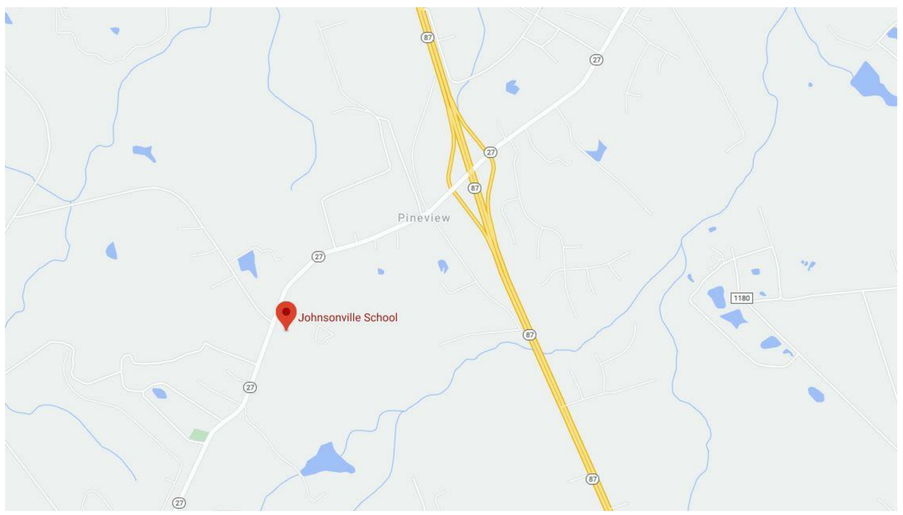
Harnett County Schools

Johnsonville Elementary School Addition/Renovation

18495 NC-27, Cameron, NC 28326

RENDERING

VICINITY MAP



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Grand total: 58

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Grand total: 31

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PLUMBING/MECHANICAL/ ELECTRICAL ENGINEER/

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

CIVIL ENGINEER:

LKC Engineering, PLLC
140 Aqua Shed Court
Aberdeen, NC 28315
P. (910) 420-1437

STRUCTURAL ENGINEER:

LHC Structural Engineers
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FOOD SERVICE DESIGNER:

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FIRE PROTECTION/FIRE ALARM

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

SET NUMBER:

12/15/2020

CONSTRUCTION DOCUMENTS

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

ENERGY STAR PARTNER

PROJECT NUMBER: 2020.300

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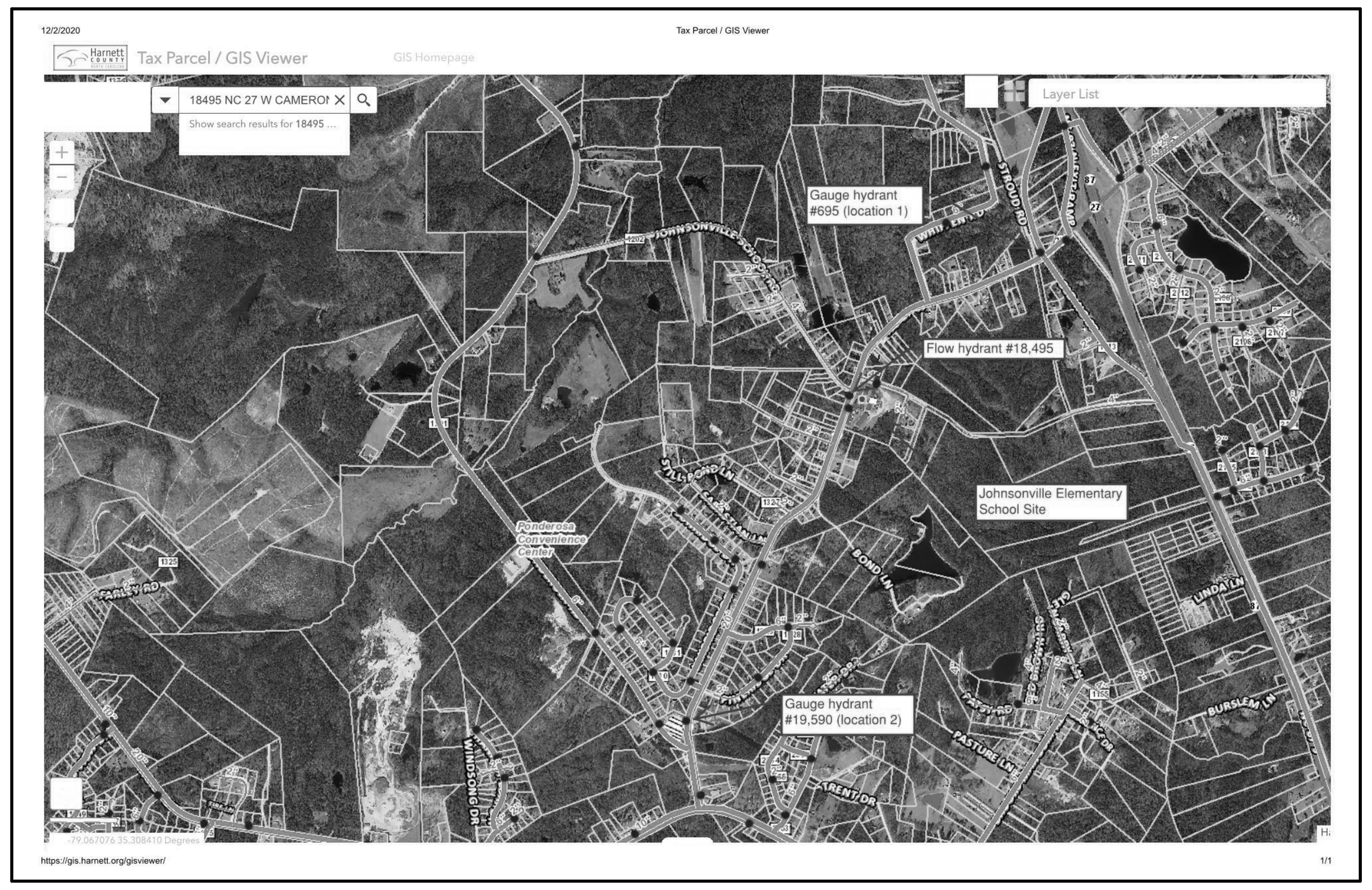

FIRE FLOW TEST RESULTS (Test 1 – Residual hydrant #19,590)

LKC Engineering, PLLC
140 Aqua Shed Court
Aberdeen, NC 28315
PH: (910) 420-1437
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(R) = Rated Capacity (in gpm) at 20 psi residual
Q(F) = Total test flow (gpm) from at pitot pressure
H(R) = Static Pressure - 20psi
H(F) = Static Pressure - Residual Pressure

	Q(F)	H(R)	H(F)
Q(R) =	840	47	8

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

Performed By: Jackson Maples — Date: 12/1/2020

Certified By: ____ — Date: ____

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

FIRE FLOW TEST RESULTS (Test 1 – Residual hydrant #695)

LKC Engineering, PLLC
140 Aqua Shed Court
Aberdeen, NC 28315
PH: (910) 420-1437
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	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(R) = Rated Capacity (in gpm) at 20 psi residual
Q(F) = Total test flow (gpm) from at pitot pressure
H(R) = Static Pressure - 20psi
H(F) = Static Pressure - Residual Pressure

	Q(F)	H(R)	H(F)
Q(R) =	840	74	28

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

Performed By: Jackson Maples — Date: 12/1/2020

Certified By: ____ — Date: ____

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

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. PROVIDE DRY-STEM SPRINKLERS SUPPLIED FROM WET PIPING FOR AREAS SUBJECT TO FREEZING TEMPERATURES WHICH ARE REQUIRED TO BE SPRINKLERED. DRY-STEM SPRINKLERS SHALL HAVE BARREL LENGTHS IN ACCORDANCE WITH 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
(symbol)	WET PIPE SYSTEM PIPING
(symbol)	ELBOW DOWN
(symbol)	ELBOW UP
(symbol)	TEE DOWN
(symbol)	PIPE CONTINUES
(symbol)	PIPE CAP (OR PLUG)
(symbol)	CONTROL VALVE WITH TAMPER SWITCH
(symbol)	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 PROFESSIONAL ENGINEER SEAL 039771 CHRISTOPHER CAIN COOK 12/15/20

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020

PROJECT #: 2020.300
DRAWN BY: CCC
CHECKED BY:

FIRE PROTECTION LEGEND, DESIGN DATA, AND SPECIFICATIONS

F-001

OPTIMA # 20-0196R

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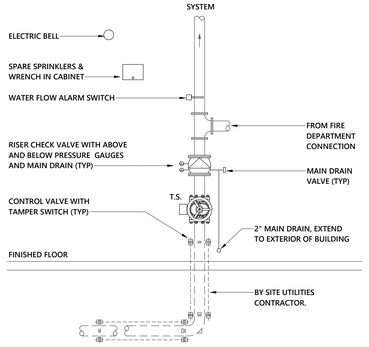

2 **SPRINKLER SYSTEM RISER DETAIL**
NOT TO SCALE

1 **FIRE PROTECTION WORK FLOOR PLAN**
1/8" = 1'-0"
0 4' 8' 16'

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sfl+a ARCHITECTS

NORTH CAROLINA REGISTERED LANDSCAPE ARCHITECT SEAL 039771 ENGINEER CHRISTOPHER C. COOK 12/15/20

CONSTRUCTION DOCUMENTS

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North Carolina License Number C-0914

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Johnsonville Elementary School Addition/Renovation

18495 NC-27, Cameron, NC 28326

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: CCC
CHECKED BY:

FIRE PROTECTION PLAN

F-101

Sheet No. 2 of 2

OPTIMA # 20-0196R

Grease Interceptor Calculator

Description	Quantity	Capacity (Gallons)	% Full	Drainage Fixture Unit Value	Drainage Flow (GPM)	Drainage Period (Minutes)	Total Flow (GPM)	Notes
Item #12: Prep Sink (IW to 3" FS1)	1			5	2.5	Cont.	2.5	1,3
Item #15: Pre-rinse Sink (IW to 3" FS1)	1			5	2.5	Cont.	2.5	1,3
Item #16: Dishwasher	1				38.0	2	19.0	1,3
Item #18: 3-Compartment Sink (24x24x12)	1	87.3	75%		65.5	2	32.7	2
Items #23.1/23.2: Combi Ovens (IW to 3" FS1)	1			5	2.5	Cont.	2.5	1,3
Item #26: Steamer (IW to 3" FS1)	1			5	2.5	Cont.	2.5	1,3
Item #28: Floor Trough (4" P-Trap)	1			6	3.0	Cont.	3.0	1,3
Item #29: Prep Sink (IW to 3" FS1)	1			5	2.5	Cont.	2.5	1,3
Item P8: Can Wash	1			5	2.5	Cont.	2.5	1,3
Area Drain (3" FD1)	5			5	12.5	Cont.	12.5	1,3
Total Flow to Grease Interceptor							**82.2**	**GPM**
Minimum Retention Time							**30.0**	**MIN**
Minimum Grease Interceptor Size							**2467.1**	**GAL**

Notes:
1. Reference NC Plumbing Code, 2018 Edition - Sections 709.2, 709.3, and 709.4.1.
2. Flow rate determined by anticipated full volume of fixture divided by the allowable drainage time of fixture.
3. Flow rate determined by fixture unit value.

Storage Tank Water Heater Sizing Calculator

Developed by the Plan Review Unit of the Environmental Health Section
NC Division of Public Health

Establishment Name:	Johnsonville Elementary School
Address:	18495 NC 27, Cameron, NC 28326

EQUIPMENT						GPH CALCULATED
Enter the description, and number and size of compartments for each sink	Description	Number of compartments	Length (Inches)	Width (Inches)	Depth (Inches)	Gallons Per Hour (GPH)
Manual warewashing sink	ITEM #18	3	28	20	12	66
Sink #2						0
Sink #3						0
Bar sink						0
Sinks are calculated at 75% capacity					Total	66

Enter type of prep sink and number of sink compartments for each sink	Type of prep sink (vegetable, meat, seafood)	Number of compartments	Gallons Per Hour (GPH)
Prep sink #1	ITEM #29	2	10
Prep sink #2	ITEM #12	1	5
Prep sink #3			0
Prep sinks are calculated at 5 gallons per compartment		Total	15

Enter the quantity of equipment	Quantity	Gallons Per Hour (GPH)
Handwashing sinks	7	35
Service sink	2	10
Hose reel	1	5
Clothes washer	1	15

Enter a description and estimated gallon per hour (GPH) usage for other equipment	Description	Estimated gallons per hour (GPH) usage	
Other equipment			0
Other equipment			0
Other equipment			0
Handwashing sinks and service sinks are calculated at 5 GPH each. Hose reels are calculated at 5 GPH, clothes washers at 15 GPH, other equipment at the usage entered.		Total	65

Enter make, model, and Final Rinse Usage gallons per hour (GPH) for the warewashing machine	Make	Model	Final Rinse Usage (GPH) Found in "Warewashing Machine Specs" tab below or on manufacturer's spec sheet	Gallons Per Hour (GPH)
Warewashing machine	Hobart	CL44EN-BAS	126	88.2

Enter the quantity of pre-rinse units	Quantity	Gallons Per Hour (GPH)
Pre-rinse	1	45
Warewashing machines are calculated at 70% of the final rinse usage specified by the manufacturer. Pre-rinses are calculated at 45 GPH.	Total	133.2

Recovery Rate Needed (GPH): 279

Water Heater Input (BTU or kW) Needed:

Gas Water Heater	Electric Water Heater
214 ,000 BTU at 70°F rise	48 kW at 70°F rise
244 ,000 BTU at 80°F rise	54 kW at 80°F rise
275 ,000 BTU at 90°F rise	61 kW at 90°F rise
306 ,000 BTU at 100°F rise	68 kW at 100°F rise

DOMESTIC WATER PIPING

1. UNDERGROUND PIPING AND JOINTS: PROVIDE TYPE 'K' SOFT ANNEALED SEAMLESS COPPER TUBING (ASTM B88) WITH NO JOINTS BENEATH BUILDING SLABS.
2. ABOVEGROUND PIPING AND JOINTS: PROVIDE TYPE 'L' HARD DRAWN SEAMLESS COPPER TUBING (ASTM B88) AND CAST COPPER ALLOY FITTINGS (ASME B16.18). JOINTS SHALL BE LEAD FREE 95/5 TIN / SILVER SOLDER JOINTS (ASTM B32).
3. PROVIDE TWO-PIECE, BRONZE OR BRASS BODY, FULL-PORT, BALL SHUTOFF VALVES WITH BLOWOUT-PROOF STEMS AND ADJUSTABLE PACKING GLANDS. PROVIDE HANDLE EXTENSIONS FOR VALVES IN INSULATED PIPING.
4. PROVIDE UNIONS DOWNSTREAM OF VALVES AND AT EACH EQUIPMENT CONNECTION.
5. INSULATE PIPING ABOVE GRADE (EXCEPT EXPOSED CONNECTIONS TO PLUMBING FIXTURES) WITH GLASS FIBER INSULATION HAVING A VAPOR BARRIER AND JACKET. PIPE INSULATION SHALL HAVE A CONDUCTIVITY NOT EXCEEDING 0.27 BTU/H x SF, SEE LIST BELOW FOR INSULATION THICKNESS:

   PROVIDE 1" THICK INSULATION FOR HOT WATER AND CIRCULATION PIPING SIZES 1/2" THROUGH 1-1/4".
   PROVIDE 1-1/2" THICK INSULATION FOR HOT WATER AND CIRCULATION PIPING SIZES 1-1/2" THROUGH 4".
   PROVIDE 1/2" THICK INSULATION FOR COLD WATER PIPING SIZES 1/2" THROUGH 1-1/4".
   PROVIDE 1" THICK INSULATION FOR COLD WATER PIPING SIZES 1-1/2" THROUGH 4".
6. PIPING INSULATION, JACKETS, COVERINGS, SEALERS, MASTICS AND ADHESIVES SHALL MEET A FLAME-SPREAD RATING OF TWENTY-FIVE (25) OR LESS AND A SMOKE-DEVELOPED RATING OF FIFTY (50) OR LESS AS TESTED BY ASTM E84 (NFPA 255) METHOD AND SHALL BE PLENUM-RATED. PROVIDE POLYVINYL CHLORIDE (PVC) INSULATION JACKETING FOR EXPOSED PIPING IN FOOD SERVICE, FOOD STORAGE, AND MECHANICAL ROOMS. INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PIPE HANGERS. PROVIDE GALVANIZED STEEL SHIELDS BETWEEN PIPE HANGERS AND INSULATION.
7. PROTECT COPPER PIPING AGAINST CONTACT WITH DISSIMILAR METALS. ALL HANGERS, SUPPORTS, ANCHORS AND CLIPS SHALL BE COPPER OR COPPER-PLATED. WHERE COPPER PIPING IS CARRIED ON TRAPEZE HANGERS WITH OTHER PIPING, PROVIDE A PERMANENT ELECTROLYTIC ISOLATION MATERIAL TO PREVENT CONTACT WITH DISSIMILAR METALS. ELECTRICAL TAPE OR SIMILAR ADHESIVE WRAPPINGS ARE NOT ACCEPTABLE ISOLATION METHODS.
8. PROTECT COPPER PIPING AGAINST CONTACT WITH MASONRY. WHERE COPPER IS SLEEVED THROUGH MASONRY, PROVIDE COPPER OR RED BRASS SLEEVES. WHERE COPPER MUST BE CONCEALED IN OR AGAINST MASONRY PARTITIONS, PROVIDE A HEAVY COATING OF ASPHALTIC ENAMEL ON THE COPPER PIPING AND FIFTEEN (15) POUND ASPHALT SATURATED FELT BETWEEN THE PIPING AND THE MASONRY PARTITION.
9. PERFORM A PRESSURE TEST ON ALL WATER PIPING. FILL PIPING WITH POTABLE WATER, CAP AND SUBJECT PIPING TO A STATIC WATER PRESSURE OF FIFTY (50) PSI ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS OR PRESSURIZE PIPING WITH AIR TO AT LEAST ONE-HUNDRED (100) PSI. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR (4) HOURS. LEAKS AND/OR LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
10. STERILIZE THE DOMESTIC WATER SYSTEM PER THE AMERICAN WATER WORKS ASSOCIATION'S SPECIFICATIONS AND LOCAL HEALTH DEPARTMENT REGULATIONS.
11. SLOPE WATER PIPING FOR DRAINAGE WITH DRAIN VALVES INSTALLED AT LOW POINTS.

SANITARY WASTE AND VENT PIPING

1. UNDERGROUND PIPING AND JOINTS: PROVIDE SERVICE WEIGHT CAST IRON HUB AND SPIGOT PIPE (ASTM A74) WITH COMPRESSION JOINTS (CISPI HSN) AND NEOPRENE GASKETS (ASTM C564).
2. ABOVEGROUND PIPING AND JOINTS: PROVIDE SERVICE WEIGHT CAST IRON NO-HUB PIPE AND FITTINGS (CISPI 301) WITH HEAVY-DUTY NEOPRENE GASKET AND STAINLESS STEEL CLAMP JOINTS (CISPI 310, ASTM C1540).
3. SLOPE WASTE AND VENT PIPING AT 1/4" PER FOOT MINIMUM FOR PIPING 2-1/2" AND SMALLER AND 1/8" PER FOOT MINIMUM FOR PIPING 3" AND LARGER UNLESS NOTED OTHERWISE. SLOPE ALL KITCHEN GREASE WASTE PIPING AT 1/4" PER FOOT MINIMUM.
4. PROVIDE CLEANOUTS AT THE BASE OF STACKS, AFTER EVERY FOUR (4) HORIZONTAL 45° BENDS IN SERIES, AND SPACED WITHIN 100'-0" APART IN HORIZONTAL RUNS. INSTALL CLEANOUTS IN LOCATIONS THAT PERMIT ACCESS FOR SERVICE WITHOUT DAMAGE TO THE BUILDING OR FINISHED MATERIALS.
5. PROVIDE FLOOR CLEANOUTS WITH TOPS DESIGNED TO MATCH SPECIFIC FLOOR FINISHES SUCH AS CARPET, TILE, ETC. GRADE CLEANOUTS SHALL BE PROVIDED IN AN 18" BY 18" BY 6" CONCRETE PAD.
6. WASTE AND VENT SYSTEMS SHALL BE TESTED AND PROVED WATER TIGHT UNDER A HEAD PRESSURE OF NO LESS THAN TEN (10) FEET. THIS PRESSURE SHALL BE HELD FOR A PERIOD OF NO LESS THAN FIFTEEN (15) MINUTES.

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

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

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS
- [ ] C406.2 EFFICIENT MECH EQUIPMENT
- [ ] C406.5 ON-SITE RENEWABLE ENERGY
- [x] C406.3 REDUCED LTG DENSITY
- [ ] C406.6 DEDICATED OA SYSTEM
- [ ] C406.4 ENHANCED LTG CONTROLS
- [ ] 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 EFFICIENCY	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)
- [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.

PLUMBING SYSTEMS SUMMARY

PLUMBING SYSTEM	TOTAL FIXTURE UNITS	PEAK DEMAND FLOW
DOMESTIC WATER SUPPLY	116.50 WSFU	72.04 GPM
SANITARY SEWER	166.00 DFU	N/A

PLUMBING SHEET INDEX

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SEAL 039771

CONSTRUCTION DOCUMENTS

optima engineering
150 Fayetteville St., Suite 520, Raleigh, NC 27601
1927 South Tryon St., Suite 300, Charlotte NC 28203
Phone: 919-926-2200 - www.optimaengineering.com
North Carolina License Number C-0914

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: CCC
CHECKED BY:

PLUMBING LEGEND, DESIGN DATA, AND SPECIFICATIONS

P-001

BIM 360://Johnsonville ES Addition Renovation/20-0196_Johnsonville School Cafeteria_MEPFP_R20.rvt
12/15/2020 12:23:03 PM

PLUMBING FOOD SERVICE EQUIPMENT SCHEDULE

ITEM	DESCRIPTION	MANUFACTURER	MODEL	PLUMBING HW	PLUMBING AFF	PLUMBING CW	PLUMBING AFF	PLUMBING IW	PLUMBING DRAIN	COMMENTS
01	COLD STORAGE SHELVING UNIT	METRO	MQ1860G							74" HIGH POSTS, POLYMER, 4-TIER, CASTERS
02	COLD STORAGE ASSEMBLY	BALLY	CUSTOM						F.D.	*SEE REFRIGERATION CONNECTION SCHEDULE
03	NOT USED									
04A	SHELVING UNIT	METRO	MQ2142G							74" HIGH POSTS, POLYMER, 4-TIER, CASTERS
04B	SHELVING UNIT	METRO	MQ2160G							74" HIGH POSTS, POLYMER, 4-TIER, CASTERS
05	POT & PAN SHELVING RACK	METRO	PR48VX3							CASTERS
06	PROOFER/ HOLDING CABINET	WINSTON	HA4522							CASTERS
07	BAKER'S WORKTABLE	EAGLE GROUP	MT3060GT-BS							STAINLESS STEEL TOP
7.1	INGREDIENT BINS	CAMBRO	IBS27148							CASTERS
08	BUN PAN RACK	METRO	RD3N							CASTERS
09	PLANETARY MIXER	HOBART	HL200-10STD							MIXER ATTACHMENTS
10	WORK TABLE	EAGLE GROUP	T3072SE							(2)S/S 20"X20"X5" DRAWERS, UNDERSHELF
11	WORK TABLE	EAGLE GROUP	T3060SEM-BS							(2)S/S 20"X20"X5" DRAWERS, UNDERSHELF
12	ONE (1) COMPARTMENT SINK	EAGLE GROUP	FN2424-1-36R-14/3					1 1/2"	F.S.	LEVER DRAIN
12.1	FAUCET	T&S BRASS	B-0231	1/2"	14"	1/2"	14"			
13	WALL MOUNTED SHELVES	EAGLE GROUP	WS1260-14/3							MOUNT 4'-6" A.F.F.
14	HAND SINK	BY PLUMBER	N.I.K.C.							
15	SOILED DISHTABLE	EAGLE GROUP	CUSTOM					1 1/2"	F.S.	20"X20" PRE-RINSE, SCRAP BLOCK
15.1	PRE-RINSE FAUCET	T&S BRASS	B-0133	1/2"	14"	1/2"	14"			
16	DISHWASHER, CONVEYOR	HOBART	CL44EN-BAS	1/2"	64"	1/2"	64"	2"	F.S.	A:BOOSTER B:DISHMACHINE, DRAIN TEMPERING KIT
17	CLEAN DISHTABLE	EAGLE GROUP	CDTR-96-14/3							
18	THREE (3) COMPARTMENT SINK	EAGLE GROUP	FN2860-3-36-14/3					1 1/2"	F.S.	(3)LEVER DRAIN
18.1	FAUCET	T&S BRASS	B-0231	1/2"	14"	1/2"	14"			
19	OVERSHELF	EAGLE GROUP	WSP1212							
20	UTILITY DISTRIBUTION SYSTEM	CAPTIVE-AIRE	UDI	3/4"	U.C.	3/4"	U.C.			
21	EXHAUST HOOD	CAPTIVE-AIRE	ND2-PSP							SEE VENTILATION SCHEDULE
22	FIRE SUPPRESSION SYSTEM	ANSUL	R-102							WET CHEMICAL
23.1	COMBI OVEN, ELECTRIC	CONVOTHERM	C4ET 10.20ES			(2) 3/4"	U.C.	2"	F.S.	STACKING KIT, WATER FILTER
23.2	COMBI OVEN, ELECTRIC	CONVOTHERM	C4ET 6.20ES			(2) 3/4"	U.C.	2"	F.S.	WATER FILTER
24	MEAT SLICER	HOBART	HS7-1							
25	MOBILE ENCLOSED CABINET	METRO	CD3N							CASTERS
26	STEAMER, CONVECTION	GROEN	(2)SSB-10GF			(2) 3/4"	U.C.		F.S.	WATER FILTER, DRAIN TEMPERING KIT
27	TILT SKILLET	CLEVELAND	SEM30TR	1/2"	U.C.	1/2"	U.C.		F.T.	DOUBLE PANTRY FAUCET
28	FLOOR TROUGH	EAGLE GROUP	ASFT-1836-SG					4"		
29	TWO (2) COMPARTMENT SINK	EAGLE GROUP	FN2448-2-24-14/3					1 1/2"	F.S.	(2)LEVER DRAIN
29.1	WALL MOUNTED SHELVES	EAGLE GROUP	WS1260-14/3							MOUNT 4'-6" A.F.F.
29.2	FAUCET	T&S BRASS	B-0231	1/2"	14"	1/2"	14"			
30	HOSE REEL	T&S BRASS	B-1444-CV	3/4"	42"	3/4"	42"		F.S.	50' HOSE
31	ICE MAKER	MANITOWOC ICE	IYT0450A-161			3/8"	64"	1/2"	F.S.	WATER FILTER
31.1	ICE BIN	MANITOWOC ICE	D-570					3/4"	F.S.	
32	PASS-THRU REFRIGERATOR	VICTORY	RSA-2D-1S-PT-HD							
33	PASS-THRU HEATED CABINET	VICTORY	HSA-1D-1-PT-HD							
34	MILK COOLER	BEVERAGE AIR	SM49HC-S							CASTERS
35	HOT FOOD SERVING COUNTER	LTI	EF5-CPA-EB					1"	F.S.	TRAY SLIDE, SNEEZE GUARD, LED LIGHT, CASTERS
36	COLD FOOD SERVING COUNTER	LTI	66-EB-MOD					1"	F.S.	TRAY SLIDE, SNEEZE GUARD, LED LIGHT, CASTERS, 12" EXTENSION
37	SERVING COUNTER, UTILITY	LTI	60-ST-EB							TRAY SLIDE, CASTERS
38	CASHIER COUNTER	LTI	36-CSE							LOCK DRAWER, CASTERS
39	P.O.S.	BY OWNER	N.I.K.C.							BY OWNER, CONNECTION AT CASHIER COUNTER. *CONNECTED TO ITEM 38
40	UTILITY CART	EAGLE GROUP	UUC-322							CASTERS
41	COUNTER TOP ICE DISPENSER	SCOTSMAN	ID150B-1A			1/2"	STUB	3/4"	F.S.	WATER DISPENSER

NOTES:
1. REFER TO FOOD SERVICE EQUIPMENT PLANS FOR ADDITIONAL INFORMATION.
2. COORDINATE ALL ROUGH-IN LOCATIONS, QUANTITIES, AND PIPE SIZES WITH THE FOOD SERVICE EQUIPMENT VENDOR PRIOR TO INSTALLATION.
3. THE PLUMBING CONTRACTOR SHALL PROVIDE ALL FINAL CONNECTIONS TO EQUIPMENT PROVIDED UNDER THE FOOD SERVICE CONTRACT.
4. WHERE A MEANS OF BACKFLOW PREVENTION HAS NOT BEEN PROVIDED WITH ANY FOOD SERVICE EQUIPMENT, THE PLUMBING CONTRACTOR SHALL PROVIDE A MEANS IN ACCORDANCE WITH THE NORTH CAROLINA PLUMBING CODE AND ALL REQUIREMENTS OF THE LOCAL HEALTH DEPARTMENT.

STORAGE ELECTRIC WATER HEATER SCHEDULE

MARK	DESCRIPTION	STORAGE (GAL)	GPH AT 80 °F RISE	ELECTRICAL DATA KW	V	PH	HZ	SPECIFICATION	NOTES
WH1	ELECTRIC, VERTICAL STORAGE	80.0	279.00	54.0	208	3	60	BRADFORD WHITE ELECTRIFLEX HD CEHD80A545208CF	1 - 6

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 140 °F.
4. SEE DETAIL 1/P-301 FOR INSTALLATION DETAILS.
5. PROVIDE UNIT WITH OPTIONAL FIVE (5) YEAR MANUFACTURER'S WARRANTY.
6. COORDINATE WITH MECHANICAL CONTRACTOR TO PROVIDE ANY ADDITIONAL TAPS IN COLD AND HOT WATER SUPPLY AND RETURN PIPING NECESSARY FOR MONITORING BY THE BUILDING AUTOMATION SYSTEM. ALL ASSOCIATED SENSORS AND CONTROL WIRING TO BE PROVIDED BY THE MECHANICAL CONTRACTOR.

PUMP SCHEDULE

MARK	DESCRIPTION	CAPACITY GPM	CAPACITY FT-HD	ELECTRICAL DATA HP	V	PH	HZ	SPECIFICATION	NOTES
CP1	INLINE CIRCULATION PUMP SERVING WH1	3.0	5.0	1/8	120	1	60	TACO 111S	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.

THERMOSTATIC MIXING VALVE SCHEDULE

MARK	DESCRIPTION	INLETS (")	OUTLET (")	INLET TEMP (°F)	OUTLET TEMP (°F)	SPECIFICATION	NOTES
TMV1	POINT-OF-USE FOR LAVATORIES	1/2	1/2	140	105	LEONARD 170A-LF-BP-BRKT-CP	1 - 3
TMV2	POINT-OF-USE FOR CUSTODIAL SINKS AND CAN WASH	1/2	1/2	140	115	LEONARD 170A-LF-BP-BRKT-CP	1 - 3

NOTES:
1. APPROVED MANUFACTURERS: ARMSTRONG, LAWLER, LEONARD, POWERS.
2. MOUNT SECURELY TO WALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
3. PROVIDE WITH COLD WATER BYPASS.

INTERCEPTOR SCHEDULE

MARK	DESCRIPTION	INLET & OUTLET (")	CAPACITY TOTAL	CAPACITY GREASE	CAPACITY SOLIDS	SPECIFICATION	NOTES
GI1	GREASE INTERCEPTOR	4	3,000.0	1,638.0	1,060.0	PROCEPTOR GMC-3000(2)	1, 2

NOTES:
1. APPROVED MANUFACTURERS: HIGHLAND TANK, MIFAB, PROCEPTOR, SCHIER, XERXES, ZURN.
2. INSTALL IN ACCORDANCE WITH DETAIL 5/P-301.

PLUMBING FIXTURE SCHEDULE

MARK	DESCRIPTION	CW	HW	W	V	SPECIFICATION	NOTES
P1	WATER CLOSET CARRIER-MOUNTED, REAR OUTLET, WHITE VITREOUS CHINA ELONGATED BOWL; 1.28-GPF, SELF-GENERATING, SENSOR-OPERATED FLUSH VALVE; PLASTIC, OPEN-FRONT SEAT WITHOUT COVER; ADJUSTABLE HORIZONTAL CARRIER	1-1/4"	---	4"	2"	FIXTURE: TOTO CT708UG#01 FLUSH VALVE: TOTO "ECOPOWER" TET1LA32#CP SEAT: TOTO SC534#01 CARRIER: WADE 311-AM1-M3	1
P1A	WATER CLOSET - ADA COMPLIANT CARRIER-MOUNTED, REAR OUTLET, WHITE VITREOUS CHINA ELONGATED BOWL; 1.28-GPF, SELF-GENERATING, SENSOR-OPERATED FLUSH VALVE; PLASTIC, OPEN-FRONT SEAT WITHOUT COVER; ADJUSTABLE HORIZONTAL CARRIER	1-1/4"	---	4"	2"	FIXTURE: TOTO CT708UG#01 FLUSH VALVE: TOTO "ECOPOWER" TET1LA32#CP SEAT: TOTO SC534#01 CARRIER: WADE 311-AM1-M3	1, 2
P2A	URINAL - ADA COMPLIANT CARRIER-MOUNTED, REAR OUTLET, WHITE VITREOUS CHINA WASHOUT BOWL; 0.125-GPF, SELF-GENERATING, SENSOR-OPERATED FLUSH VALVE; ADJUSTABLE CARRIER WITH UPPER AND LOWER BEARING PLATES	3/4"	---	2"	2"	FIXTURE: TOTO UT445U#01 FLUSH VALVE: TOTO "ECOPOWER" TEU1UA12#CP CARRIER: WADE 402-AM1-M3	1, 2
P3A	LAVATORY - ADA COMPLIANT NOMINAL 20" BY 18" RECTANGULAR BASIN, CARRIER-MOUNTED, VITREOUS CHINA, FRONT OVERFLOW; 0.35-GPM, SELF-GENERATING, SENSOR-OPERATED FAUCET; OPEN GRID DRAIN; CONCEALED ARM CARRIER	1/2"	1/2"	2"	2"	FIXTURE: TOTO L7307#01 FAUCET: TOTO "HELIX ECOPOWER" TEL113-D20EM#CP MIXING TEE: TOTO TLM10	1, 3
P3B	KITCHEN LAVATORY - ADA COMPLIANT NOMINAL 10" BY 14" RECTANGULAR BASIN, CARRIER-MOUNTED, STAINLESS STEEL; 0.5-GPM, HARD-WIRED, SENSOR-OPERATED FAUCET	1/2"	1/2"	2"	2"	FIXTURE: EAGLE GROUP HSA-10-FEPEE-B	1, 3, 4, 5
P4A	ELECTRIC WATER COOLERS - BILEVEL - ADA COMPLIANT SURFACE-MOUNTED, VANDAL-RESISTANT, STAINLESS STEEL FINISH, INTEGRAL WATER FILTRATION, WITH BOTTLE-FILLING STATION; PLATE-TYPE CARRIER	1/2"	1/2"	2"	2"	FIXTURE: ELKAY LVRCGRNTLBWSK CARRIER: WADE 403-BL-BFS-M3	1
P7	CUSTODIAL SINK NOMINAL 36" BY 36" BY 12" TERRAZZO BASIN WITH DROP FRONT AND STAINLESS STEEL CAPS ON ALL SIDES; WALL-MOUNTED CUSTODIAL SINK FAUCET, 4" LEVER HANDLES, MALE HOSE-THREAD SPOUT WITH PAIL HOOK, WITH SUPPORT ROD TO WALL BRACKET	1/2"	1/2"	3"	2"	FIXTURE: FIAT TSB3002 FAUCET: T&S BRASS B-0665-CR-BSTR P-TRAP: 3" DEEP SEAL	6, 7
P8	CAN WASH TRIM EXTERIOR MIXING HYDRANT, FREEZEPROOF, ANTI-SIPHON; FLOOR DRAIN WITH TYPE-S STRAINER	1/2"	1/2"	3"	2"	BASIN AND SURROUND TILED BY GENERAL CONTRACTOR FAUCET: WOODFORD HCB67-BR DRAIN: ZURN ZN415S-VP-Y P-TRAP: 4" DEEP SEAL	1, 7
P9	WASHING MACHINE BOX POWDER-COATED METAL BOX WITH TRIM PLATE	1/2"	1/2"	2"	2"	VALVE BOX: IPS CORPORATION W4700HA STOP: QUARTER-TURN ARRESTER VALVES SUPPLY: BRAIDED STAINLESS STEEL HOSES	
FD1	FLOOR DRAIN - RESTROOMS AND KITCHEN CAST IRON BODY, COMBINATION INVERTIBLE MEMBRANE CLAMP WITH SEEPAGE SLOTS, SQUARE NICKEL-BRONZE HEEL-PROOF STRAINER	---	---	SEE PLANS	2"	STRAINER: ZURN ZN415S-VP STRAINER: 6" BY 6" TYPE-S P-TRAP: 2" OR 3" DEEP SEAL	
FD2	FLOOR DRAIN - MECHANICAL ROOMS CAST IRON BODY, COMBINATION INVERTIBLE MEMBRANE CLAMP WITH SEEPAGE SLOTS, ROUND NICKEL-BRONZE HEEL-PROOF STRAINER, SEDIMENT BUCKET	---	---	4"	2"	FIXTURE: ZURN ZN415B-Y STRAINER: 8" DIAMETER TYPE-B P-TRAP: 4" DEEP SEAL	
FS1	FLOOR SINK - KITCHEN NOMINAL 12" BY 12" BY 6" DIMENSIONS, TYPE 304 STAINLESS STEEL RECEPTOR; NON-TILT, LOOSE SET GRATE; STAINLESS STEEL INTERIOR DOME STRAINER	---	---	SEE PLANS	2"	FIXTURE: ZURN Z1750-TS-Y STRAINER: STAINLESS STEEL P-TRAP: 3" OR 4" DEEP SEAL	8
HY1	INTERIOR WALL HYDRANT - RESTROOMS ASSE 1011 ANTI-SIPHON VACUUM BREAKER, LOOSE TEE KEY	3/4"	---	---	---	FIXTURE: WOODFORD 24-PC	9
HY2	INTERIOR WALL HYDRANT - MECHANICAL ROOMS ASSE 1052 HOSE THREAD BACKFLOW PREVENTER, METAL WHEEL HANDLE	3/4"	---	---	---	FIXTURE: WOODFORD 26-BR	10
HY3	EXTERIOR WALL HYDRANT ASSE 1011 ANTI-SIPHON VACUUM BREAKER, FREEZEPROOF	3/4"	---	---	---	FIXTURE: WOODFORD 65-BR	11
HY4	EXTERIOR ROOF HYDRANT ASSE 1052 HOSE THREAD BACKFLOW PREVENTER, SELF-DRAINING, FREEZEPROOF	3/4"	---	---	---	FIXTURE: WOODFORD SRH-MS	12
WHA	WATER HAMMER ARRESTER ASSE 1010 COMPLIANT, PDH WH201 COMPLIANT	3/4"	---	---	---	FIXTURE: WATTS LF15M2 SERIES	13
FCO	FLOOR CLEANOUT CAST IRON BODY WITH ADJUSTABLE COVER, BRONZE PLUG	---	---	SEE PLANS	---	FIXTURE: ZURN ZN1400-BZ-BP-K-VP	
GCO	GRADE CLEANOUT CAST IRON BODY WITH ADJUSTABLE COVER, BRONZE PLUG	---	---	SEE PLANS	---	FIXTURE: ZURN ZN1400-BZ-BP-VP	
WCO	WALL CLEANOUT BRONZE PLUG WITH ROUND STAINLESS STEEL ACCESS COVER	---	---	SEE PLANS	---	FIXTURE: ZURN Z1441-BP-VP	9

NOTES:
1. REFER TO ARCHITECTURAL PLANS FOR MOUNTING HEIGHT(S).
2. INSTALL FLUSH VALVE WITH MANUAL FLUSHING OPERATOR ON ACCESSIBLE SIDE OF FIXTURE.
3. PROVIDE WITH ADA-COMPLIANT SUPPLY AND DRAIN INSULATION TRIM KIT WHERE TRIM IS EXPOSED TO USERS.
4. COORDINATE HARD-WIRED FAUCET CONNECTION WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING AND INSTALLATION.
5. PROVIDE WITH TMV1 AS SPECIFIED IN THERMOSTATING MIXING VALVE SCHEDULE ON SHEET P-002.
6. REFER TO DETAIL 2/P-301 FOR MOUNTING HEIGHTS AND ACCESSORIES.
7. PROVIDE WITH TMV2 AS SPECIFIED IN THERMOSTATING MIXING VALVE SCHEDULE ON SHEET P-002.
8. REFER TO FOOD SERVICE EQUIPMENT DRAWINGS FOR LOCATIONS OF HALF, THREE-QUARTERS, FULL, ETC. STRAINER CONFIGURATIONS.
9. INSTALL AT 12" ABOVE FINISHED FLOOR.
10. INSTALL AT 24" ABOVE FINISHED FLOOR.
11. INSTALL AT 18" ABOVE FINISHED GRADE. COORDINATE INSTALLATION WITH GENERAL CONTRACTOR TO BE WITHIN STANDARD MASONRY UNIT SPACING.
12. FURNISH FIXTURE TO GENERAL CONTRACTOR FOR INSTALLATION IN ROOF. PROVIDE FINAL PIPING CONNECTIONS TO FIXTURE AFTER INSTALLATION.
13. REFER TO DETAIL 3/P-301 FOR SIZING AND INSTALLATION REQUIREMENTS.

APPROVED MANUFACTURERS	PRODUCT TYPE	APPROVED EQUALS
THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE MODEL WHICH MOST CLOSELY MATCHES THE SPECIFIED PRODUCT.	VITREOUS CHINA	AMERICAN STANDARD, KOHLER, SLOAN, TOTO, ZURN
	WATER COOLERS	ELKAY, HALSEY TAYLOR, HAWS, OASIS
	STAINLESS STEEL	ADVANCE TABCO, EAGLE GROUP, ELKAY, JUST MANUFACTURING, KOHLER
PROVIDE PRODUCTS MADE ONLY BY ANY OF THE MANUFACTURERS LISTED.	CUSTODIAL SINK BASINS	ACORN, FIAT, FLORESTONE, STERN WILLIAMS
	FLUSH VALVES	AMERICAN STANDARD, KOHLER, SLOAN, TOTO, ZURN
ALL FIXTURES OF THE SAME TYPE AND/OR MATERIAL SHALL BE PROVIDED BY A SINGLE MANUFACTURER.	FAUCETS	CHICAGO, DELTA COMMERCIAL, KOHLER, SLOAN, T&S BRASS, TOTO, ZURN
	WATER CLOSET SEATS	AMERICAN STANDARD, CHURCH, KOHLER, SLOAN, TOTO, ZURN
	WATER SPECIALTIES	IPS CORPORATION, PRECISIONS PLUMBING PRODUCTS, SIOUX CHIEF, WATTS
	FIXTURE TRIM	BRASSCRAFT, DEERBORN BRASS, KEENEY, McGUIRE, ZURN
	DRAINS, CARRIERS, CLEANOUTS	JAY R. SMITH, JOSAM, MIFAB, WADE, WATTS, ZURN

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No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
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CHECKED BY:

PLUMBING SCHEDULES

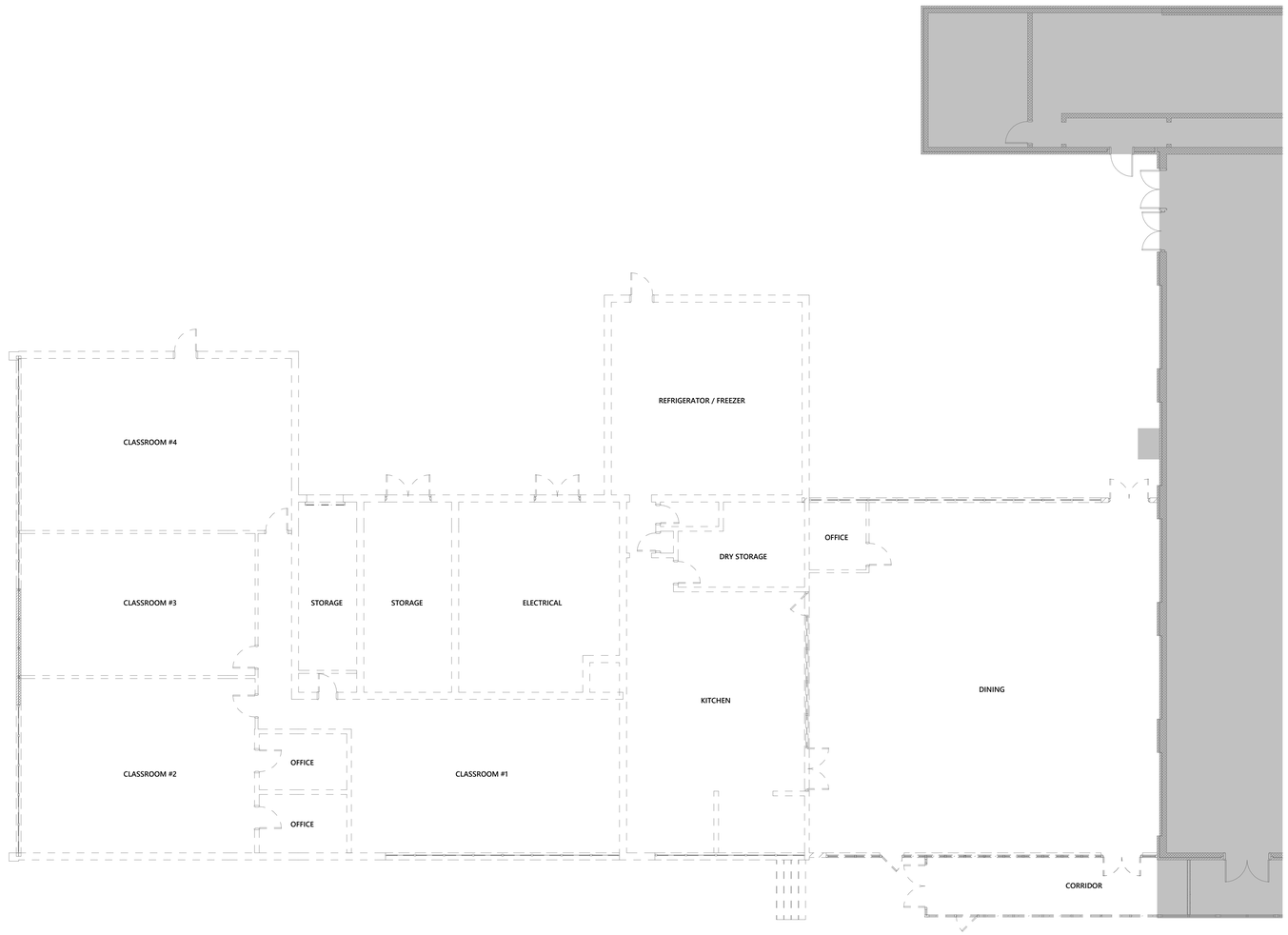
P-002

Sheet No. 2 of 9

OPTIMA # 20-0196R

PLUMBING DEMOLITION NOTES

1. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING THE PROJECT TO VERIFY EXISTING CONDITIONS AND DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID. ANY DISCREPANCIES NOTED BETWEEN THE DOCUMENTS AND EXISTING CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO BIDDING.
2. REMOVE ALL EXISTING PLUMBING FIXTURES, EQUIPMENT, PIPING, HANGERS, ETC. THROUGHOUT THE PROJECT AREA COMPLETE BACK TO EACH UTILITY CONNECTION OUTSIDE OF THE BUILDING.
3. COORDINATE REMOVAL OF THE EXISTING CONCRETE GREASE INTERCEPTOR LOCATED IN THE COURTYARD WITH THE GENERAL AND SITE UTILITY CONTRACTORS.
4. REMOVE ALL EXISTING NATURAL GAS SUPPLY PIPING ON THE BUILDING EXTERIOR. COORDINATE REMOVAL OF EXISTING NATURAL GAS CONNECTIONS WITH THE LOCAL UTILITY TO ENSURE ALL PIPING HAS BEEN REMOVED BACK TO ANY EXISTING OR PREVIOUSLY REMOVED METERS.
5. IN NO CIRCUMSTANCE SHALL ANY EXISTING UNDERGROUND PIPING BE ABANDONED IN PLACE.



1 PLUMBING DEMOLITION PLAN
1/8" = 1'-0"
0 4' 8' 16'

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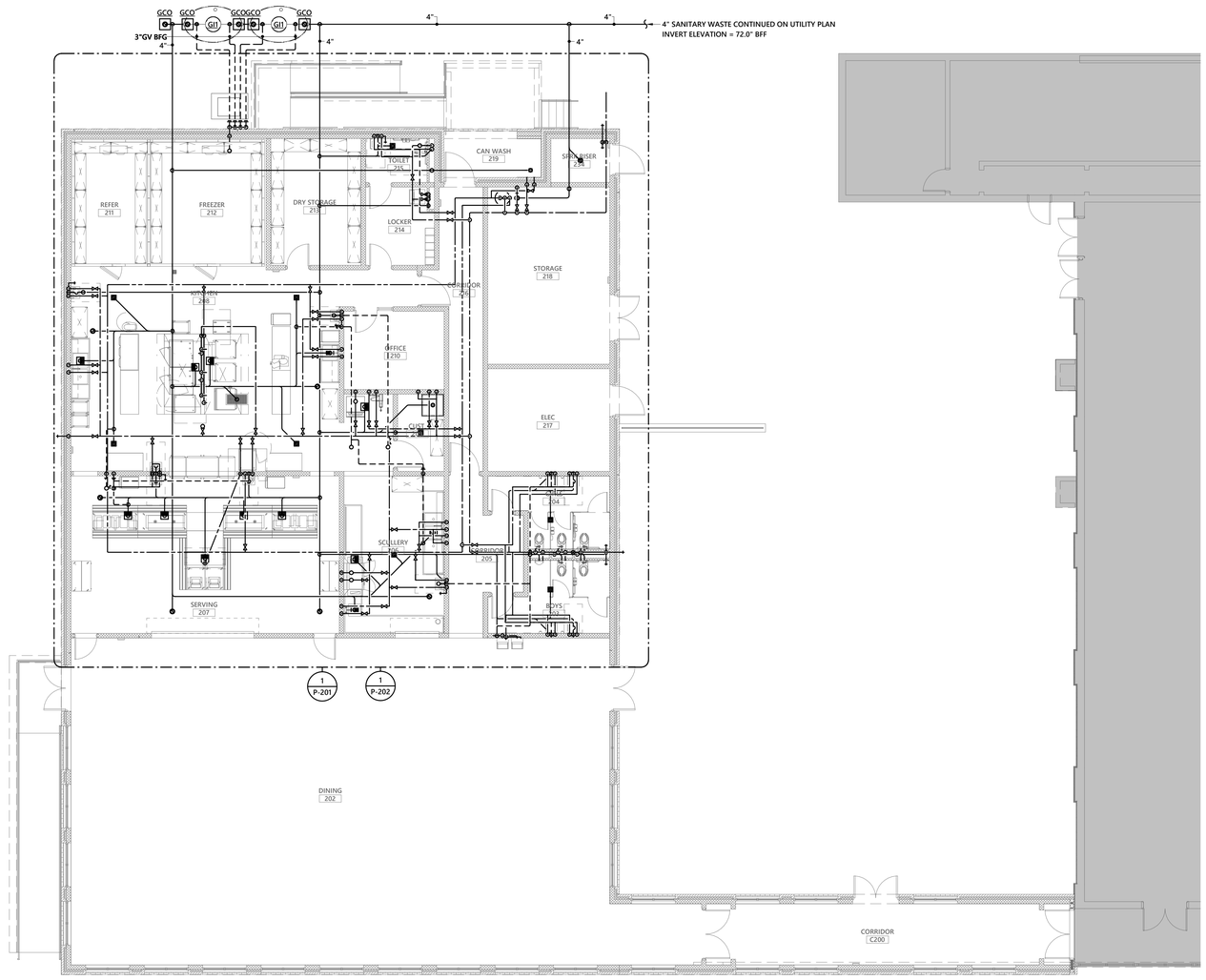
PLUMBING DEMOLITION PLAN

P-101



1 PLUMBING NEW WORK FLOOR PLAN
1/8" = 1'-0"
0 4' 8' 16'

OPTIMA # 20-0196R

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PLUMBING NEW WORK FLOOR PLAN

P-102

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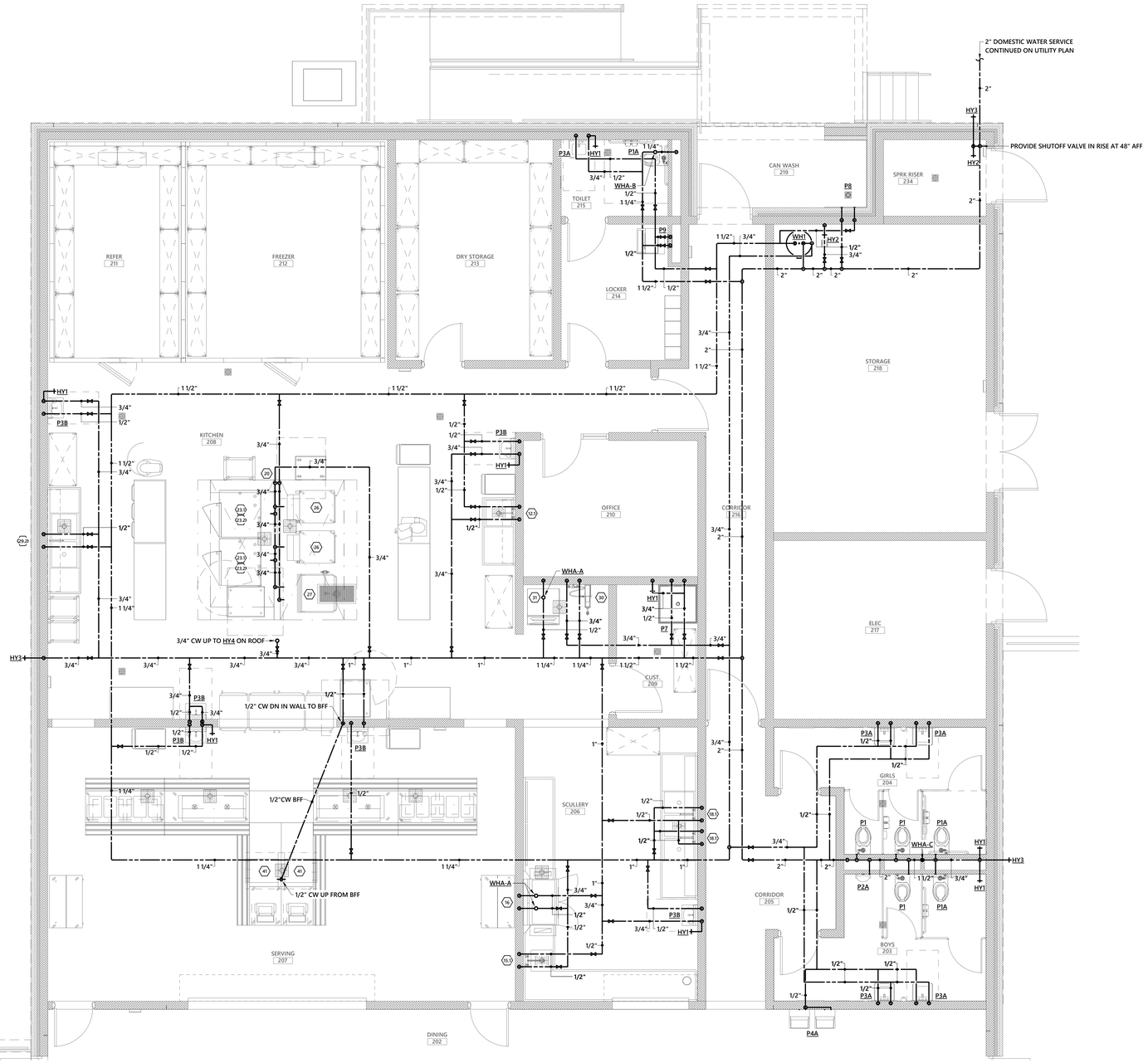

1 **PLUMBING NEW WORK PLAN - WATER SUPPLY**
1/4" = 1'-0"
0 2' 4' 8'

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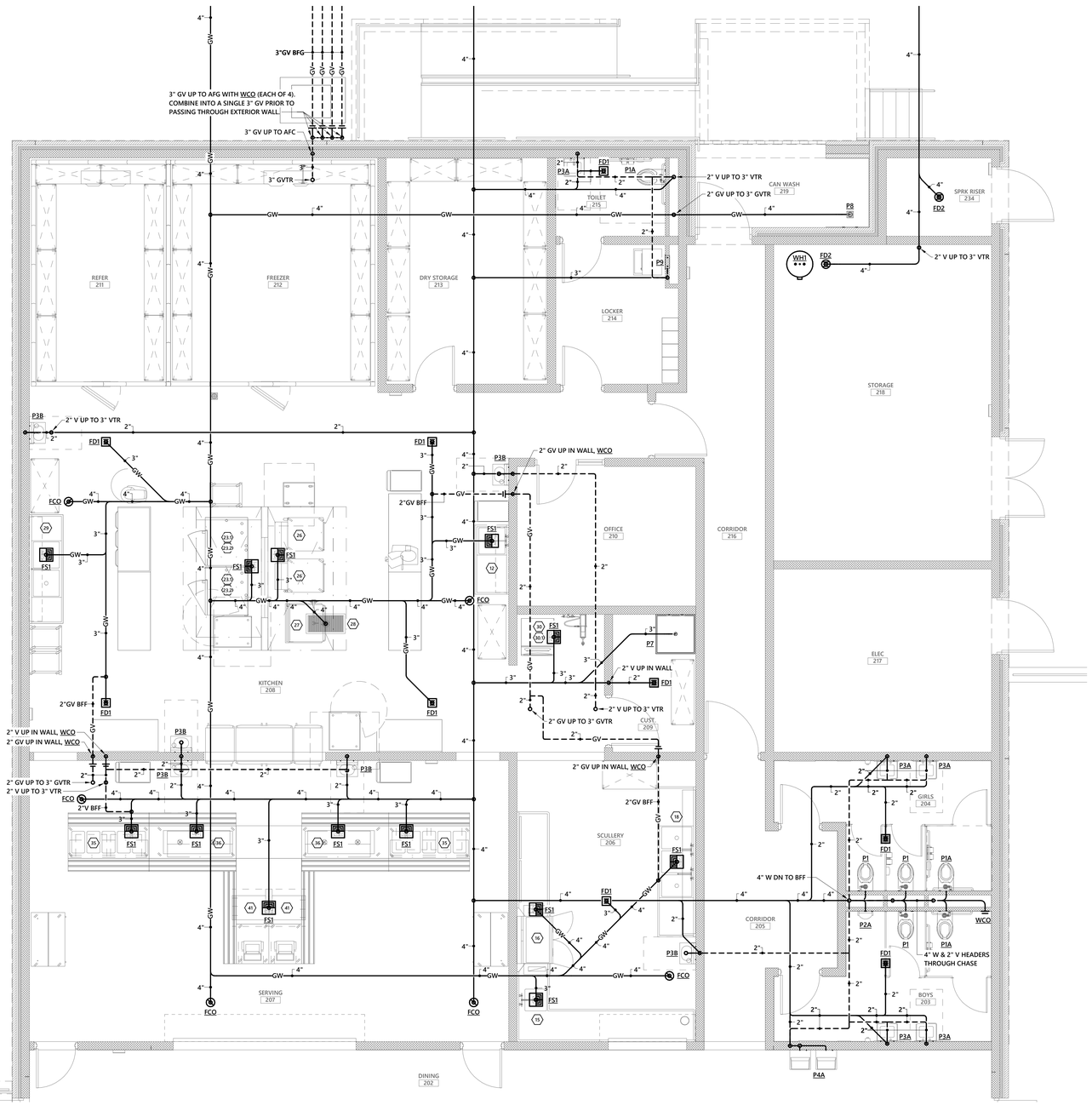
PLUMBING ENLARGED PLAN - WATER SUPPLY

P-201
Sheet No. 5 of 9

OPTIMA # 20-0196R



1 **PLUMBING NEW WORK PLAN - WASTE AND VENT**
1/4" = 1'-0"
0 2' 4' 8'

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039771 ENGINEER CHRISTOPHER C. COOK 12/15/20

CONSTRUCTION DOCUMENTS

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150 Fayetteville St., Suite 520, Raleigh, NC 27601
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North Carolina License Number C-0914

Harnett County Schools

Johnsonville Elementary School Addition/Renovation

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ENERGY STAR PARTNER

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No.	Date	Description

ISSUE DATE: 12/15/2020

PROJECT #: 2020.300
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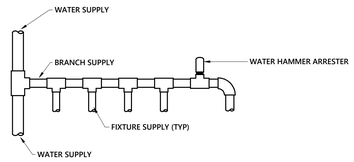
PLUMBING ENLARGED PLAN - WASTE AND VENT

P-202

Sheet No. 6 of 9

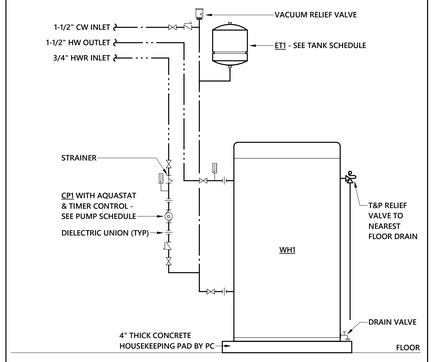
OPTIMA # 20-0196R



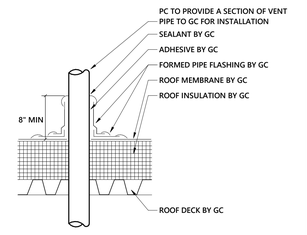
MARK	CONNECTED WSFU	PDI WH201 DESIGNATION	ARRESTER SIZE
WHA-A	1 - 11	A	1/2"
WHA-B	12 - 32	B	3/4"
WHA-C	33 - 60	C	1"
WHA-D	61 - 113	D	1 1/4"
WHA-E	114 - 154	E	1 1/2"
WHA-F	155 - 330	F	2"

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

3 WATER HAMMER ARRESTERS
SCALE: NOT TO SCALE

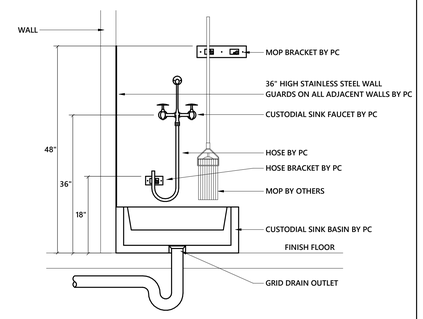


1 ELECTRIC WATER HEATER WH1
SCALE: NOT TO SCALE

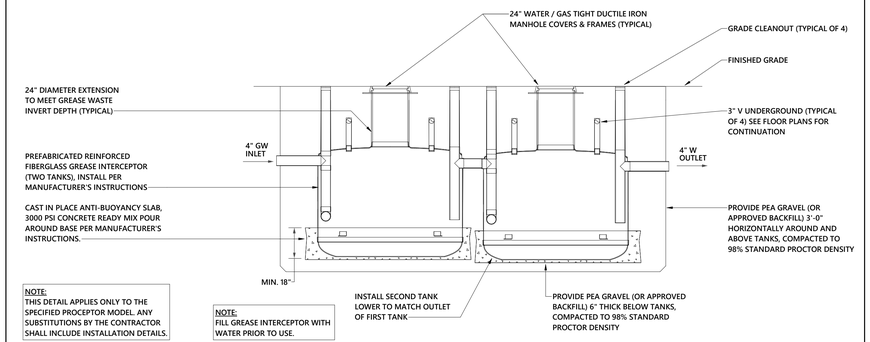


REFER TO PLUMBING PLANS FOR THE SIZES, QUANTITIES, AND LOCATIONS OF VENT TERMINALS THROUGH ROOF

4 VENT TERMINAL THROUGH ROOF
SCALE: NOT TO SCALE



2 CUSTODIAL SINK ACCESSORIES
SCALE: NOT TO SCALE



NOTE:
THIS DETAIL APPLIES ONLY TO THE SPECIFIED PROCEPTOR MODEL. ANY SUBSTITUTIONS BY THE CONTRACTOR SHALL INCLUDE INSTALLATION DETAILS.

NOTE:
FILL GREASE INTERCEPTOR WITH WATER PRIOR TO USE.

5 GREASE INTERCEPTORS GI1
SCALE: NOT TO SCALE

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PLUMBING DETAILS

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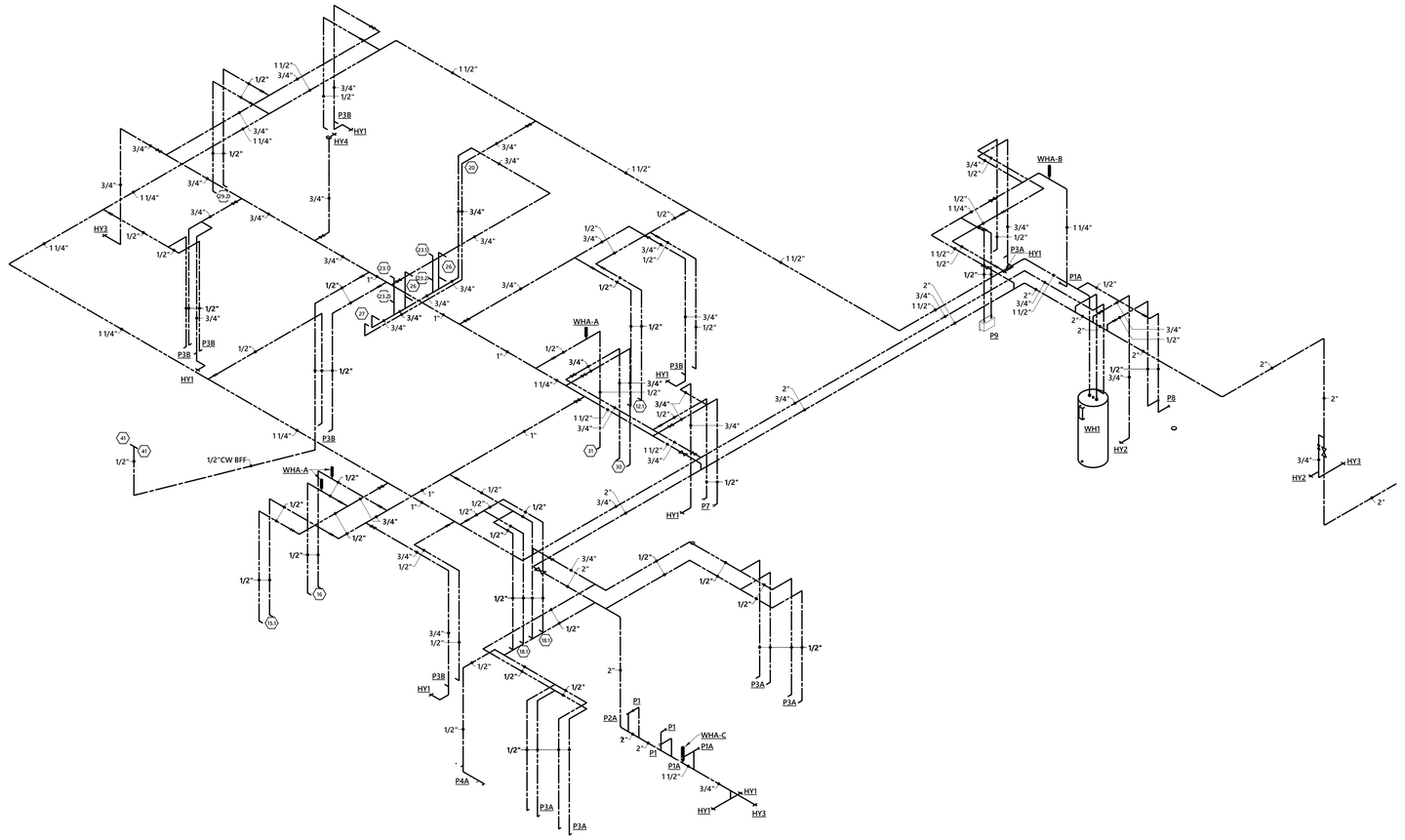
Sheet No. 7 of 9

OPTIMA # 20-0196R



1 PLUMBING RISER DIAGRAM - WATER SUPPLY
NOT TO SCALE

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PLUMBING RISER DIAGRAM - WATER SUPPLY

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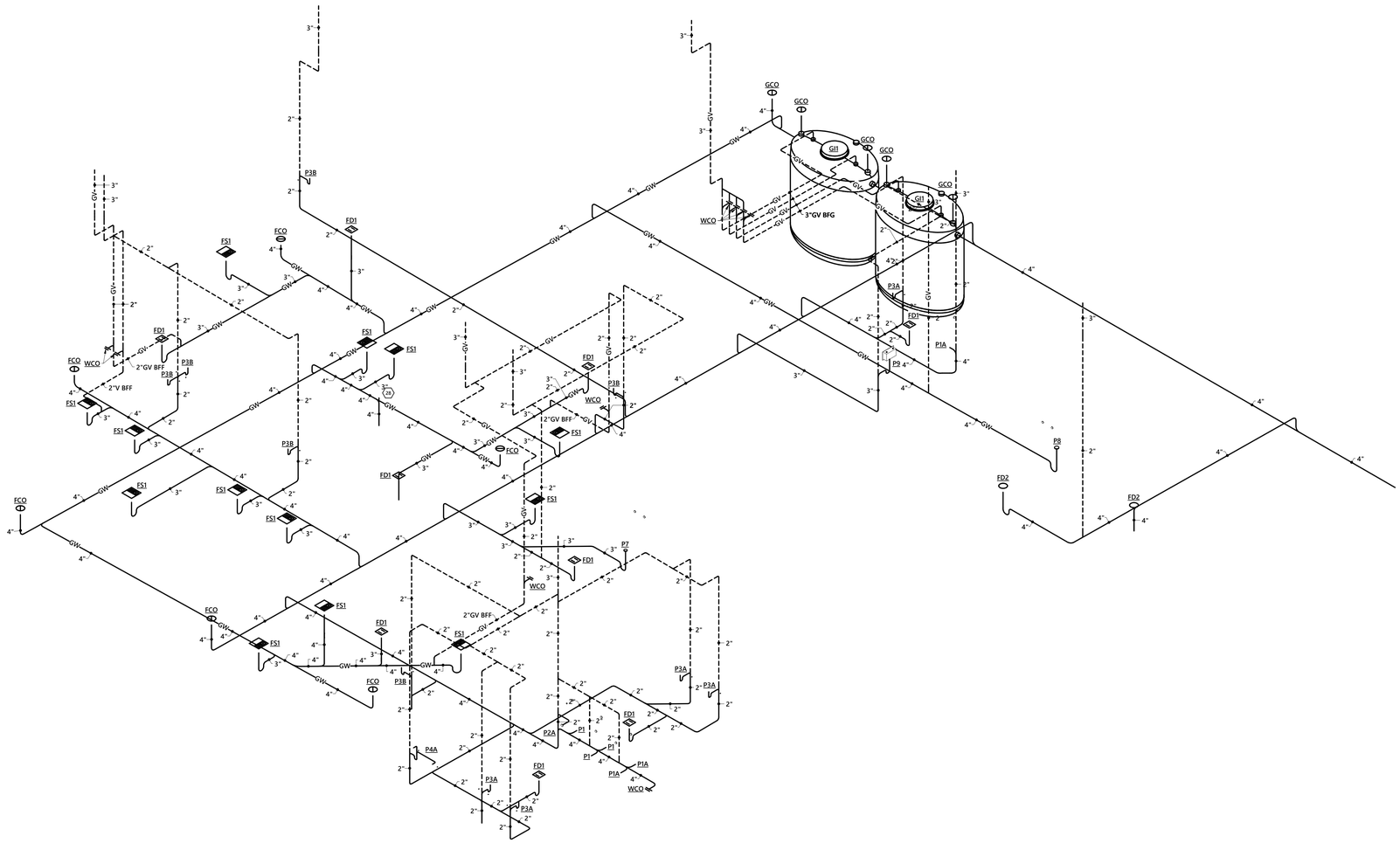
Sheet No. 8 of 9

OPTIMA # 20-0196R



1 PLUMBING RISER DIAGRAM - WASTE AND VENT
NOT TO SCALE

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PLUMBING RISER DIAGRAM - WASTE AND VENT

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Sheet No. 9 of 9

OPTIMA # 20-0196R

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 ¼". 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. ALL ROOF CURBS SHALL EXTEND A MINIMUM OF 8" ABOVE ROOF INSULATION OR AS INDICATED ON THE DRAWINGS, WHICHEVER IS GREATER. IN ADDITION, ALL ROOF CURBS OR EQUIPMENT SUPPORT RAILS THAT SUPPORT EQUIPMENT, PIPING, CONDUIT, ETC. EXPOSED ON THE ROOF SHALL HAVE SUFFICIENT HEIGHT TO MAINTAIN A MINIMUM OF 18" CLEARANCE BELOW SUPPORTED EQUIPMENT FOR ROOF MAINTENANCE.
16. CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.
17. KITCHEN HOOD EXHAUST DUCT SHALL BE 16 GAUGE CARBON STEEL. ALL JOINTS AND SEAMS SHALL BE CONSTRUCTED WITH A CONTINUOUS LIQUID - TIGHT EXTERNAL WELD. ALL DUCTWORK SHALL SLOPE A MINIMUM OF 1/4 INCH PER FOOT TOWARD HOOD. PROVIDE CLEANOUTS AT EVERY CHANGE OF DIRECTION IN THE EXHAUST DUCT AND AT 20'-0" (MINIMUM) INTERVALS.
   THE MECHANICAL CONTRACTOR SHALL PERFORM A LIGHT TEST (AS REQUIRED BY THE MECHANICAL CODE) FOR ALL JOINTS AND SEAMS IN THE PRESENCE OF THE LOCAL AUTHORITY HAVING JURISDICTION PRIOR TO CONCEALING KITCHEN HOOD EXHAUST DUCTWORK.DISHWASHER EXHAUST DUCT SHALL BE STAINLESS STEEL. ALL JOINTS AND SEAMS SHALL HAVE A LIQUID TIGHT CONTINUOUS EXTERNAL WELD. EXHAUST DUCT SHALL SLOPE DOWN IN DIRECTION OF HOOD A MINIMUM OF 1" PER FOOT.
18. 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.
19. 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.
20. EQUIPMENT OPERATED DURING CONSTRUCTION SHALL USE FILTERED MEDIA TO PREVENTCONSTRUCTION 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.
21. PROVIDE COMBINATION FIRE/SMOKE DAMPERS WITH AN IONIZATION TYPE DUCT MOUNTED SMOKE DETECTOR IN DUCTED APPLICATIONS, OR SPOT DETECTORS IN OPENING APPLICATIONS (WITHIN 5'-0" OF THE DAMPER WITH NO AIR OUTLETS OR INLETS BETWEEN DETECTOR AND DAMPER), INSTALLED IN THE DUCT WIRED, TO CLOSE THE DAMPER UPON ACTIVATION. DUCT MOUNTED SMOKE DETECTORS AND SPOT DETECTORS SHALL BE SUPPLIED, WIRED FOR INTERFACE WITH FIRE ALARM SYSTEM AND UNIT SHUTDOWN BY THE ELECTRICAL CONTRACTOR. DETECTORS SHALL BE INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.
22. 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.
23. 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.

EQUIPMENT ABBREVIATIONS

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

ABBREVIATIONS

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

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 - DX SINGLE ZONE ROOFTOP UNITS WITH ELECTRIC REHEAT COILS

- [■] 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(1) - UNITARY AIR CONDITIONERS AND CONDENSING UNITS					
AIR COND, AIR COOLED	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	13.0 SEER	14.3 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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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 040316 THOMAS A. LARSEN 12/15/2020

CONSTRUCTION DOCUMENTS

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Harnett County Schools

Johnsonville Elementary School Addition/Renovation

18495 NC-27, Cameron, NC 28326

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: TAL
CHECKED BY: GPK

MECHANICAL LEGEND AND NOTES

M-001

Sheet No. 1 of 7

OPTIMA # 20-0196R

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)
PACKAGED ROOFTOP UNITS (UNDER 25 TONS): CARRIER, TRANE, YORK/JOHNSON
FANS: COOK, GREENHECK, PENN, TWIN CITY,
AIR DISTRIBUTION: CARNES, METAL*AIRE, NAILOR, PRICE, TITUS, TUTTLE & BAILEY, KRUEGER
LOUVER: GREENHECK, RUSKIN, SAFE-AIR, POTTORFF
ELECTRIC WALL/UNIT HEATERS: MARKEL, MODINE, RAYWALL, BERKO, QMARK
DDC CONTROLS: ALERTON, HONEYWELL, SEIMENS, TRANE
KITCHEN EXHAUST AND MAKE-UP AIR: CAPTIVE-AIRE, ACCUREX, SELECT AIR SYSTEMS
KITCHEN HOODS: CAPTIVE-AIRE, ACCUREX, SELECT AIR SYSTEMS

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.

VENTILATION CALCULATIONS (NCMC 2018, SECT 403): KITCHEN

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)
KITCHEN	-	-	-	0.7	1,361	0	0	0	953
DINING ROOM	7.5	0.18	70	-	3,406	238	1,785	613	0
CORRIDOR	-	0.06	-	-	889	0	0	53	0
OFFICE	5	0.06	5	-	147	1	5	9	0
TOILET	-	-	-	70 CFM/FIXTURE	7 FIXTURES	0	0	0	490
					TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)		3081		
					TOTAL OUTSIDE AIR PROVIDED (CFM)		3100		
								TOTAL EXHAUST AIR REQUIRED (CFM)	1443
								TOTAL EXHAUST AIR PROVIDED (CFM)	4725

PACKAGE ROOFTOP UNIT SCHEDULE (DX COOLING WITH ELECTRIC REHEAT)

SYMBOL	LOCATION	AREA SERVED	SUPPLY FAN AIR FLOW (CFM)	SUPPLY FAN FAN ESP	OCCUPIED MIN. OUTSIDE AIRFLOW (CFM)	COOILING COIL TOTAL CAPACITY	COOILING COIL SENSIBLE	IEER	EER	HEATING COIL TOAL CAPACITY	SUPPLY FAN QTY	SUPPLY FAN HP	RELEIF FAN QTY	RELEIF FAN HP	ELECTRICAL DATA VOLTS	ELECTRICAL DATA PH	ELECTRICAL DATA HZ	MCA	MOCP	MANUFACTURER	MODEL	UNIT WEIGHT (LBS)
RTU-1	ROOF	DINING	9000	1.00 in-wg	1950	287960	204270	15	10.6	245880	1	7.5	1	0.0	208 V	3	60	205.0 A	225.0 A	TRANE	THD300	2631
RTU-2	ROOF	KITCHEN	5250	1.00 in-wg	1150	176580	135760	14	12.1	184410	1	3.0	1	0.0	208 V	3	60	145.0 A	175.0 A	TRANE	THD180	2340

ROOFTOP UNIT SCHEDULE NOTES:
1. COOLING CAPACITIES BASED ON 95° AMBIENT, 80/67 ENTERING AIR.
2. FURNISH UNITS WITH ROOF CURB, SUPPLY FAN WITH VARIABLE SPEED DRIVE, INTEGRATED ECONOMIZER (SOLID STATE ENTHALPY CONTROL) WITH POWERED EXHAUST AIR FAN, MINIMUM FOUR STAGES OF COOLING CAPACITY CONTROL (TWO STAGES FOR 30 TON UNIT), CRANKCASE HEATER, VAV CONTROLS, MOTORIZED OA DAMPER, MOTORIZED RELIEF DAMPER, MOTORIZED RELIEF BACKDRAFT DAMPER, OUTSIDE AIR AND RELIEF HOODS, SUPPLY MOTOR SPRING-TYPE VIBRATION ISOLATORS, CONDENSER HAIL GUARD, NEMA PREMIUM EFFICIENCY FAN MOTORS, MERV-13 RATED FILTERS, RESETTABLE CIRCUIT BREAKERS, CONTROL PANEL WITH DISPLAY, SUCTION AND DISCHARGE SERVICE VALVES, BAS CONTROLS INTERFACE MODULE. ALL ACCESS DOORS SHALL BE HINGED DOORS WITH "TOOL-LESS" ENTRY.
3. ALL UNITS SHALL BE AGA CERTIFIED, U.L. LABELED, AND ASHRAE 90.1 COMPLIANT.
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.
5. CONDENSER COIL HAIL GUARDS
6. PROVIDE CONTROL MODULE TO CONNECT/INTERFACE TO EXISTING BUILDING MANAGEMENT SYSTEM.

EXHAUST FAN SCHEDULE

SYMBOL	LOCATION	MANUFACTURER	MODEL NO.	TYPE	CFM	APPROX. ESP	DRIVE TYPE	FAN RPM	ELECTRICAL DATA WATTS	HP	VOLTAGE	PH	ACCESSORIES	CONTROL TYPE
DEF-1	SCULLERY 206	GREENHECK	CUE-099-A	DISH EXHAUST	600	1.000	DIRECT	1725	630	0.25 hp	115 V	1	A,E,P,V	8
F-1	BOYS 203 AND GIRLS 204	GREENHECK	G-098	EXHAUST	450	0.750	DIRECT	1725	240	0.25 hp	115 V	1	A,B,D,E	6
F-2	CUSTODIAN 209	GREENHECK	SP-B110	EXHAUST	75	0.500	DIRECT	950	80	0.00 hp	115 V	1	A,B,F,G,O	2
F-3	TLT 215	GREENHECK	SP-B110	EXHAUST	75	0.500	DIRECT	950	80	0.00 hp	115 V	1	A,B,F,G,O	2
F-4	ELECTRICAL 217	GREENHECK	SQ 95-D	INLINE	500	0.250	DIRECT	1550	80	0.13 hp	115 V	1	A,B,G,H,K	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.

ELECTRIC DUCT HEATER SCHEDULE

SYMBOL	LOCATION	CFM	TEMP. RISE	K.W.	STEPS	VOLT	PH	MAX. P.D.
EDH-1	KITCHEN OFFICE 210	175	40	2.5	1	208 V	3	0.00

NOTES:
1. ALL HEATERS SHALL BE OPEN-COIL, SLIP-IN TYPE HEATERS.
2. ALL HEATERS SHALL HAVE STEP CONTROL WITH NUMBER OF STEPS AS INDICATED ABOVE.
3. PROVIDE HEATERS WITH THE FOLLOWING BUILT-IN AND PRE-WIRED COMPONENTS: DISCONNECTING TYPE MAGNETIC CONTACTORS, FUSES PER N.E.C., CONTROL VOLTAGE TRANSFORMER, AIR FLOW SWITCH.

ELECTRIC WALL HEATER SCHEDULE

SYMBOL	LOCATION	CFM	BTUH	KW	MOTOR RPM	MOTOR H.P.	MOTOR VOLT	MOTOR PH	MANUFACTURER (MARKEL)	ACCESSORIES
EWH-1	ELEC 217	175	13800	4.0	600	0.00	208 V	1	F3326TD-RP	
EWH-2	SPRK RISER 234	175	5120	1.5	600	0.00	120 V	1	E3323TD-RP	

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

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-AA	ALUMINUM	24x24	6			
B	LOUVERED FACE DIFFUSER	Titus	TDC-AA	ALUMINUM	24x24	8			
C	LOUVERED FACE DIFFUSER	Titus	TDC-AA	ALUMINUM	24x24	6			
C	LOUVERED FACE DIFFUSER	Titus	TDC-AA	ALUMINUM	24x24	10			
D	LOUVERED FACE DIFFUSER	Titus	TDC-AA	ALUMINUM	24x24	12			
F	EGGCRATE RETURN GRILLE	Titus	50F	ALUMINUM	24x24		14	14	
F	EGGCRATE RETURN GRILLE	Titus	50F	ALUMINUM	24x24		22	22	
G	LOUVERED DOUBLE DEFLECTION GRILLE	Titus	300RL	STEEL	---		10	6	
H		PRICE	PDDR						
J	EGGCRATE RETURN GRILLE	Titus	50F	ALUMINUM	24x24		10	10	
AIR DISTRIBUTION SCHEDULE	LOUVERED GRILLE	Titus	355RL	STEEL	---		12	10	

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 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.

KITCHEN HOOD SCHEDULE
(FURNISHED AND INSTALLED BY M.C.)

KEF-1 DU200HFA EXHAUST FAN; 4,200 CFM, 1.5" E.S.P., 5-HP 208V-3PH FAN MOTOR, 15.0 FLA, 211 LBS OPERATING WEIGHT.

MUA-1 CAPTIVE-AIRE MODEL A2-E.452-20D ELECTRIC HEAT MAKE-UP AIR UNIT; 3,360 CFM, 0.75" E.S.P., 2-HP 208V-3PH FAN MOTOR, 10.4A MCA, 15A MOCP, 45KW ELECTRIC HEATER 208V 3PH 43DEG TEMP RISE, 696 LBS OPERATING WEIGHT.

KH-1 CAPTIVE-AIRE MODEL 6024 ND-2-PSP-F; 10'-0"x6'-0"x2'-0" DEEP HOOD WITH 14" WIDE SUPPLY PLENUMS AT FRONT; 2000 CFM EXHAUST @ 0.75" S.P. (MAX.); 1600 CFM SUPPLY @ 0.2" S.P. (MAX.)

KH-2 CAPTIVE-AIRE MODEL 6024 ND-2-PSP-F; 11'-0"x6'-0"x2'-0" DEEP HOOD WITH 14" WIDE SUPPLY PLENUM AT FRONT; 2200 CFM EXHAUST @ 0.94" S.P. (MAX.); 1760 CFM SUPPLY @ 0.2" S.P. (MAX.)

ALL STAINLESS STEEL CONSTRUCTION. ALL COMPONENTS SHALL BE U.L. LISTED AND LABELED. PROVIDE A REMOTE CONTROL PANEL MOUNTED ON FACE OF HOOD WITH MASTER DISCONNECT SWITCH, STARTER FOR FAN, CONTROL VOLTAGE TRANSFORMER, FIRE CONTROL SYSTEM RELAY AND TERMINAL STRIP. MOUNT HOOD 6'-8" ABOVE FINISH FLOOR, PROVIDE STAINLESS STEEL ENCLOSURE AROUND TOP OF HOOD AS REQUIRED TO CLOSE TO CEILING. HOOD SHALL BE PROVIDED WITH: AUTOMATICALLY OPERATED FIXED PIPE FIRE SUPPRESSION SYSTEM IN ACCORDANCE WITH NFPA 96, CONTROL SWITCHES AND PILOT LIGHT FOR EXHAUST FAN, TWO4' VAPORPROOF LED LAMP LIGHT FIXTURES (MIN. 2 PER HOOD), AND STAINLESS STEEL GREASE FILTERS. FIRE SUPPRESSION SYSTEM SHALL BE ANSUL R-102 WITH ANSULEX LIQUID FIRE SUPPRESSANT. REMOTE PULL STATION FOR ACTIVATION OF FIRE SUPPRESSION SYSTEM SHALL BE PROVIDED AND INSTALLED WHERE INDICATED ON THE PLANS. FIRE SUPPRESSION SYSTEM SHALL BE UL 300 LISTED. CONTRACTOR SHALL PROVIDE MANUAL VOLUME DAMPER IN EACH SUPPLY DUCT COLLAR FOR MAKE-UP AIR BALANCING.

HOOD MANUFACTURER SHALL PROVIDE 12" STAINLESS STEEL ISLAND UTILITY CHASE (UDS) BETWEEN SECTIONS OF HOOD, INCLUDING WATER, AND ELECTRICAL, TO SERVE ITEMS UNDER HOOD. PROVIDE QUICK DISCONNECTS FOR ALL UTILITIES. COORDINATE REQUIREMENTS WITH KITCHEN PLANS AND KITCHEN EQUIPMENT SUPPLIER.

ADDITIONAL FIRE SUPPRESSION NOTES (NCBC):

904.11.1 A MANUAL ACTUATION DEVICE SHALL BE LOCATED AT OR NEAR A MEANS OF EGRESS FROM THE COOKING AREA, A MINIMUM OF 10 FEET AND A MAXIMUM OF 20 FEET FROM THE KITCHEN EXHAUST SYSTEM. THE MANUAL ACTUATION DEVICE SHALL BE LOCATED A MINIMUM OF 3.5 FEET AND A MAXIMUM OF 4 FEET ABOVE THE FLOOR AND CLEARLY INDICATE THE HAZARD PROTECTED. THE MANUAL ACTUATION SHALL REQUIRE A MAXIMUM FORCE OF 40 POUNDS AND A MAXIMUM MOVEMENTOF 14 INCHES TO ACTUATE THE FIRE SUPPRESSION SYSTEM.

904.11.2 THE ACTUATION OF THE FIRE SUPPRESSION SYSTEM SHALL AUTOMATICALLY SHUT DOWN THE FUEL AND ELECTRICAL POWER SUPPLY TO THE COOKING EQUIPMENT. THE FUEL AND ELECTRICAL SUPPLY RESET SHALL BE MANUAL.

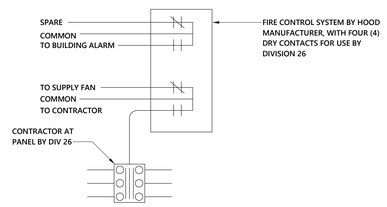
NOTES:
1. KITCHEN HOOD SHALL BE CONSTRUCTED AND INSTALLED PER NFPA 96.
2. UPON ACTIVATION OF FIRE CONTROL SYSTEM, KITCHEN HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE. PROVIDE INTERLOCK FOR AUTOMATIC OPERATION OF FIRE SUPPRESSION SYSTEM WITH:
   A. B. CONTACTORS (BY ELEC. CONTR.)
   C. HOOD SUPPLY AND EXHAUST FANS
   D. REMOTE MANUAL PULL STATION
   E. ALL ASSOCIATED AIR HANDLING UNITS
   F. FIRE ALARM SYSTEM NOTIFICATION (BY ELEC. CONTR.)
3. SEE SHEET M-501 FOR HOOD DETAILS.
4. KITCHEN HOOD EXHAUST DUCT SHALL BE STAINLESS STEEL. ALL JOINTS AND SEAMS SHALL BE CONSTRUCTED WITH A CONTINUOUS LIQUID-TIGHT EXTERNAL WELD. ALL DUCTWORK SHALL SLOPE A MINIMUM OF 1/4 INCH PER FOOT TOWARD HOOD. PROVIDE CLEANOUTS AT EVERY CHANGE OF DIRECTION IN THE EXHAUST DUCT AND AT 20'-0" (MINIMUM) INTERVALS. THE MECHANICAL CONTRACTOR SHALL PERFORM A LIGHT TEST (AS REQUIRED BY MECHANICAL CODE) FOR ALL JOINTS AND SEAMS IN THE PRESENCE OF THE LOCAL AUTHORITY HAVING JURISDICTION PRIOR TO CONCEALING KITCHEN HOOD EXHAUST DUCTWORK.
5. ALL EXPOSED PIPING WITH FIRE SUPPRESSION SYSTEM SHALL BE COVERED WITH A CHROME SLEEVE.
6. MECHANICAL CONTRACTOR SHALL INSTALL 1/2" CONDUIT IN WALL FOR MANUAL PULL STATION. SEE PLANS FOR LOCATION OF MANUAL PULL STATION.
7. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR HOOD CERTIFICATION IN COMPLIANCE WITH LOCAL CODE REQUIREMENTS. CERTIFICATION SHALL BE WITNESSED AND PERFORMED BY A PERSON CERTIFIED THROUGH AABC, TABB, NEBB OR NBC AND SHALL PROVIDE DOCUMENTATION OF PERFORMANCE TO THE CODE OFFICIAL. THIS SHALL INCLUDE WET TEST CAPTURE & CONTAINMENT.ALL EQUIPMENT SHALL BE ENERGIZED AND IN OPERATION DURING THE TEST. TEST SHALL ALSO INCLUDE VERIFYING ACTUAL FLOW RATES VERSUS DESIGN FLOW RATES.

VARIABLE SPEED KITCHEN HOODS
THE DCV (EMS) DEMAND VENTILATION SYSTEM IS DESIGNED TO AUTOMATICALLY REDUCE EXHAUST AND SUPPLY AIRFLOW QUANTITIES, WHILE ENSURING HOOD PERFORMANCE IS MAINTAINED. THE EMS USES VARIABLE FREQUENCY DRIVES (VFD) AND TEMPERATURE SENSORS IN THE EXHAUST DUCTS TO MODULATE THE FANS SPEED DURING COOKING OPERATION AND MAXIMIZE ENERGY SAVINGS. THE EMS LCD SCREEN INTERFACE PROVIDES FAN(S) CONTROL, SYSTEM CONFIGURATION, AND DIAGNOSTIC INFORMATION. CONSTRUCTION:

THE DCV INCLUDES:
- A SMART CONTROLLER
- LCD SCREEN INTERFACE
- DUCT TEMPERATURE SENSORS
- ROOM TEMPERATURE SENSOR
- VARIABLE FREQUENCY DRIVES

CONTROLS WILL BE LISTED BY ETL TO UL STANDARD 508A. THE SYSTEM INCLUDES A LCD SCREEN INTERFACE FOR FAN(S) AND HOOD LIGHTS CONTROL, WASH CONTROL (IF APPLICABLE), GAS VALVE RESET, PROGRAMMABLE SCHEDULE, MAX AIR OVERRIDE FUNCTION, PREPARATION TIME MODE, COOL DOWN MODE, AND DIAGNOSTICS INCLUDING VFD STATUS. THE LCD SCREEN SHOWS DESCRIPTIVE PLAIN TEXT EXPLAINING THE FUNCTIONS OR VALUES. THE LCD SCREEN INTERFACE WILL BE INSTALLED ON THE FACE OF THE HOOD, ON THE FACE OF THE UTILITY CABINET OR ON THE FACE OF A WALL MOUNTED CONTROL ENCLOSURE. CONTROL ENCLOSURE WILL BE NEMA 1 RATED AND LISTED FOR INSTALLATION INSIDE OF THE EXHAUST HOOD UTILITY CABINET. CONTROL ENCLOSURE MAY BE CONSTRUCTED OF STAINLESS STEEL OR PAINTED STEEL. THE SMART CONTROLLER WILL CONSTANTLY MONITOR THE EXHAUST AIR TEMPERATURE THROUGH THE RISER MOUNTED TEMPERATURE SENSOR AND MODULATE THE FAN SPEEDS ACCORDINGLY. A ROOM TEMPERATURE SENSOR WILL ALSO BE PROVIDED FOR FIELD INSTALLATION IN THE KITCHEN SPACE IN ORDER TO START THE FAN(S) BASED ON THE TEMPERATURE DIFFERENTIAL BETWEEN THE ROOM AND THE EXHAUST AIR IN THE DUCT RATHER THAN FIXED SET-POINTS. A PREPARATION TIME MODE IS AVAILABLE FOR MORNING OPERATION: DEDICATED MAKE-UP AIR WILL BE LOCKED OUT ONLY ALLOWING THE USE OF TRANSFER AIR DURING THIS MODE. EXHAUST FAN(S) WILL RUN AT LOW CFM WHILE MAINTAINING A BALANCED KITCHEN PRESSURE. A COOL DOWN MODE IS DESIGNED FOR EQUIPMENT COOL-DOWN PERIOD AT THE END OF THE DAILY COOKING OPERATIONS: SIMILARLY TO PREPARATION TIME MODE, DEDICATED MAKE-UP AIR WILL BE LOCKED OUT ONLY ALLOWING THE USE OF TRANSFER AIR DURING THIS MODE. EXHAUST FAN(S) WILL RUN AT LOW CFM WHILE MAINTAINING A BALANCED KITCHEN PRESSURE. FAN MAXIMUM/ MINIMUM SPEEDS WILL BE ADJUSTABLE FOR PROPER KITCHEN BALANCE. FAN DIRECTION CHANGE IS ALSO AVAILABLE FROM THE SMART CONTROLLER CONFIGURATION MENU WITHOUT NEED FOR REWIRING. DUCT TEMPERATURE SENSOR(S) WILL BE MOUNTED IN THE EXHAUST HOODRISER(S). TEMPERATURE PROBE WILL BE CONSTRUCTED OF STAINLESS STEEL. SYSTEM WILL BE FACTORY PRE-SET TO MODULATE FAN SPEED WITHIN A RANGE OF 45°F FOR 600°F AND 700°F COOKING APPLICATIONS AND A RANGE OF 5°F FOR 400°F COOKING APPLICATIONS. SETPOINTS ARE FULLY ADJUSTABLE THROUGH THE TOUCH SCREEN INTERFACE BASED ON APPLICATION NEEDS. THE MAX AIR OVERRIDE WILL HAVE AN ADJUSTABLE TIMEOUT VALUE. THE PANELS INCLUDE COLOR CODED WIRINGWITH AS-BUILT WIRING DIAGRAMS AND SPARE TERMINALS CONTROLLED BY THE FIRE SYSTEM MICRO SWITCH. THE PANEL IS FACTORY PRE-WIRED TO SHUT SUPPLY FANS DOWN IN A FIRE CONDITION. OPTIONS TO TURN ON THE EXHAUST FANS OR TURN OFF THE HOOD LIGHTS IN A FIRE CONDITION WILL BE CONFIGURABLE THROUGH THE SMART CONTROLLER, BUT ONLY THROUGH A PASSWORD PROTECTED MENU TO PREVENT ANY CHANGES AFTER A FIRE INSPECTION HAS BEEN PERFORMED.

BAS SHALL MONITOR STATUS AND FREQUENCY Hz OF KITCHEN FANS.



1 KITCHEN HOOD DIAGRAM
NOT TO SCALE

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MECHANICAL SCHEDULES

M-002
Sheet No. 2 of 7

OPTIMA # 20-0196R

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.

AIR HANDLING UNITS

AIR HANDLING UNITS SHALL BE STOPPED/STARTED ON A TIME OF DAY SCHEDULE THROUGH THE BAS. THIS SCHEDULE SHALL BE MODIFIED BY A START STOP OPTIMIZATION PROGRAM. UPON PROOF OF AIR FLOW THRU THE SUPPLY FAN, AS SENSED BY A RESPECTIVE CURRENT SENSING RELAY, THE NORMALLY CLOSED OUTSIDE AIR DAMPER SHALL BE ENABLED.

WHILE IN THE OCCUPIED MODE, THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY. WHILE IN THE UNOCCUPIED MODE, THE UNIT SUPPLY FAN SHALL CYCLE WITH HEATING AND COOLING LOADS. UPON A CALL FOR HEATING OR COOLING TO MEET UNOCCUPIED SETPOINTS, THE UNIT FAN SHALL BE STARTED AND THE UNIT SHALL OPERATE AS DESCRIBED BELOW AS REQUIRED BY THE SPACE TEMPERATURE. THE UNIT SHALL OPERATE FOR A MINIMUM OF 30 MINUTES (OR AS REQUIRED TO SATISFY UNOCCUPIED SETPOINT) AND SHALL NOT BE ALLOWED TO RESTART FOR A MINUM OF 15 MINUTES FOLLOWING SATISFACTION OF UNOCCUPIED SETPOINT AND SYSTEM SHUT-DOWN.

DEMAND CONTROL VENTILATION:
OUTSIDE AIR INTAKE SHALL BE PROVIDED WITH A MOTORIZED DAMPER. ON UNIT START UP, THE OUTSIDE AIR INTAKE DAMPER SHALL REMAIN CLOSED UNTIL THE RETURN AIR TEMPERATURE RISES ABOVE 65° F (ADJ) OR FALLS BELOW 75° F. (ADJ). ONCE RETURN AIR TEMPERATURE IS SATISFIED, THE OUTSIDE AIR DAMPER SHALL OPEN TO THE OCCUPIED MINIMUM SETPOINT. OUTSIDE AIR DAMPERS AND AIR FLOW MONITORING STATIONS SHALL MODULATE AS REQUIRED TO MAINTAIN MINIMUM OUTSIDE AIR FLOW. THE OUTSIDE AIR INTAKE DAMPER SHALL BE CLOSED WHILE UNIT IS IN THE UNOCCUPIED MODE. BAS SHALL BE CAPABLE OF OPENING AND CLOSING OUTSIDE AIR DAMPERS. CO2 SENSOR MOUNTED IN THE RETURN DUCT SHALL MODULATE THE OUTSIDE AIR DAMPER BASED ON CO2 LEVELS IN THE SPACE. DAMPER SHALL MODULATE OPEN FROM THE OCCUPIED MINIMUM SETPOINT OF 800 PPM TO DESIGN MAXIMUM AT 1200 PPM. AN ALARM SHALL BE ACTIVATED IF THE SPACE CO2 LEVEL RISES ABOVE 1500 PPM. SEE AHU SCHEDULE FOR MINIMUM AND DESIGN OUTSIDE AIR SETPOINTS.

AIRSIDE ECONOMIZER CYCLE:
DURING THE OCCUPIED PERIOD, WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 68° F AND THE OUTDOOR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY; THE ECONOMIZER CYCLE SHALL BE ENABLED. UNDER THOSE CONDITIONS, THE OUTDOOR AIR DAMPER AND RETURN AIR DAMPER SHALL MODULATE AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.

MODULATING DAMPER CONTROL:
MODULATING RETURN, RELIEF, AND OUTSIDE AIR DAMPERS SHALL OPERATE IN CONJUNCTION. RELIEF AND OUTSIDE AIR DAMPERS SHALL OPEN TO THE SAME POSITION (BASED ON DEMAND CONTROL VENTILATION OR ECONOMIZER CONTROL), AND RETURN DAMPER SHALL CLOSE TO THE INVERSE POSITION OF THE OUTSIDE AND RELIEF DAMPER SETTINGS.

RELIEF FANS:
RELIEF FANS SHALL BE PROVIDED WHERE INDICATED IN THE AHU AND/OR FAN SCHEDULE. VARIABLE FREQUENCY DRIVE SHALL CONTROL RELIEF FAN TO MAINTAIN BUILDING PRESSURE BETWEEN -0.02" AND +0.02", AS MEASURED BY A BUILDING PRESSURE SENSOR. RELIEF FAN SHALL SHUT DOWN WHEN BUILDING PRESSURE IS SATISFIED.

HUMIDITY CONTROL (WHERE INDICATED):
WITH SYSTEM IN OCCUPIED OR UNOCCUPIED MODE, HUMIDITY CONTROL SYSTEM SHALL BE CAPABLE OF BEING ACTIVATED. UNDER NORMAL OPERATION, UNIT SHALL CONTROLLED AS OUTLINED BELOW. PROVIDE HUMIDISTAT AS INDICATED ON PLANS, IF SPACE OR RETURN AIR HUMIDITY REACHES 65% R.H. (ADJ), ALARM SHALL BE SENT AND HUMIDITY CONTROL SEQUENCE SHALL BE ACTIVATED. AIR HANDLING UNIT DX COIL SHALL BE COMMANDED TO MAX SETTING AND UNIT REHEAT COIL SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE. WHEN SPACE HUMIDITY DROPS BELOW 55% R.H. (ADJ), BAS SHALL DEACTIVATE HUMIDITY CONTROL SEQUENCE. CONTROL OF UNIT SHALL REVERT BACK AS INDICATED BELOW.

SMOKE DETECTION & AHU SHUTDOWN:
UPON DETECTION OF SMOKE IN THE AIR HANDLING SYSTEM BY THE DUCT-MOUNTED RETURN AIR SMOKE DETECTOR, AN ALARM CONDITION SHALL BE SENT TO THE BUILDING FIRE ALARM SYSTEM AND ALL AIR HANDLING UNITS SHALL BE SHUTDOWN BY THE BUILDING FIRE ALARM SYSTEM. ALL ASSOCIATED SMOKE DAMPERS SHALL CLOSE. THE BUILDING FIRE ALARM SYSTEM SHALL PROVIDE ONE DIGITAL OUTPUT TO THE BAS TO INDICATE ACTIVATION OR FAILURE OF ANY SMOKE DETECTOR.

SINGLE ZONE VARIABLE VOLUME (SZVAV) AIR HANDLING UNITS:

A TEMPERAUTRE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. THE UNIT SUPPLY FAN SHALL START AT LOW SPEED. ON A RISE IN TEMPERATURE ABOVE SETPOINT, THE DX COOLING COIL SHALL MODULATE COMPRESSORS ON A CONTINUED RISE IN TEMPERATURE, VARIABLE FREQUENCY DRIVE SHALL INCREASE AIR FLOW TO SATISFY SPACE TEMPERATURE REQUIREMENTS. AS THE SPACE TEMPERATURE DROPS BELOW SETPOINT, THE FAN SPEED SHALL RESET FROM MAXIMUM TO MINIMUM. AS THE SPACE TEMPERATURE CONTINUES TO DROP, THE DX COOLING COIL MODULATES DOWN AND THE HEATING COIL SHALL BEGIN TO MODULATE ON. ON A CONTINUED DROP IN SPACE TEMPERATURE, THE SUPPLY FAN SPEED SHALL INCREASE TO MAINTAIN SETPOINT. THE TEMPERATURE SENSOR SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION THAT WILL PLACE THE SYSTEM IN THE OCCUPIED MODE FOR A PERIOD OF UP TO 2 HOURS.

CONSTANT VOLUME (CV) AIR HANDLING UNITS:

A TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. DX COOLING COIL SHALL MODULATE COMPRESSORS ON A RISE IN TEMPERATURE ABOVE SENSOR SETPOINT. AS THE TEMPERATURE SPACE FALLS BELOW SETPOINT, THE DX COOLING COIL COMPRESSOR SHALL MODULATE OFF AND HEATING COIL MODULATE ON TO MAINTAIN SPACE TEMPERATURE. THE TEMPERATURE SENSOR SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION THAT WILL PLACE THE SYSTEM IN THE OCCUPIED MODE FOR A PERIOD OF UP TO 2 HOURS.

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.

DOMESTIC HOT WATER SYSTEM

BAS SHALL HAVE MONITOR DOMESTIC WATER HEATING SYSTEM. AN ALARM SHALL BE GENERATED SHOULD EITHER TANK DEVIATE FROM SETPOINT BY 10° EITHER HIGH OR LOW. AN ALARM SHALL ALSO BE GENERATED SHOULD THE DOMESTIC HWS TEMPERATURE DEVIATE FROM SETPOINT BY 10° EITHER HIGH OR LOW. BAS SHALL ALSO MONITOR BOTH DOMESTIC HWR TEMPERATURES AND DOMESTIC WATER SUPPLY TEMPERATURE FOR TRACKING PURPOSES. SEE PLUMBING PLANS FOR ALL TEMPERATURE SENSOR LOCATIONS.

WALL/UNIT HEATERS

A BUILT-IN THERMOSTAT SHALL OPERATE WALL/UNIT HEATER AND FAN TO MAINTAIN A SETPOINT OF 49° (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. BOILER ROOM AND ELECTRICAL ROOM THERMOSTATS SHALL BE SET AT 85° F. (USER ADJUSTABLE, BAS REMOTE).

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	KW	AIR FLOW	WATER FLOW	CO2	HZ	RPM	AMPS	SETPOINT ADJ.	VOLTS	ENTHALPY	RUN TIME	EFFICIENCY	INPUTS: BINARY: STATUS	FILTER	SMOKE	FREEZE	AIR FLOW	LOW TEMP	OVER-RIDE	OUTPUTS: DIGITAL: OFF-ON	OFF-AUTO-ON	OPEN-CLOSE	OUTPUTS: ANALOG: DMPR. POS.	VALVE POS.	STEP CONTROL	SYSTEM FEATURES: ALARMS: HI ANALOG	LO ANALOG	HI BINARY	LO BINARY	PROOF	SYSTEM FEATURES: PROGRAMS: TIME SCHEDULING	DEMAND LIMITING	DUTY CYCLE	ECONOMIZER OPT.	ENTHALPY OPT.	SMOKE CNT.	TREND	ALARM INSTRUCT	MAIN. WK. ORD.	GENERAL: COLOR GRAPHIC	SUPPLMENT. NOTES
Air Handling Units																																		X		X			X		
Return Temp	X																																								
Return RH			X																																						
Return CO2					X																								X												
Smoke Detector																X																										
OA Damper																										X																
OA Airflow Mon. Station				X																																					
Relief Damper																										X																
Return Damper																										X																
Building Pressure		X																																							Where Indicated
Relief Fan Status															X																				X							Where Indicated
Filter Status																X																										
Mixed Air Temp	X																																		X						
Supply Fan															X							X													X						CV Only
Supply Fan VFD on/off																						X																			SZVAV & VAV Only
Supply Fan VFD Speed							X																																		SZVAV & VAV Only
Supply Fan VFD Status															X																				X							SZVAV & VAV Only
Supply Temp	X																																								
Space CO2					X																								X												
Space Humidity			X																										X												
Space Temp	X																																								CV & SZVAV Only
Over-ride																					X																					CV & SZVAV Only
Misc. Points																																							X		
2-Position OA Dampers																						X																				
Modulating OA Dampers				X																						X																
Fire Alarm Status															X																											
Freezer Temp	X																												X												
Cooler Temp	X																												X												
Toilet Fans																					X													X								
Misc. Fans																																									See Fan Schedule
Domestic HW Pump															X							X													X							
Domestic HWS Temp	X																																								
Domestic HWR Temp	X																																								
Storage Tank	X																																								

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 CAFETERIA 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. EXISTING CONTROLS BY SYSTEM BY RELIABLE CONTROLS CORPORATION (MACH-SYSTEM BY BUILDING AUTOMATION SERVICES)
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. CONTROLS CONTRACTOR SHALL PROVIDE SPARE CONTROLLERS TO THE OWNER AT COMPLETION OF PROJECT. SPARE CONTROLLERS SHALL INCLUDE ONE AHU CONTROLLER. FOUR SPARE TEMPERATURE SENSORS SHALL ALSO BE PROVIDED.
7. BAS SHALL HAVE POINT OF CONTROL ACCESS BY A LAP-TOP COMPUTER AT THE CONTROL PANEL IN EACH MECHANICAL ROOM. ACCESS SHALL BE INDEPENDENT OF OWNERS LAN.
8. ALL BAS CONTROLLERS ON AIR HANDLING UNITS SHALL HAVE MANUAL "ON/OFF" OVERRIDE SWITCHES, EITHER ON THE CONTROLLER OR THE PANEL LOCATED IN THE ROOM. SOFTWARE OVERRIDE ONLY IS NOT ACCEPTABLE.
9. 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.
10. 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.
11. ALARMS THROUGH THE BAS SYSTEM SHALL BE VISIBLE ON THE INDIVIDUAL GRAPHICS THEMSELVES, NOT ONLY ON THE SUMMARY PAGE.
12. 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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Johnsonville Elementary School Addition/Renovation

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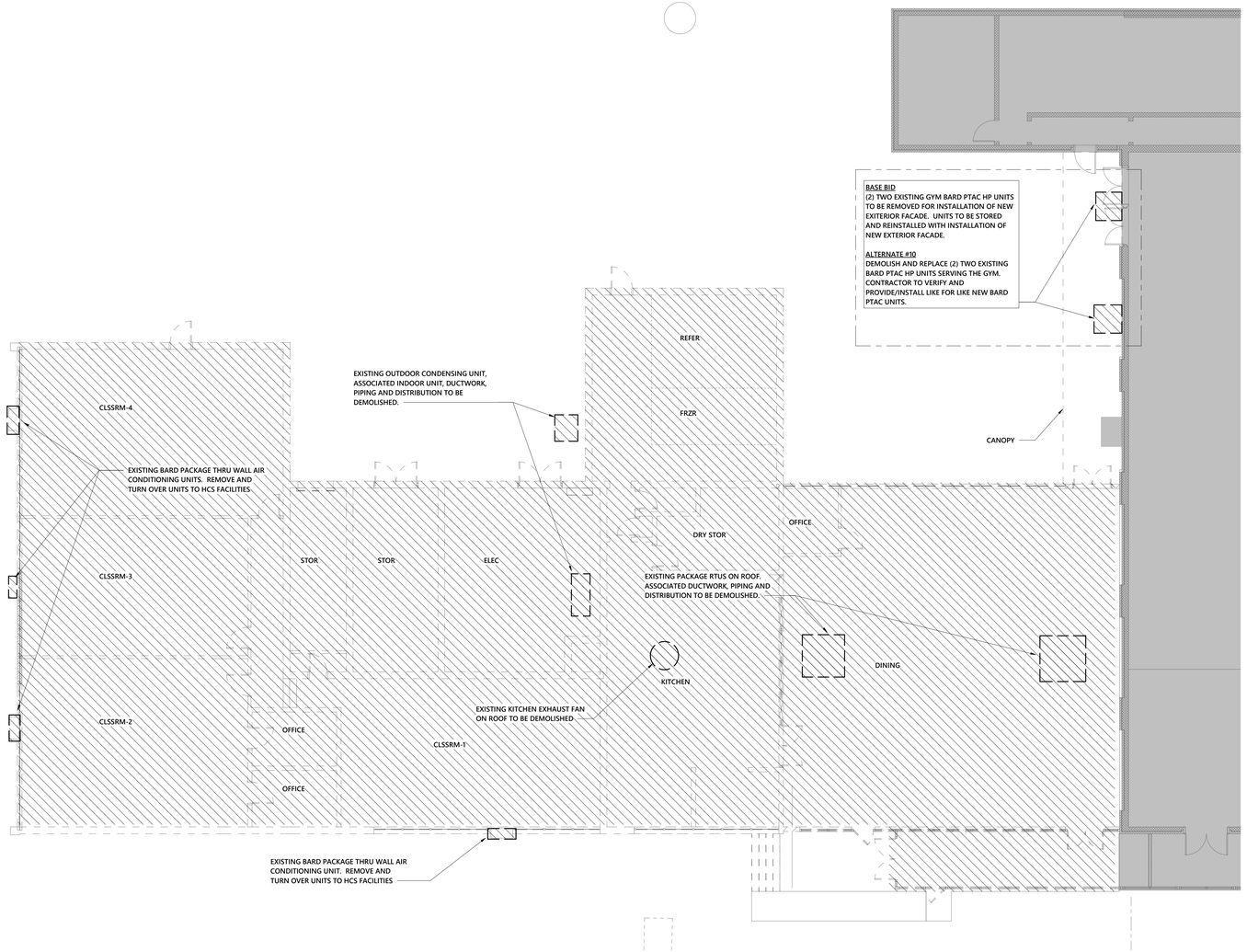
MECHANICAL CONTROLS SEQUENCE OF OPERATION

M-003

Sheet No. 3 of 7

OPTIMA # 20-0196R



1 **FIRST FLOOR MECHANICAL DUCTWORK PLAN - DEMOLITION**
1/8" = 1'-0"

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MECHANICAL DEMOLITION PLAN

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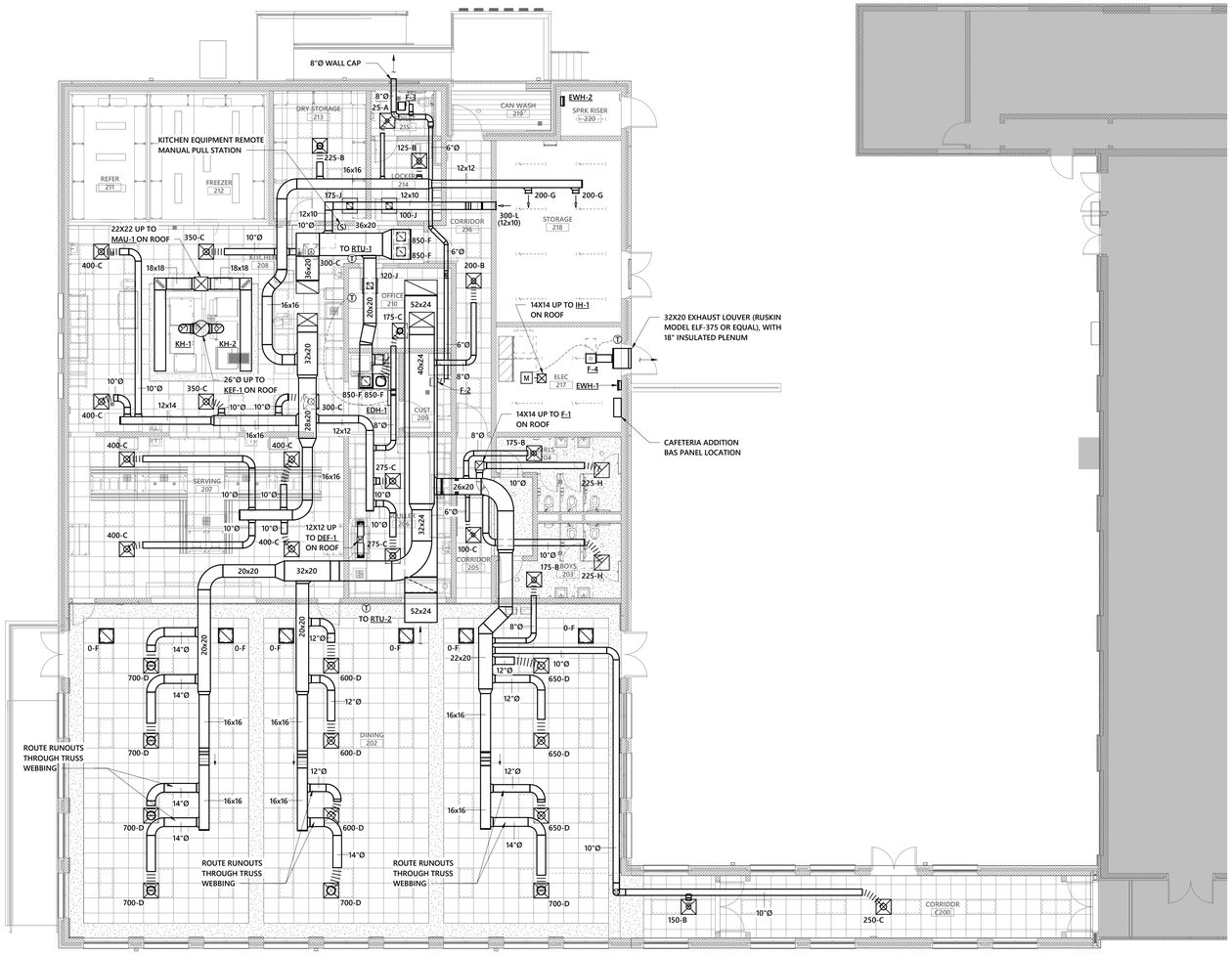
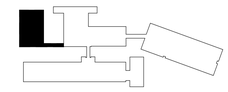
OPTIMA # 20-0196R



1 **FIRST FLOOR MECHANICAL DUCTWORK PLAN - NEW WORK**
1/8" = 1'-0"



KEYPLAN

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FIRST FLOOR MECHANICAL PLAN - NEW WORK

M-102

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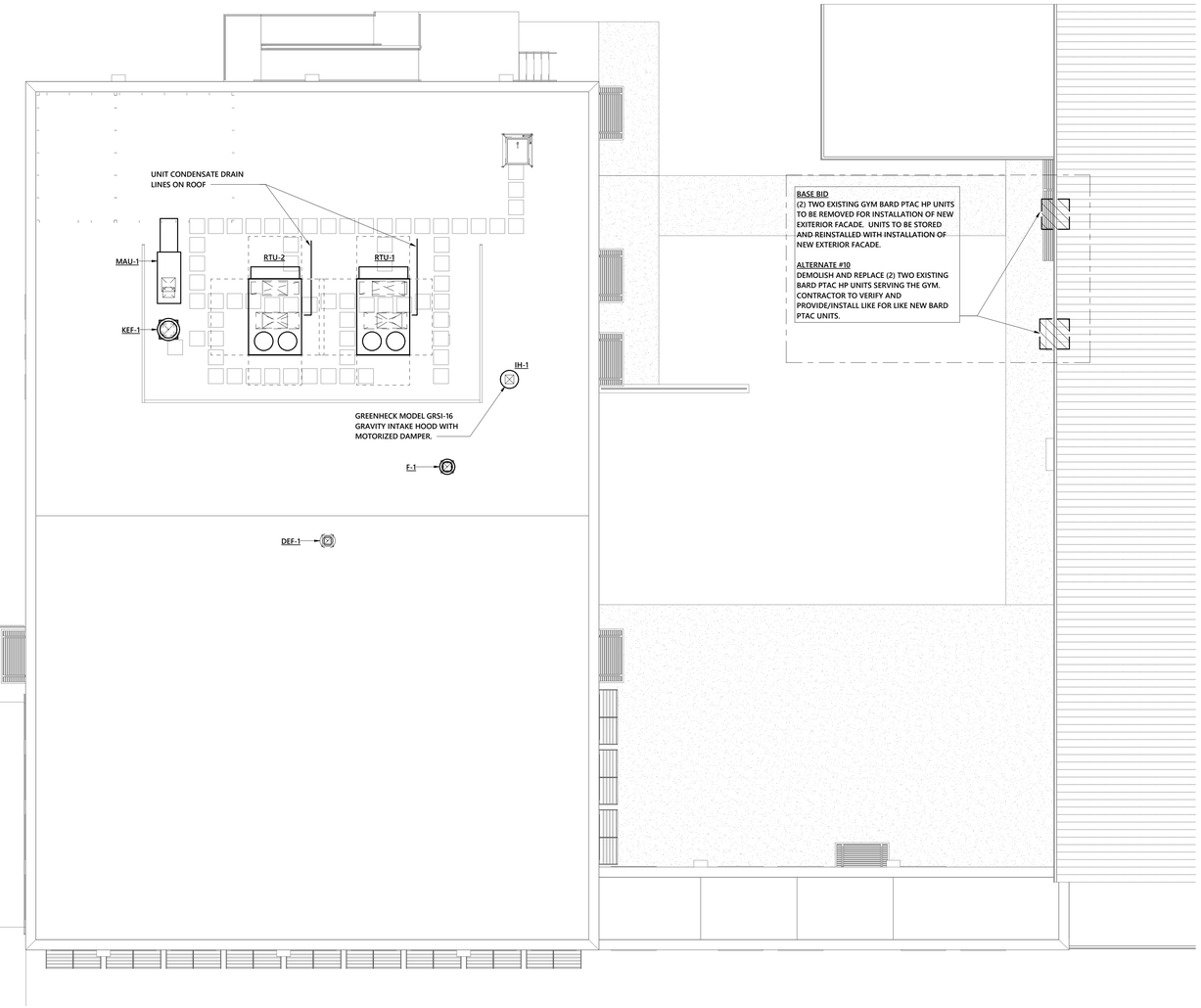
OPTIMA # 20-0196R



1 ROOF MECHANICAL PLAN
1/8" = 1'-0"

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Harnett County Schools

Johnsonville Elementary School Addition/Renovation

18495 NC-27, Cameron, NC 28326

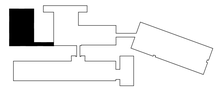
ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

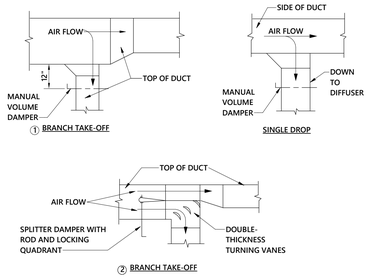
ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: TAL
CHECKED BY: GPK

ROOF MECHANICAL PLAN - NEW WORK



KEYPLAN

M-103



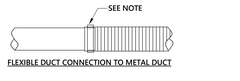
① BRANCH TAKE-OFF

SINGLE DROP

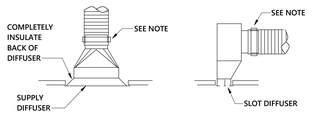
② BRANCH TAKE-OFF

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



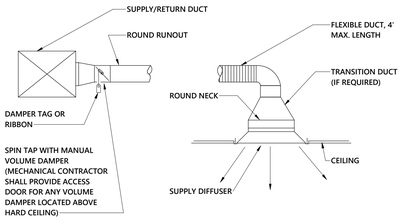
FLEXIBLE DUCT CONNECTION TO METAL DUCT



FLEXIBLE CONNECTION TO SUPPLY DIFFUSER

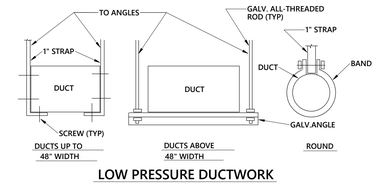
NOTE:
ALL FLEXIBLE DUCT CONNECTIONS TO SHEET METAL SHALL BE SECURED WITH APPROVED STRAP AND SEALANT.

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.

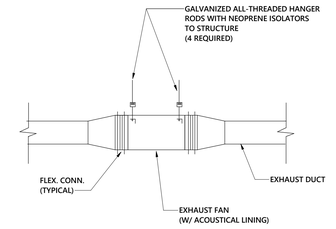
3 SPIN TAP TO ROUND NECK DIFFUSER
NOT TO SCALE



LOW PRESSURE DUCTWORK

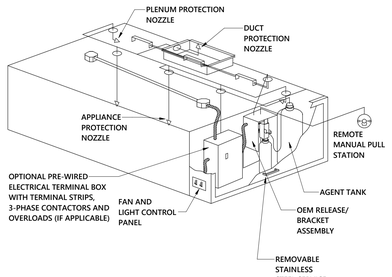
NOTE:
ALL DUCTWORK AND EQUIPMENT HANGERS AND SUPPORTS MUST BE PURCHASED THRU THE METAL DECKING MANUFACTURER. HANGERS SCREWED INTO THE DECK WILL NOT BE ACCEPTABLE. COORDINATE WITH GENERAL CONTRACTOR.

4 DUCTWORK HANGER DETAILS
NO SCALE



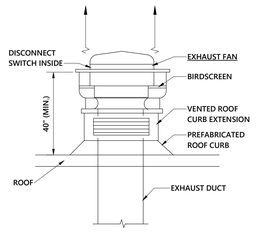
NOTES:
1. COORDINATE LOCATION OF FAN WITH OTHER TRADES TO INSURE SERVICE CLEARANCES.
2. MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING IF REQUIRED.

5 INLINE EXHAUST FAN DETAIL
NO SCALE

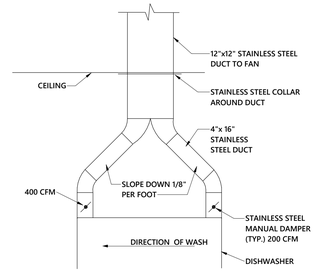


6 KITCHEN HOOD FIRE SUPRESSION
NO SCALE

NOTE:
KITCHEN HOOD MAKE-UP AIR FAN INTAKE SHALL BE A MINIMUM OF 10'-0" AWAY FROM KITCHEN HOOD EXHAUST FAN OUTLET.

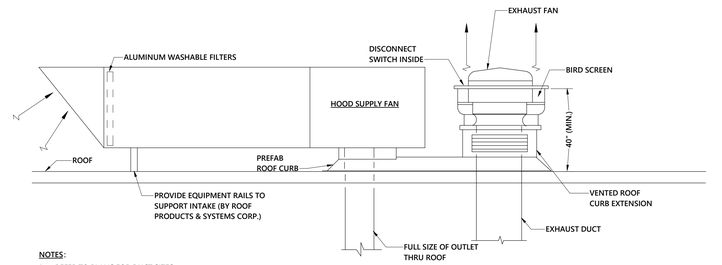


7 KITCHEN HOOD EXHAUST FAN (FLAT ROOF)
NOT TO SCALE



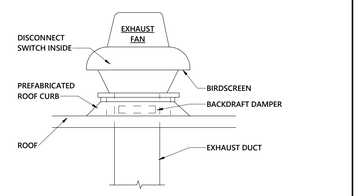
NOTE:
ALL DUCT SEAMS AND JOINTS SHALL BE CONSTRUCTED WATERTIGHT. ALL DUCTWORK SHALL SLOPE TOWARD DISHWASHER.

8 DISHWASHER EXHAUST DETAIL
NO SCALE



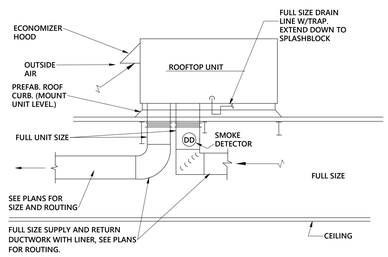
NOTES:
1. REFER TO PLANS FOR DUCT SIZES
2. SEE MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL REQUIREMENTS AND SPECIFICATIONS FOR THE KITCHEN HOOD.
3. KITCHEN HOOD MAKE-UP AIR FAN INTAKE SHALL BE A MINIMUM OF 10'-0" AWAY FROM KITCHEN HOOD EXHAUST FAN.

9 KITCHEN HOOD EXHAUST/MAKEUP AIR SYSTEM
NOT TO SCALE

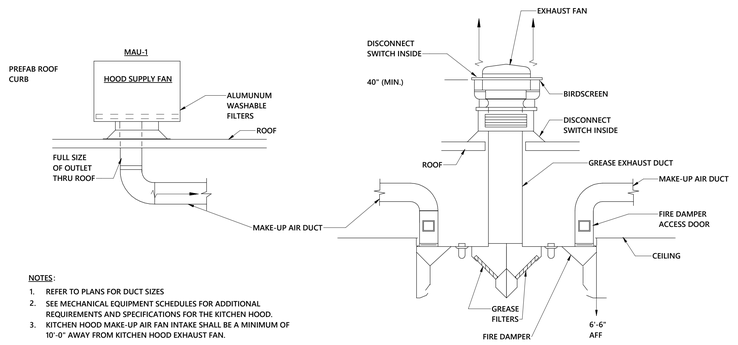


10 EXHAUSE FAN ON FLAT ROOF DETAIL
NOT TO SCALE

NOTES:
1. PROVIDE OPENING IN ROOF SIZED FOR SUPPLY AND RETURN DUCTS. ALL OTHER AREAS UNDER UNIT SHALL HAVE ANGLES AND SHEET METAL ACROSS UNDER UNIT WITH BATT INSULATION FILLING VOID.
2. ROOF CURBS SHALL MATCH SLOPE OF ROOF.
3. SMOKE DETECTORS SHALL BE IONIZITION TYPE WIRED TO SHUT DOWN THE UNIT UPON ACTIVATION. SMOKE DETECTORS SHALL BE PROVIDED AND WIRED BY THE ELECTRICAL CONTRACTOR AND INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.



11 PACKAGE RTU DETAIL
NOT TO SCALE



NOTES:
1. REFER TO PLANS FOR DUCT SIZES
2. SEE MECHANICAL EQUIPMENT SCHEDULES FOR ADDITIONAL REQUIREMENTS AND SPECIFICATIONS FOR THE KITCHEN HOOD.
3. KITCHEN HOOD MAKE-UP AIR FAN INTAKE SHALL BE A MINIMUM OF 10'-0" AWAY FROM KITCHEN HOOD EXHAUST FAN.

12 HOOD SYSTEM DETAIL
NOT TO SCALE

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CONSTRUCTION DOCUMENTS

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ISSUE DATE: 12/15/2020

PROJECT #: 2020.300
DRAWN BY: TAL
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MECHANICAL DETAILS

M-501

Sheet No. 7 of 7

OPTIMA # 20-0196R

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:

5,100 WATTS SPECIFIED

40 % 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

8,550 WATTS ALLOWED

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

- [ ] NOT APPLICABLE

TOTAL CONNECTED EXTERIOR LIGHTING POWER:

1,300 WATTS SPECIFIED

TOTAL ALLOWABLE EXTERIOR LIGHTING POWER:

1,710 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.

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION
FACP	FIRE ALARM CONTROL PANEL
F	FIRE ALARM MANUAL STATION.
SD	CEILING MOUNTED SMOKE DETECTOR.
HD	CEILING MOUNTED HEAT DETECTOR.
FS	SPRINKLER SYSTEM FLOW SWITCH. PROVIDE MONITOR MODULE.
TS	SPRINKLER SYSTEM TAMPER SWITCH. PROVIDE MONITOR MODULE.
SP	ADA COMPLIANT CEILING MOUNTED FIRE ALARM SPEAKER ONLY. WHITE FINISH.
SP 15cd	ADA COMPLIANT CEILING MOUNTED FIRE ALARM SPEAKER STROBE LIGHT. 15CD UNLESS OTHERWISE NOTED. WHITE FINISH.
SP 15cd	ADA COMPLIANT WALL MOUNTED FIRE ALARM SPEAKER STROBE LIGHT. 15CD UNLESS OTHERWISE NOTED. WHITE FINISH.
MM	FIRE ALARM MONITOR MODULE.

**Note: AUDIBLE DEVICES WITHIN SLEEPING ROOMS SHALL BE SUBJECT TO LOW FREQUENCY REQUIREMENTS. A SQUARE WAVE 520HZ TONE COMPATIBLE WITH NFPA 72 18.4.5.3. COORDINATE WITH LOCAL CODES AND REQUIREMENTS.

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.
	240/120V SINGLE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	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.
42"HD	JUNCTION BOX FOR HAND DRYER CONNECTION; SEE DETAIL 17/ SHEET E-501.
	SPECIAL OUTLET. SEE PLANS.
0.0 hp $M	FRACTIONAL HORSEPOWER MANUAL MOTOR STARTER, WITH OVERLOAD PROTECTION

ELECTRICAL FIXTURES LEGEND - COMMERCIAL

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE, 20 AMP, 120 VOLT COOPER 5362 OR EQUAL.
GFI	GROUND FAULT RECEPTACLE. NEMA 5-20R DUPLEX. ALL RECEPTACLES INSTALLED OUTSIDE, WITHIN 6' OF A SINK OR IN A KITCHEN SHALL BE GFCI.
6'"	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER, OR AT HEIGHT NOTED.
GFI	GROUND FAULT DUPLEX RECEPTACLE, NEMA 5-20R MOUNTED ABOVE COUNTER BACKSPLASH OR AT HEIGHT NOTED.
GFI WP	WEATHERPROOF RECEPTACLE. NEMA 5-20R DUPLEX, CORROSION RESISTANT COVER SHALL BE INTERMATIC #WP1020 (CLEAR) OR EQUAL.
	QUAD RECEPTACLE. TWO NEMA 5-20R DUPLEX RECEPTACLES.CORROSION RESISTEANT COVER SHALL BE INTERMATIC #WP1020 (CLEAR) OR EQUAL.
EWC	GFI NEMA 5-20R QUAD RECEPTACLE FOR ELECTRIC WATER COOLER. COORDINATE LOCATION WITH PLUMBING CONTRACTOR.

TELECOM LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
	PLYWOOD TELEPHONE BACKBOARD. SIZE AS INDICATED ON RISER.
(1)	DATA OUTLET. 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. SUBSCRIPT NEXT TO OUTLET INDICATES DATA DROPS. WHERE NO QUANTITY SHOWN, THIS INDICATES PATHWAYS AND BOXES ONLY.
	CONDUIT SLEEVE, 4" SLEEVE UNLESS OTHERWISE NOTED. PROVIDED BY ELECTRICAL CONTRACTOR.
TMGB	TELECOMMUNICATIONS MAIN GROUND BAR.

SPECIAL SYSTEMS LEGEND

SYMBOL	DESCRIPTION
S	WALL-MOUNTED SPEAKER.3/4" CONDUIT TO LOCAL ACCESSIBLE CEILING
S WP	EXTERIOR WEATHERPROOF SPEAKER;3/4" CONDUIT TO LOCAL ACCESSILBE CEILING PROVIDE WEATHERPROOF J-BOX
	BELL

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.
	EMERGENCY BATTERY PACK/EXIT COMBO FIXTURE WITH 90 MINUTE BATTERY BACKUP, SEE FIXTURE SCHEDULE.
$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.
$4	FOUR WAY SWITCH, 20 AMP, 120/277 VOLT, COOPER 1224 OR EQUAL.
$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 IR	CEILING MOUNTED OCCUPANCY SENSOR. INFRARED TECHNOLOGY. WATT STOPPER #CI-300-1 OR EQUAL.
$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.
PC	PHOTO CONTROL, EXTERIOR, MOUNT FACING NORTH.
PP	CEILING MOUNTED OCCUPANCY SENSOR POWER PACK. SENSOR SWITCH PP-20, WATT STOPPER #BZ-100, COOPER SP-20, OR EQUAL.

SECURITY DEVICES SYMBOL LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
	CAMERA. WALL MOUNTED. PROVIDE ONE (1) CATEGORY 6A CABLE. REFER TO ELECTRICAL DRAWINGS FOR JUNCTION BOX AND CONDUIT REQUIREMENTS.
DC	DOOR CONTACT, MINIMUM 1/2" CONDUIT. PROVIDE SINGLE GANG JUNCTION BOX AND PULL STRING. SEE DETAIL FOR ADDITIONAL REQUIREMENTS OF PATHWAYS AND CABLING

EXISTING/DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	HALFTONE SYMBOL INDICATES EXISTING
	DASHED SYMBOL INDICATES REMOVED

ELECTRICAL SHEET INDEX

SHEET NUMBER	SHEET NAME
E-001	ELECTRICAL LEGEND AND NOTES
E-002	ELECTRICAL NOTES
E-011	OVERALL FIRST FLOOR POWER PLAN - DEMOLITION
E-012	OVERALL FIRST FLOOR POWER PLAN - NEW WORK
E-113	ROOF POWER PLAN - NEW WORK
E-211	FIRST FLOOR LIGHTING PLAN - NEW WORK
E-311	FIRST FLOOR SPECIAL SYSTEMS PLAN - NEW WORK
E-440	ENLARGED ELECTRICAL PLANS
E-450	ELECTRICAL ELEVATIONS
E-501	ELECTRICAL DETAILS
E-502	ELECTRICAL DETAILS
E-601	ELECTRICAL SCHEDULES
E-901	ELECTRICAL DIAGRAMS

__/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

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12/15/2020

CONSTRUCTION DOCUMENTS

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020

PROJECT #: 2020.300
DRAWN BY: MKG
CHECKED BY: AEB

ELECTRICAL LEGEND AND NOTES

E-001

OPTIMA # 20-0196R

BIM 360://Johnsonville ES Addition Renovation/20-0196_Johnsonville School Cafeteria_MEPFP_R20.rvt
12/17/2020 12:14:08 PM

1. <u>GENERAL:</u>
   - 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. <u>RACEWAY:</u>
   - 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.

3. <u>OUTLET BOXES:</u>
   - 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.
   - G. ALL BOXES IN SHIELDED CONSTRUCTION (I.E. X-RAY ROOMS, ETC.) SHALL BE LEAD BACKED TYPE.

4. <u>CONDUCTORS:</u>
   - 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

* - 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. <u>WIRING DEVICES:</u>
   - 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	COOPER AH1221
THREE-WAY 20 AMP	COOPER AH1223
FOUR-WAY 20 AMP	COOPER AH1224

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

20 AMP DUPLEX	COOPER 5352
20 AMP DUPLEX GFCI	COOPER SGF20F
20 AMP DUPLEX TAMPER	COOPER TR5362
20 AMP DUPLEX GFCI-TAMPER	COOPER TRSGF20F

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. ALL WIRING DEVICES (SWITCHES AND RECEPTACLES) SHALL BE WHITE, 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. <u>SUPPORTS:</u>
   - 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. <u>PAINTING:</u>
   - 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. <u>TELECOMMUNICATIONS:</u>
   - 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. <u>LIGHTING FIXTURES:</u>
   - 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. <u>LIGHTING CONTROLS:</u>
   - 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. <u>EQUIPMENT IDENTIFICATION:</u>
   - 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
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. <u>DISCONNECTS:</u>
   - 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. <u>PANELBOARDS:</u>
   - 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. <u>FIRE ALARM SYSTEM:</u>
   - A. NEW DEVICES SHALL BE CONNECTED TO THE EXISTING FIRE ALARM SYSTEM IN COMPLIANCE WITH ALL APPLICABLE NFPA 72 AND OTHER STANDARDS AS WELL AS THE AMERICAN'S WITH DISABILITIES ACT (ADA). ALL FINAL CONNECTIONS, TESTING AND ADJUSTMENTS SHALL BE PERFORMED BY OR UNDER DIRECT SUPERVISION OF AN AUTHORIZED FACTORY REPRESENTATIVE. NEW DEVICES SHALL BE COMPATIBLE WITH THE EXISTING FIRE ALARM SYSTEM. THE CONTRACTOR SHALL FIELD VERIFY EXACT SYSTEM MANUFACTURER AND TYPE AND CAPABILITY TO MEET THE INTENT INDICATED ON THE DRAWINGS.
   - B. INITIATING DEVICE ACTIVATION SHALL CAUSE OPERATION OF THE PROPER ALARM CIRCUIT IN THE CONTROL PANEL, AND OPERATE ALL AUDIBLE AND VISUAL INDICATING ALARMS. ALL AIR HANDLING UNITS SHALL BE STOPPED UPON ANY ALARM INPUT. EACH AIR HANDLER UNIT SHALL BE PROVIDED WITH A SYSTEM CONTROLLED RELAY TO EFFECT SHUTDOWN. ALL ALARM DEVICES AND LAMPS SHALL CONTINUE TO OPERATE UNTIL THE INITIATING DEVICE IS RESET. SUBSEQUENT ALARMS SHALL RESOUND THE SYSTEM. AN AUDIBLE AND VISUAL SIGNAL SHALL INDICATE SYSTEM TROUBLE. THE CONTROL PANEL SHALL PROVIDE FOR ACTIVATING A UL LISTED CENTRAL STATION SIGNAL FOR NOTIFYING THE FIRE DEPARTMENT.
   - C. MANUAL STATIONS SHALL BE NON-CODED, WITH PULL LEVER AND GLASS ROD, SEMI-FLUSH MOUNTED. COMBINATION LIGHT AND HORN SIGNALS SHALL BE FLUSH MOUNTED. WIRING SHALL BE IN CONDUIT AS PREVIOUSLY SPECIFIED, #14 AWG MINIMUM, THHN. ALL J-BOXES USED FOR THE FIRE ALARM SYSTEM SHALL BE PAINTED RED.
   - D. CONDUCTORS SHALL BE PLENUM-RATED AND INSTALLED IN CONDUIT AND INSTALLED IN COMPLIANCE WITH NFPA 70, ARTICLE 760; IN ADDITION TO WIRING METHODS 300.4.
   - E. ALL FIRE ALARM WIRING SHALL BE CLASS A *<u>OR</u>* B.
   - F. PROVIDE ALL REQUIRED MODULES, POWER EXTENDERS, PROGRAMMING, ETC. FOR A COMPLETE AND OPERATIONAL SYSTEM.
   - G. SUBMIT FIRE ALARM SHOP DRAWINGS CONSISTING OF PRODUCT DATA, TO THE ENGINEER AND FOR APPROVAL.
   - H. FILL OUT NFPA 72 CERTIFICATION REPORT AND SUBMIT TO ENGINEER AND AUTHORITY HAVING JURISDICTION.
   - I. WARRANTY - ALL WORK PERFORMED AND ALL MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE FREE FROM DEFECTS AND SHALL REMAIN SO FOR A PERIOD OF AT LEAST TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY THE PROFESSIONAL ENGINEER AND/OR OWNER. THE FULL COST OF MAINTENANCE, LABOR, AND MATERIALS REQUIRED TO CORRECT ANY DEFECT DURING THIS TWO YEAR PERIOD SHALL BE IMMEDIATELY CORRECTED AT NO ADDITIONAL COST TO THE OWNER. ANY DEFECTS THAT RENDER THE SYSTEM INOPERATIVE SHALL BE REPAIRED WITHIN 24 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR. OTHER DEFECTS SHALL BE REPAIRED WITHIN 48 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR.
   - J. PROVIDE ALL REPROGRAMMING AND/OR REWORK AND/OR REPLACEMENT OF EXISTING FIRE ALARM PANEL AS REQUIRED.

15. <u>FIRE STOPPING:</u>
   - 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.

16. <u>SEISMIC:</u>
   - 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.

17. <u>ELECTRICAL COORDINATION WITH OTHER TRADES:</u>
   - 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.

18. <u>DEMOLITION NOTES:</u>
   - 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.

19. <u>COORDINATION DRAWINGS:</u>
   - 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.

20. <u>TESTING AND DOCUMENTATION:</u>
   - 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.

21. <u>COMMISSIONING:</u>
   - 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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NORTH CAROLINA PROFESSIONAL SEAL 048210 ENGINEER MORGAN K. GUNN
12/15/2020

CONSTRUCTION DOCUMENTS

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North Carolina License Number C-0914

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: MKG
CHECKED BY: AEB

ELECTRICAL NOTES

E-002

OPTIMA # 20-0196R

BIM 360://Johnsonville ES Addition Renovation/20-0196_Johnsonville School Cafeteria_MEPFP_R20.rvt
12/17/2020 12:14:08 PM

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.

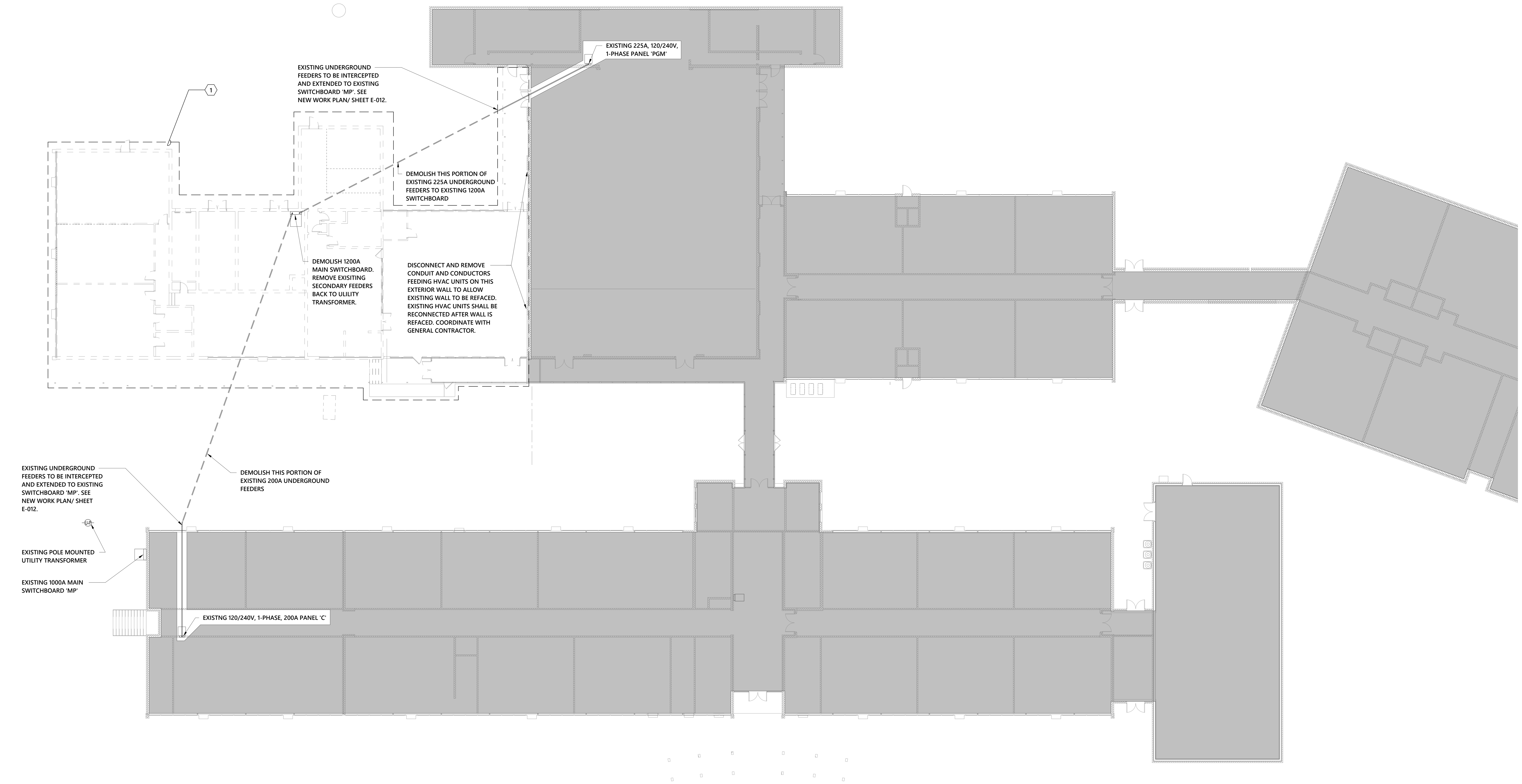
F. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.

G. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING POWER DEVICES TO REMAIN.

H. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

KEYNOTES

1 DISCONNECT AND REMOVE ALL ELECTRICAL EQUIPMENT AND DEVICES WITHIN THIS AREA (INTERIOR AND EXTERIOR) BACK TO SOURCE, UNLESS OTHERWISE NOTED.



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

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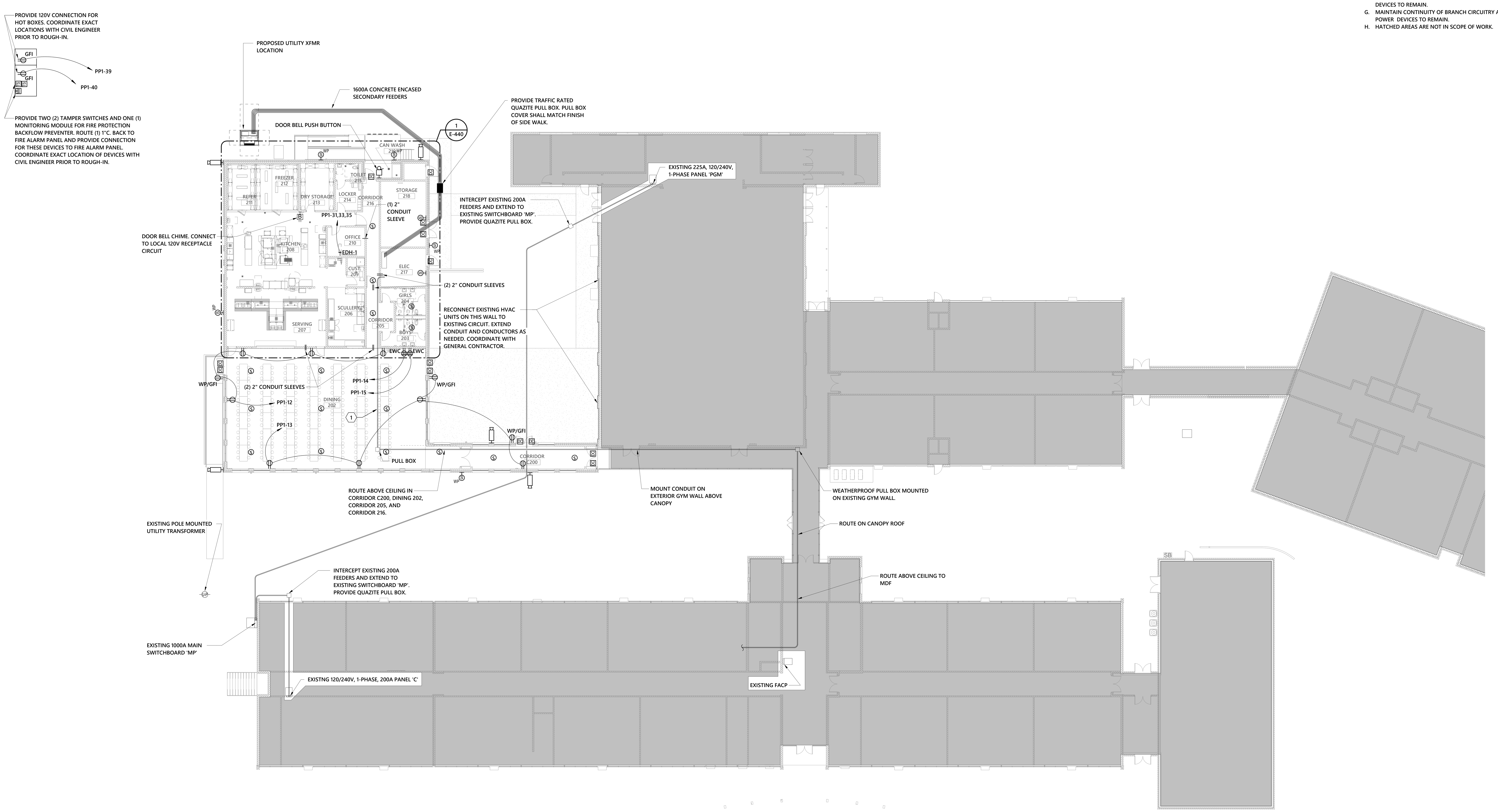
OVERALL FIRST FLOOR POWER PLAN - DEMOLITION

E-011

12/17/2020 12:14:10 PM   BIM 360://Johnsonville ES Addition Renovation/20-0196_Johnsonville School Cafeteria_MEPFP_R20.rvt

OPTIMA # 20-0196R



1 **OVERALL ELECTRICAL PLAN - NEW WORK**
1/16" = 1'-0"

KEYNOTES

1 PROVIDE (1) 3"C. FROM PLYWOOD BACKBOARD TO EXISTING MDF ROOM. PROVIDE NYLON PULL STRING AND PULL BOXES AS SHOWN. COORDINATE LOCATION OF MDF ROOM WITH OWNER.

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.

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12/15/2020

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No.	Date	Description

ISSUE DATE:	12/15/2020
PROJECT #:	2020.300
DRAWN BY:	MKG
CHECKED BY:	AEB

OVERALL FIRST FLOOR POWER PLAN - NEW WORK

E-012

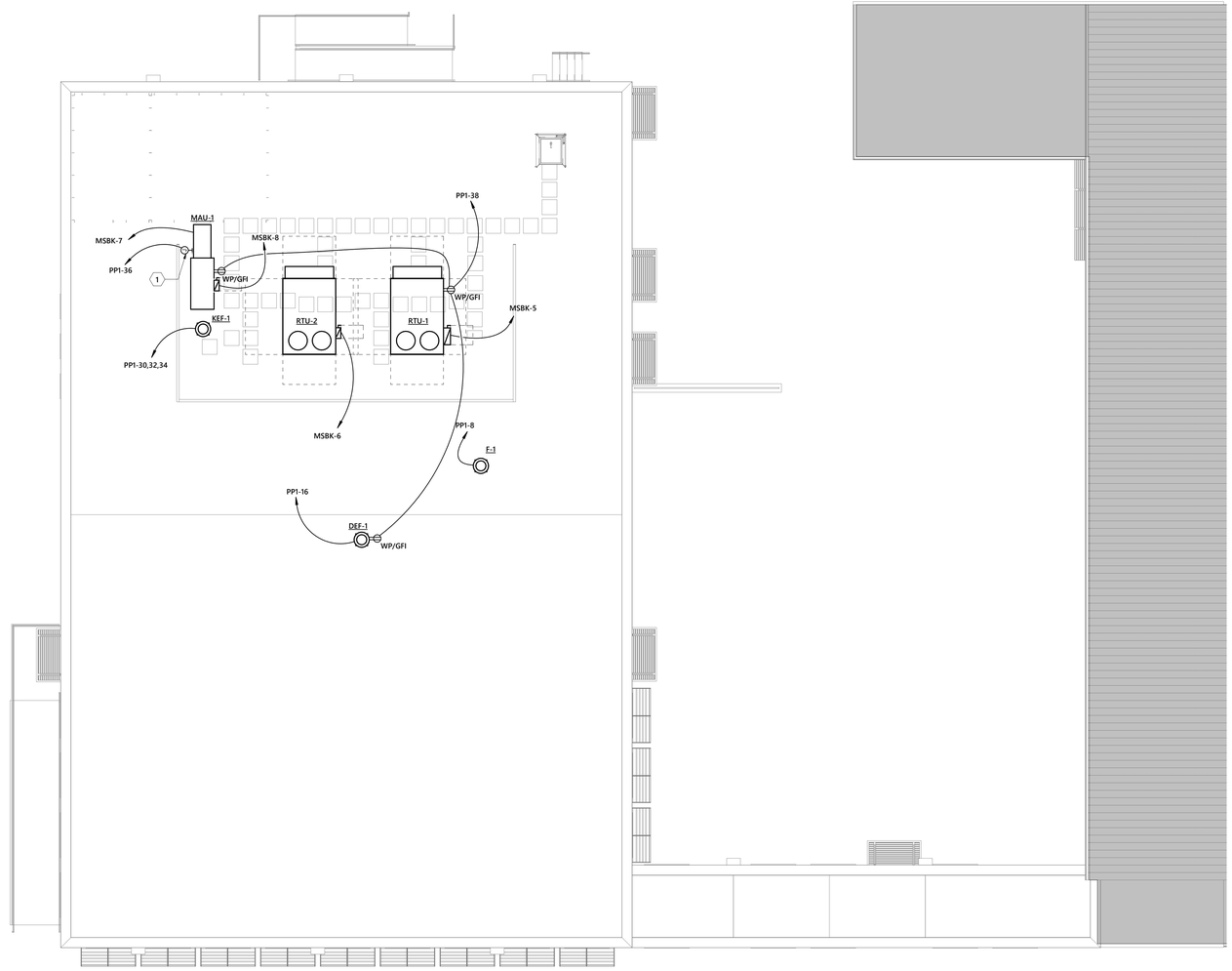
OPTIMA # 20-0196R

KEYNOTES

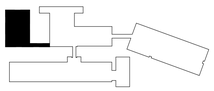
1 PROVIDE 120V CIRCUIT FOR MAU-1 CONTROLS. COORDINATE EXACT REQUIREMENTS WITH M.C. PRIOR TO ROUGH-IN.

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 ROOF POWER PLAN
1/8" = 1'-0"



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ROOF POWER PLAN - NEW WORK

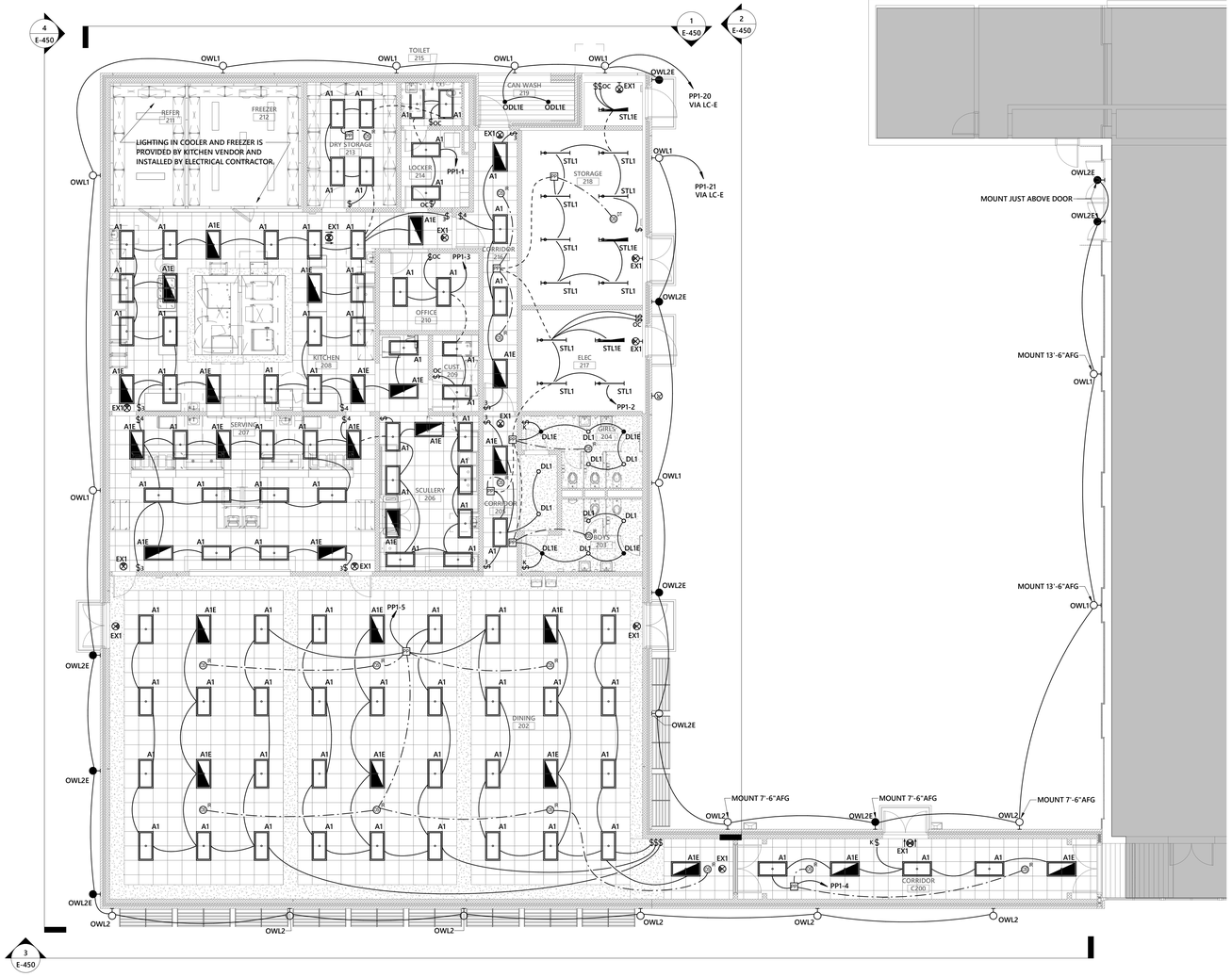
E-113

Sheet No. 5 of 13

OPTIMA # 20-0196R

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.



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

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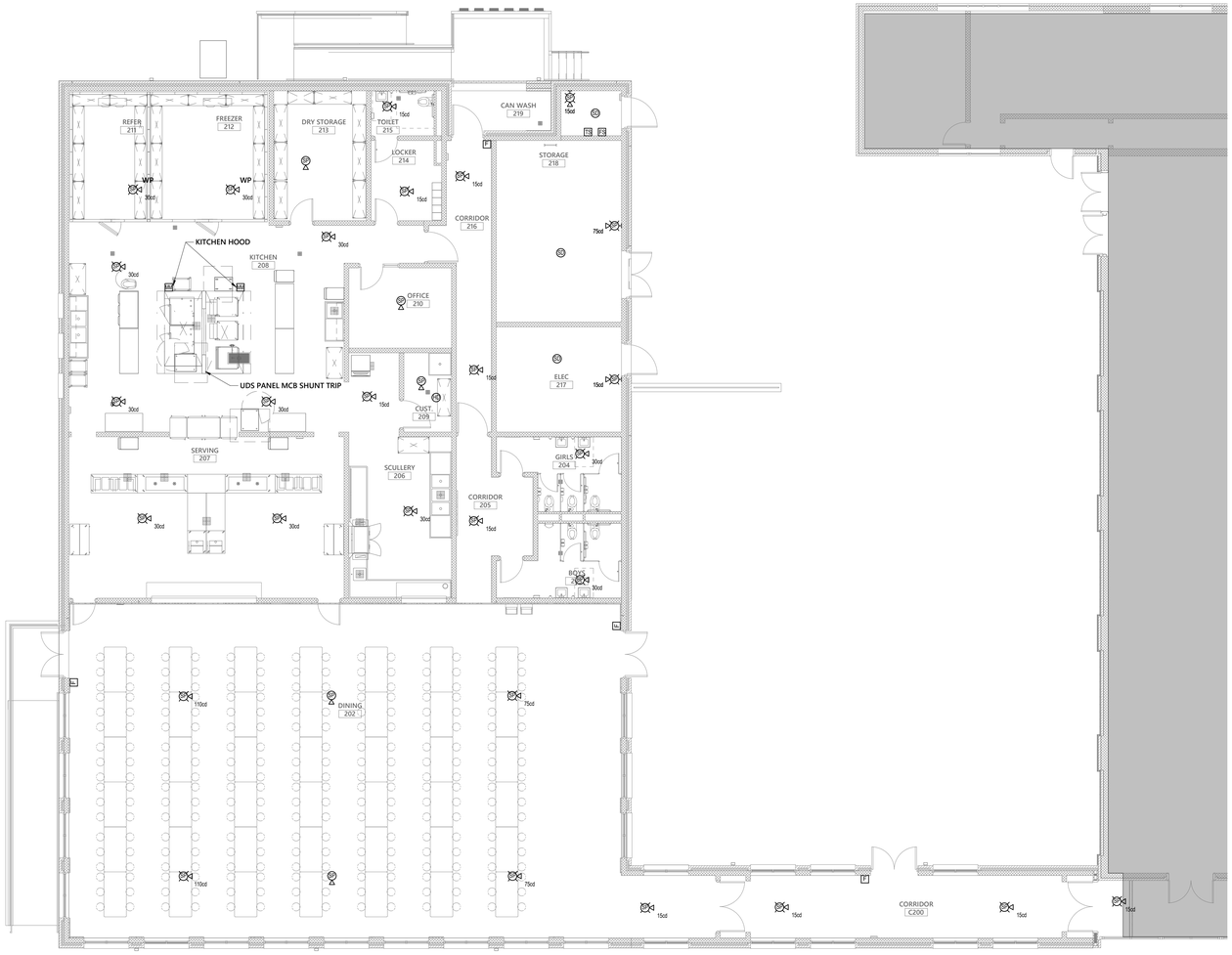
FIRST FLOOR LIGHTING PLAN - NEW WORK

E-211
Sheet No. 6 of 13

OPTIMA # 20-0196R

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 SPECIAL SYSTEMS PLAN - NEW WORK
1/8" = 1'-0"

KEYPLAN

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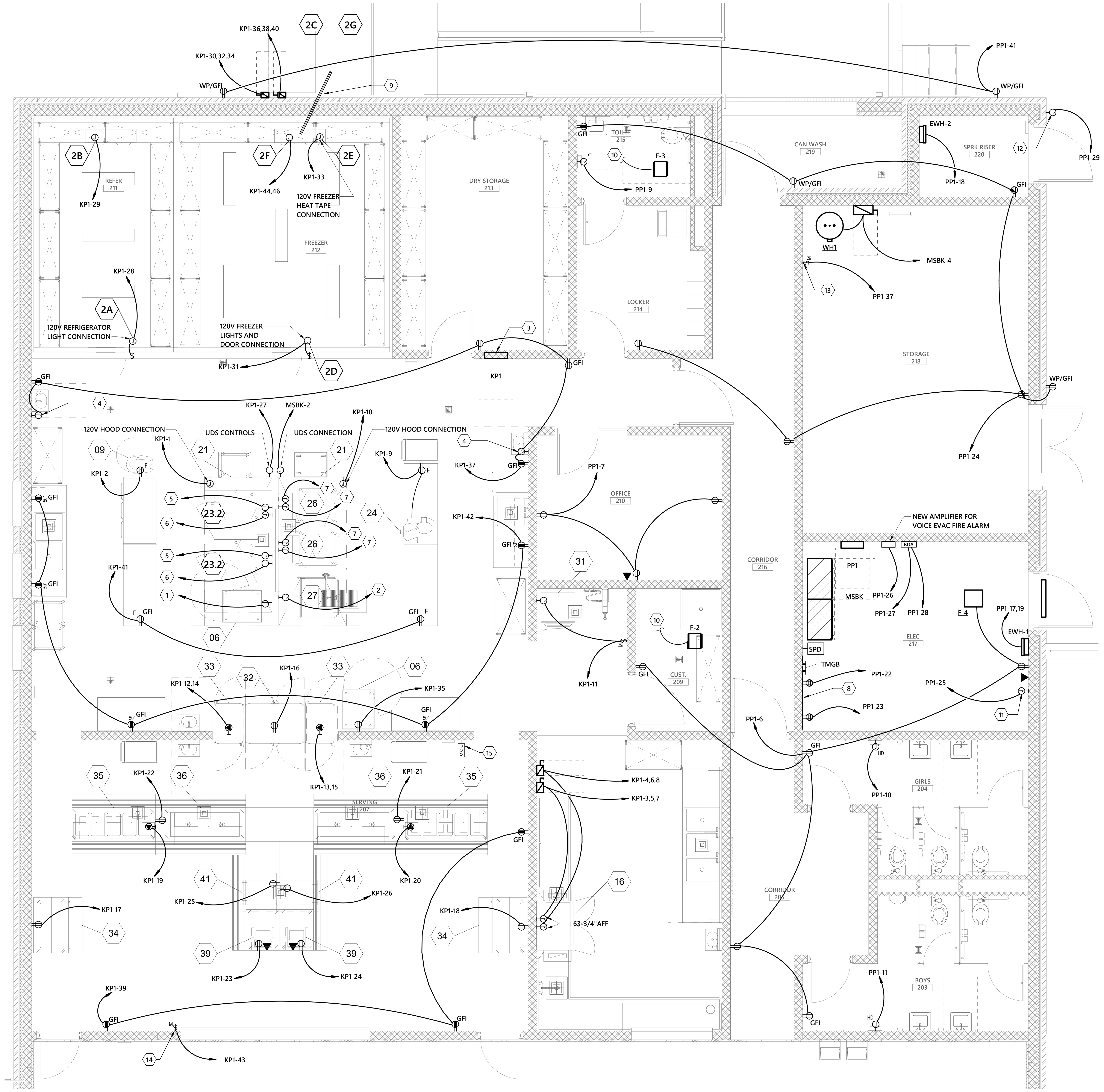
FIRST FLOOR SPECIAL SYSTEMS PLAN - NEW WORK

E-311
Sheet No. 7 of 13

OPTIMA # 20-0196R



1 ENLARGED PLAN - POWER
1/4" = 1'-0"

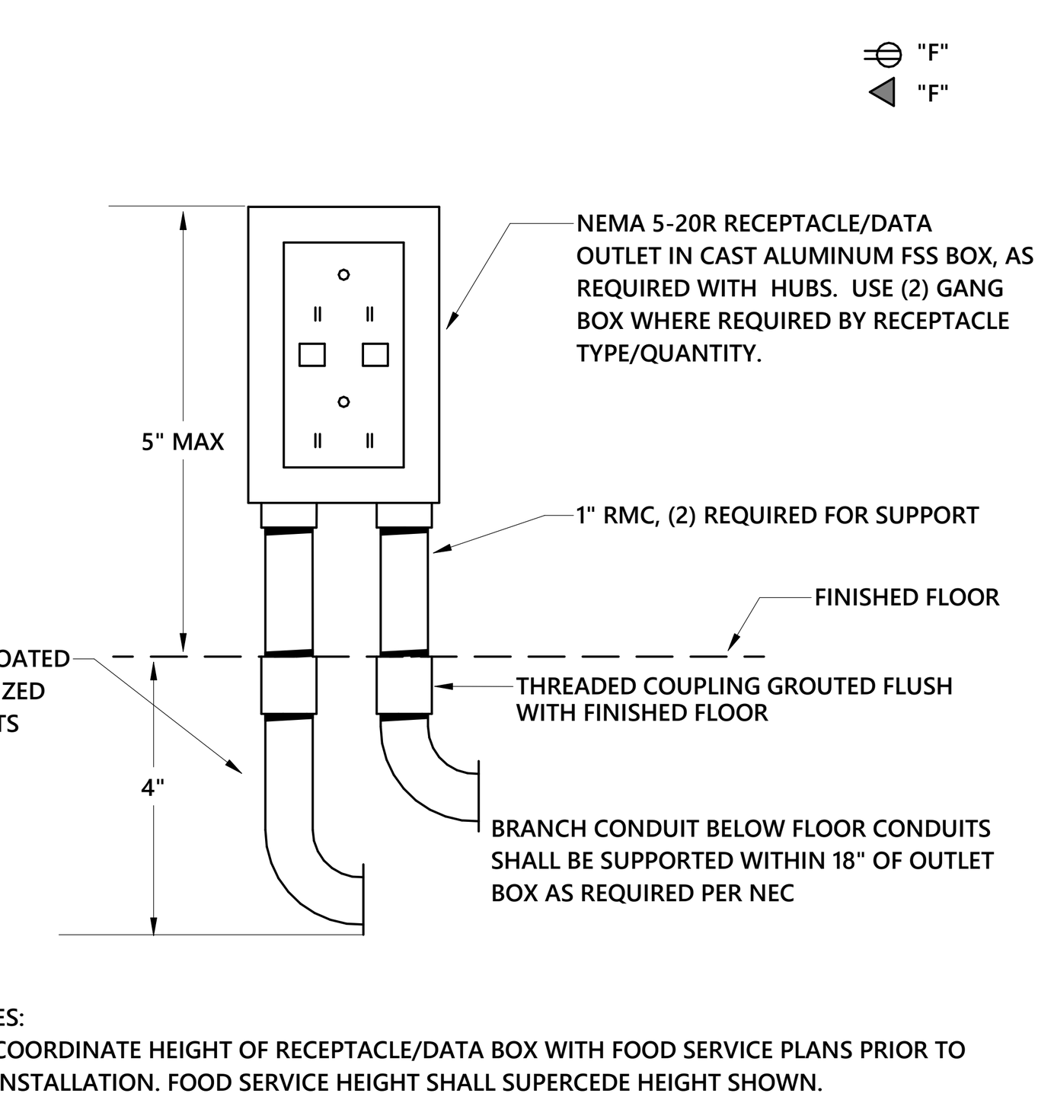
GENERAL NOTES

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. COORDINATE LOCATION OF ALL RECEPTACLES AND MOUNTING HEIGHTS IN KITCHEN WITH KITCHEN VENDOR PRIOR TO ROUGHING-IN.

KEYNOTES

1 CONNECT TO 20A, SINGLE POLE BREAKER IN KITCHEN HOOD UDS PANEL. COORDINATE EXACT REQUIREMENTS WITH KITCHEN HOOD VENDOR.
2 CONNECT TO 50A, THREE POLE BREAKER IN KITCHEN HOOD UDS PANEL. COORDINATE EXACT REQUIREMENTS WITH KITCHEN HOOD VENDOR.
3 STUB (6) 3/4"C. FROM PANEL TO ABOVE LAY-IN CEILING FOR FUTURE CIRCUITS.
4 120V CONNECTION TO HARD-WIRED PLUMBING FIXTURES. COORDINATE WITH KITCHEN VENDOR AND PLUMBING CONTRACTOR PRIOR TO ROUGH-IN. CONNECT TO LOAD SIDE OF GFCI RECEPTACLE WHEN SHOWN CONNECTED TO RECEPTACLE CIRCUIT.
5 CONNECT TO 100A, SINGLE POLE BREAKER IN KITCHEN HOOD UDS PANEL. COORDINATE EXACT REQUIREMENTS WITH KITCHEN HOOD VENDOR.
6 CONNECT TO 60A, SINGLE POLEB BREAKER IN KITCHEN HOOD UDS PANEL. COORDINATE EXACT REQUIREMENTS WITH KITCHEN HOOD VENDOR.
7 CONNECT TO 80A, SINGLE POLE BREAKER IN KITCHEN HOOD UDS PANEL. COORDINATE EXACT REQUIREMENTS WITH KITCHEN HOOD VENDOR.
8 PROVIDE 3/4" FIRE RETARDANT PLYWOOD BACKBOARD FROM 0'-6"AFF TO 9'-0"AFF. PAINT WITH COLOR WHITE FIRE RETARDANT PAINT.
9 PROVIDE (1) 1-1/2"C. FROM FREEZER CONDENSING UNIT TO FREEZER EVAPORATOR COIL.
10 CONNECT TO 120V LIGHTING CIRCUIT SERVING THIS AREA AND INTERLOCK WITH ROOM LIGHTS SWITCH.
11 120V CONNECTION TO BAS PANEL. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
12 120V CONNECTION TO SPRINKLER BELL. COORDINATE EXACT LOCATION WITH FIRE PROTECTION CONTRACTOR PRIOR TO ROUGH-IN.
13 120V CONNECTION TO CIRCULATION PUMP CP1.
14 120V CONNECTION TO OVERHEAD DOOR. COORDINATE EXACT REQUIREMENTS WITH DOOR INSTALLER PRIOR TO ROUGH-IN.
15 RAISE/LOWER/STOP SWITCH FOR OVERHEAD DOOR. COORDINATE SWITCH TYPE WITH DOOR INSTALLER.



NOTES:
1. COORDINATE HEIGHT OF RECEPTACLE/DATA BOX WITH FOOD SERVICE PLANS PRIOR TO INSTALLATION. FOOD SERVICE HEIGHT SHALL SUPERCEDE HEIGHT SHOWN.

3 KITCHEN FLOOR BOX DETAIL
NOT TO SCALE

KITCHEN SCHEDULE NOTES:

A. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL AS REQUIRED ALL DISCONNECT SWITCHES, RECEPTACLES, ETC. TOMECHANICAL, PLUMBING, AND KITCHEN EQUIPMENT COMPLETELY. THE ELECTRICAL CONTRACTOR SHALL ALSO PROVIDE ALL CORDS, PLUGS, CABLES, ETC., ON REQUIRING SUCH ITEMS.
2. THE ELECTRICAL CONTRACTOR SHALL PROVIDE FINAL CONNECTIONS TO ALL MECHANICAL, PLUMBING AND KITCHEN EQUIPMENT AS REQUIRED.
3. ALL DISCONNECT SWITCHES, FUSE SIZES, PLUG CONFIGURATIONS, BREAKER SIZES, WIRE SIZES, ETC., SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO INSTALLING. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF LACK OF COORDINATION WILL BE REMOVED.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE A GROUND WIRE AND A NEUTRAL WITH ALL CIRCUITS, WHETHER SO DESIGNATED OR NOT.
5. ALL 15 AND 20 AMP RECEPTACLES IN FOOD PREP AREA SHALL BE GFI, UNLESS NOTED TO BE PROVIDED WITH A GFI BREAKER.
6. GAS APPLIANCES - CONNECT GAS SOLEINOID VALVE TO HOOD SUSPRESSION SYSTEM. SEE DETAIL 15/E-501.

FOODSERVICE EQUIPMENT SCHEDULE_ELECTRICAL

QTY	ITEM	DESCRIPTION	MANUFACTURER	MODEL	ITEM	ELECTRICAL: ELECTRICAL A.F.F.	ELECTRICAL: KW	ELECTRICAL: HP	ELECTRICAL: AMPS	ELECTRICAL: VOLTS	ELECTRICAL: PHASE	ELECTRICAL: NEMA	CONDUIT AND CONDUCTOR SIZE	DISCONNECT SIZE	REMARKS
2	06	PROOFER/ HOLDING CABINET	WINSTON	HA4522	06	U.C./24"			19	120 V	1	5-20P C&P	2#12,1#12G., 3/4" C.		CASTERS
1	09	PLANETARY MIXER	HOBART	HL200-10STD	09	STUB		1/2	8	120 V	1	DIRECT	2#12,1#12G., 3/4" C.		MIXER ATTACHMENTS
1	16	DISHWASHER, CONVEYOR	HOBART	CL44EN-BAS	16	64"	A:30		B:55	208 V	3	(2)DIRECT	(1) 4#4,1#8G., 1-1/4"C. (1) 4#2,1#8G., 1-1/4"C.	(1) 100A-F70A-3P-4X STAINLESS STEEL (1) 100A-F90A-3P-4X STAINLESS STEEL	A:BOOSTER B:DISHMACHINE, DRAIN TEMPERING KIT
2	21	EXHAUST HOOD	CAPTIVE-AIRE	ND2-PSP	21	ABV			(2)20	120 V	1	(2) DIRECT	(2) 2#12,1#12G, 3/4" C.		SEE VENTILATION SCHEDULE
2	23.1	COMBI OVEN, ELECTRIC	CONVOTHERM	C4ET 10.20ES	23.1	U.C.			76.1	208 V	3	C&P	(2) 3#2,1#8G., 1-1/4"C.		STACKING KIT, WATER FILTER
2	23.2	COMBI OVEN, ELECTRIC	CONVOTHERM	C4ET 6.20ES	23.2	U.C.			44.1	208 V	3	C&P	(2) 4#4,1#10G., 1-1/4"C.		WATER FILTER
1	24	MEAT SLICER	HOBART	HS7-1	24				5.6	120 V	1	5-15P C&P	2#12,1#12G, 3/4" C.		
2	26	STEAMER, CONVECTION	GROEN	(2) SSB-10EF	26	U.C.			(2)59	208 V	3	C&P	(2) 4#3,1#8G, 1-1/4" C.		WATER FILTER, DRAIN TEMPERING KIT
1	27	TILT SKILLET	CLEVELAND	SEM30TR	27	U.C.			40	208 V	3	C&P	4#6,1#10G., 1" C.		DOUBLE PANTRY FAUCET
1	31	ICE MAKER	MANITOWOC ICE	IYT0450A-161	31	64"			12	120 V	1	DIRECT	2#12,1#12G, 3/4" C.	MOTOR RATED SWITCH	WATER FILTER
1	32	PASS-THRU REFRIGERATOR	VICTORY	RSA-2D-1S-PT-HD	32	90"			11	120 V	1	5-15P C&P	2#12,1#12G, 3/4" C.		
2	33	PASS-THRU HEATED CABINET	VICTORY	HSA-1D-1-PT-HD	33	90"			6	208 V	1	6-20P C&P	2#12,1#12G, 3/4" C.		
2	34	MILK COOLER	BEVERAGE AIR	SM49HC-S	34	24"			2	120 V	1	5-15P C&P	2#12,1#12G, 3/4" C.		CASTERS
2	35	HOT FOOD SERVING COUNTER	LTI	EF5-CPA-EB	35	STUB			28	120 V	1	5-50 C&P	3#6,1#8G, 1" C.		TRAY SLIDE, SNEEZE GUARD, LED LIGHT, CASTERS
2	36	COLD FOOD SERVING COUNTER	LTI	66-EB-MOD	36	STUB			7	120 V	1	5-15P C&P	2#12,1#12G, 3/4" C.		TRAY SLIDE, SNEEZE GUARD, LED LIGHT, CASTERS, 12" EXTENSION
2	39	P.O.S.	BY OWNER	N.I.K.C.	39	*				120 V	1	C&P	(2) 2#12,1#12G, 3/4" C.		BY OWNER, CONNECTION AT CASHIER COUNTER. *CONNECTED TO ITEM 38
2	41	COUNTER TOP ICE DISPENSER	SCOTSMAN	ID150B-1A	41	STUB			2.8	115 V	1	5-15P C&P	2#12,1#12G, 3/4" C.		WATER DISPENSER

REFRIGERATION CONNECTION SCHEDULE

CONN.	EQUIPMENT	LOAD	V/PH	REMARKS	DISCONNECT SIZE	CONDUCTOR AND CONDUIT SIZE
02A	LIGHTS, COOLER	400 W	120/1	3 EXTRA LIGHTS	SINGLE POLE SWITCH	2#12,1#12G., 3/4"C.
02B	EVAP. COIL, COOLER	2 AMPS	120/1	---	LOCKABLE CB	2#12,1#12G., 3/4"C.
02C	COND. UNIT, COOLER	7 MCA	208/3	---	30A/FPN-3P-3R	3#12,1#12G., 3/4"C.
02D	LIGHTS & DOOR HEAT	900 W	120/1	5 EXTRA LIGHTS	SINGLE POLE SWITCH	2#12,1#12G., 3/4"C.
02E	HEAT TAPE, FREEZER	15 AMPS	120/1	DRAINLINE HEAT TAPE	LOCKABLE CB	2#12,1#12G., 3/4"C.
02F	EVAP. COIL, FREEZER	1.8 AMPS	208/1	FEED DEFROST THRU TIMER @ COND. UNIT	LOCKABLE CB	2#12,1#12G., 3/4"C.
02G	COND. UNIT, FREEZER	19.4 MCA	208/3		30A/FPN-3P-3R	4#10,1#10G., 3/4"C.

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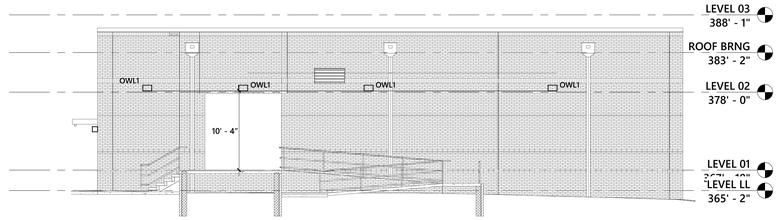
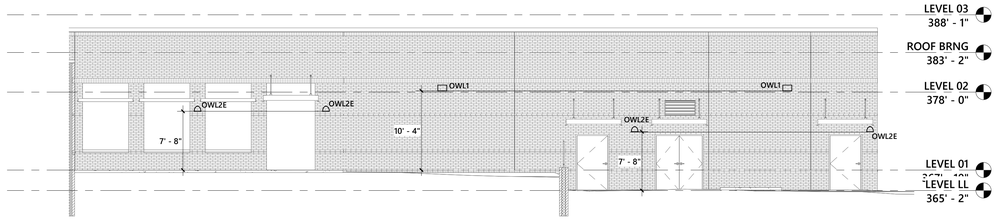
ENLARGED ELECTRICAL PLANS

E-440

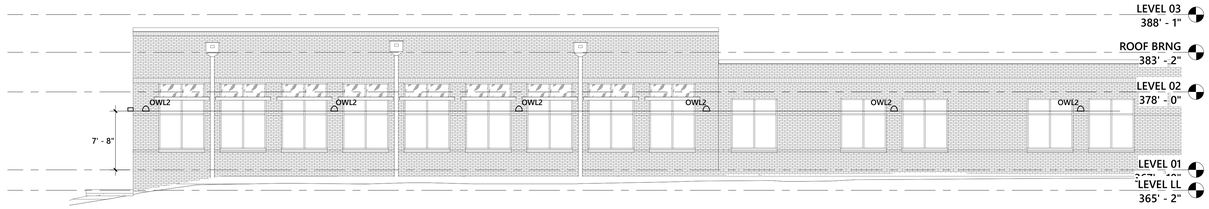
OPTIMA # 20-0196R



1 NORTH EXTERIOR ELEVATION - LIGHTING
1/8" = 1'-0"



2 EAST EXTERIOR ELEVATION - LIGHTING
1/8" = 1'-0"



3 SOUTH EXTERIOR ELEVATION - LIGHTING
1/8" = 1'-0"

4 WEST EXTERIOR ELEVATION - LIGHTING
1/8" = 1'-0"

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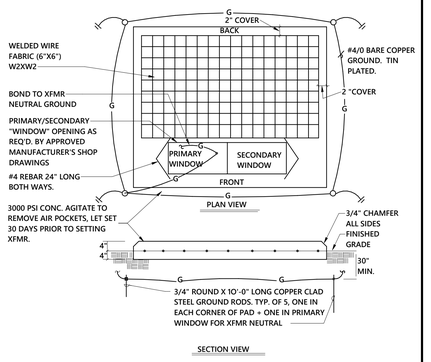
ELECTRICAL ELEVATIONS

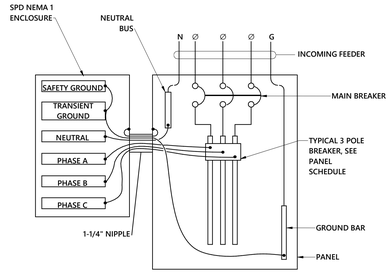
E-450

Sheet No. 9 of 13

OPTIMA # 20-0196R

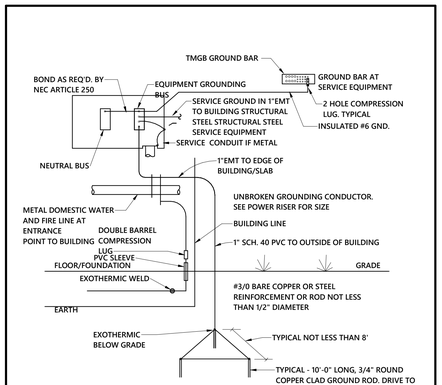


4 TRANSFORMER PAD DETAIL
NOT TO SCALE

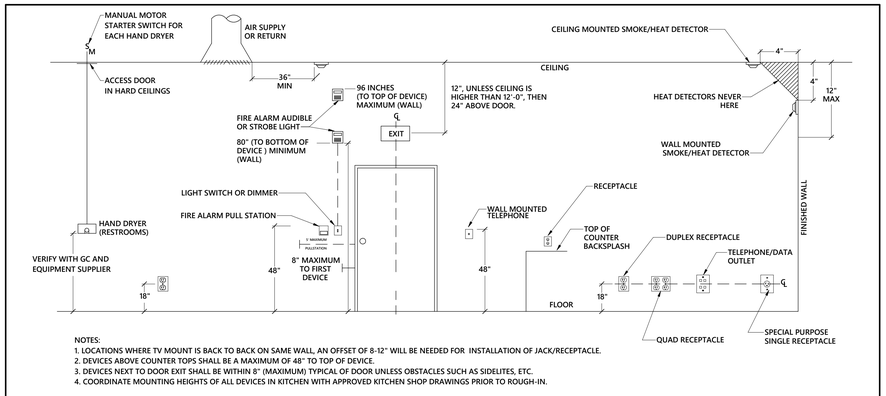


NOTES:
1. ALL WIRING SHALL BE #6 AWG.
2. AVOID SHARP BENDS IN WIRES. ALL WIRE LENGTHS SHALL NOT EXCEED 18" (WHERE POSSIBLE).
3. SEE SPD SPECIFICATION FOR EXACT TYPE (H1,H2,L1,L2) FOR LOCATION AS INDICATED ON THE POWER RISER DIAGRAM.

3 SPD CONNECTION DETAIL
NOT TO SCALE

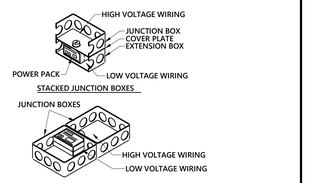


2 SERVICE GROUND DIAGRAM
NOT TO SCALE



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.
4. COORDINATE MOUNTING HEIGHTS OF ALL DEVICES IN KITCHEN WITH APPROVED KITCHEN SHOP DRAWINGS PRIOR TO ROUGH-IN.

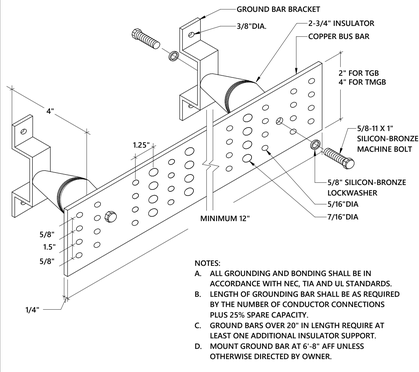
1 MOUNTING HEIGHTS OF DEVICES - ELEVATION
NOT TO SCALE



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.

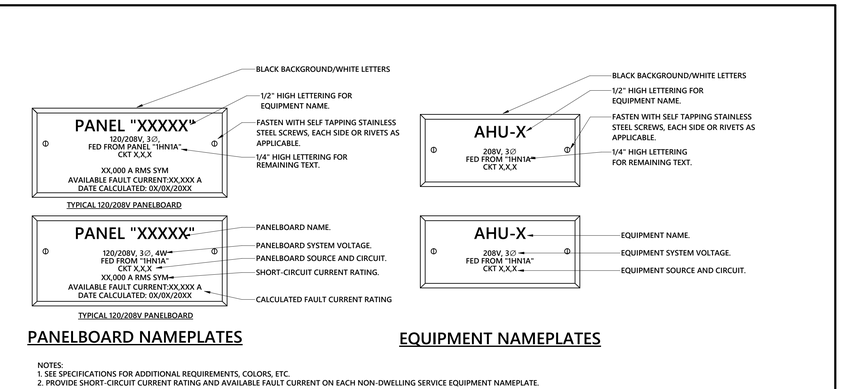
POWER PACK INSTALLED IN J-BOX

8 POWER PACK INSTALLATION
NOT TO SCALE



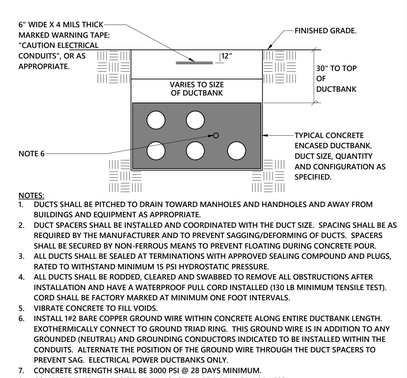
NOTES:
A. ALL GROUNDING AND BONDING SHALL BE IN ACCORDANCE WITH NEC, TIA AND UL STANDARDS.
B. LENGTH OF GROUNDING BAR SHALL BE AS REQUIRED BY THE NUMBER OF CONDUCTOR CONNECTIONS PLUS 25% SPARE CAPACITY.
C. GROUND BARS OVER 20" IN LENGTH REQUIRE AT LEAST ONE ADDITIONAL INSULATOR SUPPORT.
D. MOUNT GROUND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

7 TELECOMMUNICATIONS GROUNDING BAR DETAIL
NO SCALE



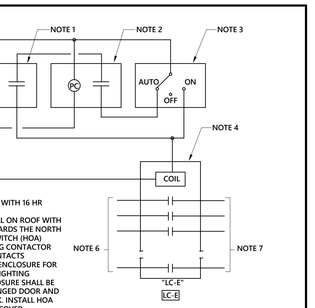
NOTES:
1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, COLORS, ETC.
2. PROVIDE SHORT-CIRCUIT CURRENT RATING AND AVAILABLE FAULT CURRENT ON EACH NON-DWELLING SERVICE EQUIPMENT NAMEPLATE.

6 TYPICAL NAMEPLATE DIAGRAM
NOT TO SCALE



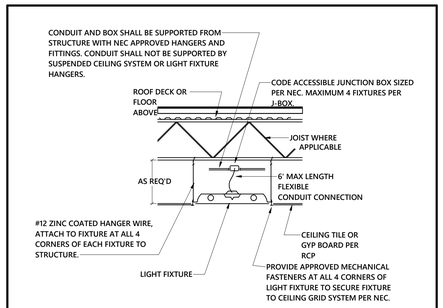
NOTES:
1. DUCTS SHALL BE PITCHED TO DRAIN TOWARD MANHOLES AND HANDHOLES AND AWAY FROM BUILDINGS AND EQUIPMENT AS APPROPRIATE.
2. DUCT SPACERS SHALL BE INSTALLED AND COORDINATED WITH THE DUCT SIZE. SPACING SHALL BE AS REQUIRED BY THE MANUFACTURER AND TO PREVENT SAGGING/DEFORMING OF DUCTS. SPACERS SHALL BE SECURED BY NON-FERROUS MEANS TO PREVENT FLOATING DURING CONCRETE POUR.
3. ALL DUCTS SHALL BE SEALED AT TERMINATIONS WITH APPROVED SEALING COMPOUND AND PLUGS, RATED TO WITHSTAND MINIMUM 15 PSI HYDROSTATIC PRESSURE.
4. ALL DUCTS SHALL BE RODDED, CLEARED AND SWABBED TO REMOVE ALL OBSTRUCTIONS AFTER INSTALLATION AND HAVE A WATERPROOF PULL CORD INSTALLED (130 LB MINIMUM TENSILE TEST). CORD SHALL BE FACTORY MARKED AT MINIMUM ONE FOOT INTERVALS.
5. VIBRATE CONCRETE TO FILL VOIDS.
6. INSTALL 1#2 BARE COPPER GROUND WIRE WITHIN CONCRETE ALONG ENTIRE DUCTBANK LENGTH. EXOTHERMICALLY CONNECT TO GROUND TRIAD RING. THIS GROUND WIRE IS IN ADDITION TO ANY GROUNDED (NEUTRAL) AND GROUNDING CONDUCTORS INDICATED TO BE INSTALLED WITHIN THE CONDUITS. ALTERNATE THE POSITION OF THE GROUND WIRE THROUGH THE DUCT SPACERS TO PREVENT SAG. ELECTRICAL POWER DUCTBANKS ONLY.
7. CONCRETE STRENGTH SHALL BE 3000 PSI @ 28 DAYS MINIMUM.
8. CONCRETE THERMAL RESISTIVITY (RHO) SHALL BE 0.55 m-C/W OR LESS.

5 TYPICAL DUCTWORK TRENCH DETAIL
NOT TO SCALE



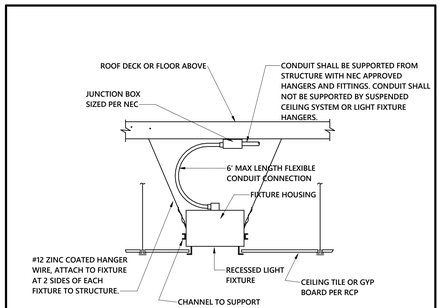
NOTES:
1. DIGITAL TIMECLOCK WITH 16 HR RESERVE
2. PHOTOELECTRIC CELL ON ROOF WITH EYE ORIENTED TOWARDS THE NORTH
3. HAND OFF AUTO SWITCH (HOA)
4. FOUR POLE LIGHTING CONTACTOR WITH 120V, 30A CONTACTS
5. PROVIDE A NEMA 1 ENCLOSURE FOR HOA SWITCH AND LIGHTING CONTACTOR. ENCLOSURE SHALL BE PROVIDED WITH 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.

13 EXTERIOR LIGHTING CONTROL DIAGRAM
NOT TO SCALE



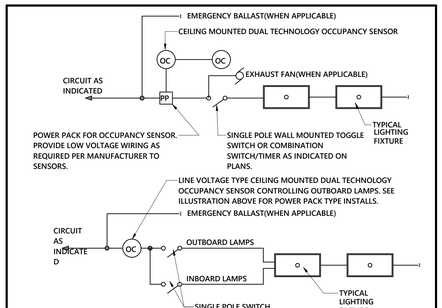
NOTES:
1. WHERE ROOF DECKING IS THE IS THE ALLOWABLE SUPPORT STRUCTURE, AND PATHWAY SYSTEM IS NOT IMC OR RMC, THE MINIMUM DISTANCE FROM ROOF DECKING SHALL BE 1.5" FOR ALL BOXES AND CONDUIT.

12 TYPICAL LAY-IN FIXTURE DIAGRAM
NOT TO SCALE



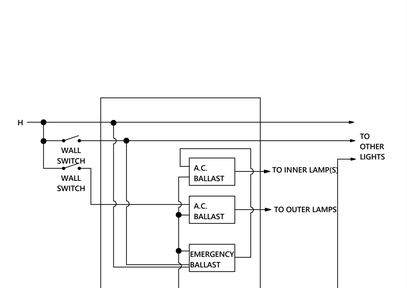
NOTES:
1. WHERE ROOF DECKING IS THE IS THE ALLOWABLE SUPPORT STRUCTURE, AND PATHWAY SYSTEM IS NOT IMC OR RMC, THE MINIMUM DISTANCE FROM ROOF DECKING SHALL BE 1.5" FOR ALL BOXES AND CONDUIT.

11 TYPICAL RECESSED DOWN LIGHT FIXTURE INSTALLATION DIAGRAM
NOT TO SCALE

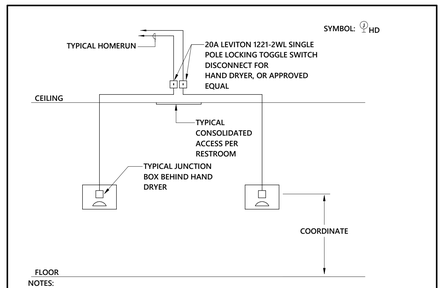


NOTES:
1. OCCUPANCY SENSORS SHALL BE SET TO TIME OUT AFTER 15 MINUTES AND THE TRIM POTENTIOMETER IS SET TO 90% FOR SENSITIVITY.
2. OCCUPANCY SENSORS SHALL BE PLACED AS TO NOT FUNCTION UPON SOMEONE JUST PASSING BY THE ROOM DOOR BUT BY ACTUALLY ENTERING THE ROOM IN AS MUCH AS POSSIBLE.

10 TYPICAL CEILING MOUNTED OCCUPANCY SENSOR WIRING DIAGRAMS
NOT TO SCALE

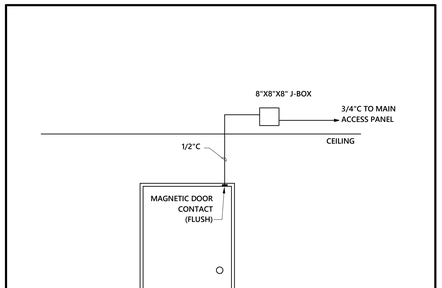


9 SWITCHED EMERGENCY LIGHTING WIRING
NOT TO SCALE

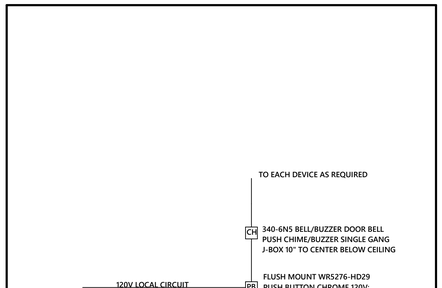


NOTES:
1. MOUNT TOGGLE SWITCHES WITHIN 8" OF ACCESS/LAY-IN TILE. LEAVE ROOM FOR FLOOR TILE/ACCESS PANEL MOVEMENT.
2. PROVIDE ACCESS PANEL FOR NON-ACCESSIBLE CEILING TYPES. COORDINATE WITH G.C. FOR TYPE (MATCH PROJECT ACCESS PANEL TYPES WHEN PROVIDED.) COORDINATE EXACT LOCATION WITH ARCHITECT IN FIELD 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.

17 HAND DRYER LAYOUT DETAIL
NO SCALE

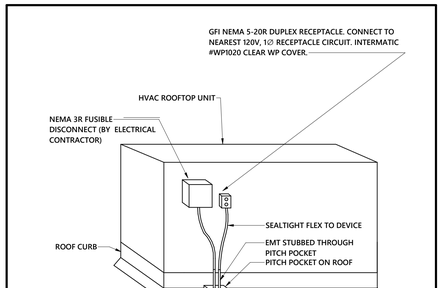


16 DOOR CONTACT ONLY
NOT TO SCALE



NOTES:
1. DEVICES ARE BASED ON EDWARDS SIGNALING SYSTEMS, DOORTRONICS, OR EATON.

15 DOOR BELL SYSTEM
NOT TO SCALE



NOTE: TYPICAL FOR ALL ROOF MOUNTED HVAC EQUIPMENT.

14 ROOFTOP RECEPTACLE DETAIL
NOT TO SCALE

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Raleigh, NC 27601
P: 919.573.6350
F: 919.573.6355
www.sfla.biz

sfl+a ARCHITECTS

12/15/2020

CONSTRUCTION DOCUMENTS

optima engineering
150 Fayetteville St., Suite 520, Raleigh, NC 27601
1927 South Tryon St., Suite 300, Charlotte NC 28203
Phone: 919-926-2050 • www.optimaengineering.com
North Carolina License Number C-0914

Harnett County Schools

Johnsonville Elementary School Addition/Renovation

18495 NC-27, Cameron, NC 28326

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: MKG
CHECKED BY: AEB

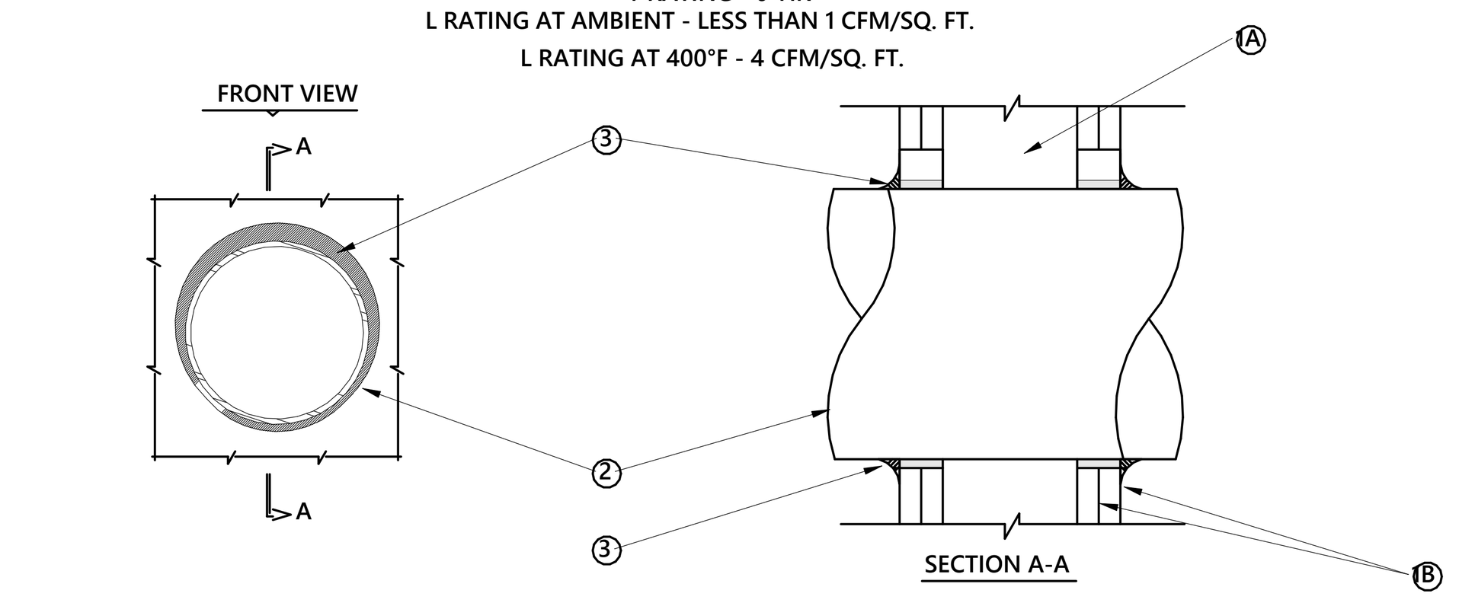
ELECTRICAL DETAILS

E-501

Sheet No. 10 of 13

OPTIMA # 20-0196R

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:

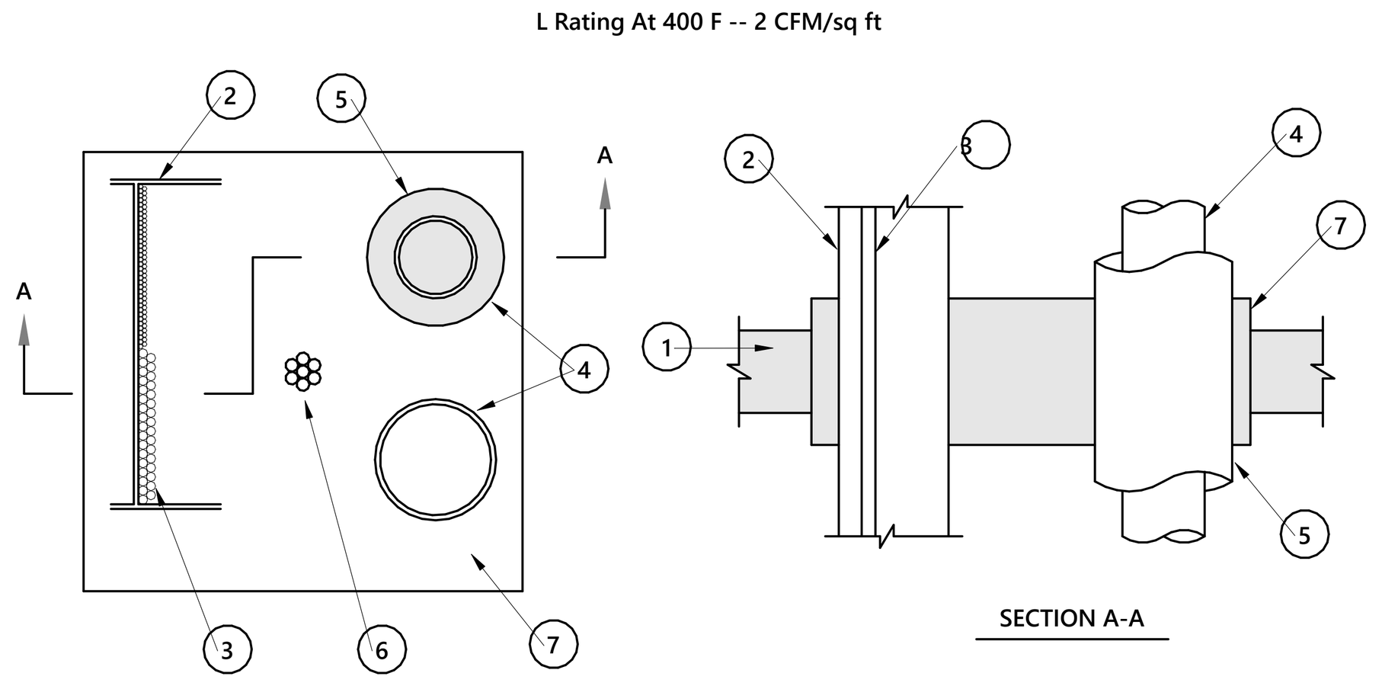
A. STEEL PIPE - NOM 12 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE - NOM 12 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT - NOM 6 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
D. COPPER TUBING - NOM 5 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER) 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
C US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

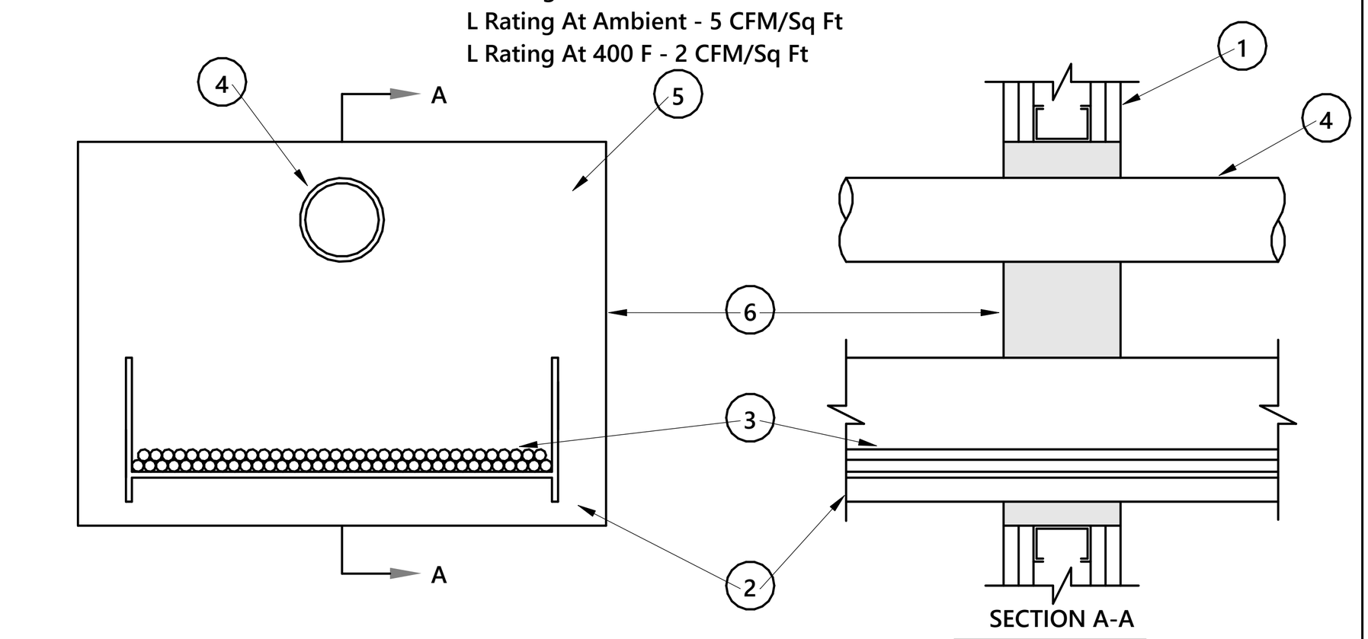
System No. C-AJ-8056
F Rating -- 3 Hr
T Rating -- 0 Hr
L Rating At Ambient -- 5 CFM/sq ft
L Rating At 400 F -- 2 CFM/sq ft



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

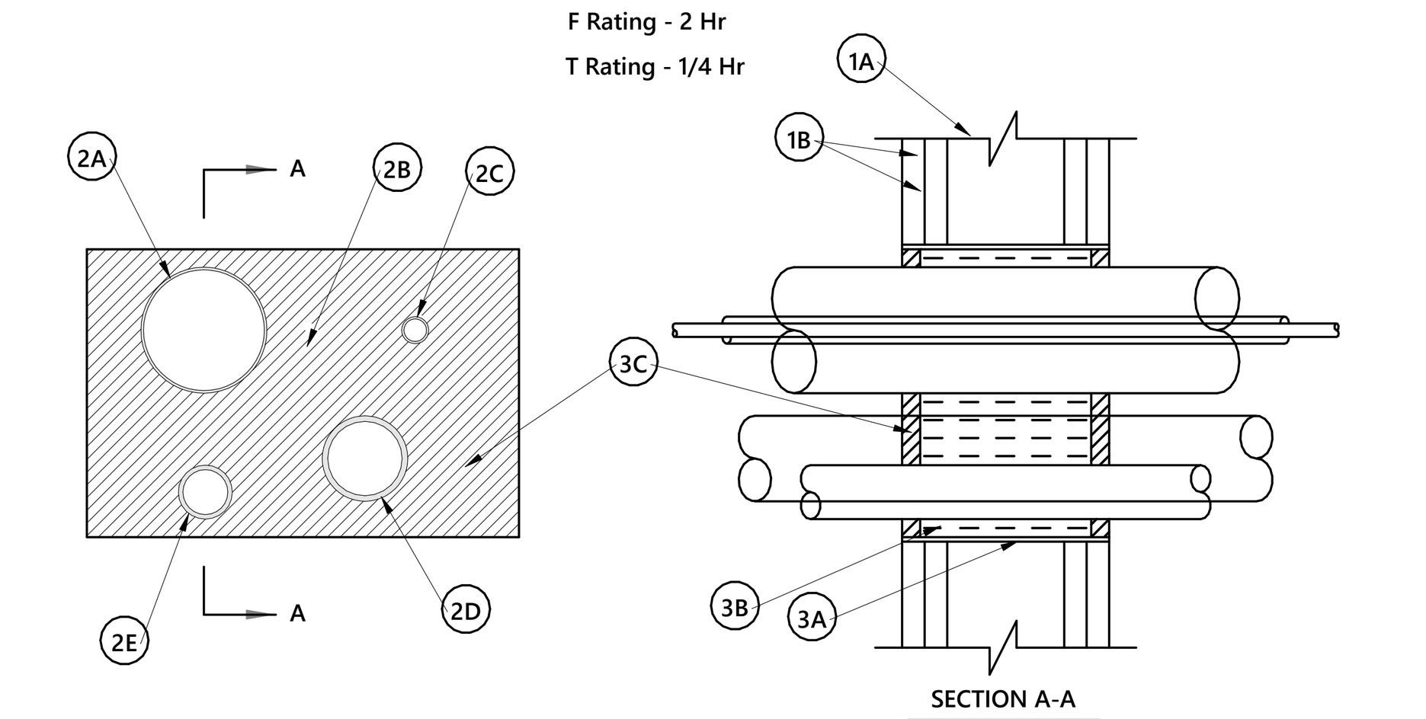
System No. W-L-8013
F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr
L Rating At Ambient - 5 CFM/Sq Ft
L Rating At 400 F - 2 CFM/Sq Ft



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

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



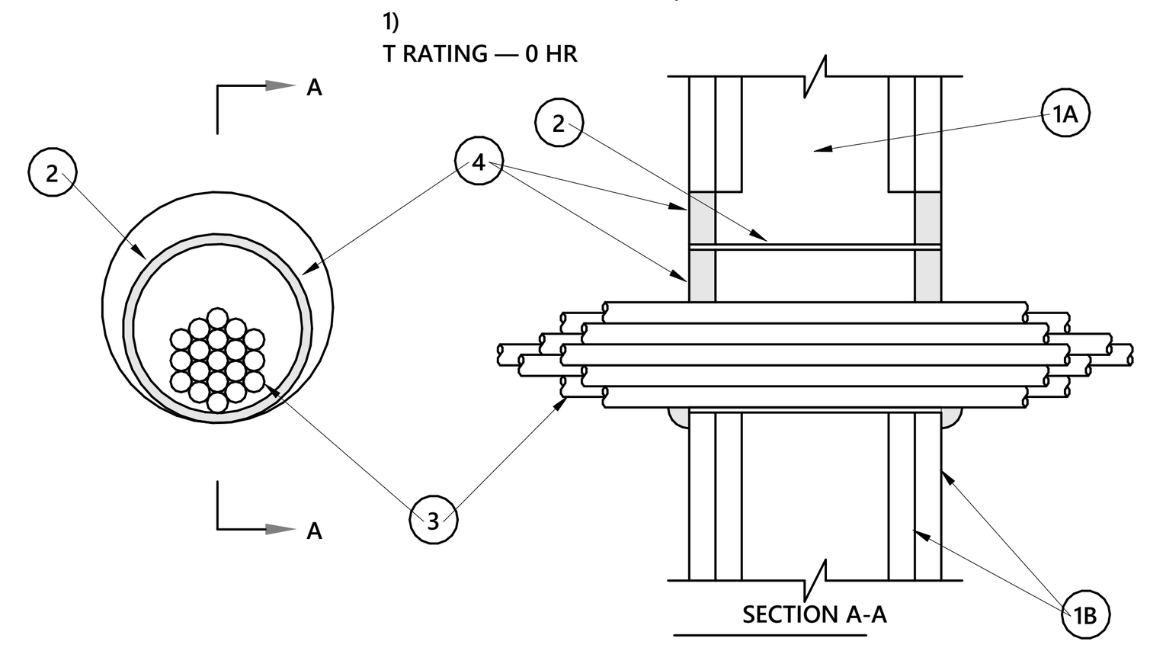
1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE
CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL
U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE
DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS WALL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

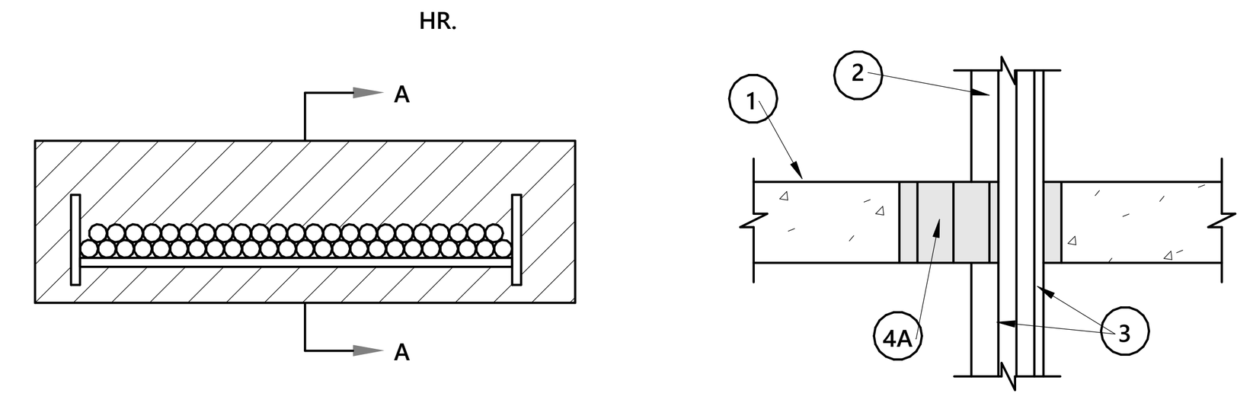
SYSTEM NO. W-L-3065
F RATINGS — 1 AND 2 HR (SEE ITEM 1)
T RATING — 0 HR



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

SYSTEM NO. C-AJ-4035
F RATING - 3 HR.
T RATING = 0 HR.

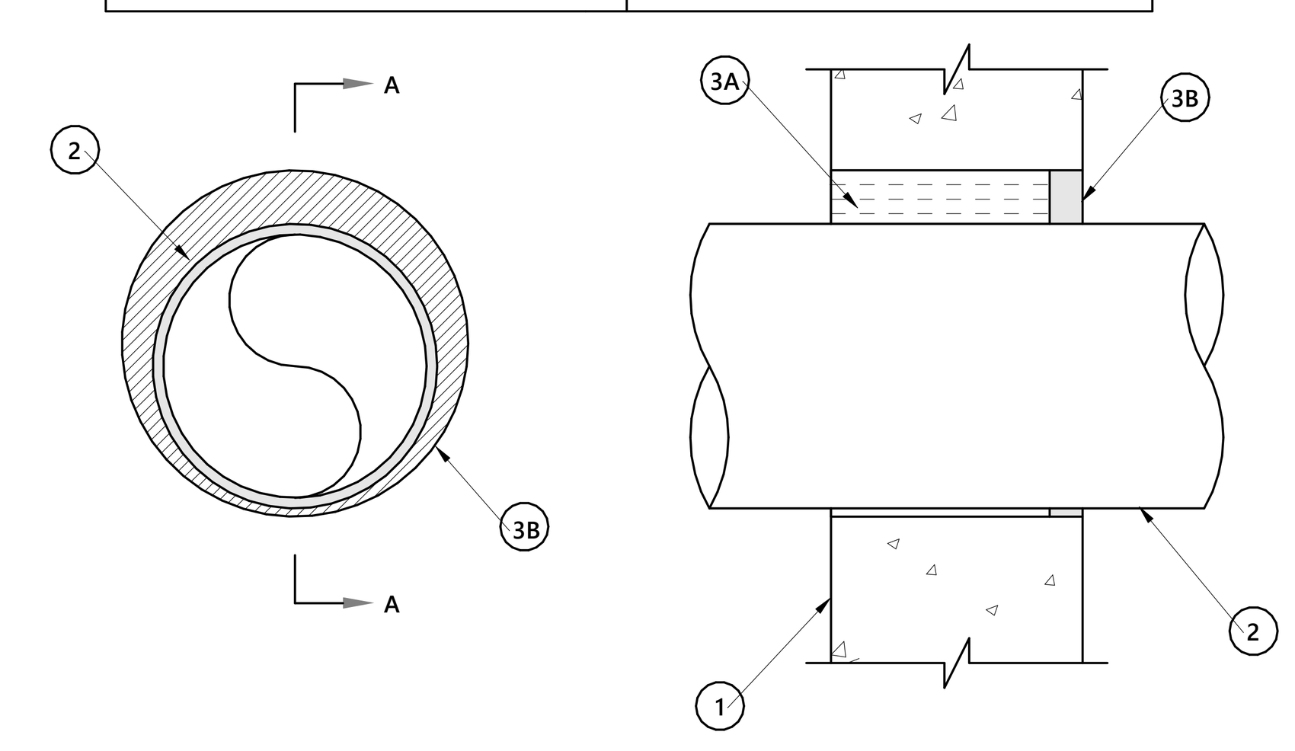


1. FLOOR OR WALL ASSEMBLY MIN 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX AREA OF OPENING IS 270 SQ IN WITH MAX DIMENSION OF 30 IN.
SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY 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
C US
REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

SYSTEM NO. W-J-1088

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



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

HILTI FIRESTOP SYSTEMS
C US
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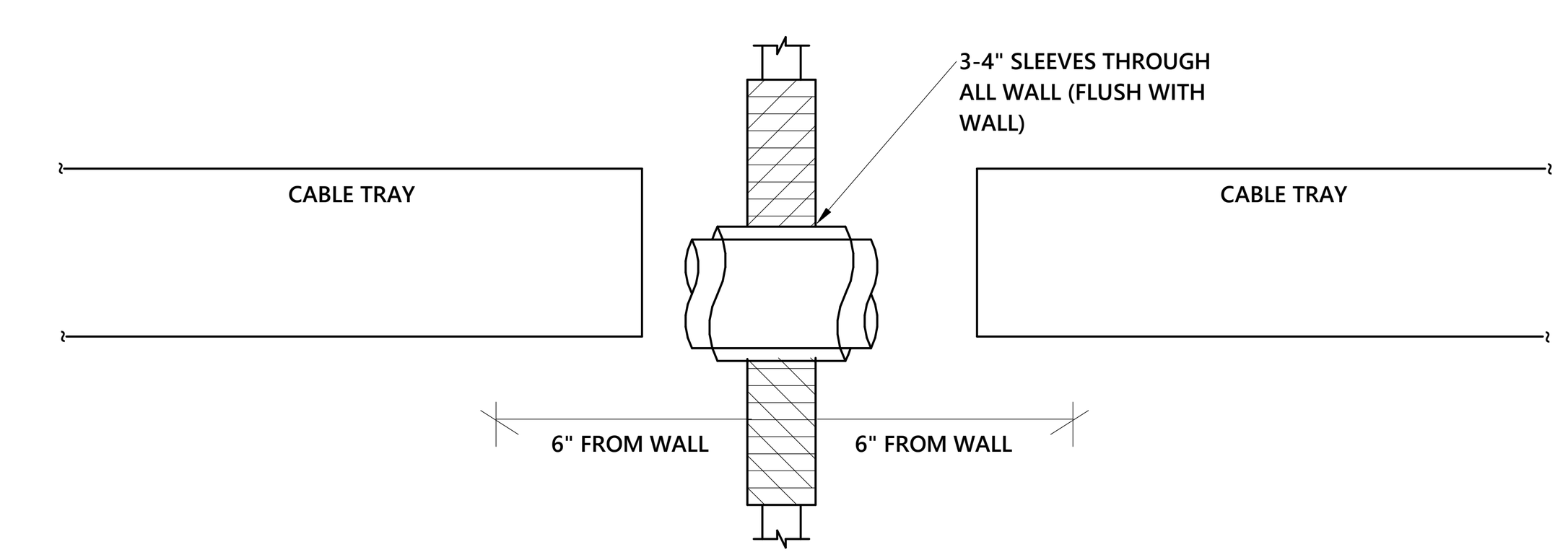
CABLE TRAY WALL INTERSECTION DETAIL



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12/15/2020

CONSTRUCTION DOCUMENTS

optima engineering
150 Fayetteville St., Suite 520, Raleigh, NC 27601
1927 South Tryon St., Suite 300, Charlotte NC 28203
Phone: 919-926-2200 - www.optimaengineering.com
North Carolina License Number C-0914

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: MKG
CHECKED BY: AEB

ELECTRICAL DETAILS

E-502

OPTIMA # 20-0196R

BIM 360://Johnsonville ES Addition Renovation/20-0196_Johnsonville School Cafeteria_MEPFP_R20.rvt
12/17/2020 12:14:27 PM

PACKAGE ROOFTOP UNIT SCHEDULE (DX COOLING WITH ELECTRIC REHEAT)

SYMBOL	DESCRIPTION	LOCATION	MCA	MOCP	ELECTRICAL DATA VOLTS	PH	HZ	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
RTU-1	AIR HANDLING UNIT	ROOF	205.0 A	225.0 A	208 V	3	60	400A/F225A-3P-3R	4#300 KCMIL ALUM. 1#2 ALUM. G, 3"C.
RTU-2	AIR HANDLING UNIT	ROOF	145.0 A	175.0 A	208 V	3	60	200A/F175A-3P-3R	4#4/0 ALUM. 1#4 ALUM. G, 2-1/2"C.

ELECTRIC DUCT HEATER SCHEDULE

SYMBOL	LOCATION	K.W.	STEPS	VOLT	PH	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
EDH-1	KITCHEN OFFICE 210	2.5	1	208 V	3	30A/F15A-3P-1	4#12, 1#12 G, 3/4"C.

EXHAUST FAN SCHEDULE

SYMBOL	LOCATION	ELECTRICAL DATA WATTS	HP	VOLTAGE	PH	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
DEF-1	SCULLERY 206	630	0.25 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.
F-1	BOYS 203 AND GIRLS 204	240	0.25 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.
F-2	CUSTODIAN 209	80	0.00 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.
F-3	TLT 215	80	0.00 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.
F-4	ELECTRICAL 217	80	0.13 hp	115 V	1	PROVIDED BY M.C.	2#12, 1#12 G, 3/4"C.

ELECTRIC WALL HEATER SCHEDULE

SYMBOL	KW	MOTOR VOLT	PH	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
EWH-1	4	208 V	1	PROVIDED BY M.C.	3#10, 1#10 G, 3/4"C.
EWH-2	2	120 V	1	PROVIDED BY M.C.	2#10, 1#10 G, 3/4"C.

KITCHEN HOOD SCHEDULE
(FURNISHED AND INSTALLED BY M.C.)

KEF-1 ECOC-AIR EABDU24 EXHAUST FAN; 3-HP 208V-3PH FAN MOTOR

DISCONNECT SIZE: PROVIDED BY M.C.
CONDUIT AND CONDUCTOR SIZE: 4#10,1#10G., 3/4"C.

MUA-1 CAPTIVE-AIRE MODEL A2-E.734-20D ELECTRIC HEAT MAKE-UP AIR UNIT; 3-HP 208V-3PH FAN MOTOR, 10.4A MCA, 15A MOCP, 45KW ELECTRIC HEATER 208V 3PH

FAN MOTOR DISCONNECT SIZE: PROVIDED BY M.C.
FAN MOTOR CONDUIT AND CONDUCTOR SIZE: 4#12,1#12G., 3/4"C.

ELECTRIC HEATER DISCONNECT SIZE: 200A/F175A-3P-3R
ELECTRIC HEATER CONDUIT AND CONDUCTOR SIZE: 4#4/0 ALUM.,1#4 ALUM. G., 3"C.

STORAGE ELECTRIC WATER HEATER SCHEDULE

MARK	DESCRIPTION	ELECTRICAL DATA KW	V	PH	HZ	DISCONNECT SIZE	CONDUIT AND CONDUCTOR SIZE
WH1	ELECTRIC, VERTICAL STORAGE	54.0	208	3	60	200A/F200A-3P-1	4#250 KCMIL ALUM., 1#4 ALUM. G., 3"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.

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	LAMP	BALLAST/DRIVER	WATTAGE	VOLTAGE	MFR	CATALOG SERIES	NOTE
A1	2X4 LED LAY-IN TROFFER	LED	INTEGRAL LED DRIVER	40 W	120V	PREFERED BRAND ALTERNATE: LITHONIA WILLIAMS CORONET	CPX 2X4 4000LM M2 APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS
A1E	SAME AS TYPE 'A1' EXCEPT PROVIDE WITH 90 MINUTE BATTERY PACK	LED	INTEGRAL LED DRIVER	40 W	120V	PREFERED BRAND ALTERNATE: LITHONIA WILLIAMS CORONET	CPX 2X4 4000LM M2 APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
DL1	6" RECESSED LED DOWNLIGHT	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	40 W	120V	LITHONIA PATHWAY JUNO COOPER SPECTRUM	LDN6 _40 L06 AR LSS MVOLT GZ10 APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	6" APERATURE MINIMUM 4000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SEMI-SPECULAR
DL1E	SAME AS TYPE 'DL1' EXCEPT PROVIDE WITH 90 MINUTE BATTERY PACK	LED	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	40 W	120V	LITHONIA PATHWAY JUNO COOPER SPECTRUM	LDN6 _ 40 L06 AR LSS MVOLT GZ10 APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	6" APERATURE MINIMUM 4000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SEMI-SPECULAR PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
EX1	EDGE-LIT EXIT SIGN	LED	INTEGRAL LED DRIVER	1 W	120V	LITHONIA HUBBELL JUNO COOPER PHILLIPS	LRP 1 RMR/RC 120/277 EL N APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	REFER TO PLANS FOR FACE STYLE, ARROW REQUIREMENTS, AND QUANITIES. RED LETTERS. PROVIDE WITH 90 MINUTE NICKEL CADMIUM BATTERY PACK.
ODL1E	6" RECESSED LED WET LOCATION DOWNLIGHT WITH 90 MINUTE BATTERY BACKUP	LED	INTEGRAL LED DRIVER	40 W	120V	LITHONIA PATHWAY JUNO COOPER SPECTRUM	LDN6 _ 40 L06 AR LSS MVOLT GZ10 APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	6" APERATURE MINIMUM 4000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SEMI-SPECULAR WET LOCATION LISTED PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
OWL1	WALL PACK TRAPEZOID LED	LED	INTEGRAL LED DRIVER	50 W	120V	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	120V	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	120V	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	120V	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	120V	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 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

PANEL: MP

VOLTAGE: 120/240 1Ø — FED FROM: EXISTING POLE MOUNT UTILITY XFMR
MOUNTING: SURFACE — MAIN TYPE: MCB — MFR: EXISTING
ENCLOSURE: NEMA1 — PHASE: 1 — TYPE: EXISTING
MAIN: 1000 A — WIRE: 3

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	A	B	B	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
--	SPACE ONLY	--	--	1	--	0.00	0.00			--	2	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	3	--			0.00	0.00	--	4	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	5	--	0.00	0.00			--	6	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	7	--			0.00	0.00	--	8	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	9	--	0.00	0.00			--	10	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	11	--			0.00	0.00	--	12	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	13	--	0.00	0.00			--	14	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	15	--			0.00	0.00	--	16	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	17	--	0.00	0.00			--	18	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	19	--			0.00	0.00	--	20	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	21	--	0.00	0.00			--	22	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	23	--			0.00	0.00	--	24	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	25	--	0.00	0.00			--	26	--	--	SPACE ONLY	--
--	SPACE ONLY	--	--	27	--			0.00	0.00	2	28	**200 A**	**EXTG**	**PANEL 'PGM'**	
--	SPACE ONLY	--	--	29	--	0.00	0.00				30				
--	SPACE ONLY	--	--	31	--			0.00	0.00	2	32	**200 A**	**EXTG**	**PANEL 'C'**	
--	SPACE ONLY	--	--	33	--	0.00	0.00				34				
	PANEL 'F'	EXTG	600 A	35	2			0.00	0.00	2	36	200 A	EXTG	PANEL 'B'	
				37		0.00	0.00				38				
	MAIN BREAKER	EXTG	1000 A	39	2			0.00	0.00	2	40	200 A	EXTG	PANEL 'A'	
				41		0.00	0.00				42				

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
3. BOLD TEXT INDICATES NEW WORK. PROVIDE ACCORDINGLY.

LOAD SUMMARY FOR MP

EXISTING PEAK KVA PER CEMC METER RECORDS	-	78KW
EXISTING PEAK KVA AT 125% AND 0.85 P.F.	-	114.71KVA
TOTAL LOAD ADDED	-	58KVA
NET TOTAL NET LOAD	-	172.71KVA
TOTAL NEW AMPERES @480/277V	-	720A
EXISTING SERVICE SIZE	-	1000A

SWITCHBOARD: MSBK

VOLTAGE: 208Y/120 3Ø — MAIN TYPE: MCB — MANUFACTUR... SQUARE D
MOUNTING: FLOOR — PHASE: 3 — TYPE: QEB
MAIN: 1600 A — WIRE: 4 — AIC: 65 KAIC

MAIN CB NOTES: 5, 6, 9

CKT/ID	LOAD SERVED	FRAME	TRIP	POLE	FEEDER	NOTES	Load
1	PANEL 'PP1'	225 A	225 A	3	NOTE 9		40.2 kVA
2	KITCHEN HOOD UDS SYSTEM	700 A	700 A	3	NOTE 9		190.4 kVA
3	PANEL 'KP1'	400 A	400 A	3	NOTE 9		87.3 kVA
4	WH-1	200 A	200 A	3	NOTE 10		54.0 kVA
5	RTU-1	225 A	225 A	3	NOTE 10		60.0 kVA
6	RTU-2	175 A	175 A	3	NOTE 10		42.0 kVA
7	MAU-1 FAN	15 A	15 A	3	NOTE 10		1.7 kVA
8	MAU-1 HEATER	175 A	175 A	3	NOTE 10		44.0 kVA
9	SPD (NOTE 8)	60 A	60 A	3	4#4,1#6G., 1-1/2"C.	NOTES 4	0.0 kVA
10	PREPARED SPACE	--	--	--		--	0.0 kVA
11	PREPARED SPACE	--	--	--		--	0.0 kVA
12	PREPARED SPACE	--	--	--		--	0.0 kVA

Load Classification	Connected...	Demand Factor	Estimated Demand
LIGHTS	5.3 kVA	125.00%	6.7 kVA
LIGHTING - EXTERIOR	1.0 kVA	125.00%	1.3 kVA
HEATING	52.5 kVA	100.00%	52.5 kVA
COOLING	0.0 kVA	0.00%	0.0 kVA
VENTILATION	0.2 kVA	100.00%	0.2 kVA
MOTORS	111.3 kVA	113.47%	126.3 kVA
KITCHEN	208.8 kVA	65.00%	135.7 kVA
RECEPTACLES	63.9 kVA	57.82%	37.0 kVA
WATER HEATER	54.0 kVA	100.00%	54.0 kVA
MISC.	20.9 kVA	100.00%	20.9 kVA
ELEVATOR	0.0 kVA	0.00%	0.0 kVA
Spare	0.0 kVA	0.00%	0.0 kVA

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA (CONNECTED):	519.6 kVA			
TOTAL KVA (DEMAND):	436.2 kVA	1470.0 A	1424.9 A	1438.8 A
TOTAL AMP. (CONNECTED):	1442.2 A			
TOTAL AMP. (DEMAND):	1210.7 A			

NOTES:
1. THIS SWITCHBOARD SHALL BE U.L. LISTED FOR USE S.E. EQUIPMENT.
2. ALL BREAKERS SHALL BE FULLY RATED - NO SERIES RATINGS.
3. ALL INCOMING BUS & BREAKER LUGS SHALL MATCH FEEDERS.
4. PROVIDE WITH TYPE 1 SPD (120kA/MODE, 240kA/PHASE MIN).
5. PROVIDE BREAKER WITH ADJUSTABLE LSI & GFP TRIP FUNCTIONS.
6. BREAKER SHALL BE 100% RATED.
7. PROVIDE BREAKER WITH SHUNT TRIP.
8. PROVIDE BREAKER WITH RELT (MAINTENANCE MODE) SWITCH.
9. SEE POWER RISER DIAGRAM/ SHEET E-901
10. SEE MECHANICAL SCHEDULES/ SHEET E-601.

PANEL: PP1

VOLTAGE: 208Y/120 3Ø — FED FROM: MSBK
MOUNTING: SURFACE — MAIN TYPE: MLO — MFR: SQUARE D
ENCLOSURE: NEMA1 — PHASE: 3 — TYPE: NQ
MAIN: 225 A — WIRE: 4 — AIC: 22 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	KITCHEN,STORAGE, LOCKER LTS	12	20 A	1	1	1.33	1.31					1	2	20 A	12	CORRIDOR, ELC RM, STRG LTS	L
L	OFFICE, SCULLERY LTS	12	20 A	3	1			1.17	0.20			1	4	20 A	12	CORRIDOR LIGHTS	L
L	DINING LTS	12	20 A	5	1					1.49	0.98	1	6	20 A	12	RECEPTACLES	R
R	REC. OFFICE 210	12	20 A	7	1	0.54	0.24					1	8	15 A		F-1 (NOTE 8)	V
R	HAND DRYER RM 215 (NOTE 7)	12	20 A	9	1			1.50	1.50			1	10	20 A	12	HAND DRYER GIRLS 204 (NOTE 7)	R
R	HAND DRYER BOYS 203 (NOTE 7)	12	20 A	11	1					1.50	0.90	1	12	20 A	12	RECEPTACLES RM 202	R
R	RECEPTACLES RM 202	12	20 A	13	1	1.08	0.50					1	14	20 A	12	REC. EWC DINING 202 (NOTE 7)	R
R	REC. EWC DINING 202 (NOTE 7)	12	20 A	15	1			0.50	0.63			1	16	15 A		DEF-1 (NOTE 8)	V
H	EWH-1	NOTE 8	25 A	17	2					2.00	2.00	1	18	25 A		EWH-2 (NOTE 8)	H
				19		2.00	0.64					1	20	20 A	12	LIGHTING - EXTERIOR	L
L	LIGHTING - EXTERIOR	12	20 A	21	1			0.40	0.50			1	22	20 A	12	REC. ELEC 217	MS
MS	REC. ELEC 217	12	20 A	23	1					0.50	1.08	1	24	20 A	12	RECEPTACLES RM 214, 215, 219	R
MS	BAS PANEL	12	20 A	25	1	0.50	0.50					1	26	20 A	12	FA VOICE AMPLIFIER	MS
MS	BDA	12	20 A	27	1			0.50	0.50			1	28	20 A	12	BDA	MS
MS	SPRINKLER BELL	12	20 A	29	1					0.50	2.26	3	30	30 A	NOTE 8	KEF-1	M
H	EDH-1	NOTE 8	15 A	31	3	0.83	2.26						32				
				33				0.83	2.26				34				
				35						0.83	0.50	1	36	20 A	12	MAU CONTROLS	MS
M	CP1 (NOTE 8)		15 A	37	1	0.50	0.54					1	38	20 A	12	ROOFTOP REC.	R
H	HOT BOX	12	20 A	39	1			1.00	1.00			1	40	20 A	12	HOT BOX	H
R	EXTERIOR REC.	12	20 A	41	1					0.36	0.00	1	42	20 A	--	SPARE	--
--	SPARE	--	20 A	43	1	0.00	0.00					1	44	20 A	--	SPARE	--
--	SPARE	--	20 A	45	1			0.00	0.00			1	46	20 A	--	SPARE	--
--	SPARE	--	20 A	47	1					0.00	0.00	1	48	20 A	--	SPARE	--
--	SPARE	--	20 A	49	1	0.00	0.00					1	50	20 A	--	SPARE	--
--	SPARE	--	20 A	51	1			0.00	0.00			1	52	20 A	--	SPARE	--
--	SPARE	--	20 A	53	1					0.00	0.00	1	54	20 A	--	SPARE	--

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	5.3 kVA	125.00%	6.7 kVA
LE	LIGHTING - EXTERIOR	1.0 kVA	125.00%	1.3 kVA
H	HEATING	8.5 kVA	100.00%	8.5 kVA
C	COOLING	0.0 kVA	0.00%	0.0 kVA
V	VENTILATION	0.2 kVA	100.00%	0.2 kVA
M	MOTORS	7.6 kVA	122.15%	9.3 kVA
K	KITCHEN	0.0 kVA	0.00%	0.0 kVA
R	RECEPTACLES	13.9 kVA	85.97%	12.0 kVA
WH	WATER HEATER	0.0 kVA	0.00%	0.0 kVA
MS	MISC.	3.0 kVA	100.00%	3.0 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

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	40.16 kVA			
TOTAL KVA (DEMAND):	41.51 kVA	106.8 A	104.1 A	124.5 A
TOTAL AMP....	111 A			
TOTAL AMP. (DEMAND):	115 A			

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 SCHEDULES/ SHEET E-601 FOR WIRE SIZE.

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)
F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

PANEL: KP1

VOLTAGE: 208Y/120 3Ø — FED FROM: MSBK
MOUNTING: RECESSED — MAIN TYPE: MLO — MFR: SQUARE D
ENCLOSURE: NEMA1 — PHASE: 3 — TYPE: NQ
MAIN: 400 A — WIRE: 4 — AIC: 22 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
K	KITCHEN HOOD (NOTE 8 & 9)	NOTE 7	20 A	1	1	0.50	1.15					1	2	20 A	NOTE 7	HEAVY DUTY MIXER (NOTE 8)	K
K	DISHWASHER MOTOR/ CONTROL/ ELECTRIC TANK HEAT (NOTE 8)	NOTE 7	90 A	3	3			8.63	6.60			3	4	70 A	NOTE 7	DISHWASHER BOOSTER HEAT (NOTE 8)	K
				5						8.63	6.60		6				
				7		8.63	6.60						8				
K	MEAT SLICER (NOTE 8)	NOTE 7	20 A	9	1			0.84	0.50			1	10	20 A	NOTE 7	KITCHEN HOOD (NOTE 8 & 9)	K
K	ICE MAKER (NOTE 8)	NOTE 7	20 A	11	1					1.79	0.82	2	12	20 A	NOTE 7	PASS THRU HEATED CABINET (NOTE 8)	K
K	PASS THRU HEATED CABINET (NOTE 8)	NOTE 7	20 A	13	2	0.82	0.82						14				
				15				0.82	1.60			1	16	20 A	NOTE 7	PASS THRU REFRIG. (NOTE 8)	MS
MS	MILK COOLER (NOTE 8)	NOTE 7	20 A	17	1					0.33	0.33	1	18	20 A	NOTE 7	MILK COOLER (NOTE 8)	MS
K	HOT FOOD SERVING (NOTE 8)	NOTE 7	50 A	19	1	3.31	3.31					1	20	50 A	NOTE 7	HOT FOOD SERVING (NOTE 8)	K
K	COLD FOOD SERVING (NOTE 8)	NOTE 7	20 A	21	1			0.92	0.92			1	22	20 A	NOTE 7	COLD FOOD SERVING (NOTE 8)	K
K	KITCHEN P.O.S. (NOTE 8)	NOTE 7	20 A	23	1					0.50	0.50	1	24	20 A	NOTE 7	KITCHEN P.O.S. (NOTE 8)	K
K	ICE DISPENSER (NOTE 8)	NOTE 7	20 A	25	1	0.42	0.42					1	26	20 A	NOTE 7	ICE DISPENSER (NOTE 8)	K
K	UDS CONTROLS (NOTE 8 & 9)	12	20 A	27	1			0.00	0.40			1	28	20 A	NOTE 7	WALK-IN COOLER LIGHTS	L
MS	WALK-IN COOLER EVAP. COIL	NOTE 10	20 A	29	1					0.30	1.05	3	30	20 A	NOTE 10	WALK-IN COOLER COND. UNIT	MS
MS	WALK-IN FRZR LIGHTS & HEAT	NOTE 10	20 A	31	1	0.90	1.05						32				
MS	WALK-IN FREEZER HEAT TAPE	NOTE 10	20 A	33	1			1.92	1.05				34				
K	WARMING DRAWER (NOTE 8)	NOTE 7	20 A	35	1					1.80	2.91	3	36	30 A	NOTE 10	WALK-IN FREEZER COND. UNIT	MS
R	RECEPTS KITCHEN 208 (NOTE 8)	12	20 A	37	1	0.72	2.91						38				
R	RECEPTACLES SERVING 207	12	20 A	39	1			0.54	2.91				40				
R	FLOOR CONVENIENCE RECEPTS.	12	20 A	41	1					0.36	0.90	1	42	20 A	12	CONVENIENCE RECEPTACLES	R
M	OVERHEAD DOOR	12	20 A	43	1	1.00	0.14					2	44	15 A	12	EVAP. COIL, FREEZ. (NOTE 9)	MS
--	SPARE	--	20 A	45	1			0.00	0.14				46				
--	SPARE	--	20 A	47	1					0.00	0.00	1	48	20 A	--	SPARE	--
--	SPARE	--	20 A	49	1	0.00	0.00					1	50	20 A	--	SPARE	--
--	SPARE	--	20 A	51	1			0.00	0.00			1	52	20 A	--	SPARE	--
--	SPARE	--	20 A	53	1					0.00	0.00	1	54	20 A	--	SPARE	--

	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	0.0 kVA	0.00%	0.0 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	18.4 kVA	65.00%	11.9 kVA
R	RECEPTACLES	50.0 kVA	60.00%	30.0 kVA
WH	WATER HEATER	0.0 kVA	0.00%	0.0 kVA
MS	MISC.	17.9 kVA	100.00%	17.9 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

		TOTAL PER PHASE: (CONNECTED)		
TOTAL KVA...	87.31 kVA			
TOTAL KVA (DEMAND):	60.88 kVA	273.7 A	232.8 A	223.5 A
TOTAL AMP....	242 A			
TOTAL AMP. (DEMAND):	169 A			

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 KITCHEN EQUIPMENT SCHEDULE/ SHEET E-440 FOR WIRE SIZE.
8. PROVIDE CLASS A GFI (6mA-PERSONNEL) BRKR (250' MAX).
9. PROVIDE BREAKER CAPABLE OF BEING LOCKED IN THE OPEN POSITION. PROVISIONS FOR LOCKING SHALL REMAIN IN PLACE WITH OR WITHOUT THE LOCK INSTALLED.
10. REFER TO REFRIGERATION CONNECTION SCHEDULE/ SHEET E-440 FOR WIRE SIZE.

LOAD CLASSIFICATION ABBREVIATIONS (CONT.)
F - FEEDER FOR DOWN STREAM PANEL. LOADS ARE INCLUDED IN THE PANEL LOAD SUMMARY.

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12/15/2020

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North Carolina License Number C-0914

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

ENERGY STAR PARTNER

LEED REGISTERED PURSUING CERTIFIED

No.	Date	Description

ISSUE DATE: 12/15/2020
PROJECT #: 2020.300
DRAWN BY: MKG
CHECKED BY: AEB

ELECTRICAL SCHEDULES

E-601

OPTIMA # 20-0196R

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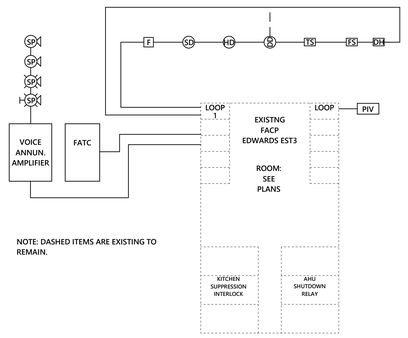
FIRE ALARM SYSTEM MATRIX	BUILDING SYSTEM OUTPUTS																				CENTRAL COMM		
	ACTIVATE COMMON ALARM SIGNAL INDICATOR	ACTIVATE AUDIBLE ALARM SIGNAL	ACTIVATE AUDIBLE SUPERVISORY SIGNAL INDICATOR	ACTIVATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTIVATE AUDIBLE TROUBLE SIGNAL INDICATOR	ACTIVATE COMMON TROUBLE SIGNAL INDICATOR	ACTIVATE GENERAL FUNCTION SIGNAL	ACTIVATE DOOR RELEASE	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 FIRST FLOOR	RETURN ELEVATOR TO ALTERNATE FLOOR	SHUNT TRIP BOTH ELEV. RELEASES DESIGNATED FLOOR	SHUT DOWN RESPECTIVE HVAC	SHOW CHANGE OF STATUS ON ANNUNCIATOR	SHOW CHANGE OF STATUS VIA 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	

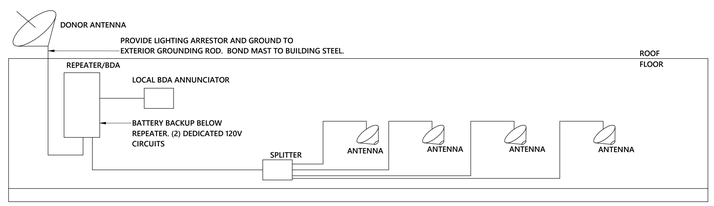


NOTE: DASHED ITEMS ARE EXISTING TO REMAIN.

FIRE ALARM NOTES

1. EXISTING FACP IS FULLY ANALOG ADDRESSABLE.
2. EXISTING FACP HAS A MINIMUM 24HR. BATTERY BACKUP.
3. EXISTING 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.

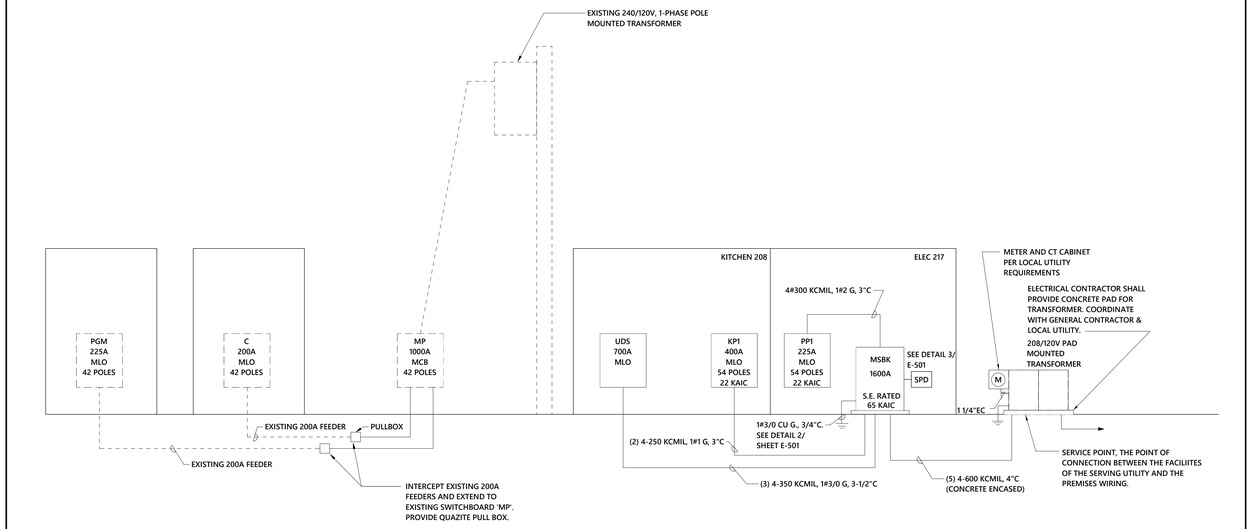
1 FIRE ALARM RISER DIAGRAM
NOT TO SCALE



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 BASED ON DESIGN FROM HARRIS COMMUNICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS AND EQUALS.
5. PROVIDE BATTERY BACK UP (5 MINS.) FOR MOMENTARY LOSS OF POWER. MAIN SYSTEM IS GENERATOR BACKED UP. NON GENERATOR BACKED UP SYSTEMS SHALL HAVE A MINIMUM BATTERY BACKUP OF 24 HOURS.
6. SEE SPECIFICATIONS FOR CABLING REQUIREMENTS.
7. 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.
8. 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.
9. SEE PLANS FOR MINIMUM LOCATIONS. BASED ON SURVEY REPORT, DEVICES SHALL BE LOCATED TO MAXIMIZE BOOSTING SIGNAL. LOCATIONS SHALL BE COORDINATED WITH GENERAL CONTRACTOR.
10. LOCAL ANNUNCIATOR SHALL PROVIDE VISUAL AND LABELED IDENTIFICATION OF:
    A. NORMAL AC POWER.
    B. SIGNAL BOOSTER TROUBLE.
    C. LOSS OF NORMAL AC POWER.
    D. FAILURE OF BATTERY CHARGER.
    E. LOW-BATTERY CAPACITY.
    F. ANTENNA FAILURE.
11. PROVIDE FIRE ALARM PANEL CONNECTION (SUPERVISORY SIGNALS). COORDINATE REQUIRED CONNECTIONS WITH FIRE ALARM CONTRACTOR:
    A. DONOR ANTENNA MALFUNCTION.
    B. BDA FAILURE.
    C. LOW BATTERY CAPACITY.
    D. LOSS OF NORMAL AC POWER.
    E. FAILURE OF BATTERY CHARGER.

2 EMERGENCY RESPONDER SYSTEM BOOSTING RISER
NO SCALE



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.

3 POWER RISER DIAGRAM
NOT TO SCALE

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ELECTRICAL DIAGRAMS

E-901
Sheet No. 13 of 13

OPTIMA # 20-0196R