water flow and Run status for CWP-1 or CWP-2 proves flow.
Once flow status has been proven for FS-C1 or FS-C2, CWP-1 or CWP-2 and P-1A and/or P-1B, after a Five (5) minute (ADJ.)delay, the chiller(s) start.
Internal controls on the chillers maintain constant leaving water temperature.
With pump CWP-1 or CWP-2 running, and system is in Summer Mode, associated Chilled Water bypass valve opens to the dual temperature system.

However, transmitter TT-CWR and controller TC-CWR can limit Chilled Water bypass valves during changeover from "winter" to "summer" as required to prevent entering water to the chillers from rising above 75° F.

As the system return falls below the setpoint of TC-CWR, Chilled Water bypass valves go fully open to the system and closed to bypass.
During "Summer" mode, Hot Water bypass valves are closed to the system while HWP-1 & HWP-2 and the boilers are inoperative.

On Start-up of main pumps P-1A or P-1B and the system is indexed for "summer" operation, chiller ACC-1 shall be enabled and its pump CWP-1 shall start. Once flow status for CWP-1 is proven for Five (5) minute (ADJ.) delay, ACC-1 compressors shall start.
However, if system Supply water temperature remains above 45° F (ADJ) for 10 minutes (ADJ), then chiller ACC-2 shall be enabled and CWP-2 shall start. Once flow status for CWP-2 is proven for Five (5) minute (ADJ.) delay, ACC-2 compressors shall start.
Once Supply water temperature drops below 44° F (ADJ) for 10 minutes (ADJ), chiller ACC-1 compressors shall stop. After a Five (5) minute (ADJ.) delay, CWP-1 shall stop.
Then, if system Supply water temperature remains above 45° F for 10 minutes (ADJ), chiller ACC-1 shall be enabled and its pump CWP-1 shall start. Once flow status for CWP-1 is proven for Five (5) minute (ADJ.) delay, ACC-1 compressors shall start and run in conjunction with chiller ACC-2 and CWP-2.
As system Supply water temperature drops below 44° F (ADJ), the reverse shall occur.

1.3 UNIT VENTILATOR
Unit shall energize on time of day schedule from BAS.
The unit ventilators are automatically started and stopped by the Energy Management System as part of the program zone.
See drawing M103 for Zone Control Schedule.

All setpoint control points shall be adjustable through the BAS.

The Building Automation System (BAS) shall perform the following Constant Volume Air System (CVAS) control strategies, appropriate to the given occupancy mode of the system, as determined by the user-adjustable time-of-day schedule for the system. Optimal start and unoccupied mode applies only to HVACU with time of day scheduled operation. Verify time schedule during Owner's training.

During "occupied" mode, each unit runs continuously. Fan speed (ADJ.) shall be controlled through the BAS. During the "unoccupied" mode, the units are inoperative unless a night low limit program (set at 55 degrees) cycles the units as required to prevent space temperature from falling below the limit.
When the unit is running, software allows the units damper to Open to outside air provided the "OA" signal from the Energy Management System allows outside air through the damper while the "OA" signal also opens the associated intake hood damper. However, when the unit stops or when the "OA" signal deactivates, the unit damper closes. The damper remains closed during night low limit operation.

In the "winter" mode, each wall thermostat T-UV maintains its heating setpoint, while low limit thermostat LLT-UV is activated.
Supply fan speed shall be set to "Low"speed (ADJ.). As space temperature deviates from setpoint (2°F(ADJ) below), the fan speed shall be set to "High" speed. As space temperature approaches setpoint (within 1°F (ADJ)), the fan speed shall be set to "Low" speed.

On a rise in space temperature, BAS first opens the unit damper to minimum position while the valve is 100% open. As temperature continues to rise, the valve is modulated closed. Finally, if temperature continues to rise after the valve is closed, the unit damper modulates open to outside air for cooling. The low limit thermostat LLT-UV can overcall T-UV to modulate the unit damper closed to outside air and the valve open as needed to prevent discharge temperature from becoming too low.

In the "summer" mode, BAS prevents the unit outside air from opening beyond minimum position and low limit thermostats LLT-UV are locked-out. Each wall thermostat T-UV maintains its cooling setpoint. Then, on a rise in space temperature, T-UV modulates the valve open to the coil as required.
Supply fan speed shall be set to "High"speed (ADJ.). As space temperature approaches setpoint (within 1°F (ADJ)), the fan speed shall be set to "Low" speed. As space temperature deviates from setpoint (2°F(ADJ) above), the fan speed shall be set to "High" speed.

During the "summer" mode, humidity sensor HS-Z7 inputs Media Center space humidity to the Energy Management System. When the humidity rises above the dehumidification setpoint (60% R.H. ADJ.), Zone #7 thermostat TZ-7 can then cycle the duct heaters through REs.

1.4 FAN COIL UNITS
Unit shall energize on time of day schedule from BAS.
The fan coil units are automatically started and stopped by the Energy Management System as part of the program zone.
See drawing M103 for Zone Control Schedule.

All setpoint control points shall be adjustable through the BAS.

The Building Automation System (BAS) shall perform the following Constant Volume Air System (CVAS) control strategies, appropriate to the given occupancy mode of the system, as determined by the user-adjustable time-of-day schedule for the system. Optimal start and unoccupied mode applies only to HVACU with time of day scheduled operation. Verify time schedule during Owner's training.

During the "occupied" mode, each unit runs continuously. Fan speed (ADJ.) shall be controlled through the BAS. During the "unoccupied" mode, the units are inoperative unless a night low limit program (set at 55 degrees) cycles the units as required to prevent space temperature from falling below the limit.

In the "winter" mode, each wall thermostat T-FCU shall maintain its heating setpoint. Then, as space temperature falls, BAS modulates the valve open to the coil. As space temperature rises, BAS modulates the valve closed to the coil.
Supply fan speed shall be set to "Low"speed (ADJ.). As space temperature deviates from setpoint (2°F(ADJ) below), the fan speed shall be set to "High" speed. As space temperature approaches setpoint (within 1°F (ADJ)), the fan speed shall be set to "Low" speed.

In the "summer" mode, each wall thermostat T-FCU shall maintain its cooling setpoint. Then, as space temperature rises, BAS modulates the valve open to the coil. As space temperature falls, BAS modulates the valve closed to the coil.
Supply fan speed shall be set to "High"speed (ADJ.). As space temperature approaches setpoint (within 1°F (ADJ)), the fan speed shall be set to "Low" speed. As space temperature deviates from setpoint (2°F(ADJ) above), the fan speed shall be set to "High" speed.

1.5 FANS
Fans shall energize on time of day schedule from BAS. Monitor status of Fans on BAS.

EF-1, 2, 4, 6, 7, 8, 9, 10 – These exhaust fans are interlocked with the associated zones through the Energy Management System. See drawing M103 for Zone Control Schedule. However, these fans do not operate when the zone is in the "unoccupied" mode.

SF-1 – This fan, which ventilates Boiler B03, is controlled by thermostat. On a rise in temperature, the fan starts.

EF-3. 5. 9 and SF-2 – Kiln exhaust fan EF-9 is controlled by a timer switch. Dishwasher exhaust fan EF-3 is controlled by an interlock relay. The Kitchen Hood exhaust fan EF-5 is controlled from a switch on the hood. When EF-5 runs, an auxiliary contact starts hood supply fan SF-2. If the hood alarm system is activated, SF-2 stops but EF-5 continues to run. Fly fan runs whenever the Kitchen loading dock door is open.

1.6 DUCTLESS SPLIT SYSTEMS
Ductless split systems are controlled by unit manufacturer's controls.
Zone temperature sensor shall monitor temperature in the associated rooms. If space temperature rises above 78°, an alarm shall be sent to the central BAS. No occupied or unoccupied settings shall be used.

1.7 UNIT HEATERS
Unit heaters shall be controlled by local thermostats only.
BAS shall monitor heater operation.

1.8 FIN TUBE HEATERS
In the "winter" mode, the wall thermostat maintains its heating setpoint. On a rise in space temperature, the valve is modulated closed.
In the "summer" mode, the valve shall remain closed.

1.9 CABINET UNIT HEATERS
In the "winter" mode, the Return Air thermostat maintains its heating setpoint. On a rise in space temperature, the valve is modulated closed.
In the "summer" mode, the valve shall remain closed.

1.10 SMOKE DETECTOR OPERATION
When particles of combustion are detected by the duct mounted smoke detector, stop the HVACU supply fan, close the outside damper and stop the fans in all air terminal units associated with the HVACU
Refer to Division 26 Fire Alarm Section for duct mounted smoke detectors.
Smoke detectors and sampling tubes shall be furnished by the electrical contractor for installation by the mechanical contractor. Sampling tubes shall be connected under electrical and installed under the mechanical section of this specification.

1.11 FIRE ALARM INTERFACE
The BAS shall shut-down all air handling equipment as required by code upon contact closure by a remote fire alarm relay located adjacent to the BAS control panel. Fire Alarm Activation shall annunciate at the BAS.
The HVAC equipment shall de-energize based on whether the dedicated smoke detector or the general alarm contact for that floor is in alarm. The equipment shall include, but not be limited to the following:
Toilets exhaust fans.
Janitor exhaust fan.
Building main relief fan.
Fan coil units.
Unit Ventilators

1.12 MISCELLANEOUS
Gas Meter
The controller shall monitor the gas meter for current gas consumption on a continual basis. These values shall be made available to the system at all time.
Alarm shall be generated as follows:
Meter Failure: Sensor reading indicates a loss of pulse output from the Gas Meter.
Peak Demand History:
The controller shall monitor and record the peak (high and low) demand readings from the gas meter. These readings shall be recorded on a daily, month-to-date, and year-to-date basis.
Usage History:
The controller shall monitor and record gas meter readings so as to provide a gas consumption history. KCF usage readings shall be recorded on a daily, month-to-date, and year-to-date basis.

The BAS shall monitor fire alarm system via open gateway processing in the fire alarm control panel.

1.13 ELECTRICAL POWER AND LIGHTING
Electric Meter
The controller shall monitor the electric meter for current power consumption on a continual basis. These values shall be made available to the system at all time.
Alarm shall be generated as follows:
Meter Failure: Sensor reading indicates a loss of pulse output from the Electric Meter.
Peak Demand History:
The controller shall monitor and record the peak (high and low) demand readings from the electric meter. These readings shall be recorded on a daily, month-to-date, and year-to-date basis.
Usage History:
The controller shall monitor and record electric meter readings so as to provide a power consumption history. KWH usage readings shall be recorded on a daily, month-to-date, and year-to-date basis.

The BAS shall monitor and control lighting via normally closed relays that interface in the lighting control contactors provided by the electrical contractor.
When the security alarm is turned on, building lighting shall give a single "flash" to alert occupants that the security alarm will engage in one minute and lighting to sweep off after alarm is enabled.

Mechanical • Electrical • Plumbing
Fire Protection • Techology Design
1927 S. Tryon St., Suite 300, Charlotte NC 28203
150 Fayetteville St., Suite 520, Raleigh, NC 27601
Phone: 704-338-1292 www.optimaengineering.com
North Carolina License Number C-0914
optima engineering

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027385 STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

SHEET TITLE:
CONTROLS SEQUENCE OF OPERATION

DWG #:
M102

SHEET NO: 3 OF 14

DUAL TEMPERATURE SYSTEM	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Boiler Hot Water Return Temp	x								x		x	At each Boiler
Boiler Hot Water Supply Temp	x								x		x	At each Boiler
Boiler Hot Water Supply Temp Setpoint Reset		x							x		x	At each Boiler
Boiler Alarm Status			x						x	x	x	At each Boiler
Boiler Status			x						x		x	At each Boiler
Boiler Mixing valve				x					x		x	At each Boiler
Boiler Pump Status			x						x		x	At each Boiler
Boiler Pump Alarm										x	x	At each Boiler
Boiler Pump Running in Hand										x	x	At each Boiler
Boiler Enable				x					x		x	At each Boiler
Boiler Failure										x	x	At each Boiler
Boiler Running in Hand										x	x	At each Boiler
Boiler High Hot Water Supply Temp										x	x	At each Boiler
Boiler Low Hot Water Supply Temp										x	x	At each Boiler
Outside Air Temp (alarm for out of range)					x				x	x	x	
Carbon Monoxide Sensor	x									x	x	
Chilled Water Return Temp	x								x		x	At each Chiller
Chilled Water Supply Temp	x								x		x	At each Chiller
Chiller setpoint		x							x		x	At each Chiller
Chiller status			x						x		x	At each Chiller
Chiller fault			x						x		x	At each Chiller
Chiller Enable/Disable				x					x		x	At each Chiller
High Main Chilled Water Return Temp										x	x	At each Chiller
High Main Chilled Water Supply Temp										x	x	At each Chiller
Low Main Chilled Water Return Temp										x	x	At each Chiller
Low Main Chilled Water Supply Temp										x	x	At each Chiller
Chiller Pump Status			x						x		x	See plans for quantity
Chiller Pump Start/Stop				x					x		x	See plans for quantity
Chiller Pump Failure										x	x	See plans for quantity
Chiller Pump Running in Hand										x	x	See plans for quantity
Circulation Pump Status			x						x		x	See plans for quantity
Circulation Pump Start/Stop				x					x		x	See plans for quantity
Circulation Pump Failure										x	x	See plans for quantity
Circulation Pump Running in Hand										x	x	See plans for quantity
Dual Temperature Supply Temp	x								x		x	
Dual Temperature Return Temp	x								x		x	
Chiller Controller BACnet Interface												
*Chiller Operating Mode									x		x	Each Chiller
*Chiller Operating Status									x		x	Each Chiller
*Chiller RLA Percent									x		x	Each Chiller
*Chiller RLA (Amps)									x		x	Each Chiller
*Chiller Entering Water Temp									x		x	Each Chiller
*Chiller Leaving Water Temp									x		x	Each Chiller
*Chiller Evaporator Flow Rate									x		x	Each Chiller
*Chiller Evaporator Flow Status									x		x	Each Chiller
*Chiller kW									x		x	Each Chiller
*Chiller Tons									x		x	Each Chiller
*Chiller kW/Ton									x		x	Each Chiller
**Failure Code					x				x		x	Each Chiller

* Manufacturer supplied points provided to the BAS via BACnet Interface

**Show Manufacturer's Failure/Fault Code Matrix in a linked graphic

VFD	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Differential Pressure	x								x		x	See plans for quantity
Differential Pressure Setpoint					x				x		x	
High Differential Pressure										x	x	
Start/Stop*				x					x		x	See plans for quantity
Speed*		x							x		x	See plans for quantity
Motor Current Amps					x				x		x	See plans for quantity
Motor Frequency Hertz					x				x		x	See plans for quantity
Motor Runtime					x						x	See plans for quantity
Motor Speed RPM					x				x		x	See plans for quantity
In Fault Condition						x			x	x	x	See plans for quantity
VFD Status				x		x			x		x	See plans for quantity

*Note: All VFDs shall have Start/Stop, Status and Speed as hardwired direct contact points. Other listed points shall be provided via a BACnet interface.

The BAS shall monitor and control all variable frequency drives (VFD) via BACnet interface in the drives. Binary Output shall be provided to signal to the BAS that the drive is running.

UNIT VENTILATOR	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Outside Air Humidity (*can be one for building)	x*				x*				x		x	
Outside Air Temp (*can be one for building)	x*				x*				x		x	
Dual Temp Supply Temp	x								x		x	
Supply Air Temp	x								x		x	
Zone Setpoint Adjust	x										x	
Zone Temp	x								x		x	
Cooling/Heating Valve		x							x		x	
R/A-O/A Damper		x							x		x	
Low Limit Temp Sensor			x						x	x	x	
Smoke Detector			x						x	x	x	
Fan Speed Switch				x					x		x	(Low/High/Off)
Supply Fan Status			x						x		x	
Supply Fan Start/Stop				x					x		x	
Cooling Setpoint					x				x		x	
Heating Setpoint					x				x		x	
Zone Humidity	x								x		x	Where indicated
Electric Duct Heater											x	Where indicated
Schedule								x			x	
Supply Fan Failure										x	x	
Supply Fan in Hand										x	x	
Drain Pan Float Switch			x							x	x	
Air Purification System (Future Device) NPBI			x							x	x	

FAN COIL UNITS	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
Outside Air Humidity (*can be one for building)	x								x		x	
Outside Air Temp (*can be one for building)	x								x		x	
Dual Temp Supply Temp	x								x		x	
Zone Temp	x								x		x	
Zone Setpoint Adjust	x										x	
Cooling/Heating Valve		x							x		x	
Smoke Detector			x						x	x	x	
Fan Speed Switch				x					x		x	(On/Off)
Zone Override			x						x		x	
Supply Fan Start/Stop				x					x		x	
Supply Fan Failure										x	x	
Supply Fan in Hand										x	x	
Drain Pan Float Switch			x							x	x	

FANS	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Zone Temp	x								x		x	Where Indicated
Fan Status			x						x		x	
Fan Start/Stop				x					x		x	
Zone Setpoint Adjustment (where required)	x								x		x	
Schedule								x			x	

DUCTLESS SPLIT SYSTEMS	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	Remarks
Space Temperature	x								x	x	x	

UNIT OR WALL HEATER	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
Heater Status			x						x	x	x	

SMOKE DETECTOR OPERATION	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
Smoke Detector Status*			x						x	x	x	
Smoke shutdown command						x			x	x	x	

KITCHEN EQUIPMENT	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
Cooler Temperature	x										x	Device for future connection
Freezer Temperature	x								x	x	x	Device for future connection

FIRE ALARM INTERFACE	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
FA Remote Relay Status*			x						x	x	x	
FA Remote Relay shutdown command**						x			x	x	x	

*Monitor FA Remote Relay status on relays next to each HVACU control panel.

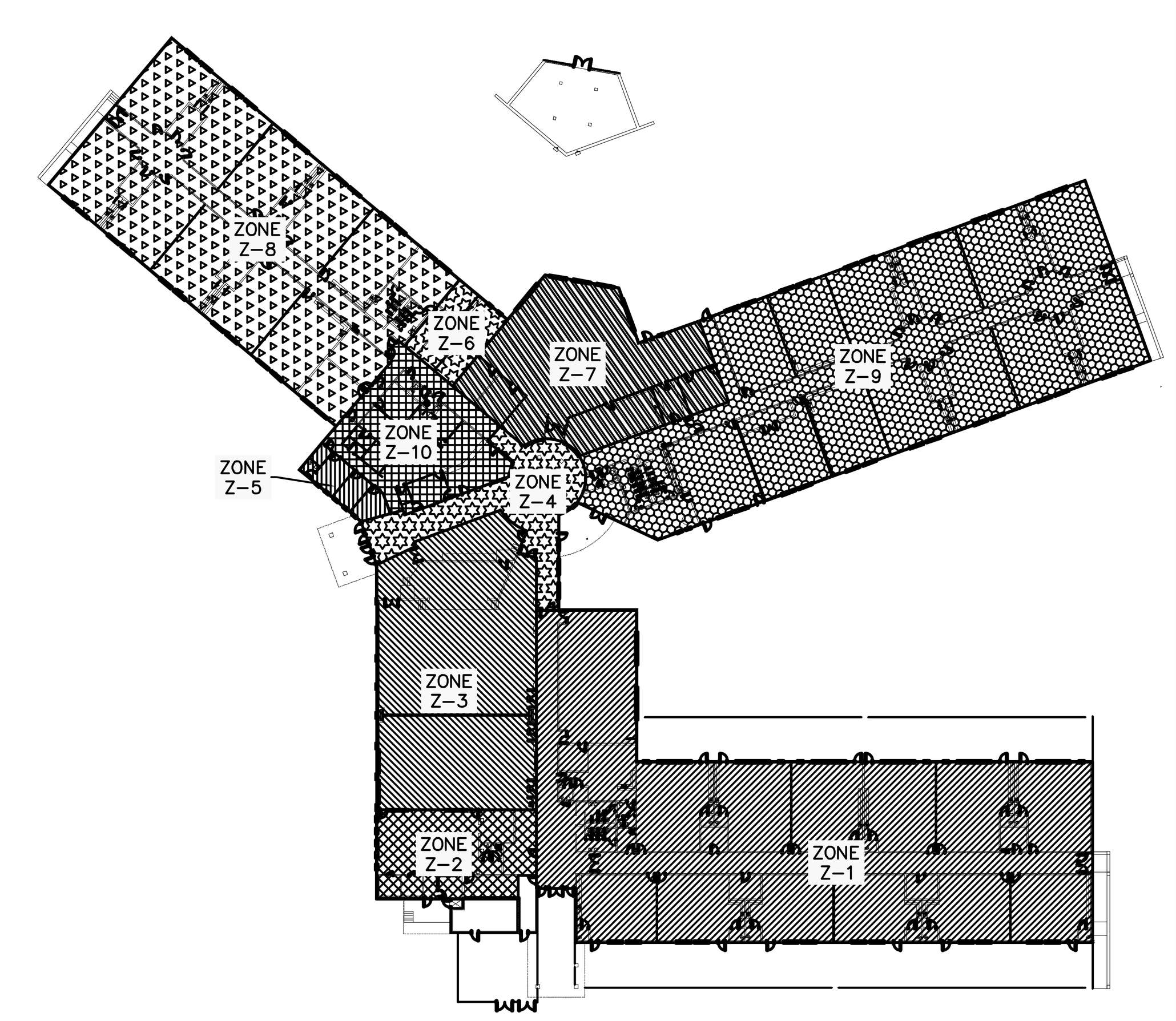
**Remote shutdown command shall shut down equipment by floor or area based on local relay status. HVACU, terminal units and fans included.

GAS METER	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
Gas Flow Rate			x						x	x		
Peak Month-to-Date									x		x	Calculate
Peak Today									x		x	Calculate
Peak Year-to-Date									x		x	Calculate
Usage Month-to-Date									x		x	Calculate
Usage Today									x		x	Calculate
Usage Year-to-Date									x		x	Calculate
Meter Failure										x		

ELECTRIC METER	Hardware Points				Software Points							
Point Name	AI	AO	BI	BO	AV	BV	Loop	Sched	Trend	Alarm	Show on Graphics	
kW Pulse			x						x	x	x	
kW Demand									x		x	Calculate
kW Peak Month-to-Date									x		x	Calculate
kW Peak Today									x		x	Calculate
kW Peak Year-to-Date									x		x	Calculate
kWh Today									x		x	Calculate
MWh Month-to-Date									x		x	Calculate
MWh Year-to-Date									x		x	Calculate
Meter Failure										x		

ZONE CONTROL SCHEDULE (SEE PLAN THIS SHEET)

ZONE	LOCATION	UNITS	ASSOCIATED COMMON OA DAMPERS	ASSOCIATED EXH FANS
Z-1	Section A	UV-A01, A05, A07, A08, A09 A14, A16, A19	OAD-A	EF-1, 2
		UV-A21, A23, A26, A28, B23A, B23B		
		FC-A04, A11, A20, A27, B01, B18, B19		
Z-2	Kitchen	FC-B05, B07A, B07B, B07C, B12	OAD-B	EF-4
Z-3	Dining & Multi Purpose	UV-20A, 20B, 20C, 20D, B21A, B21B, B21C, B21D, B21E	OADL-B1, OADL-B2	
		UV-B24, UV-C21F	OADL-B3, OADL-B4	
		FC-B26		
Z-4	Lobby	FC-C01A, C01B, C45A, C45B, C45C, C45E		
Z-5	Principal	FC-08, C09, C11		
Z-6	Guidance	FC-C28, C29, C30, C31		
Z-7	Media Center	UV-C34A, C34B		
		FC-C32, C33, C36, C37, C38		
Z-8	Section D	UV-D02, D05, D07, D08, D09, D13	OAD-D	EF-8
		UV-D14, D15, D16, D19, D20		
		FC-D10, D12, D17, D18		
Z-9	Section E	UV-E02, E03, E06A, E06B, E07, E08, E09, E10	OAD-E	EF-7, 9, 10
		UV-E14, E15, E16, E17, E20, E21		
		FC-C45D, E01, E11, E13, E18, E19		
Z-10	Administration	FC-C02, C03, C04, C15, C16, C19, C21, C22		EF-6



CONTROL ZONE PLAN

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN

optima engineering
1927 S. Tryon St., Suite 300, Charlotte NC 28203
150 Fayetteville St., Suite 520, Raleigh, NC 27601
Phone: 704-338-1292 www.optimaengineering.com
North Carolina License Number C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027386 STEVEN R. DALEY 01/10/23

DAVID COX ELEMENTARY SCHOOL

HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
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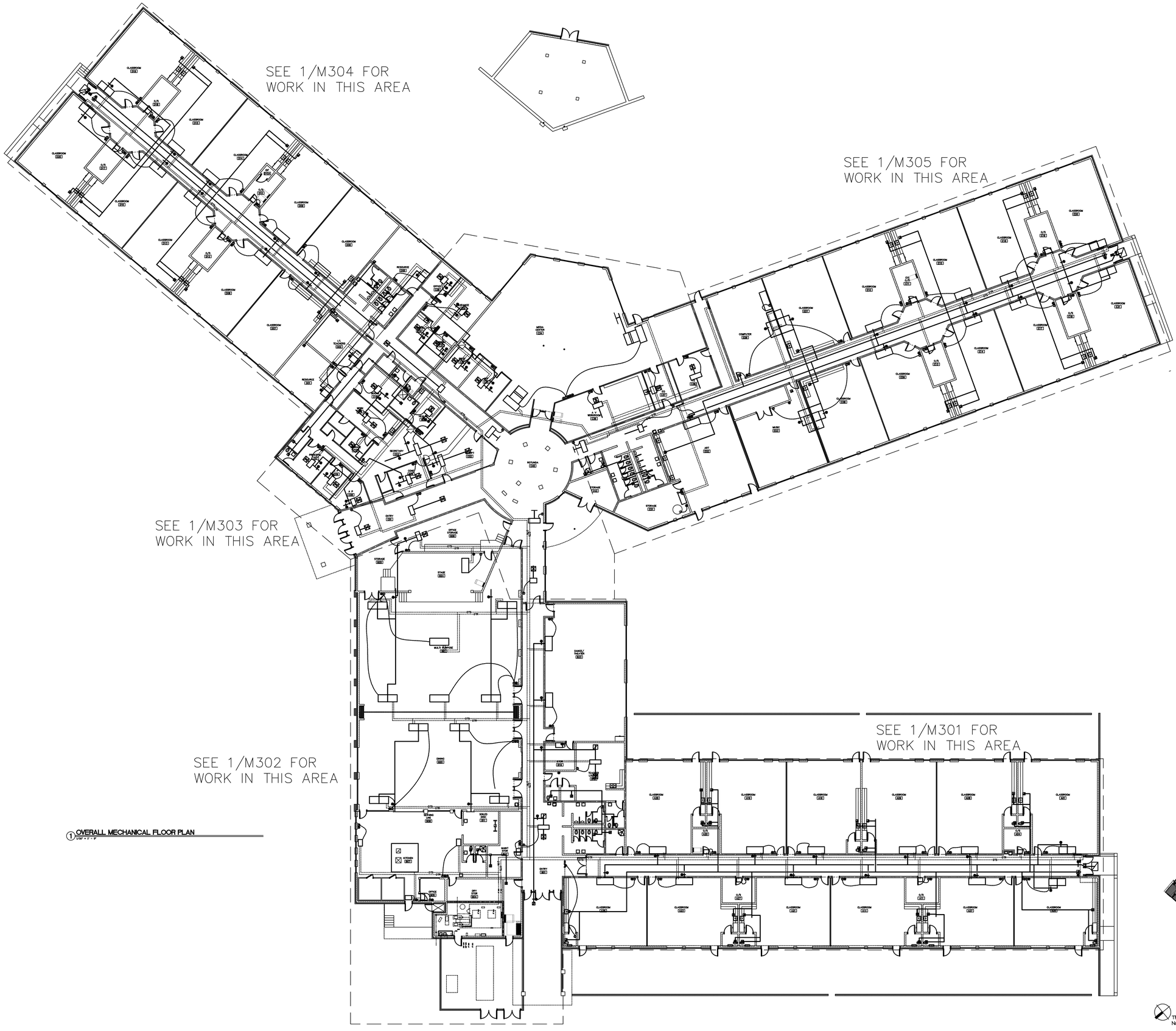
SHEET TITLE:
CONTROLS POINTS LISTS

DWG #: M103

SHEET NO: 4 OF 14

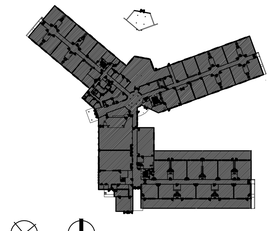
OPTIMA ENGINEERING
MECHANICAL • ELECTRICAL • PLUMBING • FIRE PROTECTION • LIGHTING DESIGN



1 OVERALL MECHANICAL FLOOR PLAN
1/16" = 1'-0"

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL

RATED WALL LEGEND
SOLID WORK



KEYPLAN
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN

optima engineering

1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: (704) 525-1928 WWW.OPTIMA-ENG.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 027886 ENGINEER STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
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SHEET TITLE:
OVERALL MECHANICAL FLOOR PLAN

DWG #:
M300

SHEET NO: 5 OF 14

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

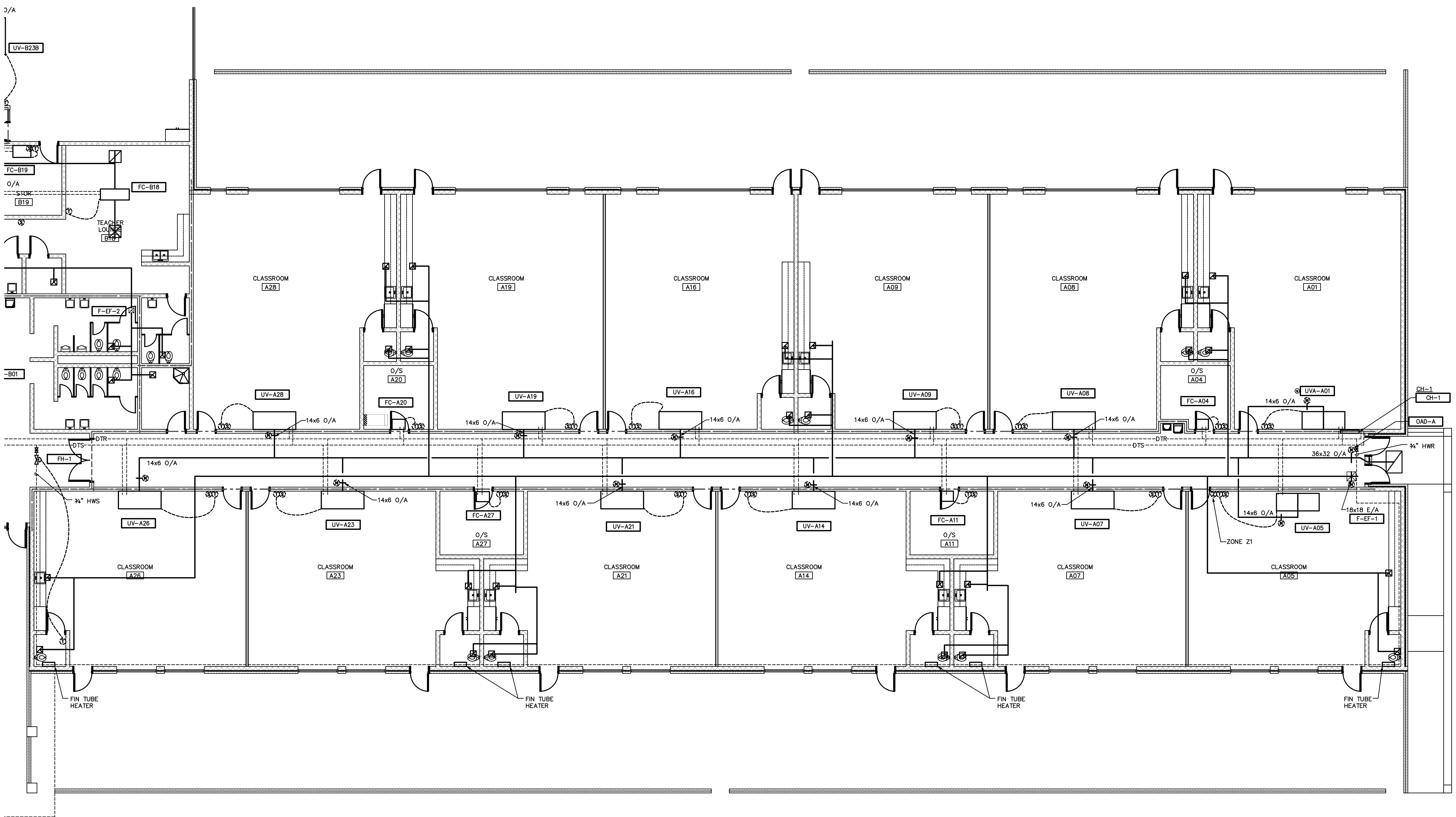
EXISTING CONTROLS DEVICES WITH COVER BOXES SHALL HAVE COVER BOXES AND MOUNTING FRAMES REMOVED, WALL SHALL BE PATCHED AND PAINTED TO MATCH EXISTING WALL. COORDINATE WALL COLOR WITH OWNER PAINTSHOP.

ALL DRAIN PANS INSIDE UNIT VENTILATORS, FAN COIL UNITS AND AIR HANDLING UNITS SHALL BE CLEANED PRIOR TO INSTALLATION OF FLOAT SWITCH.

UV AND FCU FAN SPEED SHALL BE REMOVED. FAN SPEED CONTROL SHALL BE PROVIDED THROUGH BAS. SEE DETAIL 11/M500 FOR ADDITIONAL INFORMATION. PROVIDE STAINLESS STEEL COVER PLATE AT WALL BOX.

EMERGENCY SHUT DOWN SWITCH SHALL BE REMOVED COMPLETE. PROVIDE STAINLESSS TEEL COVER PLATE AT WALL BOX.

PROVIDE NEW DIFFERENTIAL PRESSURE MONITOR IN PIPING AT SECTION D AND SECTION E.



1 SECTION A MECHANICAL FLOOR PLAN

1/8" = 1'-0"

KEYED NOTES

EQUIP TYPE — TAG: XX-XX

UV-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

UVA-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (3-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 1/M500 FOR PIPING DETAIL

FC-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCA-X FAN COIL (WITH ECONOMIZER)
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- R/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCB-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

F-X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

OAD-X OUTSIDE AIR DAMPER (GRILLE)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 3/M500 FOR DAMPER INFORMATION

OADL-X OUTSIDE AIR DAMPER (LOUVER)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 4/M500 FOR DAMPER INFORMATION

EDH-X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ESD EMERGENCY SHUTDOWN SWITCH
- REMOVE RELAY FROM CONTROL CIRCUIT.
- PROVIDE S.S. COVER PLATE AT WALL BOX.

FH-X FIN TUBE HEATER SYSTEM
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

CH-X CABINET HEATER
- UNIT MOUNTED THERMOSTAT
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

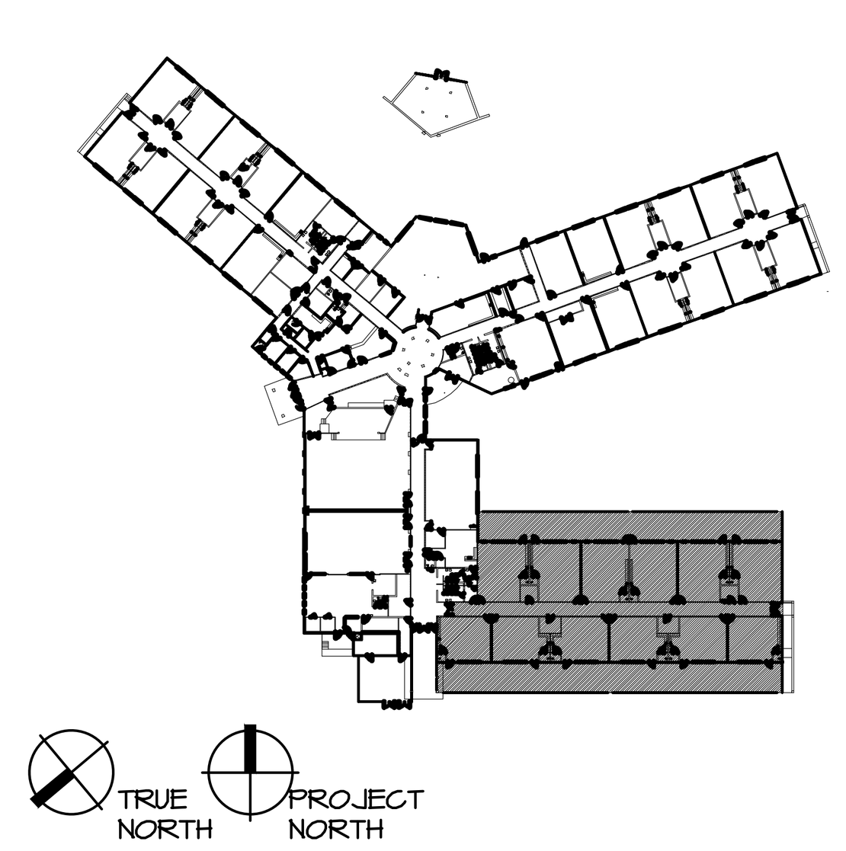
DP-X DIFFERENTIAL PRESSURE TRANSMITTER
- PROVIDE PIPE TAPS, PIPING AND INSULATION
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL

2 HR RATED WALL

4 HR RATED WALL

RATED WALL LEGEND



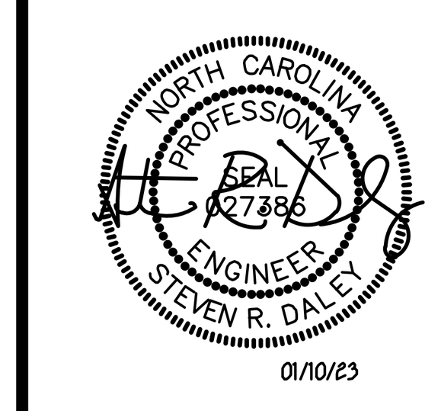
KEYPLAN

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN

1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 530, RALEIGH, NC 27601
PHONE: 704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914

optima engineering

SEAL:



DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

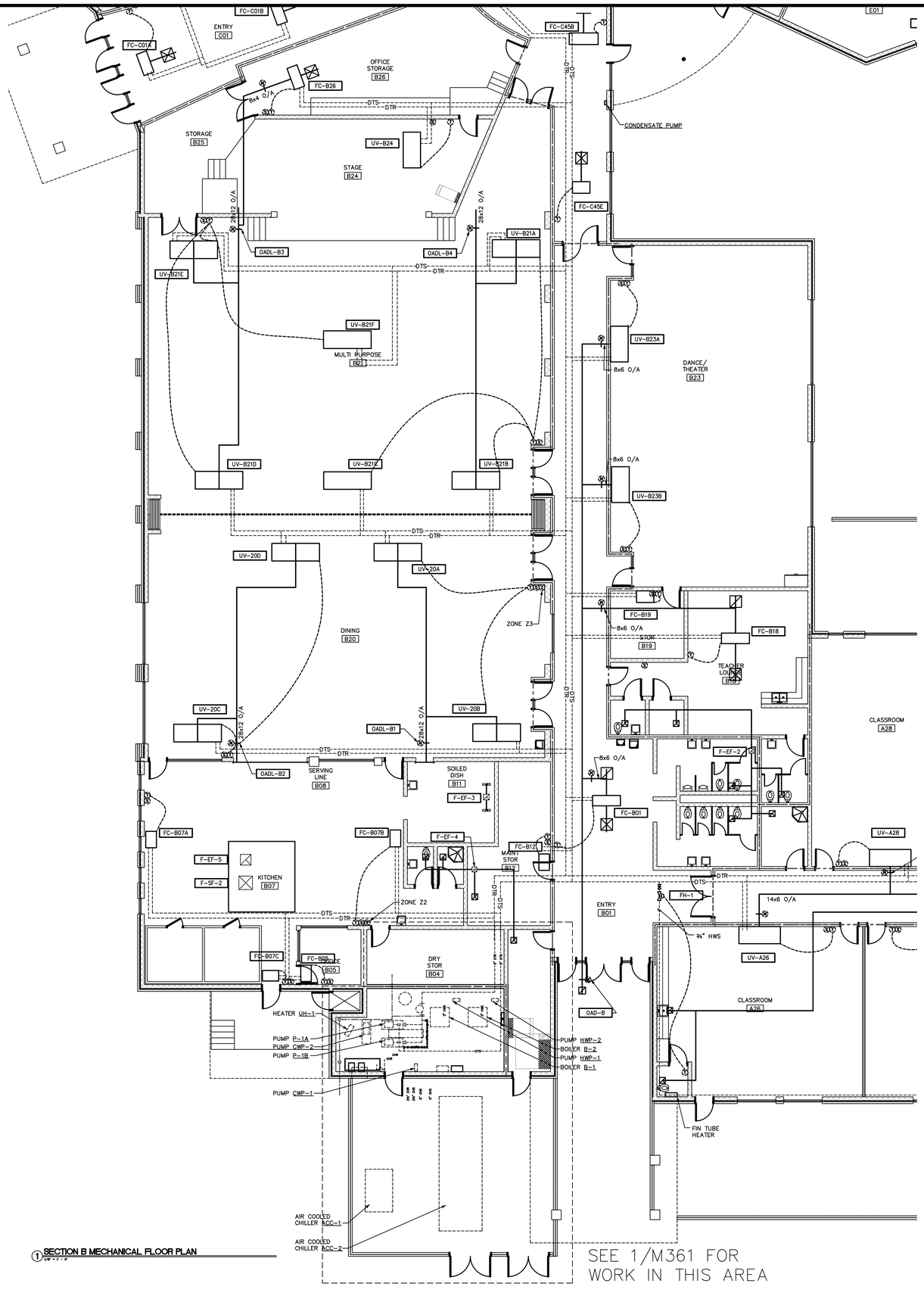
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
SECTION A MECHANICAL FLOOR PLAN

DWG #:
M301



1 SECTION B MECHANICAL FLOOR PLAN
1/8" = 1'-0"

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

EXISTING CONTROLS DEVICES WITH COVER BOXES SHALL HAVE COVER BOXES AND MOUNTING FRAMES REMOVED, WALL SHALL BE PATCHED AND PAINTED TO MATCH EXISTING WALL. COORDINATE WALL COLOR WITH OWNER PAINTSHOP.

ALL DRAIN PANS INSIDE UNIT VENTILATORS, FAN COIL UNITS AND AIR HANDLING UNITS SHALL BE CLEANED PRIOR TO INSTALLATION OF FLOAT SWITCH.

UV AND FCU FAN SPEED SHALL BE REMOVED. FAN SPEED CONTROL SHALL BE PROVIDED THROUGH BAS. SEE DETAIL 11/M500 FOR ADDITIONAL INFORMATION. PROVIDE STAINLESS STEEL COVER PLATE AT WALL BOX.

EMERGENCY SHUT DOWN SWITCH SHALL BE REMOVED COMPLETE. PROVIDE STAINLESSS TEEL COVER PLATE AT WALL BOX.

PROVIDE NEW DIFFERENTIAL PRESSURE MONITOR IN PIPING AT SECTION D AND SECTION E.

KEYED NOTES

TAG: EQUIP TYPE – XX–XX

UV–X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2–WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

UVA–X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (3–WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 1/M500 FOR PIPING DETAIL

FC–X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2–WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCA–X FAN COIL (WITH ECONOMIZER)
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2–WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- R/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCB–X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2–WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

F–X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

OAD–X OUTSIDE AIR DAMPER (GRILLE)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 3/M500 FOR DAMPER INFORMATION

OADL–X OUTSIDE AIR DAMPER (LOUVER)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 4/M500 FOR DAMPER INFORMATION

EDH–X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ESD EMERGENCY SHUTDOWN SWITCH
- REMOVE RELAY FROM CONTROL CIRCUIT.
- PROVIDE S.S. COVER PLATE AT WALL BOX.

FH–X FIN TUBE HEATER SYSTEM
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

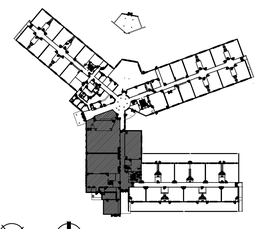
CH–X CABINET HEATER
- UNIT MOUNTED THERMOSTAT
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

DP–X DIFFERENTIAL PRESSURE TRANSMITTER
- PROVIDE PIPE TAPS, PIPING AND INSULATION
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL

RATED WALL LEGEND
BOLD HERE



TRUE NORTH / PROJECT NORTH

KEYPLAN
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
optima engineering
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE (704) 333-5190 FAX (704) 333-5193
NORTH CAROLINA LICENSE NUMBER C1591

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 027886 ENGINEER STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

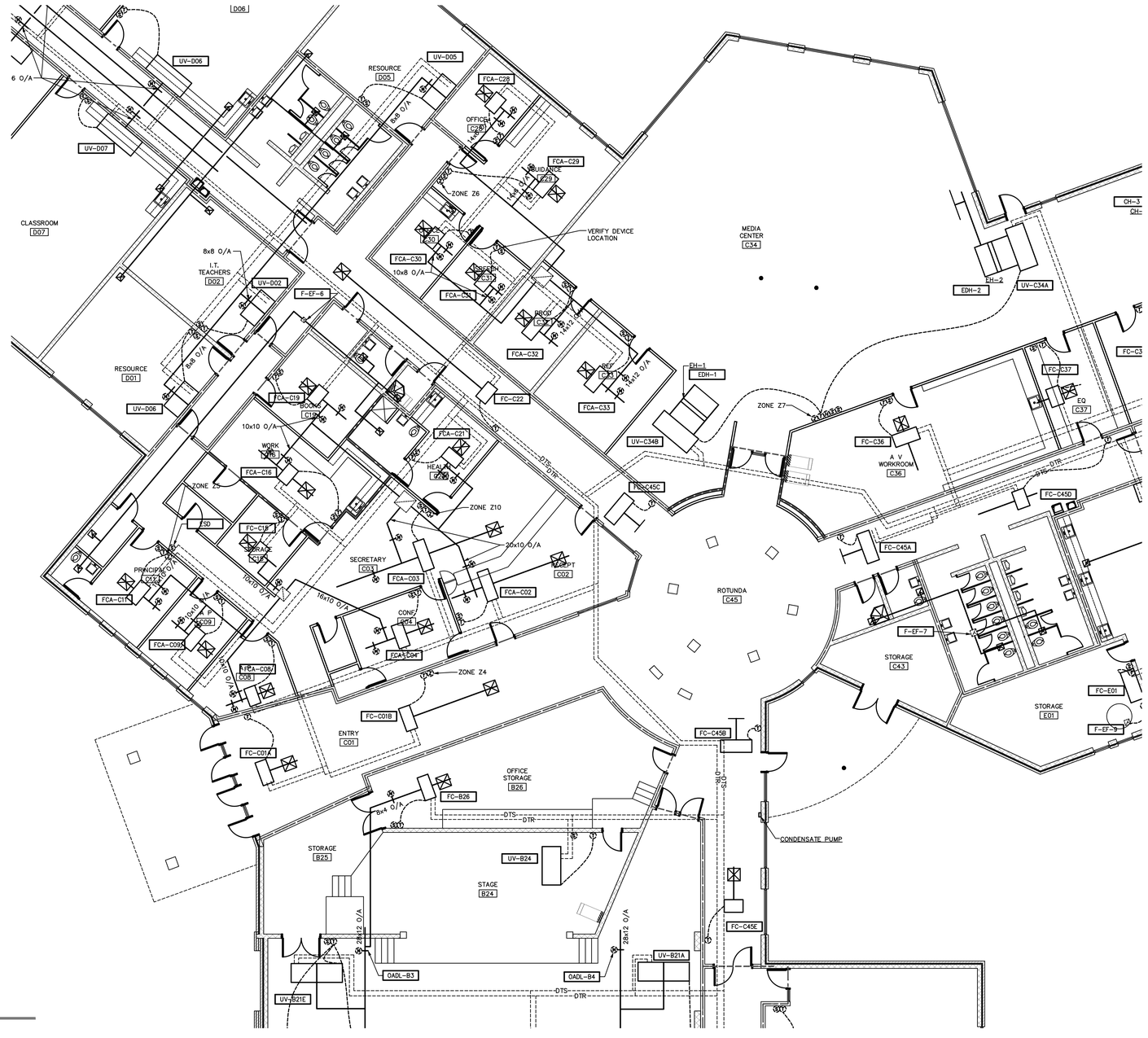
REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

SHEET TITLE:
SECTION B MECHANICAL FLOOR PLAN

DWG #:
M302

SHEET NO: 7 OF 14



1 SECTION C MECHANICAL FLOOR PLAN
1/16" = 1'-0"

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

EXISTING CONTROLS DEVICES WITH COVER BOXES SHALL HAVE COVER BOXES AND MOUNTING FRAMES REMOVED, WALL SHALL BE PATCHED AND PAINTED TO MATCH EXISTING WALL. COORDINATE WALL COLOR WITH OWNER PAINTSHOP.

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UV AND FCU FAN SPEED SHALL BE REMOVED. FAN SPEED CONTROL SHALL BE PROVIDED THROUGH BAS. SEE DETAIL 11/M500 FOR ADDITIONAL INFORMATION. PROVIDE STAINLESS STEEL COVER PLATE AT WALL BOX.

EMERGENCY SHUT DOWN SWITCH SHALL BE REMOVED COMPLETE. PROVIDE STAINLESSS TEEL COVER PLATE AT WALL BOX.

PROVIDE NEW DIFFERENTIAL PRESSURE MONITOR IN PIPING AT SECTION D AND SECTION E.

KEYED NOTES

TAG: EQUIP TYPE — XX-XX

UV-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

UVA-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (3-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 1/M500 FOR PIPING DETAIL

FC-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCA-X FAN COIL (WITH ECONOMIZER)
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- R/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCB-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

F-X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

OAD-X OUTSIDE AIR DAMPER (GRILLE)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 3/M500 FOR DAMPER INFORMATION

OADL-X OUTSIDE AIR DAMPER (LOUVER)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 4/M500 FOR DAMPER INFORMATION

EDH-X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ESD EMERGENCY SHUTDOWN SWITCH
- REMOVE RELAY FROM CONTROL CIRCUIT.
- PROVIDE S.S. COVER PLATE AT WALL BOX.

FH-X FIN TUBE HEATER SYSTEM
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

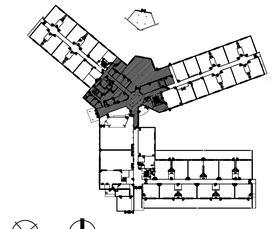
SEE 2/M500 FOR PIPING DETAIL

CH-X CABINET HEATER
- UNIT MOUNTED THERMOSTAT
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

DP-X DIFFERENTIAL PRESSURE TRANSMITTER
- PROVIDE PIPE TAPS, PIPING AND INSULATION
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL
RATED WALL LEGEND
NEW WORK



TRUE NORTH / PROJECT NORTH

KEYPLAN

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: (704) 333-1112 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0934
optima engineering

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 027886 ENGINEER STEVEN R. DALEY 01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

SHEET TITLE:
SECTION C MECHANICAL FLOOR PLAN

DWG #:
M303

SHEET NO: 8 OF 14

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

EXISTING CONTROLS DEVICES WITH COVER BOXES SHALL HAVE COVER BOXES AND MOUNTING FRAMES REMOVED, WALL SHALL BE PATCHED AND PAINTED TO MATCH EXISTING WALL. COORDINATE WALL COLOR WITH OWNER PAINTSHOP.

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UV AND FCU FAN SPEED SHALL BE REMOVED. FAN SPEED CONTROL SHALL BE PROVIDED THROUGH BAS. SEE DETAIL 11/M500 FOR ADDITIONAL INFORMATION. PROVIDE STAINLESS STEEL COVER PLATE AT WALL BOX.

EMERGENCY SHUT DOWN SWITCH SHALL BE REMOVED COMPLETE. PROVIDE STAINLESSS TEEL COVER PLATE AT WALL BOX.

PROVIDE NEW DIFFERENTIAL PRESSURE MONITOR IN PIPING AT SECTION D AND SECTION E.

1 SECTION D MECHANICAL FLOOR PLAN

KEYED NOTES

TAG
EQUIP TYPE
XX-XX

UV-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

UVA-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (3-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 1/M500 FOR PIPING DETAIL

FC-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCA-X FAN COIL (WITH ECONOMIZER)
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- R/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCB-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

F-X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

OAD-X OUTSIDE AIR DAMPER (GRILLE)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 3/M500 FOR DAMPER INFORMATION

OADL-X OUTSIDE AIR DAMPER (LOUVER)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 4/M500 FOR DAMPER INFORMATION

EDH-X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ESD EMERGENCY SHUTDOWN SWITCH
- REMOVE RELAY FROM CONTROL CIRCUIT.
- PROVIDE S.S. COVER PLATE AT WALL BOX.

FH-X FIN TUBE HEATER SYSTEM
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

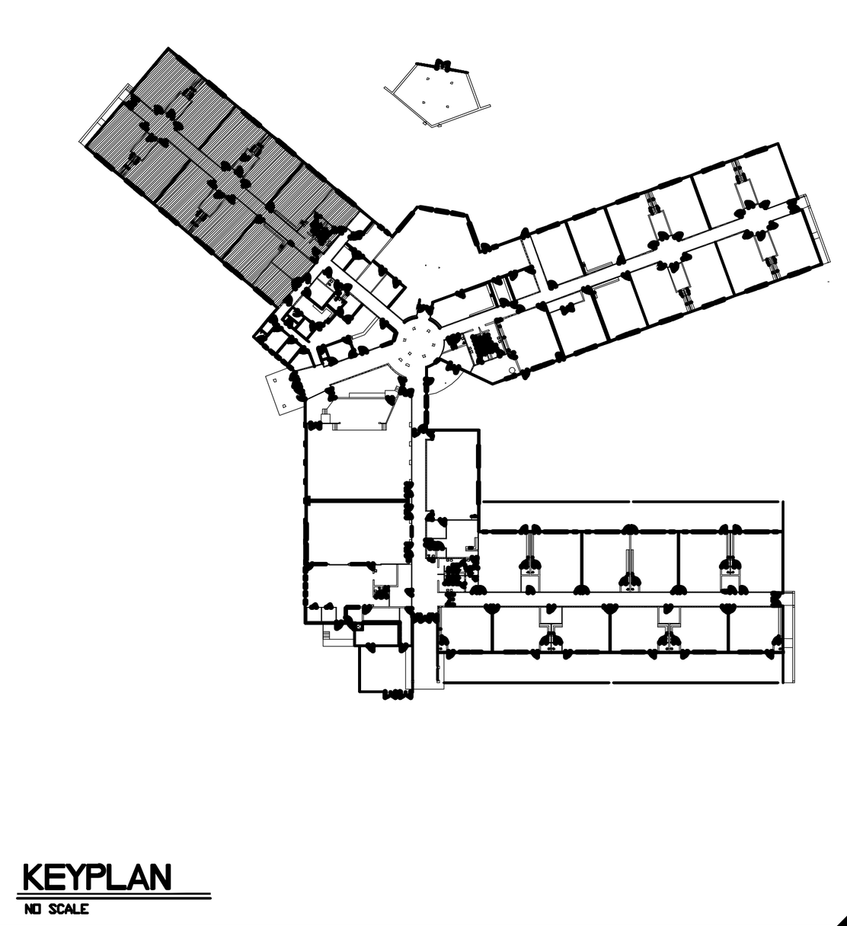
CH-X CABINET HEATER
- UNIT MOUNTED THERMOSTAT
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

DP-X DIFFERENTIAL PRESSURE TRANSMITTER
- PROVIDE PIPE TAPS, PIPING AND INSULATION
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL

RATED WALL LEGEND

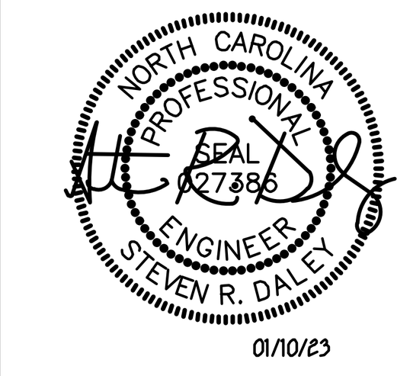


KEYPLAN

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN

1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: 704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:



DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

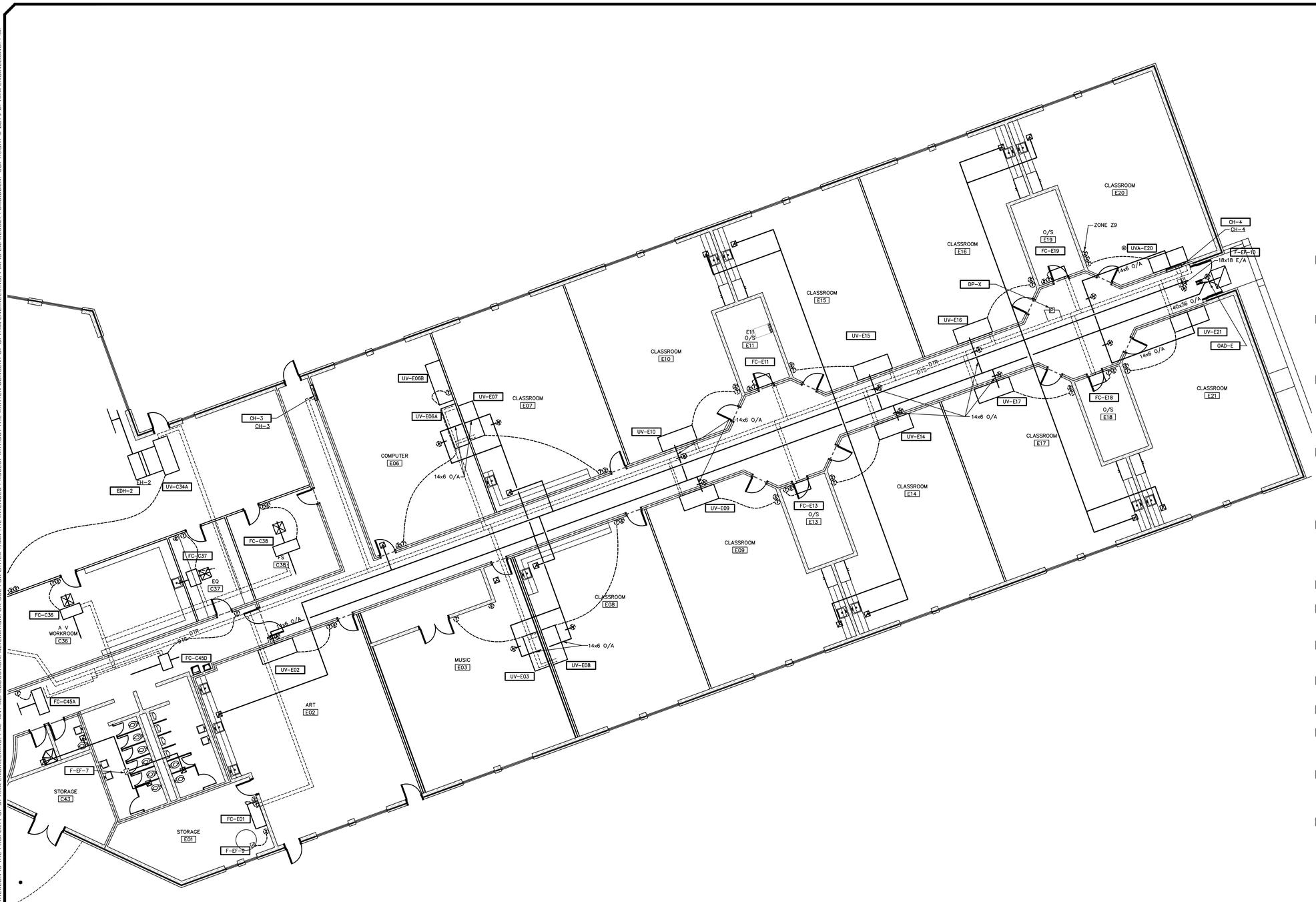
DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
SECTION D MECHANICAL FLOOR PLAN

DWG #:
M304

SHEET NO: 9 OF 14

OPTIMA ENGINEERING
MECHANICAL • ELECTRICAL • PLUMBING • FIRE PROTECTION • LIGHTING DESIGN



1 SECTION E MECHANICAL FLOOR PLAN
1/8" = 1'-0"

COORDINATE ALL NEW TEMP/HUM/CO2 SENSOR PLACEMENT WITH EXISTING FURNITURE, EQUIPMENT, ETC. ANY EXISTING TEMP/HUM/CO2 SENSOR LOCATION NOT UTILIZED FOR INDICATED SENSOR LOCATIONS SHALL BE PROVIDED WITH S.S. BLANK COVERPLATE.

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EMERGENCY SHUT DOWN SWITCH SHALL BE REMOVED COMPLETE. PROVIDE STAINLESSS TEEL COVER PLATE AT WALL BOX.

PROVIDE NEW DIFFERENTIAL PRESSURE MONITOR IN PIPING AT SECTION D AND SECTION E.

KEYED NOTES

TAG: EQUIP TYPE — XX-XX

UV-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

UVA-X UNIT VENTILATOR
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (3-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 1/M500 FOR PIPING DETAIL

FC-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
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SEE 2/M500 FOR PIPING DETAIL

FCA-X FAN COIL (WITH ECONOMIZER)
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
- O/A DAMPER AND ACTUATOR
- R/A DAMPER AND ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

FCB-X FAN COIL
- SUPPLY AIR TEMPERATURE SENSOR
- DUAL TEMPERATURE CONTROL VALVE (2-WAY VALVE) AND ACTUATOR
- THERMOSTAT
- FAN SPEED CONTROL (THROUGH BAS)
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SEE 2/M500 FOR PIPING DETAIL

F-X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

OAD-X OUTSIDE AIR DAMPER (GRILLE)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 3/M500 FOR DAMPER INFORMATION

OADL-X OUTSIDE AIR DAMPER (LOUVER)
- AIR DAMPER ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 4/M500 FOR DAMPER INFORMATION

EDH-X ELECTRIC DUCT HEATER
- SUPPLY AIR TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ESD EMERGENCY SHUTDOWN SWITCH
- REMOVE RELAY FROM CONTROL CIRCUIT.
- PROVIDE S.S. COVER PLATE AT WALL BOX.

FH-X FIN TUBE HEATER SYSTEM
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

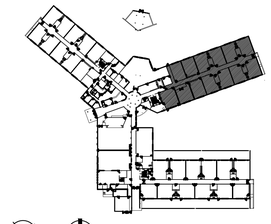
CH-X CABINET HEATER
- UNIT MOUNTED THERMOSTAT
- CONTROL VALVE (2 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

SEE 2/M500 FOR PIPING DETAIL

DP-X DIFFERENTIAL PRESSURE TRANSMITTER
- PROVIDE PIPE TAPS, PIPING AND INSULATION
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL

RATED WALL LEGEND
SCALE: NONE



KEYPLAN
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE, NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: 704.376.1555 FAX: 704.376.1556
NORTH CAROLINA LICENSE NUMBER C1591-4
optima engineering

SEAL:
NORTH CAROLINA PROFESSIONAL SEAL 027886 ENGINEER STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

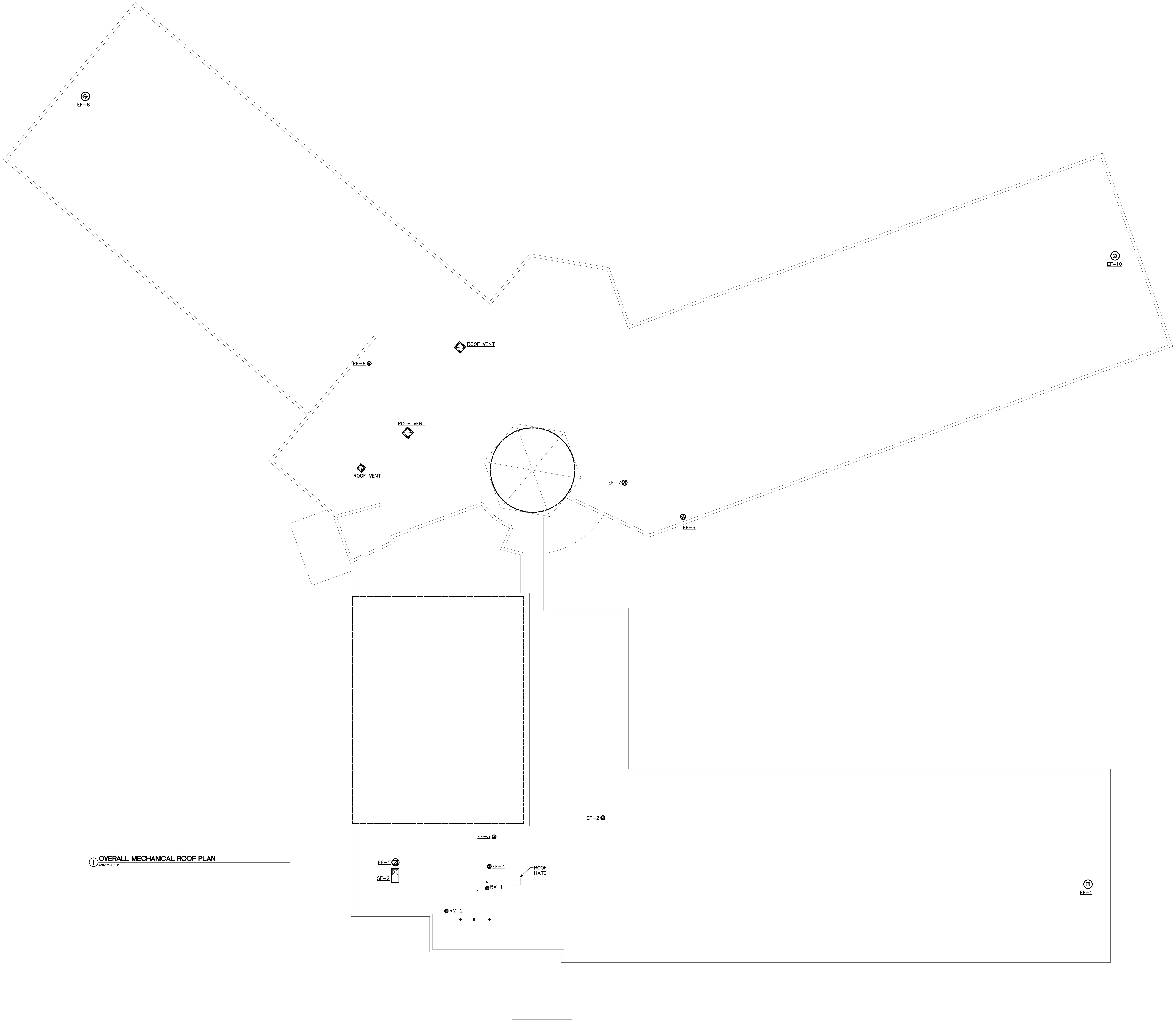
REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: TLH
DESIGNED BY: TLH
CHECKED BY: SRD

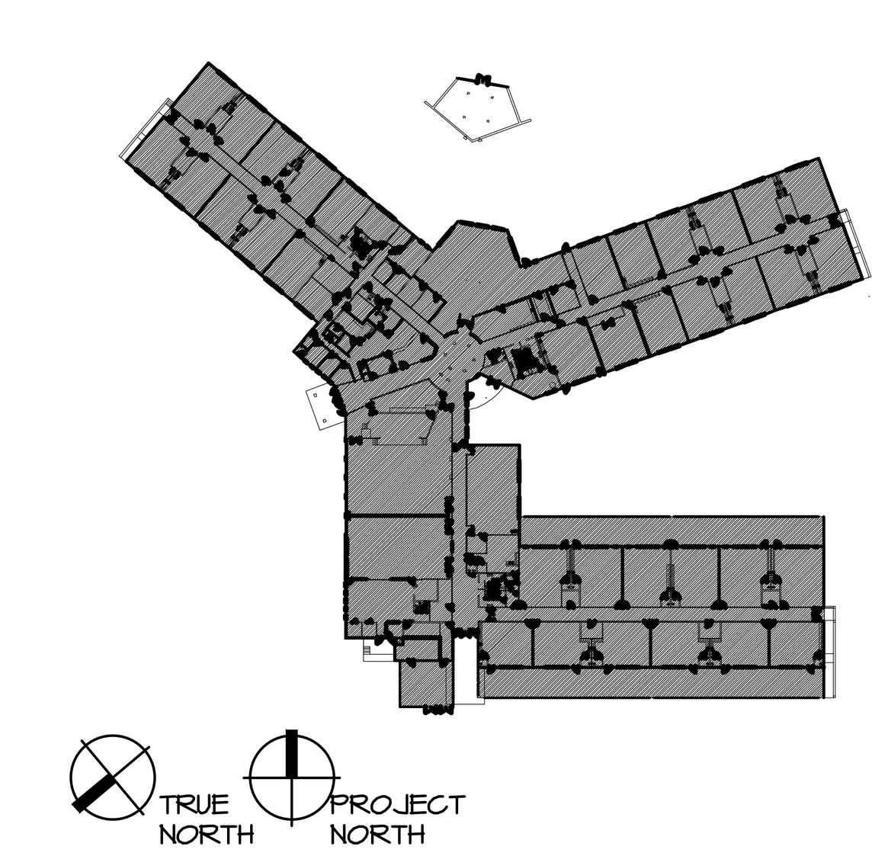
SHEET TITLE:
SECTION E MECHANICAL FLOOR PLAN

DWG #:
M305

SHEET NO: 10 OF 14



1 OVERALL MECHANICAL ROOF PLAN
1/16" = 1'-0"



KEYPLAN
NO SCALE

optima engineering
MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE:704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027388 STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

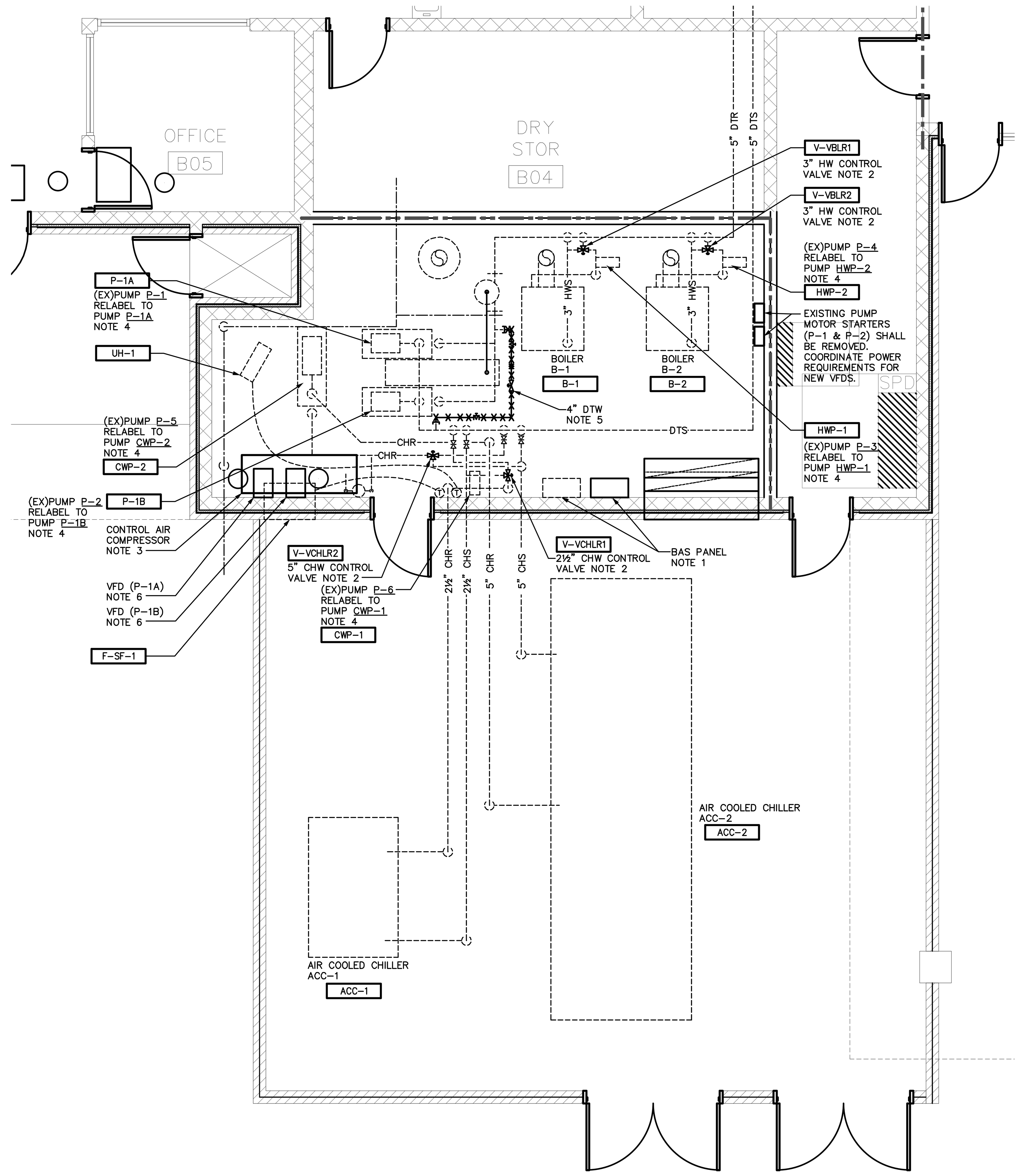
SHEET TITLE:
OVERALL MECHANICAL ROOF PLAN

DWG #:
M350

SHEET NO: 11 OF 14

NOTES:

1. REMOVE EXISTING HVAC CONTROL PANELS COMPLETE. PROVIDE NEW BAS PANEL THIS LOCATION.
2. REMOVE EXISTING CONTROL VALVE AND PNEUMATIC ACTUATOR COMPLETE. INSTALL NEW CONTROL VALVE WITH ELECTRONIC ACTUATOR. SEE DETAIL 6/M500 FOR ADDITIONAL INFORMATION.
3. EXISTING AIR COMPRESSOR AND AIR DRYER SHALL BE REMOVED COMPLETE.
4. RELABEL OF PUMP SHALL INCLUDE NEW LABELS FOR STARTER, DISCONNECT SWITCH, PUMP AND ELECTRICAL PANELBOARD IDENTIFICATION.
5. REMOVE EXISTING CONTROL VALVE, PNEUMATIC ACTUATOR, PIPE, FITTINGS AND VALVES TO LOCATION SHOWN. CAP BRANCH PIPES. VERIFY EXISTING LINE SIZE.
6. PROVIDE NEW WALL MOUNTED VFDS FOR PUMP P-1A AND P-1B. PROVIDE GROUNDING RING ON PUMP SHAFT



1 ENLARGED MECHANICAL ROOM PLAN
1/4" = 1'-0"

KEYED NOTES

TAG
EQUIP TYPE
XX-XX

P-X PUMPS
- CT SWITCH
- START/STOP RELAY
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

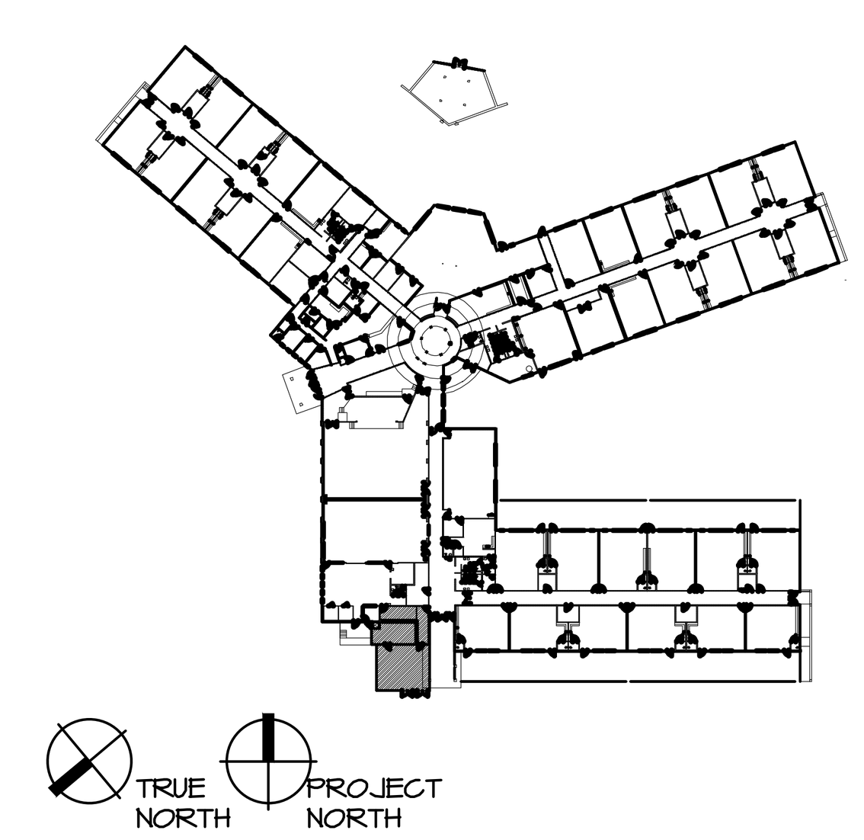
SF-X VENTILATION FAN
- CT SWITCH
- THERMOSTAT
- CO MONITOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

ACC-X CHILLER
- START/STOP RELAY
- CHILLED WATER SUPPLY TEMPERATURE SENSOR
- CHILLED WATER RETURN TEMPERATURE SENSOR
- CHILLED WATER SYSTEM SUPPLY TEMPERATURE SENSOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

F-X FAN
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

V-X CONTROL VALVE
- CONTROL VALVE (2 WAY OR 3 WAY)
- VALVE ACTUATOR
- INTERGRATE W/BAS REFER TO POINTS LIST AND SEQUENCES SHEET M102 & M103

1 HR RATED WALL
2 HR RATED WALL
4 HR RATED WALL
RATED WALL LEGEND
SCALE: NONE



KEYPLAN
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
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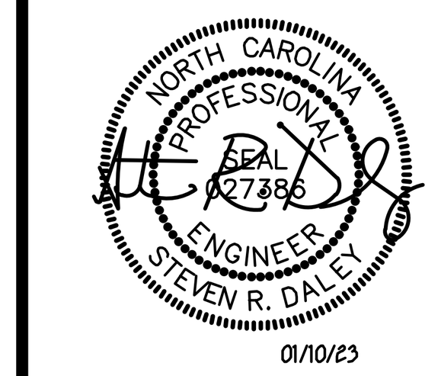
SEAL:



DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

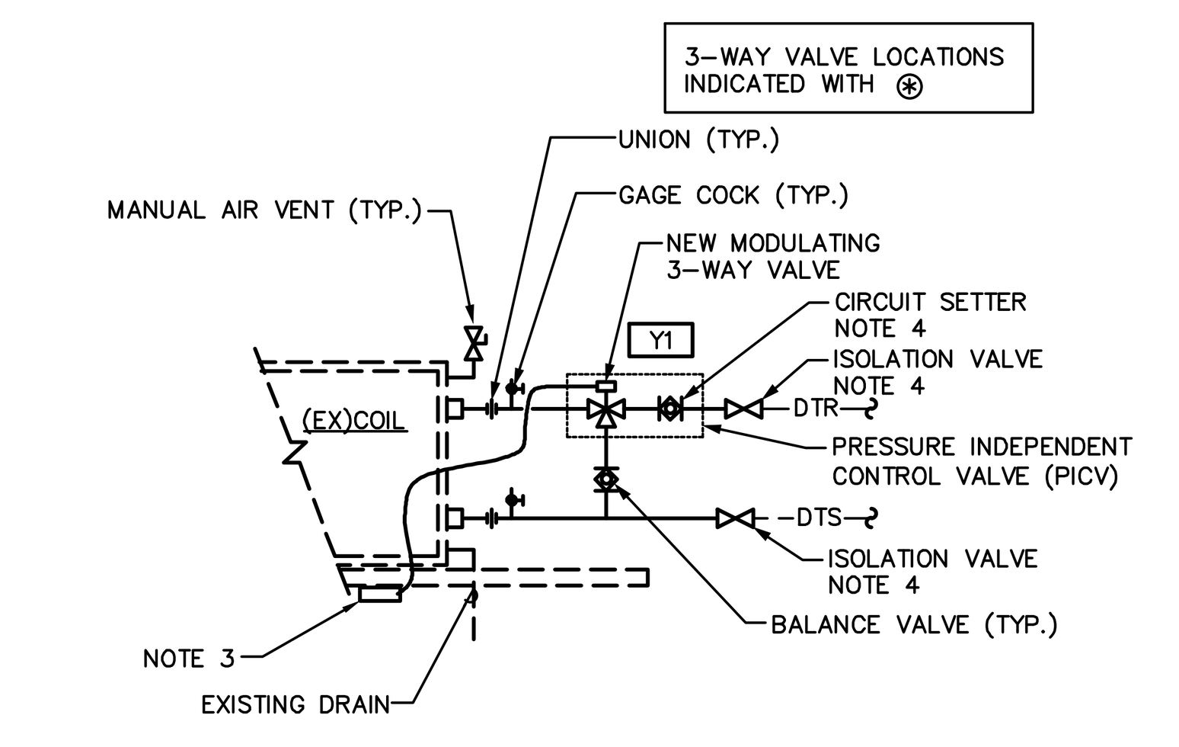
REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
ENLARGED MECHANICAL ROOM PLAN

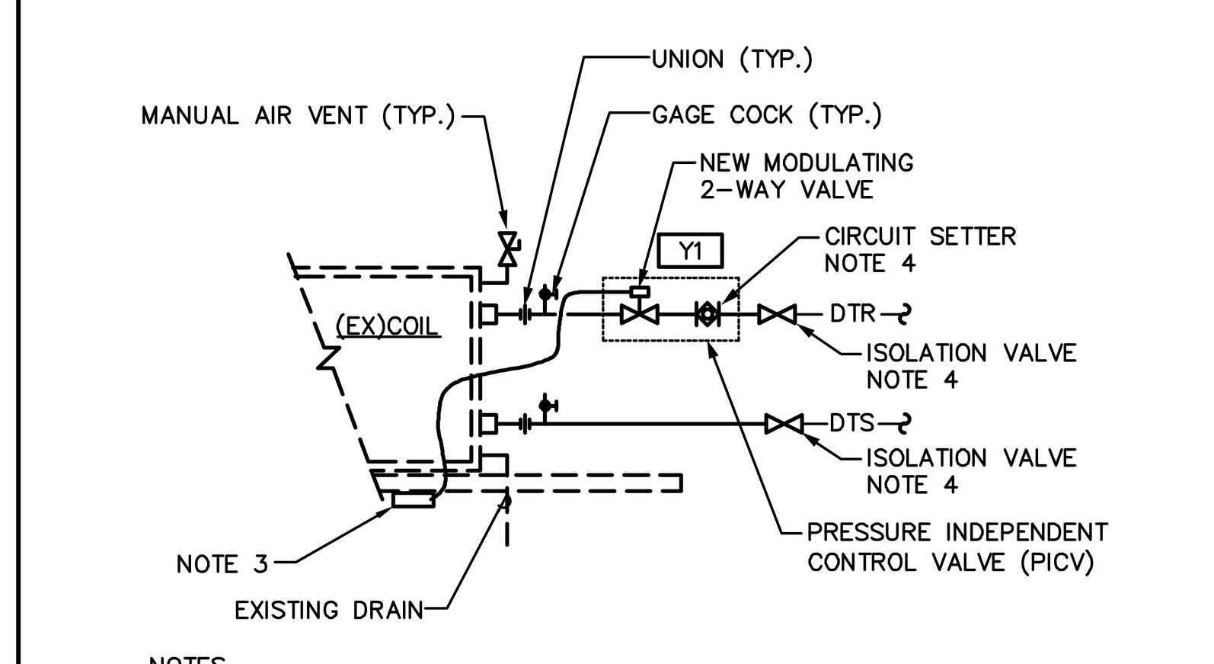
DWG #:
M361

SHEET NO: 12 OF 14



NOTES
1. REMOVE EXISTING 3-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR COMPLETE.
2. INSTALL NEW 3-WAY CONTROL VALVE WITH ELECTRONIC ACTUATOR.
3. PROVIDE FLOAT SWITCH IN UNIT DRAIN PAN TO SHUT DOWN UNIT AND ALARM TO BAS.
4. REMOVE EXISTING ISOLATION VALVE AND CIRCUIT SETTER. PROVIDE NEW ISOLATION VALVE AND CIRCUIT SETTER.
5. PROVIDE SEPARATE VALVES, NOT COMBINATION VALVE ASSEMBLIES.
6. PICV PROVIDED WITH UNION BETWEEN CIRCUIT SETTER AND CONTROL VALVE.

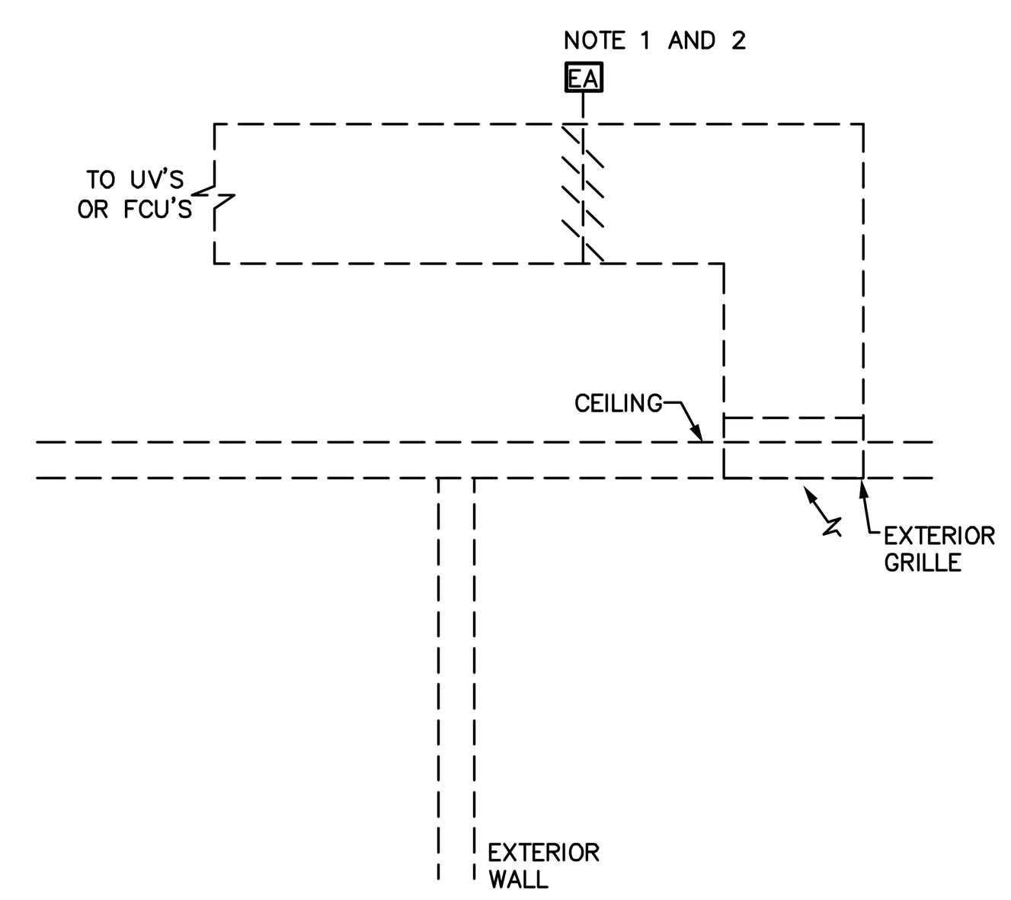
1 UNIT VENTILATOR/FAN COIL UNIT PIPING
NO SCALE



NOTES
1. REMOVE EXISTING 2-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR COMPLETE.
2. INSTALL NEW 2-WAY CONTROL VALVE WITH ELECTRONIC ACTUATOR.
3. PROVIDE FLOAT SWITCH IN UNIT DRAIN PAN TO SHUT DOWN UNIT AND ALARM TO BAS.
4. REMOVE EXISTING ISOLATION VALVE AND CIRCUIT SETTER. PROVIDE NEW ISOLATION VALVE AND CIRCUIT SETTER.
5. PROVIDE SEPARATE VALVES, NOT COMBINATION VALVE ASSEMBLIES.
6. PICV PROVIDED WITH UNION BETWEEN CIRCUIT SETTER AND CONTROL VALVE.
7. SIMILAR FOR CABINET HEATERS (CH-#) AND FIN TUBE HEATER SYSTEM. OMIT FLOAT SWITCH.

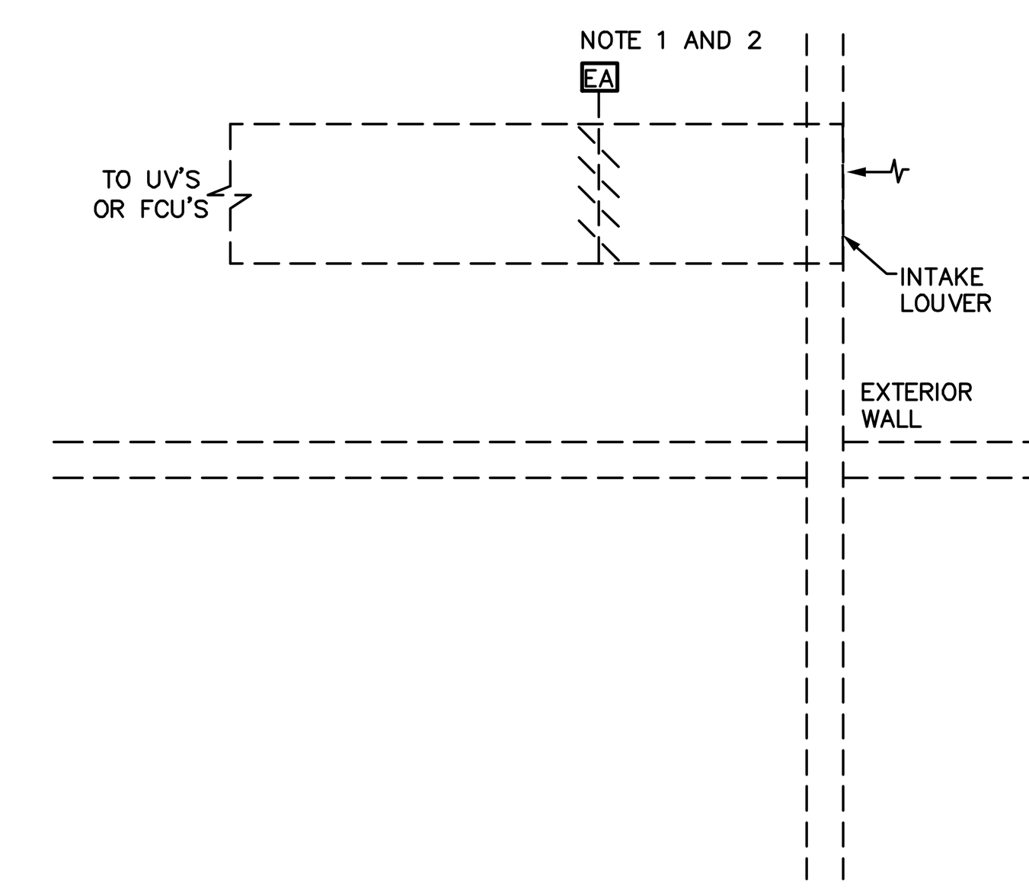
2 UNIT VENTILATOR/FAN COIL UNIT PIPING
NO SCALE

NOTES
1. REMOVE EXISTING PNEUMATIC DAMPER ACTUATOR COMPLETE. VERIFY DAMPER OPERATION PER MANUFACTURER'S IOM.
2. INSTALL NEW ELECTRONIC DAMPER ACTUATOR.

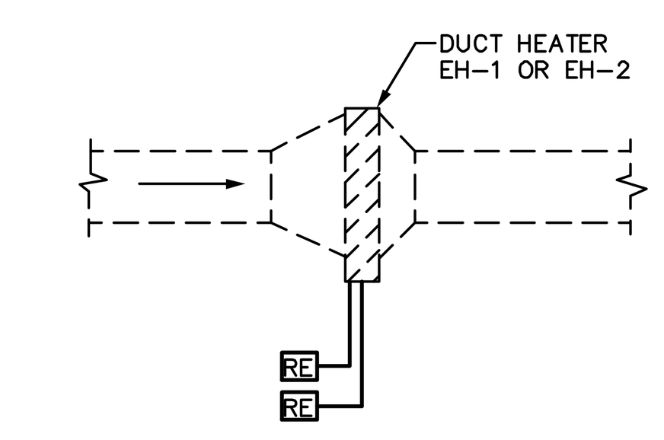


3 CEILING GRILLE INTAKE DETAIL
NO SCALE

NOTES
1. REMOVE EXISTING PNEUMATIC DAMPER ACTUATOR COMPLETE. VERIFY DAMPER OPERATION PER MANUFACTURER'S IOM.
2. INSTALL NEW ELECTRONIC DAMPER ACTUATOR.

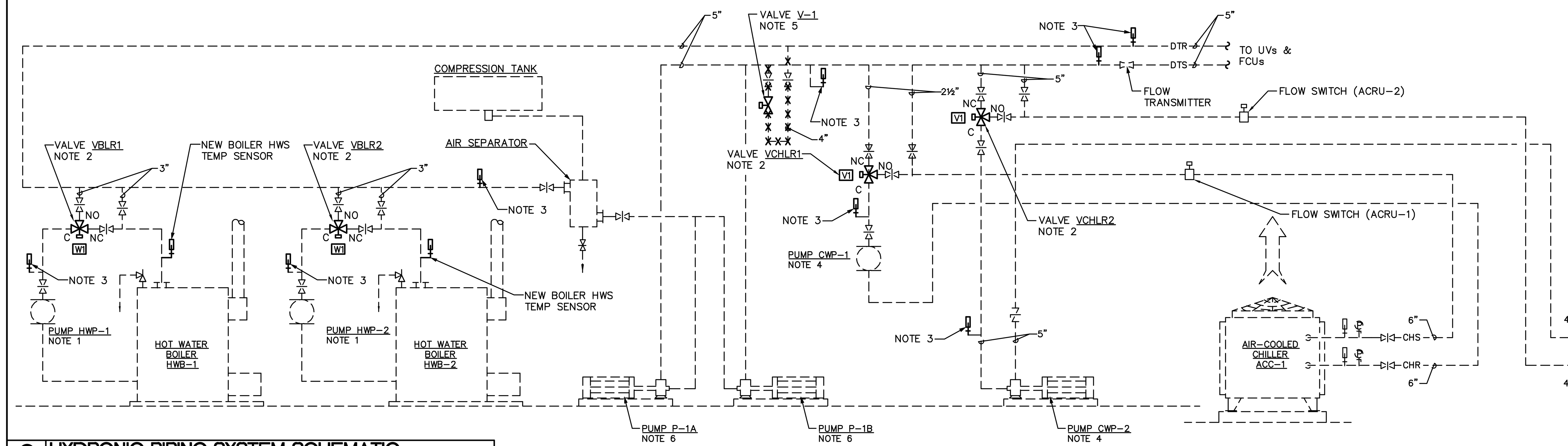


4 INTAKE LOUVER DETAIL
NO SCALE



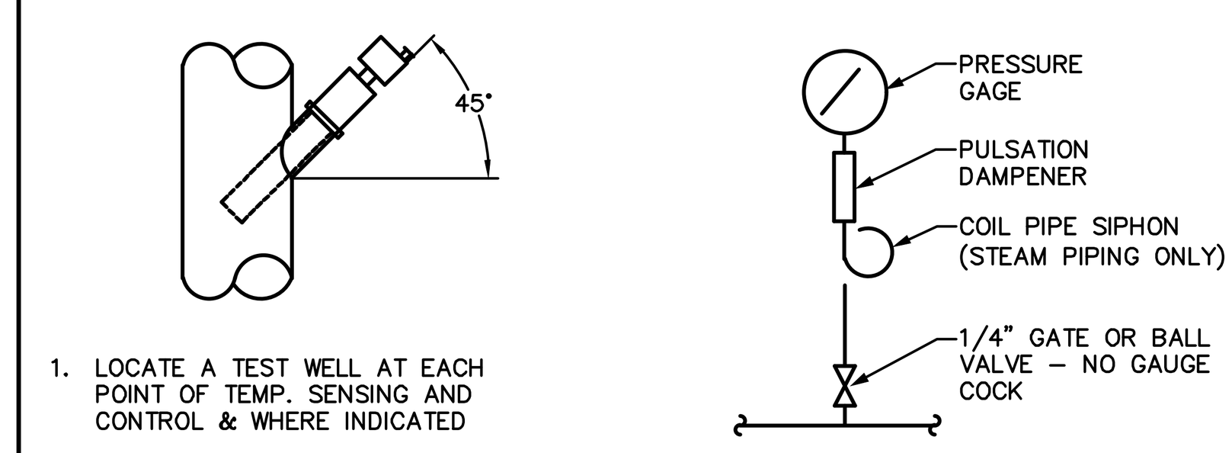
NOTE:
REMOVE EXISTING PE FOR EACH STAGE OF HEAT.
INSTALL NEW CONTROL RELAY FOR EACH HEATER STAGE.

5 ELECTRIC DUCT HEATER DETAIL
NO SCALE



NOTES
1. BOILER PUMP START/STOP SIGNAL SHALL BE SENT DIRECTLY FROM BOILER CONTROLLER CONTACTS.
2. REMOVE EXISTING 3-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR COMPLETE. INSTALL NEW 3-WAY CONTROL VALVE WITH ELECTRONIC ACTUATOR. VALVES ARE SHOWN IN FAIL SAFE POSITION.
3. REMOVE EXISTING PNEUMATIC TEMPERATURE TRANSMITTER. INSTALL NEW ELECTRONIC TEMPERATURE TRANSMITTER AT THE SAME LOCATION.
4. CHILLER PUMP START/STOP SIGNAL SHALL BE SENT DIRECTLY FROM CHILLER CONTROLLER CONTACTS.
5. REMOVE EXISTING 2-WAY CONTROL VALVE AND PNEUMATIC ACTUATOR COMPLETE. CAP PIPES AT TAPS AT PIPING MAINS.
6. ADD VFD FOR PUMP OPERATION. SEE 1/M361 FOR ADDITIONAL INFORMATION.

6 HYDRONIC PIPING SYSTEM SCHEMATIC
NO SCALE

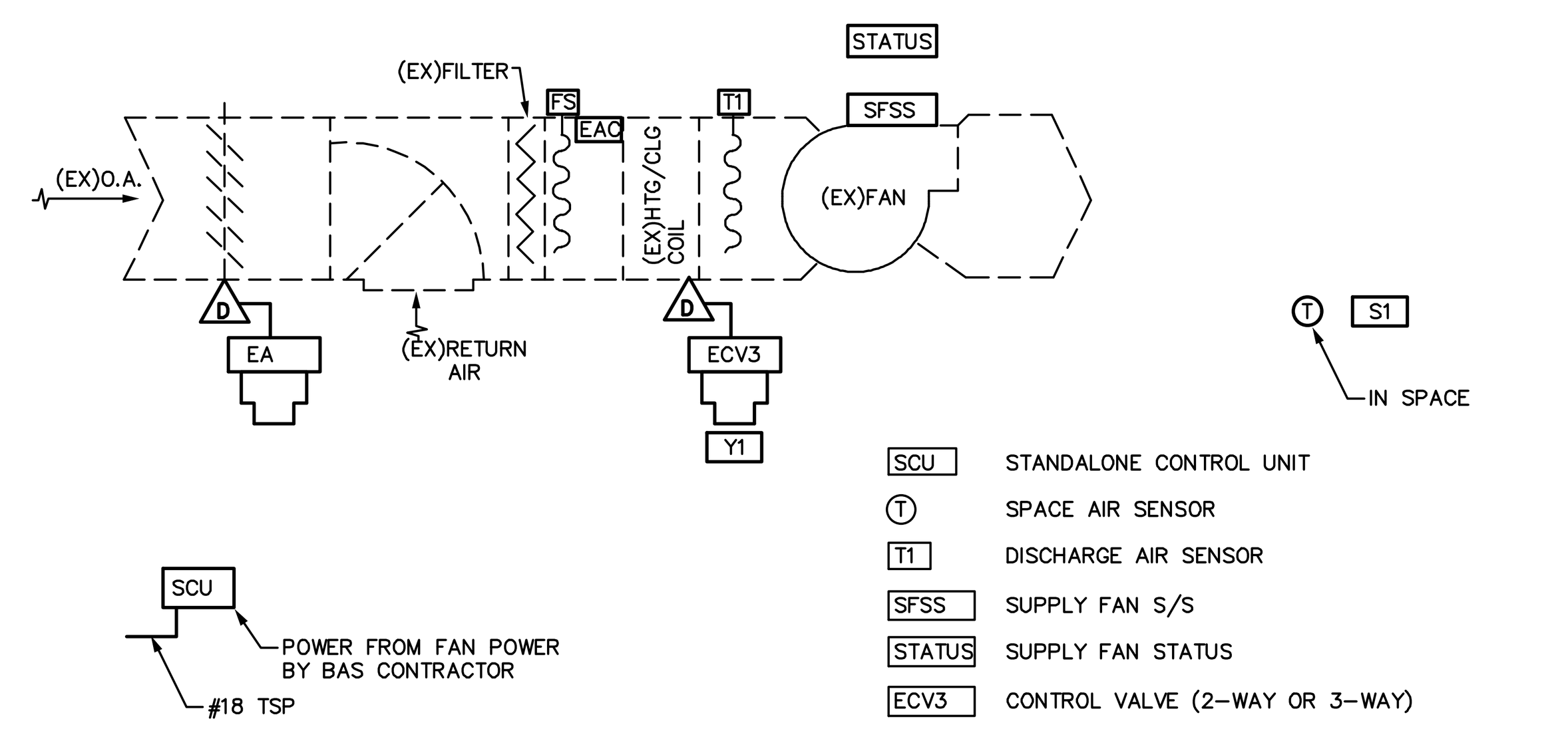


1. LOCATE A TEST WELL AT EACH POINT OF TEMP. SENSING AND CONTROL & WHERE INDICATED
2. WHERE POSSIBLE

THERMOMETER TEST WELL

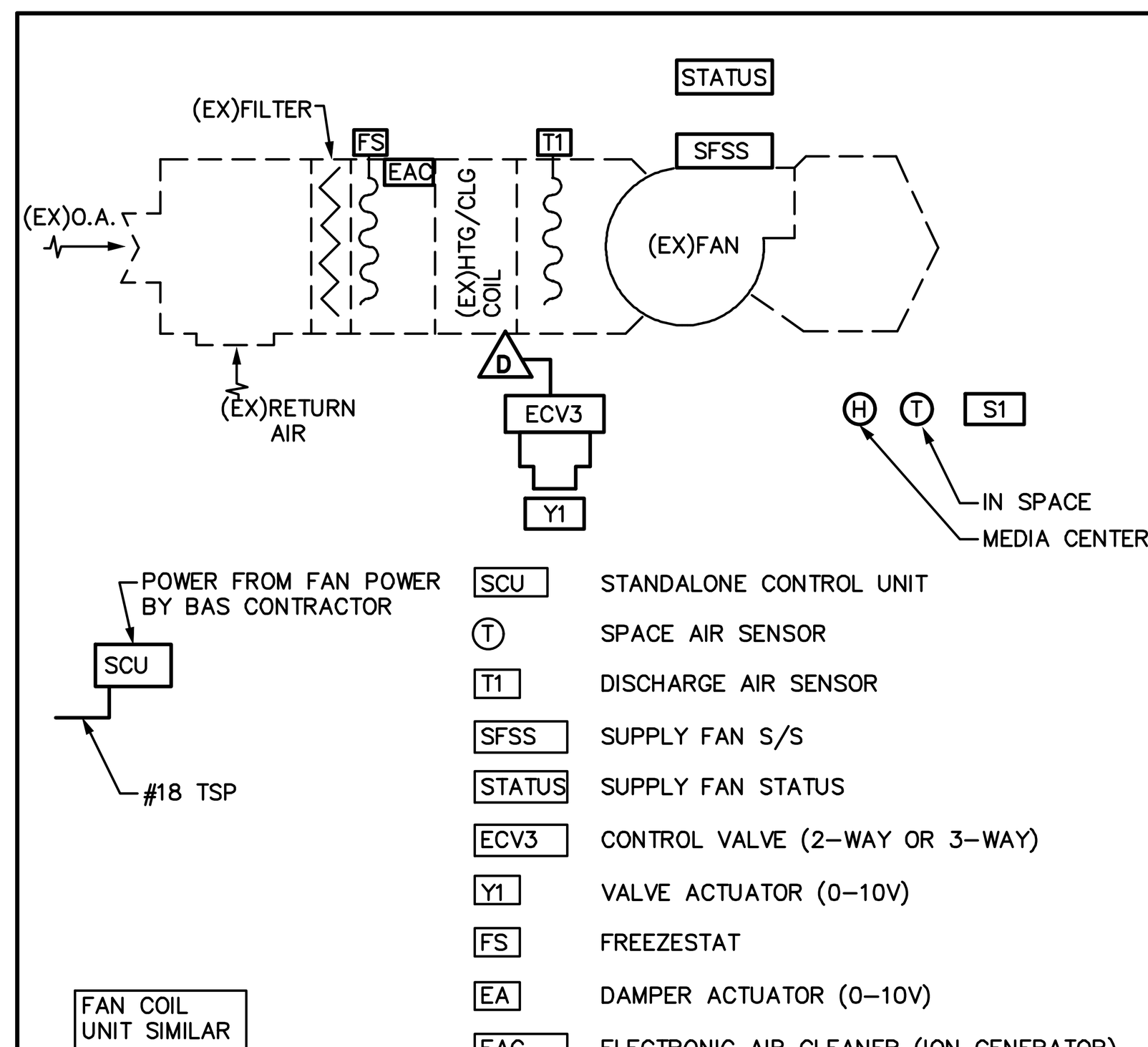
PRESSURE GAGE

7 PIPING SPECIALTIES
NO SCALE



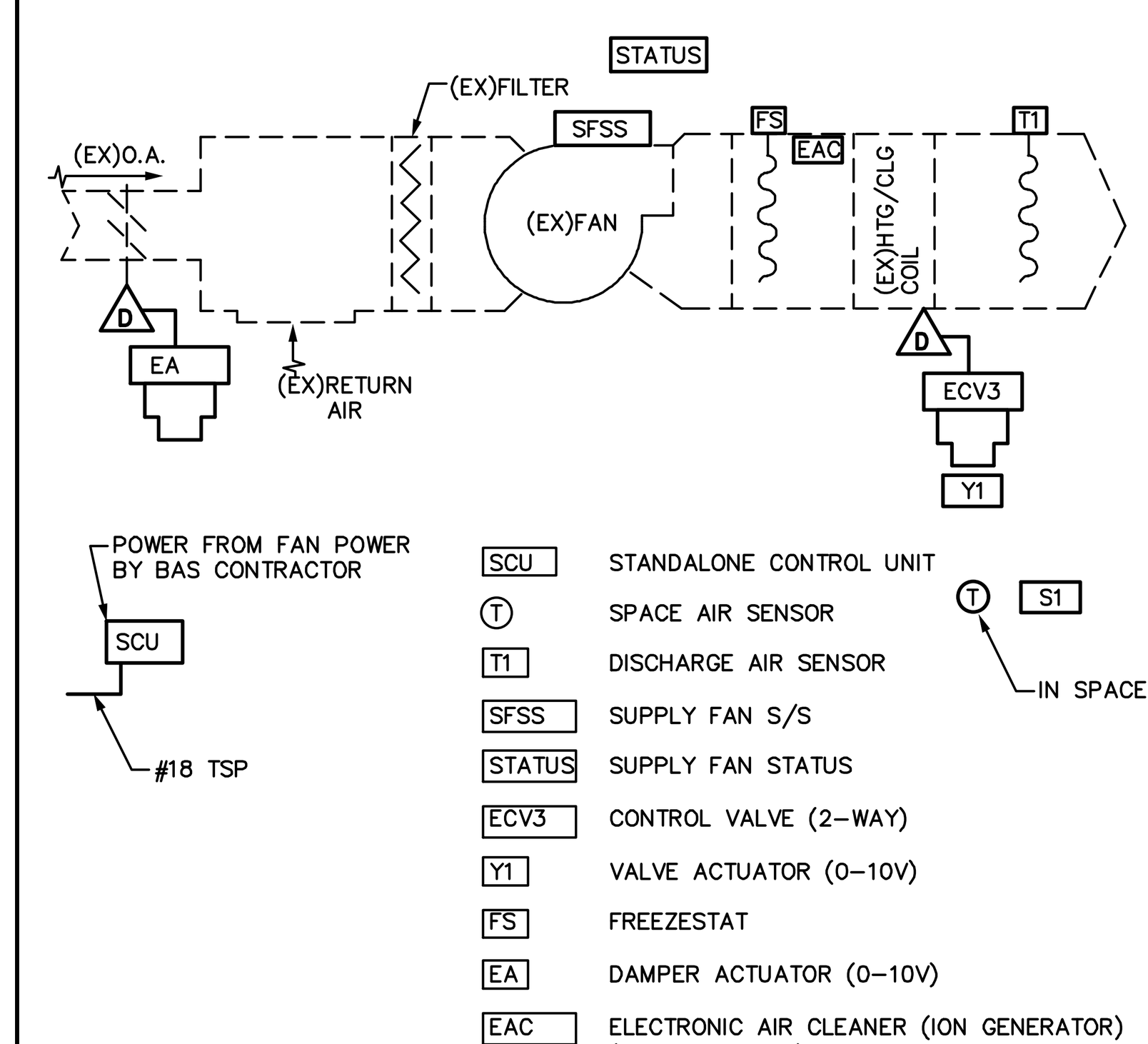
SCU	STANDALONE CONTROL UNIT
T	SPACE AIR SENSOR
T1	DISCHARGE AIR SENSOR
SFSS	SUPPLY FAN S/S
STATUS	SUPPLY FAN STATUS
ECV3	CONTROL VALVE (2-WAY OR 3-WAY)
Y1	VALVE ACTUATOR (0-10V)
FS	FREEZESTAT
EA	DAMPER ACTUATOR (0-10V)
EAC	ELECTRONIC AIR CLEANER (ION GENERATOR) (FUTURE DEVICE)

8 UNIT VENTILATOR CONTROL DIAGRAM
NO SCALE



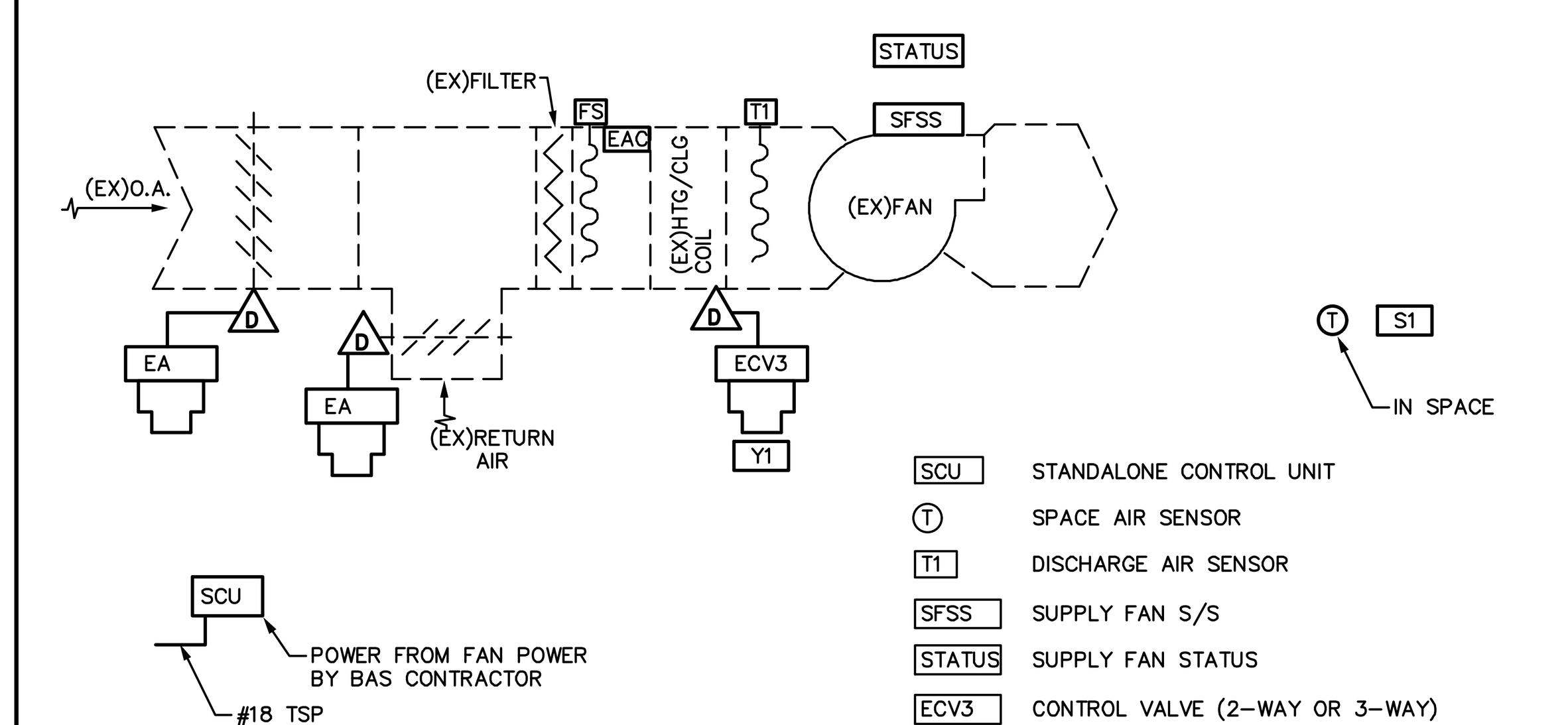
SCU	STANDALONE CONTROL UNIT
T	SPACE AIR SENSOR
T1	DISCHARGE AIR SENSOR
SFSS	SUPPLY FAN S/S
STATUS	SUPPLY FAN STATUS
ECV3	CONTROL VALVE (2-WAY OR 3-WAY)
Y1	VALVE ACTUATOR (0-10V)
FS	FREEZESTAT
EA	DAMPER ACTUATOR (0-10V)
EAC	ELECTRONIC AIR CLEANER (ION GENERATOR) (FUTURE DEVICE)
H	SPACE HUMIDITY SENSOR

9 UNIT VENTILATOR CONTROL DIAGRAM
NO SCALE



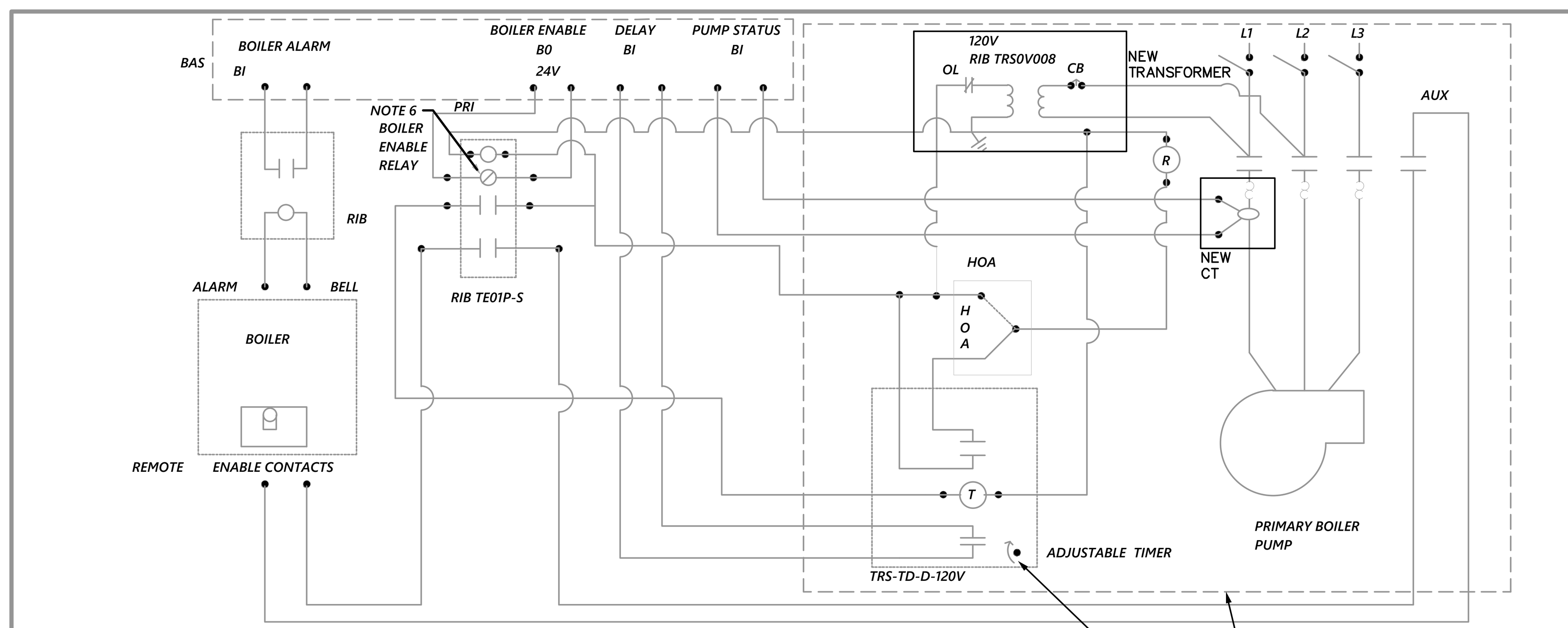
SCU	STANDALONE CONTROL UNIT
T	SPACE AIR SENSOR
T1	DISCHARGE AIR SENSOR
SFSS	SUPPLY FAN S/S
STATUS	SUPPLY FAN STATUS
ECV3	CONTROL VALVE (2-WAY)
Y1	VALVE ACTUATOR (0-10V)
FS	FREEZESTAT
EA	DAMPER ACTUATOR (0-10V)
EAC	ELECTRONIC AIR CLEANER (ION GENERATOR) (FUTURE DEVICE)

10 FAN COILUNIT CONTROL DIAGRAM
NO SCALE



SCU	STANDALONE CONTROL UNIT
T	SPACE AIR SENSOR
T1	DISCHARGE AIR SENSOR
SFSS	SUPPLY FAN S/S
STATUS	SUPPLY FAN STATUS
ECV3	CONTROL VALVE (2-WAY OR 3-WAY)
Y1	VALVE ACTUATOR (0-10V)
FS	FREEZESTAT
EA	DAMPER ACTUATOR (0-10V)
EAC	ELECTRONIC AIR CLEANER (ION GENERATOR) (FUTURE DEVICE)

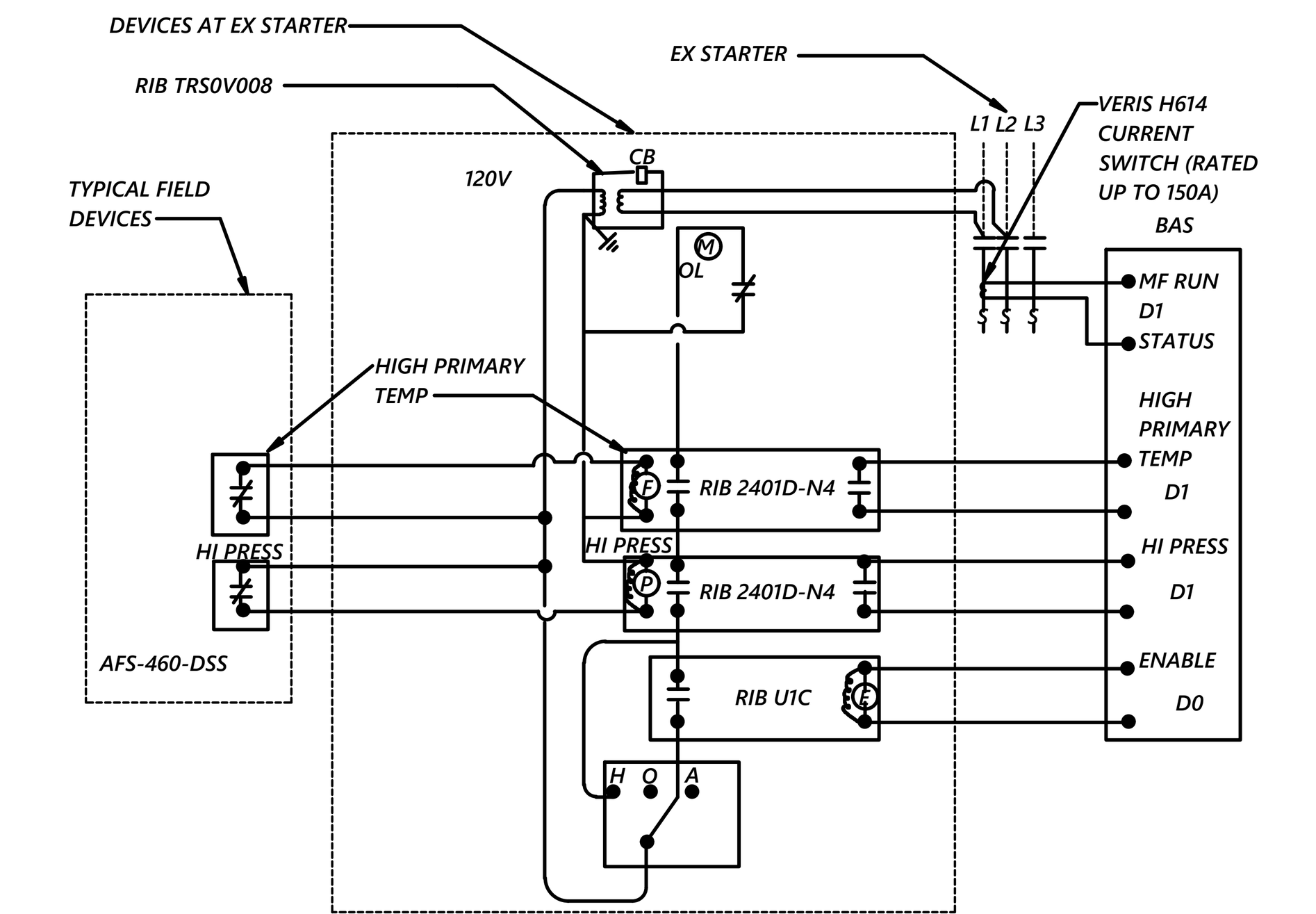
11 FAN COIL UNIT CONTROL DIAGRAM
NO SCALE



NOTES:
1. *CONTRACTOR PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.*
2. *CONTRACTOR SHALL PROVIDE CONTROL WIRING, STARTER BAS, AND FIELD DEVICE CONNECTIONS.*
3. *RIB RELAYS AND TRANSFORMER BY CONTRACTOR.*
4. *STARTER IS EXISTING.*
5. *BOILER ENABLE RELAY TO BE MOUNTED AT BOILER CONTROL PANEL.*
6. *5-25Vac/dc CONTROL INPUT*

12 BOILER INTEGRATION DETAIL
NOT TO SCALE

13 NOT USED
NO SCALE



NOTES:
1. *CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.*
2. *CONTRACTOR SHALL PROVIDE CONTROL WIRING, AND FIELD DEVICE CONNECTIONS.*
3. *RIB RELAYS, CT'S, AND TRANSFORMER BY CONTRACTOR.*

14 CMS TYPICAL MOTOR STARTER BAS INTERFACE - PUMP
NO SCALE

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE: 704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914

SEAL:
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027882 STEVEN R. DALEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

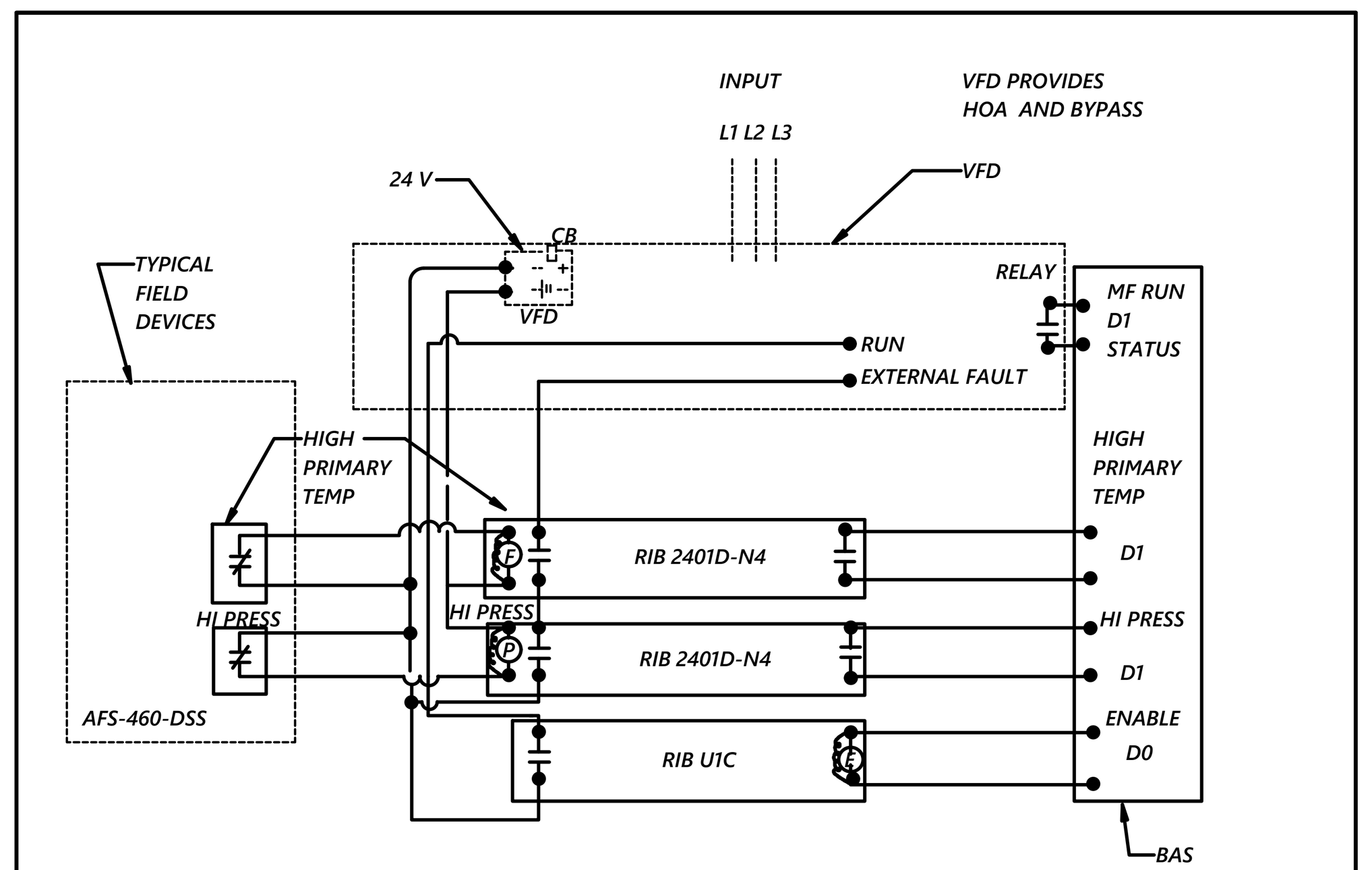
REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL DETAILS

DWG #:
M500

SHEET NO: 13 OF 14

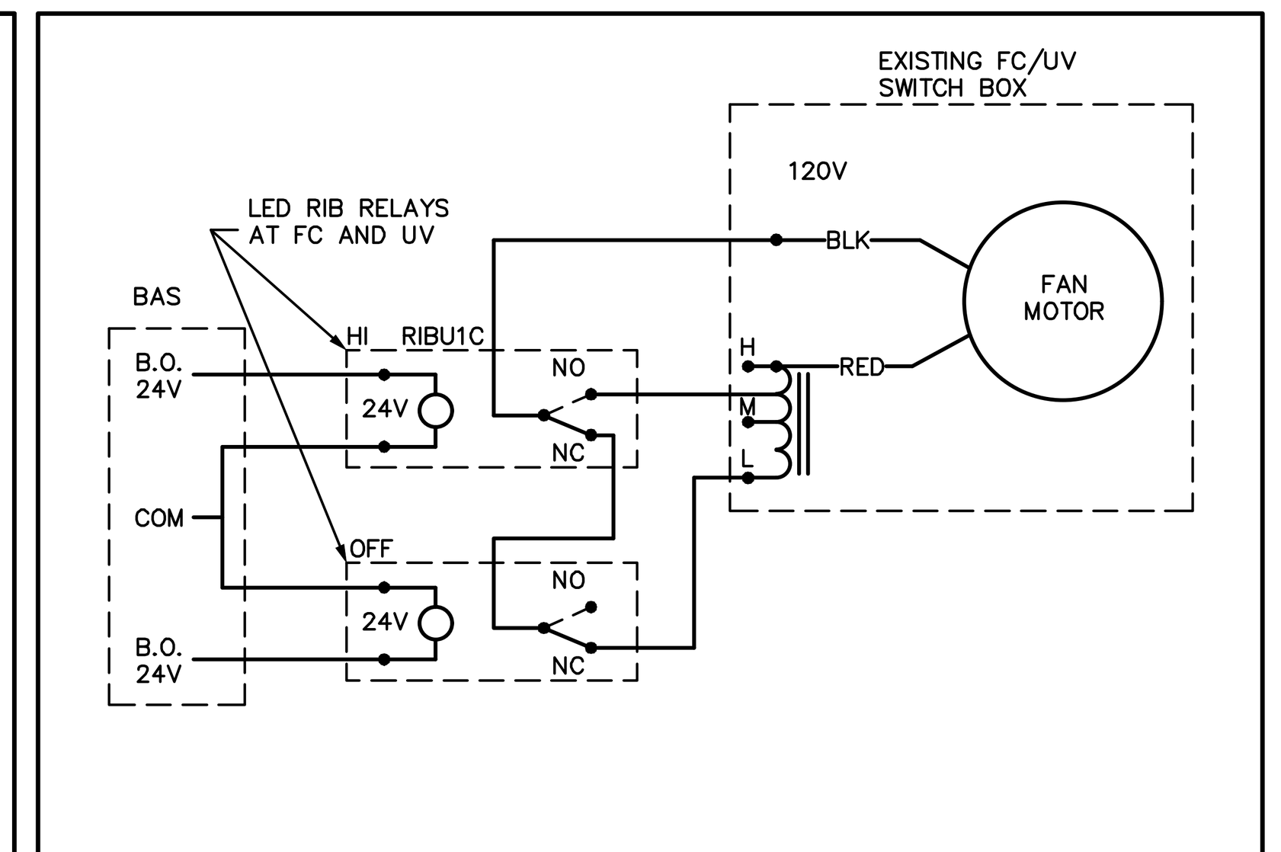


NOTES:

1. CONTRACTOR SHALL PROVIDE BRANCH CIRCUIT (LINE) TO VFD AND OUTPUT WIRING TO MOTOR(S).
2. CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE INCH CONDUIT FOR ALL CONTROL WIRING.
3. CONTRACTOR SHALL PROVIDE CONTROL WIRING, BAS, AND FIELD DEVICE CONNECTIONS.
4. RIB RELAYS BY CONTRACTOR.
5. VFD PROVIDFED BY CONTRACTOR.

1 CMS TYPICAL MOTOR VFD BAS INTERFACE - PUMP

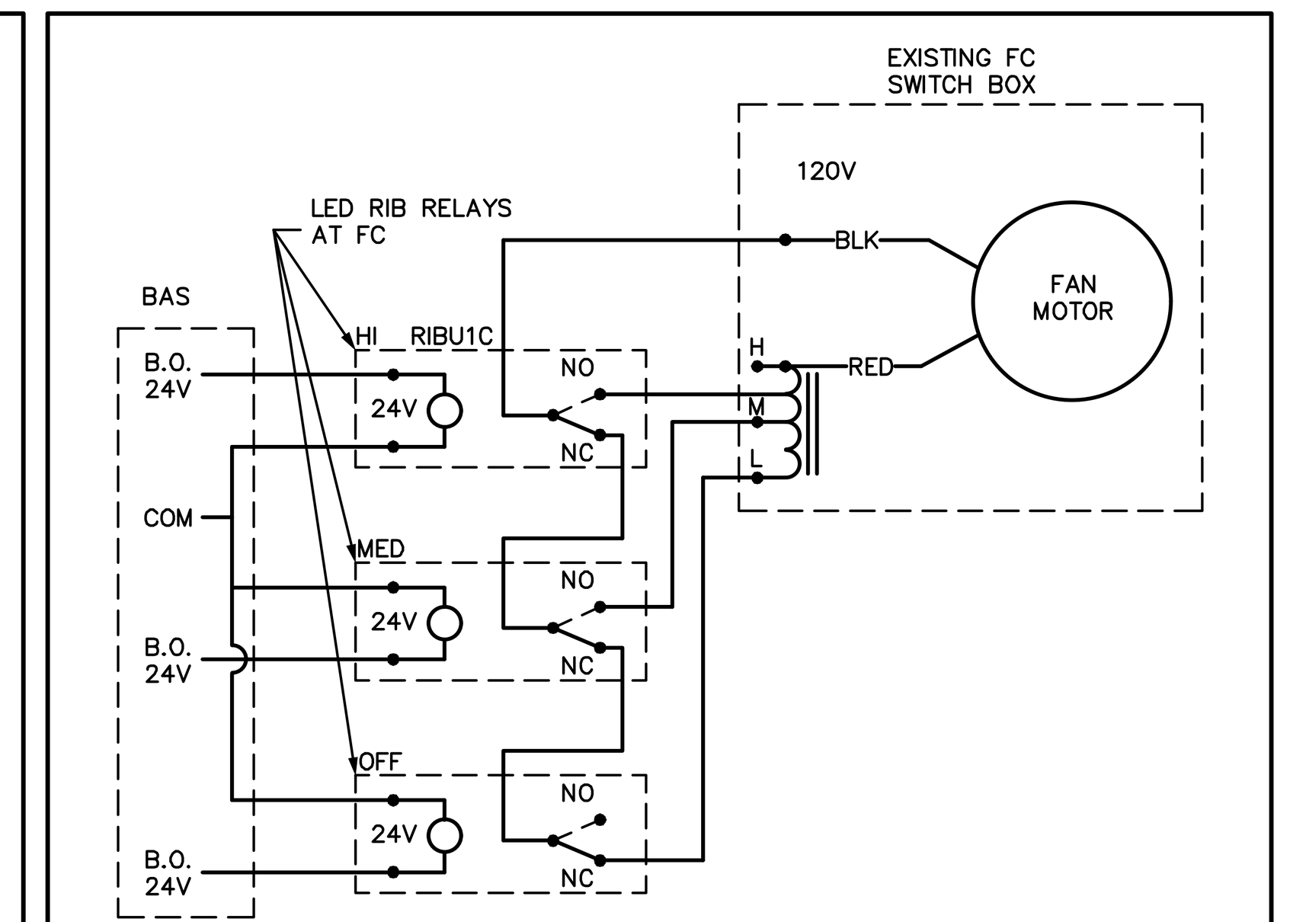
NO SCALE



LOCAL FC/UV FAN SWITCH MODIFICATION
FAIL SAFE RUN IN "LOW" SPEED
IF NEITHER "HI" OR "OFF" ARE ENERGIZED "ON", FAN RUNS IN "LOW"
BAS ENABLES "HI" RELAY, AND ALL OTHER RELAYS ARE DEENERGIZED, FAN RUNS IN "HI"
BAS ENABLES "OFF" RELAY, UNIT SHUTS "OFF"

2 LOCAL SPEED SWITCH MODIFICATION

NO SCALE

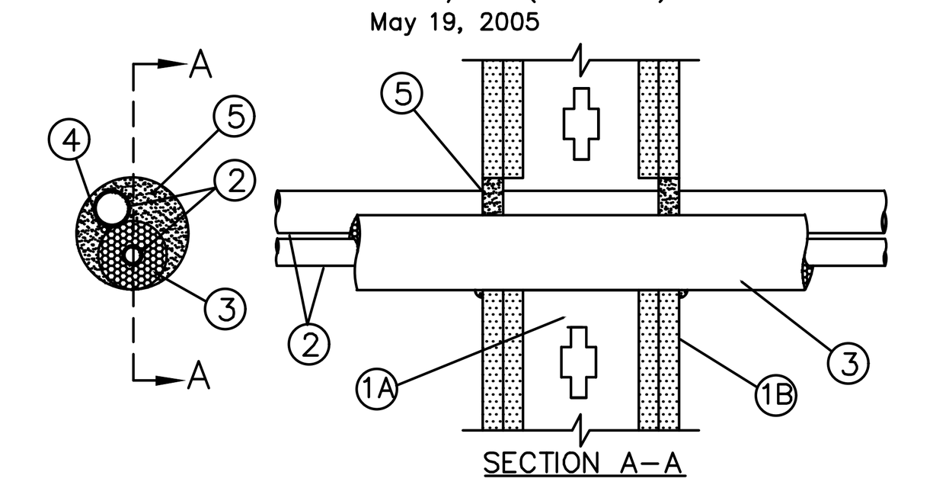


LOCAL FC FAN SWITCH MODIFICATION
FAIL SAFE RUN IN "LOW" SPEED
IF NEITHER "HI" "MED" OR "OFF" ARE ENERGIZED "ON", FAN RUNS IN "LOW"
BAS ENABLES "HI" RELAY, AND ALL OTHER RELAYS ARE DEENERGIZED, FAN RUNS IN "HI"
BAS ENABLES "MED" RELAY, AND ALL OTHER RELAYS ARE DEENERGIZED, FAN RUNS IN "MED"
BAS ENABLES "OFF" RELAY, UNIT SHUTS "OFF"

3 LOCAL SPEED SWITCH MODIFICATION

NO SCALE

SYSTEM NO.W-L-8039
RATINGS – 1 & 2 HR (SEE ITEM 1)
T RATINGS – 0 & 1/2 HR (SEE ITEM 1)
May 19, 2005



1. WALL ASSEMBLY – THE 1 OR 2 HR FIRE RATED GYPSUM BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300, U400 OR V400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 IN. BY 4 IN. (51 MM BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 3–1/2 IN. (89 MM) WIDE SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD* – THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 4 IN. (102 MM)

THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.
THE HOURLY T RATING IS 0 AND 1/2 HR FOR 1 AND 2 HR RATED ASSEMBLIES, RESPECTIVELY.

2. THROUGH PENETRANTS – A MAX OF TWO PIPES OR TUBES AND ONE CABLE INSTALLED ECCENTRICALLY OR CONCENTRICALLY WITHIN THE OPENING. ANNULAR SPACE BETWEEN PENETRANTS AND PERIPHERY OF OPENING TO BE MIN 0 IN. (POINT CONTACT) TO MAX 1–1/2 IN. (0 MM TO MAX 38 MM). SEPARATION BETWEEN PENETRANTS TO BE MIN 0 IN. (POINT CONTACT) TO MAX 1–1/2 IN. (0 MM TO MAX 38 MM). PENETRANTS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL. THE FOLLOWING TYPES AND SIZES OF PENETRANTS MAY BE USED:

A. COPPER TUBING – NOM 1 IN. (25 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
B. COPPER PIPE – NOM 1 IN. (25 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
C. STEEL PIPE – NOM 1 IN. (25 MM) DIAM (OR SMALLER) SCHEDULE 5 (OR HEAVIER) STEEL PIPE.
D. CABLES – MAX 7/C NO. 12 AWG MULTICONDUCTOR POWER AND CONTROL CABLES; XLPE OR PVC INSULATION WITH XLPE OR PVC JACKET.

3. TUBE INSULATION–PLASTICS+ – NOM 3/4 IN. (19 MM) THICK (OR LESS) ACRYLONITRILE BUTADIENE/POLYVINYL CHLORIDE (AB/PVC) FLEXIBLE FOAM FURNISHED IN THE FORM OF TUBING. THE TUBE INSULATION MAY BE INSTALLED ON A MAX OF ONE PIPE OR TUBE. ANNULAR SPACE BETWEEN THE TUBE INSULATION AND PERIPHERY OF OPENING TO BE MIN 0 IN. (POINT CONTACT) TO MAX 1–1/2 IN. (0 MM TO MAX 38 MM). SPACE BETWEEN INSULATED AND UNINSULATED PENETRANTS TO BE 0 IN. (POINT CONTACT) TO MAX 1–1/2 IN. (0 MM TO MAX 38 MM).

SEE PLASTICS (QMFZ2) CATEGORY IN THE PLASTICS RECOGNIZED COMPONENT DIRECTORY FOR NAMES OF MANUFACTURERS. ANY RECOGNIZED COMPONENT TUBE INSULATION MATERIAL MEETING THE ABOVE SPECIFICATIONS AND HAVING A UL 94 FLAMMABILITY CLASSIFICATION OF 94–5A MAY BE USED.

4. CABLES – MAX TWO 7/C (OR LESS) NO. 12 AWG (OR SMALLER) MULTICONDUCTOR POWER AND CONTROL CABLES WITH XLPE OR PVC INSULATION WITH XLPE OR PVC JACKET. CABLES TO BE SPACED MIN 0 IN. (POINT CONTACT) TO MAX 1 IN. (0 MM TO MAX 25 MM) FROM THE INSULATED THROUGH PENETRANTS AND MIN 1/2 IN. TO MAX 1 IN. (13 MM TO MAX 25 MM) FROM NON–INSULATED THROUGH PENETRANTS. THE SPACE BETWEEN THE CABLES AND THE PERIPHERY OF THE OPENING SHALL BE MIN 0 IN. (POINT CONTACT) TO MAX 1 IN. (0 MM TO MAX 25 MM). CABLES TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.

5. FILL,VOID OR CAVITY MATERIAL* – CAULK OR SEALANT – MIN 5/8 IN. (16 MM) THICKNESS OF CAULK APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. MIN 1/4 IN. (6 MM) DIAM BEAD OF CAULK APPLIED TO GYPSUM BOARD/PENETRANT INTERFACE AT POINT CONTACT LOCATION ON BOTH SIDES OF WALL.

3M COMPANY– CP 25WB+, IC 15WB+ CAULK OR FB–3000 WT SEALANT

* BEARING THE UL CLASSIFICATION MARKING

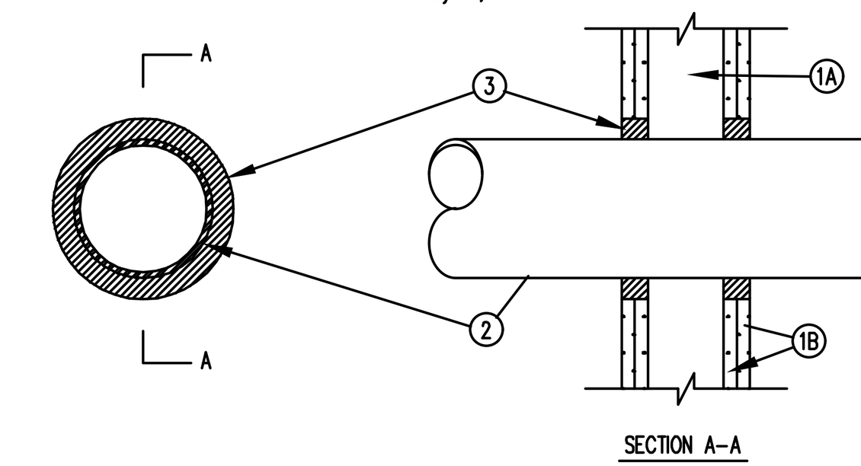
4 U.L SYSTEM NO W-L-8039 DETAIL

NO SCALE

System No. W–L–1054

METAL PIPE THROUGH GYPSUM WALL ASSEMBLY

F Ratings – 1 and 2 Hr (See Items 1 and 3)
T Rating – 0 Hr
L Rating At Ambient – Less Than 1 CFM/Sq Ft
L Rating At 400 F – 4 CFM/Sq Ft
January 21, 2020



1. Wall Assembly –– The 1 or 2 hr fire–rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs –– Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2–1/2 in. wide and spaced max 24 in. OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw–attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.
   B. Gypsum Board* –– 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 32–1/4 in. for steel stud walls. Max diam of opening is 14–1/2 in. for wood stud walls.
   The F Rating of the firestop system is equal to the fire rating of the wall assembly.
2. Through–Penetrants –– One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 0 in. to max 2–1/4 in. Pipe may be installed with continuous point contact. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. Steel Pipe –– Nom 30 in diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe –– Nom 30 in. diam (or smaller) cast or ductile iron pipe.
   C. Conduit –– Nom 4 in diam (or smaller) steel electrical metallic tubing or 6 in. diam steel conduit.
   D. Copper Tubing –– Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe –– Nom 6 in. diam (or smaller) regular (or heavier) copper pipe.
3. Fill, Void or Cavity Material* –– Sealant –– Min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in. diam bead of fill material shall be applied at the pipe wall interface on both surfaces of wall .

*Bearing the UL Classification Mark

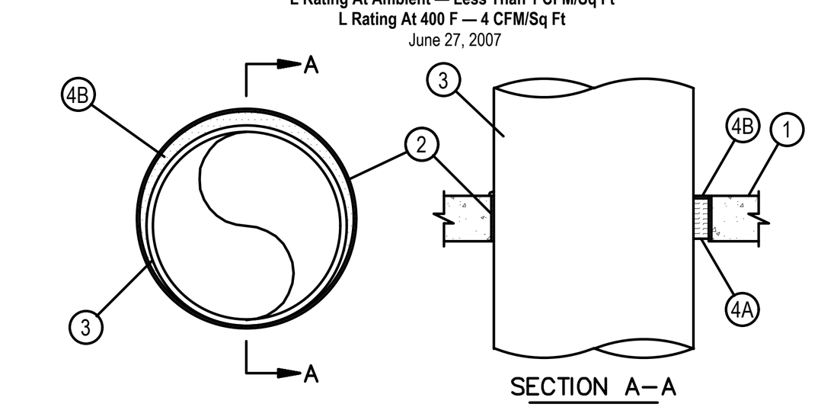
5 U.L SYSTEM NO W-L-1054 DETAIL

NO SCALE

System No. C–AJ–1226

METAL PIPE THROUGH CONCRETE WALL ASSEMBLY

F Rating — 3 Hr
T Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/Sq Ft
L Rating At 400 F — 4 CFM/Sq Ft
June 27, 2007



1. Floor or Wall Assembly –– Min 4–1/2 in. thick reinforced lightweight or normal weight (100–150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 32 in.
2. Metallic Sleeve –– (Optional) Nom 32 in. diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extending a max of 3 in. above floor or beyond both surfaces of wall.
2A. Sheet Metal Sleeve –– (Optional) Max 6 in. diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid–height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. below the bottom of the deck and a max of 1 in. above the top surface of the concrete floor.
2B. Sheet Metal Sleeve –– (Optional) – Max 12 in. diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approx mid–height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. below the bottom of the deck and a max of 1 in. above the top surface of the concrete floor.
3. Through–Penetrant –– One metallic pipe, tube or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1–7/8 in. Penetrant may be installed with continuous point contact. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic penetrants may be used:
A. Steel Pipe –– Nom 30 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe –– Nom 30 in. diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe –– Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing –– Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit –– Nom 6 in. diam (or smaller) steel conduit.
F. Conduit –– Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System –– The firestop system shall consist of the following:
A. Packing Material –– Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall or sleeve as required to accommodate the required thickness of fill material.
B. Fill, Void or Cavity Material* –– Sealant –– Min 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or sleeve or with both surfaces of wall or sleeve. At the point or continuous contact locations between penetrant and concrete or sleeve, a min 1/4 in. diam bead of fill material shall be applied at the concrete or sleeve/ pipe penetrant interface on the top surface of floor and on both surfaces of wall.

*Bearing the UL Classification Mark

6 U.L SYSTEM NO C-AJ-1226 DETAIL

NO SCALE

PIPE AND DUCTWORK WALL PENETRATION NOTES (MECHANICAL)

1. ALL INSULATED METAL PIPING PENETRATING A ONE HOUR OR MORE RATED ASSEMBLY SHALL BE SEALED AROUND INSULATION ON BOTH SIDES OF WALL WITH AN APPROVED FIRE STOP WRAP/STRIP MATERIAL. NUMBER OF WRAPS AROUND INSULATION WITHIN WALL OPENING SHALL BE AS REQUIRED FOR THICKNESS OF INSULATION AND MFG. RECOMMENDATIONS. COVER EXPOSED SURFACE AND SEAMS WITH AN APPROVED FIRE STOP CAULK ON BOTH SIDES OF WALL.
2. ALL NON–INSULATED METAL PIPING PENETRATING A ONE HOUR WALL OR MORE RATED WALL OR FLOOR SHALL BE SEALED AROUND PIPE ON BOTH SIDES OF WALL WITH AN APPROVED FIRE STOP CAULK. THICKNESS SHALL BE AS RECOMMENDED BY MANUFACTURER FOR WALL RATING REQUIRED TO MAINTAIN U.L. CLASSIFICATION.
3. ACCEPTABLE MANUFACTURERS OF FIRE STOP MATERIALS ARE AS FOLLOWS:
   3.1. NELSON FLAMESEAL PUTTY+
   3.2. CROUSE–HINDS CABLE BARRIER SYSTEM
   3.3. DOW CORNING FIRE STOP SEALANT/FOAM
   3.4. 3M FIRE BARRIER
   3.5. T&B FLAMESAFE
   3.6. THERMAFIBER BRAND SAFING
   3.7. ALL MATERIALS AND METHODS OF INSTALLATION SHALL BE U.L. APPROVED FOR THAT INSTALLATION. SHOP DRAWING SUBMITTALS OF MATERIALS AND METHOD OF INSTALLATION, INCLUDING DRAWINGS, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW.
4. WHEN A PIPE, WIRE, OR DUCT PENETRATES A NON–RATED SMOKETIGHT PARTITION, THE MECHANICAL CONTRACTOR SHALL SEAL AROUND ALL PIPES WIRES AND DUCTS WITH SEALANT MATERIAL TO MAKE IT SMOKETIGHT. SEE PLANS FOR LOCATION OF THESE PARTITIONS.
5. SEE PLANS FOR WALL TYPES.
6. ALL RATED WALL PENETRATIONS SHALL BE IN ACCORDANCE WITH UNDERWRITERS LABORATORIES PENETRATION FIRESTOP SYSTEM REQUIREMENTS. ALL MATERIALS USED IN PENETRATION FIRESTOP SYSTEMS SHALL BE APPROVED BY UNDERWRITERS LABORATORIES AND SHALL BE U.L. LABELED.
7. PENETRATIONS OF NONRATED WALLS, PARTITIONS AND FLOORS OF NON–COMBUSTIBLE CONSTRUCTION SHALL BE FIRESTOPPED WITH NONCOMBUSTIBLE MATERIALS. PENETRATIONS OF NONRATED WALLS, PARTITIONS AND FLOOR OF COMBUSTIBLE CONSTRUCTION SHALL BE FIRESTOPPED WITH MATERIALS EQUIVALENT TO TWO INCHES OF WOOD. FIRESTOPPING SHALL COMPLY WITH ASTM E–814.

MECHANICAL • ELECTRICAL • PLUMBING
FIRE PROTECTION • TECHOLOGY DESIGN
1927 S. TRYON ST., SUITE 300, CHARLOTTE NC 28203
150 FAYETTEVILLE ST., SUITE 520, RALEIGH, NC 27601
PHONE:704-338-1292 WWW.OPTIMAENGINEERING.COM
NORTH CAROLINA LICENSE NUMBER C-0914
optima engineering

SEAL:

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 027862 STEVEN R. DAILEY
01/10/23

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	TLH
DESIGNED BY:	TLH
CHECKED BY:	SRD

SHEET TITLE:
MECHANICAL DETAILS

DWG #:
M501

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SYMBOL SCHEDULE

2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY – ELECTRICAL SUMMARY

C401 METHOD OF COMPLIANCE

- ☐ 2018 NCECC CHAPTER 4
- ☐ NC SPECIFIC COMCHECK PROVIDED
- ☐ N/A BASED ON PROJECT SCOPE
- ☐ ASHRAE 90.1–2013

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

- ☐ C406.2 EFFICIENT MECH EQUIPMENT
- ☐ C406.5 ON–SITE RENEWABLE ENERGY
- ☐ C406.3 REDUCED LTG DENSITY
- ☐ C406.6 DEDICATED OA SYSTEM
- ☐ C406.4 ENHANCED DIGITAL LTG CNTLS
- ☐ C406.7 HI–EFF SERVICE WTR HTG
- ■ NOT APPLICABLE BASED ON PROJECT SCOPE
- ☐ C406.7.1 WTR HTG LOAD FRACTION

C408 – SYSTEM COMMISSIONING:

- ☐ BUILDING IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.
- ☐ BUILDING IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.
- ■ NOT APPLICABLE

C405.2 – LIGHTING CONTROLS (MANDATORY REQUIREMENTS):

- ☐ LIGHTING SYSTEMS ARE PROVIDED WITH CONTROLS AS REQUIRED PER SECTION C405.2, EXCEPT WHERE EXEMPT.
- ■ NOT APPLICABLE

C405.3 – EXIT SIGNS (MANDATORY REQUIREMENTS):

- ☐ INTERNALLY ILLUMINATED EXIT SIGNS DO NOT EXCEED 5 WATTS PER SIDE.
- ■ NOT APPLICABLE

C405.4 – INTERIOR LIGHTING POWER REQUIREMENTS (PRESCRIPTIVE) (NON–EXEMPT):

- ■ NOT APPLICABLE PER 2018 NCECC C503.1, EXCEPTION 2.G.

C405.4.1 – TOTAL CONNECTED INTERIOR LIGHTING POWER:

________ WATTS SPECIFIED

__ % REDUCTION OF SPECIFIED VS. ALLOWED (APPLICABLE IF C406.1.2 IS SELECTED)

C405.4.2 – TOTAL ALLOWABLE INTERIOR LIGHTING POWER:

METHOD OF COMPLIANCE:

- ☐ BUILDING AREA METHOD
- ☐ SPACE–BY–SPACE METHOD

________ WATTS ALLOWED

C405.5.1 – EXTERIOR BUILDING LIGHTING POWER (NON–EXEMPT):

- ■ NOT APPLICABLE

TOTAL CONNECTED EXTERIOR LIGHTING POWER:

________ WATTS SPECIFIED

TOTAL ALLOWABLE EXTERIOR LIGHTING POWER:

________ WATTS ALLOWED

C405.6 – ELECTRICAL ENERGY CONSUMPTION (DWELLING UNITS):

- ☐ SEPARATE ELECTRICAL METERING HAS BEEN PROVIDED FOR EACH DWELLING UNIT IN GROUP R–2 BUILDINGS.
- ■ NOT APPLICABLE

C405.7 – ELECTRICAL TRANSFORMERS (MANDATORY REQUIREMENTS):

- ☐ ELECTRICAL TRANSFORMERS HAVE BEEN SPECIFIED TO MEET MINIMUM EFFICIENCY REQUIREMENTS PER C405.7, EXCEPT WHERE EXEMPT.
- ■ NOT APPLICABLE

C405.8 – ELECTRICAL MOTORS (MANDATORY REQUIREMENTS):

- ☐ ELECTRICAL MOTORS HAVE BEEN SPECIFIED TO MEET MINIMUM EFFICIENCY REQUIREMENTS PER C405.8, EXCEPT WHERE EXEMPT.
- ■ NOT APPLICABLE

DEVICES AND PATHWAYS

BRANCH CIRCUIT HOMERUN TO PANEL.

JUNCTION BOX WITH CONNECTION TO EQUIPMENT SERVED. 4" SQUARE BOX WITH A SINGLE–GANG OPENING AND PLASTER RING.

PANELS, DISCONNECTS

FUSED HEAVY DUTY DISCONNECT SWITCH. NUMERALS INDICATE SWITCH RATING/FUSE SIZE. NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED.

PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'–6" AFF.

ABBREVIATIONS

BAS	BUILDING AUTOMATION SYSTEM

ELECTRICAL SHEET INDEX

1 ELECTRICAL SPECIFICATIONS

NO SCALE

1. GENERAL:

A. THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIAL,S AND SUPPLIES AS NECESSARY FOR THE COMPLETE AND SATISFACTORY OPERATING ELECTRICAL SYSTEMS AS SHOWN ON THE PLANS.
B. ALL WORK SHALL BE IN ACCORDANCE WITH LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE, NFPA, STATE BUILDING CODE, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
C. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL ELECTRICAL PERMITS AND INSPECTION FEES.
D. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY THE UNDERWRITER'S LABORATORIES, INC. OR BY A STATE APPROVED THIRD PARTY TESTING AGENCY FOR THE USE INTENDED WHERE A STANDARD FOR SUCH MATERIALS AND USE EXISTS. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL AND OF THE SAME MANUFACTURER.
E. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CATALOG DATA IN ELECTRONIC FORMAT (PDF) FOR ALL ELECTRICAL ITEMS IN THE SCOPE OF WORK, INCLUDING, BUT NOT LIMITED TO, RACEWAYS, BOXES, FITTINGS, CONDUCTORS, LUMINAIRES, LAMPS, BALLASTS, WIRING DEVICES, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, SWITCHBOARDS, FIRE ALARM, TELECOMMUNICATIONS, ETC. FOR APPROVAL AS APPLICABLE FOR THE PROJECT. ONE COMPLETE SET OF APPROVED SUBMITTALS SHALL BE MAINTAINED AT THE JOB SITE.
F. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH THE BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, CONDUIT, WIRING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, METHODS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COSTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED AFTER BIDS HAVE BEEN ACCEPTED AND ALL COSTS WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. CREDITS SHALL BE GIVEN TO THE OWNER WHERE SUCH EQUIPMENT AND METHODS RESULT IN LESS EXPENSE TO THE CONTRACTOR.
G. ONE COMPLETE SET OF THE LATEST CONSTRUCTION PLANS OF ALL TRADES SHALL BE MAINTAINED AT THE JOB SITE. IN ADDITION, ALL ADDENDUMS, BULLETINS, AND/OR SKETCHES SHALL BE INCORPORATED INTO THE ON–SITE CONSTRUCTION PLANS AS THE JOB PROGRESSES.
H. COMPLETELY ADEQUATE HOUSING SHALL BE PROVIDED FOR ALL MATERIALS STORED ON JOB SITE. ONLY CONDUIT MAY BE STORED OUTSIDE, BUT NOT IN CONTACT WITH THE GROUND.
I. THE CONDUIT AND NEUTRAL SYSTEM SHALL BE GROUNDED AT THE MAIN SERVICE EQUIPMENT. GROUNDING ELECTRODE SYSTEM SHALL BE INSTALLED PER NEC 250.
J. PROVIDE AN INTERSYSTEM BONDING TERMINATION DEVICE AT THE MAIN ELECTRICAL SERVICE PER NEC 250.94.
K. WIRING SHALL BE TESTED FOR CONTINUITY AND GROUNDS BEFORE BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER.
L. PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF WORK AND REPAIR ANY DAMAGE DONE.
M. THE ELECTRICAL CONTRACTOR SHALL CONNECT ALL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (UNLESS OTHERWISE NOTED), EXCEPT FOR CONTROL WIRING FOR EQUIPMENT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR. CONTROL WIRING FOR SUCH EQUIPMENT SHALL BE PROVIDED BY THE RESPECTIVE DISCIPLINE.
N. ALL ELECTRICAL JUNCTION BOXES, SWITCHGEAR, CABLING, VOICE/DATA OUTLETS, LOW VOLTAGE CABINETS, EMERGENCY RECEPTACLES, ETC. SHALL BE LABELED ACCORDING TO PANEL/RACK AND CIRCUIT NUMBER.
O. UPON COMPLETION OF WORK, CONTRACTOR SHALL PRESENT ENGINEER WITH CERTIFICATE OF APPROVAL FROM LOCAL INSPECTOR AND/OR AUTHORITY HAVING JURISDICTION BEFORE WORK WILL BE APPROVED FOR FINAL PAYMENT.
P. CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR A PERIOD OF ONE YEAR EFFECTIVE THE DATE THE PROJECT IS ACCEPTED BY THE OWNER. ANY IMPERFECT MATERIALS OR WORKMANSHIP SHALL BE REPLACED WITHOUT ADDED COST TO THE PROJECT.
Q. IT SHALL NOT BE THE INTENT OF ISSUED PLANS AND/OR SPECIFICATIONS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE ELECTRICAL CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL NECESSARY ITEMS FOR A COMPLETE AND OPERATING SYSTEM.
R. THE WORD "PROVIDE" MEANS THAT THIS CONTRACTOR SHALL FURNISH, FABRICATE, ERECT, CONNECT, AND COMPLETELY INSTALL SYSTEMS IN PROPER OPERATING CONDITION. ALL LABOR, PRODUCT OPTIONS, ACCESSORIES AND INCIDENTAL MATERIALS REQUIRED SHALL BE INCLUDED AS PART OF THIS WORK TO COMPLETE THE INSTALLATION.
S. ELECTRICAL CONTRACTOR SHALL NOT SCALE PLANS. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATIONS OF ALL EQUIPMENT, UNLESS OTHERWISE NOTED.
T. IF DURING THE COURSE OF WORK, THE CONTRACTOR DISCOVERS A PROBLEM WITH THE PERFORMANCE OF THE INSTALLATION RELATIVE TO THE PLANS AND SPECIFICATIONS, THE NEC, OR OTHER CODES OR REQUIREMENTS, THE CONTRACTOR SHALL IMMEDIATELY BRING THE PROBLEM TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK.
U. WHERE THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL BRING THE ISSUE TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK OR ORDERING ANY MATERIALS. NO ADDITIONAL COSTS SHALL BE WARRANTED WITHOUT A CHANGE TO THE PROJECT SCOPE.

2. RACEWAY:

A. CONDUIT SHALL BE MANUFACTURED BY ALLIED, WHEATLAND, REPUBLIC CONDUIT, WESTERN TUBE, OR APPROVED EQUIVALENT.
B. FOR INTERIOR WORK, CONDUIT SHALL BE ZINC COATED EMT EXCEPT WHERE NOT PERMITTED BY CODE. USE SCHEDULE 40 PVC BELOW CONCRETE SLAB, IN DUCTBANKS, AND FOR EXTERIOR WORK WHERE NOT SUBJECT TO DAMAGE. USE IMC WHERE SUBJECT TO PHYSICAL DAMAGE.
C. EMT FITTINGS SHALL BE COMPRESSION GLAND TYPE, OF MALLEABLE STEEL. CONNECTORS SHALL HAVE INSULATED THROATS. CAST, SET SCREW, OR INDENTER TYPE FITTINGS ARE NOT ACCEPTABLE. ALL FITTINGS FOR EMT SHALL BE MADE OF STEEL.
D. ALL RACEWAY SHALL BE RUN CONCEALED, UNLESS OTHERWISE NOTED. FISH ALL NEW OUTLETS IN EXISTING WALLS, WHERE POSSIBLE. ALL RUNS SHALL BE NEAT AND SQUARE.
E. LOW VOLTAGE CABLING NOT SPECIFIED TO BE INSTALLED IN CONDUIT, SHALL BE INSTALLED IN A CABLE TRAY SYSTEM OR J–HOOK SYSTEM CONSISTING OF MINIMUM 2" DIAMETER HOOKS LOCATED ON 3'–0" CENTERS IN ALL ACCESSIBLE CEILINGS. WHERE THERE ARE INACCESSIBLE CEILINGS, PROVIDE CONDUIT FOR ENTIRE LENGTH OF INACCESSIBILITY.
F. RACEWAYS USED FOR LOW VOLTAGE SYSTEMS SUCH AS TELECOMMUNICATIONS, FIRE ALARM, SECURITY, CCTV, CONTROLS, AND SIMILAR CONDUITS ABOVE THE CEILING AND BACKBOARD(S) SHALL BE PROVIDED WITH INSULATED THROAT BUSHINGS AT EACH CONDUIT TERMINATION. THESE BUSHINGS SHALL BE BE INSTALLED PRIOR TO PULLING LOW–VOLTAGE CABLES.
G. RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE–RATED WALLS SHALL BE FILLED WITH IMPERVIOUS, NON–SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, WATER, AND DUST. ROOF PENETRATIONS SHALL BE WITHIN THE EQUIPMENT ROOF CURB.
H. SUPPORT ALL CONDUIT WITH STRAPS AND CLAMPS.
I. ALL CONDUIT SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES, WHETHER EXPOSED OR NOT AND SUPPORTED FROM STRUCTURE AND PROPERLY SECURED.
J. WHERE CONDUITS PASS THROUGH A BUILDING EXPANSION JOINT, PROVIDE GALVANIZED EXPANSION FITTINGS WITH BONDING JUMPERS.
K. MINIMUM CONDUIT SIZE SHALL BE 3/4" FOR INTERIOR WORK.
L. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
M. PROVIDE PULL BOXES, SUCH THAT NO SINGLE CONDUIT RUN HAS BENDS IN EXCESS OF 360°. PULL BOXES SHALL BE SUITABLE AND APPROVED FOR THE INTENDED USE. WHERE CONDUITS PASS UNDER PAVED AREAS, THEY SHALL BE RGS.
N. ALL CONDUIT BENDS/ELBOWS EMERGING FROM UNDERGROUND SHALL BE IMC AND SHALL EXTEND A MINIMUM OF 18" BELOW GRADE.
O. ALL UNDERGROUND RACEWAYS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM BITUMASTIC.
P. ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATERTIGHT BY USE OF POLYETRA–FLUOROETHYLENE TAPE.
Q. THE USE OF AC OR NM CABLE IS NOT PERMITTED.
R. T. MC CABLE MAY BE USED IN LENGTHS OF 50' MAX PER CIRCUIT.

3. OUTLET BOXES:

A. JUNCTION AND PULL BOXES SHALL BE CODE GAUGE GALVANIZED STEEL. ACCEPTED MANUFACTURERS SHALL BE STEEL CITY (THOMAS & BETTS), RACO, CROUSE–HINDS, APPLETON (EMERSON), OR APPROVED EQUIVALENT.
B. OUTLET BOXES SHALL NOT BE MOUNTED BACK TO BACK IN COMMON WALLS.
C. ATTACH EMT WITH CONNECTORS HAVING INSULATED THROAT.
D. ATTACH BOXES TO STUD WORK USING CADDY BAR STRAPS THAT CONNECT TO TWO ADJACENT METAL STUDS TO PREVENT TWISTING OF BOX IN WALL.
E. ALL OUTLET BOXES (INCLUDING TELEPHONE, CABLE TV, AND COMPUTER) SHALL HAVE COVER PLATES, BLANK IF NOT USED.

4. CONDUCTORS:

A. CONDUCTORS SHALL BE MANUFACTURED BY SOUTHWIRE (SIMPULL), ENCORE (SUPERSLICK), UNITED COPPER (SLK), CERRO (SLP), OR APPROVED EQUAL, "PRE–LUBRICATED" BY THE MANUFACTURER.
B. ALL CONDUCTORS SHALL BE COPPER, RATED 75° C WET/DRY EXCEPT WHERE OTHERWISE NOTED OR REQUIRED BY U.L. OR OTHER CODES.
C. ALL CONDUCTORS SHALL BE SINGLE INSULATED CONDUCTOR, THHN/THWN–2. SIZES #10 AWG AND SMALLER SHALL BE SOLID, SIZES #8 AWG AND LARGER SHALL BE STRANDED.
D. BRANCH CIRCUITS SHALL NOT BE SMALLER THAN #12 AWG.
E. CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208 VOLT SYSTEMS AND BROWN/ORANGE/YELLOW FOR 277/480 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 VOLT SYSTEMS AND NATURAL GRAY FOR 277/480 VOLT SYSTEMS. GROUND CONDUCTOR SHALL BE GREEN ON ALL SYSTEMS. ALL CONDUCTOR SIZES SHALL HAVE COLOR–CODED INSULATION. THE USE OF COLORED TAPE ON LARGER WIRE SIZES SHALL NOT BE ALLOWED.
F. INSULATION SHALL BE DUAL RATED TYPE THHN/THWN–2 FOR FEEDERS AND BRANCH CIRCUITS. FIXTURE TAPS SHALL BE #12 THHN/THWN–2 IN FLEX WITH GREEN #12 AWG GROUNDING CONDUCTOR.
G. ALL CONDUCTORS SHALL BE IN CONDUIT.
H. MULTI–WIRE BRANCH CIRCUITS SHALL NOT BE ALLOWED.
J. JOINTS IN #10 AWG AND SMALLER SHALL BE MADE UP WITH CRIMPED CONNECTORS WITH INSULATING CAPS (NO TAPE) OR WIRENUTS (MAXIMUM OF 3 CONDUCTORS UNDER ANY CONNECTOR OR WIRENUT). LARGER WIRE SHALL USE SPLIT BOLTS OR BOLTED CLAMPS.
K. ALL WIRING LUGS THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO, BREAKERS, PANELBOARD/SWITCHBOARD LUGS, SAFETY SWITCH LUGS, MOTOR STARTER LUGS, TRANSFORMERS LUGS, WIRING DEVICE TERMINALS, AND ALL EQUIPMENT LUGS/TERMINALS SHALL BE RATED FOR USE WITH 75 DEGREE INSULATED CONDUCTORS AT THEIR 75 DEGREE AMPACITY AND SHALL BE SIZED AND SELECTED TO MATCH THE CONDUCTOR SIZE AND MATERIAL.
L. CIRCUIT JOINTS SHALL NOT BE MADE ON DEVICE TERMINALS.
M. WIRE WITHIN PANELBOARDS SHALL BE NEATLY TRAINED, SQUARED, BUNCHED, AND TAGGED.
N. GROUND ALL EQUIPMENT PER NEC ARTICLE 250. BOND WHERE CONDUITS ENTER ENCLOSURES THROUGH CONCENTRIC KNOCKOUTS. ALL FLEX, INCLUDING FIXTURE TAPS, SHALL INCLUDE GREEN GROUNDING CONDUCTOR, #12 AWG MINIMUM. PROVIDE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT AND FOR EACH CIRCUIT, SIZED PER NEC 250–122.
O. ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300–19.
P. THE ELECTRICAL CONTRACTOR SHALL FOLLOW AND APPLY THE TABLE BELOW, REGARDLESS WHAT THE PANEL SCHEDULE INDICATES, FOR SIZING ALL 120V & 277V, 20 AMP BRANCH CIRCUITS (COPPER CONDUCTORS) TO ALLOW A MAXIMUM OF 3% VOLTAGE DROP FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE ON THE BRANCH CIRCUIT AND ACHIEVE A MAXIMUM OF 5% VOLTAGE DROP ACROSS THE ENTIRE BRANCH CIRCUIT:

VOLTAGE	CONDUCTOR LENGTH *	BRANCH CIRCUIT
120	0' – 50'	#12
120	51' – 90'	#10
120	91' – 140'	#8
120	141' – 225'	#6

* – THE LENGTH IS MEASURED FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE WHICH THE BRANCH CIRCUIT SERVES. WHERE THE DISTANCE EXCEEDS ABOVE, CONSULT WITH THE ENGINEER.

5. SUPPORTS:

A. ALL EQUIPMENT SHALL BE ADEQUATELY SUPPORTED FROM STRUCTURE.
B. INSERTS IN MASONRY SHALL BE LEAD OR FIBER IN DRILLED HOLES, OR CAST IN PLACE.
C. NAILS OR POWDER ACTUATED FASTENERS SHALL NOT BE USED.
D. EMT/IMC/RGS SUPPORTS SHALL BE A MAXIMUM OF 8'–0" APART AND A MAXIMUM OF 3'–0" FROM BOXES.

6. PAINTING:

A. SUITABLE FINISH COAT SHALL BE PROVIDED FOR ALL EQUIPMENT. PANEL TUBS, COVERS, ETC. SHALL BE PRIMED AND ENAMELED TO BLEND WITH ADJACENT SURFACES, OR SHALL BE MANUFACTURER'S STANDARD COLOR BAKED ENAMEL FINISH, OR AS DIRECTED BY THE ARCHITECT.
B. CONTRACTOR TO PAINT WHERE EXISTING EXPOSED PANELBOARDS, SURFACE RACEWAY, SURFACE BOXES, ETC. HAVE BEEN REMOVED DURING THE DEMOLITION PHASE, EITHER FOR TEMPORARY WORK OR PERMANENTLY.

8. FIRE STOPPING:

A. ALL PENETRATIONS OF RATED ASSEMBLIES SHALL BE SEALED WITH RATED MATERIALS MEETING ASTM E–814.
B. PROVIDE FIRESTOPPING DEVICE(S) OR SYSTEM(S) WHICH HAVE BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E–814. INSTALL THE DEVICE(S) OR SYSTEM(S) IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE THE APPROPRIATE DEVICE(S) OR SYSTEM(S) WITH AN 'F' RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED.
C. DEVICE(S) AND/OR SYSTEM(S) SHALL BE BY HILTI, 3M OR EQUIVALENT.

9. SEISMIC:

A. THE ELECTRICAL CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR PROVIDING SEISMIC SUPPORT AND BRACING OF ELECTRICAL COMPONENTS TO RESIST THE EFFECTS OF EARTHQUAKES ON THE ELECTRICAL SYSTEM AS WELL AS ANY REQUIRED SPECIAL INSPECTIONS BASED ON THE SPECIFIC GEOGRAPHIC LOCATION AS REQUIRED. THE SEISMIC RESTRAINTS AND SPECIAL INSPECTIONS SHALL MEET ALL APPLICABLE STATE AND LOCAL BUILDING CODE REQUIREMENTS AS WELL AS ASCE–7 REQUIREMENTS.

10. DEMOLITION NOTES:

H. PARTIAL AND TOTAL DEMOLITION OF PORTIONS SHALL BE PERFORMED ALONG WITH ALL NECESSARY MODIFICATIONS TO THAT PORTION OF THE EXISTING BUILDING WHICH SHALL REMAIN SO THAT IT CONTINUES TO FUNCTION UNAFFECTED BY THE DEMOLITION AND ASSOCIATED NEW CONSTRUCTION.
I. WHERE INCLUDED AS PART OF THE CONTRACT DOCUMENTS, THE DRAWINGS INDICATE THE GENERAL AREAS OF WORK INVOLVED. HOWEVER, THE ELECTRICAL CONTRACTOR SHALL PERFORM WORK OUTSIDE THOSE AREAS SHOWN AS IS NECESSARY TO COMPLY WITH THE INTENT OF THIS SECTION.
J. THE ELECTRICAL CONTRACTOR SHALL FAMILIARIZE THEMSELVES WITH THE EXISTING BUILDING AND WITH THE WORK OF ALL OTHER TRADES AND INCLUDE ALL WORK NECESSARY TO COMPLY WITH THE INTENT OF THE DEMOLITION.
K. IT SHALL BE UNDERSTOOD THAT FIELD CONDITIONS MAY BE ENCOUNTERED DURING THE EXECUTION OF THIS CONTRACT WHICH WILL REQUIRE EXTENSION OR RELOCATION OF EXISTING SYSTEMS OR EQUIPMENT WHICH ARE NOT SPECIFICALLY SHOWN ON THE DRAWINGS, BUT WHICH ARE REQUIRED TO MEET THE STATED INTENT THAT THE BUILDING CONTINUE TO FUNCTION UNAFFECTED BY THE DEMOLITION AND ASSOCIATED NEW CONSTRUCTION. THE ELECTRICAL CONTRACTOR SHALL INCLUDE SUCH WORK AS WOULD NORMALLY BE EXPECTED IN AN EXISTING BUILDING OF THIS AGE AND TYPE.
L. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL TOOLS, EQUIPMENT, LABOR, ETC. IN ORDER TO ACCOMPLISH THE DEMOLITION PORTION OF THE PROJECT.
M. THE DEMOLITION OF CERTAIN AREAS OF THE EXISTING BUILDING SHALL BE PERFORMED BY THE GENERAL CONTRACTOR. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE GENERAL CONTRACTOR TO DIFFERENTIATE THE SCOPE OF WORK BETWEEN SEPARATE TRADES.
N. THE ELECTRICAL CONTRACTOR SHALL INCLUDE COORDINATION WITH THE GENERAL CONTRACTOR AND SUCH DEMOLITION OF THE EXISTING ELECTRICAL SYSTEMS AS IS NECESSARY SO THAT THE DEMOLITION WORK OF THE GENERAL CONTRACTOR SHALL NOT DAMAGE THOSE PORTIONS OF THE ELECTRICAL SYSTEMS WHICH ARE TO REMAIN IN SERVICE, ARE TO BE REUSED, OR ARE TO BECOME THE PROPERTY OF THE OWNER.
O. TURN OVER TO OWNER, UPON REQUEST OR AS NOTED, ITEMS SHOWN AS BEING REMOVED AND NOT REINSTALLED. ITEMS NOT DIRECTED OR REQUESTED TO BE TURNED OVER TO THE OWNER SHALL BE DISPOSED OF BY THE ELECTRICAL CONTRACTOR.
P. EQUIPMENT OR MATERIALS WHICH ARE TO BE REUSED OR TURNED OVER TO THE OWNER SHALL BE CAREFULLY REMOVED, CLEANED, AND STORED IN A CLEAN AND DRY AREA. SHOULD THE ELECTRICAL CONTRACTOR ENCOUNTER SUCH EQUIPMENT WHICH IS NOT IN SATISFACTORY CONDITION FOR REUSE AND NOT IN WORKING ORDER, THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IMMEDIATELY.
Q. DISCONNECT ELECTRICAL SERVICES TO ALL EQUIPMENT REQUIRING REMOVAL. CONDUIT SHALL BE REMOVED BACK TO THE POINT WHERE IT WILL BE CONCEALED AT THE COMPLETION OF THIS CONTRACT. WIRE AND CABLE SHALL BE REMOVED BACK TO THE FIRST OUTLET BOX, CABINET, OR TERMINATION POINT WHICH IS TO REMAIN. CIRCUITS WHICH ARE NOT REUSED SHALL BE REMOVED BACK TO THE SOURCE IN THEIR ENTIRETY.
R. REMOVE AND REINSTALL CEILINGS IN THE EXISTING BUILDING AS REQUIRED FOR THE WORK. COORDINATE WITH THE GENERAL CONTRACTOR. IN SUCH AREAS, REMOVE AND REINSTALL ALL ELECTRICAL DEVICES WHICH ARE TO REMAIN IN OR ON THE CEILING.
S. WHERE NEW CEILINGS CONFLICT WITH EXISTING ELECTRICAL WORK WHICH IS TO REMAIN, RELOCATE THE ELECTRICAL WORK INVOLVED TO CLEAR THE NEW CONSTRUCTION.
T. WHERE NEW WALL OR FLOOR FINISHES CONFLICT WITH EXISTING ELECTRICAL WORK WHICH IS TO REMAIN, RELOCATE THE ELECTRICAL WORK INVOLVED OR PROVIDE BOX EXTENSIONS OR SIMILAR DEVICES AND REINSTALL ON THE NEW FINISH.
U. WHERE EXISTING BRANCH CIRCUITS AND SYSTEMS ARE INTERRUPTED BY NEW WORK OR SYSTEMS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, ETC.), EXTEND AND RECONNECT THOSE CIRCUITS AND SYSTEMS. WHERE THOSE CIRCUITS OR SYSTEMS MUST REMAIN IN SERVICE DURING THE EXECUTION OF THIS CONTRACT, PROVIDE TEMPORARY CONNECTIONS UNTIL FINAL CONNECTIONS ARE COMPLETE.

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Phone: 704-338-1292 www.optimaengineering.com
North Carolina License Number C-0914

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SEAL:

01/10/2023

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

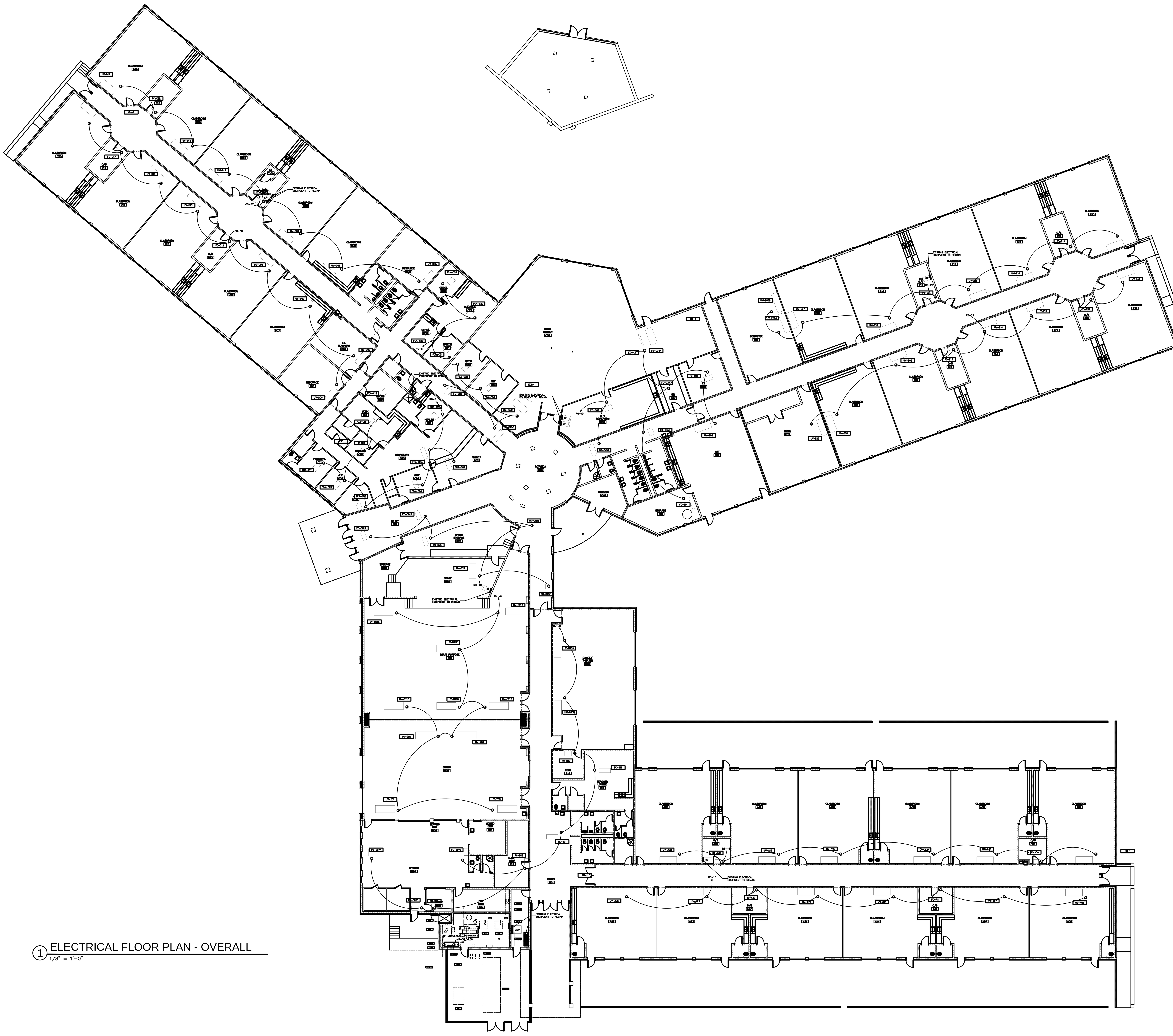
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

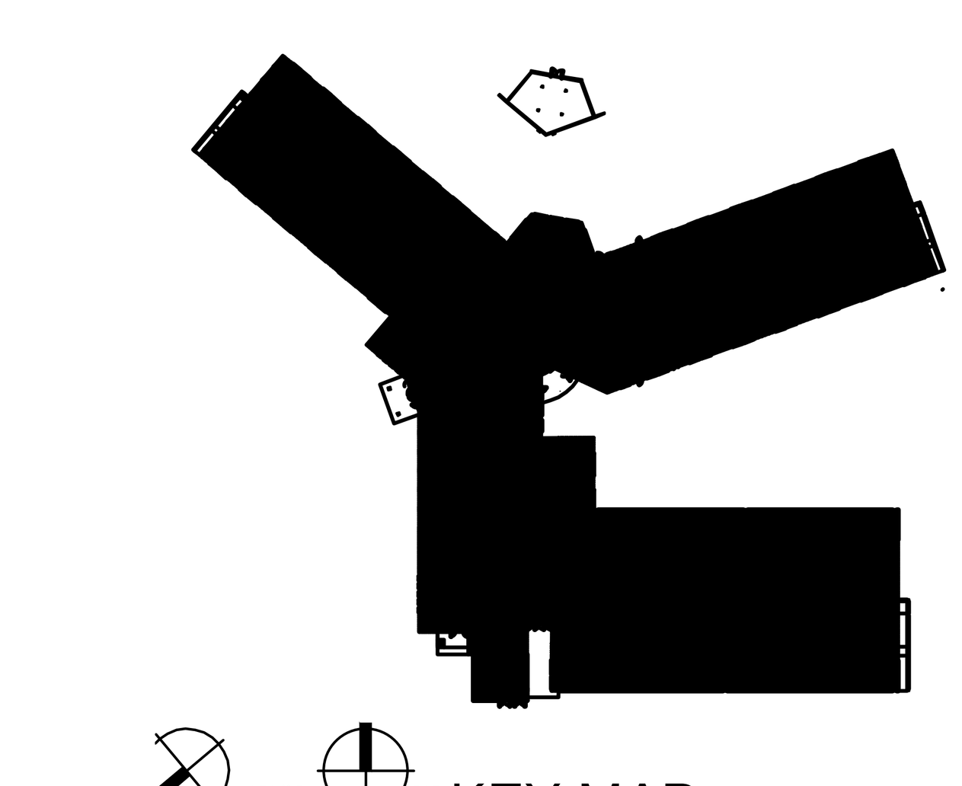
DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

SHEET TITLE: ELECTRICAL NOTES, LEGENDS & SPECIFICATIONS

DWG #: E001



1 ELECTRICAL FLOOR PLAN - OVERALL
1/8" = 1'-0"



KEY MAP

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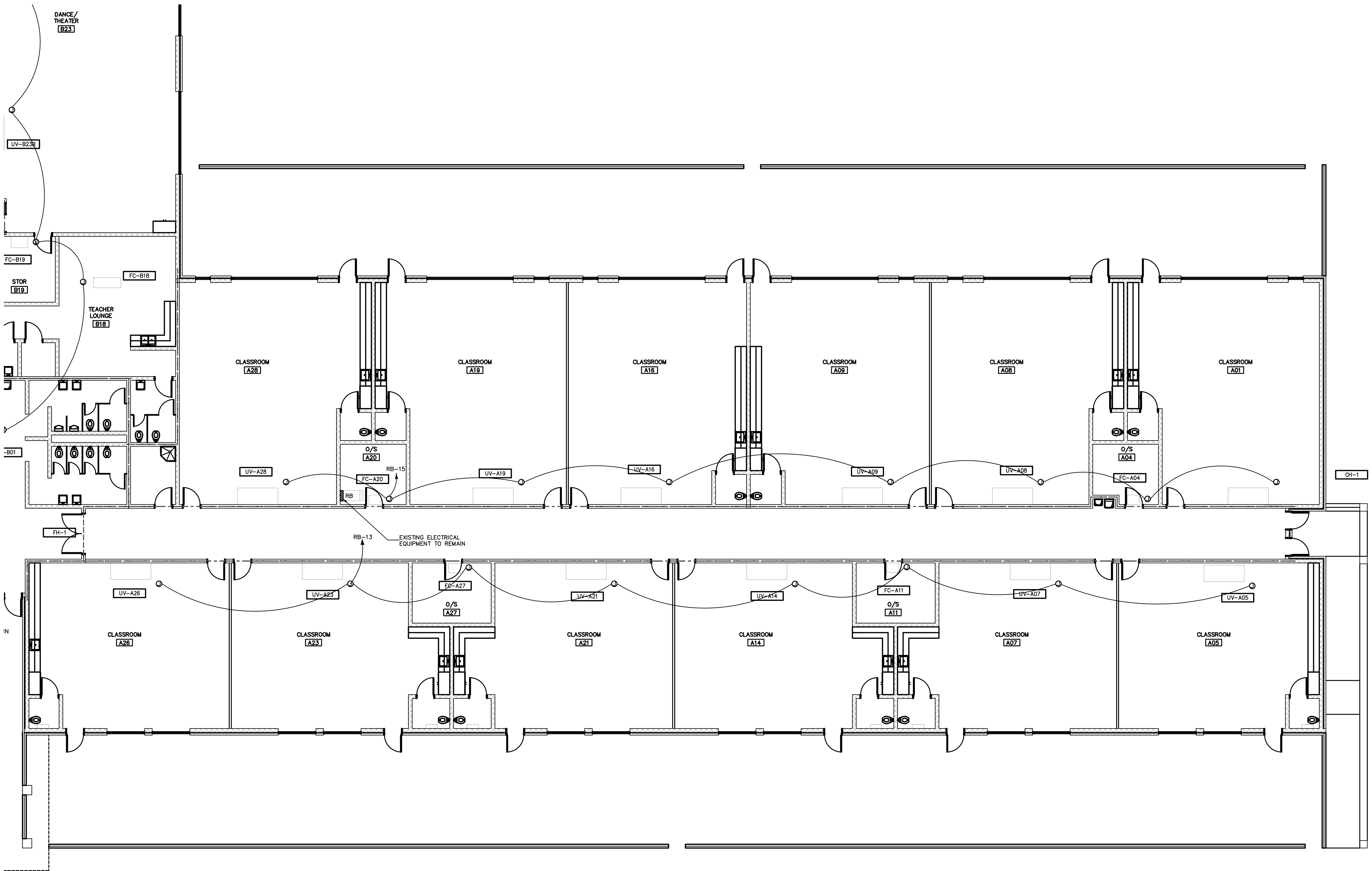
REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	SMT
DESIGNED BY:	SMT
CHECKED BY:	MAM

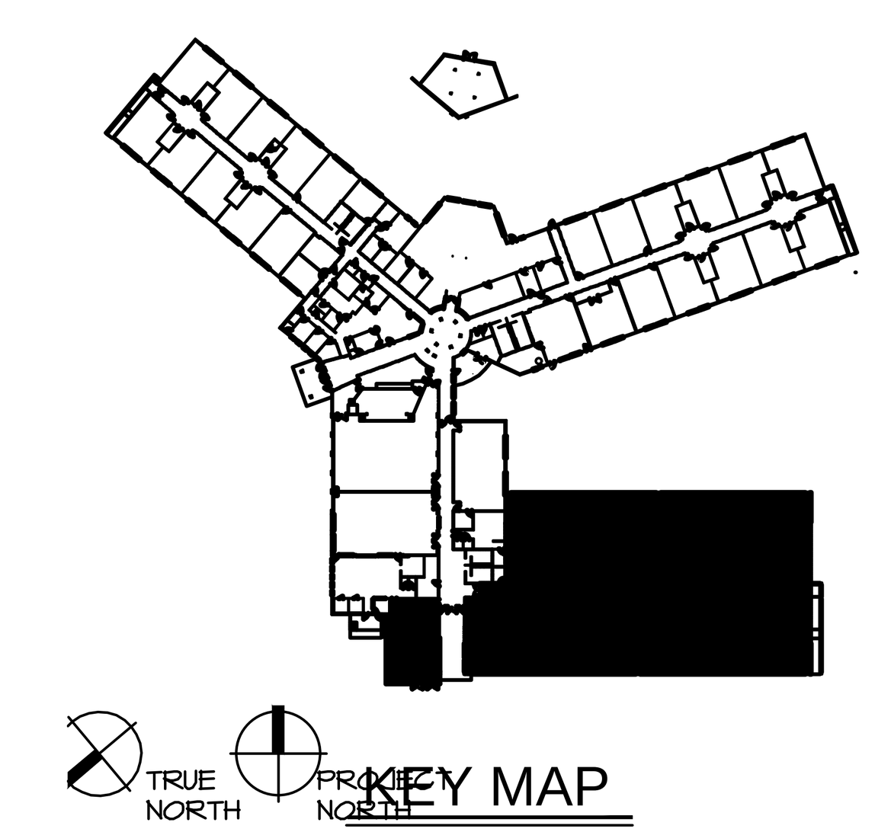
SHEET TITLE:
OVERALL ELECTRICAL FLOOR PLAN

DWG #:
E200

SHEET NO: 2 of 9



1 ELECTRICAL FLOOR PLAN - SECTION A
1/8" = 1'-0"



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL BRIAN E. THOMPSON
01/10/2023

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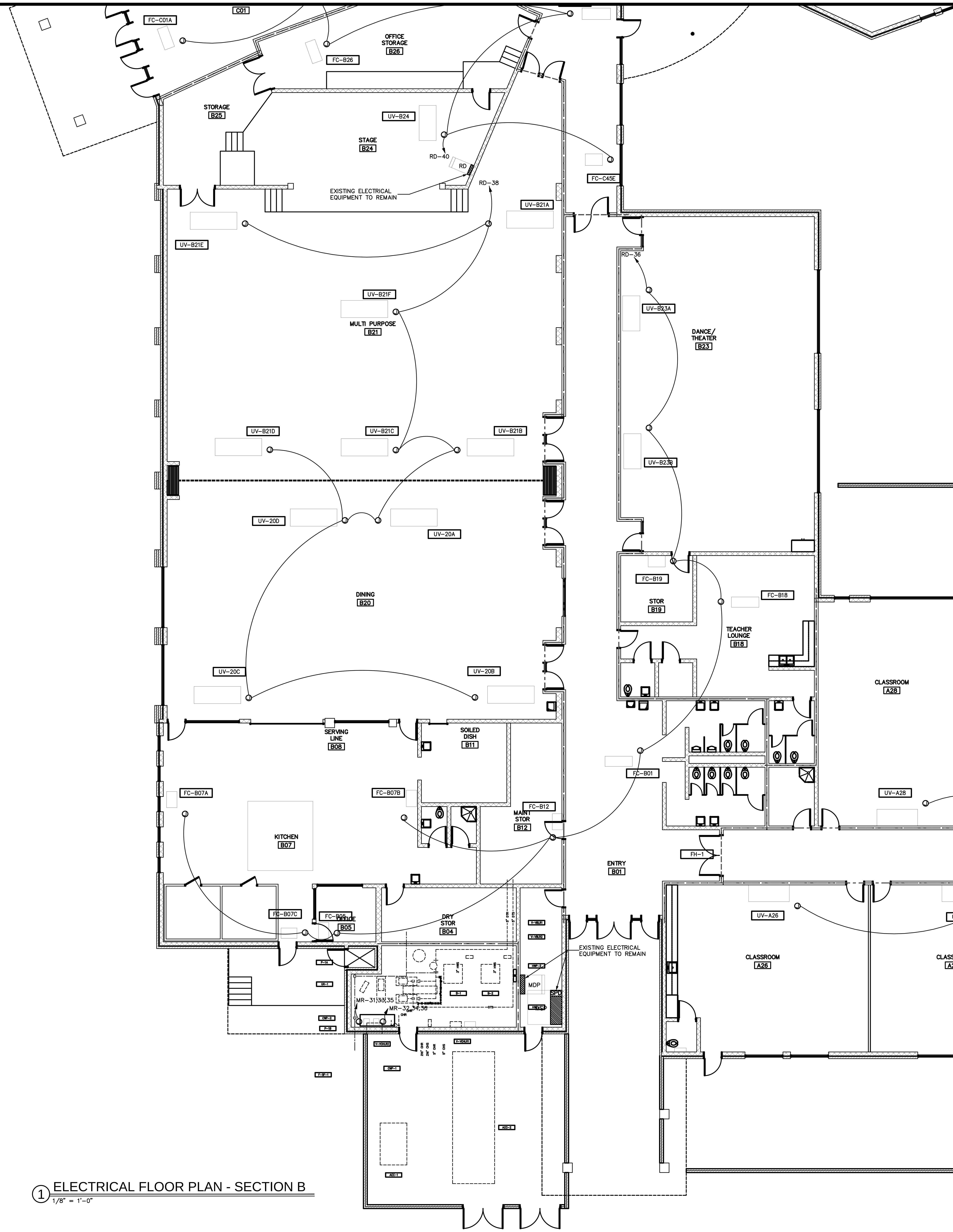
REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

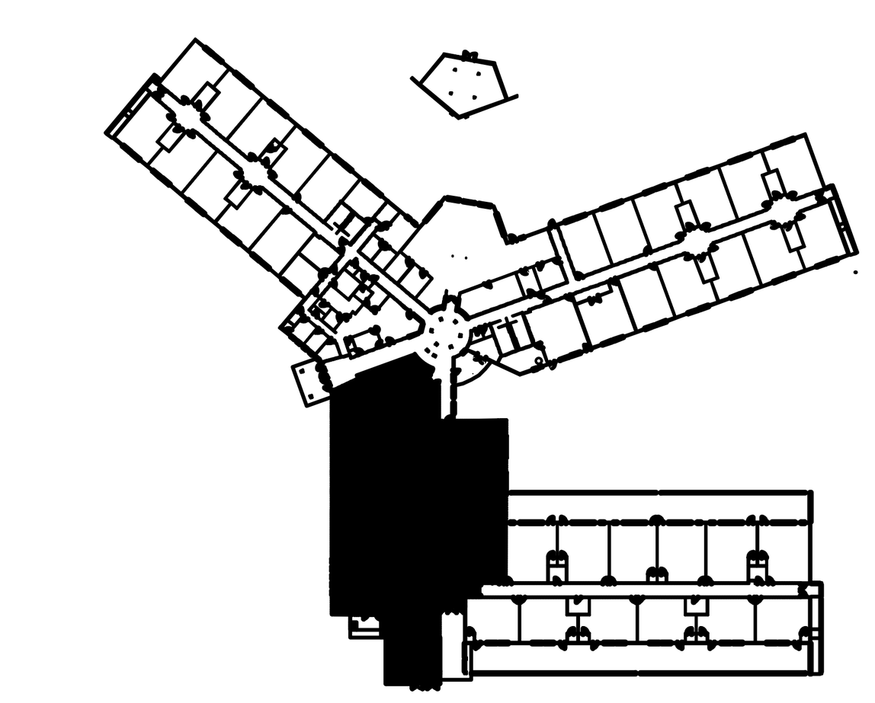
SHEET TITLE:
AREA "A" ELECTRICAL FLOOR PLAN

DWG #:
E201

SHEET NO: 3 of 9



1 ELECTRICAL FLOOR PLAN - SECTION B
1/8" = 1'-0"



KEY MAP

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REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
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SHEET TITLE:
AREA "B" ELECTRICAL FLOOR PLAN

DWG #:
E202

SHEET NO: 4 of 9

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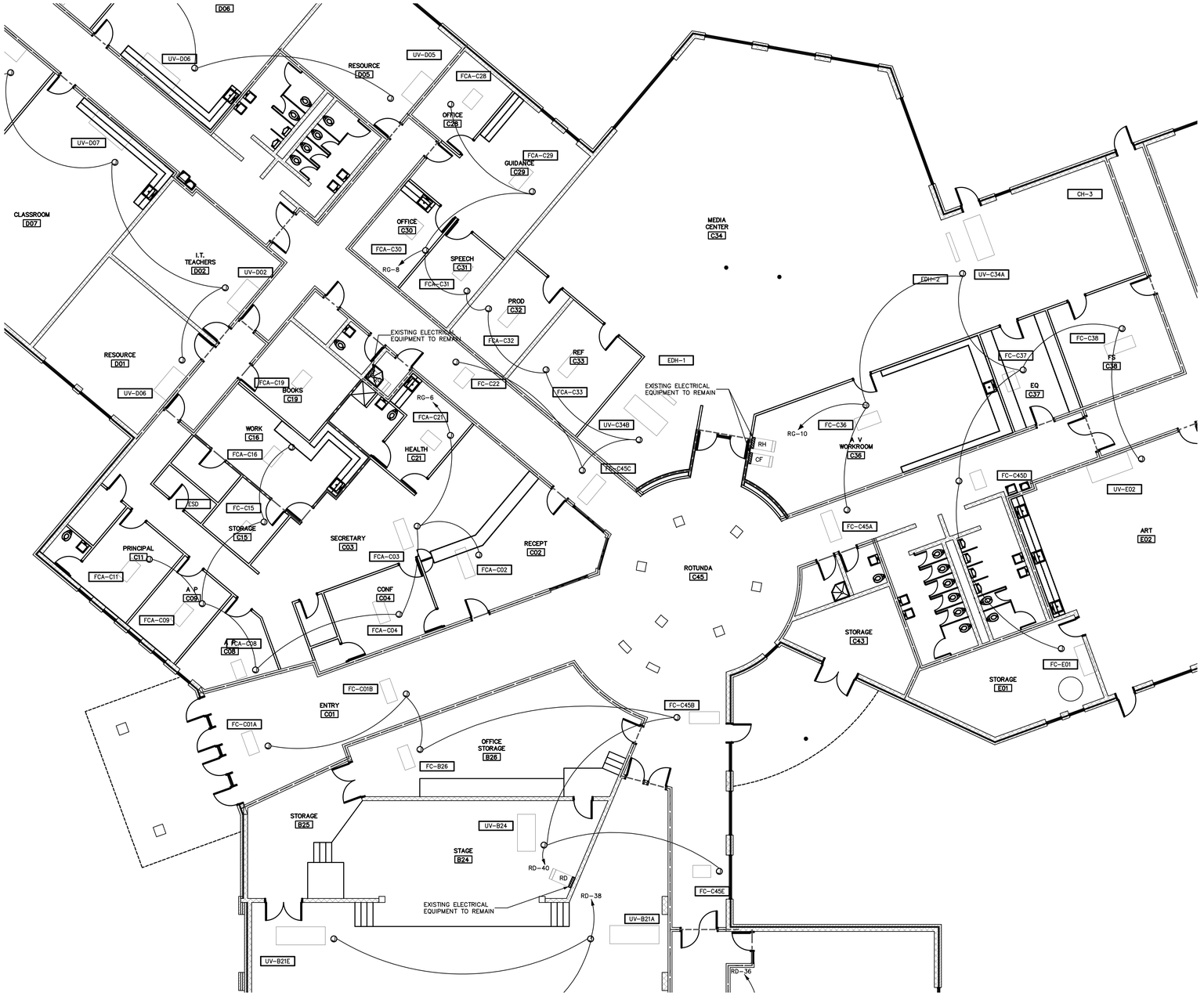
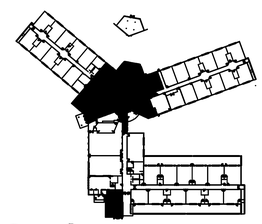


1 ELECTRICAL FLOOR PLAN - SECTION C
1/8" = 1'-0"



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4215 DAVID COX RD
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REV #	DATE	DESCRIPTION

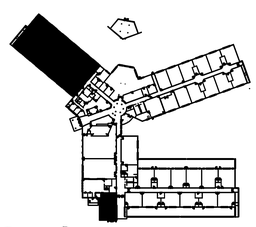
DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

SHEET TITLE:
AREA "C"
ELECTRICAL
FLOOR PLAN

DWG #:
E203

SHEET NO: 5 of 9

1 ELECTRICAL FLOOR PLAN - SECTION D
1/8" = 1'-0"



KEY MAP

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PROJECT NORTH

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REV #	DATE	DESCRIPTION

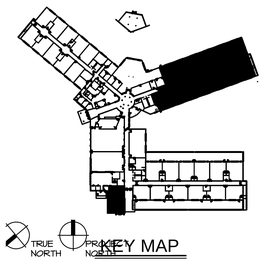
DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

SHEET TITLE:
AREA "D" ELECTRICAL FLOOR PLAN

DWG #:
E204

SHEET NO: 6 of 9

1 ELECTRICAL FLOOR PLAN - SECTION E
1/8" = 1'-0"



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REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

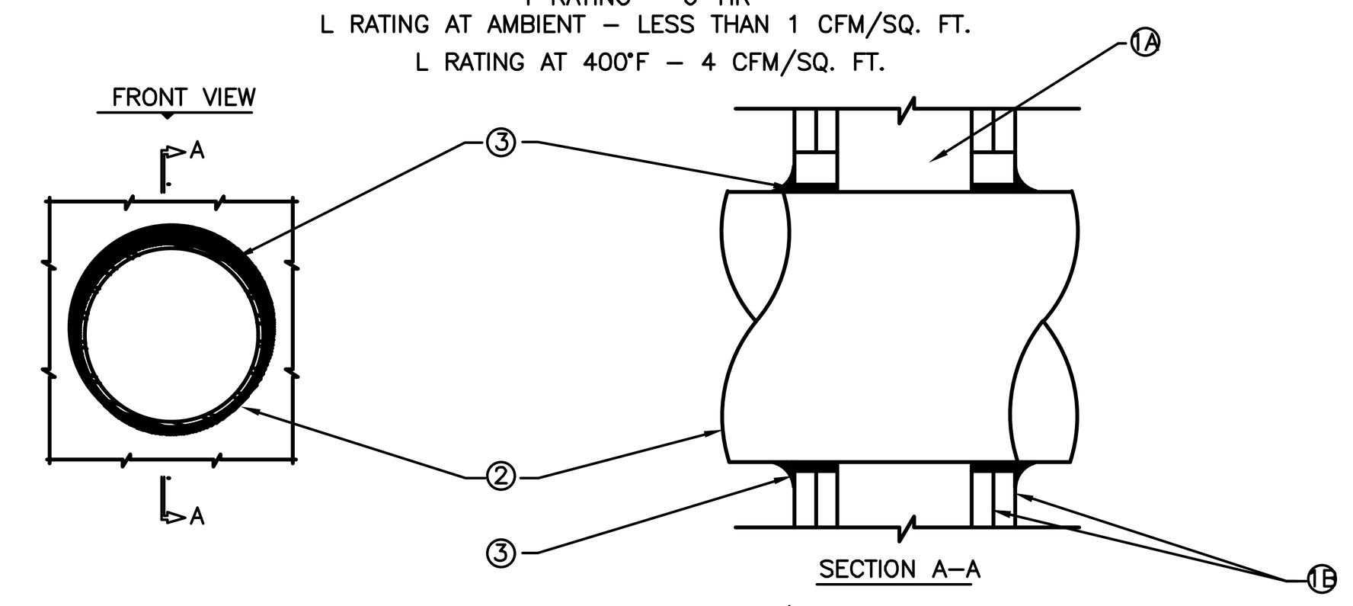
SHEET TITLE:
AREA "E"
ELECTRICAL
FLOOR PLAN

DWG #:
E205

SHEET NO: 7 of 9

U.L. SYSTEM NO. W-L-1085

F RATING — 1-HR OR 2-HR (SEE ITEM 1B)
T RATING — 0-HR
L RATING AT AMBIENT — LESS THAN 1 CFM/SQ. FT.
L RATING AT 400°F — 4 CFM/SQ. FT.



1. WALL ASSEMBLY – THE 1 OR 2 HR FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2–1/2 IN. WIDE AND SPACED MAX 24 IN. OC.

B. GYPSUM BOARD* – 5/8 IN. THICK, 4 FT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX DIA OF OPENING IS 13–1/4 IN.

DIA OF CIRCULAR OPENING CUT THROUGH GYPSUM WALLBOARD OF EACH SIDE OF WALL ASSEMBLY TO BE MIN 1/4 IN. TO MAX 1/2 IN. LARGER THAN OUTSIDE DIA OF THROUGH PENETRANT (ITEM 2). THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.

2. THROUGH PENETRANTS – ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE ANNULAR SPACE BETWEEN THE THROUGH–PENETRANT AND THE PERIPHERY OF THE OPENING SHALL BE MIN 0 IN. TO MAX 1/4 IN. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

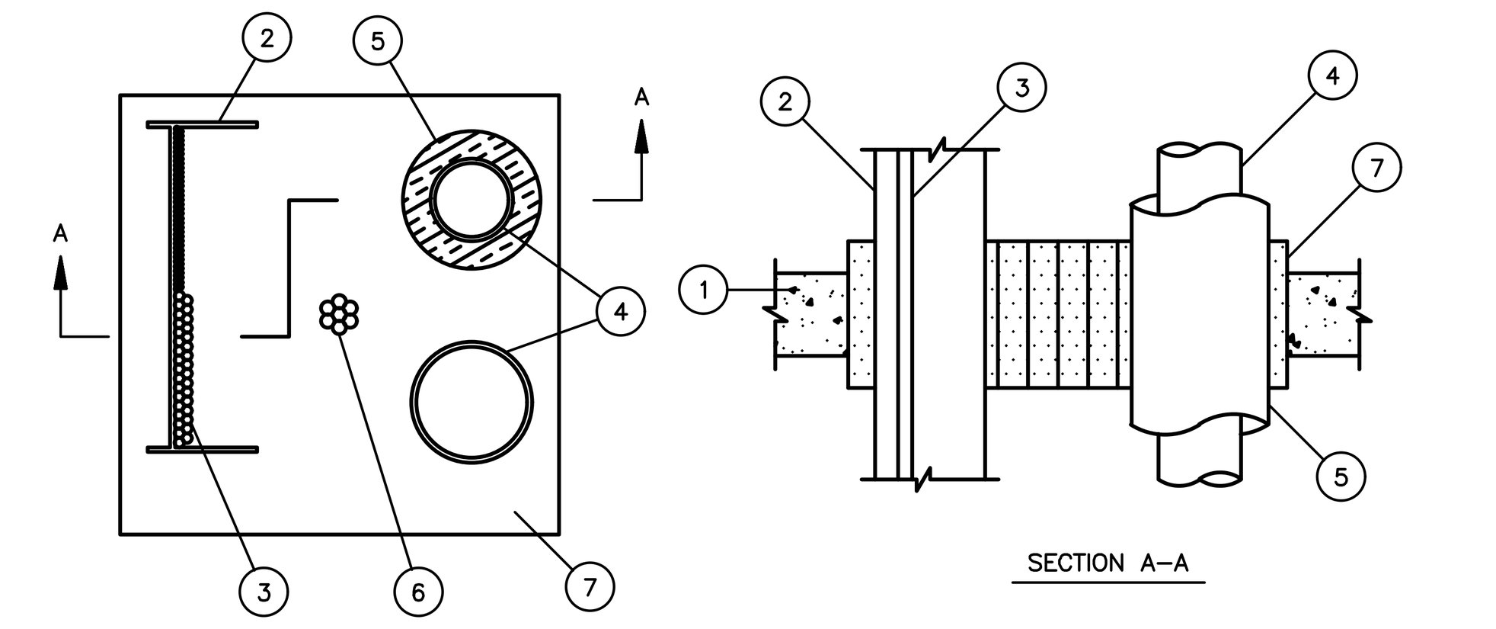
A. STEEL PIPE – NOM 12 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE – NOM 12 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT – NOM 6 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
D. COPPER TUBING – NOM 5 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER TUBING – NOM 6 IN. DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

3. FILL, VOID, OR CAVITY MATERIAL* – SEALANT – FILL MATERIAL TO BE FORCED INTO THE ANNULUS TO MAXIMUM EXTENT POSSIBLE. ADDITIONAL FILL MATERIAL TO BE INSTALLED SUCH THAT A MIN 1/2 IN. CROWN IS FORMED AROUND THE PENETRATING ITEM AND LAPPING 1/4 IN. BEYOND THE PERIPHERY OF THE OPENING.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – FS–ONE SEALANT
*BEARING THE UL CLASSIFICATION MARK

System No. C-AJ-8056

F Rating -- 3 Hr
T Rating -- 0 Hr
L Rating At Ambient -- 5 CFM/sq ft
L Rating At 400 F -- 2 CFM/sq ft

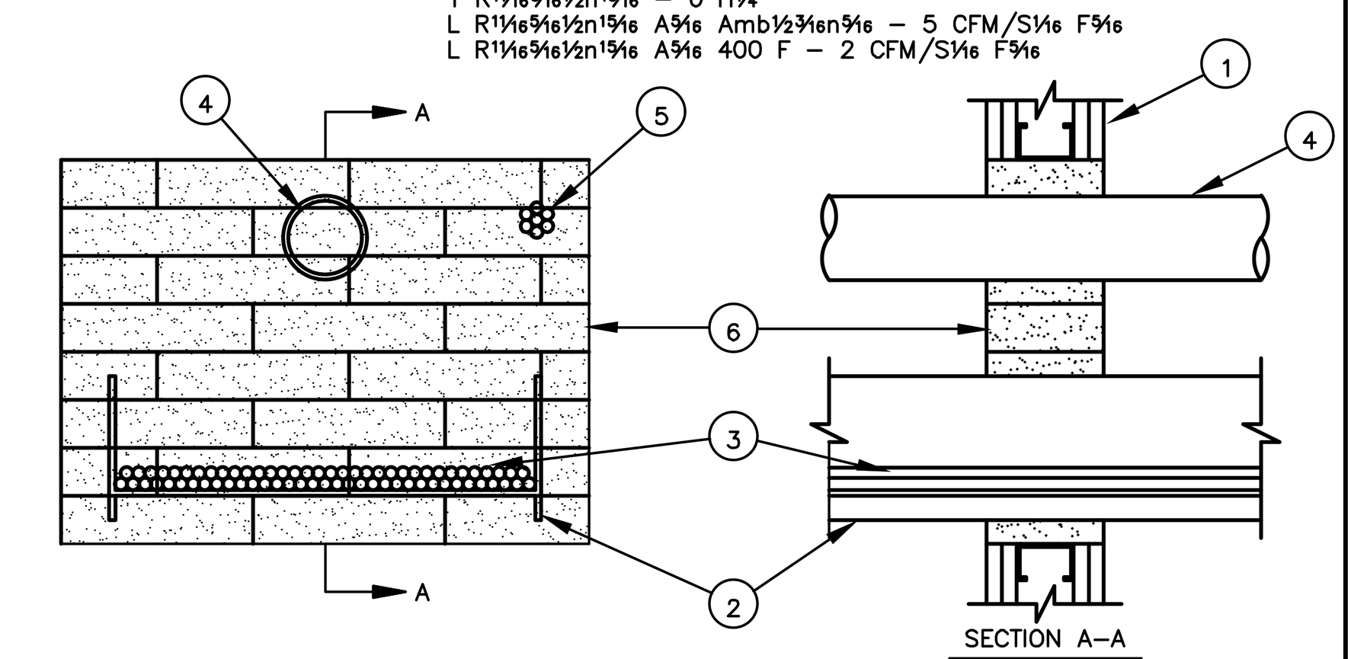


1. FLOOR OR WALL ASSEMBLY -- 4–1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX AREA OF OPENING IS 1296 IN. SQ WITH MAX DIMENSION OF 36 IN.
SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
2. CABLE TRAY* -- MAX 18 IN. WIDE BY MAX 6 IN. DEEP OPEN–LADDER OR SOLID–BACK CABLE TRAY WITH CHANNEL–SHAPED SIDE RAILS FORMED OF 0.060 IN. THICK ALUMINUM OR STEEL AND WITH 1–1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNULAR SPACE BETWEEN THE CABLE TRAYS IS 9 IN. AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1–1/2 IN. TO MAX 4–1/2 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.
3. CABLES -- AGGREGATE CROSS–SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS–SECTIONAL AREA OF THE CABLE TRAY BASED ON A MAX 3 IN. CABLE LOADING DEPTH WITHIN THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:
A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 300 PAIR – NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 1/C, 350 KCMIL WITH CROSS–LINKED POLYETHYLENE (XLPE) INSULATION AND JACKET.
D. 1/C, 500 KCMIL WITH THERMO PLASTIC INSULATION AND POLYVINYL CHLORIDE (PVC) JACKET.
E. TWENTY FOUR FIBER OPTIC CABLE WITH PVC SUB UNIT AND JACKET.
4. THROUGH–PENETRANTS -- ONE OR MORE PIPE, CONDUIT OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH–PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN PIPES, CONDUITS OR TUBING AND BETWEEN THE PERIPHERY OF THE OPENING AND THE PIPES OR CONDUITS SHALL BE MIN 1 IN. TO MAX 4–1/2 IN. PIPE, CONDUIT OR TUBE TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
A. NOM 6 IN. DIA (OR SMALLER) RIGID GALV STEEL CONDUIT.
B. NOM 4 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING.
C. NOM 4 IN. DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
D. NOM 4 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
E. NOM 6 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
F. NOM 6 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
5. PIPE COVERING -- NOM 1–1/2 IN. THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF–SEALING LAP TAPE. TRANSVERSE JOINTS SECURED WITH METAL FASTENERS OR WITH BUTT TAPE SUPPLIED WITH THE PRODUCT.
SEE PIPE AND EQUIPMENT COVERING AND MATERIALS (BRGU) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MATERIAL MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 MAY BE USED.
6. CABLES -- MAX 2 IN. DIA TIGHT BUNDLE OF CABLES CENTERED IN OPENING AND RIGIDLY SUPPORTED ON BOTH SURFACES OF FLOOR AND WALL. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:
A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 25 PAIR – NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 2/C NO. 10 AWG WITH PVC INSULATION AND JACKET.
D. 3/C NO. 8 AWG ALUMINUM CLAD CABLE WITH CROSS–LINKED POLYETHYLENE (XLPE) INSULATION AND PVC JACKET.
E. TYPE RC – 62 A/U COAXIAL CABLE WITH AIR CORE AND PVC JACKET.
F. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.
7. FIRESTOP SYSTEM -- THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL* -- FIRE BLOCKS INSTALLED WITH LONG DIMENSION PASSED THROUGH THE OPENING EXTENDING MIN 1–1/2 IN. FROM EACH SURFACE. BLOCKS TO COMPLETELY FILL THE ENTIRE OPENING.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC -- FS–FIRE BLOCK
B. FILL, VOID OR CAVITY MATERIAL* -- FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES AND BETWEEN CABLES AND CABLE TRAYS TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC -- FS–ONE SEALANT
C. WIRE MESH (NOT SHOWN) -- WHEN THE ANNULAR SPACE EXCEEDS 4–1/2 IN. TO THE PERIPHERY, A NOM 2 IN. SQ WIRE FENCING SHALL BE USED TO KEEP THE FIRE BLOCKS IN PLACE. THE WIRE FENCING IS FABRICATED FROM MIN NO. 16 SWG (0.060 IN.) GALV STEEL WIRE. THE WIRE IS CUT TO FIT THE CONTOUR OF THE PENETRATING ITEM WITH A MIN 3 IN. LAP BEYOND THE PERIPHERY OF THE OPENING. WIRE FENCING SECURED TO TOP SURFACE OF FLOOR AND BOTH SURFACES OF WALL ASSEMBLY BY MEANS OF 1/4 IN. DIA BY 1 IN. LONG CONCRETE ANCHORS AND 1/4 IN. BY 1–1/2 IN. DIA FENDER WASHERS SPACED MAX 8 IN. OC.
*BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

System No. W-L-8013

F Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr
L Rating At Ambient — 5 CFM/sq ft
L Rating At 400 F — 2 CFM/sq ft

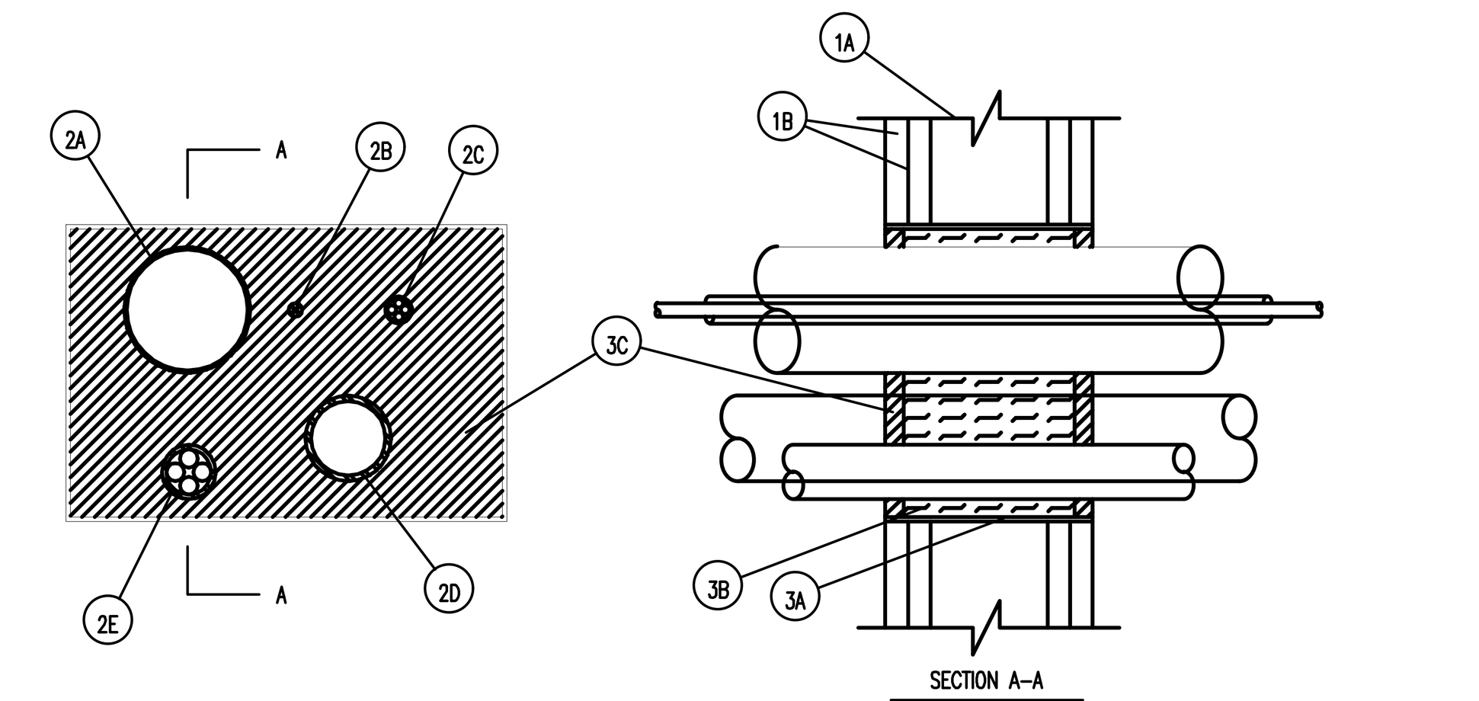


1. WALL ASSEMBLY —THE 1 OR 2 HR FIRE–RATED GYPSUM BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS —WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 IN. (51 MM) BY 4 IN. (102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2–1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC. ADDITIONAL STUDS INSTALLED TO COMPLETELY FRAME THE OPENING.
B. GYPSUM BOARD* —5/8 IN. (16 MM) THICK, 4 FT (1219 MM) WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 352 SQ IN. (2271 SQ CM) WITH MAX DIMENSION OF 22 IN. (559 MM) WIDE.
THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.
2. CABLE TRAY* —MAX 18 IN. (457 MM) WIDE BY MAX 6 IN. (152 MM) DEEP OPEN–LADDER OR SOLID–BACK CABLE TRAY WITH CHANNEL–SHAPED SIDE RAILS FORMED OF 0.065 IN. (1.65 MM) THICK ALUMINUM OR 0.060 IN. (1.52 MM) THICK STEEL AND WITH 1–1/2 IN. (38 MM) WIDE BY 1 IN. (25 MM) CHANNEL SHAPE RUNGS SPACED 9 IN. (229 MM) OC OR A 0.029 IN. (0.74 MM) THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNULAR SPACE BETWEEN THE CABLE TRAY AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1 IN. (25 MM) TO MAX 7 IN. (178 MM) CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.
3. CABLES —AGGREGATE CROSS–SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS–SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:
A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 100 PAIR – NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 1/C, 750 KCMIL (OR SMALLER) WITH PVC INSULATION AND JACKET.
4. THROUGH–PENETRANTS —ONE OR MORE PIPE OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH–PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN THE PIPE OR TUBE AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1–1/2 IN. (38 MM) TO MAX 9–1/4 IN. (235 MM). PIPE OR TUBE TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF NON–METALLIC OR METALLIC PIPES, OR TUBES MAY BE USED:
A. POLYVINYL CHLORIDE (PVC) PIPE —MAX 3 IN. (76 MM) DIA SCHEDULE 40 SOLID CORE PVC PIPE (OR SMALLER) FOR USE IN CLOSED (PROCESS OR SUPPLY) OR VENTED (DRAIN, WASTE OR VENT) PIPING SYSTEM.
B. STEEL PIPE —NOM 6 IN. (152 MM) DIA (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE.
C. CONDUIT —NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.
D. COPPER PIPE —NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
E. COPPER TUBE —NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
4A. PIPE COVERING —(NOT SHOWN) NOM 1–1/2 IN. (38 MM) THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) (56KG/M3) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF–SEALING LAP TAPE. TRANSVERSE JOINTS SECURED WITH METAL FASTENERS OR WITH BUTT TAPE SUPPLIED WITH THE PRODUCT.
SEE PIPE AND EQUIPMENT COVERING AND MATERIALS (BRGU) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MATERIAL MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 MAY BE USED.
5. CABLES —MAX 1–1/2 IN. (38 MM) DIA TIGHT BUNDLE OF CABLES INSTALLED WITHIN THE OPENING AND RIGIDLY SUPPORTED ON BOTH SURFACES OF WALL. THE SPACE BETWEEN THE CABLES AND PERIPHERY OF THE OPENING SHALL RANGE FROM 1–3/16 IN. (30.2 MM) MIN TO A MAX OF 1–1/2 IN. (38 MM). ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:
A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
B. 25 PAIR —NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. TYPE R GU/59 COAXIAL CABLE WITH PVC OUTER JACKET.
D. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.
6. FIRESTOP SYSTEM —THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL* —FIRE BLOCKS FOR WALLS INCORPORATING MAX 3–5/8 IN. (92 MM) STEEL STUDS OR MAX 2 (51 MM) BY 4 IN. (102 MM) WOOD STUDS, FIRE BLOCK INSTALLED WITH 5 IN. (127 MM) DIMENSION PROJECTING THROUGH AND CENTERED IN OPENING. FOR WALLS CONSTRUCTED OF LARGER STEEL OR WOOD STUDS, FIRE BLOCK INSTALLED WITH LONG DIMENSION PASSING THROUGH AND CENTERED IN OPENING. BLOCKS MAY OR MAY NOT BE CUT FLUSH WITH BOTH SURFACES OF WALL. WHEN MULTIPLE LAYERS OF GYPSUM BOARD ARE USED, BLOCKS MAY BE RECESSED 1/2 IN. (13 MM) FROM SURFACE OF WALL.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —FS 657 FIRE BLOCK
B. FILL, VOID OR CAVITY MATERIAL* —SEALANT OR PUTTY – FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAYS, AROUND EACH PENETRANT AND WHERE OBVIOUS VOIDS ARE OBSERVED TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —FS–ONE SEALANT, CP 618 PUTTY STICK OR CP620 FIRE FOAM
*BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

System No. W-L-8004

F Rating = 2 Hr
T Rating = 1/4 Hr



1. WALL ASSEMBLY THE FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2–1/2 IN. WIDE AND SPACED MAX 24 IN. OC. ADDITIONAL FRAMING (NOT SHOWN) MAY BE INSTALLED AROUND THE PERIMETER OF THE OPENING IN LIEU OF THE STEEL WIRE MESH (ITEM NO. 3A).
B. GYPSUM BOARD* TWO LAYERS OF NOM 5/8 IN. THICK GYPSUM WALLBOARD, AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 96 SQ IN. WITH MAX DIMENSION OF 12 IN. MAX WIDTH OF OPENING IN WOOD STUD WALLS IS LIMITED TO 12 IN.

2. THROUGH PENETRANTS THE FOLLOWING TYPES AND SIZES OF PIPES, CONDUITS, TUBING OR CABLES MAY BE USED:
A. NOM 3 IN. DIA (OR SMALLER) ELECTRICAL METALLIC TUBING (EMT).
B. MAX 25 PAIR -- NO. 24 AWG (OR SMALLER) TELEPHONE CABLE WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
C. MAX 3/C WITH GROUND -- NO. 10 AWG (OR SMALLER) TYPE NM CABLE WITH PVC INSULATION AND JACKET.
D. NOM 2 IN. DIA (OR SMALLER) SCHEDULE 40 PVC PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS ONLY.
E. MAX 300 KCMIL (OR SMALLER) POWER CABLE WITH PVC INSULATION AND NYLON JACKET. THE THROUGH PENETRATING ITEMS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY AND LOCATED AS SHOWN IN THE TABLE BELOW:

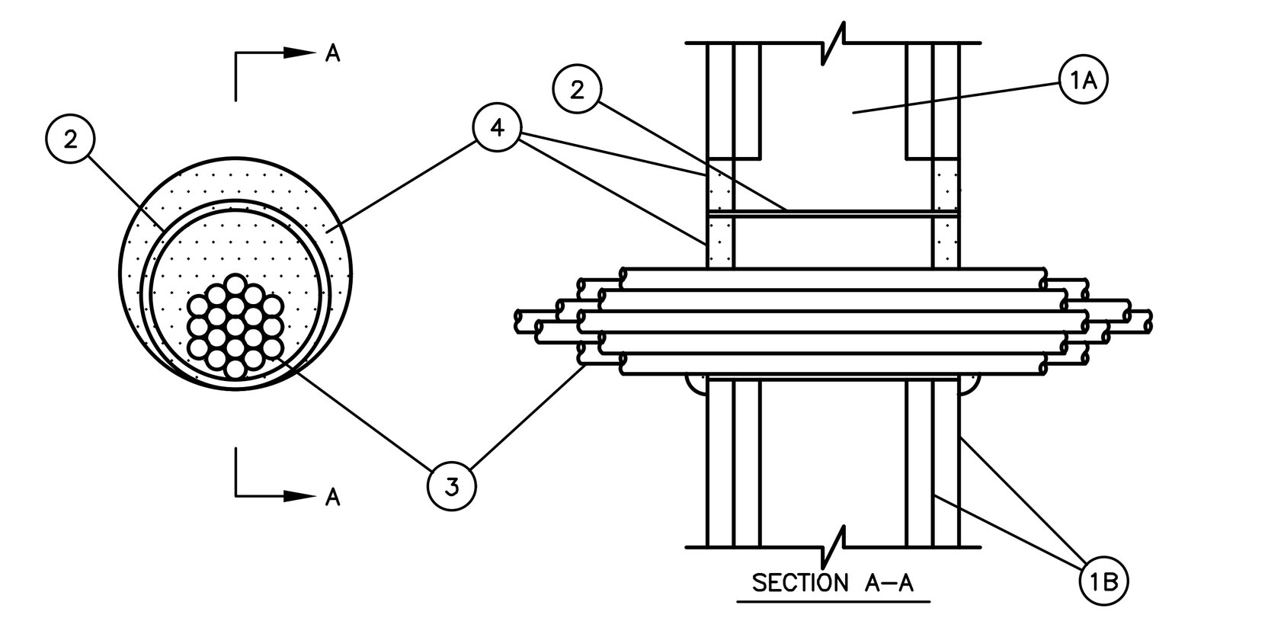
ITEM NO.	MAX DISTANCE BETWEEN ADJACENT PEN. ITEM IN.	MIN DISTANCE BETWEEN ADJACENT PEN. ITEM IN.	MAX DISTANCE FROM THROUGH OPENING IN.	MIN DISTANCE FROM THROUGH OPENING IN.
2A	7–7/16	1–11/16	7–7/16	1/2
2B	7–7/16	1–11/16	7–7/16	1/2
2C	7–7/16	1–11/16	7–7/16	1/2
2D	7–7/16	1–11/16	7–7/16	1/2
2E	7–7/16	1–11/16	7–7/16	1–1/2

3. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. STEEL WIRE MESH NO. 8 STEEL WIRE MESH HAVING A MIN 1 IN. LAP ALONG THE LONGITUDINAL SEAM. LENGTH OF STEEL WIRE MESH TO BE 4–3/4 IN., CENTERED AND FORMED TO FIT PERIPHERY OF THROUGH OPENING. STEEL WIRE MESH IS NOT REQUIRED WHEN ADDITIONAL FRAMING MEMBERS (ITEM NO. 1A) ARE USED.
B. PACKING MATERIAL MIN 4.0 IN. THICKNESS OF MIN 3.5 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
C. FILL, VOID OR CAVITY MATERIAL* – SEALANT MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC – FS–ONE SEALANT
*BEARING THE UL CLASSIFICATION MARKING

HILTI FIRESTOP SYSTEMS
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

SYSTEM NO. W-L-3065

F RATINGS — 1 AND 2 HR (SEE ITEM 1)
T RATING — 0 HR

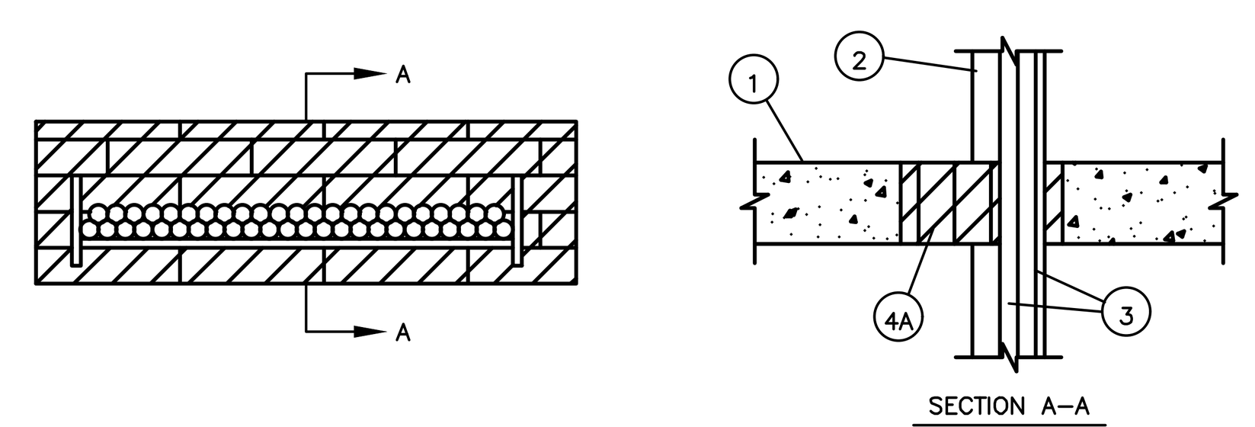


1. WALL ASSEMBLY —THE 1 OR 2 FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS —WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2–1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD* —NOM 5/8 IN. (16 MM) THICK GYPSUM BOARD, WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIA OF OPENING IS 5–1/2 IN. (138 MM) WHEN SLEEVE (ITEM 2) IS EMPLOYED. MAX DIA OF OPENING IS 4 IN. (102 MM) WHEN SLEEVE (ITEM 2) IS NOT EMPLOYED.
THE F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE FIRE RATING OF THE WALL ASSEMBLY.
2. METALLIC SLEEVE —(OPTIONAL) – NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR SCHEDULE 5 (OR HEAVIER) STEEL PIPE OR MIN 0.016 IN. THICK (0.41 MM, NO. 28 GA) GALV STEEL SLEEVE INSTALLED FLUSH WITH WALL SURFACES. THE ANNULAR SPACE BETWEEN STEEL SLEEVE AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25MM). WHEN SCHEDULE 5 STEEL PIPE OR EMT IS USED, SLEEVE MAY EXTEND UP TO 18 IN. (457 MM) BEYOND THE WALL SURFACES.
3. CABLES —AGGREGATE CROSS–SECTIONAL AREA OF CABLE IN OPENING TO BE MAX 45 PERCENT OF THE CROSS–SECTIONAL AREA OF THE OPENING. THE ANNULAR SPACE BETWEEN THE CABLE BUNDLE AND THE PERIPHERY OF THE OPENING TO BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25 MM) CABLES TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL ASSEMBLY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:
A. MAX 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
B. MAX 25 PAIR NO. 24 AWG TELEPHONE CABLE WITH PVC INSULATION AND JACKET.
B1. MAX 4 PR NO. 22 AWG CAT 5 OR CAT 6 COMPUTER CABLES.
C. TYPE RG/U COAXIAL CABLE WITH POLYETHYLENE (PE) INSULATION AND PVC JACKET HAVING A MAX OUTSIDE DIAMETER OF ½IN. (13 MM).
C1. MAX RG 6/U COAXIAL CABLE WITH FLUORINATED ETHYLENE INSULATION AND JACKETING.
D. MULTIPLE FIBER OPTICAL COMMUNICATION CABLE JACKETED WITH PVC AND HAVING A MAX OD OF 5/8 IN. (16 MM).
E. THROUGH PENETRATING PRODUCTS*—MAX THREE COPPER CONDUCTOR NO. 8 AWG . METAL–CLAD CABLE+.
AFC CABLE SYSTEMS INC
F. MAX 3/C (WITH GROUND)(OR SMALLER) NO. 8 AWG COPPER CONDUCTOR CABLE WITH PVC INSULATION AND JACKETING.
G. MAX 3/4 IN. (19 MM) DIA COPPER GROUND CABLE WITH OR WITHOUT A PVC JACKET.
H. FIRE RESISTIVE CABLES* – MAX 1–1/4 IN. (32 MM) DIA SINGLE CONDUCTOR OR MULTI CONDUCTOR TYPE MI CABLE. A MIN 1/8 IN. (3 MM) SEPARATION SHALL BE MAINTAINED BETWEEN MI CABLES AND ANY OTHER TYPES OF CABLE.
I. MAX 4/C WITH GROUND 300KCMIL (OR SMALLER) ALUMINUM SER CABLE WITH PVC INSULATION AND JACKET.
J. THROUGH PENETRATING PRODUCT* – ANY CABLES, METAL–CLAD CABLE+ OR ARMORED CABLE+ CURRENTLY CLASSIFIED UNDER THE THROUGH PENETRATING PRODUCTS CATEGORY.
SEE THROUGH PENETRATING PRODUCT (XHLY) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
4. FILL, VOID OR CAVITY MATERIAL*—SEALANT OR PUTTY —FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH EACH END OF THE STEEL SLEEVE OR WALL SURFACE. FILL MATERIAL INSTALLED SYMMETRICALLY ON BOTH SIDES OF THE WALL. A MIN 5/8 IN. (16 MM) THICKNESS OF SEALANT IS REQUIRED FOR THE 1 OR 2 HR F RATING . AN ADDITIONAL 1/2 IN. (13 MM) DIA BEAD OF FILL MATERIAL SHALL BE APPLIED AROUND THE PERIMETER OF SLEEVE ON BOTH SIDES OF THE WALL WHEN SLEEVE EXTENDS BEYOND SURFACE OF WALL.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —CP601S, CP606, FS–ONE SEALANTS OR CP618 PUTTY
*BEARING THE UL CLASSIFICATION MARK
+BEARING THE UL LISTING MARK

HILTI FIRESTOP SYSTEMS
DRAWING ORIGINATION DATE: 03–21, 2011
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

SYSTEM NO. C-AJ-4035

F RATING = 3 HR.
T RATING = 0 HR.

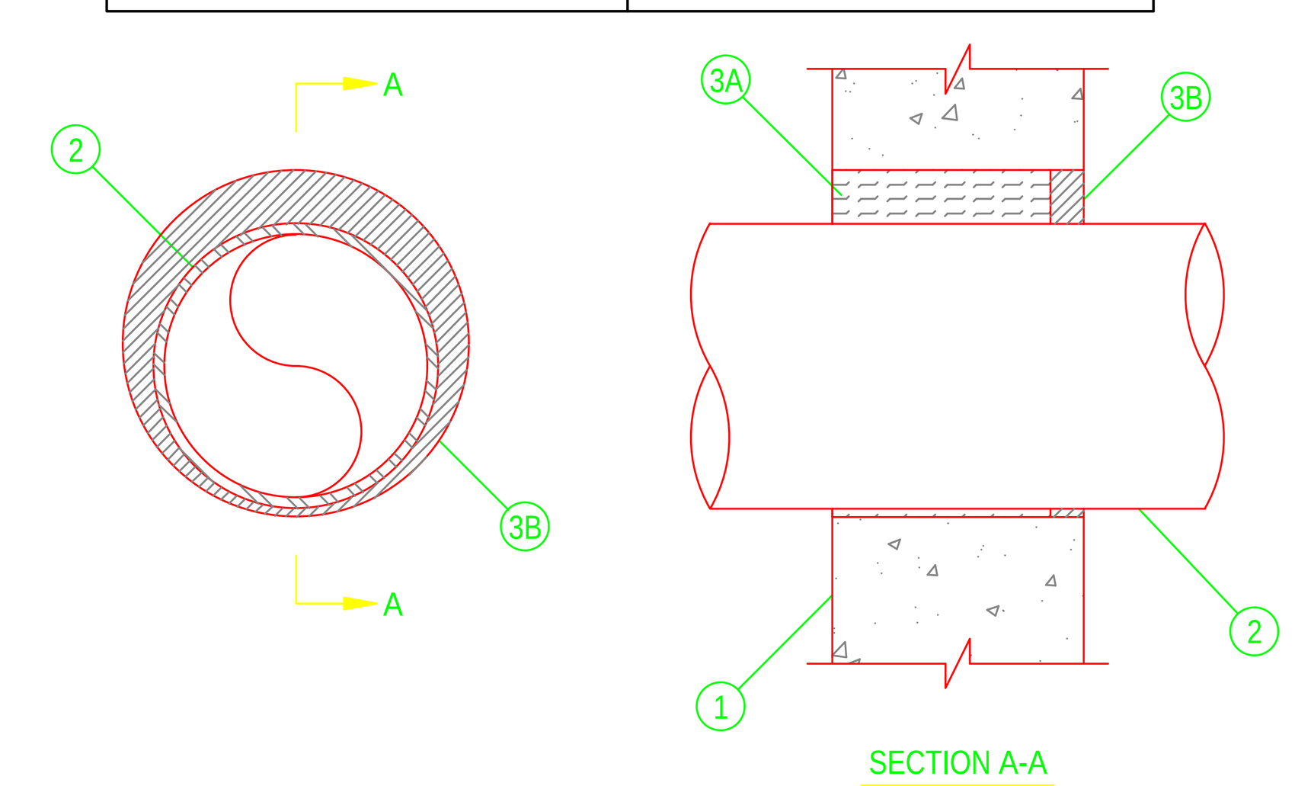


1. FLOOR OR WALL ASSEMBLY MIN 4–1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX AREA OF OPENING IS 270 SQ IN WITH MAX DIMENSION OF 30 IN.
SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
2. CABLE TRAY* MAX 24 IN. WIDE BY MAX 4 IN. DEEP OPEN–LADDER OR SOLID–BACK CABLE TRAY WITH CHANNEL–SHAPED SIDE RAILS FORMED OF 0.10 IN. THICK ALUMINUM OR 0.060 IN. THICK GALV STEEL AND WITH 1–1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. THE ANNULAR SPACE BETWEEN THE CABLE TRAY AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1 IN. TO MAX 4 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.
3. CABLES AGGREGATE CROSS–SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 40 PERCENT OF THE CROSS–SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:
A. 1/C, 500 KCMIL WITH THERMOPLASTIC INSULATION AND PVC JACKET.
B. 300 PAIR -- NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 24 FIBEROPTIC CABLE WITH PVC SUBUNIT AND JACKET.
D. THREE 1/C NO. 12 AWG WIRE, INSULATED WITH POLYVINYL CHLORIDE, IN A NOMINAL 3/4 IN. FLEXIBLE METAL CONDUIT.
4. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL* FIRE BLOCKS INSTALLED WITH THE LONG DIMENSION PLACED HORIZONTALLY WITHIN THE OPENING, FLUSH WITH BOTTOM OF FLOOR ASSEMBLIES. BLOCKS TO COMPLETELY FILL THE ENTIRE WIDTH OF OPENING OF WALL ASSEMBLIES.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC -- FS–FIRE BLOCK
B. FILL, VOID OR CAVITY MATERIAL* –SEALANT ON PUTTY– NOT SHOWN FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES AND BETWEEN CABLES AND CABLE TRAYS TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC -- FS–ONE SEALANT OR CP618 FIRESTOP PUTTY STICK (NOTE: L RATING ONLY WHEN FS–ONE SEALANT IS USED)
*BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

SYSTEM NO. W-J-1088

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F RATING – 1 AND 2 HR (SEE ITEM 3)	F RATING – 1 AND 2 HR (SEE ITEM 3)
T RATING – 0 HR	FT RATING – 0 HR
	FH RATING – 1 AND 2 HR (SEE ITEM 3)
	FTH RATING – 0 HR



1. WALL ASSEMBLY —MIN 3–3/4 IN. (95 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF OR 1600–2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAMETER OF OPENING 10–1/2 IN. (267 MM).
SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
2. THROUGH–PENETRANTS —ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. AN ANNULAR SPACE OF MIN 1/4 IN. TO MAX 1–5/8 IN. (41 MM) IS REQUIRED WITHIN FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
A. STEEL PIPE —NOM 8 IN. (203 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE —NOM 8 IN. (203 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT —NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR 6 IN. DIAM STEEL CONDUIT.
D. COPPER TUBING —NOM 4 IN. (102 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER PIPE —NOM 4 IN. (102 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
F. FLEXIBLE STEEL CONDUIT+ —NOM 2 IN. (51 MM) DIAM (OR SMALLER) FLEXIBLE STEEL CONDUIT.
SEE FLEXIBLE METAL CONDUIT (DXUZ) CATEGORY IN THE ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY FOR NAMES OF MANUFACTURERS.

HILTI FIRESTOP SYSTEMS
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SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23230 BRIAN E. THOMPSON 01/10/2023

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE
362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE: 01-10-2023
PROJECT #: 22-0153
DRAWN BY: SMT
DESIGNED BY: SMT
CHECKED BY: MAM

SHEET TITLE: ELECTRICAL DETAILS

DWG #: E601
SHEET NO: 8 of 9

PANEL: MSP

EXTG MFGR | EXTG TYPE
VOLTAGE: 277 / 480 | 3 PHASE | 4 WIRE | 65,000 AIC
MOUNTING: SURFACE | 1200 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.00				EDB	1	2	EDB				81.55
0.00	SPACE		400	EDB	3	4	EDB	450		PANEL MDP	82.64
0.00				EDB	5	6	EDB				74.43
51.05				EDB	7	8	EDB				22.41
44.40	PANEL LA		200	EDB	9	10	EDB	200		PANEL MR	22.41
46.12				EDB	11	12	EDB				22.41
4.82				EDB	13	14	EDB				21.84
5.84	PANEL EM		50	EDB	15	16	EDB	100		PANEL LB	20.19
5.86				EDB	17	18	EDB				19.63
0.00				EDB	19	20	EDB				0.00
0.00				EDB	21	22	EDB				0.00
0.00				EDB	23	24	EDB				0.00
0.00				EDB	25	26	EDB				0.00
0.00				EDB	27	28	EDB				0.00
0.00				EDB	29	30	EDB				0.00
0.00				EDB	31	32	EDB				0.00
0.00				EDB	33	34	EDB				0.00
0.00				EDB	35	36	EDB				0.00
0.00				EDB	37	38	EDB				0.00
0.00				EDB	39	40	EDB				0.00
0.00				EDB	41	42	EDB				0.00
158.1	SUB-TOTALS										367.5

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	8.4	1.25	10.5	CONNECTED		
HEATING	13.0	1.00	13.0	A =	181.7 KVA	655.5 A
COOLING	23.8	1.00	23.8	B =	175.5 KVA	633.2 A
VENTILATION	28.1	1.00	28.1	C =	168.4 KVA	607.8 A
MOTORS	27.2	1.00	27.2	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	168.1 KVA	606.5 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	161.3 KVA	581.9 A
REC. (>10kVA)	85.9	0.50	43.0	C =	155.4 KVA	560.7 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	329.2	1.00	329.2	A =	210.1 KVA	758.2 A
SPARE	0.0	1.00	0.0	B =	201.6 KVA	727.4 A
TOTAL (KVA)	525.6		484.7	C =	194.2 KVA	700.9 A

NOTES:

PANEL: MDP

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 10,000 AIC
MOUNTING: SURFACE | 1200 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.00				EDB	1	2	EDB				0.00
0.00	FUTURE MOBILE CR		200	EDB	3	4	EDB	200		FUTURE MOBILE CR	0.00
0.00				EDB	5	6	EDB				0.00
0.00				EDB	7	8	EDB				0.00
0.00	FUTURE MOBILE CR		200	EDB	9	10	EDB	200		FUTURE MOBILE CR	0.00
0.00				EDB	11	12	EDB				0.00
0.00				EDB	13	14	EDB				0.00
0.00	FUTURE MOBILE CR		200	EDB	15	16	EDB	200		FUTURE MOBILE CR	0.00
0.00				EDB	17	18	EDB				0.00
12.12				EDB	19	20	EDB				15.59
11.83	PANEL RD		200	EDB	21	22	EDB	200		PANEL KP	14.09
8.92				EDB	23	24	EDB				17.01
10.52				EDB	25	26	EDB				11.26
8.88	PANEL CF,RH,RG		200	EDB	27	28	EDB	225		PANEL RA,CA	13.68
10.24				EDB	29	30	EDB				9.08
0.00				EDB	31	32	EDB				11.28
0.00	SPARE		225	EDB	33	34	EDB	225		PANEL RC, CG, CH	11.52
0.00				EDB	35	36	EDB				9.60
9.68				EDB	37	38	EDB				11.10
10.98	PANEL RB, CC, CB		225	EDB	39	40	EDB	225		PANEL RE,CD, CE	11.66
9.60				EDB	41	42	EDB				9.98
92.8	SUB-TOTALS										145.9

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	8.4	1.25	10.5	CONNECTED		
HEATING	3.0	1.00	3.0	A =	81.6 KVA	679.1 A
COOLING	0.0	1.00	0.0	B =	82.6 KVA	688.2 A
VENTILATION	24.3	1.00	24.3	C =	74.4 KVA	619.8 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	68.0 KVA	566.0 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	68.4 KVA	569.8 A
REC. (>10kVA)	85.9	0.50	43.0	C =	61.4 KVA	511.0 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	107.0	1.00	107.0	A =	85.0 KVA	707.5 A
SPARE	0.0	1.00	0.0	B =	85.5 KVA	712.2 A
TOTAL (KVA)	238.6		197.8	C =	76.7 KVA	638.8 A

NOTES:
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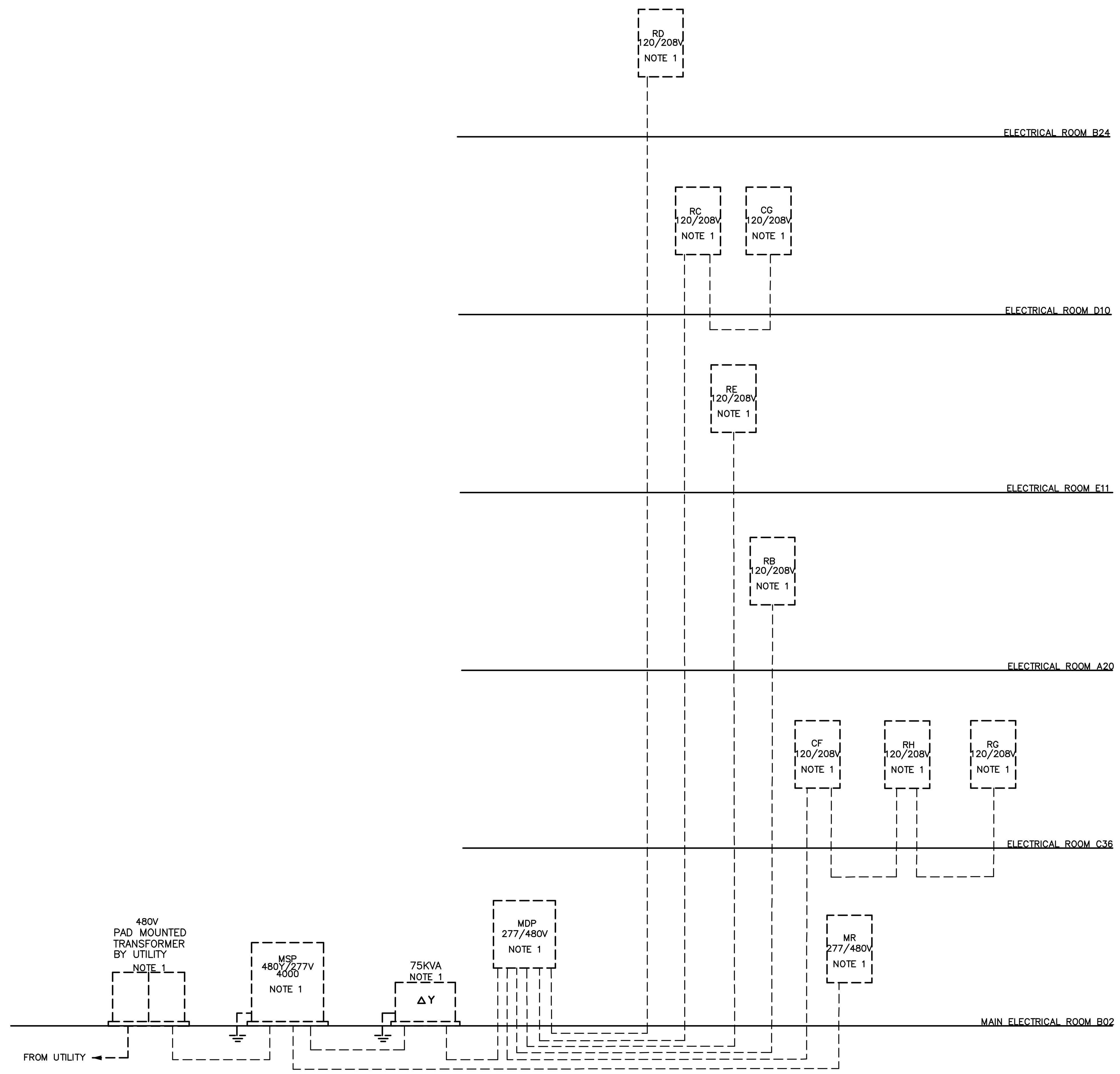

NOTES:
1. ALL EQUIPMENT SHOWN IS EXISTING AND TO REMAIN IN PLACE

1 POWER RISER DIAGRAM

NO SCALE

PANEL: RB

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 10,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.80	REC A26 (EXISTING)		20	EDB	1	2	EDB	20		REC A28 (EXISTING)	0.80
0.80	REC OS (EXISTING)		20	EDB	3	4	EDB	20		REC A26 (EXISTING)	0.80
0.80	REC A23 (EXISTING)		20	EDB	5	6	EDB	20		REC A20 (EXISTING)	0.80
0.80	REC A19 (EXISTING)		20	EDB	7	8	EDB	20		REC A19 (EXISTING)	0.80
0.80	REC A15 (EXISTING)		20	EDB	9	10	EDB	20		REC A08 (EXISTING)	0.80
0.80	REC A09 (EXISTING)		20	EDB	11	12	EDB	20		REC A15 (EXISTING)	0.80
1.68	ACUATORS (NOTE 1)	12	20	EDB	13	14	EDB	20		REC A26 (EXISTING)	0.80
1.68	ACUATORS (NOTE 1)	12	20	EDB	15	16	EDB	20		REC A19 (EXISTING)	0.80
0.80	REC A14 (EXISTING)		20	EDB	17	18	EDB	20		REC A08 (EXISTING)	0.80
0.80	REC A21 (EXISTING)		20	EDB	19	20	EDB	20		REC A01 (EXISTING)	0.80
0.80	REC A21 (EXISTING)		20	EDB	21	22	EDB	20		REC A21 (EXISTING)	0.80
0.80	REC A11 (EXISTING)		20	EDB	23	24	EDB	20		REC A05 (EXISTING)	0.80
0.80	REC A07 (EXISTING)		20	EDB	25	26	EDB	20		SPARE	0.00
0.80	REC A07 (EXISTING)		20	EDB	27	28	EDB	20		SPARE	0.00
0.00	SPARE		20	EDB	29	30	EDB	20		SPARE	0.00
0.00	SPARE		20	EDB	31	32	EDB	20		SPARE	0.00
0.80	REC OS (EXISTING)		20	EDB	33	34	EDB	20		REC OS (EXISTING)	0.50
0.80	AIR H U A21 (EXISTING)		20	EDB	35	36	EDB	20		AIR H U A28 (EXISTING)	0.80
0.80	AIR H U A27 (EXISTING)		20	EDB	37	38	EDB	20		AIR H U A20 (EXISTING)	0.80
0.80	AIR H U A14 (EXISTING)		20	EDB	39	40	EDB	20		AIR H U A16 (EXISTING)	0.80
0.80	AIR H U A07 (EXISTING)		20	EDB	41	42	EDB	20		AIR H U A04 (EXISTING)	0.80
17.0	SUB-TOTALS										13.3

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	0.0	1.25	0.0	CONNECTED		
HEATING	0.0	1.00	0.0	A =	9.7 KVA	80.6 A
COOLING	0.0	1.00	0.0	B =	11.0 KVA	91.4 A
VENTILATION	6.4	1.00	6.4	C =	9.6 KVA	79.9 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	8.0 KVA	67.0 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	9.0 KVA	75.0 A
REC. (>10kVA)	10.5	0.50	5.3	C =	8.0 KVA	66.3 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	3.4	1.00	3.4	A =	10.1 KVA	83.7 A
SPARE	0.0	1.00	0.0	B =	11.3 KVA	93.8 A
TOTAL (KVA)	30.3		25.0	C =	10.0 KVA	82.9 A

NOTES:
1. PROVIDE NEW 20A/IP BREAKER FOR NEW CIRCUIT

PANEL: MR

EXTG MFGR | EXTG TYPE
VOLTAGE: 277 / 480 | 3 PHASE | 4 WIRE | 65,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
				EDB	1	2	EDB				0.12
	SPACE ONLY			EDB	3	4	EDB	15		EF #3 - 1/4 HP (EXISTING)	0.12
				EDB	5	6	EDB				0.12
1.33				EDB	7	8	EDB				3.33
1.33	AIR COMP - 3 HP (EXISITING)		15	EDB	9	10	EDB	30		UNIT HEATER - 10 KW (EXISTING)	3.33
1.33				EDB	11	12	EDB				3.33
1.14				EDB	13	14	EDB				0.83
1.14	EF #5 - 3 HP (EXISTING)		15	EDB	15	16	EDB	20		SF #2 - 2 HP (EXISITING)	0.83
1.14				EDB	17	18	EDB				0.83
0.36				EDB	19	20	EDB				0.87
0.36	PUMP #6 - 3/4 HP (EXISTING)		15	EDB	21	22	EDB	15		PUMP #3, #4 - 3/4 HP (EXISITING)	0.87
0.36				EDB	23	24	EDB				0.87
				EDB	25	26	EDB				0.40
	SPARE		15	EDB	27	28	EDB	15		PUMP #5 (EXISITING)	0.40
				EDB	29	30	EDB				0.40
3.05				EDB	31	32	EDB				3.05
3.05	VFD #1 - 7 1/2 HP (NOTE 1)		25	EDB	33	34	EDB	25		VFD #2 - 7 1/2 HP (NOTE 1)	3.05
3.05				EDB	35	36	EDB				3.05
				EDB	37	38	EDB				7.93
	SPARE		60	EDB	39	40	EDB	60		ACC #1 (EXISITING)	7.93
				EDB	41	42	EDB				7.93
17.6	SUB-TOTALS										49.6

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	0.0	1.25	0.0	CONNECTED		
HEATING	10.0	1.00	10.0	A =	22.4 KVA	80.9 A
COOLING	23.8	1.00	23.8	B =	22.4 KVA	80.9 A
VENTILATION	3.8	1.00	3.8	C =	22.4 KVA	80.9 A
MOTORS	27.2	1.00	27.2	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	22.4 KVA	80.9 A
REC. (1st 10kVA)	0.0	1.00	0.0	B =	22.4 KVA	80.9 A
REC. (>10kVA)	0.0	0.50	0.0	C =	22.4 KVA	80.9 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	2.5	1.00	2.5	A =	28.0 KVA	101.1 A
SPARE	0.0	1.00	0.0	B =	28.0 KVA	101.1 A
TOTAL (KVA)	67.2		67.2	C =	28.0 KVA	101.1 A

NOTES:
1. REUSE EXISITING BREAKER AND WIRE

PANEL: RG

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 10,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.80	REC C26 (EXISTING)		20	EDB	1	2	EDB	30		UNIT HEATER C23 (EXISTING)	3.00
0.80	REC C10 (EXISTING)		20	EDB	3	4	EDB	20		COPIER C16 (EXISTING)	0.80
0.80	REC C09 (EXISTING)		20	EDB	5	6	EDB	20	12	ACUATORS (NOTE 1)	1.92
0.80	REC C24 (EXISTING)		20	EDB	7	8	EDB	20	12	ACUATORS (NOTE 1)	1.92
0.80	REC C21 (EXISTING)		20	EDB	9	10	EDB	20	12	ACUATORS (NOTE 1)	1.68
0.80	REC C21 (EXISTING)		20	EDB	11	12	EDB	20	10	ACUATORS (NOTE 1)	1.92
0.80	REC C25 (EXISTING)		20	EDB	13	14	EDB	20		SPARE	0.00
0.80	REC C02 (EXISTING)		20	EDB	15	16	EDB	20		SPARE	0.00
0.80	REC C04 (EXISTING)		20	EDB	17	18	EDB	20		SPARE	0.00
0.80	REC C04 (EXISTING)		20	EDB	19	20	EDB	20		SPARE	0.00
0.80	REC C22 (EXISTING)		20	EDB	21	22	EDB	20		SPARE	0.00
0.80	REC C30 (EXISTING)		20	EDB	23	24	EDB	20		SPARE	0.00
0.80	REC C29 (EXISTING)		20	EDB	25	26	EDB	20		SPARE	0.00
0.80	REC C30 (EXISTING)		20	EDB	27	28	EDB	20		FCU C19 (EXISTING)	0.80
0.80	DOOR CONTROLLER (EXISTING)		20	EDB	29	30	EDB	20		EF C26 (EXISTING)	0.80
0.00	SPARE		20	EDB	31	32	EDB	20		FCU C03 (EXISTING)	0.80
0.00	SPARE		20	EDB	33	34	EDB	20		FCU C01 (EXISTING)	0.80
0.00	SPARE		20	EDB	35	36	EDB	20		FCU (EXISTING)	0.80
0.00	SPARE		20	EDB	37	38	EDB	20		FCU C16 (EXISTING)	0.80
0.00	SPARE		20	EDB	39	40	EDB	20		FCU C11 (EXISTING)	0.80
0.00	SPARE		20	EDB	41	42	EDB	20		FCU C08 (EXISTING)	0.80
12.0	SUB-TOTALS										17.6

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	0.0	1.25	0.0	CONNECTED		
HEATING	3.0	1.00	3.0	A =	10.5 KVA	87.6 A
COOLING	0.0	1.00	0.0	B =	8.9 KVA	73.9 A
VENTILATION	6.4	1.00	6.4	C =	10.2 KVA	85.3 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	10.3 KVA	85.8 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	8.7 KVA	72.2 A
REC. (>10kVA)	1.2	0.50	0.6	C =	10.1 KVA	83.8 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	9.0	1.00	9.0	A =	12.9 KVA	107.3 A
SPARE	0.0	1.00	0.0	B =	10.8 KVA	90.2 A
TOTAL (KVA)	29.6		29.0	C =	12.6 KVA	104.8 A

NOTES:
1. PROVIDE NEW 20A/IP BREAKER FOR NEW CIRCUIT

PANEL: RD

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 10,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.80	LIGHTING CHANNEL B24 (EXISTIN		20	EDB	1	2	EDB	20		DIMMING B24 (EXISTING)	0.80
0.80	LIGHTING CHANNEL B24 (EXISTIN		20	EDB	3	4	EDB	20		DIMMING B24 (EXISTING)	1.80
0.80	LIGHTING CHANNEL B24 (EXISTIN		20	EDB	5	6	EDB	20		DIMMING B24 (EXISTING)	0.80
0.80	LIGHTING CHANNEL B24 (EXISTIN		20	EDB	7	8	EDB	20		DIMMING B24 (EXISTING)	0.60
0.80	REAR STAGE (EXISTING)		20	EDB	9	10	EDB	20		DIMMING B24 (EXISTING)	0.60
0.00	SPARE		20	EDB	11	12	EDB	20		DIMMING B24 (EXISTING)	0.60
0.80	PA SYSTEM (EXISTING)		20	EDB	13	14	EDB	20		FCU B21 (EXISTING)	0.80
1.03	REC B26 (EXISTING)		20	EDB	15	16	EDB	20		FCU B21 (EXISTING)	0.80
0.00	SPARE		20	EDB	17	18	EDB	20		FCU B21 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	19	20	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	21	22	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	23	24	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	25	26	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	27	28	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	29	30	EDB	20		COMPUTER B23 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	31	32	EDB	20		COMPUTER B26 (EXISTING)	0.80
0.80	COMPUTER B23 (EXISTING)		20	EDB	33	34	EDB	20		FUTURE LIFT B25 (EXISTING)	0.00
0.80	COMPUTER B23 (EXISTING)		20	EDB	35	36	EDB	20	12	ACUATORS (NOTE 1)	1.92
0.80	FCU B21 (EXISTING)		20	EDB	37	38	EDB	20	12	ACUATORS (NOTE 1)	1.92
0.80	FCU B21 (EXISTING)		20	EDB	39	40	EDB	20	12	ACUATORS (NOTE 1)	1.20
0.00	SPARE		20	EDB	41	42	EDB	20		SPARE	0.00
14.6	SUB-TOTALS										18.2

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	8.4	1.25	10.5	CONNECTED		
HEATING	0.0	1.00	0.0	A =	12.1 KVA	100.9 A
COOLING	0.0	1.00	0.0	B =	11.8 KVA	98.5 A
VENTILATION	4.0	1.00	4.0	C =	8.9 KVA	74.3 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	12.2 KVA	101.6 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	11.9 KVA	99.4 A
REC. (>10kVA)	3.8	0.50	1.9	C =	8.9 KVA	74.2 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	6.6	1.00	6.6	A =	15.3 KVA	127.0 A
SPARE	0.0	1.00	0.0	B =	14.9 KVA	124.2 A
TOTAL (KVA)	32.9		33.1	C =	11.1 KVA	92.8 A

NOTES:
1. PROVIDE NEW 20A/IP BREAKER FOR NEW CIRCUIT

PANEL: CG

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 10,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	1	2	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	3	4	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	5	6	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	7	8	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	9	10	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D05 (EXISTING)		20	EDB	11	12	EDB	20		REC COMPUTER D14 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	13	14	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	15	16	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	17	18	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	19	20	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	21	22	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D06 (EXISTING)		20	EDB	23	24	EDB	20		REC COMPUTER D15 (EXISTING)	0.80
0.80	REC COMPUTER D09 (EXISTING)		20	EDB	25	26	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
0.80	REC COMPUTER D09 (EXISTING)		20	EDB	27	28	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
0.80	REC COMPUTER D09 (EXISTING)		20	EDB	29	30	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
0.80	REC COMPUTER D09 (EXISTING)		20	EDB	31	32	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
0.80	REC COMPUTER D09 (EXISTING)		20	EDB	33	34	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
0.80	REC COMPUTER D13 (EXISTING)		20	EDB	35	36	EDB	20		REC COMPUTER D19 (EXISTING)	0.80
1.68	ACUATORS (NOTE 1)	12	20	EDB	37	38	EDB	20		SPARE	0.00
1.92	ACUATORS (NOTE 1)	12	20	EDB	39	40	EDB	20		SPARE	0.00
0.00	SPARE		20	EDB	41	42	EDB	20		SPARE	0.00
18.0	SUB-TOTALS										14.4

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	0.0	1.25	0.0	CONNECTED		
HEATING	0.0	1.00	0.0	A =	11.3 KVA	93.9 A
COOLING	0.0	1.00	0.0	B =	11.5 KVA	95.9 A
VENTILATION	0.0	1.00	0.0	C =	9.6 KVA	79.9 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	8.1 KVA	67.8 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	8.4 KVA	69.8 A
REC. (>10kVA)	18.8	0.50	9.4	C =	6.5 KVA	53.8 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	3.6	1.00	3.6	A =	10.2 KVA	84.8 A
SPARE	0.0	1.00	0.0	B =	10.5 KVA	87.3 A
TOTAL (KVA)	32.4		23.0	C =	8.1 KVA	67.3 A

NOTES:
1. PROVIDE NEW 20A/IP BREAKER FOR NEW CIRCUIT

PANEL: RE

EXTG MFGR | EXTG TYPE
VOLTAGE: 120 / 208 | 3 PHASE | 4 WIRE | 65,000 AIC
MOUNTING: SURFACE | 225 AMP | MAIN CIRCUIT BREAKER

LOAD KVA	LOAD SERVED	WIRE	TRIP	FRAME (Note 1)	CKT NO	CKT NO	FRAME (Note 1)	TRIP	WIRE	LOAD SERVED	LOAD KVA
0.80	REC E12 (EXISTING)		20	EDB	1	2	EDB	20		REC E11 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	3	4	EDB	20		REC E10 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	5	6	EDB	20		REC E10 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	7	8	EDB	20		REC E15 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	9	10	EDB	20		REC E16 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	11	12	EDB	20		REC E16 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	13	14	EDB	20		REC E16 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	15	16	EDB	20		REC E18 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	17	18	EDB	20		REC E17 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	19	20	EDB	20	12	ACUATORS (NOTE 1)	1.92
0.80	REC E12 (EXISTING)		20	EDB	21	22	EDB	20	12	ACUATORS (NOTE 1)	1.68
0.80	REC E12 (EXISTING)		20	EDB	23	24	EDB	20		SPARE	0.00
0.80	REC E12 (EXISTING)		20	EDB	25	26	EDB	20		SPARE	0.00
0.80	REC E12 (EXISTING)		20	EDB	27	28	EDB	20		AIR A U E13 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	29	30	EDB	20		AIR A U E08 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	31	32	EDB	20		AIR A U E17 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	33	34	EDB	20		AIR A U E02 (EXISTING)	0.80
0.80	REC E12 (EXISTING)		20	EDB	35	36	EDB	20		AIR A U E19 (EXISTING)	0.80
0.38				EDB	37	38	EDB	20		AIR A U E11 (EXISTING)	0.80
0.38	EF-10		15	EDB	39	40	EDB	20		AIR A U E15 (EXISTING)	0.80
0.38				EDB	41	42	EDB	20		AIR A U E07 (EXISTING)	0.80
15.5	SUB-TOTALS										17.2

LOAD (KVA)	Conn.	D.F.	Dmd	TOTAL LOAD PER PHASE:		
LIGHTS	0.0	1.25	0.0	CONNECTED		
HEATING	0.0	1.00	0.0	A =	11.1 KVA	92.5 A
COOLING	0.0	1.00	0.0	B =	11.7 KVA	97.1 A
VENTILATION	7.5	1.00	7.5	C =	10.0 KVA	83.1 A
MOTORS	0.0	1.00	0.0	DEMAND		
KITCHEN	0.0	0.65	0.0	A =	9.2 KVA	76.4 A
REC. (1st 10kVA)	10.0	1.00	10.0	B =	9.7 KVA	81.0 A
REC. (>10kVA)	11.6	0.50	5.8	C =	8.1 KVA	67.0 A
WATER HEATER	0.0	1.00	0.0	DEMAND @ 125%		
MISC.	3.6	1.00	3.6	A =	11.5 KVA	95.5 A
SPARE	0.0	1.00	0.0	B =	12.2 KVA	101.2 A
TOTAL (KVA)	32.7		26.9	C =	10.1 KVA	83.8 A

NOTES:
1. PROVIDE NEW 20A/IP BREAKER FOR NEW CIRCUIT

Mechanical · Electrical · Plumbing
Fire Protection · Techology Design
1927 S. Tryon St., Suite 300, Charlotte NC 28203
150 Fayetteville St., Suite 520, Raleigh, NC 27601
Phone: 704-338-1292 www.optimaengineering.com
North Carolina License Number C-0914
optima engineering

SEAL:

01/10/2023

DAVID COX ELEMENTARY SCHOOL
HVAC CONTROLS UPGRADE

362 - DAVID COX ES
4215 DAVID COX RD
CHARLOTTE, NC 28269

REV #	DATE	DESCRIPTION

DATE:	01-10-2023
PROJECT #:	22-0153
DRAWN BY:	SMT
DESIGNED BY:	SMT
CHECKED BY:	MAM

SHEET TITLE:
POWER RISER DIAGRAMS & SCHEDULE

DWG #:
E701