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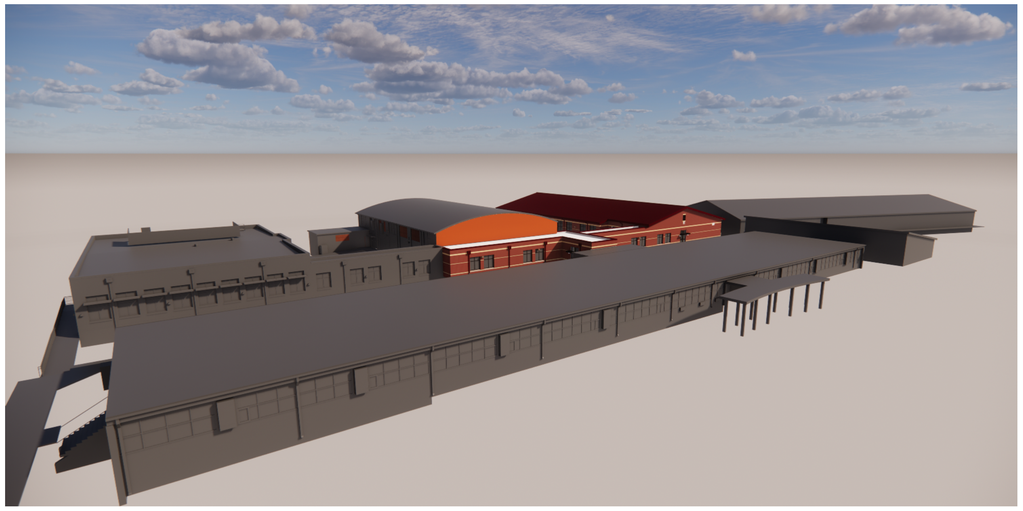
Harnett County Schools

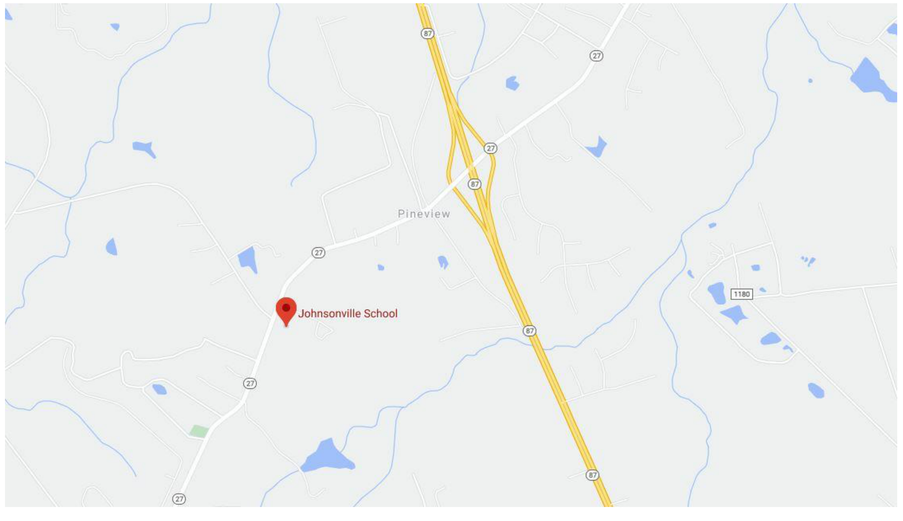
Johnsonville Elem. School Addition/Renovation-Phase 2

18495 NC-27, Cameron, NC 28326

RENDERING



VICINITY MAP



DRAWING INDEX

VOLUME 1

GENERAL

*	G1-000	COVERSHEET
	G1-001	PARTITION LEGEND, ABBREVIATIONS & PROJECT SIGNAGE
	G1-002	BUILDING CODE SUMMARY-PHASE 2
	G1-003	UL ASSEMBLIES
	G1-111	LIFE SAFETY PLAN

CIVIL

	C-100	GENERAL NOTES AND LEGENDS
	C-101	EXISTING SURVEY CONDITIONS AND DEMOLITION PLAN
	C-201	SITE LAYOUT PLAN
	C-301	GRADING AND EROSION CONTROL PLAN
	C-401	DRAINAGE PLAN
	C-501	UTILITY PLAN
	C-502	UTILITY PROFILES
	D-101	SITE DETAILS
	D-102	SITE DETAILS
	D-201	DRAINAGE DETAILS
	D-301	EROSION CONTROL DETAILS
	D-302	EROSION CONTROL DETAILS
	D-303	NCG01 INFORMATION
	D-401	WATERLINE NOTES AND DETAILS
	D-501	SANITARY SEWER NOTES & DETAILS

LANDSCAPE

	L-101	PLANTING PLAN
	L-201	PLANTING DETAILS

STRUCTURAL

	S1-001	GENERAL NOTES
	S1-010	ROOF LOADING DIAGRAMS
	S1-020	ROOF ATTACHMENT DIAGRAM
	S1-100	FOUNDATION PLAN
	S1-101	SLAB PLAN
	S1-102	MECHANICAL PLATFORM FRAMING PLAN
	S1-103	ROOF FRAMING PLAN
	S1-200	FOUNDATION DETAILS
	S1-300	TYP CMU WALL DETAILS
	S1-400	FRAMING DETAILS
	S1-401	FRAMING DETAILS

ARCHITECTURAL

	A1-001	DEMOLITION PLAN
*	A1-002	EXISTING BUILDING PHOTOS
*	A1-003	PHASING PLAN
	A1-101	OVERALL PLAN
	A1-111	ENLARGED FLOOR PLAN
*	A1-121	REFLECTED CEILING PLAN
	A1-131	ROOF PLAN
*	A1-201	BLDG ADDITION ELEVATIONS - CLASSROOM WING
*	A1-202	BLDG ADDITION ELEVATIONS - CLASSROOM WING
	A1-301	BUILDING SECTIONS
	A1-310	WALL SECTIONS
	A1-401	ENLARGED INTERIOR PLANS & ELEVATIONS
	A1-501	DETAILS
	A1-502	DETAILS
	A1-503	DETAILS
	A1-504	DETAILS
	A1-505	DETAILS
	A1-601	DOOR & WINDOW SCHEDULES
*	A1-701	FLOOR FINISH PLAN & SCHEDULE
	A1-702	FINISH DETAILS

* DENOTES PAGES THAT SHOULD BE PRINTED IN COLOR

VOLUME 2

FIRE PROTECTION

	FP1-001	FIRE PROTECTION LEGEND, DESIGN DATA, & SPECIFICATIONS
	FP1-101	FIRE PROTECTION PLAN-NEW WORK

PLUMBING

	P1-001	PLUMBING LEGEND, DESIGN DATA, AND SPECIFICATIONS
	P1-002	PLUMBING SCHEDULES
	P1-100	PLUMBING UNDERSLAB WASTE
	P1-101	PLUMBING ABOVE GROUND WASTE & VENT
	P1-103	MEZZANINE WASTE & VENT PLAN
	P1-201	PLUMBING WATER SUPPLY
	P1-401	PLUMBING RISER DIAGRAMS
	P1-501	PLUMBING DETAILS

MECHANICAL

	M1-001	MECHANICAL LEGEND AND NOTES
	M1-002	MECHANICAL SCHEDULES
	M1-003	MECHANICAL CONTROLS SEQUENCE OF OPERATION
	M1-101	MECHANICAL DEMOLITION PLAN
	M1-102	FIRST FLOOR MECHANICAL PLAN-NEW WORK
	M1-103	MECHANICAL LOFT MECHANICAL PLAN-NEW WORK
	M1-501	MECHANICAL DETAILS

ELECTRICAL

	E1-001	ELECTRICAL LEGEND AND NOTES
	E1-002	ELECTRICAL NOTES
	E1-011	OVERALL FIRST FLOOR POWER PLAN-DEMOLITION
	E1-012	OVERALL FIRST FLOOR POWER PLAN-NEW WORK
	E1-111	FIRST FLOOR POWER PLAN-NEW WORK
	E1-112	MECHANICAL LOFT ELECTRICAL PLANS-NEW WORK
	E1-211	FIRST FLOOR LIGHTING PLAN-NEW WORK
	E1-311	FIRST FLOOR SPECIAL SYSTEMS PLAN-NEW WORK
	E1-440	ENLARGED ELECTRICAL PLANS
	E1-501	ELECTRICAL DETAILS
	E1-502	ELECTRICAL DETAILS
	E1-503	ELECTRICAL DETAILS
	E1-601	ELECTRICAL PANEL SCHEDULES
	E1-602	ELECTRICAL SCHEDULES AND LIGHTING SEQUENCE OF OPERATIONS
	E1-901	ELECTRICAL DIAGRAMS

FIRE ALARM

	FA1-001	FIRE ALARM LEGEND & NOTES
	FA1-101	FIRST FLOOR FIRE ALARM PLAN - DEMOLITION
	FA1-102	FIRST FLOOR FIRE ALARM PLAN - NEW WORK
	FA1-103	MECHANICAL LOFT FIRE ALARM PLAN - NEW WORK

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PLUMBING/MECHANICAL/ ELECTRICAL ENGINEER

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Raleigh, NC 27601
P. (919) 926-1437

SET NUMBER:

03/25/22

BID SET

Harnett County Schools
Johnsonville Elem. School Addition/Renovation-Phase 2
18495 NC-27, Cameron, NC 28326

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PROJECT NUMBER: 02103.000

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FAX: (910) 637-0096
License #P-1095

FIRE FLOW TEST RESULTS:

Test Number	1
Test Date & Time	12/1/2020 - 10:30
Client	
Location	Johnsonville Elementary School
Performed by	J Maples, Logan willams Sam Tracy

Static Pressure	77	psi	Location: Hwy 24 & Hwy 27 Infront of Self Storage
Residual Pressure	69	psi	Location:
Nozzle inside Diameter		inches	(measure nozzle used)
Pitot Tube Pressure	24	psi	Location: Infront of School (hydrant #18,495)
Discharge rate (measured)	840	gpm	Flow Measuring Device: PollardWater Pitot Gauge
Required Residual Pressure	30	psi	(varies - 20psi minimum)

Formula: $Q_R = Q_F \times \left(H_R / H_F\right)^{0.54}$

Q(n) = Rated Capacity (in gpm) at 20 psi residual
Q(r) = Total test flow (gpm) from at pitot pressure
H(n) = Static Pressure - 20psi
H(r) = Static Pressure - Residual Pressure

Q(n) =	840	47	8
	Q(r)	H(n)	H(r)

Available Fire Flow Q(n) = **2,185** gpm at 30 psi residual

Performed By: Jackson Maples 12/1/2020 Date

Certified By: Date

Notes: Residual hydrant #19,590 (hydrant #'s taken from Harnett County GIS)

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License #P-1095

FIRE FLOW TEST RESULTS:

Test Number	1
Test Date & Time	12/1/2020 - 10:30
Client	
Location	Johnsonville Elementary School
Performed by	J Maples, Logan willams Sam Tracy

Static Pressure	104	psi	Location: Hwy 87 & Hwy 27 intersection
Residual Pressure	76	psi	Location:
Nozzle inside Diameter		inches	(measure nozzle used)
Pitot Tube Pressure	24	psi	Location: Infront of School (hydrant #18,495)
Discharge rate (measured)	840	gpm	Flow Measuring Device: PollardWater Pitot Gauge
Required Residual Pressure	30	psi	(varies - 20psi minimum)

Formula: $Q_R = Q_F \times \left(H_R / H_F\right)^{0.54}$

Q(n) = Rated Capacity (in gpm) at 20 psi residual
Q(r) = Total test flow (gpm) from at pitot pressure
H(n) = Static Pressure - 20psi
H(r) = Static Pressure - Residual Pressure

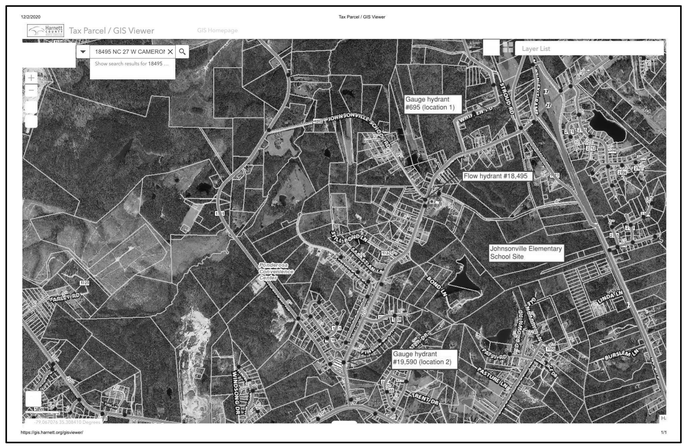
Q(n) =	840	74	28
	Q(r)	H(n)	H(r)

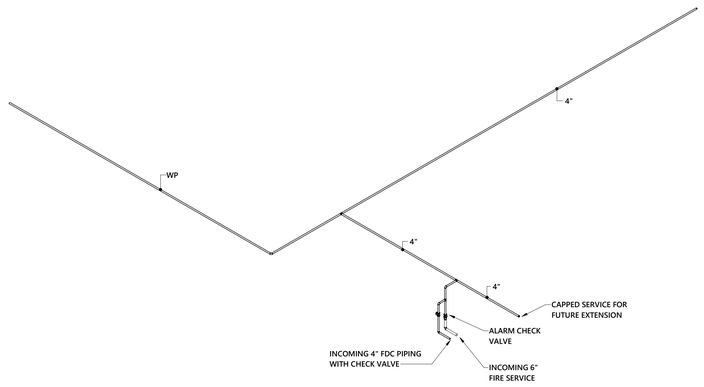
Available Fire Flow Q(n) = **1,420** gpm at 30 psi residual

Performed By: Jackson Maples 12/1/2020 Date

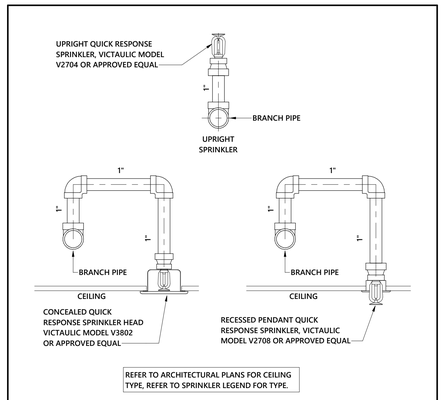
Certified By: Date

Notes: Residual hydrant #695 (hydrant #'s taken from Harnett County GIS)

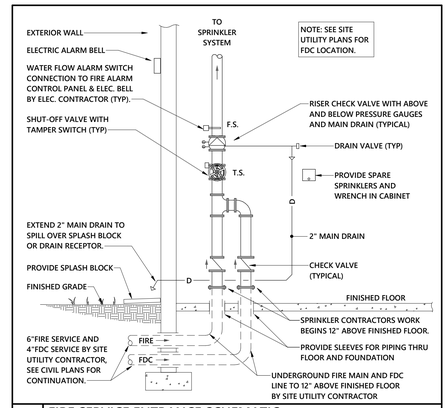




3 FIRE PROTECTION RISER DIAGRAM



2 TYPICAL RETURN BEND SCHEMATIC
NOT TO SCALE



1 FIRE SERVICE ENTRANCE SCHEMATIC
NOT TO SCALE

FIRE PROTECTION SPECIFICATIONS

GENERAL REQUIREMENTS:

1. THE INTENT OF THESE PLANS IS TO PROVIDE INFORMATION TO THE REVIEWING AUTHORITIES THAT THE BUILDING WILL BE PROTECTED BY AUTOMATIC SPRINKLER SYSTEMS. THE INFORMATION INCLUDED WITHIN THESE DOCUMENTS IS PROVIDED FOR COORDINATION AND AS A REFERENCE ONLY AND THESE DOCUMENTS SHALL NOT BE CONSIDERED ACTUAL DESIGN OR CONSTRUCTION DOCUMENTS.
2. PROVIDE DESIGN, FABRICATION, AND INSTALLATION OF HYDRAULICALLY CALCULATED AUTOMATIC SPRINKLER SYSTEMS. INCLUDE ALL SERVICES, MATERIALS, LABOR, AND EQUIPMENT REQUIRED FOR COMPLETE WORKING SYSTEMS. DESIGN AND INSTALL AUTOMATIC SPRINKLER SYSTEMS IN FULL COMPLIANCE WITH THE LATEST EDITIONS OF NFPA 13, THE NORTH CAROLINA FIRE PREVENTION CODE, THE OWNER'S INSURANCE UNDERWRITER, AND THE LOCAL AUTHORITY HAVING JURISDICTION.
3. PROVIDE SHOP DRAWINGS AND HYDRAULIC CALCULATIONS FOR REVIEW BY THE AUTHORITY HAVING JURISDICTION INCLUDING, BUT NOT LIMITED TO, ALL REQUIRED ITEMS AS OUTLINED IN NFPA 13 "PLANS AND CALCULATIONS: SECTIONS. SHOP DRAWINGS MUST BE PREPARED BY A NICET LEVEL III (OR HIGHER) TECHNICIAN CERTIFIED IN WATER-BASED SYSTEMS LAYOUT. INCLUDE DESIGNER'S NAME, SIGNATURE, AND CERTIFICATION NUMBER ON EACH PLAN SHEET OF THE SHOP DRAWING PACKAGE AND ON THE COVER SHEET OF EACH HYDRAULIC CALCULATION. THE HYDRAULIC CALCULATIONS SHALL BE BASED ON THE ACTUAL MANUFACTURER'S PRODUCT DATA INTENDED FOR INSTALLATION IN THE SYSTEMS AND NOT STANDARD VALUES FROM CALCULATION SOFTWARE.
4. THE CONTRACTOR SHALL PERFORM A FIRE FLOW TEST IN ACCORDANCE WITH NFPA 291 UTILIZING TEST AND FLOW HYDRANTS LOCATED ACROSS THE UTILITY CONNECTION INDICATED ON THE SITE UTILITIES PLAN PRIOR TO BEGINNING DESIGN. THE CONTRACTOR'S FIRE FLOW TEST DATA SHALL BE INCLUDED IN THE HYDRAULIC CALCULATIONS PROVIDED IN THE SHOP DRAWING PACKAGE. FIRE FLOW TEST DATA OLDER THAN ONE YEAR WILL NOT BE ACCEPTED. COORDINATE WITH THE OWNER AND LOCAL UTILITY PRIOR TO PERFORMING ANY FIRE FLOW TESTS.
5. EXAMINE THE CONSTRUCTION DOCUMENTS INCLUDING ANY SPECIFICATIONS OR PROJECT MANUALS. REVIEW THE PROJECT CONDITIONS AND VERIFY ALL MEASUREMENTS, DISTANCES, ELEVATIONS, CLEARANCES, PIPE SIZES, ETC. PRIOR TO THE START OF CONSTRUCTION. COORDINATE THE LOCATION OF SPRINKLERS WITH THE ARCHITECTURAL CEILING PLANS AND THE WORK OF OTHER TRADES. PROVIDE ADDITIONAL SPRINKLERS IN ORDER TO COORDINATE WITH LUMINAIRES. ANY CHANGES OR ALTERATIONS REQUIRED DUE TO A LACK OF COORDINATION SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
6. PROVIDE ALL NECESSARY OFFSETS, RISES, OR DROPS IN THE PIPING AND ASSOCIATED AUXILIARY DRAINS AS REQUIRED BY NFPA 13.
7. FIRESTOP ALL PENETRATIONS OF FIRE-RATED WALLS, FLOORS, AND PARTITIONS. PROVIDE A DEVICE OR SYSTEM WHICH HAS BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E814 AND INSTALL IN ACCORDANCE WITH THE CONDITIONS OF THE LISTING. PROVIDE A DEVICE OR SYSTEM WITH AN F-RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED. REFER TO ARCHITECTURAL PLANS FOR WALL AND FLOOR TYPES.
8. FLUSH AND TEST SYSTEM PIPING IN ACCORDANCE WITH NFPA 13.
9. AT THE COMPLETION OF THE PROJECT, PROVIDE TO THE OWNER TWO SETS OF RECORD DRAWINGS WHICH CLEARLY SHOW ANY CHANGES AND/OR MODIFICATIONS, ADDITIONS, OR DELETIONS OF THE CONSTRUCTION DOCUMENTS.
10. AT THE COMPLETION OF THE PROJECT, PROVIDE TO THE OWNER ALL EXTRA STOCK REQUIRED BY NFPA 13.
11. THE CONTRACTOR SHALL GUARANTEE ALL WORK, MATERIALS, AND EQUIPMENT FURNISHED AGAINST DEFECTS, LEAKS, PERFORMANCE, AND NONOPERATION FOR A PERIOD OF ONE (1) YEAR AFTER THE DATE OF THE OWNER'S FINAL ACCEPTANCE. DEFECTS SHALL BE INTERPRETED AS DEFECTIVE MATERIALS OR EQUIPMENT OR UNSATISFACTORY INSTALLATION AND ARE NOT INTENDED TO APPLY TO ORDINARY WEAR AND TEAR. THE CONTRACTOR SHALL PAY FOR ANY REPAIRS OR REPLACEMENTS CAUSED BY THESE DEFECTS WITHIN THE PERIOD COVERED BY THE GUARANTEE, INCLUDING ALL INCIDENTAL WORK REQUIRED TO FIX THE DEFICIENCY.

MATERIALS:

1. PROVIDE UL LISTED BLACK STEEL PIPING (ASTM A53, ASTM A135, OR ASTM A795) WITH AN FM APPROVED MIC-INHIBITING COATING. PIPING 1-1/2" IN DIAMETER AND SMALLER SHALL BE SCHEDULE FORTY BLACK STEEL PIPE WITH THREADED OR WELDED FITTINGS. PIPING 2" IN DIAMETER AND LARGER SHALL BE SCHEDULE TEN BLACK STEEL PIPE ROLL-GROOVED FOR MECHANICAL FITTINGS.
2. PROVIDE UL LISTED STANDARD WEIGHT CAST IRON OR MALLEABLE IRON FITTINGS FOR PRESSURES UP TO 175 PSI. PROVIDE EXTRA HEAVY WEIGHT CAST IRON OR MALLEABLE IRON FITTINGS FOR PRESSURES OVER 175 PSI. THREADED CAST IRON FITTINGS SHALL MEET ASME B16.4. THREADED MALLEABLE IRON FITTINGS SHALL MEET ASME B16.3. GROOVED FITTINGS AND COUPLINGS SHALL BE UL LISTED DUCTILE IRON UTILIZING AN EPDM GASKET. PLAIN-END FITTINGS AND COUPLINGS OR WELDED-SEGMENTED FITTINGS ARE PROHIBITED. BUSHINGS OR GROOVED-END REDUCING COUPLINGS SHALL NOT BE USED UNLESS STANDARD REDUCING FITTINGS ARE NOT REGULARLY AVAILABLE.
3. SUPPORT PIPING IN ACCORDANCE WITH NFPA 13.
4. PROVIDE ORDINARY AND INTERMEDIATE TEMPERATURE SPRINKLERS THROUGHOUT. PROVIDE CONCEALED PENDENT SPRINKLERS IN AREAS WITH CEILINGS. PROVIDE UPRIGHT SPRINKLERS IN AREAS WITH EXPOSED STRUCTURE. PROVIDE SIDEWALL SPRINKLERS IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13. QUICK RESPONSE SPRINKLERS SHALL BE INSTALLED IN ALL LIGHT HAZARD AREAS IN ACCORDANCE WITH NFPA 13. WHERE QUICK RESPONSE SPRINKLERS ARE INSTALLED IN A COMPARTMENT, THEY SHALL BE INSTALLED THROUGHOUT THE COMPARTMENT. COORDINATE SPRINKLER AND ESCUTCHEON OR COVER PLATE FINISHES WITH ADJACENT FINISHES AS INDICATED ON THE ARCHITECTURAL PLANS. IN GENERAL, ALL PENDENT AND SIDEWALL SPRINKLERS AND COVER PLATES SHALL HAVE A WHITE ENAMEL FINISH.
5. PROVIDE OS&Y CONTROL VALVES, IRON BODY, BRONZE MOUNTED, DOUBLE DISC WITH PARALLEL SEATS, AND/OR; BUTTERFLY, LUG TYPE, DUCTILE IRON BODY, STAINLESS STEEL STEM, ALUMINUM BRONZE DISC, PHENOLIC RING AND BUNA-N SEAT. VALVES SHALL BE UL LISTED FOR FIRE PROTECTION SERVICE.
6. PROVIDE ALL PIPELINE-INSTALLED ALARM INITIATING AND NOTIFICATION DEVICES REQUIRED BY NFPA 13. COORDINATE DEVICE QUANTITIES AND LOCATIONS WITH THE FIRE ALARM CONTRACTOR PRIOR TO DESIGN AND INSTALLATION.
7. PROVIDE ESCUTCHEONS WHERE PIPES PASS EXPOSED THROUGH WALLS, FLOORS, OR CEILINGS. COORDINATE COLOR WITH ADJACENT FINISHES AS INDICATED ON THE ARCHITECTURAL PLANS.
8. PROVIDE ALL SIGNAGE AS REQUIRED BY NFPA 13.

COORDINATION DRAWINGS

THE MECHANICAL CONTRACTOR SHALL ORGANIZE COORDINATION MEETINGS TO DEVELOP A SET OF COORDINATION DRAWINGS WITH ALL CONTRACTORS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, IT/DATA, AND GENERAL CONTRACTOR). THE MECHANICAL CONTRACTOR WILL HAVE THE LEAD RESPONSIBILITY FOR THE COORDINATION DRAWINGS. THE MECHANICAL CONTRACTOR SHALL PRODUCE THE ORIGINAL DRAWINGS AND FORWARD THE DRAWINGS TO EACH OF THE OTHER CONTRACTORS FOR THEM TO ADD THEIR SYSTEMS TO THE SET OF COORDINATION DRAWINGS. THE CONTRACTORS WILL DEVELOP THE DRAWINGS IN THIS ORDER: MECHANICAL, FIRE PROTECTION, PLUMBING, ELECTRICAL, IT/DATA, AND GENERAL. THIS SHALL ALSO BE THE ORDER OF PRECEDENCE FOR INSTALLATION OF SYSTEMS. ANY RELOCATION OF SYSTEM ROUTINGS WILL BE FOUND IN THE COORDINATION PHASE AND NOTICED BY EACH OF THE CONTRACTORS. THESE DRAWINGS, WHEN COMPLETED, SHALL BE SIGNED OFF BY ALL OF THE ABOVE LISTED PARTIES. DRAWINGS SHALL BE COMPLETED PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK AND PIPING SYSTEMS, OR PURCHASE OF EQUIPMENT. THE FOLLOWING ITEMS REPRESENT THE MINIMUM REQUIREMENTS OF COORDINATION DRAWINGS:

1. ALL COORDINATION DRAWINGS WILL BE PRODUCED AT 1/4" = 1'-0 SCALE.
2. DRAWINGS WILL BE ORIGINAL DRAWINGS AND NOT OVERLAYS OF THE CONTRACT/DESIGN DRAWINGS.
3. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
4. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPILED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, FIRE PROTECTION, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.

THE USE OF BUILDING INFORMATION MODELING (BIM) THROUGHOUT THE CONSTRUCTION PROCESS IS A REQUIREMENT FOR THIS PROJECT TO HELP REDUCE OR ELIMINATE FIELD-DETECTED CONFLICTS, IMPROVE CONSTRUCTION QUALITY AND MAINTAIN AN AGGRESSIVE SCHEDULE. THE CONTRACTOR WILL BE RESPONSIBLE FOR CREATING THE MODEL AND MANAGING THE COORDINATION AND COLLISION DETECTION PROCESS. THE MODEL MUST CONTAIN COMPLETE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION SYSTEMS CONSISTENT WITH THE DESIGN AND FABRICATION DRAWINGS.

FIRE PROTECTION LEGEND

NEW PIPING	DESCRIPTION
	WET PIPE SYSTEM PIPING
	ELBOW DOWN
	ELBOW UP
	TEE DOWN
	PIPE CONTINUES
	PIPE CAP (OR PLUG)
	CONTROL VALVE WITH TAMPER SWITCH
	CHECK VALVE

ADDITIONAL ABBREVIATIONS

ABOVE FINISH CEILING	AFC	INCH	"
ABOVE FINISH FLOOR	AFF	KILOWATT	KW
ABOVE FINISH GRADE	AFG	MAXIMUM	MAX
AUTHORITY HAVING JURISDICTION	AHJ	MINIMUM	MIN
BACKFLOW PREVENTER	BFP	NOT IN CONTRACT	NIC
BELOW FINISH CEILING	BFC	NOT TO SCALE	NTS
BELOW FINISH FLOOR	BFF	POUND	LB
BELOW FINISH GRADE	BFG	POUNDS PER SQUARE INCH	PSI
DEGREE	°	REDUCED PRESSURE DETECTOR ASSEMBLY	RPDA
DEGREES FAHRENHEIT	°F	REVOLUTIONS PER MINUTE	RPM
DIAMETER, NOMINAL	DIA	SQUARE FEET	SF
DIFFERENCE	Δ	TYPICAL	TYP
DOWN	DN		
FOOT OR FEET	'	ELECTRICAL CONTRACTOR	EC
FEET OF HEAD	FT-HD	FIRE ALARM CONTRACTOR	FC
GALLONS	GAL	GENERAL CONTRACTOR	GC
GALLONS PER MINUTE	GPM	MECHANICAL CONTRACTOR	MC
HORSEPOWER	HP	PLUMBING CONTRACTOR	PC
HERTZ	HZ	SPRINKLER CONTRACTOR	SC

DESIGN DATA

LIGHT HAZARD OCCUPANCY (ALL AREAS NOT SPECIFICALLY DESIGNATED "OH-1" OR "OH-2"):

DESIGN DENSITY:	0.10 GPM/SF
WET PIPE HYDRAULICALLY MOST REMOTE AREA:	1,500 SF
SPRINKLER ORIFICE SIZE:	1/2"
MAXIMUM COVERAGE AREA PER SPRINKLER:	225 SF
DURATION OF WATER SUPPLY:	30 MINUTES
TOTAL COMBINED HOSE STREAM ALLOWANCE:	100 GPM

ORDINARY HAZARD, GROUP I OCCUPANCY (AREAS DESIGNATED "OH-1"):

DESIGN DENSITY:	0.15 GPM/SF
WET PIPE HYDRAULICALLY MOST REMOTE AREA:	1,500 SF
SPRINKLER ORIFICE SIZE:	1/2"
MAXIMUM COVERAGE AREA PER SPRINKLER:	130 SF
DURATION OF WATER SUPPLY:	60 - 90 MINUTES
TOTAL COMBINED HOSE STREAM ALLOWANCE:	250 GPM

ORDINARY HAZARD, GROUP II OCCUPANCY (AREAS DESIGNATED "OH-2"):

DESIGN DENSITY:	0.20 GPM/SF
WET PIPE HYDRAULICALLY MOST REMOTE AREA:	1,500 SF
SPRINKLER ORIFICE SIZE:	1/2"
MAXIMUM COVERAGE AREA PER SPRINKLER:	130 SF
DURATION OF WATER SUPPLY:	60 - 90 MINUTES
TOTAL COMBINED HOSE STREAM ALLOWANCE:	250 GPM

FIRE PROTECTION SHEET INDEX

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North Carolina License Number C-0914

Harnett County Schools

Johnsonville Elementary School Addition/Renovation Phase 2

18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: CAW
CHECKED BY: ESD

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FIRE PROTECTION LEGEND, DESIGN DATA, AND SPECIFICATIONS

FP1-001

Sheet No. 1 of 2

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OPTIMA # 21-0266R

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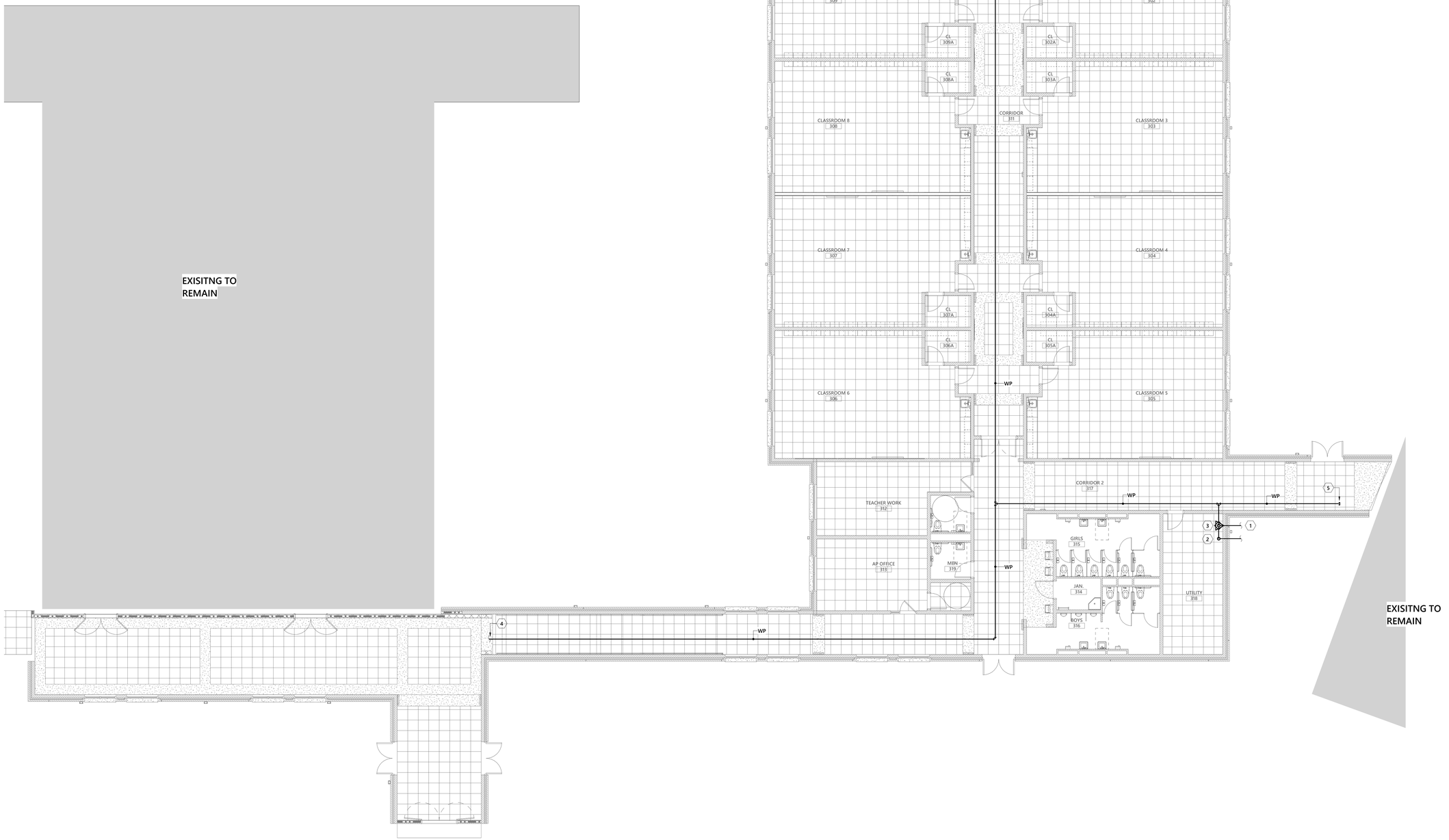
KEYED NOTES

1 INCOMING 6" FIRE SERVICE. SEE SITE/CIVIL DRAWINGS FOR CONTINUATION.
2 INCOMING 4" FDC PIPING WITH CHECK VALVE. SEE SITE/CIVIL DRAWINGS FOR CONTINUATION AND LOCATION OF SITE-LOCATED FDC.
3 ALARM CHECK VALVE.
4 EXTEND SPRINKLER PIPING INTO NEW CORRIDOR.
5 CAPPED SERVICE FOR FUTURE EXTENSION INTO EXISTING CLASSROOM BUILDING.



1 FIRST FLOOR FIRE PROTECTION PLAN - PHASE 2
1/8" = 1'-0"

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Harnett County Schools

Johnsonville Elementary School Addition/Renovation Phase 2

18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: CAW
CHECKED BY: ESD

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FIRE PROTECTION PLAN - NEW WORK

FP1-101
Sheet No. 2 of 2

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PLUMBING GENERAL NOTES

1. GENERAL AND SPECIAL CONDITIONS OF THE CONTRACT APPLY TO THE PLUMBING SCOPE OF WORK. THE PLUMBING DRAWINGS AND SPECIFICATIONS SHALL NOT BE INTERPRETED AS WAIVING OR OVERRULING ANY REQUIREMENTS EXPRESSED IN GENERAL CONDITIONS.
2. PLUMBING WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE NORTH CAROLINA STATE PLUMBING CODE AND WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION.
3. PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED FOR THE COMPLETION AND OPERATION OF ALL PLUMBING SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE CODES.
4. APPLY AND PAY FOR ALL NECESSARY PERMITS, FEES, AND INSPECTIONS REQUIRED BY ANY PUBLIC AUTHORITY HAVING JURISDICTION. ACREAGE CHARGES, FACILITIES CHARGES, AND BOND PROPERTY ASSESSMENTS ARE NOT TO BE CONSTRUED TO BE A PART OF THIS CONTRACT.
5. WARRANT THE SYSTEM LABOR, MATERIALS, AND EQUIPMENT FOR THE TIME PERIOD SPECIFIED IN THE PROJECT MANUAL. IF NO WARRANTY SECTION IS PROVIDED, THEN WARRANT THE SYSTEM LABOR, MATERIALS, AND EQUIPMENT FOR A MINIMUM OF ONE (1) YEAR AFTER COMPLETION AND ACCEPTANCE. PRIOR TO TURNING THE COMPLETED SYSTEM OVER TO THE OWNER, REVIEW THE INSTALLATION WITH THE ENGINEER AND REPLACE OR REPAIR ANY DEFECTIVE WORKMANSHIP, EQUIPMENT, AND MATERIALS AT NO ADDITIONAL COST TO THE OWNER.
6. COORDINATE ALL PLUMBING PIPING LOCATIONS, ROUGH-IN LOCATIONS, AND EQUIPMENT LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS AND INTERFERENCES. FINAL PIPING AND EQUIPMENT LOCATIONS SHALL BE A CODE COMPLIANT INSTALLATION FOR ALL TRADES.
7. PLUMBING PLANS SHALL NOT BE SCALED. REFERENCE THE ARCHITECTURAL PLANS FOR DIMENSIONS OF ALL LOCATIONS OF PLUMBING FIXTURES, FLOOR DRAINS, COLUMNS, WALLS, DOORS, ETC.
8. WHERE DISCREPANCIES ARE FOUND IN THE DRAWINGS AND SPECIFICATIONS, THE MORE STRINGENT SHALL APPLY. CONTACT ENGINEER FOR CLARIFICATION.
9. PROVIDE PRODUCTS REQUIRING ELECTRICAL CONNECTIONS LISTED AND CLASSIFIED BY UNDERWRITERS' LABORATORIES, INC. (UL), AS SUITABLE FOR THE PURPOSE SPECIFIED.
10. ALL PIPING SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA.
11. ALL VALVES, BACKFLOW PREVENTERS, BOOSTER PUMPS, ETC. SERVING THE DOMESTIC WATER SYSTEM SHALL MEET LEAD FREE STANDARDS PER ANSI/NSF 372 AND NSF 61, ANNEX G.
12. PROVIDE COMPLETE PLUMBING FIXTURES AND EQUIPMENT. INCLUDE SUPPLIES, STOPS, VALVES, FAUCETS, DRAINS, TRAPS, TAILPIECES, ESCUTCHEONS, ETC. AND INSTALL PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
13. CUT WALLS, FLOORS, AND CEILINGS AS REQUIRED FOR INSTALLATION OF PLUMBING WORK. ALL CUTTING SHALL BE HELD TO A MINIMUM. PATCH AND FINISH SURFACES TO MATCH ADJOINING SURFACES.
14. PIPE PENETRATIONS THROUGH WALLS, PARTITIONS, AND FLOORS SHALL BE SLEEVED. CORE DRILLING THROUGH WALLS AND PARTITIONS IS PERMITTED IF PERFORMED IN A NEAT CRAFTSMAN LIKE MANNER. OPENINGS THROUGH WALLS, PARTITIONS, AND FLOORS SHALL BE LARGE ENOUGH FOR PIPE INSULATION TO REMAIN CONTINUOUS THROUGH THE PENETRATION. PIPES PENETRATING THROUGH EXTERIOR WALLS SHALL BE SEALED WATER TIGHT. INSTALL ESCUTCHEONS IN ALL EXPOSED AREAS.
15. PIPING AND SPECIALTIES SHALL BE LOCATED CONCEALED IN WALLS, PARTITIONS, OR ABOVE CEILINGS UNLESS NOTED OTHERWISE. PIPING IN EXPOSED AREAS SHALL BE RUN TIGHT TO STRUCTURAL ELEMENTS.
16. PROVIDE ACCESS DOORS FOR ALL SPECIALTIES, VALVES, WATER HAMMER ARRESTERS, TRAP PRIMERS, ETC., CONCEALED BEHIND WALLS OR CEILINGS THAT REQUIRE MAINTENANCE ACCESS.
17. DO NOT INSTALL PIPING IN AREAS SUBJECT TO FREEZING TEMPERATURES. INSTALL PIPING SHOWN IN EXTERIOR WALLS ON THE CONDITIONED SIDE OF THE WALL INSULATION.
18. PIPING, VENTS, ETC. EXTENDING THROUGH EXTERIOR WALLS AND/OR THE ROOF SHALL BE FLASHED AND COUNTER-FLASHED IN A WATERPROOF MANNER. COORDINATE FLASHING WITH THE GENERAL CONTRACTOR.
19. PROVIDE A CHROME-PLATED FINISH FOR ALL EXPOSED PIPING FOR PLUMBING FIXTURES IN FINISHED AREAS.
20. PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.
21. ATTACH HANGERS TO STRUCTURE. SUPPORT PIPING IN ACCORDANCE WITH SECTION 308 OF THE NORTH CAROLINA PLUMBING CODE.
22. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE.
23. VALVES AND OTHER PIPING ACCESSORIES REQUIRING ACCESS SHALL BE INSTALLED IN ACCESSIBLE LOCATIONS NO MORE THAN EIGHTEEN (18) INCHES ABOVE THE CEILING. PROVIDE OFFSETS IN PIPING AS NEEDED TO MEET THIS REQUIREMENT.
24. FIRESTOP ALL PENETRATIONS OF FIRE-RATED WALLS, FLOORS, AND PARTITIONS. PROVIDE A DEVICE(S) OR SYSTEM(S) WHICH HAS BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E814 AND INSTALL IN ACCORDANCE WITH THE CONDITIONS OF THE LISTING. PROVIDE A DEVICE(S) OR SYSTEM(S) WITH AN F-RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED. REFER TO ARCHITECTURAL PLANS FOR WALL AND FLOOR TYPES.
25. PROVIDE PIPING LABELS FOR ALL PLUMBING PIPING. PIPING LABELS SHALL BE ACRYLIC FACED, WRAP-AROUND TYPE. EACH LABEL SHALL INDICATE THE PIPING CONTENTS, DIRECTION OF FLOW AND SHALL BEAR THE MANUFACTURER'S STANDARD COLOR AND NOMENCLATURE FOR THE SERVICE INDICATED.

SUBMITTALS:

1. PROVIDE SUBMITTALS BEARING THE CONTRACTOR'S REVIEW STAMP FOR ALL PLUMBING FIXTURES, PIPING, EQUIPMENT, AND ACCESSORIES IN ELECTRONIC FORMAT (PDF).
2. NO PRIVATELY LABELED MATERIALS WILL BE ACCEPTED AS EQUALS TO PRODUCTS SPECIFIED HEREIN.
3. THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH SUBSTITUTIONS TO SPECIFIED PLUMBING FIXTURES AND EQUIPMENT INCLUDING BUT NOT LIMITED TO: PROVIDING MAINTENANCE ACCESS CLEARANCE, PIPING, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC. AND ANY MODIFICATIONS TO ASSOCIATED MECHANICAL, ELECTRICAL, OR PLUMBING SYSTEMS REQUIRED BY THE EQUIPMENTS INSTALLATION INSTRUCTIONS. ALL COSTS ASSOCIATED WITH SUBSTITUTIONS SHALL BE INCLUDED IN THE ORIGINAL BASE BID.

COORDINATION DRAWINGS

THE MECHANICAL CONTRACTOR SHALL ORGANIZE COORDINATION MEETINGS TO DEVELOP A SET OF COORDINATION DRAWINGS WITH ALL CONTRACTORS (ELECTRICAL, MECHANICAL, PLUMBING, IT/DATA, AND GENERAL CONTRACTOR). THE MECHANICAL CONTRACTOR WILL HAVE THE LEAD RESPONSIBILITY FOR THE COORDINATION DRAWINGS. THE MECHANICAL CONTRACTOR SHALL PRODUCE THE ORIGINAL DRAWINGS AND FORWARD THE DRAWINGS TO EACH OF THE OTHER CONTRACTORS FOR THEM TO ADD THEIR SYSTEMS TO THIS SET OF COORDINATION DRAWINGS. THE CONTRACTORS WILL DEVELOP THE DRAWINGS IN THIS ORDER: MECHANICAL, PLUMBING, ELECTRICAL, IT/DATA, AND GENERAL. THIS SHALL ALSO BE THE ORDER OF PRECEDENCE FOR INSTALLATION OF SYSTEMS. ANY RELOCATION OF SYSTEM ROUTINGS WILL BE FOUND IN THE COORDINATION PHASE AND NOTICED BY EACH OF THE CONTRACTORS. THESE DRAWINGS, WHEN COMPLETED, SHALL BE SIGNED OFF BY ALL OF THE ABOVE LISTED PARTIES. DRAWINGS SHALL BE COMPLETED PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK AND PIPING SYSTEMS, OR PURCHASE OF EQUIPMENT. THE FOLLOWING ITEMS REPRESENT THE MINIMUM REQUIREMENTS AND COORDINATION DRAWINGS:

1. ALL COORDINATION DRAWINGS WILL BE PRODUCED AT 1/4" = 1'-0 SCALE.
2. DRAWINGS WILL BE ORIGINAL DRAWINGS AND NOT OVERLAYS OF THE CONTRACT/DESIGN DRAWINGS.
3. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
4. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPILED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.

THE USE OF BUILDING INFORMATION MODELING (BIM) THROUGHOUT THE CONSTRUCTION PROCESS IS A REQUIREMENT FOR THIS PROJECT TO HELP REDUCE OR ELIMINATE FIELD-DETECTED CONFLICTS, IMPROVE CONSTRUCTION QUALITY, AND MAINTAIN AN AGGRESSIVE SCHEDULE. THE CONTRACTOR WILL BE RESPONSIBLE FOR CREATING THE MODEL AND MANAGING THE COORDINATION AND COLLISION DETECTION PROCESS. THE MODEL MUST CONTAIN COMPLETE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS CONSISTENT WITH THE DESIGN AND FABRICATION DRAWINGS.

UNDERSLAB DRAINAGE VIDEO RECORDING

THE CONTRACTOR SHALL PERFORM TWO SEPARATE DIAGNOSTIC VIDEOS OF UNDERSLAB DRAINAGE LINES. THE FIRST VIDEO SHALL BE PERFORMED AFTER ALL FLOOR SLABS HAVE BEEN POURED. THE SECOND VIDEO SHALL BE RECORDED AFTER VISUAL VERIFICATION BY THE DESIGN ENGINEER THAT ALL DEFICIENCIES FROM THE FIRST DIAGNOSTIC VIDEO HAVE BEEN CORRECTED AND PRIOR TO THE REQUEST FOR SUBSTANTIAL COMPLETION OF THE PROJECT. THE CONTRACTOR SHALL SUBMIT EACH VIDEO RECORDING TO THE OWNER AND DESIGN ENGINEER IN A DIGITAL FILE FORMAT FOR FINAL REVIEW. THE DIAGNOSTIC VIDEO SHALL CONTAIN THE PIPE SEGMENT DESIGNATION MATCHING THE SUBMITTED REFERENCE PLAN AT THE BEGINNING OF THE RECORDING FOR EACH PIPE SEGMENT. THE DIAGNOSTIC VIDEOS APPLY TO ALL UNDERGOUND SANITARY WASTE PIPING 3" AND LARGER.

PRIOR TO EACH DIAGNOSTIC VIDEO THE CONTRACTOR SHALL:

- SUBMIT A DIAGNOSTIC VIDEO REFERENCE PLAN OF ALL UNDERGROUND DRAINAGE PIPING CONTAINING DESIGNATIONS FOR EACH PIPING SEGMENT (i.e. PIPE SEGMENT A-B, B-C, C-D, etc.) TO THE ENGINEER.
- PROVIDE AT LEAST TWO WEEKS NOTICE TO THE DESIGN ENGINEER AND THE OWNERS REPRESENTATIVE.
- CLEAN ALL DRAINAGE LINES TO BE FREE OF ALL DEBRIS.
- PROVIDE A LIGHT STREAM OF CLEAR WATER FLOWING THROUGH THE PIPE SEGMENT DURING THE VIDEO.

PLUMBING LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
	CW	COLD WATER PIPING
	HW	HOT WATER PIPING
	HWR	HOT WATER RETURN PIPING
	W	SANITARY WASTE PIPING
	V	SANITARY VENT PIPING
GW	GW	GREASE WASTE PIPING
GV	GV	GREASE VENT PIPING
D	D	INDIRECT DRAINAGE PIPING
		PIPING ELBOW DOWN
		TEE BOTTOM CONNECTION
		PIPING ELBOW UP
		PIPING CONTINUES
		SHUTOFF VALVE
		CHECK VALVE
		INLINE PUMP
	FCO	FLOOR CLEANOUT
	WCO	WALL CLEANOUT
	GCO	GRADE CLEANOUT
	FD	FLOOR DRAIN
	FS	FLOOR SINK
	HY	WALL HYDRANT
	WHA-#	WATER HAMMER ARRESTER - SUFFIX INDICATES PDI SIZE
		CONNECT TO EXISTING

ADDITIONAL ABBREVIATIONS

AAV	AIR ADMITTANCE VALVE	HP	HORSEPOWER
AFC	ABOVE FINISH CEILING	HZ	HERTZ
AFF	ABOVE FINISH FLOOR	"	INCH(ES)
AFG	ABOVE FINISH GRADE	IE	INVERT ELEVATION
BFP	BACKFLOW PREVENTER	KW	KILOWATT(S)
BFC	BELOW FINISH CEILING	MAX	MAXIMUM
BFF	BELOW FINISH FLOOR	MIN	MINIMUM
BFG	BELOW FINISH GRADE	PSI	POUNDS PER SQUARE INCH
CFH	CUBIC FEET PER HOUR	RPZ	REDUCED-PRESSURE ZONE
°	DEGREE(S)	T&P	TEMPERATURE AND PRESSURE
°F	DEGREES FAHRENHEIT	TYP	TYPICAL
DN	DOWN	VTR	VENT TERMINAL THROUGH ROOF
DFU	DRAINAGE FIXTURE UNIT	WSFU	WATER SUPPLY FIXTURE UNIT
'	FOOT (FEET)		
FT-HD	FEET OF HEAD	EC	ELECTRICAL CONTRACTOR
GAL	GALLONS	FC	FIRE ALARM CONTRACTOR
GPF	GALLONS PER FLUSH	GC	GENERAL CONTRACTOR
GPH	GALLONS PER HOUR	MC	MECHANICAL CONTRACTOR
GPM	GALLONS PER MINUTE	PC	PLUMBING CONTRACTOR
HD	HUB DRAIN	SC	SPRINKLER CONTRACTOR

2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY - PLUMBING SUMMARY

C401 METHOD OF COMPLIANCE

- ■ 2018 NCECC CHAPTER 4
- ☐ ASHRAE 90.1-2013 PRESCRIPTIVE
- ☐ ASHRAE 90.1-2013 PERFORMANCE
- ☐ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)
- ☐ COMCHECK PROVIDED (2018 NCECC)
- ☐ COMCHECK PROVIDED (90.1-2013)
- ☐ ENERGY MODELING DATA PROVIDED

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

- ☐ C406.2 EFFICIENT MECH EQUIPMENT
- ■ C406.3 REDUCED LTG DENSITY
- ☐ C406.4 ENHANCED LTG CONTROLS
- ☐ C406.5 ON-SITE RENEWABLE ENERGY
- ☐ C406.6 DEDICATED OA SYSTEM
- ☐ C406.7 SERVICE WATER HEATING

TABLE C404.2 - MINIMUM PERFORMANCE OF WATER HEATING EQUIPMENT[c]

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUB CATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED a,b	REQ'D SL	SPECIFIED EQPM
WATER HEATER ELECTRIC	> 12 kW	RESISTANCE	1.73V + 155, SL	293.4 BTU/H	282.7 BTU/H

a. ENERGY FACTOR (EF) AND THERMAL EFFICIENCY (E_t) ARE MINIMUM REQUIREMENTS. IN THE ENERGY FACTOR EQUATION V IS THE VOLUME IN GALLONS.
b. STANDBY LOSS (SL) IS THE MAXIMUM BTU/H BASED ON A NOMINAL 70° TEMPERATURE DIFFERENCE BETWEEN STORED WATER AND AMBIENT REQUIREMENTS. IN THE STANDBY LOSS EQUATION Q IS THE NAMEPLATE INPUT RATE IN BTU/H. IN THE EQUATIONS FOR ELECTRIC WATER HEATERS, V IS THE RATED VOLUME IN GALLONS AND V_m IS THE MEASURED VOLUME IN GALLONS. IN THE STANDBY LOSS EQUATION FOR GAS WATER HEATERS AND BOILERS, V IS THE RATED VOLUME IN GALLONS.
c. REFER TO WATER HEATER SCHEDULES FOR SPECIFIED WATER HEATING EQUIPMENT TYPES, CAPACITIES (STORAGE VOLUME) AND ENERGY INPUTS (ELECTRIC AND/OR GAS).

C405.8 ELECTRICAL MOTORS (MANDATORY REQUIREMENTS)

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

C408 - SYSTEM COMMISSIONING

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

PLUMBING SYSTEMS SUMMARY

PLUMBING SYSTEM	TOTAL FIXTURE UNITS	PEAK DEMAND FLOW
DOMESTIC WATER SUPPLY	161 WSFU	58 GPM
SANITARY SEWER	92 DFU	N/A

PLUMBING SHEET INDEX

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PLUMBING LEGEND, DESIGN DATA, AND SPECIFICATIONS

P1-001

Sheet No. 1 of 8

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PLUMBING SPECIALTIES SCHEDULE

SYMBOL	DESCRIPTION	CONNECTION SIZE W	V	CW	HW	SPECIFICATION	REMARKS
CS-x	BALANCING VALVE, THERMOSTATIC, AUTOMATIC, SUFFIX INDICATES PIPE SIZE, SEE FLOOR PLANS	-	-	-	**	EQUIPMENT: CIRCUIT SOLVER CS SERIES, SIZES 1/2" THRU 2", NSF 61 CERTIFIED.	PROVIDE 105°F MODEL
SA-x	SHOCK ARRESTOR, SUFFIX INDICATES PDI SIZE	-	-	x	-	EQUIPMENT: SIOUX CHIEF 650 SERIES, SIZES 1/2" THRU 2", NSF 61 CERTIFIED.	SEE SHOCK ARRESTOR TABLE THIS SHEET
HB1	HOSE BIBB, INTERIOR, EXPOSED, STAINLESS STEEL FACE PLATE, ANTI-SIPHON	-	-	3/4"	-	EQUIPMENT: WOODFORD 26P, PROVIDE VACUUM BREAKER AND METAL LOOSE KEY FOR EACH HOSE BIBB	MOUNT 18" AFF
HB2	HOSE BIBB, INTERIOR, RECESSED STAINLESS STEEL FACE PLATE, ANTI-SIPHON VACUUM BREAKER	-	-	3/4"	-	EQUIPMENT: WOODFORD B24	MOUNT 18" AFF
HB3	HOSE BIBB, EXTERIOR, EXPOSED, STAINLESS STEEL FACE PLATE, FREEZELESS, ANTI-SIPHON	-	-	3/4"	-	EQUIPMENT: ZURN Z1310-34EL, PROVIDE VACUUM BREAKER AND METAL LOOSE KEY FOR EACH HOSE BIBB	MOUNT 18" AFF
CO	PLUG CLEANOUT, CAST IRON BODY	**	-	-	-	CLEANOUT: ZURN Z-1440-BP, BRONZE PLUG	GAS / WATER TIGHT
WCO	WALL CLEANOUT, CAST IRON BODY, STAINLESS STEEL WALL PLATE	**	-	-	-	CLEANOUT: ZURN Z-1446-BP, BRONZE PLUG	GAS / WATER TIGHT
FCO	FLOOR CLEANOUT, CAST IRON BODY, NICKEL BRONZE TOP, ADJUSTABLE	**	-	-	-	CLEANOUT: ZURN ZN-1400-BP, BRONZE PLUG	GAS / WATER TIGHT, INSTALL TOP FLUSH WITH FINISHED FLOOR
YCO	YARD CLEANOUT, CAST IRON BODY, NICKEL BRONZE TOP, ADJUSTABLE, INSTALLED IN 18"x18"x6" CONCRETE PAD	**	-	-	-	CLEANOUT: ZURN ZN-1400-BP, BRONZE PLUG INSTALL IN 18"x 18"x 6" DEEP CONCRETE PAD	GAS / WATER TIGHT, INSTALL TOP FLUSH WITH FINISHED GRADE
FD1	FLOOR DRAIN, CAST IRON BODY, SQUARE NICKEL BRONZE GRATE, ADJUSTABLE, TRAP PRIMER	3"	2"	-	-	DRAIN: ZURN ZN415-SZ1-DP-P-Y	INSTALL TOP FLUSH WITH FINISHED FLOOR.
FD2	FLOOR DRAIN, CAST IRON BODY, ROUND NICKEL BRONZE GRATE, ADJUSTABLE, TRAP PRIMER	3"	2"	-	-	DRAIN: ZURN ZN415-P-Y	INSTALL TOP OF DRAIN LIP FLUSH WITH FLOOR.

NOTES:

** MATCH PIPE SIZE SHOWN ON PLANS, SEE PLANS.

APPROVED EQUALS:
THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MODEL WHICH MOST CLOSELY MATCHES THE SPECIFIED PRODUCT. PROVIDE PRODUCTS MADE BY THE MANUFACTURER'S LISTED.

PRODUCT TYPE:	ACCEPTED MANUFACTURERS:
SHOCK ARRESTOR	SIOUX CHIEF, PPP INC., ZURN, WATTS
HOSE BIBBS	ZURN, WOODFORD, ZURN, J.R. SMITH
DRAINS	ZURN, J.R. SMITH, WADE
BACKFLOW PREVENTER	WILKINS, WATTS, APOLLO

STORAGE ELECTRIC WATER HEATER SCHEDULE

MARK	DESCRIPTION	STORAGE (GAL)	GPH AT 70 °F RISE	ELECTRICAL DATA KW	V	PH	HZ	SPECIFICATION	NOTES
WH1	ELECTRIC, VERTICAL STORAGE	50	61	12	480	3	60	A.O. SMITH DSE-50A-12	1 - 4

NOTES:
1. APPROVED MANUFACTURERS: A.O. SMITH, BRADFORD WHITE, RHEEM, STATE INDUSTRIES.
2. WATER HEATER SHALL MEET OR EXCEED THE REQUIREMENTS OF ASHRAE 90.1 AND THE NORTH CAROLINA ENERGY EFFICIENCY CODE.
3. SET WATER HEATER OUTLET TEMPERATURE TO 120 °F.
4. PROVIDE UNIT WITH OPTIONAL FIVE (5) YEAR MANUFACTURER'S WARRANTY.

PUMP SCHEDULE

MARK	DESCRIPTION	CAPACITY GPM	FT-HD	ELECTRICAL DATA HP	V	PH	HZ	SPECIFICATION	NOTES
CP1	INLINE CIRCULATION PUMP SERVING WH1	2.0	5.0	1/8	120	1	60	BELL AND GOSSETT NBF-85/LW	1 - 4

NOTES:
1. APPROVED MANUFACTURERS: BELL & GOSSETT, GRUNDFOS, GOULDS, TACO.
2. PUMP SHALL BE BRONZE OR STAINLESS STEEL CONSTRUCTION.
3. MOUNT SECURELY FROM STRUCTURE SUCH THAT THE PIPING BEARS NO WEIGHT OF THE PUMP.
4. PROVIDE WITH AQUASTAT CONTROL WITH CONNECTION TO BUILDING AUTOMATION SYSTEM FOR TIME CLOCK OVERRIDE(S). CONTROL WIRING TO BUILDING AUTOMATION SYSTEM PROVIDED BY MECHANICAL CONTRACTOR.

THERMAL EXPANSION TANK SCHEDULE

MARK	DESCRIPTION	TOTAL VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	WEIGHT (LB)	SPECIFICATION	NOTES
ET1	DIAPHRAGM, THERMAL EXPANSION	3.5	2.3	22.0	WESSELS TTA-5	1 - 3

NOTES:
1. APPROVED MANUFACTURERS: AMTROL, BELL & GOSSETT, WATTS, WESSELS.
2. PROVIDE WITH PRESSURE GAUGE, AIR-CHARGE FITTING, AND TANK DRAIN; PRECHARGE TO 40.0 PSI.
3. MOUNT SECURELY AND INDEPENDENTLY FROM THE STRUCTURE SUCH THAT THE CONNECTED PIPING BEARS NO WEIGHT OF THE TANK.

PLUMBING FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	CONNECTION SIZE W	V	CW	HW	SPECIFICATION	REMARKS
P1	FIXTURE: TOILET: ELONGATED, WHITE VITREOUS CHINA, CARRIER MOUNTED, TOP SPUD, 1.6 GPF. FLUSH VALVE: SELF-GENERATING, SENSOR OPERATED, PUSH-BUTTON OVERRIDE, 1.6 GPF.	4"	2"	1"	-	FIXTURE: TOTO CT708UG#01 FLUSH VALVE: TOTO "ECOPOWER" TET1GA32#CP SEAT: TOTO SC534#01	NOTE 1
P1A	FIXTURE: TOILET: ELONGATED, WHITE VITREOUS CHINA, CARRIER MOUNTED, TOP SPUD, 1.6 GPF. FLUSH VALVE: SELF-GENERATING, SENSOR OPERATED, PUSH-BUTTON OVERRIDE, 1.6 GPF.	4"	2"	1"	-	FIXTURE: TOTO CT708UG#01 FLUSH VALVE: TOTO "ECOPOWER" TET1GA32#CP SEAT: TOTO SC534#01	NOTE 1
P2	FIXTURE: URINAL. WHITE VITREOUS CHINA, CARRIER MOUNTED, 0.125 GPF FLUSH VALVE: SELF-GENERATING, SENSOR OPERATED, PUSH-BUTTON OVERRIDE, 0.125 GPF.	2"	2"	3/4"	-	FIXTURE: TOTO UT445U#01 FLUSH VALVE: TOTO "ECOPOWER" TEU1UA12#CP	NOTE 2
P2A	FIXTURE: URINAL. WHITE VITREOUS CHINA, CARRIER MOUNTED, 0.125 GPF FLUSH VALVE: SELF-GENERATING, SENSOR OPERATED, PUSH-BUTTON OVERRIDE, 0.125 GPF.	2"	2"	3/4"	-	FIXTURE: TOTO UT445U#01 FLUSH VALVE: TOTO "ECOPOWER" TEU1UA12#CP	NOTE 2
P3	FIXTURE: LAVATORY, ADA. 20"x18", VITREOUS CHINA, CARRIER MOUNTED, 4" CENTERS. FAUCET: BATTERY POWERED, SENSOR OPERATED, POLISHED CHROME, LAMINAR SPRAY, MIXING VALVE, 0.50 GPM.	2"	1-1/2"	1/2"	1/2"	FIXTURE: TOTO LT307(A) FAUCET: ZURN Z6950-XL-S-MV-N-HW6	NOTES 3, 5
P4A	FIXTURE: WATER COOLER & BOTTLE FILLER, ADA. STAINLESS STEEL FINISH, SINGLE BOWL, VANDAL RESISTANT, CARRIER MOUNTED, INTEGRAL WATER FILTER, SENSOR OPERATED BOTTLE FILLER WITH AUTO SHUT-OFF.	2"	1-1/2"	1/2"	-	FIXTURE: ELKAY LZS8WSLK P-TRAP: ZURN Z-870 (1-1/4"x1-1/2", 17 GA.) SUPPLY/STOP: ZURN 8806-XL-LR-LK	NOTE 4, 6
P4B	FIXTURE: WATER COOLER. STAINLESS STEEL FINISH, SINGLE BOWL, VANDAL RESISTANT, CARRIER MOUNTED, INTEGRAL WATER FILTER.	2"	1-1/2"	1/2"	-	FIXTURE: ELKAY LZS8L P-TRAP: ZURN Z-870 (1-1/4"x1-1/2", 17 GA.) SUPPLY/STOP: ZURN 8806-XL-LR-LK	NOTE 4, 6
P5	FIXTURE: CASEWORK SINK, ADA. , 20"x18", SINGLE BOWL, 18 GAUGE STAINLESS STEEL, COUNTER MOUNTED, SELF RIMMING. FAUCET: 6" GOOSENECK FAUCET, WRIST BLADE HANDLES, VANDAL RESISTANT AERATOR, 1.5 GPM.	2"	1-1/2"	1/2"	1/2"	FIXTURE: ELKAY LRAD191955-3 FAUCET: AMERICAN STANDARD 6530.170 "MONTERREY" BASKET STRAINER: ZURN Z-8740 P-TRAP: ZURN 8703 (1-1/2"x2", 17 GA.) SUPPLY/STOP: ZURN 8806-XL-LR-LK	NOTES 5
P6	FIXTURE: MOP SINK. 24"x 24"x 12" TERRAZZO BASIN, 6" DROP FRONT WITH STAINLESS STEEL THRESHOLD CAP, 36" HIGH STAINLESS STEEL WALL GUARDS, HOSE, MOP HANGER BRACKET. FAUCET: POLISHED CHROME, 8" CENTERS, VACUUM BREAKER.	3"	2"	1/2"	1/2"	FIXTURE: FIAT TSB100-830AA-832AA-MSG2424 FAUCET: T&S BRASS B-0665-BSTR	

NOTES:
1. SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. PROVIDE A FLOOR MOUNTED PLATE STYLE CARRIER EQUAL TO ZURN Z1201 SERIES. WHEN CARRIER IS LOCATED BEHIND A BLOCK WALL, PROVIDE EXTENDED STUD LENGTHS TO COMPENSATE FOR THE BLOCK WALL THICKNESS.
2. SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. PROVIDE A FLOOR MOUNTED PLATE STYLE CARRIER EQUAL TO ZURN Z1222 SERIES. WHEN CARRIER IS LOCATED BEHIND A BLOCK WALL, PROVIDE EXTENDED STUD LENGTHS TO COMPENSATE FOR THE BLOCK WALL THICKNESS.
3. SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. PROVIDE A FLOOR MOUNTED, ADJUSTABLE CONCEALED ARM CARRIER EQUAL TO ZURN Z1231 SERIES. WHEN CARRIER IS LOCATED BEHIND BLOCK WALL, PROVIDE EXTENDED CONCEALED ARM SLEEVES TO COMPENSATE FOR THE BLOCK WALL THICKNESS.
4. SEE ARCHITECTURAL PLANS FOR MOUNTING HEIGHT. PROVIDE A FLOOR MOUNTED, ADJUSTABLE CONCEALED ARM CARRIER EQUAL TO ZURN Z1225 SERIES. WHEN CARRIER IS LOCATED BEHIND BLOCK WALL, PROVIDE EXTENDED CONCEALED ARM SLEEVES TO COMPENSATE FOR THE BLOCK WALL THICKNESS.
5. PROVIDE PRE-MANUFACTURED ADA COMPLIANT INSULATION KIT FOR EXPOSED P-TRAP AND SUPPLY TRIM UNDER SINK.
6. PROVIDE CANE APRON ON WATER COOLERS MOUNTED ON EXPOSED WALLS.

APPROVED EQUALS:
THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MODEL WHICH MOST CLOSELY MATCHES THE SPECIFIED PRODUCT. PROVIDE PRODUCTS MADE BY THE MANUFACTURER'S LISTED.

PRODUCT TYPE:	ACCEPTED MANUFACTURERS:
VITREOUS CHINA	KOHLER, AMERICAN STANDARD, SLOAN
FLUSH VALVES	SLOAN, ZURN, DELANEY
ENAMELED CAST IRON	KOHLER, AMERICAN STANDARD, ZURN
CARRIERS	ZURN, J.R. SMITH, WADE
STAINLESS STEEL SINKS	ELKAY, JUST, ADVANCE TABCO
FAUCETS	AMERICAN STANDARD, ZURN, CHICAGO
WATER COOLERS	ELKAY, HALSEY TAYLOR, HAWS
SUPPLIES, STOPS	ZURN, MCGUIRE, BRASSCRAFT
HOSE BIBBS	ZURN, J.R. SMITH, WOODFORD
UTILITY SINKS	FIAT, FLORESTONE, STERN WILLIAMS

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PLUMBING SCHEDULES

P1-002

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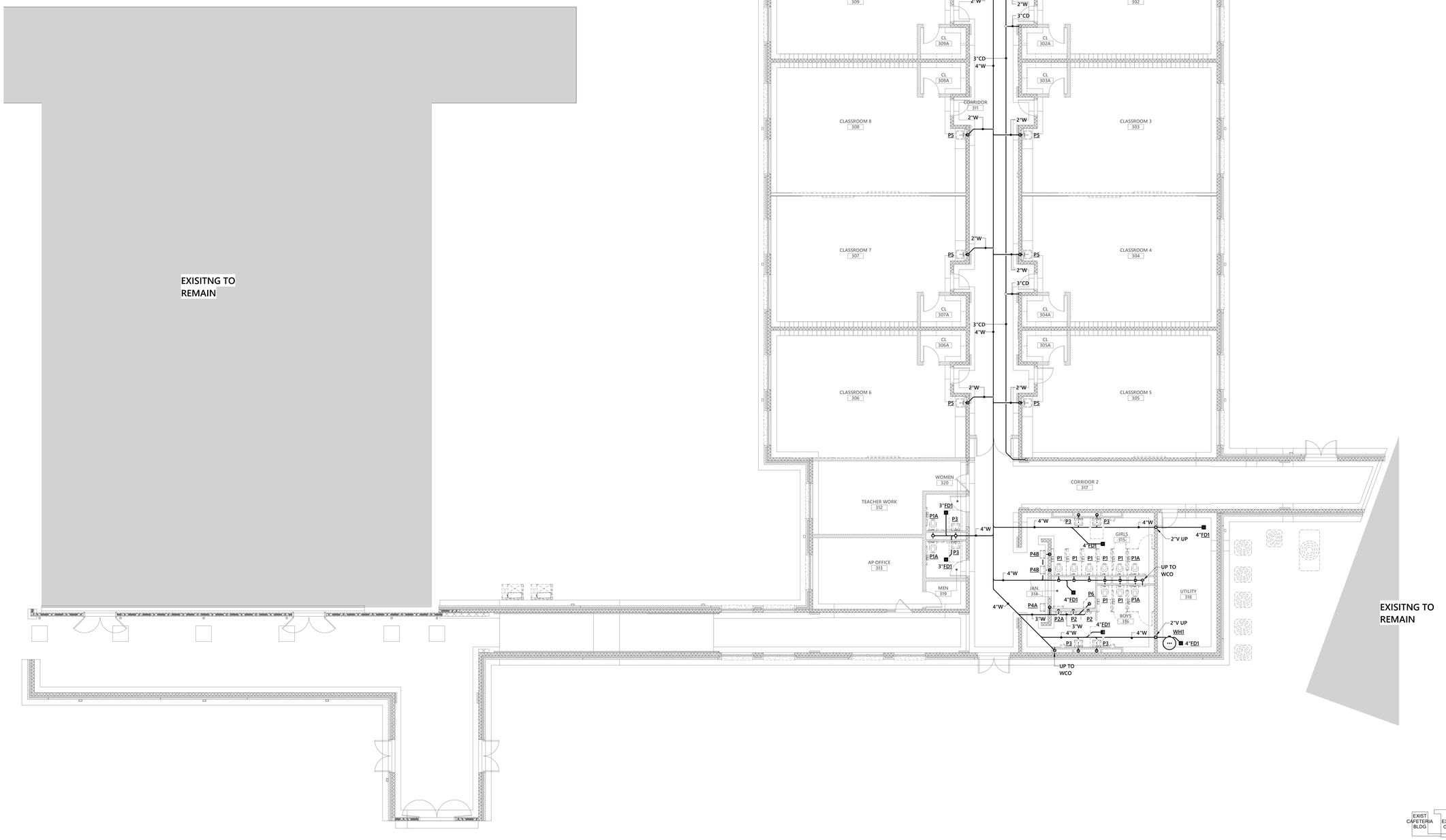
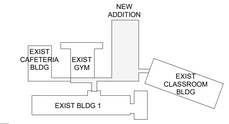


KEYED NOTES

1 SANITARY WASTE INVERT ELEVATION = 41.6" BFF
2 CONDENSATE WASTE INVERT ELEVATION = 41.6"

1 **FIRST FLOOR UNDERSLAB WASTE PLAN - PHASE 2**
1/8" = 1'-0"



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PLUMBING UNDERSLAB WASTE

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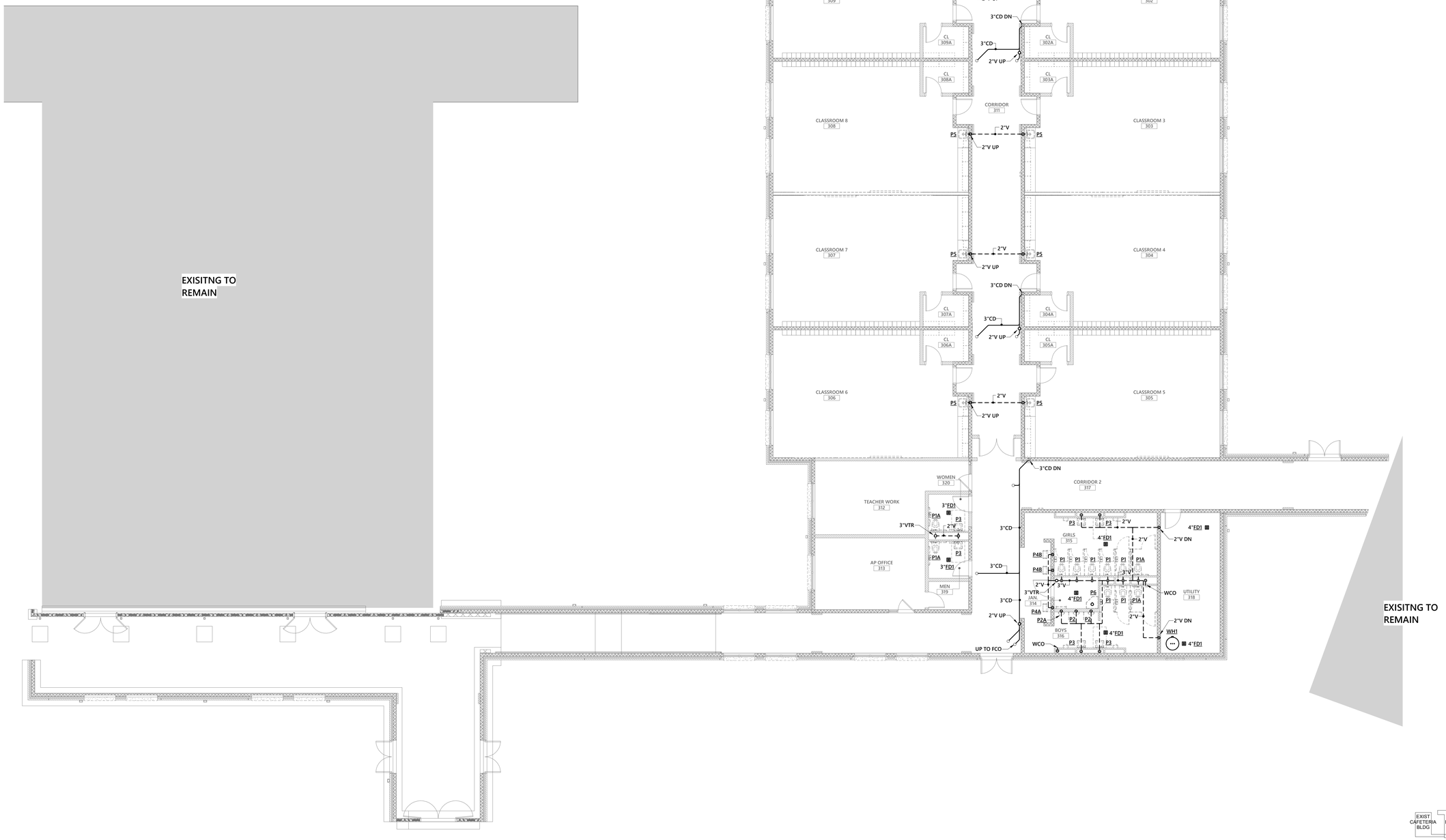
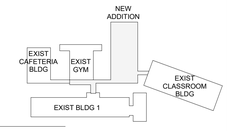


1 FIRST FLOOR WASTE & VENT PLAN - PHASE 2
1/8" = 1'-0"



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PLUMBING ABOVE GROUND WASTE & VENT

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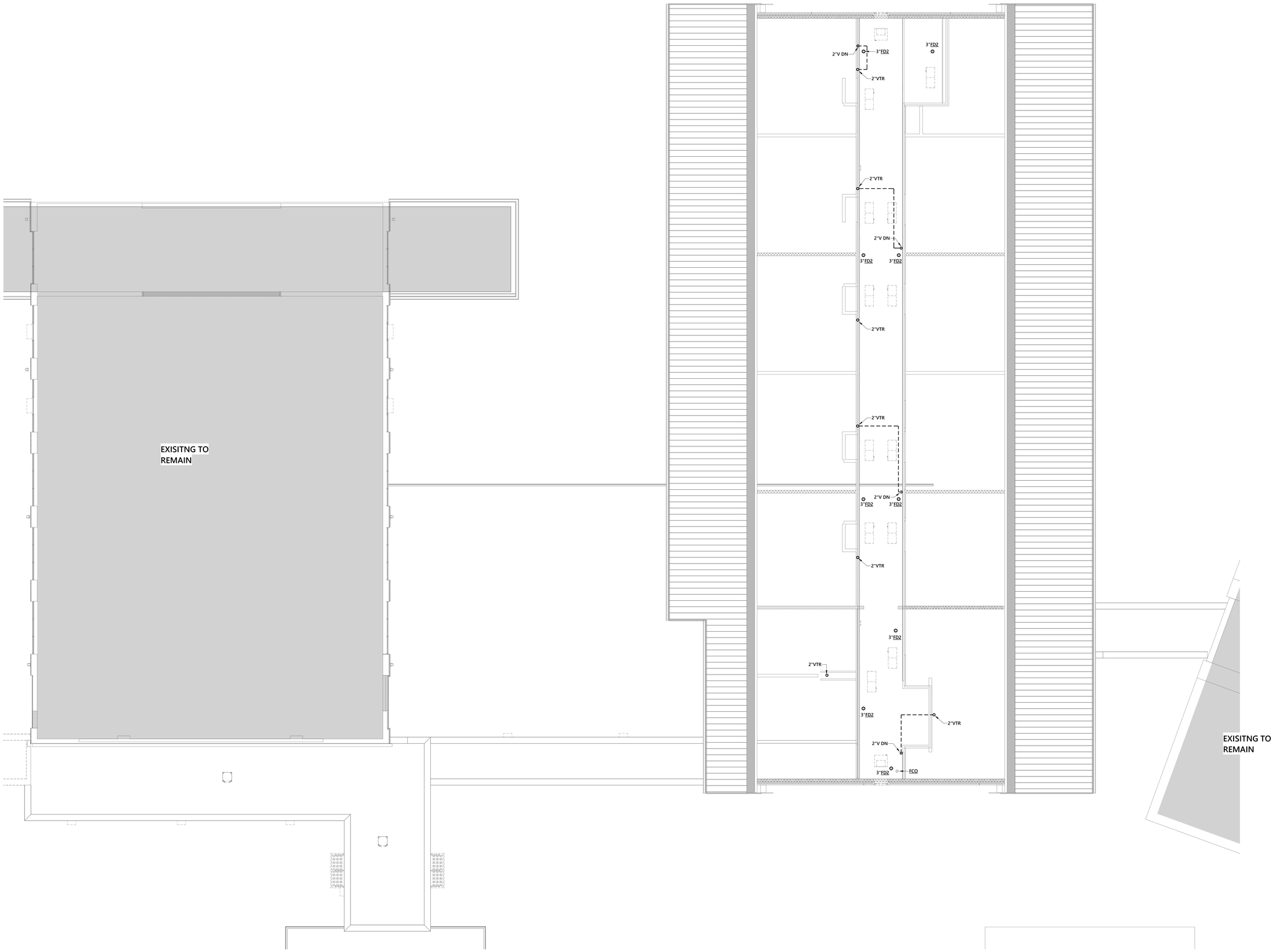

1 MEZZANINE WASTE & VENT - PHASE 2
1/8" = 1'-0"

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MEZZANINE WASTE & VENT

P1-103
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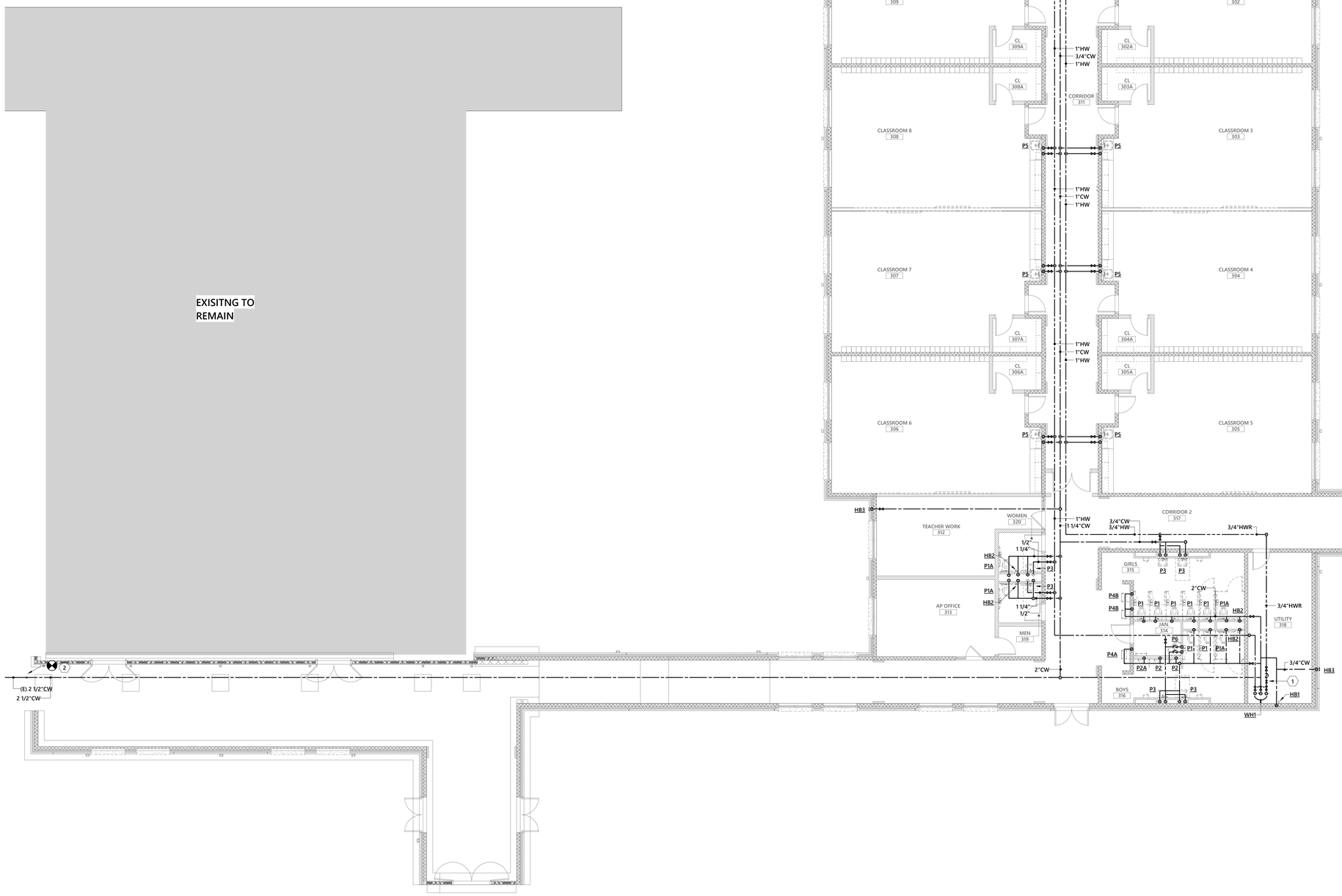
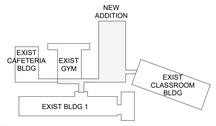
KEYED NOTES

1 PROVIDE HOT WATER RECIRCULATION ASSEMBLY AND SET TO 2.0 GPM.
2 CONNECT NEW 2-1/2"CW TO EXISTING 2-1/2"CW IN CORRIDOR CEILING SPACE.



1 FIRST FLOOR WATER SUPPLY PLAN - PHASE 2
1/8" = 1'-0"



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PLUMBING WATER SUPPLY

P1-201

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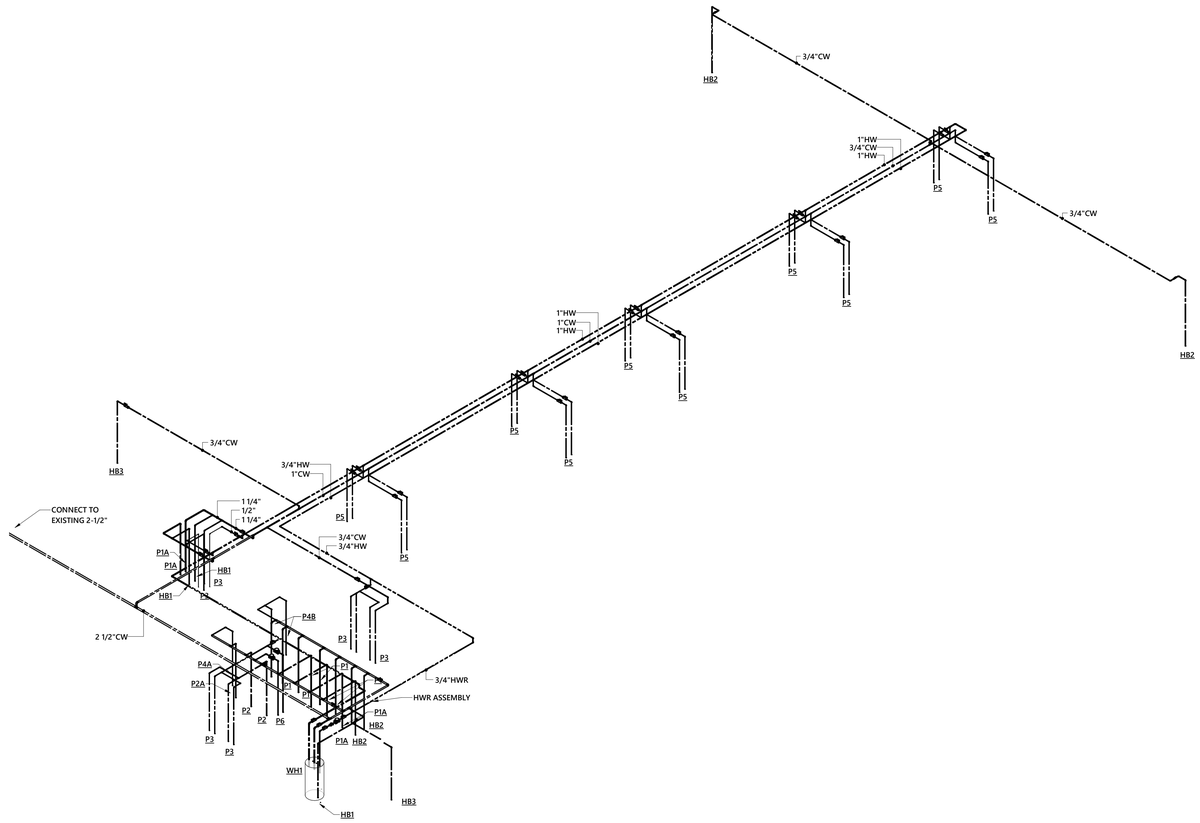
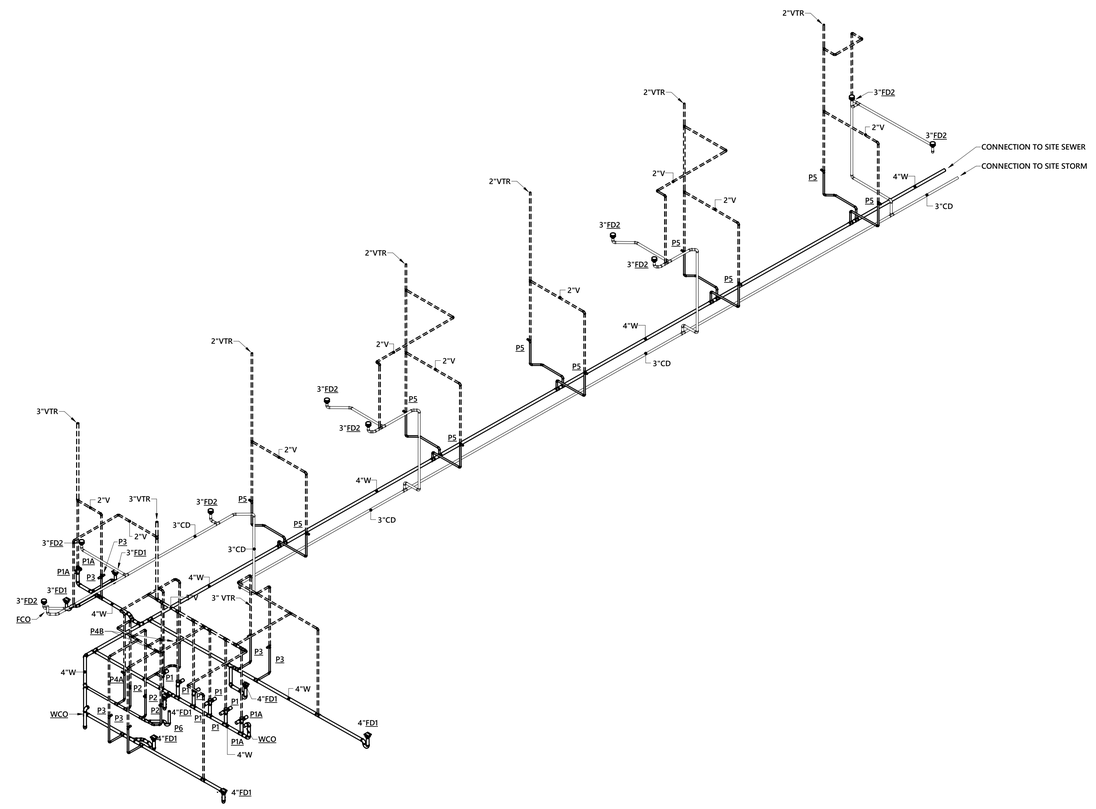


1 PLUMBING RISER DIAGRAM - WATER SUPPLY
NOT TO SCALE



2 PLUMBING RISER DIAGRAM - WASTE AND VENT
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PLUMBING RISER DIAGRAMS

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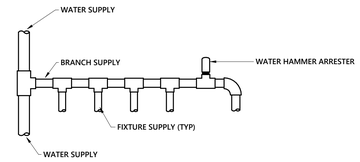
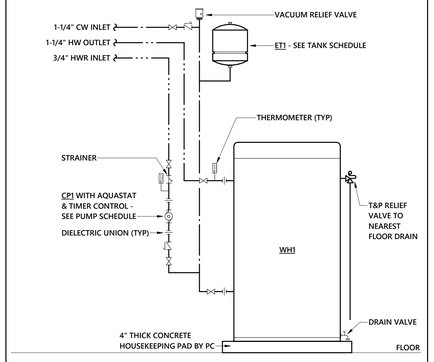


MARK	CONNECTED WSFU	PDI WH201 DESIGNATION	ARRESTER SIZE
WHA-A	1 - 11	A	1/2"
WHA-B	12 - 32	B	3/4"
WHA-C	33 - 60	C	1"
WHA-D	61 - 113	D	1 1/4"
WHA-E	114 - 154	E	1 1/2"
WHA-F	155 - 330	F	2"

NOTES:
1. INSTALL WATER HAMMER ARRESTERS IN ACCORDANCE WITH PDI WH201 GUIDELINES.

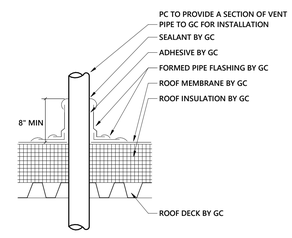
3 WATER HAMMER ARRESTERS

SCALE: NOT TO SCALE



1 ELECTRIC WATER HEATER WH1

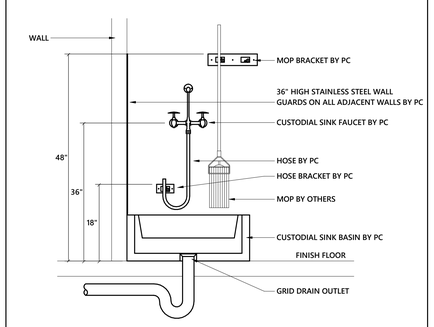
SCALE: NOT TO SCALE



REFER TO PLUMBING PLANS FOR THE SIZES, QUANTITIES, AND LOCATIONS OF VENT TERMINALS THROUGH ROOF

4 VENT TERMINAL THROUGH ROOF

SCALE: NOT TO SCALE



2 CUSTODIAL SINK ACCESSORIES

SCALE: NOT TO SCALE

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MECHANICAL GENERAL NOTES

SEE SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS. THESE GENERAL NOTES ARE INTENDED TO SUPPLEMENT THE SPECIFICATIONS. INTHE 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. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. ALL SUPPLY, RETURN AND OUTSIDE AIR DUCTWORK SHALL BE WRAPPED WITH 2" THICK DUCT WRAP WITH VAPOR BARRIER. INSULATION (INCLUDING FLEXIBLE DUCT INSULATION) SHALL HAVE A MINIMUM INSTALLED R-VALUE OF 6.0. ROOFTOP UNIT RETURN DUCTWORK AND TRANSFER DUCTS SHALL BE LINED WITH 1" THICK FIBERGLASS DUCT LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE.
4. ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE NORTH CAROLINA INTERNATIONAL MECHANICAL CODE. SEAL LOW PRESSURE SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK FOR POSITIVE/NEGATIVE 2" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4.
5. ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.
6. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.
7. THE MECHANICAL 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. TESTING AND BALANCING CONTRACTOR TO CONFIRM FILTERS ARE CLEAN, AND FREE OF DEBRIS PRIOR TO BEGINNING WORK. THE MECHANICAL CONTRACTOR SHALL REPLACE ANY DIRTY FILTERS, AS NEEDED. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.
8. 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. IN ADDITION, THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE TO HIRE A REGISTERED DESIGN PROFESSIONAL TO COMMISSION THE INSTALLED SYSTEM AND PROVIDE THE OWNER AND CODE REVIEWER A SEALED STATEMENT OF COMMISSIONING (PER 20128 NCECC APPENDIX C1).
9. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
10. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.
11. CONDENSATE DRAIN PIPING SHALL BE SCHEDULE 40 PVC PIPE AND FITTINGS. DRAINS FROM AIR HANDLING UNITS SHALL BE TRAPPED. CONDENSATE DRAINS SHALL BE INSULATED WITH 1" THICK ARMAFLEX INSULATION. MINIMUM DRAIN SIZE SHALL BE ¾". TERMINATE ROOFTOP UNIT DRAINS ON A CONCRETE SPLASHBLOCK.
12. ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.
13. INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. 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.
14. CONTRACTOR SHALL VERIFY LOCATION OF ALL ROOF PENETRATIONS WITH ARCHITECT & OWNER PRIOR TO INSTALLATION. NEW ROOF PENETRATIONS MADE THROUGH EXISTING ROOF SYSTEMS SHALL BE VERIFIED WITH THE OWNER'S EXISTING ROOF WARRANTY PRIOR TO INSTALLATION.
15. CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.
16. ALL ISOLATION VALVES, TERMINAL UNITS, CONTROLS, ETC. REQUIRING ACCESS AND SERVICE SHALL BE INSTALLED WITHIN 18" OF THE CEILING FOR SERVICE ACCESSIBILITY. LOCATIONS SHALL BE INDICATED ON THE CEILING GRID PER THE SPECIFICATIONS.
17. DUCTWORK AND PIPING PASSING THROUGH/ABOVE ELECTRICAL ROOMS SHALL BE CLOSELY COORDINATED WITH THE ELECTRICAL CONTRACTOR. DUCTWORK OR PIPING SHALL NOT BE LOCATED ABOVE ELECTRICAL PANELS.
18. EQUIPMENT OPERATED DURING CONSTRUCTION SHALL USE FILTERED MEDIA TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING COILS, DUCTWORK SYSTEMS, AIR TERMINALS ETC. AT COMPLETION OF CONSTRUCTION, MECHANICAL CONTRACTOR SHALL CLEAN ALL SYSTEMS WITH ALL CONTROL DEVICES WIDE OPEN AND REMOVE ANY REMAINING DEBRIS PRIOR TO TEST AND BALANCING. MECHANICAL CONTRACTOR SHALL REPLACE ALL FILTRATION WITH NEW FILTERS AT COMPLETION OF CONSTRUCTION. ANY DUCTWORK, AIR TERMINALS, AND/OR OTHER EQUIPMENT UPSTREAM OF FILTRATION SHALL BE CLEANED THOROUGHLY OF CONSTRUCTION DEBRIS BEFORE HANDING OVER TO OWNER.
19. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING RESTRAINTS TO RESIST THE EARTHQUAKE EFFECTS ON THE MECHANICAL SYSTEMS. THE REQUIREMENTS FOR THOSE RESTRAINTS ARE FOUND IN THE LOCAL BUILDING CODE AND ASCE 7. THE ANCHORAGE OF THE MECHANICAL SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE LOCAL BUILDING CODE AND ASCE 7.
20. ALL MECHANICAL EQUIPMENT SHALL BE U.L. LISTED AND LABELED AS A COMPLETE PACKAGE, NOT THOUGH 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.

VENTILATION CALCULATIONS (NCMC 2018, SECT 403): DOAS-1

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
CLASSROOM (AGES 5-8)	7.5	0	25	-	5124	129	968	0	0
CORRIDOR	-	0.06	-	-	1198	0	0	72	0
				TOTAL OA REQUIRED (PEOPLE + AREA, CFM)/0.8			1300		
				TOTAL OUTSIDE AIR PROVIDED (CFM)			1400		
						TOTAL EXHAUST AIR REQUIRED (CFM)			-
						TOTAL EXHAUST AIR PROVIDED (CFM)			-

VENTILATION CALCULATIONS (NCMC 2018, SECT 403): DOAS-2

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
CLASSROOM (AGES 5-8)	7.5	0	25	-	3374	85	638	0	0
CORRIDOR	-	0.06	-	-	1747	0	0	105	0
OFFICE	5	0.06	5	-	682	4	20	41	0
TOILET	-	-	-	70 CFM/FIXTURE	14 FIXTURES	0	0	0	980
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			1005		
				TOTAL OUTSIDE AIR PROVIDED (CFM)			1100		
						TOTAL EXHAUST AIR REQUIRED (CFM)			980
						TOTAL EXHAUST AIR PROVIDED (CFM)			1050

EQUIPMENT ABBREVIATIONS

AC	AIR CONDITIONING UNIT	EWH	ELECTRIC WATER HEATER
ACC	AIR COOLED CONDENSER	FCU	FAN COIL UNIT
ACCU	AIR COOLING CONDENSING UNIT	FP	FIRE PUMP
AHU	AIR HANDLING UNIT	GI	GREASE INTERCEPTOR
AS	AIR SEPARATOR	GRV	GRAVITY ROOF VENTILATOR
B	BOILER	HWP	HEATING WATER PUMP
CH	CHILLER	HX	HEAT EXCHANGER
CT	COOLING TOWER	HRU	HEAT RECOVERY UNIT
CUH	CABINET UNIT HEATER	PRV	POWER ROOF VENTILATOR
CWP	CONDENSER WATER PUMP	RE	RETURN/EXHAUST FAN
CHWP	CHILLED WATER PUMP	RTU	ROOFTOP UNIT
DBP	DOMESTIC WATER BOOSTER PUMP	SEP	SEWAGE EJECTOR PUMP
DC	DUCT MOUNTED COIL	SF	SUPPLY FAN
DCP	DOMESTIC WATER CIRCULATING PUMP	SP	SUMP PUMP
EF	EXHAUST FAN	UH	UNIT HEATER
EDC	ELECTRIC DUCT COIL	WH	WATER HEATER
ET	EXPANSION TANK		

ABBREVIATIONS

Ø	ROUND	LVR	LOUVER
ABV	ABOVE	LWT	LEAVING WATER TEMPERATURE
AC	AIR CONDITIONING	M/A	MIXED AIR
AD	AREA DRAIN	MAX	MAXIMUM
ADD	ADDENDUM	MBH	ONE THOUSAND BTU PER HOUR
AFF	ABOVE FINISHED FLOOR	MCF	ONE THOUSAND CUBIC FEET
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	MD	MOTORIZED DAMPER
ALT	ALTERNATE	MECH	MECHANICAL
AP	ACCESS PANEL	MFR	MANUFACTURER
ARCH	ARCHITECT/ARCHITECTURAL	MIN	MINIMUM
BFF	BELOW FINISHED FLOOR	MISC	MISCELLANEOUS
BLW	BELOW	MTR	MOTOR
BTU	BRITISH THERMAL UNITS	MU/A	MAKE-UP/AIR
BTUH	BRITISH THERMAL UNITS PER HOUR	NC	NOISE CRITERIA
CAP	CAPACITY	NC	NORMALLY CLOSED
CB	CATCH BASIN	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NO	NUMBER
CLG	CEILING	NO	NORMALLY OPEN
CO	CLEAN OUT	NTS	NOT TO SCALE
CW	COLD WATER	O	OXYGEN
D	DEGREE	O/A	OUTSIDE AIR
DB	DRY BULB	ORD	OVERFLOW ROOF DRAIN
DIA	DIAMETER	PD	PRESSURE DROP
DN	DOWN	PIV	POST INDICATOR VALVE
DW	DISTILLED WATER	PLBG	PLUMBING
EA	EACH	PRESS	PRESSURE
EAT	ENTERING AIR TEMPERATURE	PRV	PRESSURE REDUCING VALVE
ELEC	ELECTRICAL	PSI	POUNDS PER SQUARE INCH
EQUIP	EQUIPMENT	PSIG	POUNDS PER SQUARE INCH GAUGE
EWC	ELECTRIC WATER COOLER	PWR	POWER
EWT	ENTERING WATER TEMPERATURE	R	DUCT RISER
E/A	EXHAUST AIR	R/A	RETURN AIR
EXIST	EXISTING	RCP	RADIANT CEILING PANEL
F	DEGREES FAHRENHEIT	RD	ROOF DRAIN
FCO	FLOOR CLEAN OUT	REC	RECESSED
FD	FLOOR DRAIN	RED	REDUCER
FD	FIRE DAMPER	RH	RELATIVE HUMIDITY
FDV	FIRE DEPARTMENT VALVE	RL/A	RELIEF AIR
FL	FLOOR	RM	ROOM
FO	FUEL OIL	RPM	REVOLUTIONS PER MINUTE
FOV	FUEL OIL VENT	RW	RAIN WATER
FOR	FUEL OIL RETURN	SF	SQUARE FOOT
FOS	FUEL OIL SUPPLY	S/A	SUPPLY AIR
FPM	FEET PER MINUTE	SAN	SANITARY
FS	FLOOR SINK	SF	SQUARE FOOT
FT	FOOT/FEET	SD	SMOKE DAMPER
FTR	FIN TUBE RADIATION	SM	SURFACE MOUNT
GAL	GALLON	SP	STANDPIPE
GC	GENERAL CONTRACTOR	SP	STATIC PRESSURE
GPM	GALLONS PER MINUTE	STM	STEAM
GW	GREASE WASTE	T	THERMOSTAT
HB	HOSE BIB	TD	TEMPERATURE DROP
HP	HORSE POWER	TDR	TRENCH DRAIN
HTG	HEATING	TEMP	TEMPERATURE
HTR	HEATER	TYP	TYPICAL
HW	HOT WATER	UG	UNDERGROUND
HYD	HYDRANT	VAC	VACUUM
ID	INDIRECT	V	VENT
IN	INCH	VAV	VARIABLE AIR VOLUME
INV	INVERT	VENT	VENTILATION
LB	POUND	VTR	VENT THROUGH ROOF
LB/HR	POUNDS PER HOUR	W	WASTE
LAT	LEAVING AIR TEMPERATURE	WB	WET BULB
LP	LOW PRESSURE	WCO	WALL CLEAN OUT
LPG	LIQUEFIED PETROLEUM GAS	WH	WALL HYDRANT

MECHANICAL DUCT SYMBOLS

SYMBOL	DESCRIPTION
16x8	SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
16/8	OVAL DUCT SIZE TAG (WIDTH / HEIGHT)
16"Ø	ROUND DUCT SIZE TAG (DIAMETER)
(E)	EXISTING DUCT TAG
	DUCT BEING DEMOLISHED
S/A	SUPPLY AIR
O/A	OUTDOOR AIR
R/A	RETURN AIR
E/A	EXHAUST AIR
L/A	RELIEF AIR
	SUPPLY AIR DIFFUSER (4-WAY)
	RETURN AIR GRILLE
	RETURN AIR GRILLE WITH SOUND BOOT
	EXHAUST AIR GRILLE
	POINT OF EXISTING TO NEW CONNECTION
	POINT OF DISCONNECT TO EXISTING CONNECTION
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
X / X	SECTION CUT REFERRING DETAIL NUMBER REFERRING SHEET NUMBER

MECHANICAL ACCESSORIES SYMBOL LEGEND

SYMBOL	DESCRIPTION
DD	ROUND DUCT MOUNTED SMOKE DETECTOR. FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR. CUTTING OF DUCT, INSTALLATION OF DETECTOR. AND DETERMINATION OF SAMPLING TUBE LENGTH SHALL BE THE MECHANICAL CONTRACTOR. PROVIDE REMOTE INDICATING LIGHT WITH EACH DETECTOR.
DD	RECTANGULAR DUCT MOUNTED DUCT DETECTOR. FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR. CUTTING OF DUCT, INSTALLATION OF DETECTOR. AND DETERMINATION OF SAMPLING TUBE LENGTH SHALL BE THE MECHANICAL CONTRACTOR. PROVIDE REMOTE INDICATING LIGHT WITH EACH DETECTOR.
M	RECTANGULAR DUCT MOUNTED MOTOR OPERATED DAMPER, INTERLOCK WITH FAN AS INDICATED. (DAMPER BY M.C.)
U	UNDERCUT DOOR (BY G.C.)

MECHANICAL PIPING SYSTEMS LEGEND

SYMBOL	DESCRIPTION
—D—	CONDENSATE DRAINAGE
—R—	REFRIGERANT

COMMISSIONING NOTE - 2018 NCECC C408

THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR SYSTEM COMMISSIONING PER 2018 NCECC SECTION 408. MC SHALL HIRE A REGISTERED DESIGN PROFESSIONAL (ENGINEERED SEALED IN NC OR CERTIFIED COMMISSIONING PROFESSIONAL) TO PERFORM THE COMMISSIONING DUTIES DESCRIBED IN SECTION C408, AND PROVIDE OWNER AND CODE OFFICIAL WITH A SEALED STATEMENT OF COMPLETION (APPENDIX C1). THE CONTRACTOR SHALL COORDINATE WITH COMMISSIONING AGENT AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT.

2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY - MECHANICAL SUMMARY

C401 METHOD OF COMPLIANCE

- ■ 2018 NCECC CHAPTER 4
- ☐ ASHRAE 90.1-2013 PRESCRIPTIVE
- ☐ ASHRAE 90.1-2013 PERFORMANCE
- ☐ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)
- ☐ COMCHECK PROVIDED (2018 NCECC)
- ☐ COMCHECK PROVIDED (90.1-2013)
- ☐ ENERGY MODELING DATA PROVIDED

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

- ☐ C406.2 EFFICIENT MECH EQUIPMENT
- ■ C406.3 REDUCED LTG DENSITY
- ☐ C406.4 ENHANCED LTG CONTROLS
- ☐ C406.5 ON-SITE RENEWABLE ENERGY
- ☐ C406.6 DEDICATED OA SYSTEM
- ☐ C406.7 SERVICE WATER HEATING

C301 CLIMATE ZONE

4A - HARNETT 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	263,900 BTUH (peak)
BUILDING COOLING LOAD	417,800 BTUH (peak)
INSTALLED HEATING CAPACITY	430,290 BTUH
INSTALLED COOLING CAPACITY	464,540 BTUH

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

SYSTEM DESCRIPTION - SINGLE ZONE SPLIT SYSTEM HEAT PUMP UNITS

- ■ MINIMUM HVAC EQUIP EFFICIENCY COMPLIANCE - TABLE C403.2.3
- ☐ INCREASED HVAC EQUIP EFFICIENCY COMPLIANCE - 10% OVER TABLE C403.2.3

EQUIP TYPE	SIZE CATEGORY (BTUH)	SUBCATEGORY	C403.2.3 MINIMUM EFFICIENCY (a)	10% INCREASED EFF. (a)	DESIGN EFFIC.
TABLE C403.2.3(2) - ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS					
AIR COOLED COOL MODE	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	14.0 SEER	15.4 SEER	SEE SCHEDULE

C403.2.4 THRU C403.2.11

- ■ HVAC SYSTEMS ARE FULLY COMPLIANT WITH THE REQUIREMENTS FOR HVAC SYSTEM CONTROL, VENTILATION, ENERGY RECOVERY, DUCT AND PLENUM INSULATION AND SEALING, PIPING INSULATION, AND SYSTEM COMPLETION.

C403.2.12 - AIR SYSTEM DESIGN AND CONTROL

- ■ ALL FANS INSTALLED ON THE PROJECT ARE 5 HP OR LESS AND ARE EXEMPT FROM THESE REQUIREMENTS.
- ☐ FANS ABOVE 5 HP MEET THE CFM LIMITATIONS SHOWN BELOW:

OPTION 1 - FAN SYSTEM MOTOR NAMEPLATE HP - TABLE C403.2.12.1(1)

ALLOWABLE NAMEPLATE MOTOR HP	CONSTANT VOLUME MINIMUM CFM	VARIABLE VOLUME MINIMUM CFM	DESIGN CFM
7.5	6,818 CFM	5,000 CFM	SEE SCHEDULE
10	9,091 CFM	6,667 CFM	SEE SCHEDULE
15	13,636 CFM	10,000 CFM	SEE SCHEDULE
20	18,182 CFM	13,333 CFM	SEE SCHEDULE
25	22,727 CFM	16,667 CFM	SEE SCHEDULE
30	27,272 CFM	20,000 CFM	SEE SCHEDULE
40	36,364 CFM	26,667 CFM	SEE SCHEDULE
50	45,455 CFM	33,333 CFM	SEE SCHEDULE

C405.8 - ELECTRICAL MOTORS (MANDATORY REQUIREMENTS).

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

C408 - SYSTEM COMMISSIONING

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

MECHANICAL SHEET INDEX

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Harnett County Schools

Johnsonville Elementary School Addition/Renovation Phase 2

18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022

PROJECT #: 02103.000
DRAWN BY: TAL
CHECKED BY: GPK

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MECHANICAL LEGEND AND NOTES

M1-001

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INDOOR UNIT SCHEDULE

SYMBOL	CFM	NOMINAL TONNAGE	O.A. CFM	E.S.P.	COOLING CAPACITY TC (BTUH)	COOLING CAPACITY SHC (BTUH)	HEATING CAPACITY (BTUH)	ELECTRIC HEAT KW	ELECTRIC HEAT STAGES	ELECTRIC HEAT VOLTAGE	ELECTRIC HEAT PH	FAN MOTOR FLA	ELECRICAL DATA MCA	ELECRICAL DATA MOCP	ELECRICAL DATA VOLTAGE	ELECRICAL DATA PH	MANUFACTURER	MODEL	WEIGHT	REFRIGERANT TYPE	MATCHING OUTDOOR UNIT
IDU-1	1,200	3.0	205	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-1
IDU-2	1,200	3.0	215	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-2
IDU-3	1,200	3.0	215	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-3
IDU-4	1,500	4.0	270	0.4 in-wg	47,500	36,200	46,500	14.4	1	480	3	0.9	24.8	25.0	480 V	3	TRANE	TAM9A0C48	174 lb	R-410A	HP-4
IDU-5	1,200	3.0	215	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-5
IDU-6	1,500	4.0	270	0.4 in-wg	47,500	36,200	46,500	14.4	1	480	3	0.9	24.8	25.0	480 V	3	TRANE	TAM9A0C48	174 lb	R-410A	HP-6
IDU-7	1,200	3.0	215	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-7
IDU-8	1,200	3.0	215	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-8
IDU-9	1,200	3.0	210	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-9
IDU-10	1,200	3.0	210	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-10
IDU-11	1,000	2.5	140	0.4 in-wg	29,600	22,800	28,800	7.2	1	208	1	3.5	48.0	50.0	208 V	1	TRANE	TAM9A0B30	138 lb	R-410A	HP-11
IDU-12	1,200	3.0	120	0.4 in-wg	37,800	28,200	34,800	14.4	1	480	3	0.6	23.8	25.0	480 V	3	TRANE	TAM9A0C36	146 lb	R-410A	HP-12

NOTES:

1. COOLING CAPACITY BASED ON 80°/67° ENTERING AIR.
2. PROVIDE UNITS WITH: ELECTRONIC 7-DAY PROGRAMMABLE THERMOSTAT, 1" THICK DISPOSABLE FILTER (MERV 8 MINIMUM), FIELD INSTALLED HEATER, U.L. LABEL, SINGLE POINT ELECTRICAL CONNECTION, 1-INCH INSULATION.
3. SEQUENCE OF OPERATION: UNIT SHALL BE CONTROLLED BY ITS ELECTRONIC 7-DAY PROGRAMMABLE THERMOSTAT. UNIT SUPPLY FAN SHALL RUN CONTINUOUSLY IN THE OCCUPIED MODE, CYCLE WITH HEATING AND COOLING WHILE UNOCCUPIED. UPON A RISE IN SPACE TEMPERATURE, UNIT COMPRESSOR AND CONDENSER FAN SHALL ACTIVATE TO SATISFY SPACE. UPON A DROP IN SPACE TEMPERATURE, UNIT COMPRESSOR SHALL ACTIVATE IN REVERSE CYCLE FOR HEATING. UPON A FURTHER DROP IN SPACE TEMPERATURE, ELECTRIC HEAT SHALL BE ENERGIZED TO SATISFY SPACE TEMPERATURE. THERMOSTATS SHALL PROVIDE A DEADBAND OF 5°, WITHIN WHICH THE SUPPLY OF HEATING OR COOLING ENERGY TO THE ZONE CAN BE REDUCED TO THE MINIMUM. OCCUPANCY SCHEDULES SHALL BE SET TO OCCUPIED MONDAY THRU FRIDAY, 7 AM TO 7 PM, UNOCCUPIED NIGHTS AND WEEKENDS. THERMOSTATS SHALL BE SET FOR OCCUPIED COOLING 75°, OCCUPIED HEATING 70°, UNOCCUPIED COOLING 85°, UNOCCUPIED HEATING 55°. ALL TIME AND TEMPERATURE SETPOINTS SHALL BE VERIFIED BY THE OWNER PRIOR TO PROGRAMMING. THERMOSTATS SHALL BE PROGRAMMED BY MECHANICAL CONTRACTOR IN THE PRESENCE OF OWNER'S REPRESENTATIVE PRIOR TO PROJECT COMPLETION.
4. PROVIDE EACH UNIT WITH A IONIZATION TYPE SMOKE DETECTOR, INSTALLED IN THE RETURN DUCT WIRED TO SHUT DOWN THE UNIT UPON ACTIVATION. SMOKE DETECTOR SHALL BE SUPPLIED, WIRED FOR INTERFACE WITH FIRE ALARM SYSTEM AND UNIT SHUTDOWN BY THE ELECTRICAL CONTRACTOR. SMOKE DETECTOR SHALL BE INSTALLED IN THE RETURN DUCT BY THE MECHANICAL CONTRACTOR.

HEAT PUMP SCHEDULE (AIR COOLED)

SYMBOL	NOMINAL TONNAGE	COOLING COIL TC (BTUH)	COOLING COIL SHC (BTUH)	EFFICIENCY EER	EFFICIENCY SEER	HEATNG CAPACITY (BTUH)	EFFICIENCY COP	EFFICIENCY HSPF	COMPRESSOR LRA	COMPRESSOR RLA	FAN FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA FUSE	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PH	REFRIG. TYPE	MANUFACTURER TRANE MODEL	WEIGHT	MATCHING INDOOR UNIT
HP-1	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-1
HP-2	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-2
HP-3	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-3
HP-4	4.0	47,500	36,200	13	17.0	46,500	4.1	10	41.0	6.4	0.6	9.0	15.0	480 V	3	R-410A	4TWA7048A4	286 lb	IDU-4
HP-5	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-5
HP-6	4.0	47,500	36,200	13	17.0	46,500	4.1	10	41.0	6.4	0.6	9.0	15.0	480 V	3	R-410A	4TWA7048A4	286 lb	IDU-6
HP-7	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-7
HP-8	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-8
HP-9	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-9
HP-10	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-10
HP-11	2.5	28,600	22,500	13	16.0	27,800	3.8	9	67.8	12.8	0.7	17.0	25.0	208 V	1	R-410A	4TWR6030H	198 lb	IDU-11
HP-12	3.0	37,800	28,200	13	17.0	34,800	3.9	9.5	38.0	5.7	0.6	8.0	15.0	480 V	3	R-410A	4TWA7036A4	257 lb	IDU-12

NOTES:

1. COOLING CAPACITY @ 95 AMBIENT.
2. ALL UNITS SHALL BE U.L. LISTED AND HAVE A MINIMUM SEER OF 13.
3. HEAT PUMP SUPPLEMENTARY ELECTRIC RESISTANCE HEAT SHALL BE PROVIDED WITH CONTROLS TO PREVENT OPERATION WHEN THE REVERSE CYCLE HEAT CAN MEET HEATING LOAD. SUPPLEMENTAL ELECTRIC HEAT SHALL BE ALLOWED TO OPERATE DURING HEAT PUMP DEFROST CYCLE. SUPPLEMENTAL ELECTRIC HEAT SHALL BE LOCKED OUT WHEN THE OUTDOOR TEMPERATURE IS BETWEEN 35°F AND 40°F AND THE INDOOR TEMPERATURE SETPOINT IS INCREASED.
4. MOUNT UNITS ON A 4" THICK CONCRETE PAD AND PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND UNITS.
5. PROVIDE UNITS WITH CONDENSER COIL HAIL GUARDS AND LOW AMBIENT CONTROLS.
6. FOR REFRIGERANT LINE APPLICATIONS WITH A TOTAL EQUIVALENT LENGTH BETWEEN 50'-0" AND 175'-0".
   THE FOLLOWING ACCESSORIES SHALL BE PROVIDED;
   - -COMPRESSOR CRANKCASE HEATER
   - -FOR HORIZONTAL CONFIGURATION: PROVIDE LIQUID LINE SOLENOID WITHIN 2'-0" OUTDOOR UNIT WITH FLOW ARROW POINTING TOWARD OUTDOOR UNIT. VAPOR LINE SHOULD SLOPE TOWARD INDOOR UNIT.
   - -MECHANICAL CONTRACTOR & UNIT MANUFACTURER ARE TO REVIEW INSTALLATION, AND FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR LONG REFRIGERANT LINE APPLICATIONS (AS DEFINED BY UNIT MFGR).

DOAS INDOOR UNIT SCHEDULE

SYMBOL	CFM	O.A. CFM	E.S.P.	COOLING CAPACITY TC (BTUH)	COOLING CAPACITY SHC (BTUH)	HEATING CAPACITY (BTUH)	REHEAT CAPACITY (BTUH)	ELECTRIC HEAT KW	ELECTRIC HEAT STAGES	ELECTRIC HEAT FLA	ELECTRIC HEAT VOLTAGE	ELECTRIC HEAT PH	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PH	MANUFACTURER	MODEL	WEIGHT	REFRIGERANT TYPE	MATCHING OUTDOOR UNIT
DOAS-1	1,400	1400	1.00 in-wg	117,550	61,560	98,800	28,000	30.0	4	36.1	460	3	37.7	47.0	50.0	460 V	3	AAON	V3-BRB-3-0-162C-5T4	702 lb	R-410A	CU-1
DOAS-2	1,100	1100	1.00 in-wg	86,450	45,860	67,200	19,000	22.5	3	27.1	460	3	28.7	36.0	40.0	460 V	3	AAON	V3-BRB-3-0-162C-5S4	702 lb	R-410A	CU-2

NOTES:

1. COOLING CAPACITY BASED ON 95°/78° ENTERING AIR.
2. PROVIDE UNITS WITH: 1" THICK DISPOSABLE FILTER (MERV 8 MINIMUM), U.L. LABEL, SINGLE POINT ELECTRICAL CONNECTION, 1-INCH INSULATION.
3. SEQUENCE OF OPERATION: UNIT SHALL BE CONTROLLED BY BAS ON OCCUPIED/UNOCCUPIED BUILDING SCHEDULE. UPON A RISE IN SPACE TEMPERATURE, UNIT COMPRESSOR AND CONDENSER FAN SHALL ACTIVATE TO SATISFY SPACE. UPON A DROP IN SPACE TEMPERATURE, UNIT COMPRESSOR SHALL ACTIVATE IN REVERSE CYCLE FOR HEATING. UPON A FURTHER DROP IN SPACE TEMPERATURE, ELECTRIC HEAT SHALL BE ENERGIZED TO SATISFY SPACE TEMPERATURE. THERMOSTATS SHALL PROVIDE A DEADBAND OF 5°, WITHIN WHICH THE SUPPLY OF HEATING OR COOLING ENERGY TO THE ZONE CAN BE REDUCED TO THE MINIMUM. OCCUPANCY SCHEDULES SHALL BE SET TO OCCUPIED MONDAY THRU FRIDAY, 7 AM TO 7 PM, UNOCCUPIED NIGHTS AND WEEKENDS. THERMOSTATS SHALL BE SET FOR OCCUPIED COOLING 75°, OCCUPIED HEATING 70°, UNOCCUPIED COOLING 85°, UNOCCUPIED HEATING 55°. ALL TIME AND TEMPERATURE SETPOINTS SHALL BE VERIFIED BY THE OWNER PRIOR TO PROGRAMMING. THERMOSTATS SHALL BE PROGRAMMED BY MECHANICAL CONTRACTOR IN THE PRESENCE OF OWNER'S REPRESENTATIVE PRIOR TO PROJECT COMPLETION.

EXHAUST FAN SCHEDULE

SYMBOL	LOCATION	MANUFACTURER	MODEL NO.	TYPE	CFM	APPROX. ESP	DRIVE TYPE	FAN RPM	ELECTRICAL DATA WATTS	ELECTRICAL DATA HP	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PH	ACCESSORIES	CONTROL TYPE
F-1	UTILITY 318	GREENHECK	SQ-120	INLINE	1150	0.75	DIRECT	1050	1127	0.50 hp	115 V	1	A,B,F,G	5
F-2	UTILITY 318	GREENHECK	SP-A1050	CEILING	800	0.25	DIRECT	1138	438	0.00 hp	115 V	1	A,B,F,G	1

EXHAUST FAN SCHEDULE ACCESSORIES:

- A. DISCONNECT SWITCH
- B. GRAVITY BACKDRAFT DAMPER
- C. MOTORIZED BACKDRAFT DAMPER
- D. PREFAB, ROOF CURB
- E. BIRDSCREEN
- F. ACOUSTICAL LINING
- G. HANGING BRACKETS WITH VIBRATION ISOLATION
- H. WL, WALL LOUVER DISCHARGE
- I. RCC OR GRS ROOF CAP (FLAT ROOF) OR RJ ROOF CAP (PITCHED ROOF)
- J. WALL MOUNTING COLLAR
- K. INLET GAURD
- M. 2" WASHABLE ALUMINUM FILTERS
- N. MOTORSIDE FAN GUARD
- O. EXHAUST GRILLE
- P. U.L. 762
- Q. VENTED ROOF CURB EXTENSION
- R. COMBINATION KITCHEN HOOD FAN CURB
- S. INTERLOCK WITH FUME HOOD
- T. PROVIDE DRAIN PLUG ACCESSORY
- U. ROOF SUPPORT RAILS
- V. HINGED BRACKET KIT

EXHAUST FAN SCHEDULE CONTROLS:

1. WALL MOUNTED THERMOSTAT (REVERSE ACTING, SET FOR 80°)
2. INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IF ANY ROOM IS SERVED BY FAN)
3. WALL MOUNTED ON/OFF SWITCH WITH IDENTIFICATION LABEL
4. WALL MOUNTED MUSHROOM PUSH BUTTON SWITCH/STARTER WITH IDENTIFICATION LABEL
5. CONTROLLED BY BUILDING AUTOMATION SYSTEM
6. CONTINUOUS OPERATION
7. CONTROLLED BY THE FACP AND FIREMAN'S MANUAL OVER-RIDE CONTROL PANEL IN FIRE COMMAND ROOM. NO MECHANICAL CONTROL POINTS REQUIRED BY M.C. FOR SMOKE CONTROL FANS
8. INTERLOCK WITH DISHWASHER OPERATION

EXHAUST FAN SCHEDULE NOTES:

1. ALL FANS SHALL BE U.L. LISTED AND LABELED AND SHALL BE AMCA CERTIFIED FOR SOUND AND AIR FLOW. ALL FANS INSTALLED INSIDE, ABOVE, OR ADJACENT TO OCCUPIED SPACES SHALL HAVE A MAXIMUM 9.0 INLET SONE LEVEL.
2. ALL FANS SHALL BE SUPPLIED BY ONE MANUFACTURER UNLESS NOTED OTHERWISE.
3. MECHANICAL CONTRACTOR SHALL PROVIDE MAGNETIC STARTER WITH AUXILIARY CONTACTS AS REQUIRED.
4. PROVIDE ALL DIRECT DRIVE FANS WITH SPEED CONTROLLERS.

DOAS CONDENSING UNIT SCHEDULE

SYMBOL	COOLING COIL TC (BTUH)	COOLING COIL SHC (BTUH)	HEATNG CAPACITY (BTUH)	EFFICIENCY EER	EFFICIENCY COP	COMPRESSOR QTY	COMPRESSOR RLA-1	COMPRESSOR RLA-2	ELECTRICAL DATA FLA	ELECTRICAL DATA MCA	ELECTRICAL DATA FUSE	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PH	REFRIG. TYPE	MANUFACTURER AAON MODEL	WEIGHT	MATCHING INDOOR UNIT
CU-1	117,550	61,560	98,800	9.9	2.44	2	9.7	10.6	24.0	27.0	35.0	460 V	3	R-410A	CFA-013-B-A-3-DJ00K	1123 lb	DOAS-1
CU-2	86,450	45,860	67,200	11.6	2.82	2	7.8	6.2	17.0	19.0	25.0	460 V	3	R-410A	CFA-009-B-A-3-DJ00K	1060 lb	DOAS-2

NOTES:

1. COOLING CAPACITY @ 95 AMBIENT.
2. ALL UNITS SHALL BE U.L. LISTED AND HAVE A MINIMUM SEER OF 13.
3. HEAT PUMP SUPPLEMENTARY ELECTRIC RESISTANCE HEAT SHALL BE PROVIDED WITH CONTROLS TO PREVENT OPERATION WHEN THE REVERSE CYCLE HEAT CAN MEET HEATING LOAD. SUPPLEMENTAL ELECTRIC HEAT SHALL BE ALLOWED TO OPERATE DURING HEAT PUMP DEFROST CYCLE. SUPPLEMENTAL ELECTRIC HEAT SHALL BE LOCKED OUT WHEN THE OUTDOOR TEMPERATURE IS BETWEEN 35°F AND 40°F AND THE INDOOR TEMPERATURE SETPOINT IS INCREASED.
4. MOUNT UNITS ON A 4" THICK CONCRETE PAD AND PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND UNITS.
5. PROVIDE UNITS WITH CONDENSER COIL HAIL GUARDS AND LOW AMBIENT CONTROLS.
6. FOR REFRIGERANT LINE APPLICATIONS WITH A TOTAL EQUIVALENT LENGTH BETWEEN 50'-0" AND 175'-0".
   THE FOLLOWING ACCESSORIES SHALL BE PROVIDED;
   - -COMPRESSOR CRANKCASE HEATER
   - -FOR HORIZONTAL CONFIGURATION: PROVIDE LIQUID LINE SOLENOID WITHIN 2'-0" OUTDOOR UNIT WITH FLOW ARROW POINTING TOWARD OUTDOOR UNIT. VAPOR LINE SHOULD SLOPE TOWARD INDOOR UNIT.
   - -MECHANICAL CONTRACTOR & UNIT MANUFACTURER ARE TO REVIEW INSTALLATION, AND FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR LONG REFRIGERANT LINE APPLICATIONS (AS DEFINED BY UNIT MFGR).

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)
DUCTED SPLIT SYSTEMS: CARRIER, TRANE, YORK
FANS: COOK, GREENHECK, PENN, TWIN CITY,
AIR DISTRIBUTION: CARNES, METAL*AIRE, NAILOR, PRICE, TITUS, TUTTLE & BAILEY, KRUEGER
FIRE DAMPERS: GREENHECK, NAILOR, RUSKIN, POTTORFF, NCA, SAFE-AIRE
LOUVER: GREENHECK, RUSKIN, SAFE-AIR, POTTORFF
DUCTLESS SPLIT SYSTEMS: DAIKIN, MITSUBISHI, TRANE
ELECTRIC WALL/UNIT HEATERS: MARKEL, MODINE, RAYWALL, BERKO, QMARK
DDC CONTROLS: RELIABLE CONTROLS CORPORATION (MACH-SYSTEM BY BUILDING AUTOMATION SERVICES), AUTOMATED LOGIC CONTROLS, JOHNSON CONTROLS INC.
100% OUTSIDE AIR MAKE-UP UNITS: AAON, ENGINEERED AIR, DESERT AIRE

NOTE:
ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF 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 TH MECHANICAL CONTRACTOR.

DUCTLESS A/C CONDENSING UNIT SCHEDULE

ID	NOMINAL TONNAGE	EER	SEER	COP	HSPF	SUMMER AMBIENT DBT	WINTER AMBIENT DBT	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP	ELECTRICAL DATA VOLTAGE	ELECTRICAL DATA PH	REFRIG. TYPE	MANUFACTURER	MODEL	WEIGHT
ODU-1	1.5	14.4	24.6	2.47	11	95.0 °F	0.0 °F	11.0	28.0	208 V	1	R410A	MITSUBISHI	PUZ-A18NKA7	100 lb
ODU-2	1.5	14.4	24.6	2.47	11	95.0 °F	0.0 °F	11.0	28.0	208 V	1	R410A	MITSUBISHI	PUZ-A18NKA7	100 lb

DUCTLESS A/C INDOOR UNIT SCHEDULE

ID	MANUFACTURER	MODEL NO.	DESIGN AIRFLOW	COOLING CAPACITY NOMINAL	COOLING CAPACITY TOTAL (BTUH)	COOLING CAPACITY SENSIBLE (BTUH)	HEATING CAPACITY (BTUH)	UNIT WEIGHT
A/C-1	MITSUBISHI	PLA-A18EA7	600 CFM	1.5 ton	18000	15300	19000	46 lb
A/C-2	MITSUBISHI	PLA-A18EA7	600 CFM	1.5 ton	18000	15300	19000	46 lb

NOTES:

1. ALL UNITS SHALL BE U.L. LISTED AND HAVE A MINIMUM SEER OF 15.
2. COOLING CAPACITIES ARE BASED ON 95° AMBIENT, 80° ENTERING AIR DRY BULB, 67° ENTERING AIR WET BULB. AIRFLOWS INDICATED ARE AT 'HIGH' SPEED (DRY COIL).
3. HEATING CAPACITIES ARE BASED ON 17°F AMBIENT, 65°F ENTERING AIR.
4. MOUNT OUTDOOR UNIT ON EQUIPMENT SUPPORT RAILS.
5. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND OUTDOOR UNIT.
6. PROVIDE UNITS WITH MANUFACTURER'S LOW AMBIENT CONTROLS FOR OPERATION DOWN TO 0°F, INVERTER, 120V INTEGRAL CONDENSATE PUMP, COMPRESSOR, FACTORY THERMOSTAT, AND INTEGRAL MANUFACTURER NON-LOCKING DISCONNECT SWITCH FOR INDOOR UNIT.
7. INDOOR UNIT IS POWERED BY THE CONDENSING UNIT.
8. PROVIDE OUTDOOR UNIT WITH 6 YEAR EXTENDED COMPRESSOR WARRANTY.
9. SIZE AND INSTALL REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS.

GRILLES, REGISTERS AND DIFFUSERS SCHEDULE

SYMBOL	DESCRIPTION	MANUF.	MODEL	MATERIAL	FACE SIZE	NECK SIZE	NECK WIDTH	NECK HEIGHT	NOTES
A	LOUVERED FACE DIFFUSER	TITUS	TDC	STEEL	24x24	6			
B	LOUVERED FACE DIFFUSER	TITUS	TDC	STEEL	24x24	8			
C	LOUVERED FACE DIFFUSER	TITUS	TDC	STEEL	24x24	10			
D	PERFORATED DIFFUSER	TITUS	PAR	STEEL	24x24	16			
F	PERFORATED DIFFUSER	TITUS	PAR	STEEL	24x24	12			
G	LOUVERED GRILLE	TITUS	4FL	ALUMINUM	24x24	12			
H	LOUVERED GRILLE	PRICE	4FL	ALUMINUM	12x12	6			
J	LOUVERED FACE DIFFUSER	TITUS	TDC	STEEL	12x12	6			

AIR DISTRIBUTION SCHEDULE NOTES:

1. ALL CEILING AND WALL MOUNTED DEVICES SHALL BE FURNISHED WITH AN ENAMEL BRIGHT WHITE FINISH UNLESS NOTED OTHERWISE.
2. ALL DEVICES SHALL BE FURNISHED WITH FRAMES SUITABLE FOR THE TYPE OF INSTALLATION REQUIRED.
3. ALL LINEAR DIFFUSERS IN LAY-IN CEILINGS SHALL BE FURNISHED WITH END CAPS. ALL LINEAR DIFFUSERS IN HARD CEILINGS SHALL BE FURNISHED WITH END BORDERS. ALL LINEAR SUPPLY DIFFUSERS SHALL BE PROVIDED WITH INTEGRAL AIRFLOW PATTERN ADJUSTMENT BARS FOR HORIZONTAL/VERTICAL PATTERN ADJUSTMENT AT EACH SLOT.
4. ALL DOUBLE DEFLECTION SUPPLY GRILLES SHALL HAVE DAMPER BLADES ADJUSTED TO PROVIDE AIRFLOW PATTERN INDICATED BY FLOW ARROWS ON PLANS. DAMPERS SHALL BE ADJUSTED TO A 30 DEGREE POSITION UNLESS NOTED OTHERWISE ON PLANS.

LOUVER SCHEDULE - MECHANICAL EQUIPMENT

SYMBOL	MANUFACTURER	MODEL NO.	DESIGN AIRFLOW	FREE AREA	FREE AREA VELOCITY	PD	DAMPER TYPE	DIMENSIONS WIDTH	DIMENSIONS HEIGHT	REMARKS
L-1	GREENHECK	ELF-375DX	1950 CFM	3.5 SF	557 FPM	0.02 in-wg	NONE	42"	24"	
L-2	GREENHECK	ELF-375DX	1100 CFM	2.5 SF	440 FPM	0.02 in-wg	NONE	30"	24"	
L-3	GREENHECK	ELF-375DX	1400 CFM	2.5 SF	560 FPM	0.02 in-wg	NONE	30"	24"	

LOUVER SCHEDULE NOTES:

1. PROVIDE BAKED ENAMEL FINISH, COLOR BY ARCHITECT.
2. PROVIDE WITH BIRDSCREEN.
3. PROVIDE WITH DAMPER AS NOTED IN SCHEDULE
4. INSTALL WITH 18" DEEP INSULATED PLENUM.
5. PROVIDE FRAME TYPE REQUIRED FOR MOUNTING LOCATION.

ELECTRIC WALL HEATER SCHEDULE

SYMBOL	LOCATION	CFM	BTUH	KW	MOTOR RPM	MOTOR H.P.	MOTOR VOLT	MOTOR PH	MANUFACTURER (MARKEL)	ACCESSORIES
EWH-1	UTILITY 318	175	13800	4.0	600	0.00	208 V	1	F3326TD-RP	A,B,G,H

NOTES:

1. HEATING CAPACITY BASED ON 65° F E.A.T.
2. SEE PLANS FOR TYPE OF THERMOSTAT REQUIRED (WALL MOUNTED OR UNIT MOUNTED). UNIT HEATERS SHOWN WITHOUT THERMOSTAT INDICATED SHALL BE PROVIDED WITH A UNIT MOUNTED THERMOSTAT.
3. SET TO MAINTAIN 45°F.

ELECTRIC UNIT HEATER ACCESSORIES:

- A. DISCONNECT SWITCH
- B. BUILT IN THERMOSTAT
- C. WALL MOUNTED THERMOSTAT
- D. WALL MOUNTING BRACKETS
- E. CEILING MOUNTED BRACKETS
- F. ADJUSTABLE DISCHARGE LOUVERS
- G. PENCIL PROOF LOUVERS
- H. CABINET FOR SURFACE MOUNTING

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Johnsonville Elementary School
Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: TAL
CHECKED BY: GPK

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MECHANICAL SCHEDULES

M1-002

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OPTIMA # 21-0266R

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SEQUENCE OF OPERATION

A COMPLETE AND OPERATIONAL DDC CONTROL SYSTEM (BAS) SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS (SECTION 230900) AND AS INTENDED ON THESE PLANS. ALL CONTROL POINTS AND EQUIPMENT SEQUENCES OF OPERATION LISTED IN SPECIFICATION SECTION 230900 SHALL BE CONSIDERED IN ADDITION TO THOSE LISTED HERE. 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. MECHANICAL CONTRACTOR SHALL COORDINATE ALL BAS INTEGRATION REQUIREMENTS WITH EQUIPMENT VENDORS AND CONTROLS CONTRACTOR PRIOR TO PURCHASING EQUIPMENT AND PROVIDE ALL EQUIPMENT WITH COMMUNICATION/INTERFACE CARDS AS REQUIRED FOR SYSTEM INTEGRATION.

SINGLE ZONE CLASSROOM HEAT PUMPS

ON A CALL FOR HEATING OR COOLING, UNIT SHALL ENERGIZE AND THE UNIT AND HEAT PUMP HEATING/COOLING SYSTEM SHALL START ON A TWO MINUTE DELAY.

WHEN PLACED IN THE OCCUPIED MODE BY THE BAS, THE UNITS SHALL BE INDEXED "ON".
(SHALL BE STARTED TO PROVIDE CONSTANT VENTILATION WHILE IN THE OCCUPIED MODE AND PROVIDE FIRST STAGE OF HEATING AND COOLING AS OUTLINED BELOW).

SINGLE ZONE UNITS SHALL BE PROVIDED WITH A WALL MOUNTED DDC SENSOR FOR SPACE TEMPERATURE CONTROL. WHILE IN THE OCCUPIED MODE THE SUPPLY FAN AND HEAT PUMP HEATING/COOLING SYSTEM SHALL CYCLE ON UPON A CALL FOR HEATING OR COOLING AS REQUIRED TO MAINTAIN SPACE TEMPERATURE. SENSOR SHALL ALSO SEND A SIGNAL TO ITS ZONE DEDICATED OUTSIDE AIR SYSTEM TO INDICATE WHETHER ITS STATUS IS HEAT, COOL, OR SATISFIED.

WHILE IN THE UNOCCUPIED MODE, THE UNIT SHALL CYCLE AS NOTED ABOVE TO MAINTAIN SETBACK TEMPERATURES. IF ACTIVATED DURING THE UNOCCUPIED MODE, THE UNIT SHALL RUN FOR A MINIMUM OF 20 MINUTES AND SHALL NOT BE ALLOWED TO RESTART FOR A MINIMUM OF FIVE MINUTES FOLLOWING SHUT-DOWN.

UNITS PROVIDED WITH DUCT SMOKE DETECTORS (SEE PLANS) SHALL HAVE DUCT DETECTOR INSTALLED IN THE RETURN DUCT PRIOR TO THE O.A. DUCT CONNECTION. DUCT DETECTOR SHALL SHUT-DOWN UNIT AND ACTIVATE FIRE ALARM UPON DETECTION OF SMOKE.

CLASSROOM WING DEDICATED OUTSIDE AIR UNITS:

WHEN PLACED IN THE OCCUPIED MODE, DEDICATED OUTSIDE AIR UNIT (DOAS) SHALL BE INDEXED "ON". UNITS SHALL START TO SUPPLY CONDITIONED/NEUTRAL AIR

UNIT COMPRESSORS SHALL OPERATE IN HEATING OR COOLING MODE TO SUPPLY AIR AT NEUTRAL CONDITIONS (67-73° AND 45-55% RH). IF ALL SENSORS ON THE ZONE ARE CALLING FOR COOLING, DOAS COMPRESSOR SHALL OPERATE IN COOLING MODE TO DISCHARGE AIR AT 55° AND SHALL FUNCTION AS THE FIRST STAGE OF COOLING FOR THE CLASSROOMS. WHEN ALL CLASSROOMS ARE CALLING FOR HEAT, COMPRESSOR SHALL OPERATE IN THE HEATING MODE,

UTILIZE REVERSE HEAT PUMP CYCLE TO HEAT OUTSIDE AIR TO 95° AND SERVE AS FIRST STAGE OF HEATING FOR THE CLASSROOMS. IF ALL SENSORS ARE SATISFIED, OR THERE IS A MIX OF CALLS FOR HEATING AND COOLING, DOAS UNIT SHALL OPERATE TO MAINTAIN NEUTRAL DISCHARGE CONDITIONS (67-73° AND 45-55% RH), UTILIZING COOLING, HEATING, REHEAT AS REQUIRED.

IN THE UNOCCUPIED MODE, UNIT SHALL REMAIN OFF UNLESS THE ZONE IS SCHEDULED ON VIA THE DDC SYSTEM OVERRIDE PANEL, OR ACTIVATED BY THE DEHUMIDIFICATION SEQUENCE.

NOTE: COORDINATE EXACT SEQUENCE OF OPERATION FOR ENERGY RECOVERY UNITS WITH MANUFACTURER, MANUFACTURER AND ENGINEER TO APPROVE FINAL SEQUENCE PRIOR TO PROGRAMMING. BAS VENDOR SHALL VERIFY ALL OPERATION/MONITORING POINTS COMPATIBILITY AT SUBMITTAL PHASE.

THERMOSTATS & TEMPERATURE SENSORS

THERMOSTATS AND TEMPERATURE SENSORS SHALL BE PROVIDED WHERE INDICATED ON THE DRAWINGS, AND PER THE SPECIFICATIONS. THERMOSTATS TO 70°. THERMOSTATS SHALL HAVE A 3° RANGE IN WHICH THEY ARE SATISFIED (IF SET TO 70°, SATISFIED ANYWHERE BETWEEN 68.5° AND 71.5°). SLIDE BAR SHALL HAVE THE CAPABILITY TO ADJUST THE HEATING AND COOLING SETPOINTS BY 3° IN EITHER DIRECTION, BUT MAINTAIN A MINIMUM 4° SPREAD BETWEEN THE HEATING AND COOLING SETPOINT. UNOCCUPIED SETTINGS SHALL BE 85° COOLING AND 60° HEATING. ALL SETPOINTS SHALL BE VERIFIED WITH THE OWNER BEFORE PROGRAMMING, AND FULLY ADJUSTABLE THROUGH THE BAS.

WALL/UNIT HEATERS

A BUILT-IN THERMOSTAT SHALL OPERATE WALL/UNIT HEATER AND FAN TO MAINTAIN A SETPOINT OF 45° (ADJ). ONCE THE UNIT HEATER IS ENERGIZED, IT WILL RUN FOR AT LEAST FIVE MINUTES TO AVOID SHORT CYCLING. BAS DOES NOT INTERFACE WITH UNIT HEATERS.

MISC. EXHAUST FANS

PROVIDE WALL SWITCHES, WALL THERMOSTATS, INTERLOCKS, ETC. AS INDICATED ON THE FAN SCHEDULE TO CONTROL FANS AS INDICATED ON PLANS. UTILITY ROOM AND ELECTRICAL ROOM THERMOSTATS SHALL BE SET AT 85° F. (USER ADJUSTABLE).

TOILET EXHAUST FANS

CENTRAL BAS SHALL OPERATE EXHAUST FANS ON A PROGRAMMED SCHEDULE. FANS SHALL RUN WHEN ASSOCATED ZONE IS IN THE OCCUPIED MODE, AND BE OFF WHEN ASSOCIATED ZONE IS IN THE UNOCCUPIED MODE.

INPUT/OUTPUT SUMMARY

SYSTEM, APPARATUS, OR AREA POINT DESCRIPTION	INPUTS – ANALOG – MEASURED: TEMPERATURE	PRESSURE	RH	KW	AIR FLOW	WATER FLOW	CO2	HERTZ	RPM	VOLTS	AMPS	KWH	ANALOG – CALC.: ENTHALPY	RUN TIME	EFFICIENCY	BINARY: STATUS	FILTER	SMOKE	FREEZE	AIR FLOW	METER	OVER-RIDE	OUTPUTS – DIGITAL: OFF-ON	OFF-AUTO-ON	OFF-HI-LO	OPEN-CLOSE	ANALOG: DMPR. POS.	VALVE POS.	SETPOINT ADJ.	STEP CONTROL	SYSTEM FEATURES – ALARMS: HI ANALOG	LO ANALOG	HI BINARY	LO BINARY	PROOF	PROGRAMS: TIME SCHEDULING	DEMAND LIMITING	DUTY CYCLE	START/STOP OPT.	ENTHALPY OPT.	SMOKE CNT.	TREND	ALARM INSTRUCT	MAIN. WK. ORD.	GENERAL: COLOR GRAPHIC	SUPPLMENT. NOTES
HEAT PUMP																																				X									X	
Supply Fan																X							X												X											
Compressor #1																X							X												X											
Compressor #2																X							X												X											WHERE APPLICABLE
Space Temp	X																																													
Space RH			X																																											
Supply Temp	X																																													
Over-ride																						X																								
Setpoint Adjust																													X																	
Return Air Smoke (by elec. contr.)																		X																									X			WHERE INDICATED
DOAS																																				X									X	
Supply Fan																X							X												X											
Compressor #1																X							X												X											
Compressor #2																X							X												X											
Entering Supply Air Temp	X																																													
Leaving Supply Air Temp																																														
Leaving Supply Air RH			X																																											
Override																						X																								
Setpoint Adjust																													X																	
Fans																																													X	
Misc. Fans																							X																							SEE FAN SCHEDULE

GENERAL NOTE:

THE POINTS LIST PROVIDED IS INTENDED TO COMMUNICATE THE GENERAL DESIGN INTENT TO THE CONTROLS SUBCONTRACTOR AND IS NOT INTENDED TO BE COMPLETE. IN THE CONTROLS SUBMITTAL, THE SUBCONTRACTOR SHALL FULLY DEVELOP THE POINTS LIST FOR ALL SYSTEMS IDENTIFIED AND SHALL PRESENT ALL SETPOINTS, CONTROL PARAMETERS, AND ALARM POINTS. THE CONTROLS SUBCONTRACTOR SHALL INCORPORATE STANDARD FEATURES SUCH AS MINIMUM RUN TIME DELAYS AND DEAD BANDS FROM SETPOINTS TO PREVENT EQUIPMENT FROM SHORT CYCLING WHEN NEAR SETPOINTS. ALL MONITORED POINTS SHALL INCLUDE EARLY HIGH/LOW ALARM NOTIFICATIONS PRIOR TO HAVING TO TAKE CORRECTIVE ACTIONS OR EQUIPMENT SHUTDOWNS. TRANSMITTERS SHALL INCLUDE OUT-OF-RANGE, FAIL-SAFE POSITIONING FOR OPEN CIRCUITS OR LOSS OF COMMUNICATION. CONTROL CONTRACTOR SHALL SPECIFY TO FAIL DE-ENERGIZER, HOLD LAST STATE, OR DEFAULT TO A PREDETERMINED SETPOINT. THESE BASIC FEATURES THAT ARE NECESSARY AND ARE PART OF A COMPLETE CONTROLS INSTALLATION SHALL BE INCLUDED IN THE SCOPE OF SERVICES FOR DELIVERABLES AT NO ADDITIONAL COSTS TO THE OWNER.

CONTROL SYSTEM NOTES

1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. HVAC CONTROLS FOR CLASSROOM ADDITION PROJECT TO BE INTEGRATED IN TO SCHOOLS EXISTING BAS. ALL POINTS AND EQUIPEMENT TO BE ACCESSIBLE FROM THE EXISTING BAS FRONT END AS INDICATED WITH ADDITIONAL GRAPHICS FOR EQUIPMENT AND FLOORPLANS. EXISTING CONTROLS BY RELIABLE CONTROLS CORPORATION.
3. ALL CONTROL SETPOINTS SHALL BE ADJUSTABLE AND TRENDABLE BY THE USER AND MAINTENANCE DEPARTMENT. INDICATED SCHEDULES AND SETPOINTS SHOULD BE USED FOR ORIGINAL SYSTEM SET-UP. ANY CHANGES IN SETPOINT SETTINGS REQUIRED FOR INTENDED SYSTEM OPERATION SHALL BE APPROVED BY THE ENGINEER AND SHALL BE DISCREETLY INDICATED ON THE AS-BUILT DRAWINGS.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE A DEDICATED 120V CIRCUIT IN A J-BOX FOR CONTROL POWER. CONTROLS CONTRACTOR SHALL EXTEND 120V POWER FROM J-BOX TO CONTROL PANELS, DAMPER ACTUATORS, TRANSFORMERS, ETC. AS REQUIRED FOR INSTALLATION OF THE CONTROL SYSTEM. ALL CONTROL TRANSFORMERS SHALL BE SEPARATELY INTERNALLY FUSED OR HAVE MANUAL RESETS.
5. CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF 24 HOURS OF OWNER TRAINING PROVIDED BY A FACTORY CERTIFIED REPRESENTATIVE. COORDINATE THROUGH THE MECHANICAL CONTRACTOR AND CONSTRUCTION MANAGEMENT FIRM.
6. ALL CONTROL AND POWER WIRING SHALL BE PLENUM-RATED WITH A MINIMUM FIRE SPREAD RATING OF 25 AND A MINIMUM SMOKE DEVELOPED RATING OF 50 PER ASTM E84.
7. THE SEQUENCE OF OPERATION OF OPERATION AND POINTS LIST IS INTENDED TO COMMUNICATE THE MINIMUM REQUIREMENTS AND GENERAL DESIGN INTENT TO THE CONTROLS CONTRACTOR AND IS NOT INTENDED TO BE A FULLY DEVELOPED OR COMPLETE SEQUENCE OF OPEARTION. IN THE CONTROLS SUBMITTAL THE CONTROLS CONTRACTOR SHALL FULLY DEVELOP THE SEQUENCE OF OPERATIONS FOR ALL SYSTEMS IDENTIFIED AN SHALL PRESENT ALL SETPOINTS, CONTROL PARAMETERS, TIME DELAYS, ALARM POINTS, ETC. AS REQUIRED TO COMPLY WITH THE DESIGN INTENT. THE CONTROLS CONTRACTOR SHALL INCORPORATE STANDARD FEATURES SUCH AS MINIMUM RUN TIME DELAYS AND DEAD BANDS TO PREVENT SHORT CYCLING. ALL MONITORED POINTS SHALL INCLUDE EARLY HIGH/LOW ALARM NOTIFICATIONS PRIOR TO REQUIRED CORRECTIVE ACTIONS OR UNIT SHUT-DOWNS. CONTROL CONTRACTOR SHALL SPECIFY IN THE CONTROL SUBMITTAL FAIL SAFE POSITION FOR OUT OF RANGE, FAIL SAFE POSITIONING FOR OPEN CIRCUITS OR LOSS OF COMMUNICATION.
8. ALARMS THROUGH THE BAS SYSTEM SHALL BE VISIBLE ON THE INDIVIDUAL GRAPHICS THEMSELVES, NOT ONLY ON THE SUMMARY PAGE.
9. LOCATE MAIN CONTROL HUBS FOR ADDITION CONTROLS IN ELECTRICAL ROOM. COORDINATE EXACT LOCATION OF PANELS WITH ALL OTHER TRADES AND BUILDING OWNER'S FACILITIES DEPARTMENT PRIOR TO INSTALLATION.

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Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: TAL
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MECHANICAL CONTROLS SEQUENCE OF OPERATION

M1-003

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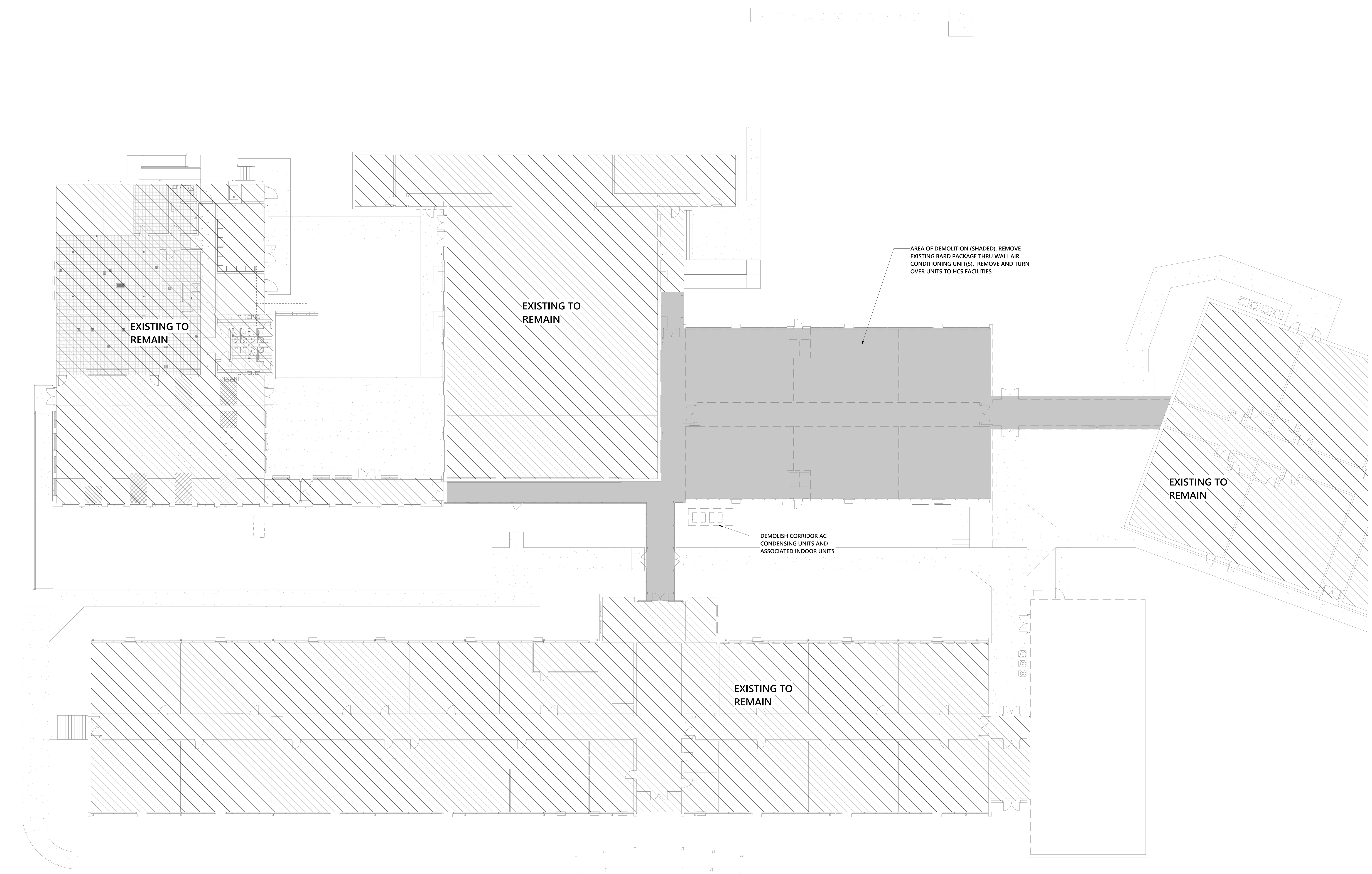

1 OVERALL MECHANICAL PLAN - DEMOLITION - PHASE 2
1/16" = 1'-0"

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MECHANICAL DEMOLITION PLAN

M1-101

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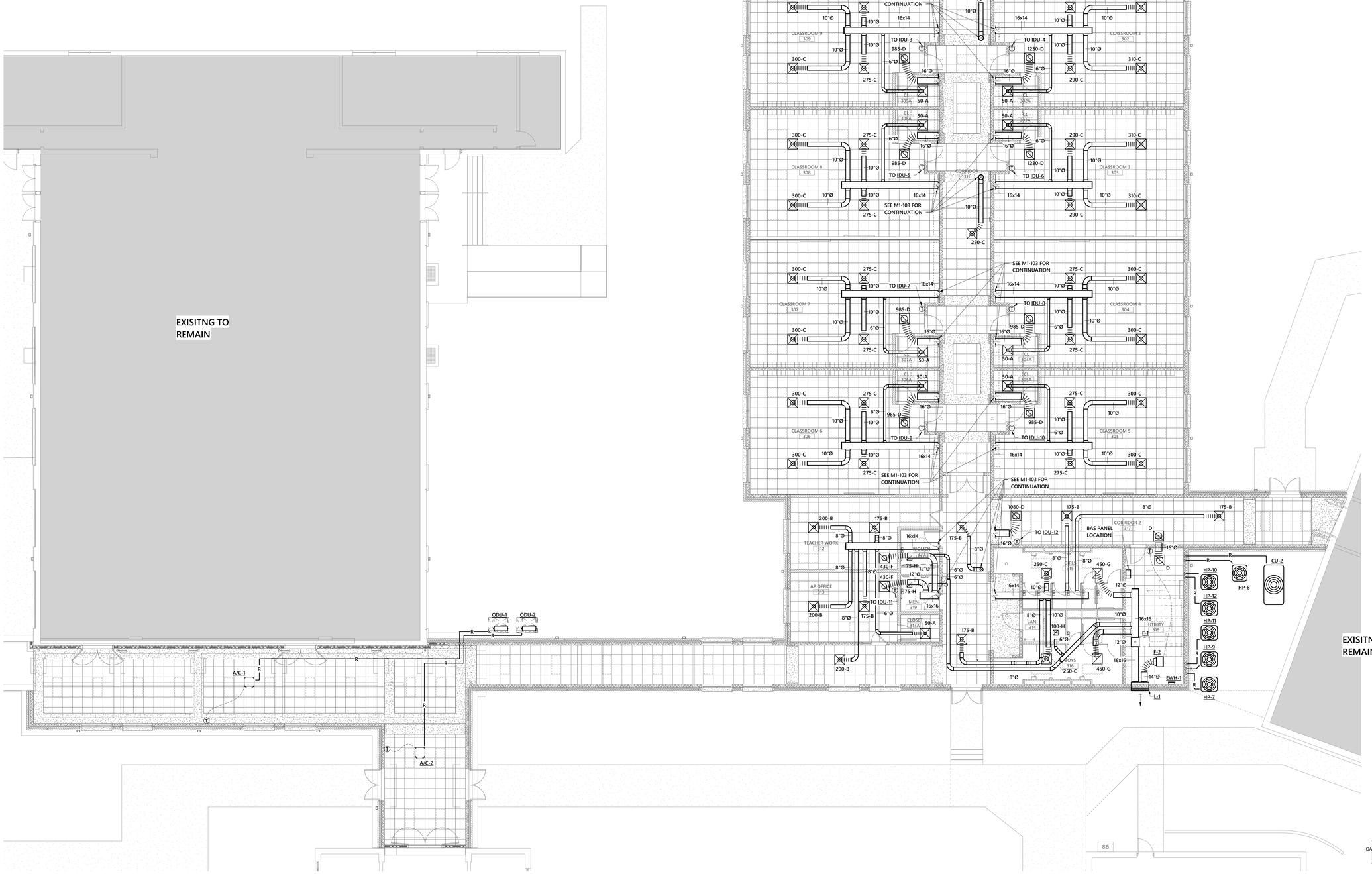
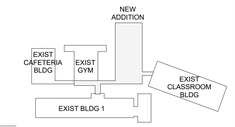


1 FIRST FLOOR MECHANICAL DUCTWORK PLAN - PHASE 2
1/8" = 1'-0"



KEYPLAN

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FIRST FLOOR MECHANICAL PLAN - NEW WORK

M1-102
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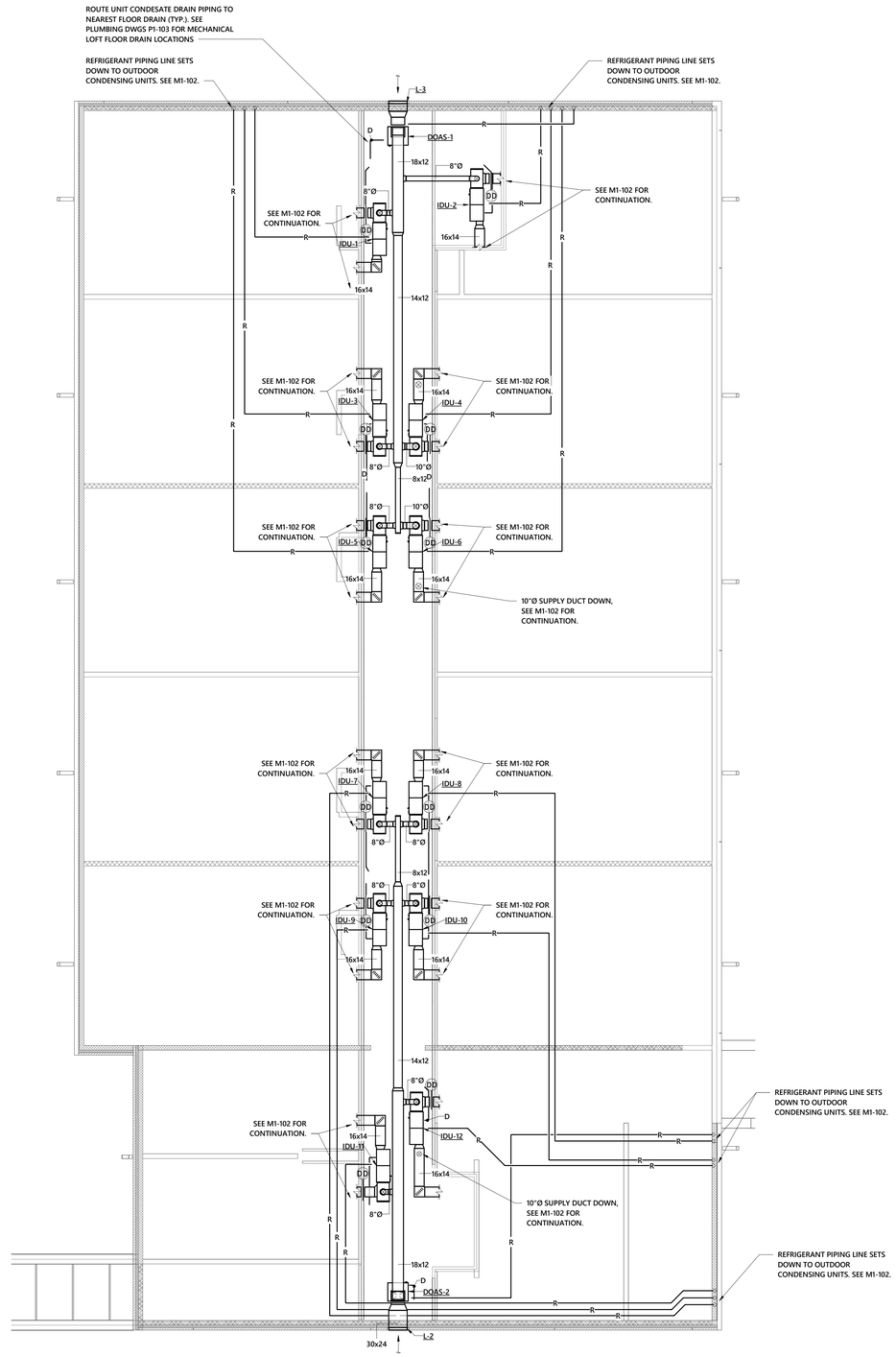

1 MECHANICAL LOFT MECHANICAL PLAN - PHASE 2
1/8" = 1'-0"

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MECHANICAL LOFT MECHANICAL PLAN - NEW WORK

M1-103

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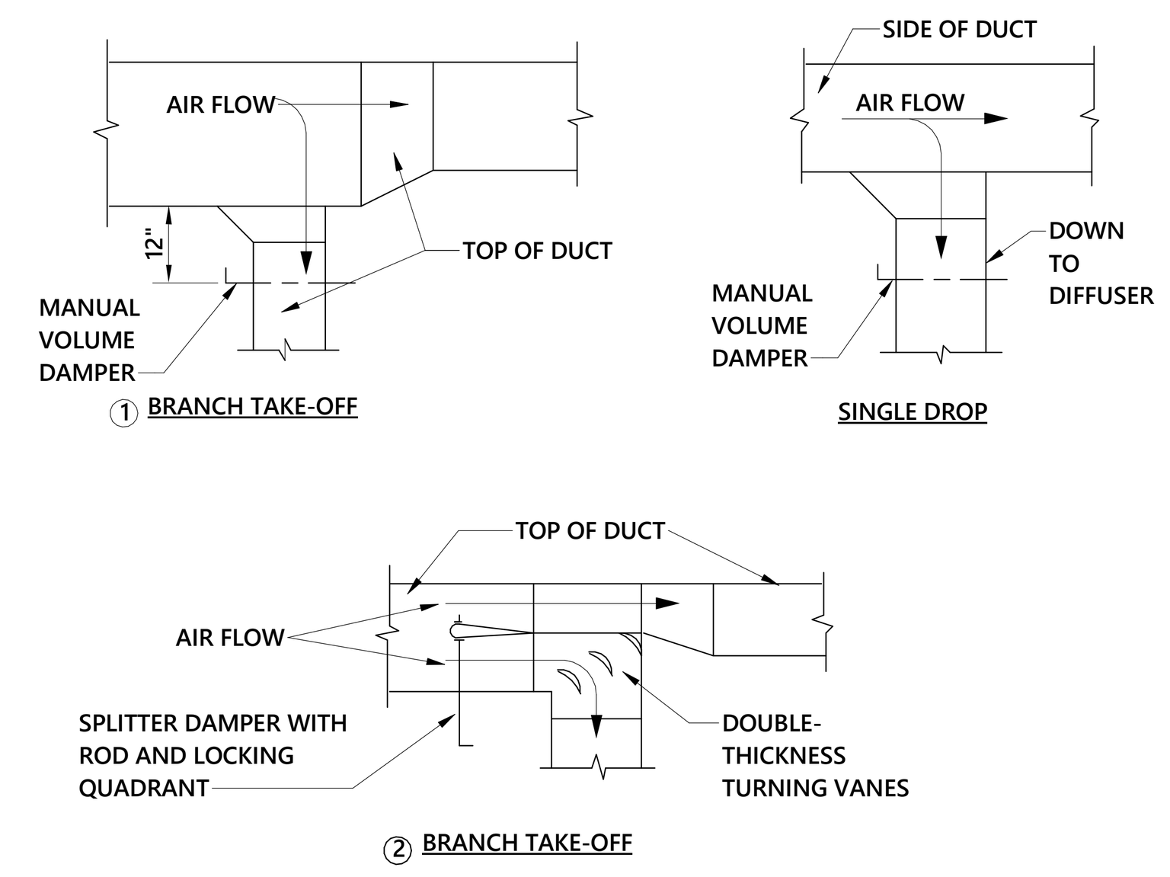
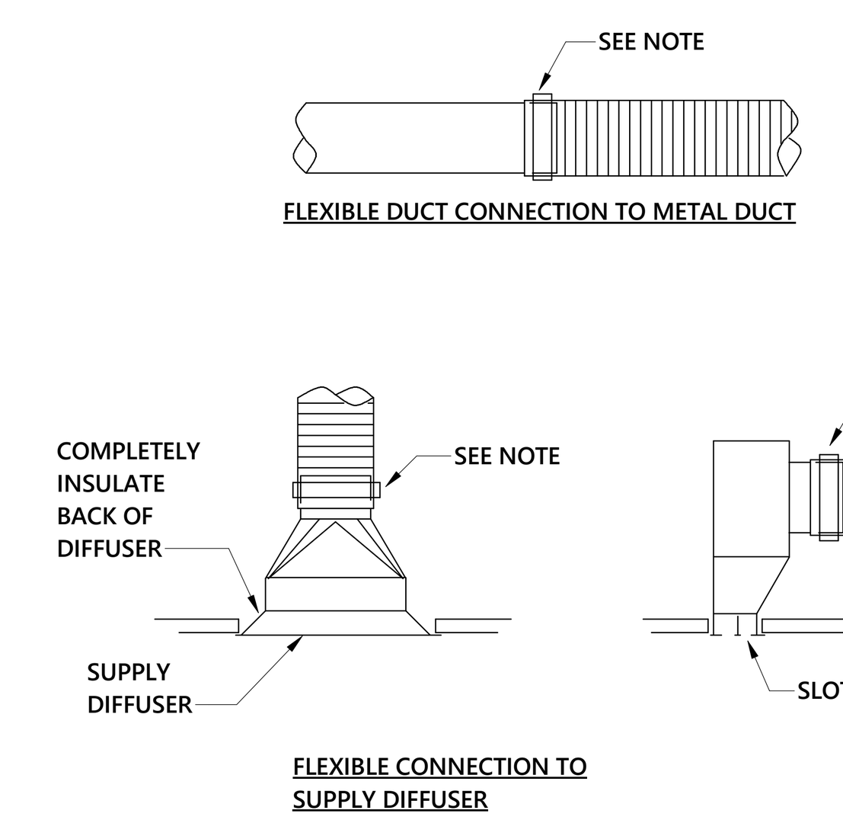


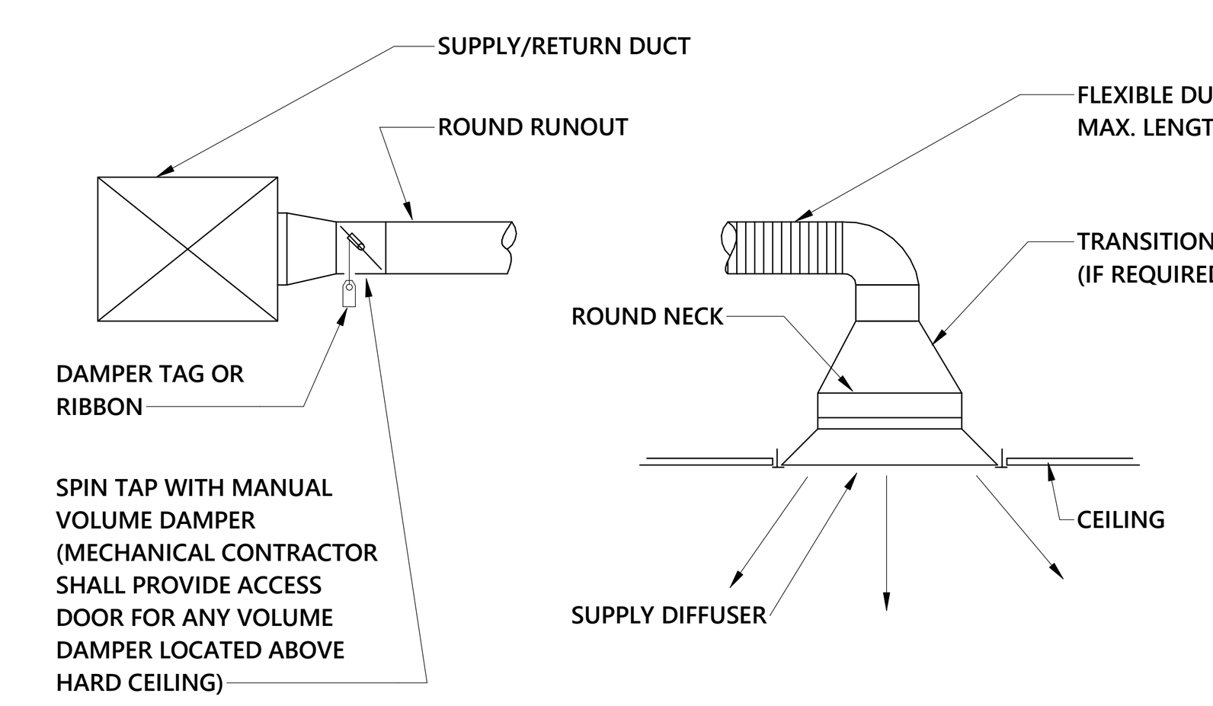
NOTE:
1. USE BRANCH TAKE-OFF 1 WHEN MAIN AND BRANCH DUCTS ARE DIFFERENT DEPTHS.
2. USE BRANCH TAKE-OFF 2 WHEN MAIN AND BRANCH DUCTS ARE SAME DEPTHS.
3. MANUAL VOLUME DAMPERS SHALL BE PROVIDED FOR ALL SUPPLY, RETURN AND GENERAL EXHAUST SINGLE DROP DUCT RUNS.

1 DUCTWORK DETAILS
NOT TO SCALE



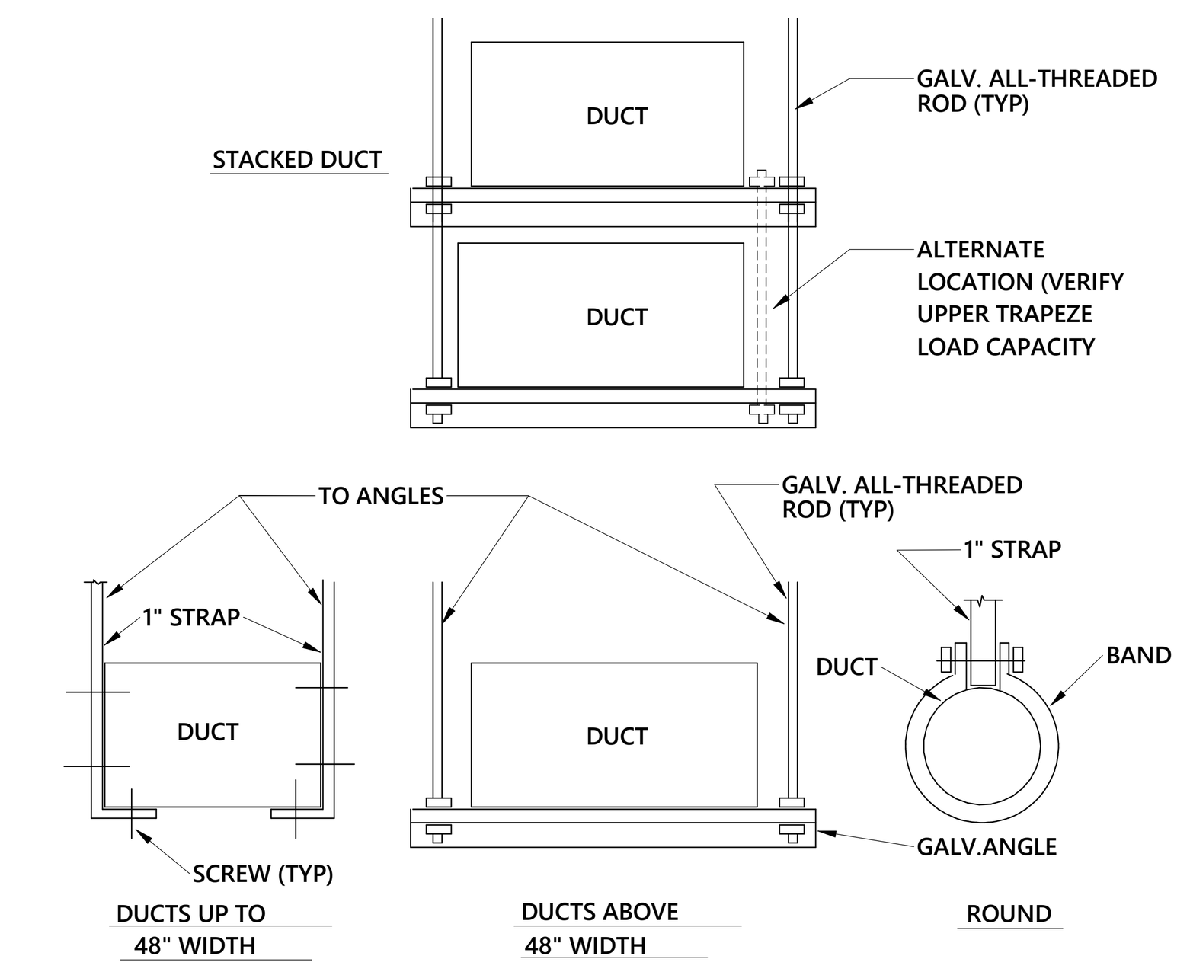
NOTE:
ALL FLEXIBLE DUCT CONNECTIONS TO SHEET METAL SHALL BE SECURED WITH APPROVED STRAP AND SEALANT.

2 FLEX CONNECTION DETAIL
NOT TO SCALE



NOTE:
1. ALL MANUAL VOLUME DAMPERS (FOR INSULATED DUCTWORK) SHALL BE PROVIDED WITH AN ELEVATED REGULATOR (STAND-OFF) EQUAL TO DURO DYNE SRST SERIES. STAND SHALL EXTEND A MINIMUM OF 2" BEYOND DUCTWORK WITH EXTENDED TAB/SHAFT.
2. MANUAL VOLUME DAMPERS SHALL BE PROVIDED FOR ALL SUPPLY, RETURN, AND GENERAL EXHAUST RUNOUTS.

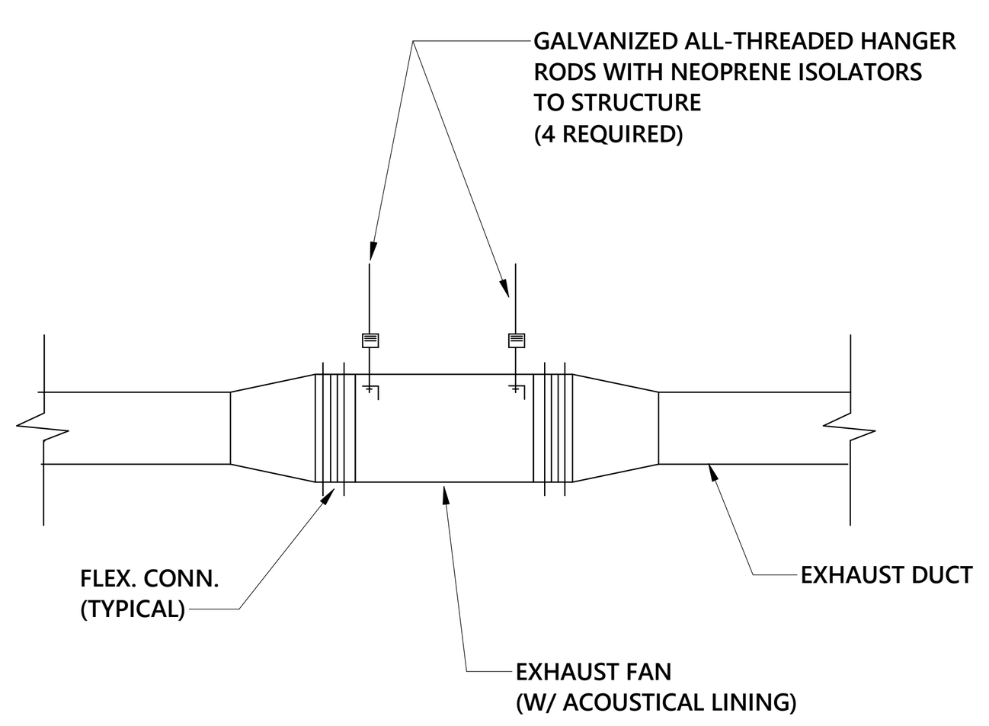
3 SPIN TAP TO ROUND NECK DIFFUSER
NOT TO SCALE



LOW PRESSURE DUCTWORK

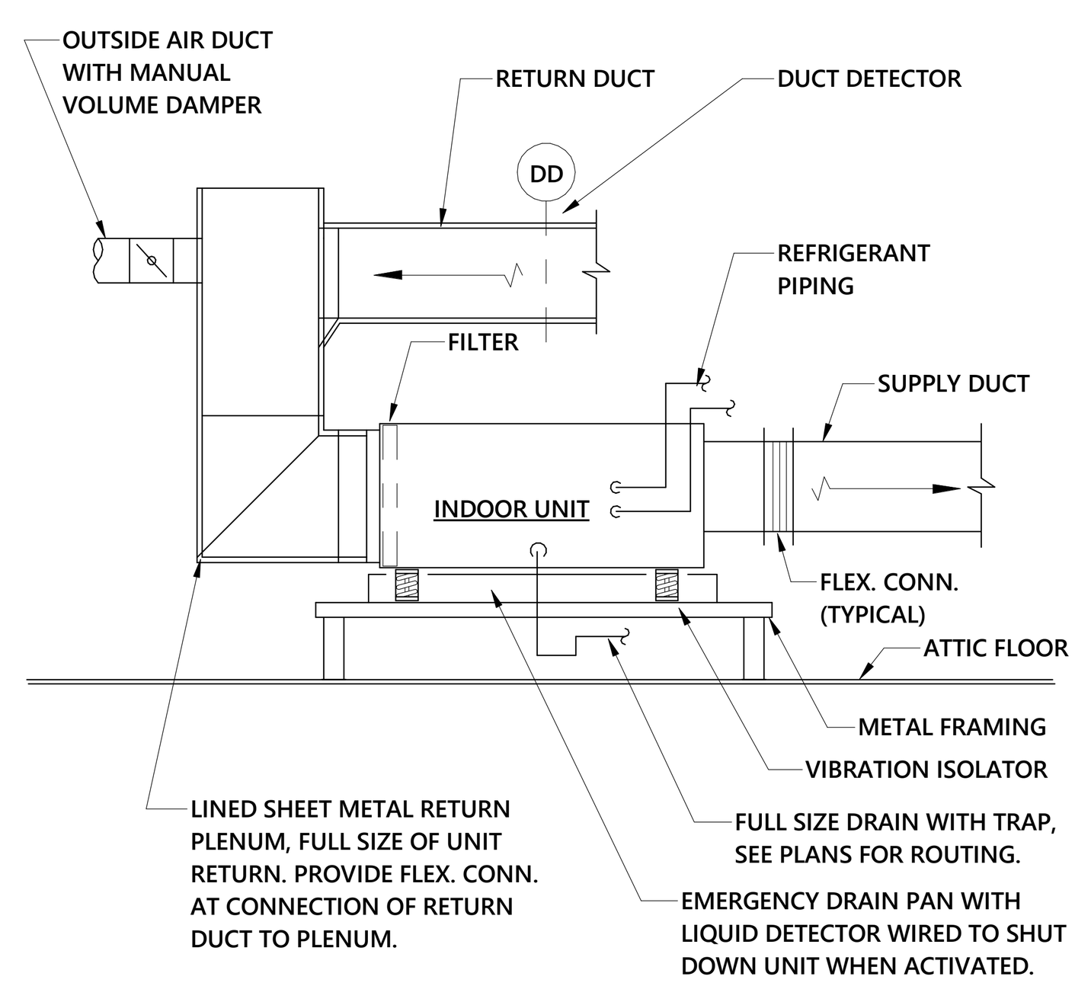
NOTE:
ALL DUCTWORK AND EQUIPMENT HANGERS AND SUPPORTS MUST BE PURCHASED THRU THE METAL DECKING MANUFACTURER. HANGERS SCREWED INTO THE DECK WILL NOT BE ACCEPTABLE. COORDINATE WITH GENERAL CONTRACTOR.

4 DUCTWORK HANGER DETAILS
NO SCALE



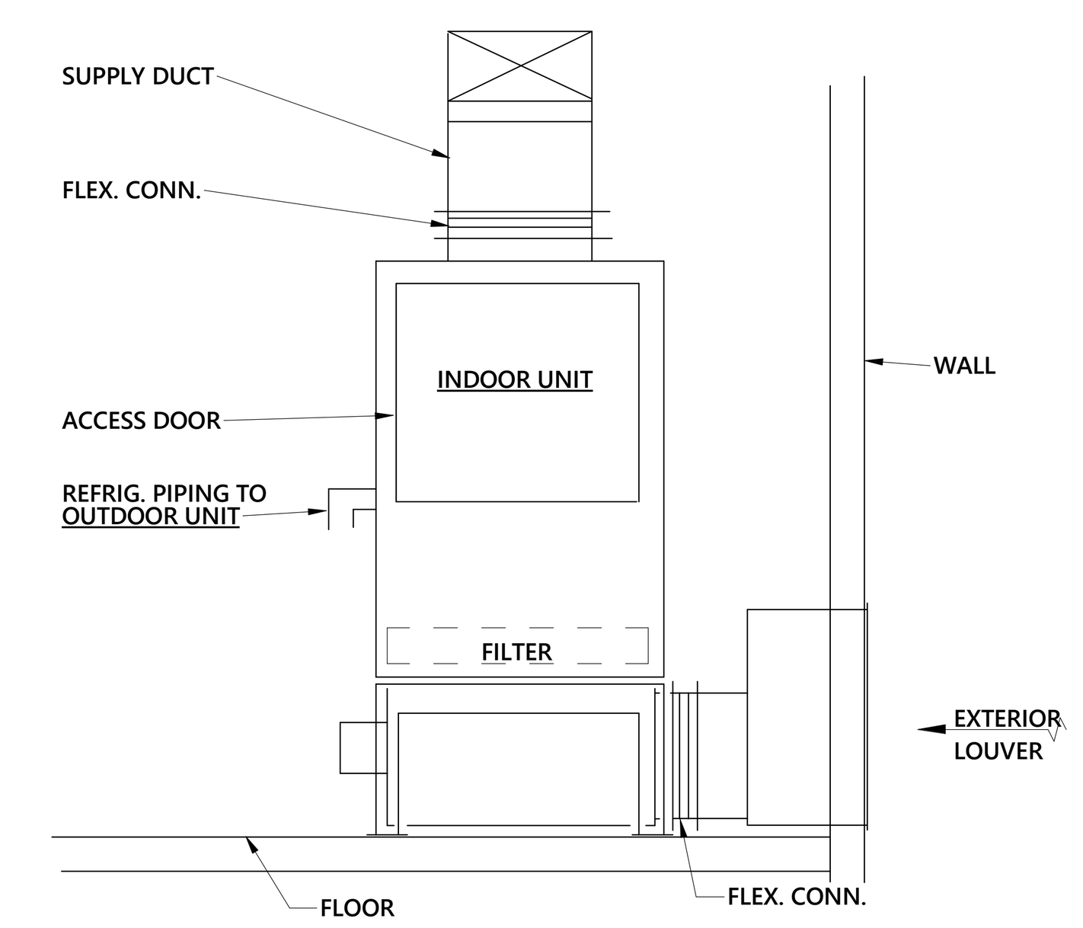
NOTES:
1. COORDINATE LOCATION OF FAN WITH OTHER TRADES TO INSURE SERVICE CLEARANCES.
2. MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING IF REQUIRED.
3. DO NOT HANG FAN FROM UNISTRUT SUPPORTS

5 INLINE EXHAUST FAN DETAIL
NO SCALE



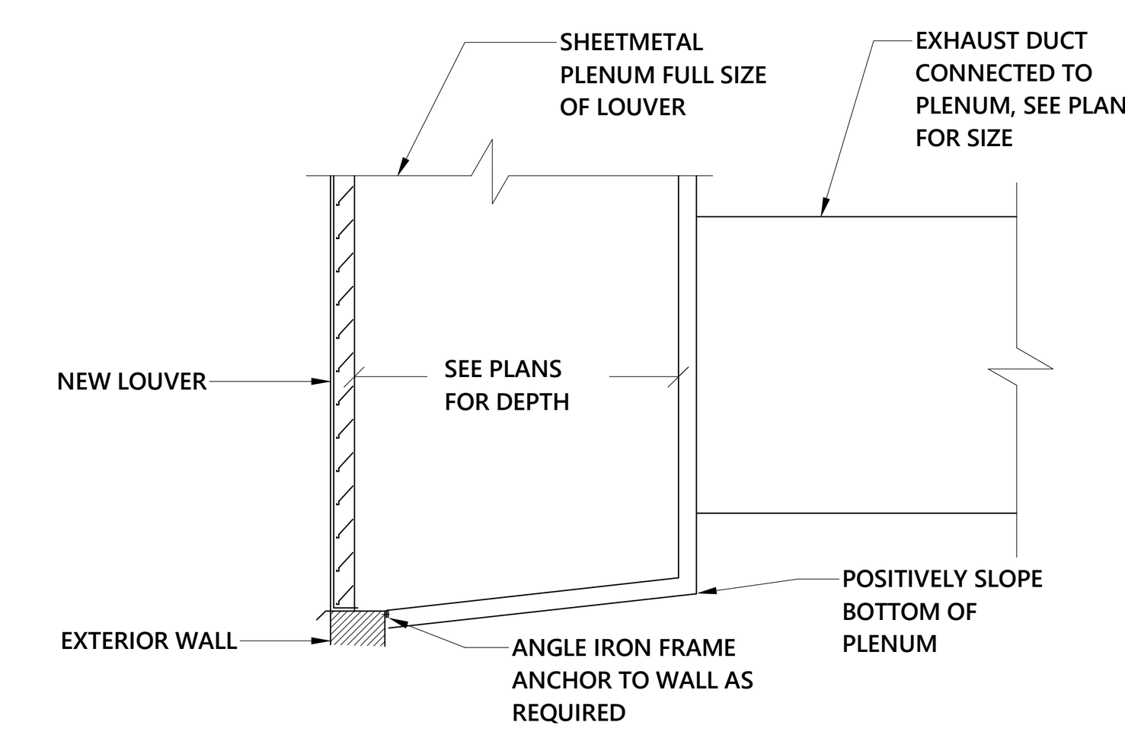
NOTE:
1. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF FAN COIL UNIT WITH DUCTWORK, PLUMBING, ELECTRICAL, ETC. TO MAINTAIN FILTER AND MAINTENANCE ACCESS CLEARANCES.

6 IDU - HORIZONTAL ON ATTIC FLOOR
NOT TO SCALE



NOTES:
1. PROVIDE FULL SIZE CONDENSATE DRAIN WITH TRAP, SEE PLANS FOR ROUTING.

7 DOAS - VERTICAL ELEC. UNIT
NOT TO SCALE



NOTE:
1. EXTEND SHEET METAL PLENUM TO BACKSIDE OF LOUVER

8 SHEET METAL PLENUM
NO SCALE

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NORTH CAROLINA PROFESSIONAL ENGINEER 040316 THOMAS A. LANGEN 03/25/2022

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Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: TAL
CHECKED BY: GPK

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MECHANICAL DETAILS

M1-501

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OPTIMA # 21-0266R

Autodesk Docs://Johnsonville ES Addition Renovation/21-0266R_Johnsonville Classroom Addition_MEPFP_R22.rvt
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2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY - ELECTRICAL SUMMARY

C401 METHOD OF COMPLIANCE

- [x] 2018 NCECC CHAPTER 4
- [ ] NC SPECIFIC COMCHECK PROVIDED
- [ ] N/A BASED ON PROJECT SCOPE
- [ ] ASHRAE 90.1-2013

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

- [ ] C406.1.1 EFFICIENT MECH EQUIPMENT
- [ ] C406.1.4 ON-SITE RENEWABLE ENERGY
- [x] C406.1.2 REDUCED LTG DENSITY
- [ ] C406.1.5 DEDICATED OA SYSTEM
- [ ] C406.1.3 ENHANCED DIGITAL LTG CNTLS
- [ ] C406.1.6 HI-EFF SERVICE WTR HTG
- [ ] NOT APPLICABLE BASED ON PROJECT SCOPE

C405.2 - LIGHTING CONTROLS (MANDATORY REQUIREMENTS):

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

C405.3 - EXIT SIGNS (MANDATORY REQUIREMENTS):

- [x] 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:

7,600 WATTS SPECIFIED

49 % REDUCTION OF SPECIFIED VS. ALLOWED (APPLICABLE IF C406.1.2 IS SELECTED)

C405.4.2 - TOTAL ALLOWABLE INTERIOR LIGHTING POWER:

METHOD OF COMPLIANCE:

- [x] BUILDING AREA METHOD
- [ ] SPACE-BY-SPACE METHOD

15,140 WATTS ALLOWED

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

- [ ] NOT APPLICABLE

TOTAL CONNECTED EXTERIOR LIGHTING POWER:

800 WATTS SPECIFIED

TOTAL ALLOWABLE EXTERIOR LIGHTING POWER:

860 WATTS ALLOWED

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

- [ ] SEPARATE ELECTRICAL METERING HAS BEEN PROVIDED FOR EACH DWELLING UNIT IN GROUP R-2 BUILDINGS.
- [x] NOT APPLICABLE

C405.7 - ELECTRICAL TRANSFORMERS (MANDATORY REQUIREMENTS):

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

C405.8 - ELECTRICAL MOTORS (MANDATORY REQUIREMENTS):

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

C408 - SYSTEM COMMISSIONING:

- [x] PROJECT AREA IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.
- [ ] PROJECT AREA IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.

__/F__-_P-__

SWITCH FRAME SIZE (AMPERES)

FUSE SIZE (AMPERES)

NUMBER OF POLES

NEMA RATING

ELECTRICAL DISCONNECT SIZE DISCRIPTION

ELECTRICAL ABBREVIATIONS

1P	1 POLE (2P, 3P, 4P, ETC.)
A	AMPERE
AC	ABOVE COUNTER OR AIR CONDITIONER
ACLG	ABOVE CEILING
ADO	AUTOMATIC DOOR OPENER
AF	AMP FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFI	ARC FAULT CIRCUIT INTERRUPTER
AHU	AIR HANDLING UNIT
ALUM	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
AMPL	AMPLIFIER
ARCH	ARCHITECT, ARCHITECTURAL
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AUDIO VISUAL
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BD	BOARD
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
C	CONDUIT
CAB	CABINET
CAT	CATALOG
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
COMB	COMBINATION
CMPR	COMPRESSOR
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUATION OR CONTINUOUS
CONTR	CONTRACTOR
CONV	CONVECTOR
CP	CIRCULATING PUMP
CRT	CATHODE-RAY TUBE
CT	CURRENT TRANSFORMER
CTR	CENTER
CU	COPPER
DCP	DOMESTIC WATER CIRCULATING PUMP
DEPT	DEPARTMENT
DET	DETAIL
DIA	DIAMETER
DISC	DISCONNECT
DIST	DISTRIBUTION
DN	DOWN
DPR	DAMPER
DS	SAFETY DISCONNECT SWITCH
DT	DOUBLE THROW
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EP	ELECTRIC PNEUMATIC
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXH	EXHAUST
EXP	EXPLOSION PROOF
FA	FIRE ALARM
FABP	FIRE ALARM BOOSTER POWER SUPPLY PANEL
FACP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FIXT	FIXTURE
FLR	FLOOR
FLUOR	FLUORESCENT
FU	FUSE
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTOR
G	GROUND
GND	GROUND
GRS	GALVANIZED RIGID STEEL (CONDUIT)
GYP BD	GYPSUM BOARD
HOA	HANDS-OFF-AUTOMATIC SWITCH
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPF	HIGH POWER FACTOR
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWP	HYDRONIC WATER PUMP
IC	INTERRUPTING CAPACITY
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
IR	INFRARED
I/W	INTERLOCK WITH
J-BOX	JUNCTION BOX
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
LOC	LOCATE OR LOCATION
LT	LIGHT
LTG	LIGHTING
LTNG	LIGHTNING
LV	LOW VOLTAGE
MAX	MAXIMUM
MAG.S	MAGNETIC STARTER
M/C	MOMENTARY CONTACT
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDC	MAIN DISTRIBUTION CENTER
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MFS	MAIN FUSED DISCONNECT SWITCH
MH	MANHOLE
MIC	MICROPHONE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MMS	MANUAL MOTOR STARTER
MOA	MULTIOUTLET ASSEMBLY
MSP	MOTOR STARTER PANELBOARD
MSBD	MAIN SWITCHBOARD
MT	MOUNT
MT.C	EMPTY CONDUIT
MTS	MANUAL TRANSFER SWITCH
MTR	MOTOR, MOTORIZED
N.C.	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NFDS	NON-FUSED SAFETY DISCONNECT SWITCH
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
N.O.	NORMALLY OPEN
NPF	NORMAL POWER FACTOR
NTS	NOT TO SCALE
OH	OVERHEAD
OL	OVERLOADS
PA	PUBLIC ADDRESS
PB	PULL BOX OR PUSHBUTTON
PE	PNEUMATIC ELECTRIC
PED	PEDESTAL
PF	POWER FACTOR
PH	PHASE
PIV	POST INDICATING VALVE
PNL	PANEL
PP	POWER POLE
PR	PAIR
PRI	PRIMARY
PROJ	PROJECTION
PRV	POWER ROOF VENTILATOR
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE (CONDUIT)
PWR	POWER
QUAN	QUANTITY
RCPT	RECEPTACLE
REQD	REQUIRED
RM	ROOM
RSC	RIGID STEEL CONDUIT
RTU	ROOF TOP UNIT
SC	SURFACE CONDUIT
SEC	SECONDARY
SHT	SHEET
SIM	SIMILAR
S/N	SOLID NEUTRAL
SPEC	SPECIFICATION
SPKR	SPEAKER
SP	SPARE
SR	SURFACE RACEWAY
SS	STAINLESS STEEL
SSW	SELECTOR SWITCH
S/S	STOP/START PUSHBUTTONS
STA	STATION
STD	STANDARD
SURF	SURFACE MOUNTED
SW	SWITCH
SWBD	SWITCHBOARD
SYM	SYMMETRICAL
SYS	SYSTEM
TEL	TELEPHONE
TERM	TERMINAL
TL	TWIST LOCK
TR	TAMPER RESISTANT
T-STAT	THERMOSTAT
TTC	TELEPHONE TERMINAL CABINET
TV	TELEVISION
TVTC	TELEVISION TERMINAL CABINET
TYP	TYPICAL
UC	UNDER COUNTER
UE	UNDERGROUND ELECTRICAL
UG	UNDERGROUND
UH	UNIT HEATER
UT	UNDERGROUND TELEPHONE
UTIL	UTILITY
UV	UNIT VENTILATOR OR ULTRAVIOLET
V	VOLT
VA	VOLT-AMPERES
VDT	VIDEO DISPLAY TERMINAL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
W	WATT
W/	WITH
WG	WIRE GUARD
WH	WATER HEATER
W/O	WITHOUT
WP	WEATHERPROOF
XFMR	TRANSFORMER
XFR	TRANSFER

SYMBOL SCHEDULE POWER

SYMBOL	DESCRIPTION
	WIRING SYSTEM CONCEALED IN WALL OR CEILING. WHEN SHOWN, CROSS LINES INDICATE NUMBER OF WIRES. (GROUND WIRES ARE NOT SHOWN)
	WIRING SYSTEM, UNSWITCHED LEG OF LIGHTING CIRCUIT.
	WIRING SYSTEM LOW VOLTAGE.
	CONDUIT TURNED UP TO FLOOR ABOVE.
	CONDUIT TURNED DOWN TO FLOOR BELOW.
	BRANCH CIRCUIT HOMERUN TO PANEL.

SYMBOL SCHEDULE POWER LEGEND

SYMBOL	DESCRIPTION
	JUNCTION BOX WITH CONNECTION TO EQUIPMENT SERVED. 4" SQUARE BOX WITH A SINGLE-GANG OPENING AND PLASTER RING.
	208Y/120V THREE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	480Y/277V THREE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	480-208Y/120V TRANSFORMER. SEE RISER FOR SIZE. PROVIDE 4" HOUSEKEEPING PAD.
SPD	SURGE PROTECTION DEVICE (SPD); SEE DETAIL.
42"HD	JUNCTION BOX FOR HAND DRYER CONNECTION; SEE DETAIL 8/ SHEET E1-501.
0.3 hp XX-1	CONNECTION TO MOTOR. STARTER PROVIDED BY OTHERS UNLESS OTHERWISE NOTED. NUMBER INDICATES HORSEPOWER.
0.0 hp $M	FRACTIONAL HORSEPOWER MANUAL MOTOR STARTER, WITH OVERLOAD PROTECTION

ELECTRICAL FIXTURES LEGEND - COMMERCIAL

SYMBOL	DESCRIPTION
	TAMPER RESISTANT DUPLEX RECEPTACLE, 20 AMP, 120 VOLT
GFI	TAMPER RESISTANT GROUND FAULT RECEPTACLE. NEMA 5-20R DUPLEX. ALL RECEPTACLES INSTALLED OUTSIDE, WITHIN 6' OF A SINK OR IN A KITCHEN SHALL BE GFCI.
GFI	TAMPER RESISTANT GROUND FAULT DUPLEX RECEPTACLE, NEMA 5-20R MOUNTED ABOVE COUNTER BACKSPLASH, COORDINATE MOUNTING HEIGHTS WITH ARCHITECTURAL ELEVATIONS PRIOR TO ROUGH-IN.
GFI WP	WEATHERPROOF RECEPTACLE. NEMA 5-20R DUPLEX, CORROSION RESISTANT COVER.
	TAMPER RESISTANT QUAD RECEPTACLE. TWO NEMA 5-20R DUPLEX RECEPTACLES.
EWC	TAMPER RESISTANT GFI NEMA 5-20R QUAD RECEPTACLE FOR ELECTRIC WATER COOLER. COORDINATE LOCATION WITH PLUMBING CONTRACTOR.
	QUAD RECEPTACLE. TWO NEMA 5-20R DUPLEX RECEPTACLES ABOVE COUNTER

TELECOM LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
	PLYWOOD TELEPHONE BACKBOARD. SIZE AS INDICATED ON RISER.
(1)	DATA OUTLET ABOVE COUNTER OR HEIGHT SPECIFIED. MIMIMUM 1 1/4" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING FOR J-HOOK SYSTEM OR TO LOCAL CABLE TRAY (WITHIN 6") AS APPLICABLE WITH PULL STRING. 4" SQUARE BOX WITH A SINGLE-GANG OPENING AND PLASTER RING. COORDINATE MOUNTING HEIGHTS WITH ARCHITECT. CABLIGN TO BE PROVIDED BY STRUCTURED CABLING CONTRACTOR.
	DATA OUTLET MOUNTED AT 18" AFF OR HEIGHT SPECIFIED. MINIMUM 1 1/4" CONDUIT TO ABOVE NEAREST ACCESSIBLE CEILING FOR J-HOOK SYSTEM OR TO LOCAL CABLE TRAY (WITHIN 6") AS APPLICABLE WITH PULL STRING. 4" SQUARE BOX WITH A SINGLE-GANG OPENING AND PLASTER RING. CABLING TO BE PROVIDED BY STRUCTURED CABLING CONTRACTOR.
WAP	STRUCTURE MOUNTED JUNCTION BOX FOR WIRELESS ACCESS POINT IN OPEN CEILING APPLICATIONS. 4" SQUARE BOX WITH A TWO-GANG OPENING. STUB 1" EC FROM BOX TO J-HOOKS OR CABLE TRAY ABOVE ACCESSIBLE CEILING. CABLING TO BE PROVIDED BY STRUCTURED CABLING CONTRACTOR.
	CONDUIT SLEEVE, 4" SLEEVE UNLESS OTHERWISE NOTED. PROVIDED BY ELECTRICAL CONTRACTOR.
CABLE TRAY	CABLE TRAY - WIRE MESH 12" WIDE X 4" DEEP (8" RUNG SPACING) SUSPENDED FROM CEILING STRUCTURE UNLESS OTHERWISE NOTED CABLE TRAY SHALL BE COORDINATED WITH MECHANICAL DUCTWORK IN FIELD PRIOR TO INSTALLATION; CONTRACTOR SHALL PRODUCE COORDINATION DRAWINGS AND FIELD ADJUST AS REQUIRED TO MEET INTENT OF DRAWINGS.
TMGB	TELECOMMUNICATIONS MAIN GROUND BAR.

EM./LS LIGHTING FIXTURE SYMBOLS AND DEVICES

SYMBOL	DESCRIPTION
	FLUORESCENT OR LED FIXTURE WITH EMERGENCY BATTERY DRIVER. PROVIDE 1100 LUMEN INVERTER RATED FOR 90 MINUTE OPERATION. SEE FIXTURE SCHEDULE FOR FIXTURE TYPE, EMERGENCY DEVICE SHALL SUPPLEMENT FIXTURE.

LIGHTING FIXTURES SYMBOLS AND DEVICES LEGEND

SYMBOL	DESCRIPTION
	LED LIGHTING FIXTURE. SEE FIXTURE SCHEDULE. SUSPEND FOUR CORNERS WITH WIRE TO STRUCTURE. DO NOT ALLOW GRID ALONE TO SUPPORT FIXTURE.
	LED STRIP LIGHT FIXTURE
	RECESSED LED OR H.I.D. LIGHTING FIXTURE.
$3	THREE WAY SWITCH, 20 AMP, 120/277 VOLT, COOPER 1223, THREE WAY SWITCH, 20 AMP, 120/277 VOLT, COOPER 1223, OR EQUAL BY HUBBELL, LEVITON AND PASS & SEYMOUR.
$K	KEY OPERATED SWITCH
OS DT	CEILING MOUNTED OCCUPANCY SENSOR, DUAL TECHNOLOGY. SENSOR SWITCH CM PDT 10, WATT STOPPER #DT-300, COOPER OAC-DT OR EQUAL.
OS DTC	CORNER MOUNT ADDRESSABLE OCCUPANCY SENSOR, DUAL TECHNOLOGY. HUBBELL NXOS-LODT OR EQUAL BY ACUITY NLIGHT, WATT STOPPER DLM, OR GREENGATE. CONICAL PATTERN, MOUNT AS CLOSE TO CORNER OF ROOM AS POSSIBLE. MOUNT 10' AFF OR 6" BELOW CEILING (IF LOWER THAN 10'.) PROVIDE WITH RJ45 ADAPTER TO CONNECT TO ROOM CONTROLLER
$OC	WALL MOUNTED OCCUPANCY SENSOR AND SWITCH. INFRARED TECHNOLOGY WITH NEUTRAL, 120/277V RATED. WATT STOPPER #WS-250, OR EQUAL BY SENSOR SWITCH, AND LEVITON.
$L1	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF FOR 1 ZONE OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
$L2	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF FOR 2 ZONES OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
$P2	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF WITH DIMMING CONTROL FOR 2 ZONES OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
PP	CEILING MOUNTED OCCUPANCY SENSOR POWER PACK. SENSOR SWITCH PP-20, WATT STOPPER #BZ-100, COOPER SP-20, OR EQUAL.
PP NX	ADDRESSABLE ROOM CONTROLLER HUBBELL NXRC OR EQUAL BY ACUITY NLIGHT, WATTSTOPPER DLM.
PP NXD	ADDRESSABLE ROOM CONTROLLER W/ 0-10V DIMMING, HUBBEL NXRC OR EQUAL BY ACUITY NLIGHT, WATTSTOPPER DLM.

SECURITY DEVICES SYMBOL LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
X	CEILING MOUNTED SECURITY CAMERA LOCATION. CAMERA PROVIDED AND INSTALLED BY OTHERS. CABLING TO BE PROVIDED BY STRUCTURED CABLING CONTRACTOR. X=WP EXTERIOR WALL MOUNTED CAMERA. REFER TO DETAIL 2 & 3/ SHEET E1-503 FOR REQUIREMENTS.
DC	DOOR CONTACT, MINIMUM 1/2" CONDUIT. PROVIDE SINGLE GANG JUNCTION BOX AND PULL STRING. COORDINATE WITH SECURITY VENDOR; SEE DETAIL 13/ SHEET E1-501.
MD	SECURITY MOTION DETECTOR. CEILING MOUNTED. PROVIDE 1-GANG JUNCTION BOX. ROUTE (1) 1/2"C. FROM JUNCTION BOX TO NEAREST J-HOOK SYSTEM. PROVIDE PULL STRING.

EXISTING/DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	HALFTONE SYMBOL INDICATES EXISTING
	DASHED SYMBOL INDICATES REMOVED

SPECIAL SYSTEMS LEGEND

SYMBOL	DESCRIPTION
S	FLUSH-MOUNTED CEILING SPEAKER
S	WALL-MOUNTED SPEAKER.3/4" CONDUIT TO LOCAL ACCESSIBLE CEILING
S WP	EXTERIOR WEATHERPROOF SPEAKER; SEE DETAIL 1/ SHEET E1-503.

ELECTRICAL SHEET INDEX

LIST OF OWNER PREFERRED ALTERNATES ALTERNATES:

- Alternate 1: Provide Lithonia lay-in lighting fixtures
- Alternate 2A: Provide Best locks & latches with interchangeable cores
- Alternate 2B: Provide Precision exit devices
- Alternate 2C: Provide LCN 4111 closers
- Alternate 2D: Provide Select continuous hinges
- Alternate 2E: Provide Best Grand Master Key System
- Alternate 3A: Provide Zurn plumbing fixtures
- Alternate 3B: Provide TOTO Ecopower flush valves
- Alternate 3C: Provide Elkay water coolers
- Alternate 4: Provide Special-Lite integrated door assemblies
- Alternate 5: Provide BARD HVAC units for gymnasium only
- Alternate 6: Provide Apollo plumbing valves
- Alternate 7: (not used)
- Alternate 8: Provide Square D switchgear
- Alternate 9: All Work associated with Building 1
- Alternate 10: All Work associated with windows and HVAC replacement in the Gymnasium Building

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ELECTRICAL LEGEND AND NOTES

E1-001

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1. GENERAL:
   A. THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS, 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 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, 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. THE WORD "CONNECT" MEANS THAT THIS CONTRACTOR SHALL PROVIDE (SEE DEFINITION ABOVE) ALL DISCONNECTING MEANS, OVERCURRENT PROTECTION AND WIRING REQUIRED TO PLACE THE EQUIPMENT AND SYSTEMS IN PROPER OPERATING CONDITION AND TO COMPLY WITH CODE REQUIREMENTS.
   T. CONTRACTOR SHALL COORDINATE THE ROUGH-IN OF ALL OUTLET LOCATIONS WITH ARCHITECTURAL FLOOR PLANS, ELEVATIONS, AND MILLWORK SHOP DRAWINGS PRIOR TO ROUGH-IN.
   U. ELECTRICAL CONTRACTOR SHALL NOT SCALE PLANS. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATIONS OF ALL EQUIPMENT, UNLESS OTHERWISE NOTED.
   V. CONTRACTOR SHALL TEST ALL "LIFE SAFETY" EQUIPMENT AND SYSTEMS FOR PROPER FUNCTION AND OPERATION. UPON SUCCESSFUL COMPLETION OF TESTS, CONFIRMATION SHALL BE SENT TO THE ENGINEER OF RECORD IN THE FORM OF A LETTER STATING THE TESTS PERFORMED, THE RESULTS, AND THE DATE TESTS WERE SUCCESSFULLY COMPLETE. "LIFE SAFETY" EQUIPMENT AND SYSTEMS CONSIST OF THOSE AS SPECIFIED IN THE STATE BUILDING CODE, THE NATIONAL ELECTRICAL CODE, NFPA 101, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
   W. 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.
   X. 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.
   Y. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PROVIDING TEMPORARY POWER AND LIGHTING FOR ALL TRADES. AT NO TIME SHALL EXISTING BUILDING POWER SYSTEMS BE UTILIZED WITHOUT WRITTEN PERMISSION FROM THE OWNER.
   Z. COORDINATE LOCATION AND REQUIREMENTS FOR ELECTRICAL SERVICE WITH THE POWER COMPANY. WHERE MORE THAN ONE SERVICE IS SUPPLIED TO A BUILDING, PROVIDE IDENTIFICATION AT EACH SERVICE PER NEC 230-2(E).
   AA. THE CONTRACTOR SHALL PROVIDE A MINIMUM TWO WEEK NOTICE FOR ANY PLANNED UTILITY OUTAGES. WRITTEN AUTHORIZATION FROM THE OWNER SHALL BE PROVIDED PRIOR TO ANY OUTAGE. ALL PLANNED UTILITY OUTAGES SHALL BE COORDINATED WITH THE OWNER TO OCCUR DURING NON-OPERATING TIMES, INCLUDING NIGHTS, WEEKENDS AND HOLIDAYS. ALL PLANNED UTILITY OUTAGES SHALL INCLUDE PROVISIONS FOR PROPER BACK-UP OF ALL LIFE-SAFETY SYSTEMS AND INCLUDE AN APPROVED FIRE-WATCH PROGRAM AS REQUIRED BY THE LOCAL FIRE MARSHALL.
   BB. EACH BIDDER SHALL VISIT THE JOB SITE PRIOR TO BIDDING TO FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS AND TO ASCERTAIN THE EXTENT OF WORK REQUIRED. FAILURE TO VISIT SITE SHALL NOT EXCUSE CONTRACTOR FROM PERFORMING REQUIRED WORK NOR SHALL IT BE AN ACCEPTABLE REASON FOR REQUESTING ADDITIONS TO THE CONTRACT.

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, 1" FOR EXTERIOR WORK.
   L. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
   M. LIQUID-TIGHT METAL CONDUIT SHALL ONLY BE USED FOR FINAL CONNECTIONS TO EQUIPMENT AND ALL OTHER ROTATING AND VIBRATING EQUIPMENT, MAXIMUM LENGTH OF 3'-0".
   N. FLEXIBLE METAL CONDUIT, MINIMUM SIZE 3/8", SHALL ONLY BE USED FOR FINAL CONNECTION TO LIGHTING FIXTURES, MAXIMUM LENGTH OF 6'-0".
   O. 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.
   P. ALL CONDUIT BENDS/ELBOWS EMERGING FROM UNDERGROUND SHALL BE IMC AND SHALL EXTEND A MINIMUM OF 18" BELOW GRADE.
   Q. ALL UNDERGROUND RACEWAYS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM BITUMASTIC.
   R. ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATERTIGHT BY USE OF POLYETRA-FLUOROETHYLENE TAPE.
   S. THE USE OF AC OR NM CABLE IS NOT PERMITTED.
   T. MC CABLE IS NOT ALLOWED, EXCEPT FOR FINAL CONNECTION TO LIGHT FIXTURES. PER NOT 2,N.

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 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.
   F. ALL EXTERIOR BOXES SHALL BE WATER-TIGHT.

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. ALUMINUM CONDUCTOR MAY ONLY BE UTILIZED WHERE NOTED IN THE DRAWINGS.
   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. CONTROL WIRING MAY BE #14 AWG.
   E. CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 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. WIRING TO LIGHTING FIXTURES SHALL BE AS REQUIRED BY UL LABEL.
   I. 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. ALL SYSTEM FURNITURE CONNECTIONS SHALL COMPLY WITH NEC 605.
   O. 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.
   P. ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300-19.
   Q. THE ELECTRICAL CONTRACTOR SHALL FOLLOW AND APPLY THE TABLE BELOW, REGARDLESS WHAT THE PANEL SCHEDULE INDICATES, FOR SIZING ALL 120V, 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' - 255'	#6
277	0' - 125'	#12
277	126' - 200'	#10
277	201' - 330'	#8
277	331' - 525'	#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. WIRING DEVICES:
   A. WIRING DEVICES SHALL BE SPECIFICATION GRADE, MINIMUM, EQUAL TO COOPER QUALITY INDICATED BELOW OR AS MANUFACTURED BY HUBBELL, LEGRAND-PASS & SEYMOUR, LEVITON, OR APPROVED EQUAL, UNLESS OTHERWISE NOTED:

   SWITCHES (120V) SHALL BE AS FOLLOWS:

SINGLE-POLE 20 AMP	SEE SPECIFICATIONS
THREE-WAY 20 AMP	SEE SPECIFICATIONS
FOUR-WAY 20 AMP	SEE SPECIFICATIONS
SINGLE-POLE-KEY 20 AMP	SEE SPECIFICATIONS

   DUPLEX RECEPTACLES SHALL HAVE A NYLON FACE AND SHALL BE AS FOLLOWS:

20 AMP DUPLEX	SEE SPECIFICATIONS
20 AMP DUPLEX GFCI	SEE SPECIFICATIONS
20 AMP DUPLEX TAMPER	SEE SPECIFICATIONS
20 AMP DUPLEX GFCI-TAMPER	SEE SPECIFICATIONS

   THE PART NUMBERS ABOVE ARE FOR WIRING DEVICE TYPE ONLY. SEE BELOW FOR WIRING DEVICE COLOR AND PLATE MATERIAL/COLOR.

   B. SEE MOUNTING HEIGHT ELEVATION DETAIL FOR STANDARD MOUNTING HEIGHTS OF ALL DEVICES, UNLESS OTHERWISE NOTED.
   C. THE COLOR OF ALL WIRING DEVICES (SWITCHES AND RECEPTACLES) SHALL BE AS DIRECTED BY THE ARCHITECT, UNLESS OTHERWISE NOTED. ALL COVER PLATES SHALL BE 302 STAINLESS STEEL. COVER PLATES IN MASONRY WALLS SHALL BE OVERSIZE TYPE.
   D. EACH DUPLEX RECEPTACLE INDICATED TO BE ON A DEDICATED CIRCUIT SHALL BE 20 AMP TYPE.
   E. ADJACENT DEVICES SHALL HAVE A COMMON WALL PLATE.
   F. WEATHERPROOF COVERS SHALL BE "WHILE-IN-USE" SO PLUGS MAY BE INSTALLED WITHOUT COMPROMISING THE WP FUNCTION. COOPER #WIU-2 DOUBLE-GANG WITH CLEAR COVER OR APPROVED EQUAL.
   G. A MAXIMUM OF 10 GENERAL PURPOSE RECEPTACLES SHALL BE ON EACH BRANCH CIRCUIT.
   H. ALL WALL MOUNTED OCCUPANCY/VACANCY SENSORS/SWITCHES SHALL BE INSTALLED WITH AN EQUIPMENT GROUNDING CONDUCTOR.
   I. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8, INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.
   J. ALL GFCI RECEPTACLES SHALL HAVE AUTO-MONITORING / SELF-TEST FUNCTION AND REVERSE LINE-LOAD MISFIRE FUNCTION AND MEET ALL REQUIREMENTS OF UL 943 (LATEST EDITION).
   K. TAMPER-RESISTANT RECEPTACLES SHALL BE PROVIDED FOR ALL AREAS PER NEC 406.12, INCLUDING DWELLING UNITS, GUEST ROOMS AND GUEST SUITES OF HOTELS AND MOTELS, CHILD-CARE FACILITIES, PRESCHOOL AND ELEMENTARY EDUCATION FACILITIES, BUSINESS OFFICES/CORRIDORS/WAITING ROOMS AND THE LIKE IN CLINICS/MEDICAL/DENTAL OFFICES AND OUTPATIENT FACILITIES, ASSEMBLY OCCUPANCIES INCLUDING PLACES OF AWAITING TRANSPORTATION/GYMNASIUMS/SKATING RINKS/AUDITORIUMS, AND DORMITORIES/STUDENT HOUSING.

6. 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.
   E. LIGHTING FIXTURES MOUNTED IN OR ON CEILING SHALL BE SUPPORTED FROM STRUCTURE VIA 12 GAUGE STEEL WIRE. PROVIDE A MINIMUM OF FOUR WIRES, ONE ATTACHED TO EACH CORNER OF LAY-IN FIXTURES. RECESSED DOWNLIGHT FIXTURES SHALL BE SUPPORTED THE SAME. DO NOT SUPPORT RACEWAY OR FIXTURES FROM CEILING GRID OR DUCT WORK. USE U.L. LISTED GRID CLIPS ON ALL LAY-IN FIXTURES.

7. 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. TELECOMMUNICATIONS:
   A. FURNISH A COMPLETE TELEPHONE CONDUIT SYSTEM AS INDICATED ON THE DRAWINGS.
   B. TELECOMMUNICATION OUTLETS SHALL CONSIST OF A 4" SQUARE DEEP BOX WITH SINGLE GANG PLASTER RING. PROVIDE BLANK PLATE WITH KNOCKOUTS FOR OUTLETS, AS PERMANENT COVERS WILL BE PROVIDED BY A SEPARATE INSTALLER.
   C. PROVIDE MINIMUM 1" RACEWAY, UNLESS OTHERWISE NOTED, FROM EACH BOX TO ABOVE NEAREST ACCESSIBLE CEILING SPACE FOR J-HOOK SYSTEM OR TO CABLE TRAY AS APPLICABLE. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
   D. PROVIDE RACEWAYS FOR ALL EXTERIOR AND/OR EXPOSED LOCATIONS.
   E. PROVIDE GROUNDING FOR ALL TELEPHONE/DATA SYSTEMS AND EQUIPMENT PER REQUIREMENTS AND SPECIFICATIONS PROVIDED BY THE OWNERS DESIGNATED VENDOR.
   F. ALL LOW-VOLTAGE CABLING SHALL BE PLENUM-RATED.
   G. CONTRACTOR SHALL FURNISH AND INSTALL A #6 AWG GREEN INSULATED COPPER WIRE IN CONDUIT FROM THE MAIN ELECTRICAL GROUNDING BAR TO TELECOMMUNICATIONS GROUNDING BUS BAR.
   H. PROVIDE MOUNTING BACKBOARDS FOR COMMUNICATIONS EQUIPMENT. BACKBOARDS SHALL BE OF 3/4" TYPE AC, EXTERIOR PLYWOOD, PAINTED BOTH SIDES AND ALL EDGES WITH 2 COATS OF GRAY FLAME RETARDANT PAINT.

9. LIGHTING FIXTURES:
   A. TYPES AND MANUFACTURERS ARE SCHEDULED ON THE PLANS. EQUIVALENT FIXTURES BY OTHERS MAY BE SUBMITTED ONLY AS INDICATED ON THE PLANS AND ARE SUBJECT TO THE APPROVAL OF THE OWNER AND ENGINEER.
   B. ALL FIXTURES SHALL BE U.L. LISTED AND LABELED.
   C. DRIVERS SHALL BE AS INDICATED IN THE LIGHTING FIXTURE SCHEDULE OR AS OTHERWISE NOTED.
   D. ALL FIXTURES SHALL BE PROVIDED FOR PROPER VOLTAGE BASED ON THE CIRCUIT ASSIGNMENT INDICATED ON THE PLANS.
   E. CATALOG NUMBERS ARE FOR GENERAL IDENTIFICATION OF FIXTURES ONLY. ALL RELATED PARTS, SUCH AS PLASTER RINGS, JUNCTION BOXES, LOUVERS, SHIELDS, MOUNTING STEMS, CANOPIES, CONNECTORS, STRAPS, NIPPLES, HARDWARE, ACCESSORIES, ETC., TO FIT THEM PROPERLY TO THE CONSTRUCTION, SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR. CONTRACTOR SHALL PROVIDE SUITABLE TRIM AND APPURTENANCES TO MOUNT FIXTURES IN TYPE OF CEILING OR WALL AS SPECIFIED IN ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF CATALOG NUMBER GIVEN.
   F. ALL FIXTURES SHALL BE GROUNDED PER THE NEC.
   G. FIXTURES CONNECTED WITH FLEX TO THE RIGID RACEWAY PORTION OF THE WIRING SYSTEM SHALL CARRY A GREEN BONDING JUMPER WITHIN THE FLEX. THE JUMPER SHALL BE FASTENED TO BOTH THE FIXTURE AND THE RACEWAY SYSTEM WITH A STEEL CITY "G" CLIP OR APPROVED EQUIVALENT. PHASE AND GROUND CONDUCTORS RUN IN FLEX SHALL BE #12 AWG MINIMUM. MAXIMUM FLEX LENGTH SHALL BE 6'-0".
   H. MOUNT ALL FIXTURES PLUMB AND SQUARE WITH ROWS ALIGNED.
   I. SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF FIXTURES.
   J. CONTRACTOR SHALL COORDINATE FIXTURE TYPE AND TRIM WITH CEILING CONSTRUCTION AND ADJUST ACCORDINGLY WITHOUT ADDITIONAL EXPENSE.
   K. ALL LIGHTING FIXTURES SHALL BE THERMALLY PROTECTED PER THE NEC.
   L. FIXTURES IN CONTACT WITH INSULATION SHALL BE IC RATED.

10. LIGHTING CONTROLS:
   A. FURNISH AND INSTALL WHERE SHOWN AN ELECTRONIC TIME CONTROLLER AS MANUFACTURED BY TORK (NSI), PARAGON, INTERMATIC, OR APPROVED EQUAL. CONTACTS SHALL BE SPST OR AS INDICATED, RATED 120V AT 20A BALLAST LOAD, AND MINIMUM 30,000 SWITCHING CYCLES. PROVIDE WITH THE NUMBER OF CHANNELS INDICATED (MINIMUM 2 CHANNELS) OR AS REQUIRED TO MEET THE INTENT OF THE DRAWINGS. EACH CHANNEL SHALL BE INDIVIDUALLY PROGRAMMABLE WITH 128 ON-OFF OPERATIONS PER WEEK PLUS FOUR SEASONAL SCHEDULES TO MODIFY THE BASIC PROGRAM AND A HOLIDAY SCHEDULE THAT OVERRIDES THE WEEKLY OPERATION. THE CONTROLLER SHALL BE PROVIDED WITH A PHOTOELECTRIC SENSOR, ASTRONOMIC DIAL, AND A BATTERY BACKED-UP, NON-VOLITILE MEMORY FOR SCHEDULES AND TIME CLOCK.
   B. LIGHTING CONTACTORS SHALL SWITCH LOADS AT THE VOLTAGE AND AMPERE RATING INDICATED AND SHALL HAVE THE NUMBER OF POLES INDICATED ON THE DRAWINGS OR AS REQUIRED. THE CONTACTOR AND CONTACTS SHALL BE CONTINUOUSLY RATED FOR THE LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH-INRUSH BALLAST LOADS.
   C. ALL LIGHTING CONTACTORS SHALL BE ELECTRICALLY HELD AND BE INSTALLED IN A NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED.

11. EQUIPMENT IDENTIFICATION:
   A. PROVIDE ENGRAVED PHENOLIC NAMEPLATES FOR ALL ELECTRICAL EQUIPMENT SUPPLIED FOR THE PROJECT, INCLUDING BUT NOT LIMITED TO, WIRING TROUGHS, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, SWITCHBOARDS, SWITCHGEARS, MOTOR CONTROL CENTERS (MCC), BUSWAYS, GENERATORS, AUTOMATIC TRANSFER SWITCHES (ATS), UNINTERRUPTIBLE POWER SUPPLY (UPS), POWER DISTRIBUTION UNITS (PDU), FLOOR/REMOTE DISTRIBUTION CABINETS (FDC/RDC), STATIC TRANSFER SWITCHES (STS), ETC. NAMEPLATE SHALL INDICATE THE DEVICE NAME, SYSTEM VOLTAGE (VOLTAGE/PHASE/WIRE), AND UPSTREAM DEVICE AND CIRCUIT. PROVIDE NAMEPLATES FOR CIRCUIT BREAKERS IN SWITCHGEARS, SWITCHBOARDS AND DISTRIBUTION PANELS.
   B. NAMEPLATE COLORS SHALL BE AS FOLLOWS:

120/208V EQUIPMENT	BLUE SURFACE WITH WHITE CORE
277/480 EQUIPMENT	BLACK SURFACE WITH WHITE CORE
FIRE ALARM SYSTEMS	BRIGHT RED SURFACE WITH WHITE CORE
SECURITY SYSTEMS	BURGUNDY SURFACE WITH WHITE CORE
TELEPHONE SYSTEMS	ORANGE SURFACE WITH WHITE CORE
DATA SYSTEMS	BROWN SURFACE WITH WHITE CORE

   C. NAMEPLATES UP TO 8 SQUARE INCHES SHALL NOT BE LESS THAN 1/16" THICK. NAMEPLATES LARGER THAN 8 SQUARE INCHES SHALL NOT LESS THAN 1/8" THICK.
   D. LETTERING HEIGHT SHALL BE 1/2" MINIMUM.
   E. NAMEPLATES SHALL BE ATTACHED WITH SELF-DRILLING/SELF-TAPPING SCREWS, EXCEPT RIVETS SHALL BE USED WHERE END OF SCREW IS NOT PROTECTED. QUANTITY AS FOLLOWS:

UP TO 5 SQUARE INCHES:	2 SCREWS
5 TO 12 SQUARE INCHES:	4 SCREWS
ABOVE 12 SQUARE INCHES:	6 SCREWS

12. DISCONNECTS:
   A. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE IN NEMA 1 ENCLOSURES, UNLESS OTHERWISE NOTED, FUSED OR NON-FUSED AS INDICATED. SWITCHES SHALL HAVE REJECTION-TYPE FUSE CLIPS. SWITCHES SHALL BE BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. WHERE FED FROM A LOAD CENTER, GENERAL-DUTY SWITCHES SHALL BE PERMITTED.
   B. FUSES LESS THAN 60A SHALL BE CLASS RK5, DUAL-ELEMENT, TIME-DELAY WITH INDICATION
   C. FUSES GREATER THAN 60A SHALL BE CLASS J, DUAL-ELEMENT, TIME-DELAY WITH INDICATION.
   D. A SET OF 3 SPARE FUSES OF EACH SIZE AND TYPE SHALL BE FURNISHED TO THE OWNER

13. PANELBOARDS:
   A. PANELBOARDS SHALL BE PROVIDED AS MANUFACTURED BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. ALL NEW EQUIPMENT FOR THE PROJECT SHALL BE BY THE SAME MANUFACTURER. LOAD CENTER TYPE PANELBOARDS SHALL BE USED WHERE THE PANELBOARD SERVES A DWELLING UNIT.
   B. ALL BUSSING, INCLUDING NEUTRAL AND GROUND, SHALL BE COPPER.
   C. ALL BREAKERS SHALL BE AUTOMATIC THERMAL-MAGNETIC TYPE MOLDED CASE BOLT-ON TYPE, CALIBRATED FOR 40 DEGREE C, OR AMBIENT COMPENSATION, UNLESS OTHERWISE NOTED.
   D. PANELS SHALL BE FULLY RATED (AIC). NO SERIES AIC RATINGS ARE ALLOWED.
   E. PANELS SHALL HAVE FULL SIZE EQUIPMENT GROUNDING BARS AND NEUTRAL BARS, EXCEPT WHERE INDICATED TO BE 200%.
   F. ALL PANELBOARD AND BREAKER LUGS SHALL BE SIZED AND RATED PER THE CONDUCTOR SIZE AND MATERIAL.
   G. LIGHTING AND APPLIANCE PANELS (100A-600A) SHALL HAVE FRONT ACCESSIBLE HINGED DOOR-IN-DOOR COVERS WITH DEAD FRONT, SHALL BE 20" WIDE MINIMUM WITH MINIMUM 4" WIDE WIRING GUTTERS.
   H. DISTRIBUTION PANELS (600A-1200A) SHALL HAVE FRONT ACCESSIBLE DEAD FRONT COVERS.
   I. PROVIDE HANDLE LOCK-ON DEVICES FOR ALL CIRCUIT BREAKERS CONNECTED TO EMERGENCY, EXIT, NIGHT LIGHTING, FIRE ALARM, TELEPHONE BOARDS, AND SECURITY SYSTEMS.
   J. BREAKERS USED FOR SWITCHING SHALL BE SWITCHING DUTY (SWD) RATED.
   K. BREAKERS USED FOR HEATING, AIR-CONDITIONING AND/OR REFRIGERATION SHALL BE HACR RATED.
   L. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8, INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.
   M. ALL OVERCURRENT DEVICES WHICH COMPRISE THE EMERGENCY SYSTEM OR LEGALLY REQUIRED STANDBY SYSTEM SHALL BE SELECTIVELY COORDINATED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE MANUFACTURER DOCUMENTATION INDICATING COMPLIANCE WITH THE SELECTIVE COORDINATION REQUIREMENTS PER THE NEC.
   O. ALL PANELBOARDS SHALL HAVE METAL DIRECTORY FRAME. FOR EACH PANELBOARD, PROVIDE TYPED CIRCUIT DIRECTORY PER NEC 408.4. SPARE CIRCUIT BREAKERS SHALL BE LABELED SPARE AND IN THE OFF POSITION.
   P. ALL CIRCUIT BREAKERS RATED 1200A OR HIGHER, OR CAPABLE OF BEING RATED 1200A OR HIGHER (I.E. ADJUSTABLE LONG-TIME PICKUP OR REPLACEABLE TRIP/RATING PLUG), SHALL BE PROVIDED WITH AN ENERGY-REDUCING MAINTENANCE SWITCH WITH LOCAL STATUS INDICATOR PER NEC 240.87(B).
   Q. ALL GROUNDING TERMINAL BUSSES OF PANELBOARDS SERVING THE SAME PATIENT VICINITY SHALL BE BONDED TOGETHER WITH 1#10 AWG GREEN INSULATED COPPER GROUNDING CONDUCTOR. THE CONDUCTOR SHALL BE CONTINUOUS EXCEPT THAT IT MAY BE BROKEN AT THE PANELBOARD GROUND BAR IN ORDER TO TERMINATE.

14. 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.

15. 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.

16. ELECTRICAL COORDINATION WITH OTHER TRADES:
   A. THE ELECTRICAL CONTRACTOR SHALL CONNECT AND/OR PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT SUPPLIED BY OTHERS APPLICABLE TO THE PROJECT, INCLUDING BUT NOT LIMITED TO, MECHANICAL, PLUMBING, FIRE PROTECTION AND SUPPRESSION, OWNER FURNISHED, KITCHEN, LABORATORY, ETC. UNLESS OTHERWISE NOTED.
   B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH-IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.
   C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL MOTOR STARTER SWITCHES, DISCONNECT SWITCHES, RECEPTACLES, ETC. TO MECHANICAL AND PLUMBING EQUIPMENT. ALL STARTERS, OTHER THAN MANUAL STARTER SWITCHES, SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY THE ELECTRICAL CONTRACTOR.
   D. ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO ORDERING OR INSTALLING. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF LACK OF COORDINATION WILL BE REMOVED AND INSTALLED CORRECTLY AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.
   E. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT RUNS AND LIGHT FIXTURE LOCATIONS ABOVE THE CEILING WITH OTHER TRADES PRIOR TO INSTALLATION.
   F. ALL DUCT SMOKE DETECTORS SHALL BE PROVIDED AND CONNECTED BY THE ELECTRICAL CONTRACTOR, BUT INSTALLED BY THE MECHANICAL CONTRACTOR.
   G. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY OUTLETS FOR HEAT TAPE CONNECTIONS FOR MECHANICAL SYSTEMS. PROVIDE CLASS B (30mA) GFCI PROTECTION ON THE BREAKER SUPPLYING THE HEAT TAPE.
   H. THE ELECTRICAL CONTRACTOR SHALL PROVIDE 120V POWER AT EACH HVAC UNIT HAVING A CONTROLS POWER SUPPLY. CIRCUIT(S) SHALL BE DEDICATED 20A SERVING A MAXIMUM OF 10 HVAC UNITS PER CIRCUIT. COORDINATE ALL LOCATIONS WITH THE MECHANICAL CONTRACTOR.

17. DEMOLITION NOTES:
   A. 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.
   B. 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.
   C. 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.
   D. 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.
   E. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL TOOLS, EQUIPMENT, LABOR, ETC. IN ORDER TO ACCOMPLISH THE DEMOLITION PORTION OF THE PROJECT.
   F. 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.
   G. 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.
   H. 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.
   I. 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.
   J. 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.
   K. 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.
   L. WHERE NEW CEILINGS CONFLICT WITH EXISTING ELECTRICAL WORK WHICH IS TO REMAIN, RELOCATE THE ELECTRICAL WORK INVOLVED TO CLEAR THE NEW CONSTRUCTION.
   M. 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.
   N. WHERE EXISTING BRANCH CIRCUITS AND SYSTEMS ARE INTERRUPTED BY NEW WORK OR SYSTEMS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, ETC.), EXTEND AND RECONNECT THOSE EXECUTION OF THIS CONTRACT, PROVIDE TEMPORARY CONNECTIONS UNTIL FINAL CONNECTIONS ARE COMPLETE.

18. COORDINATION DRAWINGS:
   A. THE MECHANICAL CONTRACTOR SHALL ORGANIZE COORDINATION MEETINGS TO DEVELOP A SET OF DRAWINGS WITH ALL CONTRACTORS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, IT/DATA, SECURITY AND GENERAL). THE MECHANICAL CONTRACTOR WILL HAVE THE LEAD RESPONSIBILITY FOR THE COORDINATION DRAWINGS. THE MECHANICAL CONTRACTOR SHALL PRODUCE THE ORIGINAL DRAWINGS AND FORWARD THE DRAWINGS TO EACH OF THE OTHER CONTRACTORS FOR THEM TO ADD THEIR SYSTEMS TO THIS SET OF COORDINATION DRAWINGS. THE CONTRACTORS WILL DEVELOP THE DRAWINGS IN THIS ORDER: MECHANICAL, FIRE PROTECTION, PLUMBING, ELECTRICAL, IT/DATA (INCLUDING CABLE TRAY), SECURITY, AND GENERAL. THIS SHALL ALSO BE THE ORDER OF PRECEDENCE FOR INSTALLATION OF SYSTEMS. ANY RELOCATION OF SYSTEM ROUTINGS WILL BE FOUND IN THE COORDINATION PHASE AND NOTICED BY EACH OF THE CONTRACTORS. THESE DRAWINGS, WHEN COMPLETED, SHALL BE SIGNED OFF BY ALL OF THE ABOVE LISTED PARTIES. DRAWINGS SHALL BE COMPLETED PRIOR TO PURCHASE, FABRICATION OR INSTALLATION OF EQUIPMENT AND/OR SYSTEMS. THE FOLLOWING ITEMS REPRESENT THE MINIMUM REQUIREMENTS FOR SHOP DRAWINGS AND COORDINATION DRAWINGS:
      1. ALL SHOP AND COORDINATION DRAWINGS WILL BE 1/4"=1'-0" SCALE.
      2. DRAWINGS WILL BE ORIGINAL DRAWINGS AND NOT OVERLAYS OF THE CONTRACT/DESIGN DRAWINGS.
      3. COORDINATION DRAWINGS WILL BE DRAWN ON REPRODUCIBLE MATERIAL 48"x36".
      4. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
      5. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPILED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, FIRE PROTECTION, IT/DATA, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.

19. TESTING AND DOCUMENTATION:
   A. TESTING AND DOCUMENTATION SHALL BE PROVIDED AS FOLLOWS:
      1. GFCI EQUIPPED BREAKERS SHALL BE PERFORMANCE TESTED.
      2. LIGHTING CONTROL SYSTEMS SHALL BE TESTED FOR PROPER OPERATION OF SETPOINTS.

20. COMMISSIONING:
   A. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR EQUIPMENT/SYSTEM START-UP AND TESTING. THE ELECTRICAL CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR EQUIPMENT/SYSTEM COMMISSIONING AS DIRECTED BY THE COMMISSIONING AUTHORITY (CxA). THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE COMMISSIONING AUTHORITY AND PROVIDE ALL NECESSARY TIME, EQUIPMENT, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT.

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No.	Date	Description

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PROJECT #: 02103.000
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ELECTRICAL NOTES

E1-002

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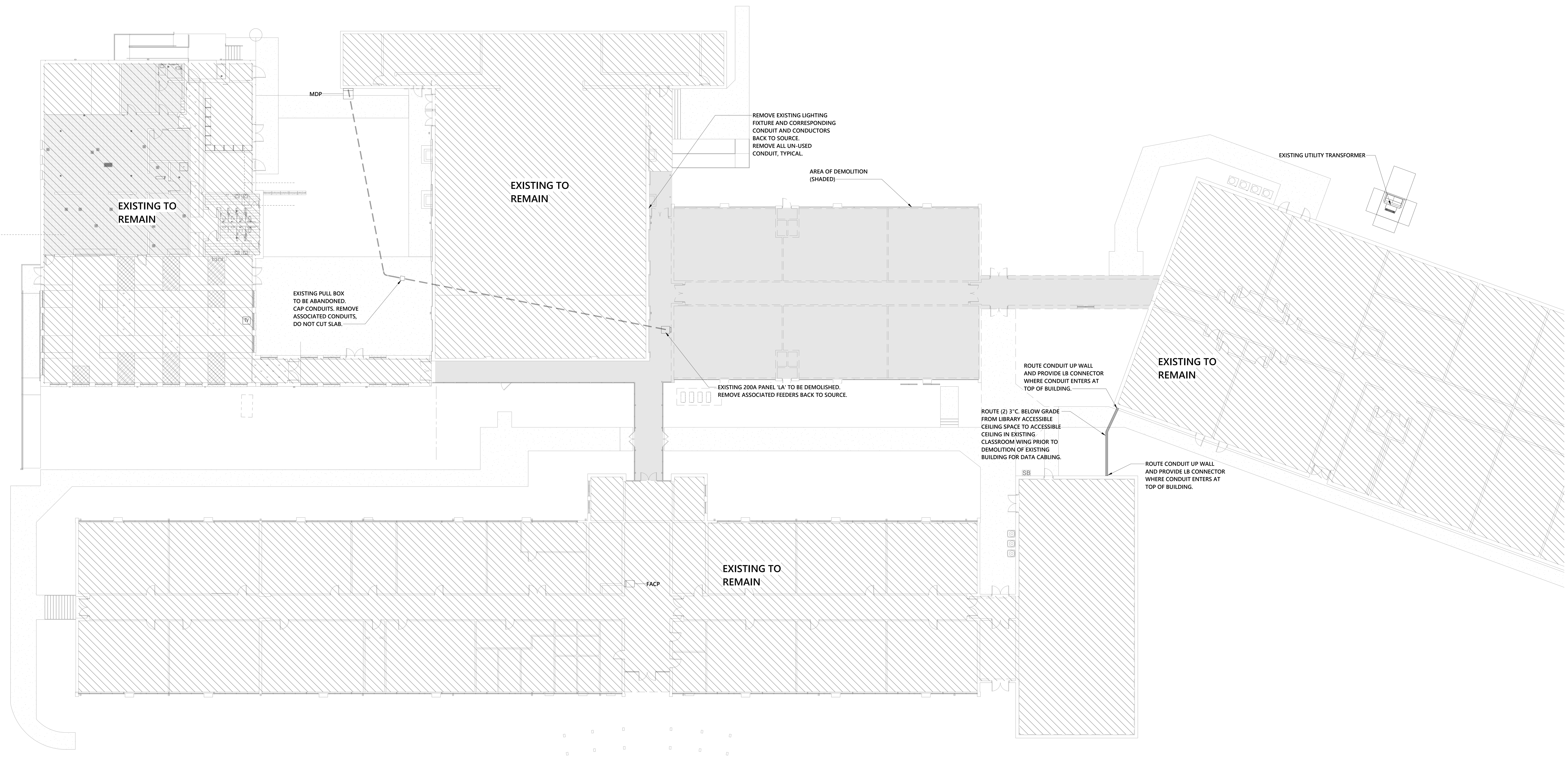
GENERAL NOTES

A. SWITCHBOARDS, PANELBOARDS, METER SOCKET ENCLOSURES AND MOTOR CONTROL CENTERS SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.
B. FOR ALL RELOCATED MECHANICAL EQUIPMENT, RELOCATE ASSOCIATED ELECTRICAL CONNECTIONS AND EXTEND FEEDERS AS REQUIRED TO NEW EQUIPMENT LOCATIONS. SEE NEW WORK PLAN FOR NEW LOCATIONS.
C. DASHED ARCHITECTURAL LINES INDICATE DEMOLITION. DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES IN WALLS AND CEILINGS. TYPICAL IN ALL AREAS UNLESS OTHERWISE NOTED. COORDINATE WITH OTHER TRADES AS REQUIRED TO FACILITATE COMPLETE DEMOLITION.
D. CONTRACTOR SHALL MAKE SURE TO MAINTAIN CONTINUITY OF ELECTRICAL DEVICES THAT ARE OUTSIDE AREA OF WORK THAT ARE INTENDED TO REMAIN ENERGIZED.
E. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHT FIXTURES TO REMAIN.
F. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
G. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING POWER DEVICES TO REMAIN.
H. HATCHED AREAS ARE NOT IN SCOPE OF WORK.



1 OVERALL ELECTRICAL PLAN - DEMOLITION - PHASE 2
1/16" = 1'-0"

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OVERALL FIRST FLOOR POWER PLAN - DEMOLITION

E1-011

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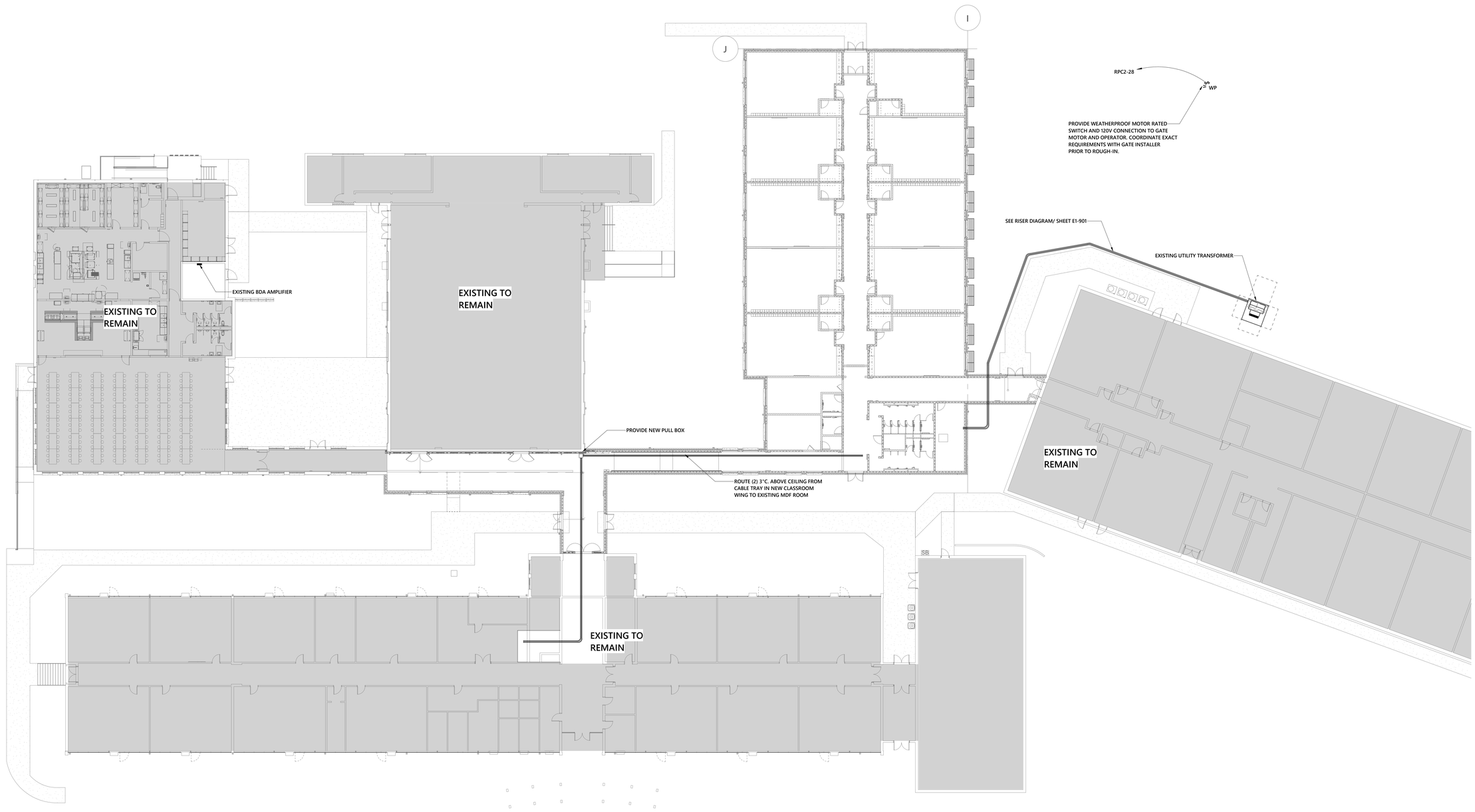

1 **OVERALL ELECTRICAL PLAN - PHASE 2**
1/16" = 1'-0"

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OVERALL FIRST FLOOR POWER PLAN - NEW WORK

E1-012

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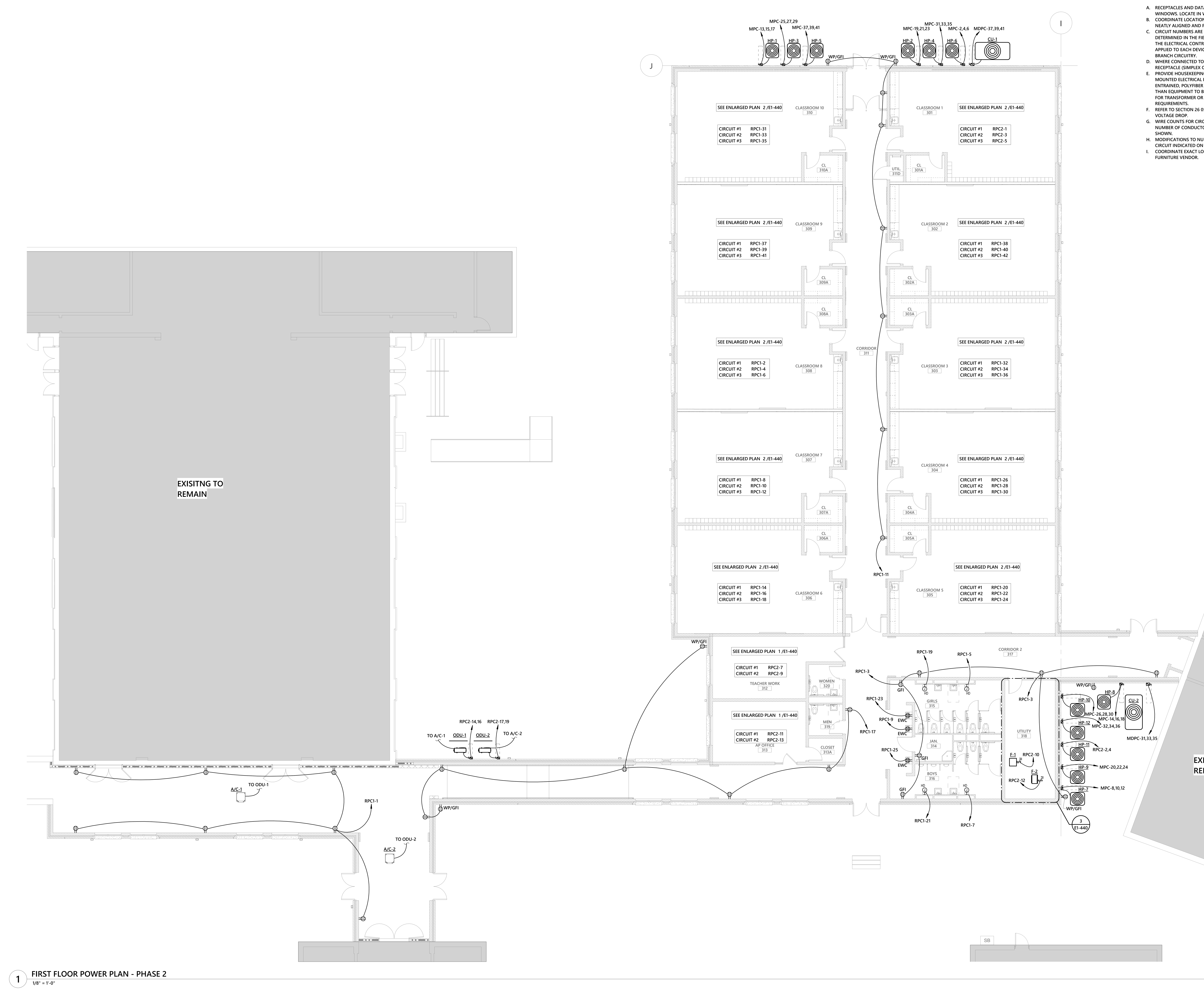

1 FIRST FLOOR POWER PLAN - PHASE 2
1/8" = 1'-0"

GENERAL NOTES

A. RECEPTACLES AND DATA OUTLETS SHALL NOT BE MOUNTED IN TRIM OF WINDOWS. LOCATE IN WHERE FULL WALL IS AVAILABLE.
B. COORDINATE LOCATION OF ALL FLOOR BOXES IN THE SAME AREA SHALL BE NEATLY ALIGNED AND PARALLEL TO BUILDING LINES.
C. CIRCUIT NUMBERS ARE DIAGRAMMATIC. EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD AND REFLECTED ON AS-BUILT DOCUMENTATION BY THE ELECTRICAL CONTRACTOR. THE ASSOCIATED CIRCUIT NUMBERS THAT ARE APPLIED TO EACH DEVICE AND PIECE OF EQUIPMENT INFERS INTERCONNECTING BRANCH CIRCUITRY.
D. WHERE CONNECTED TO A 20A BRANCH CIRCUIT SUPPLYING AN INDIVIDUAL RECEPTACLE (SIMPLEX OR DUPLEX), THE RECEPTACLE SHALL BE RATED AT 20A.
E. PROVIDE HOUSEKEEPING PADS FOR ALL FLOOR MOUNTED AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE, 4" WIDER AND 4" LONGER THAN EQUIPMENT TO BE PLACED ON IT. REFER TO ELECTRICAL DETAIL DRAWINGS FOR TRANSFORMER OR SWITCHGEAR PADS THAT MAY EXCEED THESE REQUIREMENTS.
F. REFER TO SECTION 26 0519 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.
G. WIRE COUNTS FOR CIRCUIT CONDUCTORS ARE NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.
H. MODIFICATIONS TO NUMBER OF CONDUCTORS IN HOME RUNS IN ADDITION TO CIRCUIT INDICATED ON THIS DRAWING ARE PROHIBITED.
I. COORDINATE EXACT LOCATION OF ALL FLOOR BOXES WITH ARCHITECT AND FURNITURE VENDOR.

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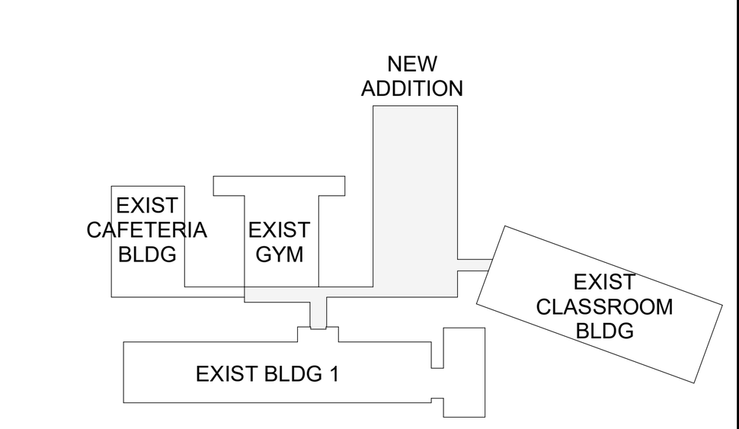
FIRST FLOOR POWER PLAN - NEW WORK



KEYPLAN

E1-111

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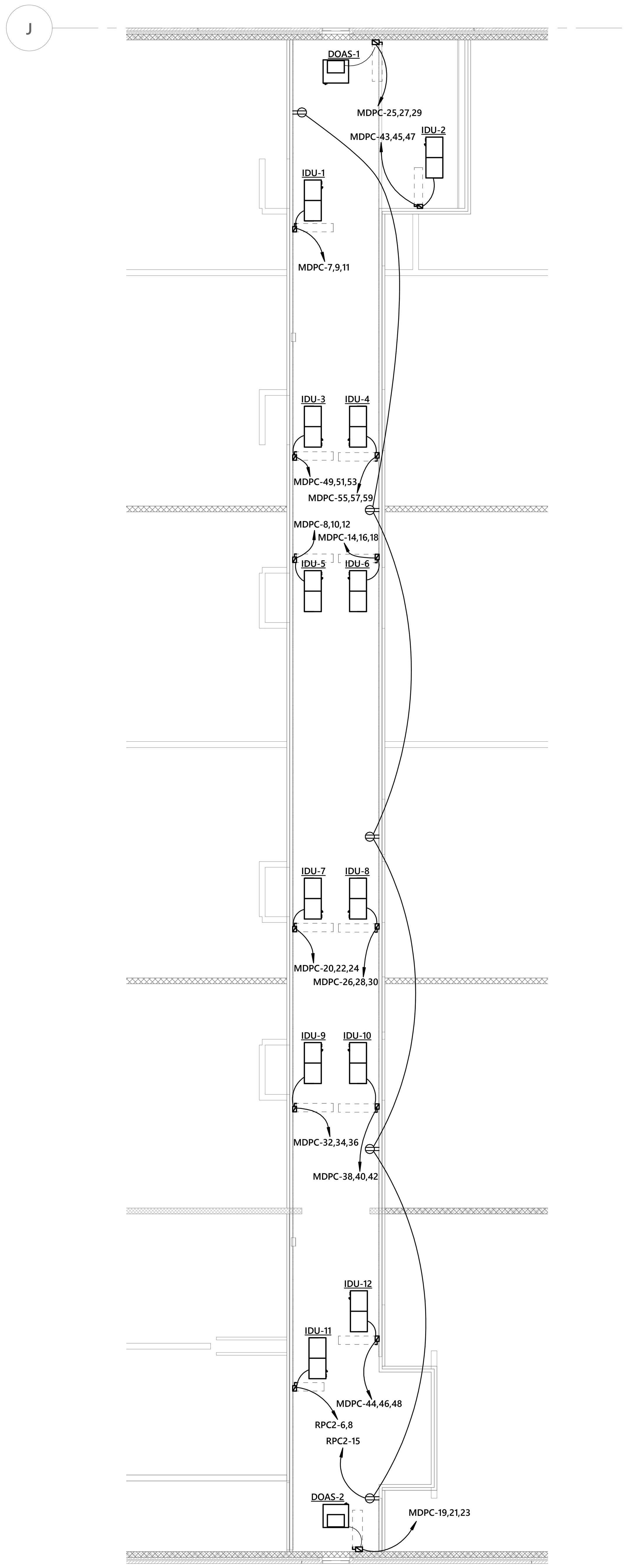
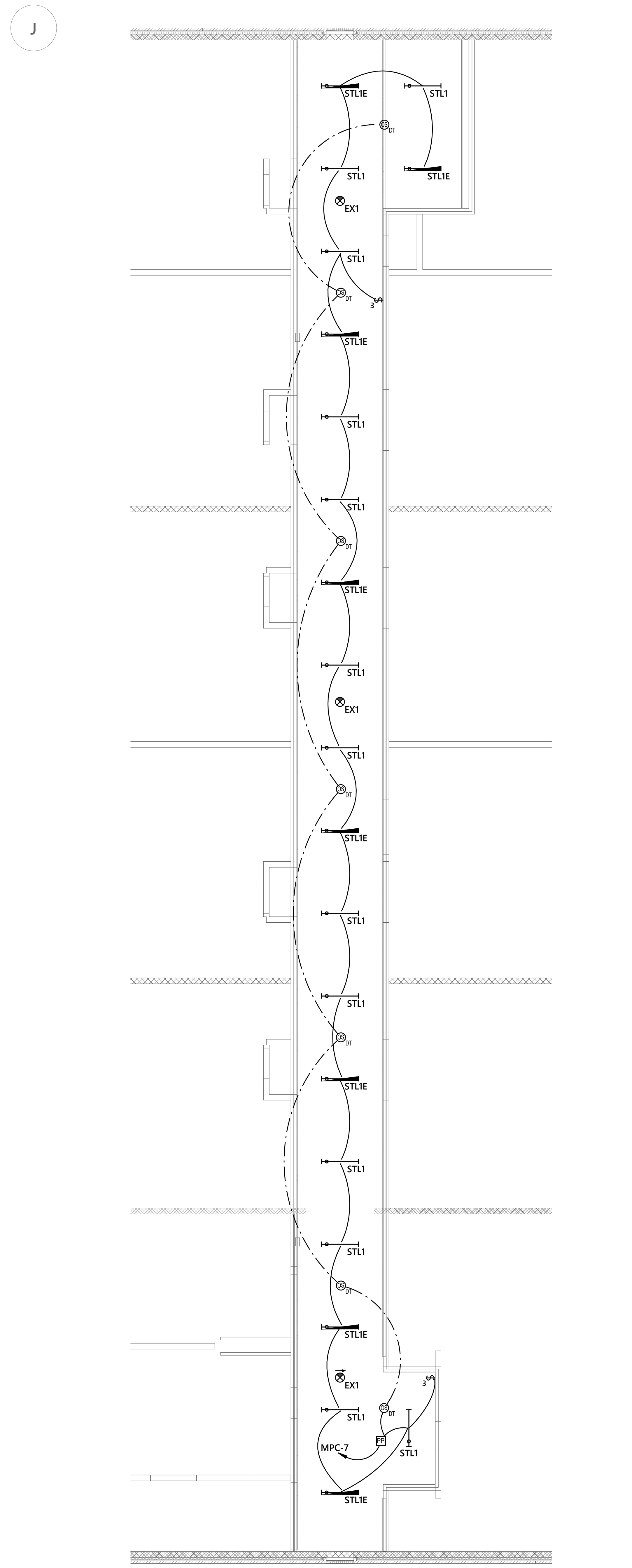
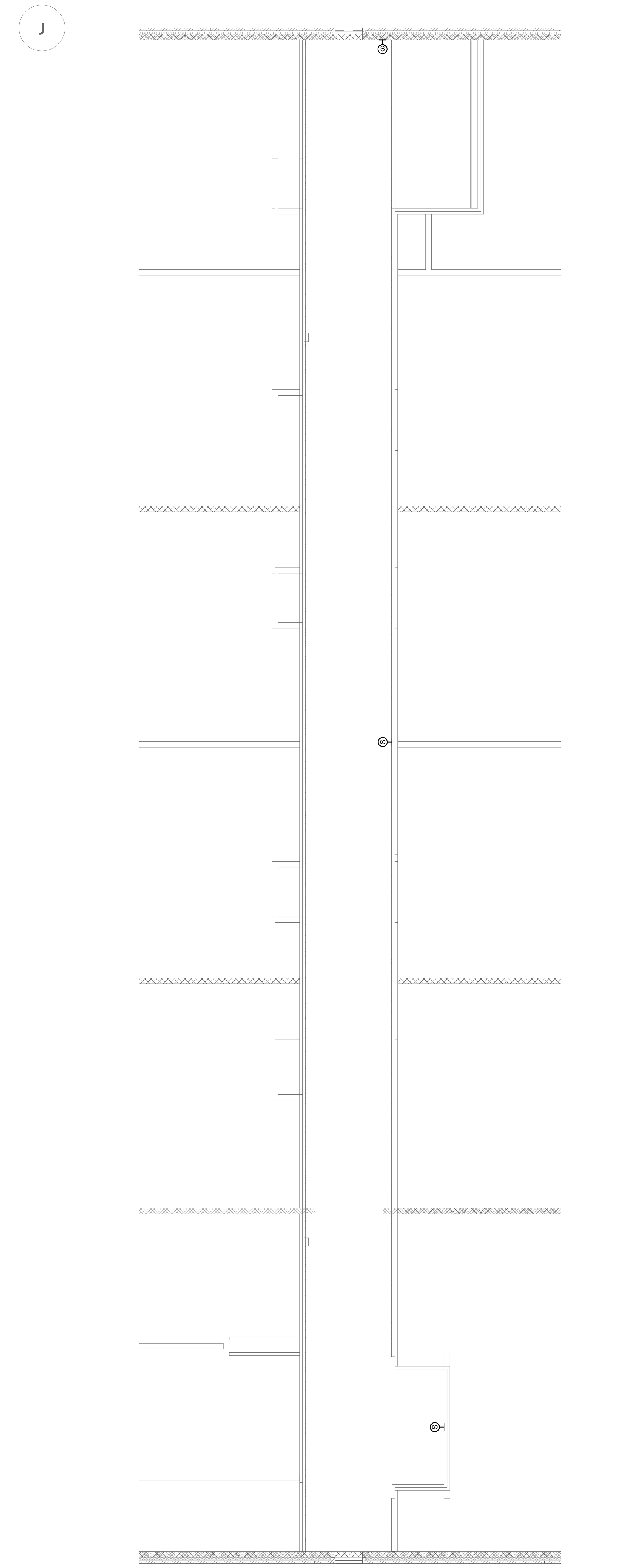
E. PROVIDE HOUSEKEEPING PADS FOR ALL FLOOR MOUNTED AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE, 4" WIDER AND 4" LONGER THAN EQUIPMENT TO BE PLACED ON IT. REFER TO ELECTRICAL DETAIL DRAWINGS FOR TRANSFORMER OR SWITCHGEAR PADS THAT MAY EXCEED THESE REQUIREMENTS.
F. REFER TO SECTION 26 0519 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.
G. WIRE COUNTS FOR CIRCUIT CONDUCTORS ARE NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.
H. MODIFICATIONS TO NUMBER OF CONDUCTORS IN HOME RUNS IN ADDITION TO CIRCUIT INDICATED ON THIS DRAWING ARE PROHIBITED.
I. COORDINATE EXACT LOCATION OF ALL FLOOR BOXES WITH ARCHITECT AND FURNITURE VENDOR.



1 MECHANICAL LOFT POWER PLAN - PHASE 2
1/8" = 1'-0"



2 MECHANICAL LOFT LIGHTING PLAN - PHASE 2
1/8" = 1'-0"



3 MECHANICAL LOFT SYSTEMS PLAN - PHASE 2
1/8" = 1'-0"

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MECHANICAL LOFT ELECTRICAL PLANS - NEW WORK

E1-112

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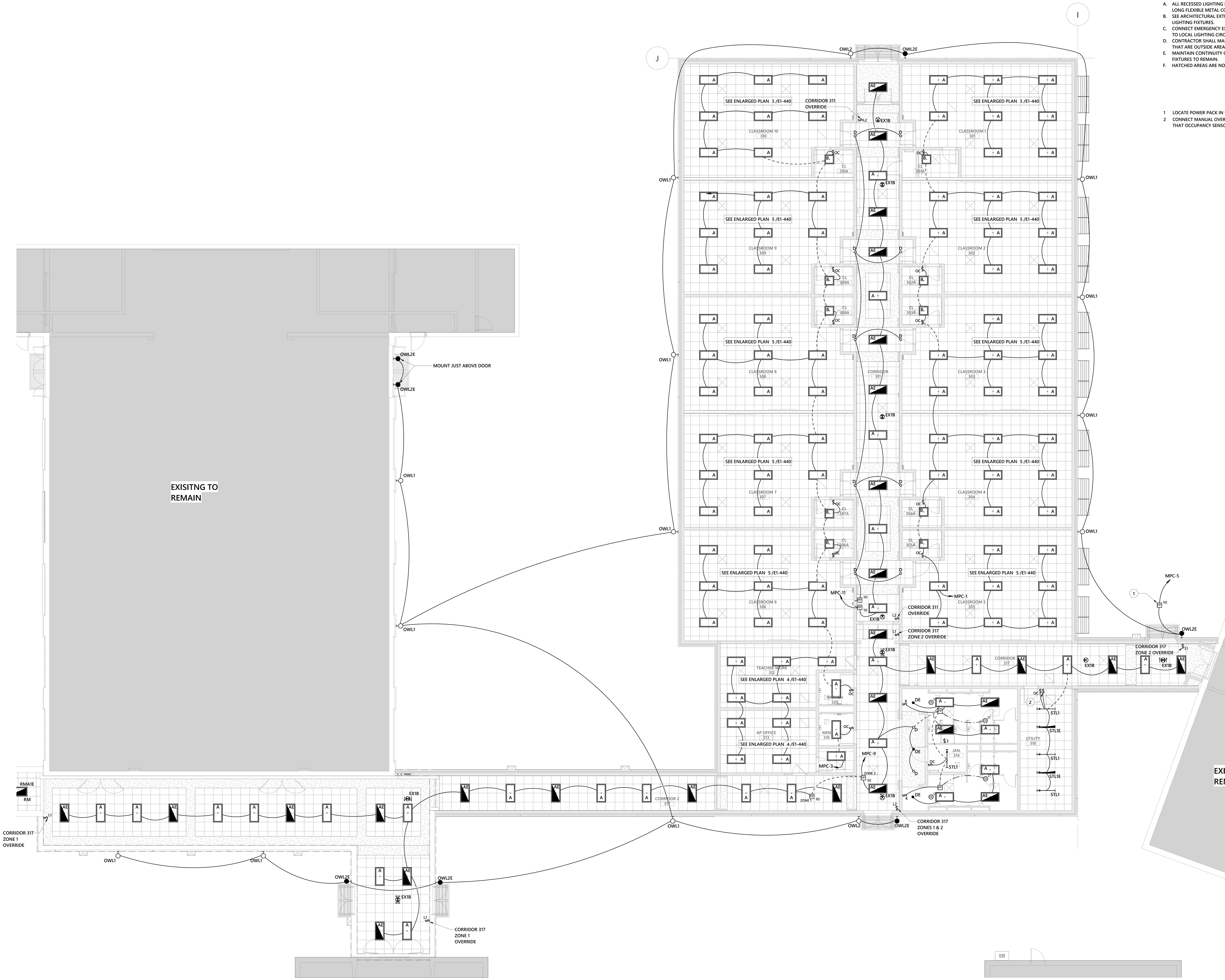
GENERAL NOTES

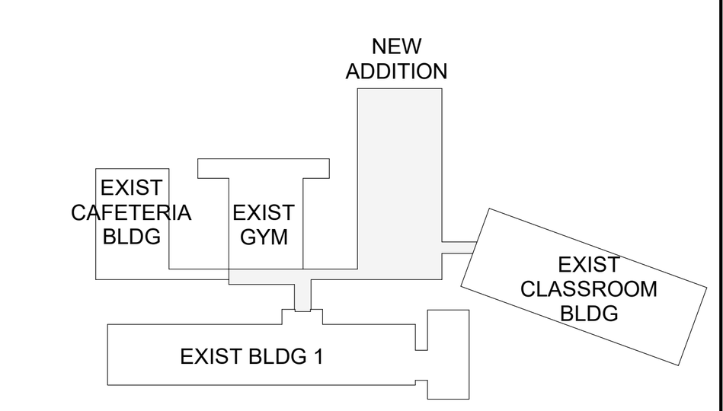
A. ALL RECESSED LIGHTING FIXTURES IN LAY-IN CEILING SHALL BE INSTALLED WITH 6'-0" LONG FLEXIBLE METAL CONDUIT.
B. SEE ARCHITECTURAL EXTERIOR ELEVATIONS FOR MOUNTING HEIGHTS OF EXTERIOR LIGHTING FIXTURES.
C. CONNECT EMERGENCY EXIT SIGNS AND THE UNSWITCHED INPUT OF BATTERY PACKS TO LOCAL LIGHTING CIRCUIT, AHEAD OF SWITCHING.
D. CONTRACTOR SHALL MAKE SURE TO MAINTAIN CONTINUITY OF ELECTRICAL DEVICES THAT ARE OUTSIDE AREA OF WORK THAT ARE INTENDED TO REMAIN ENERGIZED.
E. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHT FIXTURES TO REMAIN.
F. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

KEYED NOTES

1 LOCATE POWER PACK IN UTILITY ROOM.
2 CONNECT MANUAL OVERRIDE SWITCH IN PARALLEL WITH OCCUPANCY SENSOR SO THAT OCCUPANCY SENSOR MAY BE OVERRIDDEN FOR PERSONAL SAFETY.



1 FIRST FLOOR LIGHTING PLAN - NEW WORK - PHASE 2
1/8" = 1'-0"



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FIRST FLOOR LIGHTING PLAN - NEW WORK

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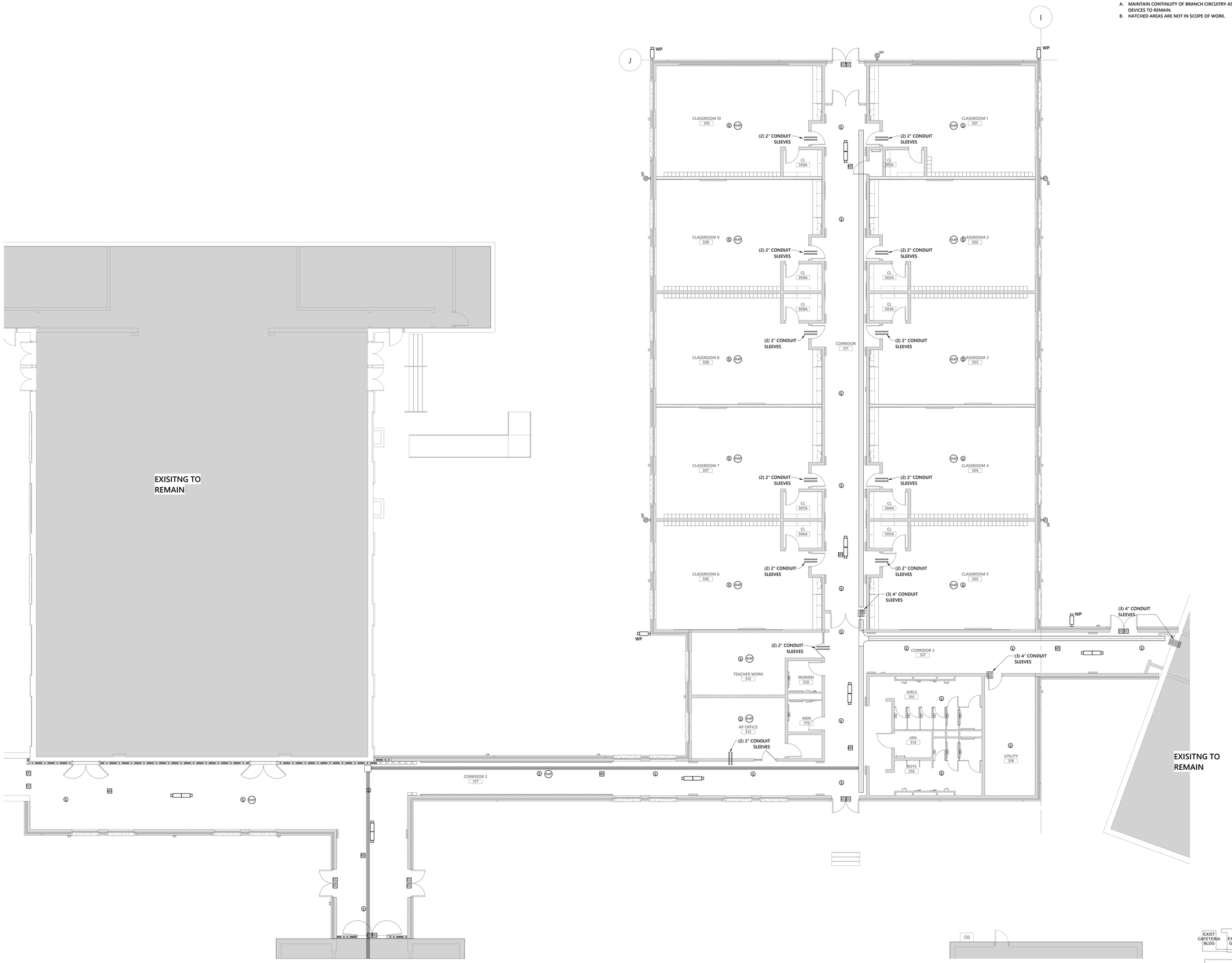
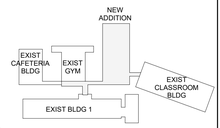
GENERAL NOTES

A. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
B. HATCHED AREAS ARE NOT IN SCOPE OF WORK.



1 FIRST FLOOR SYSTEMS PLAN - PHASE 2
1/8" = 1'-0"



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FIRST FLOOR SPECIAL SYSTEMS PLAN - NEW WORK

E1-311
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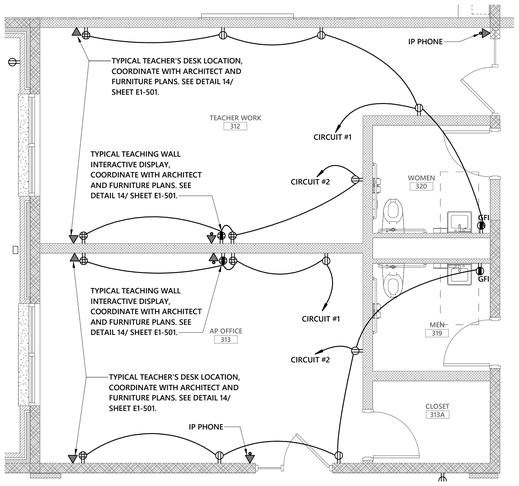
GENERAL NOTES

A. SEE SHEET E1-001 FOR SYMBOLS AND ABBREVIATIONS.

KEYED NOTES

1 PROVIDE 3/4" FIRE RETARDANT PLYWOOD BACKBOARD FROM FLOOR TO CEILING INSTALLED VERTICALLY STARTING AT 6"AFF. PAINT WITH TWO COATS OF COLOR WHITE FIRE RETARDANT PAINT.

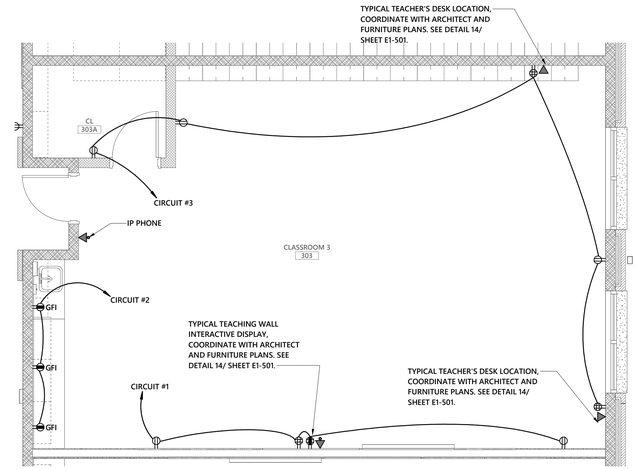
2 PROVIDE 120V CONNECTION FOR MECHANICAL CONTROLS. COORDINATE WITH MECHANICAL CONTROLS CONTRACTOR PRIOR TO ROUGH-IN.



GENERAL NOTES:

1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS
2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

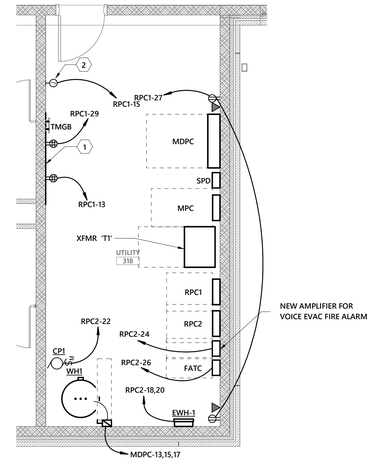
1 ENLARGED AP & TEACHER WORK ROOM PLAN - POWER - PHASE 2
1/4" = 1'-0"



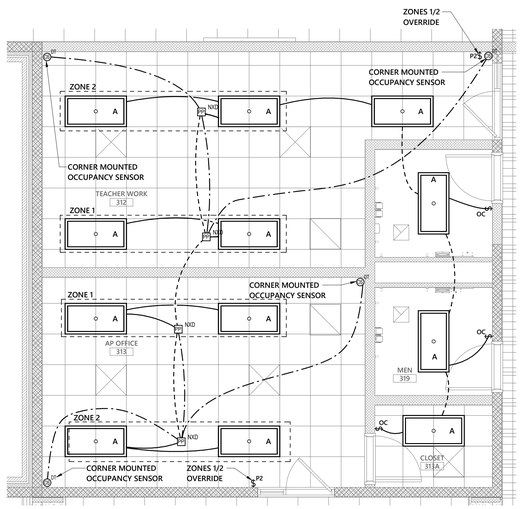
GENERAL NOTES:

1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS
2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

2 ENLARGED TYPICAL CLASSROOM PLAN - POWER - PHASE 2
1/4" = 1'-0"



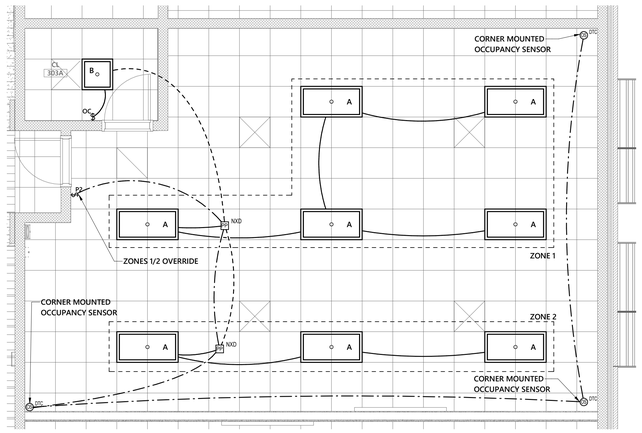
3 ENLARGED UTILITY ROOM PLAN - ELECTRICAL - PHASE 2
1/4" = 1'-0"



GENERAL NOTES:

1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.
3. CLASSROOM ZONES:
   A. ZONE 1
   B. ZONE 2

4 ENLARGED AP & TEACHER'S WORK ROOM PLAN - LIGHTING - PHASE 2
1/4" = 1'-0"



GENERAL NOTES:

1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.
3. CLASSROOM ZONES:
   A. ZONE 1: CLASSROOM ZONE
   B. ZONE 2: TEACHING WALL ZONE

5 ENLARGED TYPICAL CLASSROOM PLAN - LIGHTING - PHASE 2
1/4" = 1'-0"

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ENLARGED ELECTRICAL PLANS

E1-440

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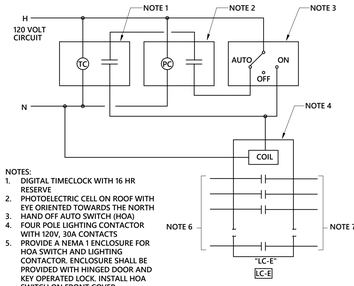
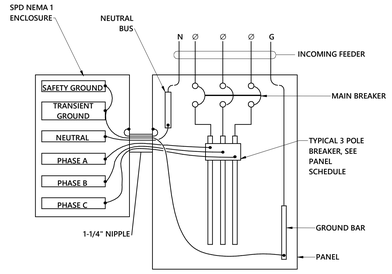


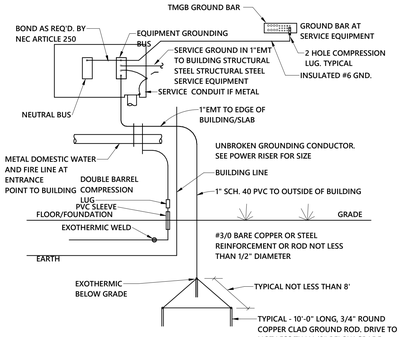
NOTES:
1. DIGITAL TIMECLOCK WITH 16 HR RESERVE
2. PHOTOELECTRIC CELL ON ROOF WITH EYE ORIENTED TOWARDS THE NORTH
3. HAND OFF AUTO SWITCH (HOA)
4. FOUR POLE LIGHTING CONTACTOR WITH 120V, 30A CONTACTS
5. PROVIDE A NEMA 1 ENCLOSURE FOR HOA SWITCH AND LIGHTING CONTACTOR. ENCLOSURE SHALL BE PROVIDED WITH HINGED DOOR AND KEY OPERATED LOCK. INSTALL HOA SWITCH ON FRONT COVER.
6. LIGHTING CIRCUITS FROM PANELBOARDS.
7. LIGHTING CIRCUITS TO BLDG/SITE, SEE PLANS.

4 EXTERIOR LIGHTING CONTROL DIAGRAM
NOT TO SCALE

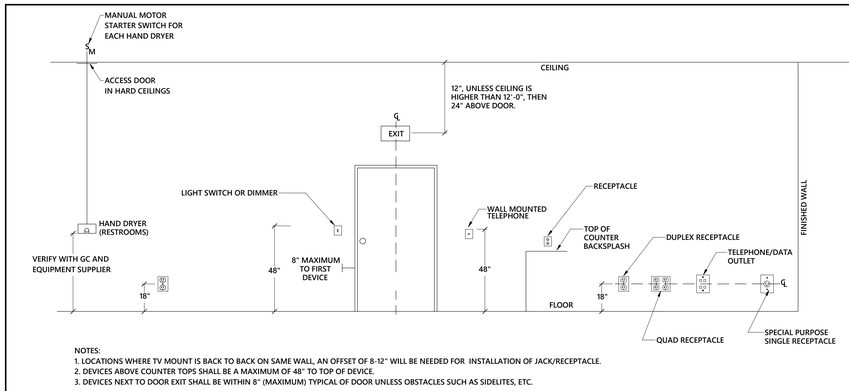


NOTES:
1. ALL WIRING SHALL BE #6 AWG.
2. AVOID SHARP BENDS IN WIRES. ALL WIRE LENGTHS SHALL NOT EXCEED 18" (WHERE POSSIBLE).
3. SEE SPD SPECIFICATION FOR EXACT TYPE (H1,H2,L1,L2) FOR LOCATION AS INDICATED ON THE POWER RISER DIAGRAM.

3 SPD CONNECTION DETAIL
NOT TO SCALE

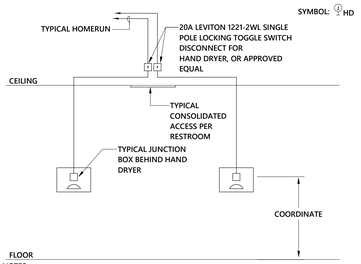


2 SERVICE GROUND DIAGRAM
NOT TO SCALE



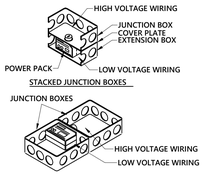
NOTES:
1. LOCATIONS WHERE TV MOUNT IS BACK TO BACK ON SAME WALL, AN OFFSET OF 8-12" WILL BE NEEDED FOR INSTALLATION OF JACK/RECEPTACLE.
2. DEVICES ABOVE COUNTER TOPS SHALL BE A MAXIMUM OF 48" TO TOP OF DEVICE.
3. DEVICES NEXT TO DOOR EXIT SHALL BE WITHIN 8" (MAXIMUM) TYPICAL OF DOOR UNLESS OBSTACLES SUCH AS SIDELITES, ETC.

1 MOUNTING HEIGHTS OF DEVICES - ELEVATION
NOT TO SCALE



NOTES:
1. MOUNT TOGGLE SWITCHES WITHIN 8" OF ACCESS/LAY-IN TILE. LEAVE ROOM FOR FLOOR TILE/ACCESS PANEL MOVEMENT.
2. PROVIDE ACCESS PANEL FOR NON-ACCESSIBLE CEILING TYPES. COORDINATE WITH G.C. FOR TYPE (MATCH PROJECT ACCESS PANEL TYPES WHEN PROVIDED.) COORDINATE EXACT LOCATION WITH ARCHITECT IN FIELD PRIOR TO CONDUIT ROUGH-IN.
3. TOGGLE SWITCHES TO BE CONSOLIDATED INTO ONE ACCESS LOCATION.3. TOGGLE SWITCHES TO BE CONSOLIDATED INTO ONE ACCESS LOCATION.
4. SEE PLANS FOR HAND DRYER QUANTITIES AND LOCATIONS.SEE PLANS FOR HAND DRYER QUANTITIES AND LOCATIONS.
5. HAND DRYER HEIGHTS AND ASSOCIATED JUNCTION BOXES ARE TO BE COORDINATED WITH ARCHITECTURAL ELEVATIONS.

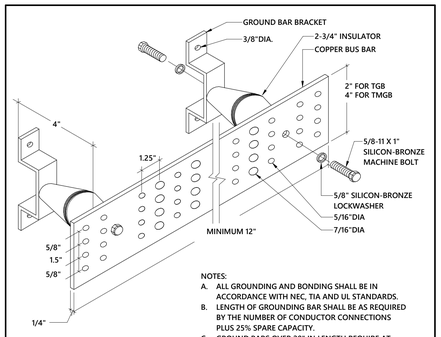
8 HAND DRYER LAYOUT DETAIL
NO SCALE



NOTE:
DO NOT MOUNT POWER PACKS CLOSER THAN 6-12 INCHES FROM SENSOR. PROVIDE DOUBLE STACKED JUNCTION BOX FOR MAXIMUM VENTILATION OF POWER PACK. PROVIDE BLANK COVER, WHERE PERMITTED BY CODE AND AHJ, LEAVE (2) OPENINGS IN CONDUIT KNOCKOUT FOR VENTING OF POWER PACK. VERIFY WITH AHJ PRIOR TO KNOCKOUT REMOVAL.

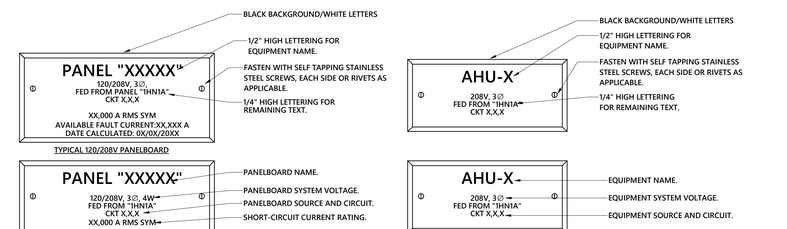
POWER PACK INSTALLED IN J-BOX

7 POWER PACK INSTALLATION
NOT TO SCALE



NOTES:
A. ALL GROUNDING AND BONDING SHALL BE IN ACCORDANCE WITH NEC, TIA AND UL STANDARDS.
B. LENGTH OF GROUNDING BAR SHALL BE AS REQUIRED BY THE NUMBER OF CONDUCTOR CONNECTIONS PLUS 25% SPARE CAPACITY.
C. GROUND BARS OVER 20" IN LENGTH REQUIRE AT LEAST ONE ADDITIONAL INSULATOR SUPPORT.
D. MOUNT GROUND BAR AT 6'-8" AFF UNLESS OTHERWISE DIRECTED BY OWNER.

6 TELECOMMUNICATIONS GROUNDING BAR DETAIL
NO SCALE

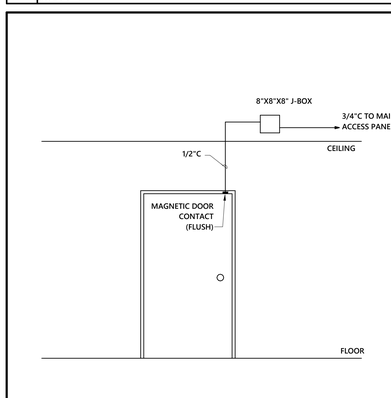


PANELBOARD NAMEPLATES

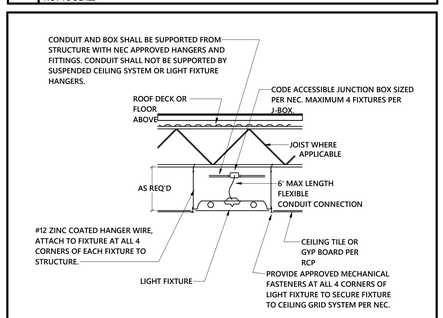
EQUIPMENT NAMEPLATES

NOTES:
1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, COLORS, ETC.
2. PROVIDE SHORT-CIRCUIT CURRENT RATING AND AVAILABLE FAULT CURRENT ON EACH NON-DWELLING SERVICE EQUIPMENT NAMEPLATE.

5 TYPICAL NAMEPLATE DIAGRAM
NOT TO SCALE

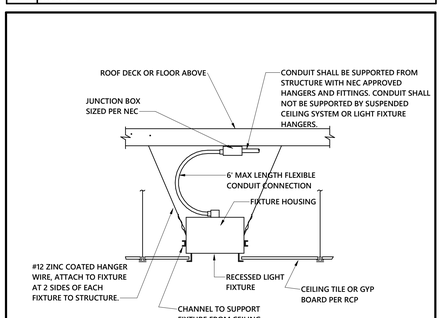


13 DOOR CONTACT ONLY
NOT TO SCALE



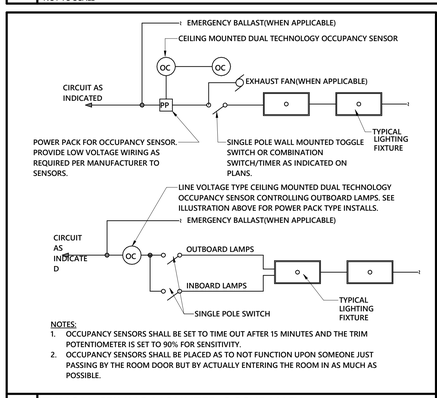
NOTES:
1. WHERE ROOF DECKING IS THE IS THE ALLOWABLE SUPPORT STRUCTURE, AND PATHWAY SYSTEM IS NOT IMC OR RMC, THE MINIMUM DISTANCE FROM ROOF DECKING SHALL BE 1.5" FOR ALL BOXES AND CONDUIT.

12 TYPICAL LAY-IN FIXTURE DIAGRAM
NOT TO SCALE



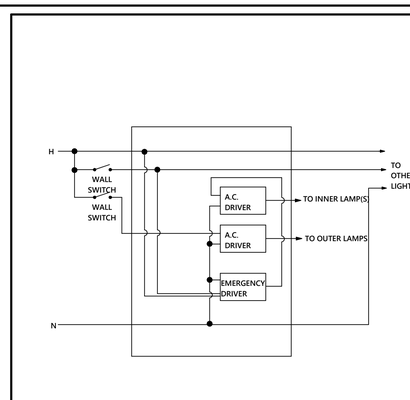
NOTES:
1. WHERE ROOF DECKING IS THE IS THE ALLOWABLE SUPPORT STRUCTURE, AND PATHWAY SYSTEM IS NOT IMC OR RMC, THE MINIMUM DISTANCE FROM ROOF DECKING SHALL BE 1.5" FOR ALL BOXES AND CONDUIT.

11 TYPICAL RECESSED DOWN LIGHT FIXTURE INSTALLATION DIAGRAM
NOT TO SCALE

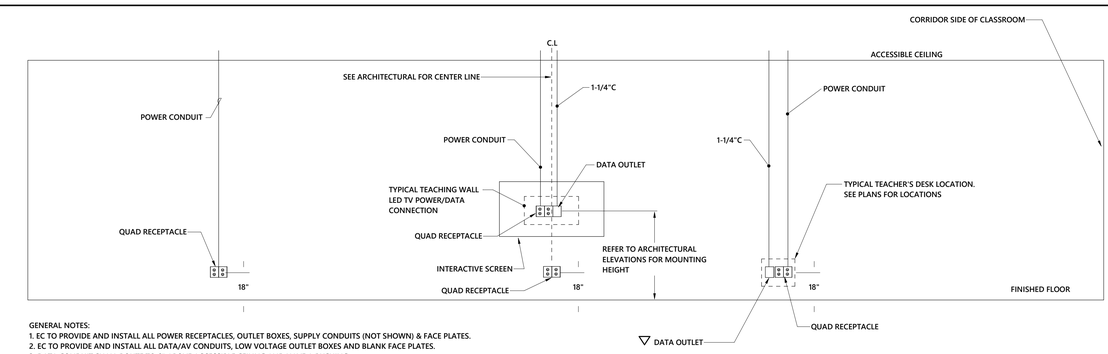


NOTES:
1. OCCUPANCY SENSORS SHALL BE SET TO TIME OUT AFTER 15 MINUTES AND THE TRIM POTENTIOMETER IS SET TO 90% FOR SENSITIVITY.
2. OCCUPANCY SENSORS SHALL BE PLACED AS TO NOT FUNCTION UPON SOMEONE JUST PASSING BY THE ROOM DOOR BUT BY ACTUALLY ENTERING THE ROOM IN AS MUCH AS POSSIBLE.

10 TYPICAL CEILING MOUNTED OCCUPANCY SENSOR WIRING DIAGRAMS
NOT TO SCALE



9 SWITCHED EMERGENCY LIGHTING WIRING
NOT TO SCALE



GENERAL NOTES:
1. EC TO PROVIDE AND INSTALL ALL POWER RECEPTACLES, OUTLET BOXES, SUPPLY CONDUITS (NOT SHOWN) & FACE PLATES.
2. EC TO PROVIDE AND INSTALL ALL DATA/AV CONDUITS, LOW VOLTAGE OUTLET BOXES AND BLANK FACE PLATES.
3. DATA CONDUIT SHALL ROUTE TO 6" ABOVE ACCESSIBLE CEILING AND HAVE A BUSHING.
4. INTERACTIVE LED TV BY OTHERS.
5. "DATA" OUTLETS ARE DOUBLE GANG BOXES WITH SINGLE-GANG MUD RINGS. STRUCTURED CABLING CONTRACTOR SHALL PROVIDE (2) DROPS AT EACH LOCATION.
6. DO NOT INSTALL BACKBOXES BACK TO BACK. WHERE BACK TO BACK INSTALLATIONS ARE SHOWN, OFF SET EACH INSTRUCTIONAL WALL.

14 INSTRUCTIONAL WALL ELEVATION
NO SCALE

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Phone: 919-926-2200 – www.optimaengineering.com
North Carolina License Number C-0914

Harnett County Schools

Johnsonville Elementary School Addition/Renovation Phase 2

18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG

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ELECTRICAL DETAILS

E1-501

Sheet No. 10 of 15

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OPTIMA # 21-0266R

Autodesk Docs://Johnsonville ES Addition Renovation/21-0266R_Johnsonville Classroom Addition_MEPFP_R22.rvt
3/25/2022 10:35:17 AM

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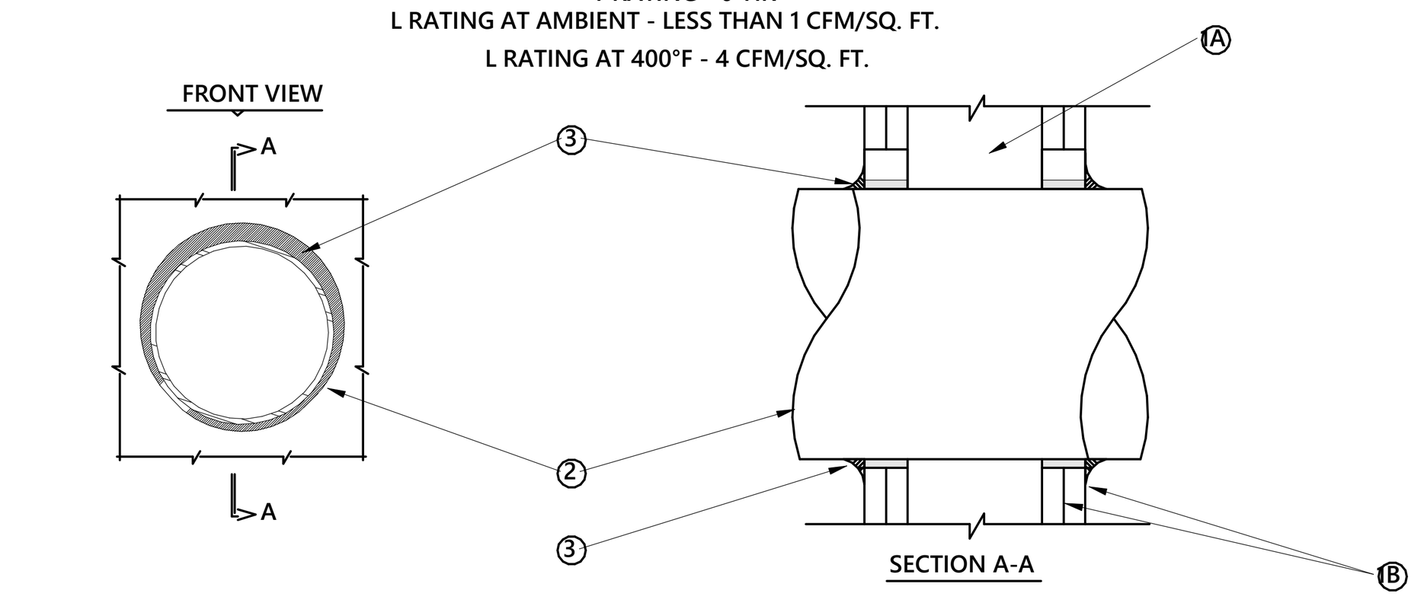
U.L. SYSTEM NO. W-L-1085
F RATING - 1-HR OR 2-HR (SEE ITEM 1B)
T RATING - 0-HR
L RATING AT AMBIENT - LESS THAN 1 CFM/SQ. FT.
L RATING AT 400°F - 4 CFM/SQ. FT.



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 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 ANNUIAR 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:

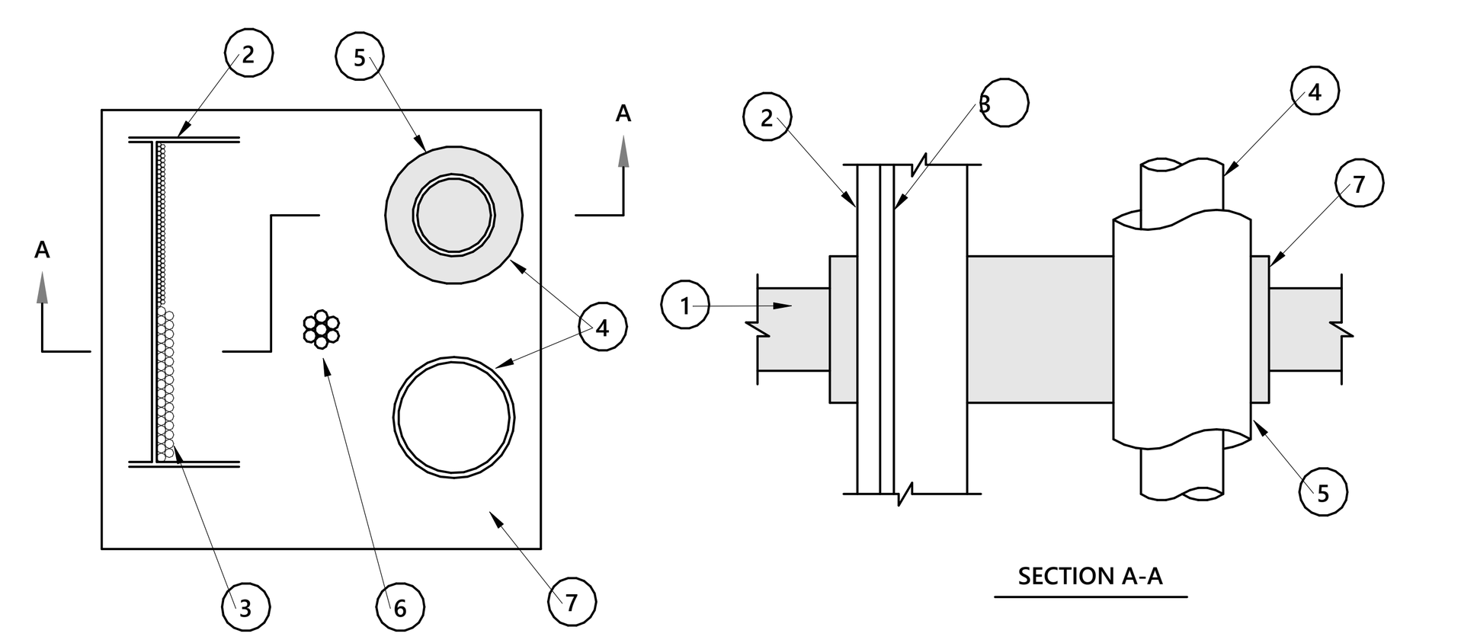
A. STEEL PIPE - NOM 12 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE - NOM 12 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT - NOM 6 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
D. COPPER TUBING - NOM 5 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER)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

HILTI FIRESTOP SYSTEMS
CLASSIFIED C UL US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

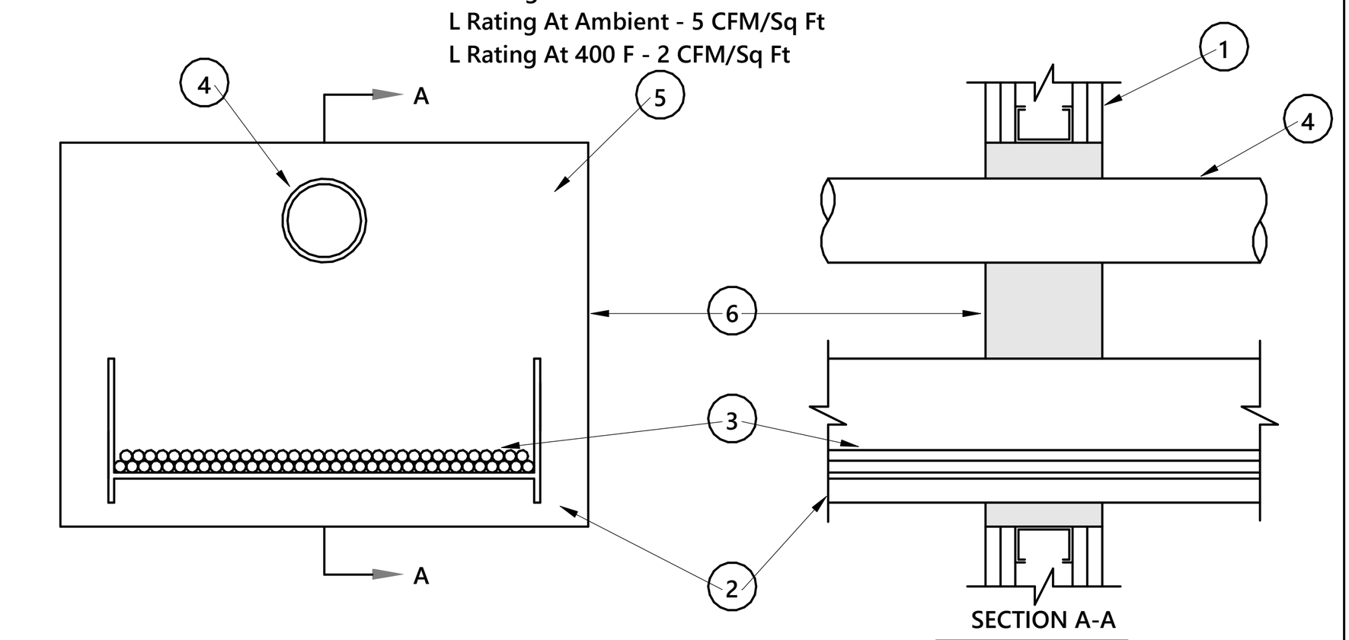
System No. C-AJ-8056
F Rating -- 3 Hr
T Rating -- 0 Hr
L Rating At Ambient -- 5 CFM/sq ft
L Rating At 400 F -- 2 CFM/sq ft



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
CLASSIFIED C UL US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

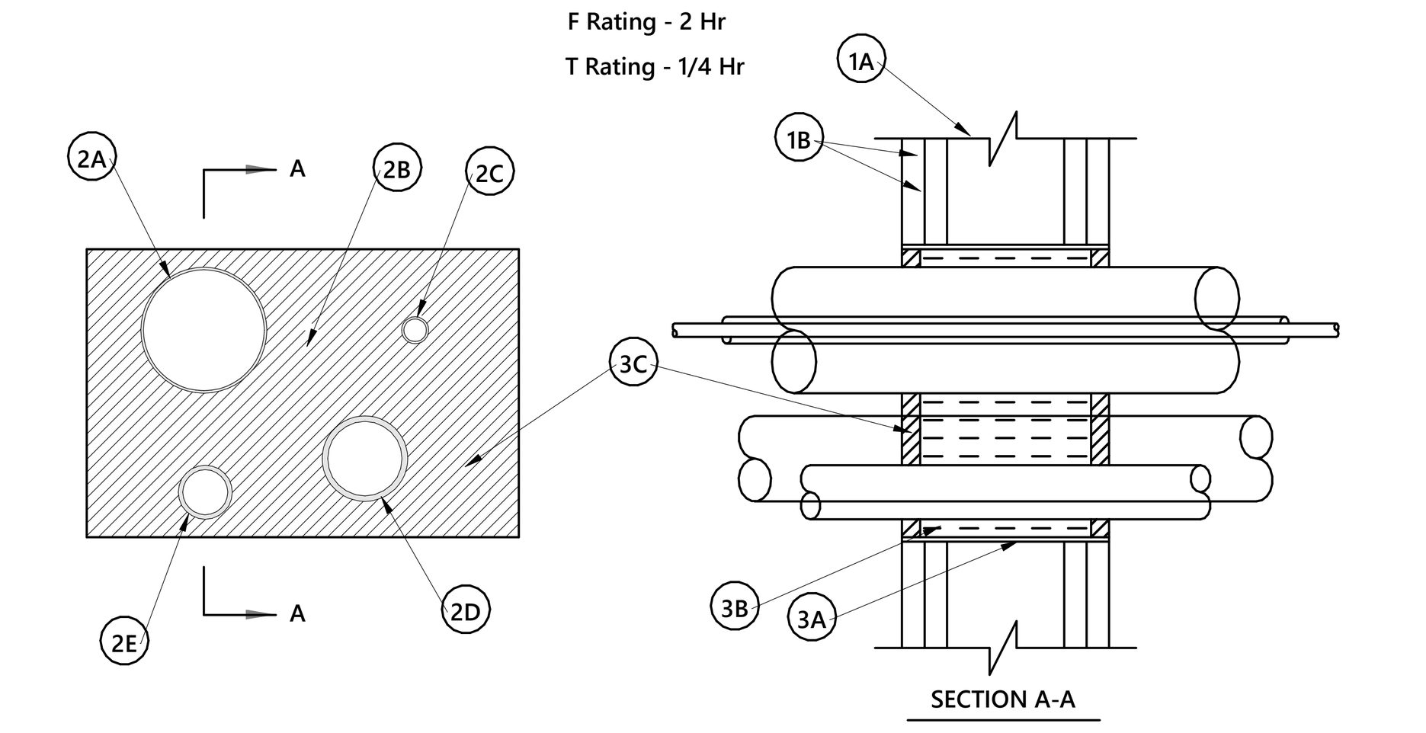
System No. W-L-8013
F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr
L Rating At Ambient - 5 CFM/Sq Ft
L Rating At 400 F - 2 CFM/Sq Ft



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
CLASSIFIED C UL US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

System No. W-L-8004
F Rating - 2 Hr
T Rating - 1/4 Hr



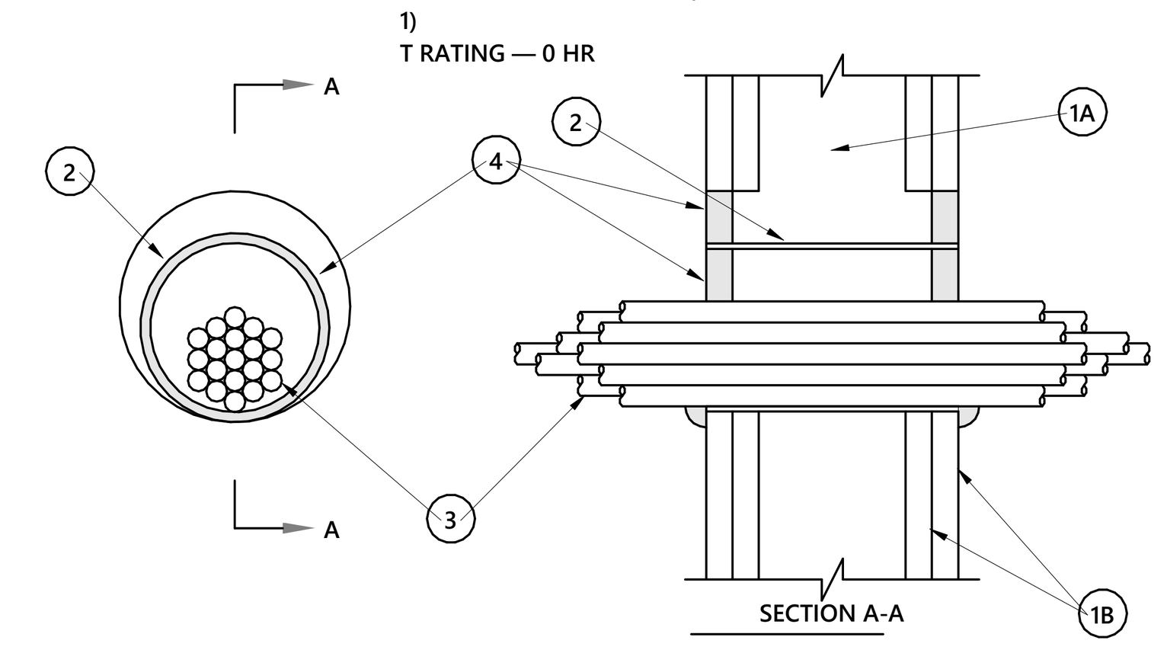
1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE
CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL
U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE
DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS WALL 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
CLASSIFIED C UL US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

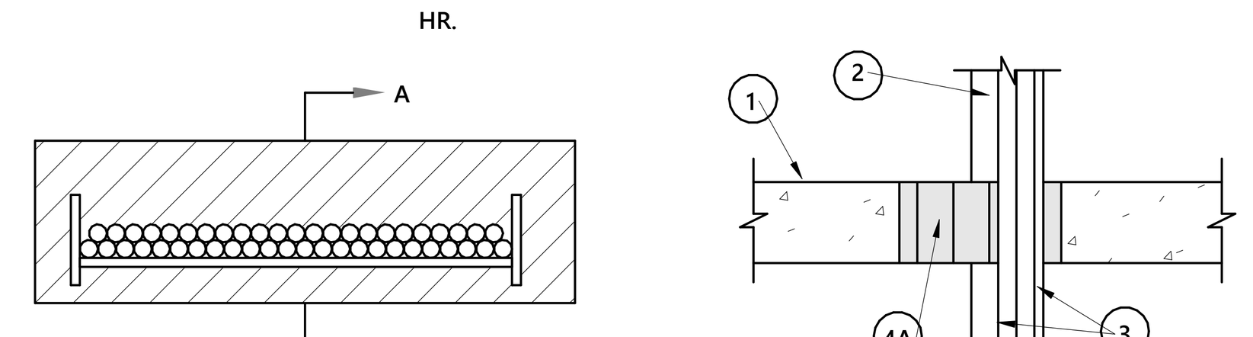
SYSTEM NO. W-L-3065
F RATINGS — 1 AND 2 HR (SEE ITEM 1)
T RATING — 0 HR



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 ½ IN. (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
CLASSIFIED C UL US
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
CLASSIFIED C UL US
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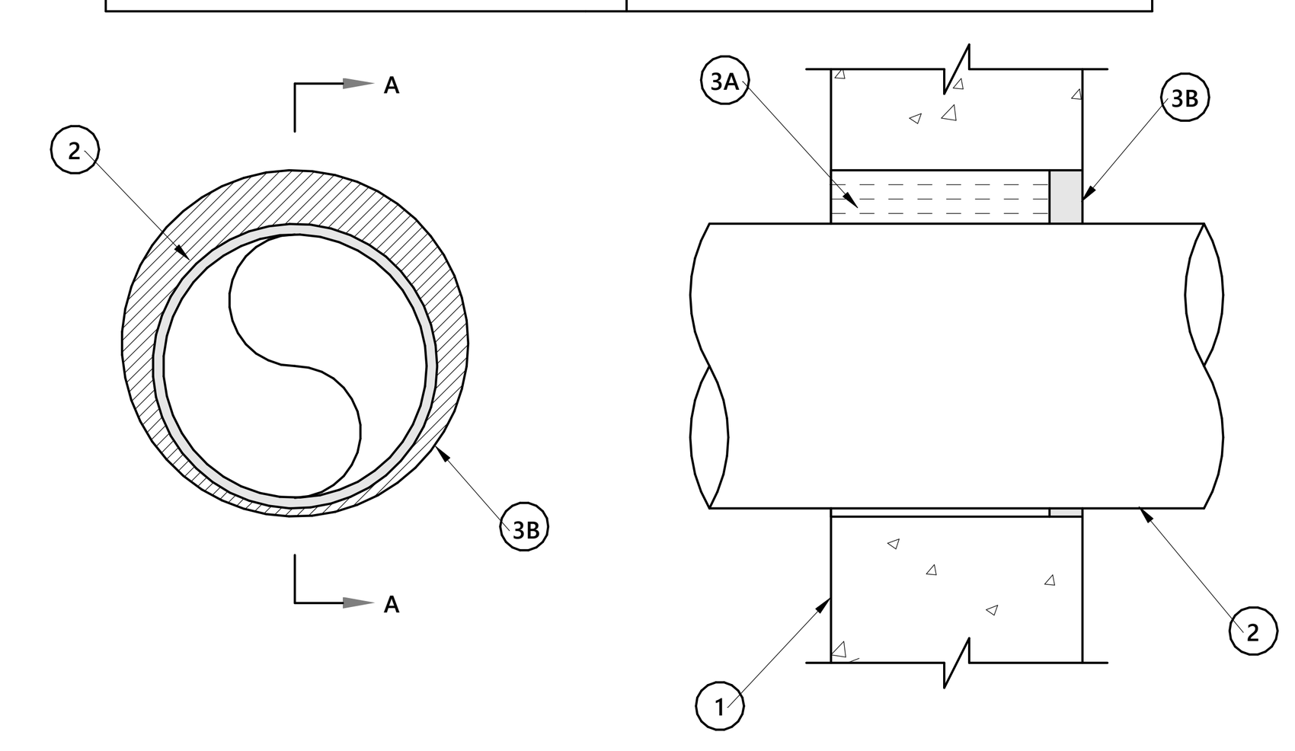
SYSTEM NO. W-J-1088

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.

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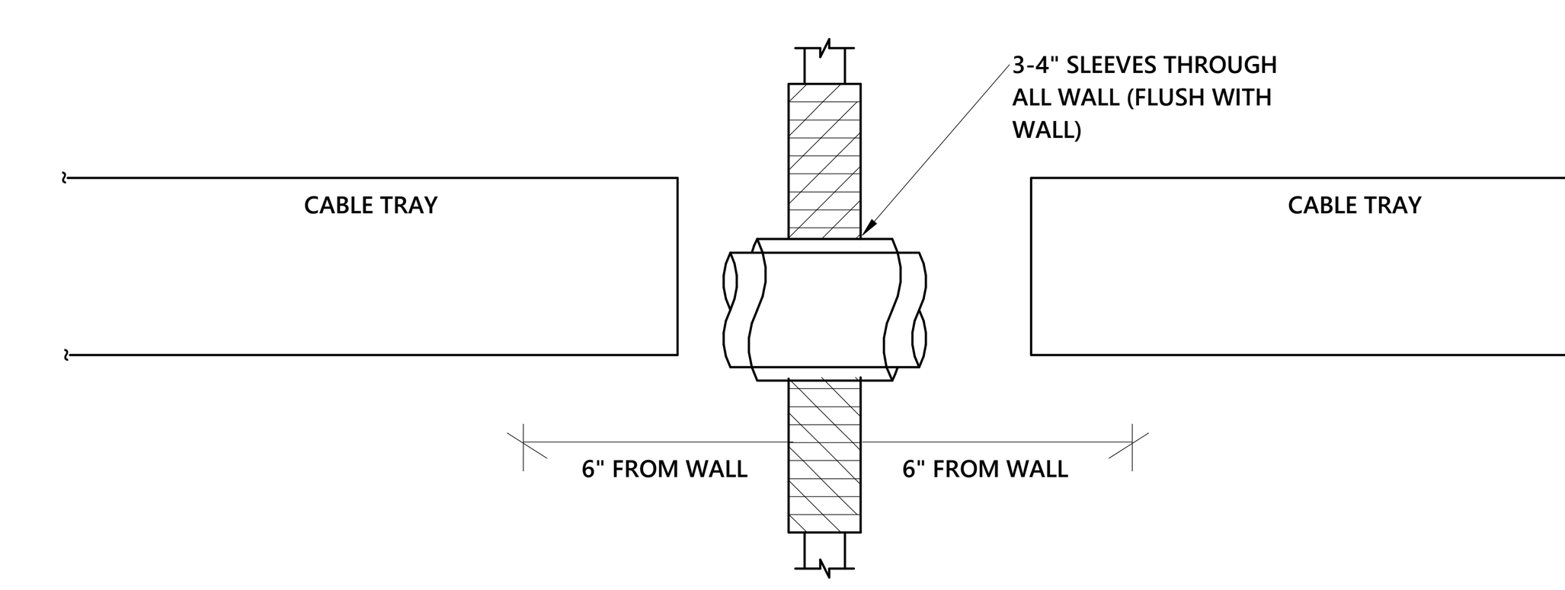
CABLE TRAY WALL INTERSECTION DETAIL



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3/25/2022

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Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG
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ELECTRICAL DETAILS

E1-502

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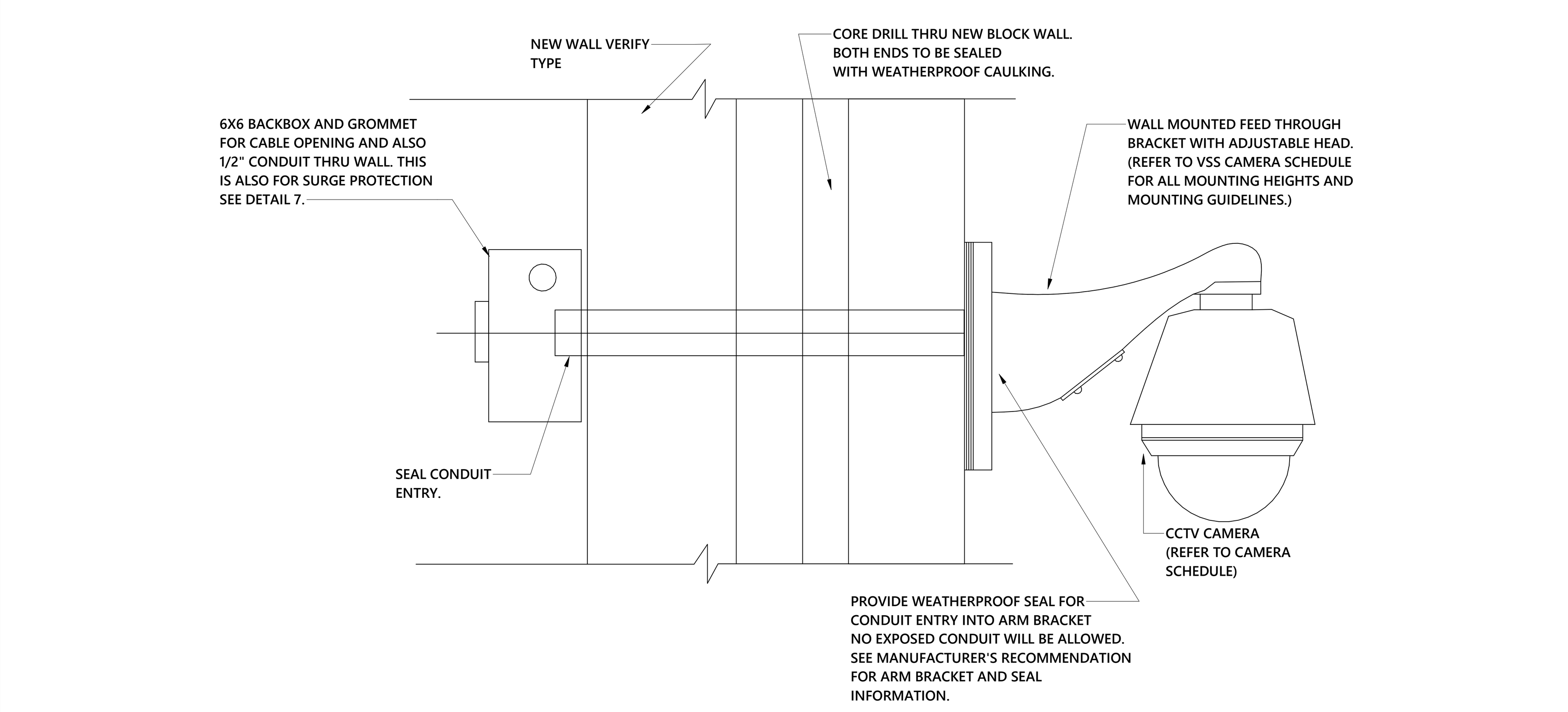
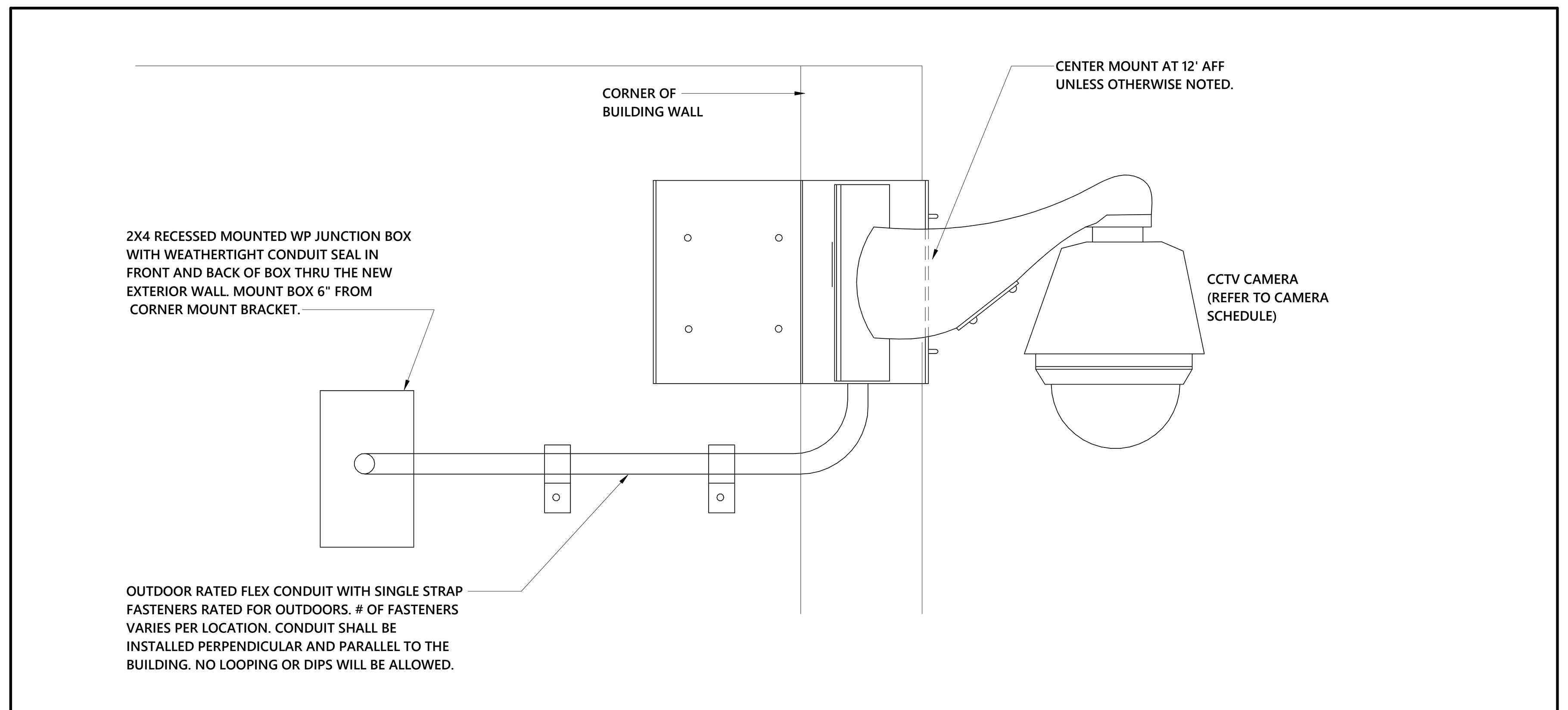
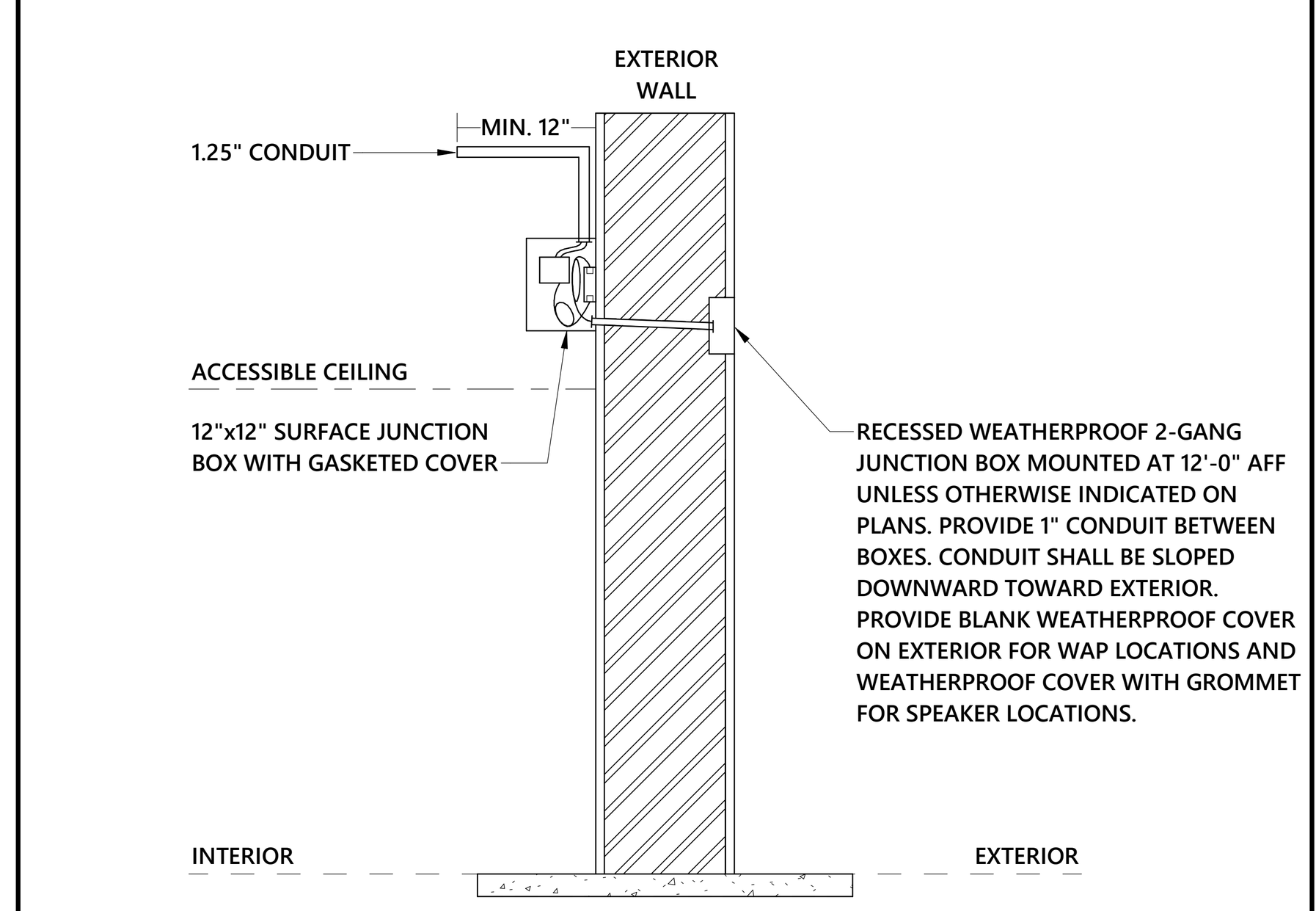


3 CAMERA MOUNT EXTERIOR WALL
NO SCALE



2 CAMERA MOUNTING FOR EXTERIOR CORNER MOUNT
NO SCALE



GENERAL NOTES:

A. SURFACE JUNCTION BOX SHALL BE LOCATED ABOVE ACCESSIBLE CEILING SPACE.
B. ALL DEVICES SHALL BE SECURED INSIDE JUNCTION BOX.

1 EXTERIOR NETWORK DEVICE DETAIL (ACCESSIBLE CEILING)
NOT TO SCALE

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Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG

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ELECTRICAL DETAILS

E1-503

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OPTIMA # 21-0266R

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PANEL: MDPC

VOLTAGE: 480Y/277 3Ø | FED FROM: UTILITY TRANSFORMER

MOUNTING: SURFACE | MAIN TYPE: MCB | MFR: SQUARE D
ENCLOSURE: NEMA1 | PHASE: 3 | TYPE: I-LINE
MAIN: 600 A | WIRE: 4 | AIC: 42 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	A	B	B	C	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
F	PANEL 'MPC'	NOTE 9	200 A	1	3	22.55	27.14					3	2	125 A	NOTE 9	TRANSFORMER 'T2'	F
				3				24.24	16.91				4				
				5						21.58	23.66		6				
H	IDU-1	NOTE 10	25 A	7	3	5.27	5.27					3	8	25 A	NOTE 10	IDU-5	H
				9				5.27	5.27				10				
				11						5.27	5.27		12				
WH	WATER HEATER WH1	NOTE 10	20 A	13	3	4.00	6.16					3	14	25 A	NOTE 10	IDU-6	H
				15				4.00	6.16				16				
				17						4.00	6.16		18				
H	DOAS-2	NOTE 10	40 A	19	3	7.95	5.27					3	20	25 A	NOTE 10	IDU-7	H
				21				7.95	5.27				22				
				23						7.95	5.27		24				
H	DOAS-1	NOTE 10	50 A	25	3	10.45	5.27					3	26	25 A	NOTE 10	IDU-8	H
				27				10.45	5.27				28				
				29						10.45	5.27		30				
C	CU-2	NOTE 10	25 A	31	3	4.71	5.27					3	32	25 A	NOTE 10	IDU-9	H
				33				4.71	5.27				34				
				35						4.71	5.27		36				
C	CU-1	NOTE 10	35 A	37	3	6.65	5.27					3	38	25 A	NOTE 10	IDU-10	H
				39				6.65	5.27				40				
				41						6.65	5.27		42				
H	IDU-2	NOTE 10	25 A	43	3	5.27	5.27					3	44	25 A	NOTE 10	IDU-12	H
				45				5.27	5.27				46				
				47						5.27	5.27		48				
H	IDU-3	NOTE 10	25 A	49	3	5.27	--					3	50	--	-	SPACE ONLY	
				51				5.27	--				52				
				53						5.27	--		54				
H	IDU-4	NOTE 10	25 A	55	3	6.16	--					3	56	--	-	SPACE ONLY	
				57				6.16	--				58				
				59						6.16	--		60				
	SPACE ONLY	-	--	61	1	--	--					1	62	--	-	SPACE ONLY	
	SPACE ONLY	-	--	63	1			--	--			1	64	--	-	SPACE ONLY	

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	7.8 kVA	125.00%	9.7 kVA
LE	LIGHTING - EXTERIOR	0.9 kVA	125.00%	1.1 kVA
H	HEATING	313.5 kVA	100.00%	313.5 kVA
C	COOLING	39.2 kVA	100.00%	39.2 kVA
V	VENTILATION	0.0 kVA	0.00%	0.0 kVA
M	MOTORS	2.1 kVA	113.65%	2.4 kVA
K	KITCHEN	0.0 kVA	0.00%	0.0 kVA
R	RECEPTACLES	34.2 kVA	64.62%	22.1 kVA
WH	WATER HEATER	12.0 kVA	100.00%	12.0 kVA
MS	MISC.	6.0 kVA	100.00%	6.0 kVA
S	Spare	0.0 kVA	0.00%	0.0 kVA
E	ELEVATOR	0.0 kVA	0.00%	0.0 kVA
LD	LAUNDRY	0.0 kVA	0.00%	0.0 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. THIS PANEL SHALL BE U.L. LISTED FOR USE AS S.E. EQUIP.
8. PROVIDE "ALL MODES" SPD (40kA / MODE, 80kA / PHASE).
9. SEE RISER DIAGRAM/ SHEET E1-901 FOR FEEDER SIZE.
10. REFER TO MECHANICAL SCHEDULE SHEET E1.602 FOR WIRE SIZE.

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	416.61 kVA			
TOTAL KVA (DEMAND):	406.96 kVA	519.2 A	486.1 A	503.2 A
TOTAL AMP....	501 A			
TOTAL AMP. (DEMAND):	489 A			

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)

F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

PANEL: MPC

VOLTAGE: 480Y/277 3Ø | FED FROM: MDPC

MOUNTING: SURFACE | MAIN TYPE: MLO | MFR: SQUARE D
ENCLOSURE: NEMA1 | PHASE: 3 | TYPE: NF
MAIN: 200 A | WIRE: 4 | AIC: 42 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	A	B	B	C	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
L	CLASSROOM LIGHTS	12	20 A	1	1	1.77	1.99					3	2	20 A	NOTE 7	HP-6	H
L	CLASSROOM/WORKROOM LIGHTS	12	20 A	3	1			2.25	1.99				4				
LE	EXTERIOR LIGHTS	12	20 A	5	1					0.87	1.99		6				
L	MECHANICAL PLATFORM LTS	12	20 A	7	1	0.87	1.77					3	8	20 A	NOTE 7	HP-7	H
L	CORRIDOR LIGHTS	12	20 A	9	1			2.08	1.77				10				
L	CORRIDOR 311 LIGHTS	12	20 A	11	1					0.80	1.77		12				
H	HP-1	NOTE 7	20 A	13	3	1.77	1.77					3	14	20 A	NOTE 7	HP-8	H
				15				1.77	1.77				16				
				17						1.77	1.77		18				
H	HP-2	NOTE 7	20 A	19	3	1.77	1.77					3	20	20 A	NOTE 7	HP-9	H
				21				1.77	1.77				22				
				23						1.77	1.77		24				
H	HP-3	NOTE 7	20 A	25	3	1.77	1.77					3	26	20 A	NOTE 7	HP-10	H
				27				1.77	1.77				28				
				29						1.77	1.77		30				
H	HP-4	NOTE 7	20 A	31	3	1.99	1.77					3	32	20 A	NOTE 7	HP-12	H
				33				1.99	1.77				34				
				35						1.99	1.77		36				
H	HP-5	NOTE 7	20 A	37	3	1.77	--					3	38	--	-	SPACE ONLY	
				39				1.77	--				40				
				41						1.77	--		42				

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	7.8 kVA	125.00%	9.7 kVA
LE	LIGHTING - EXTERIOR	0.9 kVA	125.00%	1.1 kVA
H	HEATING	59.7 kVA	100.00%	59.7 kVA
C	COOLING	0.0 kVA	0.00%	0.0 kVA
V	VENTILATION	0.0 kVA	0.00%	0.0 kVA
M	MOTORS	0.0 kVA	0.00%	0.0 kVA
K	KITCHEN	0.0 kVA	0.00%	0.0 kVA
R	RECEPTACLES	0.0 kVA	0.00%	0.0 kVA
WH	WATER HEATER	0.0 kVA	0.00%	0.0 kVA
MS	MISC.	0.0 kVA	0.00%	0.0 kVA
S	Spare	0.0 kVA	0.00%	0.0 kVA
E	ELEVATOR	0.0 kVA	0.00%	0.0 kVA
LD	LAUNDRY	0.0 kVA	0.00%	0.0 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. REFER TO MECHANICAL SCHEDULE SHEET E1.602 FOR WIRE SIZE.

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	68.37 kVA			
TOTAL KVA (DEMAND):	70.53 kVA	81.9 A	88.1 A	77.9 A
TOTAL AMP....	82 A			
TOTAL AMP. (DEMAND):	85 A			

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)

F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

PANEL: RPC1

VOLTAGE: 208Y/120 3Ø | FED FROM: T1

MOUNTING: SURFACE | MAIN TYPE: MCB | MFR: SQUARE D
ENCLOSURE: NEMA1 | PHASE: 3 | TYPE: NQOD
MAIN: 225 A | WIRE: 4 | AIC: 10 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	A	B	B	C	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
R	CORRIDOR REC.	12	20 A	1	1	1.26	0.90					1	2	20 A	12	CLASSROOM 8 REC.	R
R	COR/RR/EXT. REC.	12	20 A	3	1			1.26	0.54			1	4	20 A	12	CLASSROOM 8 REC.	R
MS	HAND DRYER GRILS 315 (NOTE 7)	12	20 A	5	1					1.00	0.90	1	6	20 A	12	CLASSROOM 8 REC.	R
MS	HAND DRYER BOYS 316 (NOTE 7)	12	20 A	7	1	1.00	0.90					1	8	20 A	12	CLASSROOM 7 REC.	R
MS	EWC CORRIDOR 317 (NOTE 7)	12	20 A	9	1			0.50	0.54			1	10	20 A	12	CLASSROOM 7 REC.	R
R	CORRIDOR 311 REC.	12	20 A	11	1					1.44	0.90	1	12	20 A	12	CLASSROOM 7 REC.	R
R	TBB REC.	12	20 A	13	1	0.18	0.90					1	14	20 A	12	CLASSROOM 6 REC.	R
MS	BAS CONTROL PANEL	12	20 A	15	1			0.50	0.54			1	16	20 A	12	CLASSROOM 6 REC.	R
R	CORRIDOR/EXT. REC.	12	20 A	17	1					1.26	0.90	1	18	20 A	12	CLASSROOM 6 REC.	R
MS	HAND DRYER GRILS 315 (NOTE 7)	12	20 A	19	1	1.00	0.90					1	20	20 A	12	CLASSROOM 5 REC.	R
MS	HAND DRYER BOYS 316 (NOTE 7)	12	20 A	21	1			1.00	0.54			1	22	20 A	12	CLASSROOM 5 REC.	R
MS	EWC CORRIDOR 317 (NOTE 7)	12	20 A	23	1					0.50	0.90	1	24	20 A	12	CLASSROOM 5 REC.	R
MS	EWC CORRIDOR 317 (NOTE 7)	12	20 A	25	1	0.50	0.90					1	26	20 A	12	CLASSROOM 4 REC.	R
R	UTILITY RM REC.	12	20 A	27	1			0.36	0.54			1	28	20 A	12	CLASSROOM 4 REC.	R
R	TBB REC.	12	20 A	29	1					0.18	0.90	1	30	20 A	12	CLASSROOM 4 REC.	R
R	CLASSROOM 10 REC.	12	20 A	31	1	0.90	0.90					1	32	20 A	12	CLASSROOM 3 REC.	R
R	CLASSROOM 10 REC.	12	20 A	33	1			0.54	0.54			1	34	20 A	12	CLASSROOM 3 REC.	R
R	CLASSROOM 10 REC.	12	20 A	35	1					0.90	0.90	1	36	20 A	12	CLASSROOM 3 REC.	R
R	CLASSROOM 9 REC.	12	20 A	37	1	0.90	0.90					1	38	20 A	12	CLASSROOM 2 REC.	R
R	CLASSROOM 9 REC.	12	20 A	39	1			0.54	0.54			1	40	20 A	12	CLASSROOM 2 REC.	R
R	CLASSROOM 9 REC.	12	20 A	41	1					0.90	0.90	1	42	20 A	12	CLASSROOM 2 REC.	R

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	0.0 kVA	0.00%	0.0 kVA
LE	LIGHTING - EXTERIOR	0.0 kVA	0.00%	0.0 kVA
H	HEATING	19.3 kVA	100.00%	19.3 kVA
C	COOLING	5.2 kVA	100.00%	5.2 kVA
V	VENTILATION	0.0 kVA	0.00%	0.0 kVA
M	MOTORS	2.1 kVA	113.65%	2.4 kVA
K	KITCHEN	0.0 kVA	0.00%	0.0 kVA
R	RECEPTACLES	34.2 kVA	64.62%	22.1 kVA
WH	WATER HEATER	0.0 kVA	0.00%	0.0 kVA
MS	MISC.	6.0 kVA	100.00%	6.0 kVA
S	Spare	0.0 kVA	0.00%	0.0 kVA
E	ELEVATOR	0.0 kVA	0.00%	0.0 kVA
LD	LAUNDRY	0.0 kVA	0.00%	0.0 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. PROVIDE CLASS A GFI (6mA PERSONNEL) BRKR (250' MAX).
8. PROVIDE FEED-THRU LUGS.
9. LOAD TOTAL INCLUDES FEED-THRU SECTIONS.

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	67.71 kVA			
TOTAL KVA (DEMAND):	55.89 kVA	234.8 A	140.9 A	205.8 A
TOTAL AMP....	188 A			
TOTAL AMP. (DEMAND):	155 A			

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)

F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

PANEL: RPC2

VOLTAGE: 208Y/120 3Ø | FED FROM: RPC1

MOUNTING: SURFACE | MAIN TYPE: MLO | MFR: SQUARE D
ENCLOSURE: NEMA1 | PHASE: 3 | TYPE: NQ
MAIN: 225 A | WIRE: 4 | AIC: 10 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	A	B	B	C	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
R	CLASSROOM 1 REC.	12	20 A	1	1	0.90	1.99					2	2	25 A	NOTE 8	HP-11	H
R	CLASSROOM 1 REC.	12	20 A	3	1			0.54	1.99				4				
R	CLASSROOM 1 REC.	12	20 A	5	1					0.90	5.65	2	6	50 A	NOTE 8	IDU-11	H
R	TEACHER WORK REC.	12	20 A	7	1	0.90	5.65						8				
R	TEACHER WORK REC.	12	20 A	9	1			1.08	1.13			1	10	15 A	NOTE 8	F-1	M
R	TEACHER WORK REC.	12	20 A	11	1					0.90	0.44	1	12	15 A	NOTE 8	F-2	M
R	TEACHER WORK REC.	12	20 A	13	1	1.08	1.29					2	14	30 A	NOTE 8	ODU-1	C
R	MECHANICAL PLATFORM REC.	12	20 A	15	1			0.90	1.29				16				
C	ODU-2	NOTE 8	30 A	17	2					1.29	2.00	2	18	25 A	NOTE 8	EWH-1	H
				19		1.29	2.00						20				
S...	SPARE	12	20 A	21	1			0.00	0.50			1	22	15 A	NOTE 8	CP1	M
S...	SPARE	12	20 A	23	1					0.00	0.00	1	24	20 A	12	FA VOICE AMPLIFIER	MS
S...	SPARE	12	20 A	25	1	0.00	0.00					1	26	20 A	12	FATC	MS
S...	SPARE	12	20 A	27	1			0.00	1.00			1	28	20 A	8	GATE MOTOR	M
S...	SPARE	12	20 A	29	1					0.00	0.00	1	30	20 A	12	SPARE	S...
S...	SPARE	12	20 A	31	1	0.00	0.00					1	32	20 A	12	SPARE	S...
S...	SPARE	12	20 A	33	1			0.00	0.00			1	34	20 A	12	SPARE	S...
S...	SPARE	12	20 A	35	1					0.00	0.00	1	36	20 A	12	SPARE	S...
S...	SPARE	12	20 A	37	1	0.00	0.00					1	38	20 A	12	SPARE	S...
S...	SPARE	12	20 A	39	1			0.00	0.00			1	40	20 A	12	SPARE	S...
S...	SPARE	12	20 A	41	1					0.00	0.00	1	42	20 A	12	SPARE	S...

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	0.0 kVA	0.00%	0.0 kVA
LE	LIGHTING - EXTERIOR	0.0 kVA	0.00%	0.0 kVA
H	HEATING	19.3 kVA	100.00%	19.3 kVA
C	COOLING	5.2 kVA	100.00%	5.2 kVA
V	VENTILATION	0.0 kVA	0.00%	0.0 kVA
M	MOTORS	2.1 kVA	113.65%	2.4 kVA
K	KITCHEN	0.0 kVA	0.00%	0.0 kVA
R	RECEPTACLES	7.2 kVA	100.00%	7.2 kVA
WH	WATER HEATER	0.0 kVA	0.00%	0.0 kVA
MS	MISC.	0.0 kVA	0.00%	0.0 kVA
S	Spare	0.0 kVA	0.00%	0.0 kVA
E	ELEVATOR	0.0 kVA	0.00%	0.0 kVA
LD	LAUNDRY	0.0 kVA	0.00%	0.0 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. PROVIDE CLASS A GFI (6mA PERSONNEL) BRKR (250' MAX).
8. REFER TO MECHANICAL SCHEDULE SHEET E1.602 FOR WIRE SIZE.

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	34.71 kVA			
TOTAL KVA (DEMAND):	34.99 kVA	129.4 A	70.3 A	96.7 A
TOTAL AMP....	96 A			
TOTAL AMP. (DEMAND):	97 A			

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)

F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

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Harnett County Schools

Johnsonville Elementary School Addition/Renovation Phase 2

18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022

PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG

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ELECTRICAL PANEL SCHEDULES

E1-601

Autodesk Docs://Johnsonville ES Addition Renovation/21-0266R_Johnsonville Classroom Addition_MEPFP_R22.rvt

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LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	LAMP	BALLAST/DRIVER	WATTAGE	VOLTAGE	MFR	CATALOG SERIES	NOTE
D	6" RECESSED LED DOWNLIGHT	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	25 W	UNIV	GOTHAM PATHWAY JUNO SPECTRUM	EVO 20 6AR LS MVOLT 6VLED 2000 INDY L6 20 U G2 L600P SGE6LEDGI 20W MD	6" APERATURE MINIMUM 3000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SEMI-SPECULAR WET LOCATION LISTED
DE	SAME AS TYPE 'D' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	25 W	UNIV	GOTHAM PATHWAY JUNO SPECTRUM	EVO 20 6AR LS MVOLT 6VLED 2000 INDY L6 20 U G2 L600P SGE6LEDGI 20W MD	6" APERATURE MINIMUM 4000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SEMI-SPECULAR WET LOCATION LISTED PROVIDE WITH 90 MINUTE BATTERY BACKUP
EX1	EDGE-LIT EXIT SIGN	LED	INTEGRAL LED DRIVER	5 W	UNIV	LITHONIA HUBBELL JUNO PHILLIPS	QUANTUM LQM S W R 120/277 EL N APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	NICKEL CADMIUM BATTERY EXIT SIGN 90 MINUTE OPERATION;RED TEST SWITCH PROVIDED UL LISTED FOR DAMP LOCATIONS
EX1B	CLEAR EDGE-LIT EXIT SIGN	LED	INTEGRAL LED DRIVER	5 W	UNIV	LITHONA HUBBELL JUNO PHILIPS	LRP 1RMR/RC 120/277 DUAL LITE NAVILLITE CHLORIDE	NICKEL CADMIUM BATTERY EXIT SIGN 90 MINUTE OPERATION;RED TEST SWITCH PROVIDED UL LISTED FOR DAMP LOCATIONS
OWL1	WALL PACK TRAPEZOID LED	LED	INTEGRAL LED DRIVER	50 W	UNIV	LITHONIA HUBBELL JUNO COOPER PHILLIPS	WST LED P3 VF MVOLT APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COORDINATE FINISH WITH ARCHITECT; MINIMUM 6000 LUMENS; WET LOCATION LISTED
OWL2	WALL MOUNTED EXTERIOR WEDGE LIGHT	LED	INTEGRAL LED DRIVER	20 W	UNIV	LITHONIA HUBBELL JUNO COOPER PHILLIPS	WDGE1 LED P2 80CRI VW MVOLT APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COLOR CHOSEN BY ARCHITECT; WET LOCATION LISTED; VISUAL COMFORT WIDE THROW; MINIMUM 2000 LUMENS
OWL2E	SAME AS TYPE 'OWL2' EXCEPT PROVIDE WITH 90 MINUTE EMERGENCY BATTERY BACKUP	LED	INTEGRAL LED DRIVER	20 W	UNIV	LITHONIA HUBBELL JUNO COOPER PHILLIPS	WDGE1 LED P2 80CRI VW MVOLT E4WH APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COLOR CHOSEN BY ARCHITECT; WET LOCATION LISTED; VISUAL COMFORT WIDE THROW; MINIMUM 2000 LUMENS
STL1	4 FT. LED STRIP	LED	INTEGRAL LED DRIVER	40 W	UNIV	LITHONIA COLUMBIA CREE COOPER DAY-BRITE	CLX LED L48 5000LM SEF FDL MVOLT GZ10 35K 80CRI APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	PROVIDE CHAIN FOR PENDANT MOUNTING PROVIDE WIRE GUARD 4000 MINIMUM LUMENS LENSED
STL1E	SAME AS TYPE 'STL1' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	INTEGRAL LED DRIVER	40 W	UNIV	LITHONIA COLUMBIA CREE COOPER DAY-BRITE	CLX LED L48 5000LM SEF FDL MVOLT GZ10 35K 80CRI APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	PROVIDE CHAIN FOR PENDANT MOUNTING PROVIDE WIRE GUARD 4000 MINIMUM LUMENS LENSED PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER

LIGHTING FIXTURE SCHEDULE - PREFFERED BRAND ALT.

TYPE	DESCRIPTION	LAMP	BALLAST/DRIVER	WATTAGE	VOLTAGE	MFR	CATALOG SERIES	NOTE
A	2X4 LED FLAT PANEL	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	40 W	277V	PREFERRED BRAND ALTERNATE: LITHONIA WILLIAMS CORONET	CPX 2X4 4000LM MIN10 APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS PROVIDE FLANGE KIT FOR GYPSUM BOARD CEILINGS
AE	2X4 LED FLAT PANEL SAME AS TYPE 'A' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	40 W	277V	PREFERRED BRAND ALTERNATE: LITHONIA WILLIAMS CORONET	CPX 2X4 4000LM MIN10 E10WLCP APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS PROVIDE FLANGE KIT FOR GYPSUM BOARD CEILINGS PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
B	2X2 LED FLAT PANEL	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	30 W	277V	PREFERRED BRAND ALTERNATE: LITHONIA WILLIAMS CORONET	CPX 2X2 3200LM MIN10 APPROVED EQUAL APPROVED EQUAL	3200 MINIMUM LUMENS UL LISTED DAMP LOCATIONS PROVIDE FLANGE KIT FOR GYPSUM BOARD CEILINGS

LIGHTING FIXTURE NOTES

1. LIGHTING FIXTURES, AS SPECIFIED, HAVE BEEN SO SELECTED TO ACHIEVE REQUIRED/DESIRED FOOT CANDLE LEVELS OF ILLUMINATION IN THEIR RESPECTIVE AREA, HENCE SPECIFIC FIXTURE CHARACTERISTICS WHICH MAY CREATE PARTICULAR ILLUMINATION RESULTS ARE ESSENTIAL. ANY DEVIATIONS FROM SPECIFIED FIXTURES SHALL DEEM THE SUBMITTING AGENT AND CONTRACTOR RESPONSIBLE IN PROVING SUCH DEVIATION WILL PROVIDE THE EXACT LIGHTING RESULT IN DUPLICATION TO THE DESIGN HEREIN.
2. SUBSTITUTIONS APPROVED BY THE ENGINEER PREVIOUS TO BID ARE ACCEPTABLE AS LONG AS THEY ARE EQUAL TO FIXTURE SPECIFIED. UNLESS OTHERWISE NOTED. THIS INCLUDES LENS, COLORS, REFLECTORS, PHOTOMETRICS, HOUSING MATERIALS, FINISHES, ETC. ANY SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER WITH COMPLETE CUT SHEETS FOR APPROVAL 10 WORKING DAYS PRIOR TO BID. SUBSTITUTE FIXTURES SHALL BE PRICED WITH THE SPECIFIED FIXTURE AND LISTED SEPARATELY FOR THE ENGINEER AND OWNER TO MAKE AN INFORMED DECISION.
3. CONTRACTOR SHALL PROVIDE SUITABLE TRIM AND APPURTENANCES TO MOUNT FIXTURES IN TYPE OF CEILING OR WALL AS SPECIFIED IN ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF CATALOG NUMBER GIVEN. ONTRACTOR SHALL VERIFY TYPE OF CEILING OR WALL BY REVIEWING ARCHITECTURAL FINISH SCHEDULES PRIOR TO ORDERING FIXTURES.
4. CONFIRM FINAL FIXTURE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND ELEVATIONS.
5. PROVIDE LOW TEMPERATURE (0 DEGREE F) DRIVER FOR ANY FIXTURE INSTALLED ON EXTERIOR OR OTHER AREAS SUBJECT TO LOW TEMPERATURES.
6. DURING THE BIDDING PROCESS, THE CONTRACTOR SHALL INFORM ARCHITECT AND ENGINEER OF ANY DELIVERY OR SCHEDULING ISSUES THAT MAY IMPACT THE PROJECT CRITICAL PATH SCHEDULING. CONTRACTORS SHOULD CONFIRM AND EXPECT AN 8 TO 10 WEEK DELIVERY UNLESS SELECTED FIXTURES ARE CONSIDERED TO BE A 'QUICK SHIP' PRODUCT.
7. NO FIXTURE SUBSTITUTIONS WILL BE CONSIDERED DUE TO LACK OF COORDINATION OF DELIVERY DATES AND CONSTRUCTION SCHEDULE AFTER TIME OF BID.
8. ALL MATERIAL EXPEDITING EXPENSES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
9. ANY FIXTURES BEING INSTALLED IN CEILING, INDICATED BY THE ARCHITECT AS HAVING INSULATION IN CONTACT WITH THE CEILING SURFACE, SHALL BE IC RATED AND LABELED SUCH FROM THE MANUFACTURER.
10. ACCEPTABLE DRIVER MANUFACTURERS FOR SUBMISSION ARE OSRAM/SYLVANIA, ADVANCE, GE, PHILLIPS OR UNIVERSAL TRIAD PROVIDED THEY MEET INTENDED CRITERIA AS LISTED IN THIS SCHEDULE AND PROJECT SPECIFICATIONS.
11. SUPPORT RECESSED TROFFERS AT ALL FOUR CORNERS FROM STRUCTURE. CEILING GRID SUPPORT IS NOT ACCEPTABLE.
12. COMPLETELY EXAMINE LIGHTING PLANS TO COORDINATE SWITCHING, DIMMING AND ANY SPECIAL DRIVER CONTROLS THAT MAY BE PART OF THE DESIGN INTENT.
13. COORDINATE CLOSELY FIXTURES CONTROLLED VIA AUTOMATIC OR DIMMING CONTROLS TO ASSURE FIXTURE APPENDAGES ARE ORDERED PROPERLY TO MEET DESIGN INTENT.
14. CONTRACTOR SHALL FURNISH A COMPLETE SET OF PLANS TO HIS SUPPLIER TO ASSURE LIGHTING PACKAGE IS COMPLETE.
15. PROVIDE DIMMING DRIVER/MODULE FOR FIXTURES INDICATED ON PLANS AS BEING CONTROLLED VIA DIMMING DEVICE.
16. ELECTRICAL VALUE ENGINEERING SHALL BE BILLED AT AN HOURLY RATE BY ENGINEERING FOR SUBMITTAL REVIEWS.
17. ANY FIXTURES BEING DIMMED THAT WILL REQUIRE SPECIAL LEVELS OF DIMMING SHALL HAVE THIS REQUIREMENT BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO ISSUE OF FINAL PLANS. WITHOUT SPECIFIC REQUIREMENTS, ENGINEER SHALL UTILIZE BEST JUDGEMENT AND LATER CHANGES WILL BE AT THE EXPENSE OF THE OWNER. LIGHTING FIXTURE NOTES
18. THE COLOR TEMPERATURE OF ALL INTERIOR FIXTURES SHALL BE 4000K. THE COLOR TEMPERATURE OF ALL EXTERIOR FIXTURES SHALL BE 4000K.
19. COORDINATE THE MOUNTING HEIGHT OF ALL PENDANT MOUNTED FIXTURES WITH ARCHITECT.

LIGHTING SEQUENCE OF OPERATION

A COMPLETE AND OPERATIONAL LIGHTING CONTROL SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS (SECTION 260923 AND 260943) AND AS INTENDED ON THESE PLANS. ALL CONTROL POINTS AND EQUIPMENT SEQUENCES OF OPERATION LISTED IN SPECIFICATION SECTION 260923 SHALL BE CONSIDERED IN ADDITION TO THOSE LISTED HERE. 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.

SYSTEM DESCRIPTION:
LIGHTING CONTROLS ARE BASED ON ETHERNET CONNECTED DEVICES THAT HAVE INDIVIDUAL ADDRESS LOCATIONS FOR PROGRAMMING AND CONTROL. INDEPENDENT OF THE ETHERNET BASED CONTROLS ARE STAND ALONE OCCUPANCY SENSORS. THESE SHALL BE INDEPENDENT AND NOT TIED INTO THE BAS/SYSTEM SOFTWARE.

SENSORS
1. CEILING MOUNTED OCCUPANCY AND VACANCY SENSORS SHALL OPERATE AS PART OF THE ETHERNET BASED SYSTEM AND AS STAND ALONE CONTROLS AS SHOWN ON THE PLANS.
2. WALL MOUNTED NON SWITCH TYPE OCCUPANCY/VACANCY SENSORS SHALL OPERATE AS PART OF THE ETHERNET BASED SYSTEM.
3. ALL OCCUPANCY SENSORS SHALL BE PROGRAMMED FOR AUTOMATIC ON (FULL LEVELS) AND AUTOMATIC OFF.
4. ALL VACANCY SENSORS SHALL BE PROGRAMMED FOR MANUAL ON AND AUTOMATIC OFF.
5. LARGE PUBLIC SPACES SHALL BE OCCUPANCY BASED WHERE PROVIDED WITH A SENSOR.

TIMER SETTINGS:
A. WALL SWITCH PASSIVE INFRARED: 2 MINUTES FOR INDIVIDUAL RESTROOMS AND STORAGE ROOMS.
B. CLASSROOMS VACANCY: 15 MINUTES.
C. WALL SWITCH VACANCY SENSORS OFFICES: 5 MINUTES.
D. OTHER SPACES NOT LISTED: 30 MINS.

BAS INTEGRATION:
A. EXTERIOR LIGHTING ZONES, TIME SCHEDULE AND PHOTOCELL CONTROL.
B. INTERIOR LIGHTING:
- CORRIDORS
- CLASSROOMS
- OFFICES

COMMISSIONING AND COORDINATION OF BAS:
1. BAS CONTROL SHALL BE THE PRIORITY SYSTEM WITH LOCAL OVERRIDES.
2. LIGHTING SYSTEM SHALL ALSO BE INDEPENDENTLY CONTROLLED BY A SOFTWARE BASED SYSTEM.
3. LIGHTING SYSTEM IS CONNECTED TO THE BAS VIA BACNET PROTOCOL OR EQUAL. COORDINATE LANGUAGE REQUIREMENTS WITH MECHANICAL CONTROLS CONTRACTOR SUPPLYING BUILDING AUTOMATION SYSTEM.

LIGHTING COORDINATION AND QUALITY CONTROL:
1. ELECTRICAL CONTRACTOR SHALL HAVE A PRE-CONSTRUCTION MEETING WITH CONTROLS SUPPLIER PRIOR TO CONDUIT ROUGH-IN TO VERIFY BOXES, CONDUIT PATHS, AND GENERAL LIGHTING CONTROL STRATEGY FOR INSTALLATION.
2. ELECTRICAL CONTRACTOR SHALL HAVE A POST-SUBMITTAL MEETING WITH CONTROLS SUPPLIER TO IDENTIFY LINE AND LOW VOLTAGE ROUTING, INTENT OF LIGHTING CONTROL DESIGN, AND GENERAL CONSTRUCTION STRATEGIES.

EXTERIOR LIGHTING CONTROL:
A. EXTERIOR LIGHTING CONTROL IS VIA SCHEDULED TIME CONTROL AND PHOTOCELL.

OTHER SYSTEM INTEGRATION:
1. UPON A FIRE ALARM EVENT, ALL CORRIDOR ZONES SHALL SWEEP ON.

TIME SCHEDULES:
A. TIME SCHEDULES ARE TO BE DETERMINED BY THE OWNER. THIS SHALL BE COORDINATED AND DIRECTED BY OWNER AND INPUT BY THE LIGHTING PROGRAMMER AND THE BAS PROGRAMMER. SEE THE BELOW INITIAL SETTING UNTIL OWNER HAS GIVEN INPUT.
B. INITIAL TIME SCHEDULES SHALL BE:
MONDAY - FRIDAY: 6AM ON, 7 PM OFF
SATURDAY 8AM ON, 4 PM OFF
SUNDAY: OFF

INDIVIDUAL AREAS INTENT OF CONTROL:
- MAIN CORRIDORS/HALLWAYS: TIME SCHEDULE ZONED. MANUAL LOW VOLTAGE OVERRIDE IN LOCAL CORRIDOR. CORRIDOR SWITCHES SHALL BE LOCKED OUT (PUBLIC AREAS) DURING "NORMAL OPERATING HOURS."
- GROUP RESTROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFRARED.)OCCUPANCY SENSORS SHALL OPERATE NORMAL AND EMERGENCY FIXTURES IN THIS AREA.
- INDIVIDUAL RESTROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFRARED.)
- UTILITY ROOMS, ETC.: ON/OFF WALL SWITCH OCCUPANCY SENSORS WITH MANUAL OVERRIDE FOR PERSONNEL SAFETY. SEE PLANS
- STORAGE ROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFRARED.)
- CLASSROOMS: 2 ZONES. ZONE ONE IS ON/OFF WITH FULL DIMMING, ZONE TWO IS ON/OFF WITH FULL DIMMING. ZONES WORK INDEPENDENTLY OF EACH OTHER.

LIGHTING SYSTEM NOTES:
1. SYSTEM ARCHITECTURE SHALL BE DESIGNED BY RESPECTIVE CONTROLS PROVIDER.
2. SYSTEM IS BASED ON NX DISTRIBUTED INTELLIGENCE, BY HUBBELL. ALL ALTERNATE MANUFACTURERS SHALL PROVIDE EQUIPMENT TO MEET THE DESIGN INTENT. (GRAPHIC WALL PODS FOR EXAMPLE.) APPROVED EQUALS: WATTSTOPPER DLM, COOPER GREENGATE, OR ACUITY NLIGHT.
3. SEE VENDOR DRAWINGS/DETAILS FOR ALL 0-10V DIMMING WIRING.
4. PROVIDE DEVICE LAYOUT AS PART OF LIGHTING CONTROL SUBMITTAL. INCLUDE ALL DEVICE LOCATIONS, CABLING, EQUIPMENT, ETC.

FIXTURE NOTES:
A. ARCHITECT TO APPROVE ALL EXTERIOR FIXTURE LOCATIONS. E.C. TO MARK OFF LOCATIONS WITH TEMPORARY "CHALK" OUTLINE AND PLAN FOR ARCHITECT ON-SITE APPROVAL OF LOCATIONS BEFORE INSTALLATION. E.C. TO CONTACT ARCHITECT WITH (1) WEEK PRIOR NOTICE.

ELECTRIC WALL HEATER SCHEDULE

_EL	LOCATION	KW	MOTOR VOLT	MOTOR PH	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
EWH-1	UTILITY 318	4.0	208 V	1	PROVIDED BY M.C.	3#10, 1#10 G, 3/4"C.

STORAGE ELECTRIC WATER HEATER SCHEDULE

MARK	DESCRIPTION	ELECTRICAL DATA					
		KW	V	PH	HZ	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
WH1	ELECTRIC, VERTICAL STORAGE	12	480	3	60	30A/F20A-3P-1	4#12,1#12G., 3/4"C.

PUMP SCHEDULE

MARK	DESCRIPTION	ELECTRICAL DATA					
		HP	V	PH	HZ	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
CP1	INLINE CIRCULATION PUMP SERVING WH1	1/8	120	1	60	MOTOR RATED SWITCH	2#12,1#12G., 3/4"C.

HEAT PUMP SCHEDULE (AIR COOLED)

ID	NOMINAL TONNAGE	COMPRESSOR		FAN	ELECTRICAL DATA				MATCHING INDOOR UNIT	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
		LRA	RLA	FLA	MCA	FUSE	VOLTAGE	PH			
HP-1	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-1	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-2	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-2	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-3	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-3	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-4	4.0	41.0	6.4	0.6	9.0	15.0	480 V	3	IDU-4	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-5	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-5	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-6	4.0	41.0	6.4	0.6	9.0	15.0	480 V	3	IDU-6	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-7	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-7	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-8	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-8	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-9	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-9	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-10	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-10	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.
HP-11	2.5	67.8	12.8	0.7	17.0	25.0	208 V	1	IDU-11	30A/F25A-3P-3R	4#10,1#10G, 3/4"C.
HP-12	3.0	38.0	5.7	0.6	8.0	15.0	480 V	3	IDU-12	30A/F15A-3P-3R	4#12, 1#12 G, 3/4"C.

DUCTLESS A/C CONDENSING UNIT SCHEDULE

ID	NOMINAL TONNAGE	ELECTRICAL DATA				DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
		MCA	MOCP	VOLTAGE	PH		
ODU-1	1.5	11.0	28.0	208 V	1	30A/F30A-2P-3R	3#10, 1#10 G, 3/4"C.
ODU-2	1.5	11.0	28.0	208 V	1	30A/F30A-2P-3R	3#10, 1#10 G, 3/4"C.

DUCTLESS A/C INDOOR UNIT SCHEDULE

ID	MANUFACTURER	MODEL NO.	QTY	COOLING CAPACITY			HEATING CAPACITY (BTUH)	CONDUIT AND CONDUCTOR SIZE	DISCONNECT SIZE
				NOMINAL	TOTAL (BTUH)	SENSIBLE (BTUH)			
A/C-1	MITSUBISHI	PLA-A18EA7	1	1.5 ton	18000	15300	19000	3#10, 1#10 G, 3/4"C.	PROVIDED BY M.C.
A/C-2	MITSUBISHI	PLA-A18EA7	1	1.5 ton	18000	15300	19000	3#10, 1#10 G, 3/4"C.	PROVIDED BY M.C.

INDOOR UNIT SCHEDULE

SYMBOL	NOMINAL TONNAGE	ELECTRIC HEAT				FAN MOTOR FLA	ELECRICAL DATA				MATCHING OUTDOOR UNIT	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
		KW	STAGES	VOLTAGE	PH		MCA	MOCP	VOLTAGE	PH			
IDU-1	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-1	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-2	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-2	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-3	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-3	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-4	4	14.4	1	480	3	0.9	24.8	25.0	480 V	3	HP-4	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-5	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-5	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-6	4	14.4	1	480	3	0.9	24.8	25.0	480 V	3	HP-6	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-7	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-7	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-8	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-8	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-9	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-9	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-10	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-10	30A/F25A-3P-1	4#10,1#10G, 3/4"C.
IDU-11	2.5	7.2	1	208	1	3.5	48.0	50.0	208 V	1	HP-11	60A/F50A-3P-1	3#6, 1#10G, 1"C.
IDU-12	3	14.4	1	480	3	0.6	23.8	25.0	480 V	3	HP-12	30A/F25A-3P-1	4#10,1#10G, 3/4"C.

EXHAUST FAN SCHEDULE

SYMBOL	LOCATION	ELECTRICAL DATA				DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
		WATTS	HP	VOLTAGE	PH		
F-1	UTILITY 318	1127	0.50 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.
F-2	UTILITY 318	438	0.00 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.

DOAS CONDENSING UNIT SCHEDULE

SYMBOL	COMPRESSOR			ELECTRICAL DATA					MATCHING INDOOR UNIT	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
	QTY	RLA-1	RLA-2	FLA	MCA	FUSE	VOLTAGE	PH			
CU-1	2	9.7	10.6	24.0	27.0	35.0	460 V	3	DOAS-1	60A/F35A-3P-3R	4#8,1#10G., 3/4"C.
CU-2	2	7.8	6.2	17.0	19.0	25.0	460 V	3	DOAS-2	30A/F25A-3P-3R	4#10,1#10G, 3/4"C.

DOAS INDOOR UNIT SCHEDULE

SYMBOL	ELECTRIC HEAT					ELECRICAL DATA					MATCHING OUTDOOR UNIT	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
	KW	STAGES	FLA	VOLTAGE	PH	FLA	MCA	MOCP	VOLTAGE	PH			
DOAS-1	30.0	4	36.1	460	3	37.7	47.0	50.0	460 V	3	CU-1	60A/F50A-3P-1	4#6,1#10G., 1"C.
DOAS-2	22.5	3	27.1	460	3	28.7	36.0	40.0	460 V	3	CU-2	60A/F40A-3P-1	4#8,1#10G., 3/4"C.

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North Carolina License Number C-0914

Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG

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ELECTRICAL SCHEDULES AND LIGHTING SEQUENCE OF OPERATIONS

E1-602

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OPTIMA # 21-0266R

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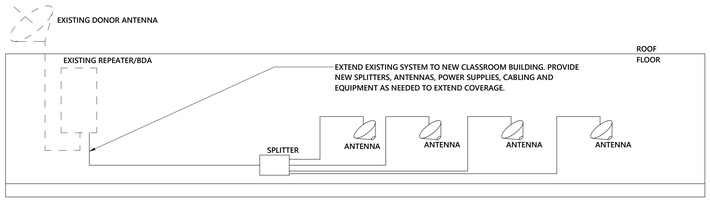
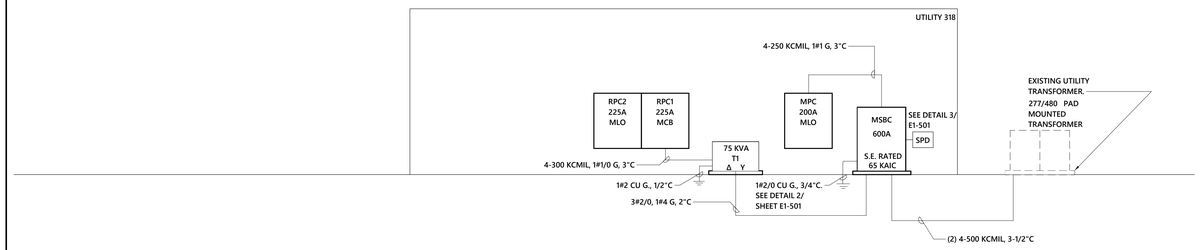


1 EMERGENCY RESPONDER SYSTEM BOOSTING RISER
NO SCALE

SYSTEM NOTES

NOTES:
1. SYSTEM IS BASED ON 800Mhz. COORDINATE WITH LOCAL EMERGENCY RESPONDERS FOR NECESSARY FREQUENCY RFEQUIRED
2. SEE SPECIFICATIONS FOR ALL EQUIPMENT AND CABLING REQUIREMENTS.
3. ALL CABLING TO BE INSTALLED IN 1 1/2" CONDUIT.
4. SYSTEM SUPPLIER SHALL PROVIDE A SYSTEM SURVEY REPORT PRIOR TO PROVIDING THE SYSTEM. THIS SHALL BE CONSIDERED BASE BID FOR THE PROJECT. SIGNAL SURVEY REPORT SHALL BE TAKEN TO THE LOCAL FIRE CODE OFFICIAL AND THE LOCAL FIRE CODE OFFICIAL SHALL DETERMINE IF THE SYSTEM NEEDS TO BE INSTALLED. SIGNAL STRENGTH MEASUREMENTS SHALL BE MEASURED IN 95% OF ALL AREAS ON EACH FLOOR (100% OF ALL EGRESS AND CRITICAL AREAS). A MINIMUM SIGNAL STRENGTH OF -95dBM IS REQUIRED.
5. PROVIDE A DEDUCTIVE ALTERNATE FOR THE EMERGENCY RESPONDER SYSTEM INCLUDING ALL DEVICES, CABLING, CONDUIT, AND EQUIPMENT. SUBMITTAL AND SURVEY REPORT SHALL BE CONSIDERED BASE BID.
6. BASED ON SURVEY REPORT, DEVICES SHALL BE LOCATED TO MAXIMIZE BOOSTING SIGNAL. LOCATIONS SHALL BE COORDINATED WITH GENERAL CONTRACTOR.
7. DASHED ITEMS ARE EXISTING.



NOTES:
1. ALL FEES ASSOCIATED WITH UTILITY COMPANY COORDINATION, INCLUDING PURCHASE/LEASE OF UTILITY TRANSFORMER, TRANSFORMER PRIMARY FEES, PAD, AND ALL ADMINISTRATIVE FEES SHALL BE INCLUDED AS PART OF THE E.C. CONTRACT.
2. ELECTRICAL FEEDERS SIZES SHOWN ON RISER ARE SIZED ALUMINUM MATERIAL, UNLESS NOTED OTHERWISE.
3. DASHED ITEMS ARE EXISTING TO REMAIN.
4. X-OUT ITEMS ARE EXISTING TO BE DEMOLISHED.

2 POWER RISER DIAGRAM
NOT TO SCALE

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ELECTRICAL DIAGRAMS

E1-901
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FIRE ALARM SYSTEM MATRIX

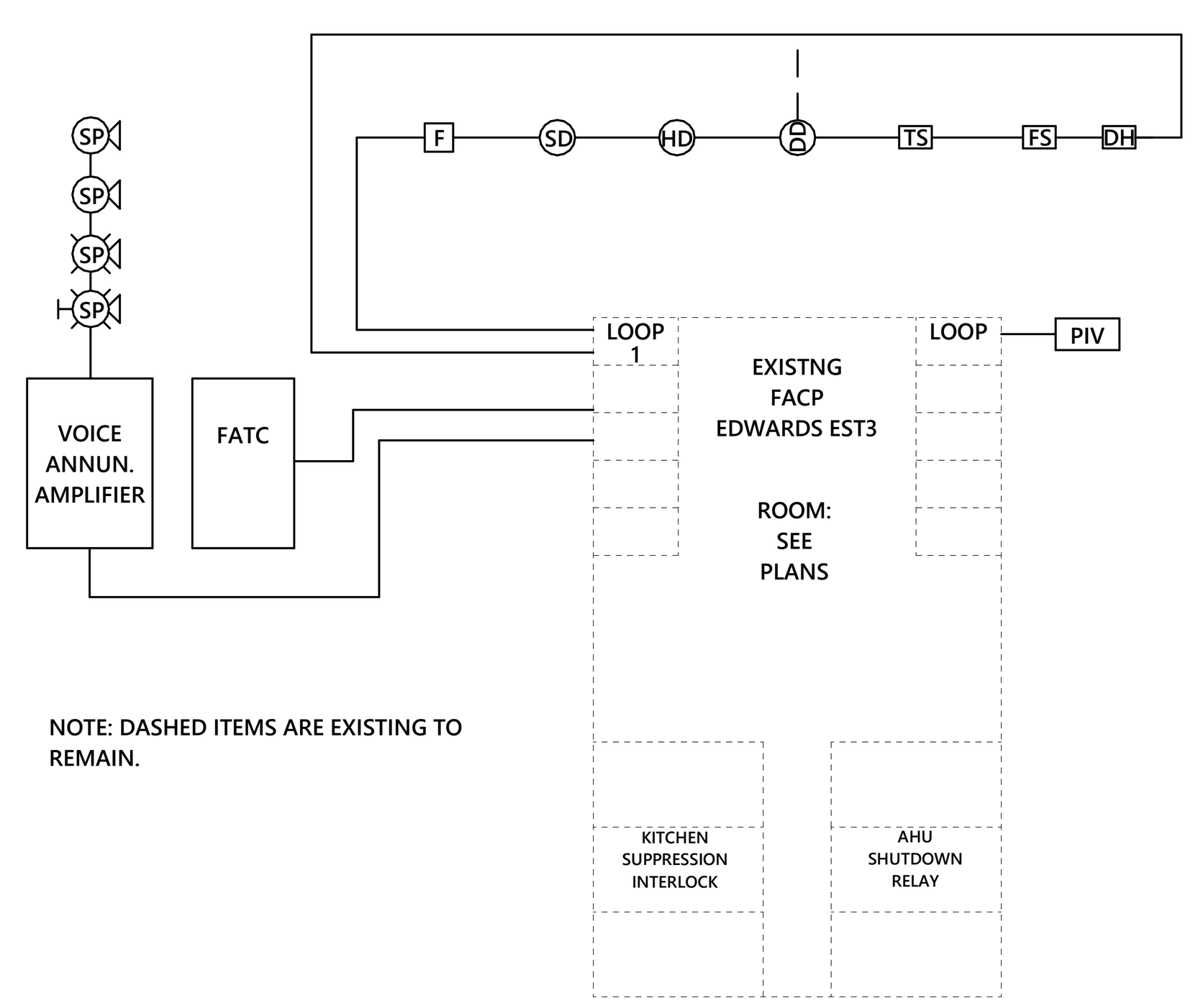
BUILDING SYSTEM OUTPUTS | CENTRAL COMM

	ACTIVATE COMMON ALARM SIGNAL INDICATOR	ACTIVATE AUDIBLE ALARM SIGNAL	ACTIVATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTIVATE AUDIBLE SUPERVISORY INDICATOR	ACTIVATE COMMON TROUBLE SIGNAL INDICATOR	ACTIVATE AUDIBLE TROUBLE SIGNAL	ACTIVATE GENERAL EVACUATION SIGNAL	DISPLAY CHANGE OF STATUS	ACTIVATE EXTERNAL HORNS/STROBES	TRANSMIT FIRE ALARM SIGNAL TO CENTRAL STATION	TRANSMIT SUPERVISORY SIGNAL TO CENTRAL STATION	TRANSMIT TROUBLE SIGNAL TO CENTRAL STATION	RETURN ELEVATOR TO ALTERNATE FLOOR	RETURN ELEVATOR TO FIRST FLOOR	SHUNT TRIP AFTER ELEV. REACHES DESIGNATED FLOOR	SHUT DOWN RESPECTIVE HVAC	SHOW CHANGE OF STATUS ON ANNUNCIATOR	SHOW CHANGE OF STATUS ON CENTRAL PANEL	TRANSMIT FIRE ALARM SIGNAL TO CENTRAL STATION	TRANSMIT SUPERVISORY SIGNAL TO CENTRAL STATION	TRANSMIT TROUBLE SIGNAL TO CENTRAL STATION
MANUAL FIRE ALARM PULL BOXES	X	X					X	X	X	X							X	X	X		
BUILDING SMOKE DETECTOR	X	X					X	X	X	X							X	X	X		
DUCT SMOKE DETECTOR			X	X				X			X					X	X	X		X	
SPRINKLER WATER FLOW	X	X					X	X	X	X							X	X	X		
SPRINKLER TAMPER			X	X				X			X						X	X		X	
1ST FLOOR ELEV. LOBBY SMOKE DET.	X	X					X	X	X	X			X				X	X	X		
UPPER FLR. ELEV. LOBBY SMOKE DET.	X	X					X	X	X	X				X			X	X	X		
HOOD SUPPRESSION SYSTEM	X	X					X	X	X	X							X	X	X		
NOTIFICATION DEVICE SHORT CIRCUIT					X	X		X				X					X	X			
OPEN CIRCUIT					X	X		X				X					X	X			X
GROUND FAULT					X	X		X				X					X	X			X
FIRE ALARM A.C. POWER FAILURE					X	X		X				X					X	X			X
FIRE ALARM SYSTEM LOW BATTERY					X			X				X					X	X			X
BDA SYSTEM			X					X			X						X	X			X

NFPA FIRE ALARM LEGEND

	DESCRIPTION
F	FIRE ALARM MANUAL STATION.
FATC	FIRE ALARM TERMINAL CABINET
NAC	NOTIFICATION APPLIANCE CIRCUIT POWER EXTENDER
15cd	FIRE ALARM SPEAKER W/STROBE (CANDELAS), WHITE FINISH
	FIRE ALARM SPEAKER ONLY, WHITE FINISH
15cd	FIRE ALARM SPEAKER W/STROBE (CANDELAS), WHITE FINISH
	FIRE ALARM SPEAKER ONLY, WHITE FINISH
	SMOKE DETECTOR/SENSOR (DEFAULT PHOTOELECTRIC TYPE)
X	HEAT DETECTOR/SENSOR. X=TYPE
WF	SPRINKLER FLOW SWITCH
VS	VALVE SUPERVISORY SWITCH
DD	RECTANGULAR DUCT MOUNTED DUCT DETECTOR. FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR. CUTTING OF DUCT, INSTALLATION OF DETECTOR. AND DETERMINATION OF SAMPLING TUBE LENGTH SHALL BE THE MECHANICAL CONTRACTOR. PROVIDE REMOTE INDICATING LIGHT WITH EACH DETECTOR.
R	DUCT DETECTOR REMOTE INDICATING LIGHT.

FA_Sheet List

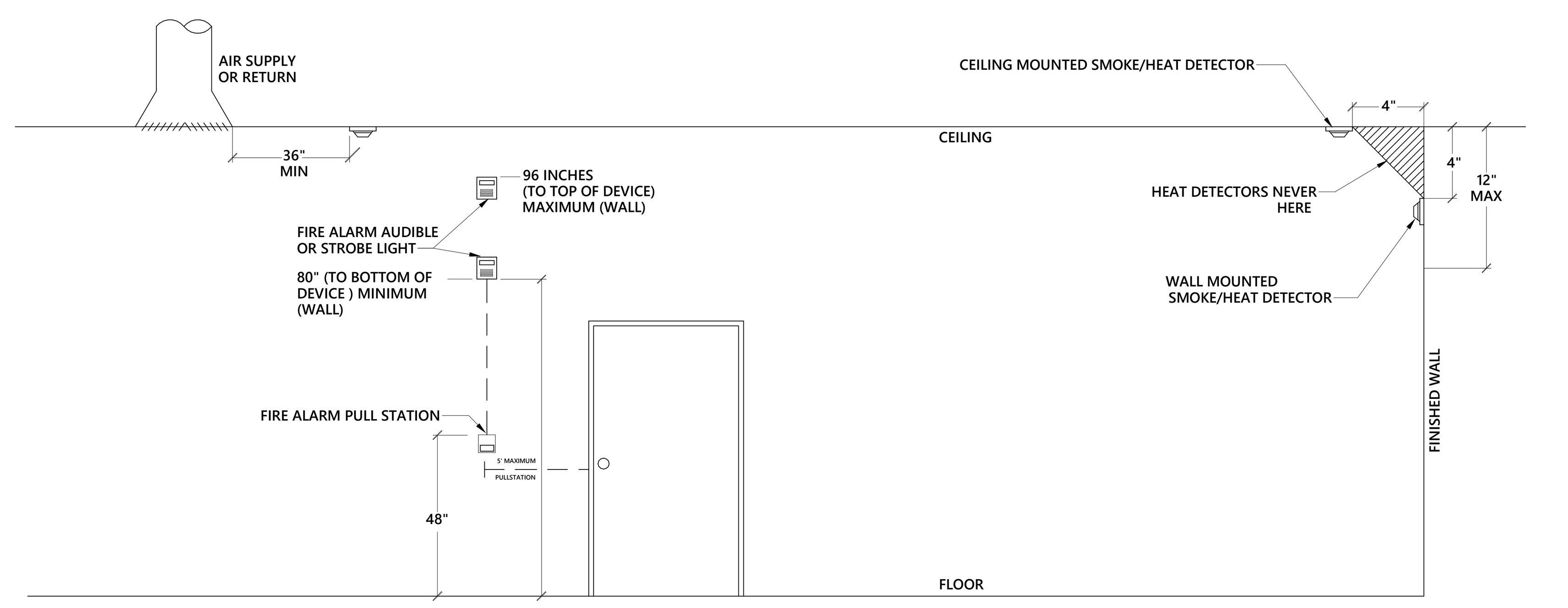


NOTE: DASHED ITEMS ARE EXISTING TO REMAIN.

FIRE ALARM NOTES

1. EXISTING FACP IS FULLY ANALOG ADDRESSABLE.
2. EXISTING FACP HAS A MINIMUM 24HR. BATTERY BACKUP.
3. EXSTING FACP IS CONNECTED TO A UL APPROVED CENTRAL STATION.
4. ZONE PER NFPA 72, 2013 AND MANUFACTURER'S RECOMMENDATIONS WITH NO ONE ZONE EXCEEDING 15,000 S.F. PER FLOOR.
5. COORDINATE QUANTITY AND LOCATIONS OF DEVICES WITH CONTRACT DRAWINGS.
6. LOCATE SMOKE DETECTOR WITHIN 5' OF THE MAGNETIC HOLD OPEN DOORS. (TYPICAL)
7. LOCATE FIRE ALARM PULL STATION WITHIN 5' OF THE EXIT DOOR.
8. LOCATE SMOKE/HEAT DETECTOR WITHIN 5' OF THE FA EQUIPMENT (FACP, FATC).
9. LOCATION OF CEILING MOUNTED SMOKE/HEAT DETECTOR SHALL BE FIELD COORDINATED PRIOR TO ROUGH IN. THE DETECTOR SHALL BE A MINIMUM OF 2' AWAY FROM LIGHT FIXTURE AND A MINIMUM OF 3' AWAY FROM AIR DISTRIBUTION DEVICES.
10. AUTOMATIC DOOR CLOSING SHALL BE ACCOMPLISHED BY THE ACTIVATION OF THE LOCAL SMOKE DETECTORS AT THAT DOOR. SMOKE DETECTOR ACTIVATION SHALL ALERT THE BUILDING FIRE ALARM SYSTEM. THE FIRE ALARM SYSTEM SHALL CAUSE ALL HOLD OPEN DOORS TO CLOSE UPON ALARM ACTIVATION IN THE BUILDING.
11. ACTIVATION OF AN ALARM ZONE SHALL CAUSE ALL AIR HANDLING EQUIPMENT TO SHUT DOWN (ALL DAMPERS, AIR HANDLERS AND EXHAUST FANS MUST STOP).
12. ACTIVATION OF KITCHEN HOOD SUPPRESSION SYSTEM PROVIDES SIGNAL TO FACP WHICH IN TURN ACTIVATES ALL ANNUNCIATING ZONES & CUTS OFF AHU SUPPLY AIR.
13. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF ALL FLOW, PRESSURE, & TAMPER SWITCHES WITH FIRE PROTECTION CONTRACTOR PRIOR TO INSTALLATION.
14. ALL VISUAL DEVICES WITHIN THE SAME AREA SHALL BE SYNCHRONIZED. IT SHALL BE A THREE BEAT TEMPORAL PATTERN.
15. ALL FIRE ALARM WIRING SHALL BE IN CONDUIT.
16. PROVIDE MULTI-TEMPORAL SOUNDING CAPABILITY AT ALL AUDIO DEVICES FOR EMERGENCY NOTIFICATION FOR NON VOICE SYSTEMS COMPONENTS.
17. THE FIRE ALARM SYSTEM MANUFACTURER SHALL PROVIDE NOTIFICATION APPLIANCE CIRCUIT (NAC) POWER EXTENDERS AS REQUIRED.
18. THE DUCT SMOKE DETECTORS SHALL COMPLY WITH IFC 907.12.
19. THE CIRCUIT FEEDING THE FIRE ALARM PANEL IS DEDICATED FOR THE FIRE ALARM ONLY. BREAKER SHALL BE PROVIDED WITH A LABEL "FIRE ALARM CIRCUIT" AND SHALL BE RED.
20. PROVIDE REMOTE LIGHT FOR DUCT SMOKE DETECTOR ON CEILING WHERE UNIT IS ABOVE CEILING.
21. CONTRACTOR RESPONSIBLE FOR SHOP DRAWINGS AS REQUIRED BY LOCAL AHJ.
22. DUCT DETECTORS SHALL BE VERIFIED WITH THE MECHANICAL DRAWINGS FOR QUANTITY AND LOCATION. TOTAL QUANTITY MINIMUM SHALL BE BASED ON BOTH MECHANICAL SCHEDULES AND MECHANICAL PLAN LOCATIONS AND ELECTRICAL PLANS. WHEN DEVICE QUANTITIES (ELECTRICAL VS. MECHANICAL) ARE IN CONFLICT, PROVIDE THE GREATER QUANTITY OF DETECTORS.

1 FIRE ALARM RISER DIAGRAM
NOT TO SCALE



NOTES:
1. DEVICES REQUIRED TO BE ADA ACCESSIBLE SHALL BE INSTALLED PER ANSI A117.1.

2 MOUNTING HEIGHTS OF FIRE ALARM DEVICES - ELEVATION
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Harnett County Schools
Johnsonville Elementary School Addition/Renovation Phase 2
18495 NC-27, Cameron, NC 28326

No.	Date	Description

ISSUE DATE: 03/25/2022
PROJECT #: 02103.000
DRAWN BY: JSD
CHECKED BY: MKG

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FIRE ALARM LEGEND & NOTES

FA1-001

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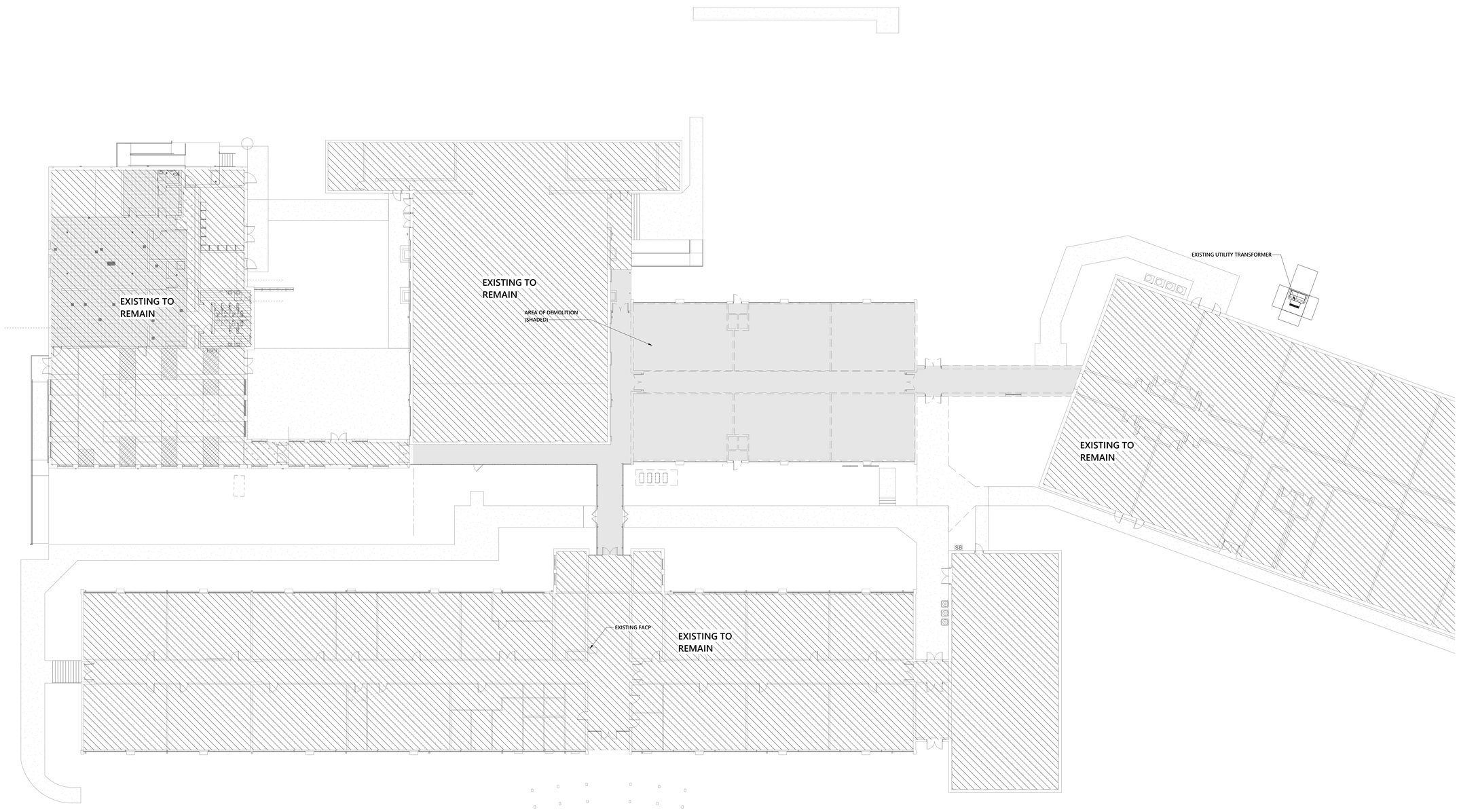
GENERAL NOTES

A. DASHED ARCHITECTURAL LINES INDICATE DEMOLITION. DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES IN WALLS AND CEILINGS. TYPICAL IN ALL AREAS UNLESS OTHERWISE NOTED. COORDINATE WITH OTHER TRADES AS REQUIRED TO FACILITATE COMPLETE DEMOLITION.
B. CONTRACTOR SHALL MAKE SURE TO MAINTAIN CONTINUITY OF FIRE ALARM DEVICES THAT ARE OUTSIDE AREA OF WORK THAT ARE INTENDED TO REMAIN ENERGIZED.
C. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
D. HATCHED AREAS ARE NOT IN SCOPE OF WORK.



1 OVERALL FIRE ALARM PLAN - DEMOLITION - PHASE 2
1/16" = 1'-0"

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FIRST FLOOR FIRE ALARM PLAN - DEMOLITION

FA1-101

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GENERAL NOTES

A. REFER TO SHEET FA1-001 FOR LEGEND AND SYMBOLS.
B. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

1 FIRST FLOOR FIRE ALARM PLAN - NEW WORK - PHASE 2
1/8" = 1'-0"

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FIRST FLOOR FIRE ALARM PLAN - NEW WORK

FA1-102

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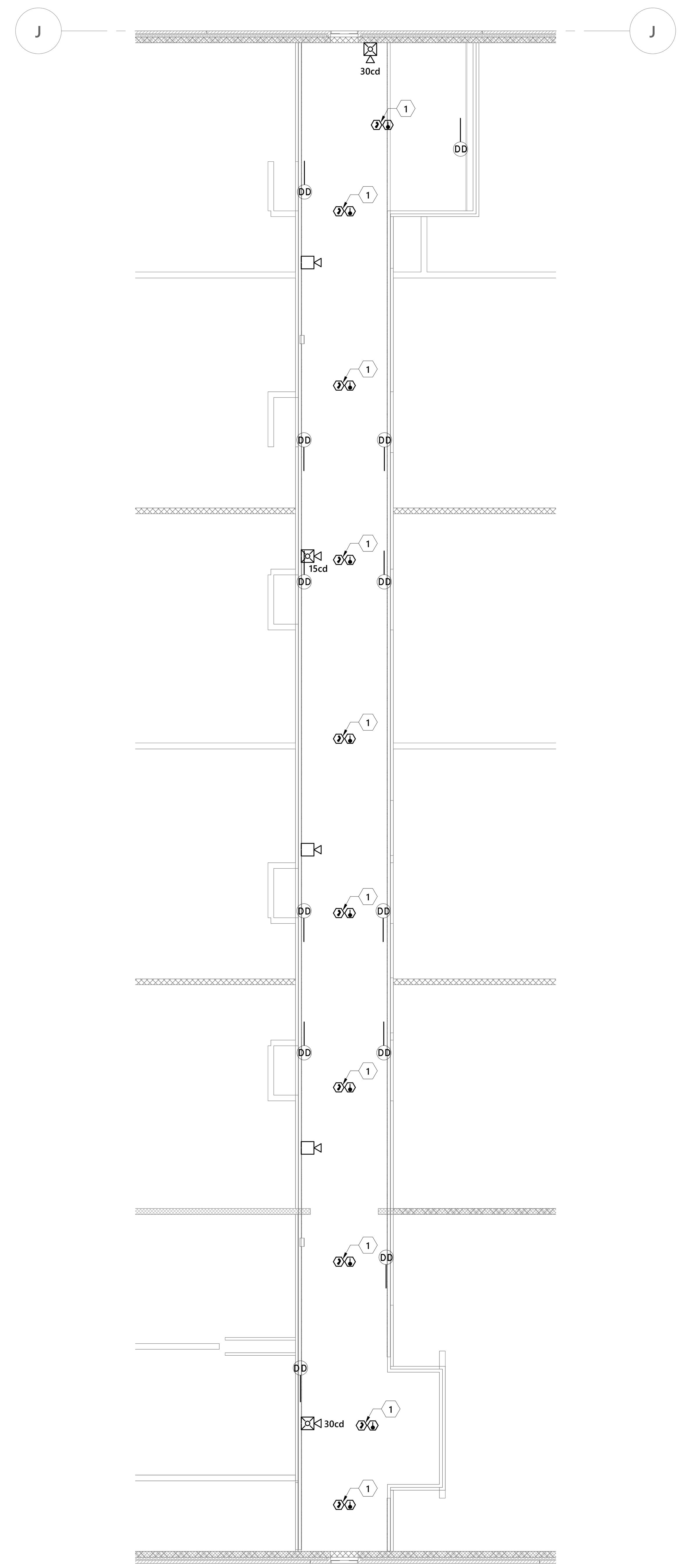
GENERAL NOTES

A. REFER TO SHEET FA1-001 FOR LEGEND AND SYMBOLS.
B. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

KEYED NOTES

1 PROVIDE COMBINATION SMOKE AND HEAT DETECTOR.



1 MECHANICAL LOFT FIRE ALARM PLAN - PHASE 2
1/8" = 1'-0"

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MECHANICAL LOFT FIRE ALARM PLAN - NEW WORK

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