2018 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY - ELECTRICAL SUMMARY

C401 METHOD OF COMPLIANCE

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

C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS

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

C405.2 - LIGHTING CONTROLS (MANDATORY REQUIREMENTS):

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

C405.3 - EXIT SIGNS (MANDATORY REQUIREMENTS):

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

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

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

C405.4.1 - TOTAL CONNECTED INTERIOR LIGHTING POWER:

5,510 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:

- ■ BUILDING AREA METHOD
- ☐ SPACE-BY-SPACE METHOD

9,180 WATTS ALLOWED

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

- ☐ NOT APPLICABLE

TOTAL CONNECTED EXTERIOR LIGHTING POWER:

1,040 WATTS SPECIFIED

TOTAL ALLOWABLE EXTERIOR LIGHTING POWER:

1,100 WATTS ALLOWED

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

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

C405.7 - ELECTRICAL TRANSFORMERS (MANDATORY REQUIREMENTS):

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

C405.8 - ELECTRICAL MOTORS (MANDATORY REQUIREMENTS):

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

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.

TELECOM LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
———	PLYWOOD TELEPHONE BACKBOARD. SIZE AS INDICATED ON RISER.
◀ #	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. IF CABLE QUANTITY AND SERVICE ARE NOT IDENTIFIED, THEN PATHWAY ONLY OR REFER TO TO TECHNOLOGY DRAWINGS FOR CABLE AND ACTIVATION TYPE.
WAP	STRUCTURE MOUNTED JUNCTION BOX FOR WIRELESS ACCESS POINT IN OPEN CEILING APPLICATIONS. 4" SQUARE BOX WITH A TWO-GANG OPENING. STUB 1" EC FROM BOX TO J-HOOKS OR CABLE TRAY ABOVE ACCESSIBLE CEILING. PROVIDE CABLING, TERMINATIONS AND FACEPLATE PER SPECIFICATIONS.
WAP	STRUCTURE MOUNTED JUNCTION BOX FOR WIRELESS ACCESS POINT ON WALL MOUNTED APPLICATIONS. 4" SQUARE BOX WITH A TWO-GANG OPENING. STUB 1" EC FROM BOX TO J-HOOKS OR CABLE TRAY ABOVE ACCESSIBLE CEILING. PROVIDE CABLING, TERMINATIONS AND FACEPLATE PER SPECIFICATIONS.
TV	TV DISPLAY BACKBOX. COORDINATE MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ROUGH-IN, SEE DETAIL 8 / SHEET 602 FOR REQUIREMENTS. PROVIDE PULL STRING FOR LOW VOLTAGE CABLING TO ACCESSIBLE CEILING.
TGB **	TELECOMMUNICATIONS GROUND BAR.

SYMBOL SCHEDULE POWER

SYMBOL	DESCRIPTION
	WIRING SYSTEM CONCEALED IN WALL OR CEILING.
	WIRING SYSTEM CONCEALED IN OR UNDER SLAB OR UNDERGROUND WHEN SHOWN ON POWER PLANS. UNSWITCHED LEG OF LIGHTING CIRCUIT WHEN SHOWN ON LIGHTING PLANS.
	WIRING SYSTEM LOW VOLTAGE OCCUPANCY SENSOR.
	CONDUIT TURNED DOWN TO FLOOR BELOW.
	CONDUIT TURNED UP TO FLOOR ABOVE.
	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.
J	CEILING MOUNT JUNCTION BOX WITH CONNECTION TO EQUIPMENT SERVED
	208/120V SINGLE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	208/120V THREE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	480Y/277V THREE PHASE PANELBOARD. SEE SCHEDULE FOR MOUNTING. TOP OF PANEL AT 6'-6" AFF.
	480-208Y/120V TRANSFORMER. SEE RISER FOR SIZE. PROVIDE 4" THICK HOUSEKEEPING PAD TO EXTEND 3" ON SIDES, FRONT WITH CHAMFER EDGE AND OSHA COMPLIANT, SAFETY YELLOW, EPOXY PAINT SUITABLE FOR CONCRETE.
HDB	JUNCTION BOX FOR HAND DRYER CONNECTION; SEE MOUNTING HEIGHTS DETAIL FOR EXACT HEIGHT; SEE ARCH. SHEETS FOR COORDINATION 4" SQUARE BOX WITH A SINGLE-GANG OPENING AND PLASTER RING.
	FUSED HEAVY DUTY DISCONNECT SWITCH. NUMERALS INDICATE SWITCH RATING. NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED. UNSHADED INDICATES NON-FUSED.
$M	FRACTIONAL HORSEPOWER MANUAL MOTOR STARTER, WITH OVERLOAD PROTECTION
$X	ALL THINGS "X" CAN BE: T = TIMER, (0 - 4) HOUR MANUAL TIMER SWITCH, F = FAN SWITCH, VARIABLE SPEED FAN SWITCH

ELECTRICAL FIXTURES LEGEND - COMMERCIAL

SYMBOL	DESCRIPTION
	TAMPER RESISTANT DUPLEX RECEPTACLE, 20 AMP, 120 VOLT COOPER 5362 OR EQUAL.
GFI	TAMPER RESISTANT GROUND FAULT RECEPTACLE. NEMA 5-20R DUPLEX. ALL RECEPTACLES INSTALLED OUTSIDE, WITHIN 6' OF A SINK OR IN A KITCHEN SHALL BE GFCI.
WR	WEATHERPROOF GROUND FAULT RECEPTACLE. NEMA 5-20R DUPLEX, CORROSION RESISTANT, WITH IN-USE COVER.
	QUAD RECEPTACLE. TWO TAMPER RESISTANT NEMA 5-20R DUPLEX RECEPTACLES, OTHERWISE SAME AS DUPLEX RECEPTACLE ABOVE.
EWC	QUAD RECEPTACLE, TWO TAMPER RESISTANT NEMA 5-20R FOR ELECTRIC WATER COOLER TO BE SUPPLIED BY GROUND FAULT BREAKER. COORDINATE LOCATION WITH PLUMBING CONTRACTOR.

EM./LS LIGHTING FIXTURE SYMBOLS AND DEVICES

SYMBOL	DESCRIPTION
	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
	WALL MOUNTED LED LIGHTING FIXTURE.
	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.
	RECESSED LINEAR LIGHT (TYPE DENOTED IN LIGHTING SCHEDULE)
	SUSPENDED OR PENDANT LIGHT (TYPE DENOTED)
	CEILING MOUNTED EXIT LIGHT WITH ARROWS AND NUMBERS OF FACES AS INDICATED ON PLANS. 90 MIN BATTERY BACKUP. SEE LIGHTING FIXTURE SCHEDULE.
	WALL MOUNTED EXIT LIGHT WITH ARROWS AND NUMBERS OF FACES AS INDICATED ON PLANS. 90 MIN BATTERY BACKUP. SEE LIGHTING FIXTURE SCHEDULE.
$	SINGLE POLE SWITCH, 20 AMP, 120/277 VOLT, COOPER AH 1221, OR EQUAL BY HUBBELL, LEVITON AND PASS & SEYMOUR.
$K	ADDRESSABLE KEY OPERATED SWITCH
OCSIT	CEILING MOUNTED OCCUPANCY SENSOR, DUAL TECHNOLOGY. SENSOR SWITCH CM PDT 10, WATT STOPPER #DT-300, COOPER OAC-DT 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	ADDRESSABLE PHOTOCELL, EXTERIOR, MOUNT FACING NORTH.
$L1	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF FOR 1 ZONE OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
$P1	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF WITH DIMMING CONTROL FOR 1 ZONE OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
$P4	WALL MOUNTED LOW VOLTAGE ADDRESSABLE LIGHT CONTROL WALL SWITCH ON/OFF WITH DIMMING CONTROL FOR 4 ZONES OF LIGHTING. HUBBELL NXSW SERIES OR EQUAL BY ACUITY NLIGHT OR WATTSTOPPER DLM. PROVIDE ON/OFF LABELS FOR EACH BUTTON.
OS	CEILING MOUNTED OCCUPANCY SENSOR POWER PACK. SENSOR SWITCH PP-20, WATT STOPPER #BZ-100, COOPER SP-20, OR EQUAL.
OS NX	ADDRESSABLE ROOM CONTROLLER W/ 0-10V DIMMING HUBBELL NXRC OR EQUAL BY ACUITY NLIGHT, WATTSTOPPER DLM, OR COOPER GREENGATE
OS NXD	ADDRESSABLE ROOM CONTROLLER W/ 0-10V DIMMING, HUBBELL NXRC OR EQUAL BY ACUITY NLIGHT, WATTSTOPPER DLM, OR COOPER GREENGATE
OS EMD	ADDRESSABLE EMERGENCY ROOM CONTROLLER W/0-10V DIMMING, UL924 LISTED. HUBBELL NXRC-UL924 OR EQUAL BY ACUITY NLIGHT, WATTSTOPPER DLM, OR COOPER GREENGATE

SPECIAL SYSTEMS LEGEND

SYMBOL	DESCRIPTION
S	FLUSH-MOUNTED CEILING SPEAKER.
	WALL-MOUNTED SPEAKER. 3/4" CONDUIT TO LOCAL CABLE TRAY.
WP	EXTERIOR WEATHERPROOF SPEAKER; SEE DETAIL 7 / SHEET E-602.

SECURITY DEVICES SYMBOL LEGEND - ELECTRICAL

SYMBOL	DESCRIPTION
	CEILING MOUNTED SECURITY CAMERA LOCATION. CAMERA PROVIDED AND INSTALLED BY OTHERS. PROVIDED JUNCTION BOX AS REQUIRED BY OTHERS.
	PTZ CAMERA. WALL MOUNTED. REFER TO ELECTRICAL DRAWINGS FOR JUNCTION BOX AND CONDUIT REQUIREMENTS. FOR X = WP: EXTERIOR WALL MOUNTED PTZ CAMERA. REFER TO DETAILS 9 & 10 / SHEET E-602 FOR REQUIREMENTS.
DC	DOOR CONTACT, MINIMUM 1/2" CONDUIT. PROVIDE SINGLE GANG JUNCTION BOX AND PULL STRING. SEE CARD READER DETAIL FOR ADDITIONAL REQUIREMENTS OF PATHWAYS AND CABLING
MD	SECURITY MOTION DETECTOR. CEILING MOUNTED. REFER TO SPECIFICATIONS AND DETAILS FOR DEVICES AND CABLING REQUIREMENTS. REFER TO ELECTRICAL DRAWINGS FOR JUNCTION BOX AND CONDUIT REQUIREMENTS.

EXISTING/DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	HALFTONE SYMBOL INDICATES EXISTING
	DASHED SYMBOL INDICATES REMOVED
	HATCHED SYMBOL INDICATES REMOVED

DISCONNECT SIZE DESCRIPTION

__A-F__A-__P-__

FRAME SIZE — FUSE SIZE — NUMBER OF POLES — NEMA RATING

COMMISSIONING NOTES

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

ELECTRICAL ABBREVIATIONS LIST

1P	1 POLE (2P, 3P, 4P, ETC.)	DCP	DOMESTIC WATER CIRCULATING PUMP	HT	HEIGHT	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
A	AMPERE	DEPT	DEPARTMENT	HTG	HEATING	NFDS	NON-FUSED SAFETY DISCONNECT SWITCH
AC	ABOVE COUNTER OR AIR CONDITIONER	DET	DETAIL	HTR	HEATER	NIC	NOT IN CONTRACT
ACLG	ABOVE CEILING	DIA	DIAMETER	HV	HIGH VOLTAGE	NL	NIGHT LIGHT
ADO	AUTOMATIC DOOR OPENER	DISC	DISCONNECT	HVAC	HEATING, VENTILATING AND AIR CONDITIONING	N.O.	NORMALLY OPEN
AF	AMP FRAME	DIST	DISTRIBUTION	HWP	HYDRONIC WATER PUMP	NPF	NORMAL POWER FACTOR
AFF	ABOVE FINISHED FLOOR	DN	DOWN			NTS	NOT TO SCALE
AFG	ABOVE FINISHED GRADE	DPR	DAMPER	IC	INTERRUPTING CAPACITY		
AFI	ARC FAULT CIRCUIT INTERRUPTER	DS	SAFETY DISCONNECT SWITCH	IG	ISOLATED GROUND	OH	OVERHEAD
AHU	AIR HANDLING UNIT	DT	DOUBLE THROW	IMC	INTERMEDIATE METAL CONDUIT	OL	OVERLOADS
AL	ALUMINUM	DWG	DRAWING	INCAND	INCANDESCENT		
ALT	ALTERNATE			IR	INFRARED	PA	PUBLIC ADDRESS
AMP	AMPERE	EC	ELECTRICAL CONTRACTOR	I/W	INTERLOCK WITH	PB	PULL BOX OR PUSHBUTTON
AMPL	AMPLIFIER	ELEC	ELECTRIC, ELECTRICAL			PE	PNEUMATIC ELECTRIC
ANNUN	ANNUNCIATOR	ELEV	ELEVATOR	J-BOX	JUNCTION BOX	PED	PEDESTAL
APPROX	APPROXIMATELY	EM	EMERGENCY			PF	POWER FACTOR
AQ-STAT	AQUASTAT	EMS	ENERGY MANAGEMENT SYSTEM	KV	KILOVOLT	PH	PHASE
ARCH	ARCHITECT, ARCHITECTURAL	EMT	ELECTRICAL METALLIC TUBING	KVA	KILOVOLT-AMPERE	PIV	POST INDICATING VALVE
AS	AMP SWITCH	EP	ELECTRIC PNEUMATIC	KVAR	KILOVOLT-AMPERE REACTIVE	PNL	PANEL
AT	AMP TRIP	EQUIP	EQUIPMENT	KW	KILOWATT	PP	POWER POLE
ATS	AUTOMATIC TRANSFER SWITCH	EWC	ELECTRIC WATER COOLER	KWH	KILOWATT HOUR	PR	PAIR
AUTO	AUTOMATIC	EX	EXISTING			PRI	PRIMARY
AUX	AUXILIARY	EXH	EXHAUST	LOC	LOCATE OR LOCATION	PROJ	PROJECTION
AV	AUDIO VISUAL	EXP	EXPLOSION PROOF	LT	LIGHT	PRV	POWER ROOF VENTILATOR
AWG	AMERICAN WIRE GAUGE			LTG	LIGHTING	PT	POTENTIAL TRANSFORMER
		FA	FIRE ALARM	LTNG	LIGHTNING	PVC	POLYVINYL CHLORIDE (CONDUIT)
BATT	BATTERY	FABP	FIRE ALARM BOOSTER POWER SUPPLY PANEL	LV	LOW VOLTAGE	PWR	POWER
BD	BOARD	FACP	FIRE ALARM CONTROL PANEL	MAX	MAXIMUM		
BLDG	BUILDING	FCU	FAN COIL UNIT	MAG.S	MAGNETIC STARTER	QUAN	QUANTITY
BMS	BUILDING MANAGEMENT SYSTEM	FIXT	FIXTURE	M/C	MOMENTARY CONTACT		
		FLR	FLOOR	MC	MECHANICAL CONTRACTOR	RCPT	RECEPTACLE
C	CONDUIT	FLUOR	FLUORESCENT	MCB	MAIN CIRCUIT BREAKER	REQD	REQUIRED
CAB	CABINET	FU	FUSE	MCC	MOTOR CONTROL CENTER	RM	EXISTING TO REMAIN
CAT	CATALOG	FUDS	FUSED SAFETY DISCONNECT SWITCH	MDC	MAIN DISTRIBUTION CENTER	RSC	RIGID STEEL CONDUIT
CATV	CABLE TELEVISION			MDP	MAIN DISTRIBUTION PANEL	RTU	ROOF TOP UNIT
CB	CIRCUIT BREAKER	GA	GAUGE	MFR	MANUFACTURER		
CCTV	CLOSED CIRCUIT TELEVISION	GAL	GALLON	MFS	MAIN FUSED DISCONNECT SWITCH	SC	SURFACE CONDUIT
CKT	CIRCUIT	GALV	GALVANIZED	MH	MANHOLE	SEC	SECONDARY
CLG	CEILING	GC	GENERAL CONTRACTOR	MIC	MICROPHONE	SHT	SHEET
COMB	COMBINATION	GEN	GENERATOR	MIN	MINIMUM	SIM	SIMILAR
COMPR	COMPRESSOR	GFI	GROUND FAULT CIRCUIT INTERRUPTER	MISC	MISCELLANEOUS	S/N	SOLID NEUTRAL
CONN	CONNECTION	GFP	GROUND FAULT PROTECTOR	MLO	MAIN LUGS ONLY	SPEC	SPECIFICATION
CONST	CONSTRUCTION	GND	GROUND	MMS	MANUAL MOTOR STARTER	SPKR	SPEAKER
CONT	CONTINUATION OR CONTINUOUS	GRS	GALVANIZED RIGID STEEL (CONDUIT)	MOA	MULTIOUTLET ASSEMBLY	SP	SPARE
CONTR	CONTRACTOR	GYP BD	GYPSUM BOARD	MSP	MOTOR STARTER PANELBOARD	SR	SURFACE RACEWAY
CONV	CONVECTOR			MSBD	MAIN SWITCHBOARD	SS	STAINLESS STEEL
CP	CIRCULATING PUMP	HOA	HANDS-OFF-AUTOMATIC SWITCH	MT	MOUNT	SSW	SELECTOR SWITCH
CRT	CATHODE-RAY TUBE			MT.C	EMPTY CONDUIT	S/S	STOP/START PUSHBUTTONS
CT	CURRENT TRANSFORMER	HORIZ	HORIZONTAL	MTS	MANUAL TRANSFER SWITCH	STA	STATION
CTR	CENTER	HP	HORSEPOWER	MTR	MOTOR, MOTORIZED	STD	STANDARD
CU	COPPER	HPF	HIGH POWER FACTOR	N.C.	NORMALLY CLOSED	SURF	SURFACE MOUNTED
				NEC	NATIONAL ELECTRICAL CODE	SW	SWITCH

SWBD	SWITCHBOARD	XFMR	TRANSFORMER
SYM	SYMMETRICAL	XFR	TRANSFER
SYS	SYSTEM		
TEL	TELEPHONE	W	WATT
TEL/DATA	TELEPHONE/DATA	W/	WITH
TERM	TERMINAL	WG	WIRE GUARD
TL	TWIST LOCK	WH	WATER HEATER
TR	TAMPER RESISTANT	W/O	WITHOUT
T-STAT	THERMOSTAT	WP	WEATHERPROOF
TTC	TELEPHONE TERMINAL CABINET		
TV	TELEVISION	∠	ANGLE
TVTC	TELEVISION TERMINAL CABINET	@	AT
		△	DELTA
TYP	TYPICAL	'	FEET
		"	INCHES
UC	UNDER COUNTER	#	NUMBER
UE	UNDERGROUND ELECTRICAL	Ø	PHASE
UG	UNDERGROUND	C	CENTER LINE
UH	UNIT HEATER	P	PLATE
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		

ELECTRICAL SHEET INDEX

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Harnett County Schools

LILLINGTON-SHAWTOWN ELEMENTARY ADDITION

855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ELECTRICAL LEGEND AND NOTES

E-001

Sheet No. 1 of 12

OPTIMA# 24-0045R

1. GENERAL:

A. THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS, AND SUPPLIES AS NECESSARY FOR THE COMPLETE AND SATISFACTORY OPERATING ELECTRICAL SYSTEMS AS SHOWN ON THE PLANS.

B. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, NFPA, STATE BUILDING CODE, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.

C. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL ELECTRICAL PERMITS AND INSPECTION FEES.

D. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY THE UNDERWRITER'S LABORATORIES, INC. OR BY A STATE APPROVED THIRD PARTY TESTING AGENCY FOR THE USE INTENDED WHERE A STANDARD FOR SUCH MATERIALS AND USE EXISTS. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL AND OF THE SAME MANUFACTURER.

E. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CATALOG DATA IN ELECTRONIC FORMAT (PDF) FOR ALL ELECTRICAL ITEMS IN THE SCOPE OF WORK, INCLUDING, BUT NOT LIMITED TO, RACEWAYS, BOXES, FITTINGS, CONDUCTORS, LUMINAIRES, LAMPS, BALLASTS, WIRING DEVICES, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, FIRE ALARM, TELECOMMUNICATIONS, ETC. FOR APPROVAL AS APPLICABLE FOR THE PROJECT. ONE COMPLETE SET OF APPROVED SUBMITTALS SHALL BE MAINTAINED AT THE JOB SITE.

F. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH THE BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, CONDUIT, WIRING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, METHODS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COSTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED AFTER BIDS HAVE BEEN ACCEPTED AND ALL COSTS WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. CREDITS SHALL BE GIVEN TO THE OWNER WHERE SUCH EQUIPMENT AND METHODS RESULT IN LESS EXPENSE TO THE CONTRACTOR.

G. ONE COMPLETE SET OF THE LATEST CONSTRUCTION PLANS OF ALL TRADES SHALL BE MAINTAINED AT THE JOB SITE. IN ADDITION, ALL ADDENDUMS, BULLETINS, AND/OR SKETCHES SHALL BE INCORPORATED INTO THE ON-SITE CONSTRUCTION PLANS AS THE JOB PROGRESSES.

H. COMPLETELY ADEQUATE HOUSING SHALL BE PROVIDED FOR ALL MATERIALS STORED ON JOB SITE. ONLY CONDUIT MAY BE STORED OUTSIDE, BUT NOT IN CONTACT WITH THE GROUND.

I. THE CONDUIT AND NEUTRAL SYSTEM SHALL BE GROUNDED AT THE MAIN SERVICE EQUIPMENT. GROUNDING ELECTRODE SYSTEM SHALL BE INSTALLED PER NEC 250.

J. PROVIDE AN INTERSYSTEM BONDING TERMINATION DEVICE AT THE MAIN ELECTRICAL SERVICE PER NEC 250.94.

K. WIRING SHALL BE TESTED FOR CONTINUITY AND GROUNDS BEFORE BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER.

L. PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF WORK AND REPAIR ANY DAMAGE DONE.

M. THE ELECTRICAL CONTRACTOR SHALL CONNECT ALL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (UNLESS OTHERWISE NOTED), EXCEPT FOR CONTROL WIRING FOR EQUIPMENT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR. CONTROL WIRING FOR SUCH EQUIPMENT SHALL BE PROVIDED BY THE RESPECTIVE DISCIPLINE.

N. ALL ELECTRICAL JUNCTION BOXES, SWITCHGEAR, CABLING, VOICE/DATA OUTLETS, LOW VOLTAGE CABINETS, EMERGENCY RECEPTACLES, ETC. SHALL BE LABELED ACCORDING TO PANEL/RACK AND CIRCUIT NUMBER.

O. UPON COMPLETION OF WORK, CONTRACTOR SHALL PRESENT ENGINEER WITH CERTIFICATE OF APPROVAL FROM LOCAL INSPECTOR AND/OR AUTHORITY HAVING JURISDICTION BEFORE WORK WILL BE APPROVED FOR FINAL PAYMENT.

P. CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR A PERIOD OF ONE YEAR EFFECTIVE THE DATE THE PROJECT IS ACCEPTED BY THE OWNER. ANY IMPERFECT MATERIALS OR WORKMANSHIP SHALL BE REPLACED WITHOUT ADDED COST TO THE PROJECT.

Q. IT SHALL NOT BE THE INTENT OF ISSUED PLANS AND/OR SPECIFICATIONS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE ELECTRICAL CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL NECESSARY ITEMS FOR A COMPLETE AND OPERATING SYSTEM.

R. THE WORD "PROVIDE" MEANS THAT THIS CONTRACTOR SHALL FURNISH, FABRICATE, ERECT, CONNECT, AND COMPLETELY INSTALL SYSTEMS IN PROPER OPERATING CONDITION. ALL LABOR, PRODUCT OPTIONS, ACCESSORIES AND INCIDENTAL MATERIALS REQUIRED SHALL BE INCLUDED AS PART OF THIS WORK TO COMPLETE THE INSTALLATION.

S. THE WORD "CONNECT" MEANS THAT THIS CONTRACTOR SHALL PROVIDE (SEE DEFINITION ABOVE) ALL DISCONNECTING MEANS, OVERCURRENT PROTECTION AND WIRING REQUIRED TO PLACE THE EQUIPMENT AND SYSTEMS IN PROPER OPERATING CONDITION AND TO COMPLY WITH CODE REQUIREMENTS.

T. CONTRACTOR SHALL COORDINATE THE ROUGH-IN OF ALL OUTLET LOCATIONS WITH ARCHITECTURAL FLOOR PLANS, ELEVATIONS, AND MILLWORK SHOP DRAWINGS PRIOR TO ROUGH-IN.

U. ELECTRICAL CONTRACTOR SHALL NOT SCALE PLANS. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATIONS OF ALL EQUIPMENT, UNLESS OTHERWISE NOTED.

V. CONTRACTOR SHALL TEST ALL "LIFE SAFETY" EQUIPMENT AND SYSTEMS FOR PROPER FUNCTION AND OPERATION. UPON SUCCESSFUL COMPLETION OF TESTS, CONFIRMATION SHALL BE SENT TO THE ENGINEER OF RECORD IN THE FORM OF A LETTER STATING THE TESTS PERFORMED, THE RESULTS, AND THE DATE TESTS WERE SUCCESSFULLY COMPLETE. "LIFE SAFETY" EQUIPMENT AND SYSTEMS CONSIST OF THOSE AS SPECIFIED IN THE STATE BUILDING CODE, THE NATIONAL ELECTRICAL CODE, NFPA 101, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.

W. IF DURING THE COURSE OF WORK, THE CONTRACTOR DISCOVERS A PROBLEM WITH THE PERFORMANCE OF THE INSTALLATION RELATIVE TO THE PLANS AND SPECIFICATIONS, THE NEC, OR OTHER CODES OR REQUIREMENTS, THE CONTRACTOR SHALL IMMEDIATELY BRING THE PROBLEM TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK.

X. WHERE THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL BRING THE ISSUE TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK OR ORDERING ANY MATERIALS. NO ADDITIONAL COSTS SHALL BE WARRANTED WITHOUT A CHANGE TO THE PROJECT SCOPE.

Y. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PROVIDING TEMPORARY POWER AND LIGHTING FOR ALL TRADES. AT NO TIME SHALL EXISTING BUILDING POWER SYSTEMS BE UTILIZED WITHOUT WRITTEN PERMISSION FROM THE OWNER.

Z. COORDINATE LOCATION AND REQUIREMENTS FOR ELECTRICAL SERVICE WITH THE POWER COMPANY. WHERE MORE THAN ONE SERVICE IS SUPPLIED TO A BUILDING, PROVIDE IDENTIFICATION AT EACH SERVICE PER NEC 230-2(E).

AA. THE CONTRACTOR SHALL PROVIDE A MINIMUM TWO WEEK NOTICE FOR ANY PLANNED UTILITY OUTAGES. WRITTEN AUTHORIZATION FROM THE OWNER SHALL BE PROVIDED PRIOR TO ANY OUTAGE. ALL PLANNED UTILITY OUTAGES SHALL BE COORDINATED WITH THE OWNER TO OCCUR DURING NON-OPERATING TIMES, INCLUDING NIGHTS, WEEKENDS AND HOLIDAYS. ALL PLANNED UTILITY OUTAGES SHALL INCLUDE PROVISIONS FOR PROPER BACK-UP OF ALL LIFE-SAFETY SYSTEMS AND INCLUDE AN APPROVED FIRE-WATCH PROGRAM AS REQUIRED BY THE LOCAL FIRE MARSHALL.

BB. EACH BIDDER SHALL VISIT THE JOB SITE PRIOR TO BIDDING TO FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS AND TO ASCERTAIN THE EXTENT OF WORK REQUIRED. FAILURE TO VISIT SITE SHALL NOT EXCUSE CONTRACTOR FROM PERFORMING REQUIRED WORK NOR SHALL IT BE AN ACCEPTABLE REASON FOR REQUESTING ADDITIONS TO THE CONTRACT.

2. RACEWAY:

A. CONDUIT SHALL BE MANUFACTURED BY ALLIED, WHEATLAND, REPUBLIC CONDUIT, WESTERN TUBE, OR APPROVED EQUIVALENT.

B. FOR INTERIOR WORK, CONDUIT SHALL BE ZINC COATED EMT EXCEPT WHERE NOT PERMITTED BY CODE. USE SCHEDULE 40 PVC BELOW CONCRETE SLAB, IN DUCTBANKS, AND FOR EXTERIOR WORK WHERE NOT SUBJECT TO DAMAGE. USE IMC WHERE SUBJECT TO PHYSICAL DAMAGE.

C. EMT FITTINGS SHALL BE COMPRESSION GLAND TYPE, OF MALLEABLE STEEL. CONNECTORS SHALL HAVE INSULATED THROATS. CAST, SET SCREW, OR INDENTER TYPE FITTINGS ARE NOT ACCEPTABLE. ALL FITTINGS FOR EMT SHALL BE MADE OF STEEL.

D. ALL RACEWAY SHALL BE RUN CONCEALED, UNLESS OTHERWISE NOTED. FISH ALL NEW OUTLETS IN EXISTING WALLS, WHERE POSSIBLE. ALL RUNS SHALL BE NEAT AND SQUARE.

E. LOW VOLTAGE CABLING NOT SPECIFIED TO BE INSTALLED IN CONDUIT, SHALL BE INSTALLED IN A CABLE TRAY SYSTEM OR J-HOOK SYSTEM CONSISTING OF MINIMUM 2" DIAMETER HOOKS LOCATED ON 3'-0" CENTERS IN ALL ACCESSIBLE CEILINGS. WHERE THERE ARE INACCESSIBLE CEILINGS, PROVIDE CONDUIT FOR ENTIRE LENGTH OF INACCESSIBILITY.

F. RACEWAYS USED FOR LOW VOLTAGE SYSTEMS SUCH AS TELECOMMUNICATIONS, FIRE ALARM, SECURITY, CCTV, CONTROLS, AND SIMILAR CONDUITS ABOVE THE CEILING AND BACKBOARD(S) SHALL BE PROVIDED WITH INSULATED THROAT BUSHINGS AT EACH CONDUIT TERMINATION. THESE BUSHINGS SHALL BE BE INSTALLED PRIOR TO PULLING LOW-VOLTAGE CABLES.

G. RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE-RATED WALLS SHALL BE FILLED WITH IMPERVIOUS, NON-SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, WATER, AND DUST. ROOF PENETRATIONS SHALL BE WITHIN THE EQUIPMENT ROOF CURB.

H. SUPPORT ALL CONDUIT WITH STRAPS AND CLAMPS.

I. ALL CONDUIT SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES, WHETHER EXPOSED OR NOT AND SUPPORTED FROM STRUCTURE AND PROPERLY SECURED.

J. WHERE CONDUITS PASS THROUGH A BUILDING EXPANSION JOINT, PROVIDE GALVANIZED EXPANSION FITTINGS WITH BONDING JUMPERS.

K. MINIMUM CONDUIT SIZE SHALL BE 3/4" FOR INTERIOR WORK, 1" FOR EXTERIOR WORK.

L. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.

M. LIQUID-TIGHT METAL CONDUIT SHALL ONLY BE USED FOR FINAL CONNECTIONS TO EQUIPMENT AND ALL OTHER ROTATING AND VIBRATING EQUIPMENT, MAXIMUM LENGTH OF 3'-0".

N. FLEXIBLE METAL CONDUIT, MINIMUM SIZE 3/8", SHALL ONLY BE USED FOR FINAL CONNECTION TO LIGHTING FIXTURES, MAXIMUM LENGTH OF 6'-0".

O. PROVIDE PULL BOXES, SUCH THAT NO SINGLE CONDUIT RUN HAS BENDS IN EXCESS OF 360°. PULL BOXES SHALL BE SUITABLE AND APPROVED FOR THE INTENDED USE. WHERE CONDUITS PASS UNDER PAVED AREAS, THEY SHALL BE RGS.

P. ALL CONDUIT BENDS/ELBOWS EMERGING FROM UNDERGROUND SHALL BE IMC AND SHALL EXTEND A MINIMUM OF 18" BELOW GRADE.

Q. ALL UNDERGROUND RACEWAYS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM BITUMASTIC.

R. ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATERTIGHT BY USE OF POLYETRA-FLUOROETHYLENE TAPE.

S. THE USE OF AC OR NM CABLE IS NOT PERMITTED.

T. MC CABLE IS NOT ALLOWED, EXCEPT FOR FINAL CONNECTION TO LIGHT FIXTURES. PER NOT 2,N.

3. OUTLET BOXES:

A. JUNCTION AND PULL BOXES SHALL BE CODE GAUGE GALVANIZED STEEL. ACCEPTED MANUFACTURERS SHALL BE STEEL CITY (THOMAS & BETTS), RACO, CROUSE-HINDS, APPLETON (EMERSON), OR APPROVED EQUIVALENT.

B. OUTLET BOXES SHALL NOT BE MOUNTED BACK TO BACK IN COMMON WALLS.

C. ATTACH EMT WITH CONNECTORS HAVING INSULATED THROAT.

D. ATTACH BOXES TO STUD WORK USING CADDY BAR STRAPS THAT CONNECT TO TWO ADJACENT STUDS TO PREVENT TWISTING OF BOX IN WALL.

E. ALL OUTLET BOXES (INCLUDING TELEPHONE, CABLE TV, AND COMPUTER) SHALL HAVE COVER PLATES, BLANK IF NOT USED.

F. ALL EXTERIOR BOXES SHALL BE WATER-TIGHT.

4. CONDUCTORS:

A. CONDUCTORS SHALL BE MANUFACTURED BY SOUTHWIRE (SIMPULL), ENCORE (SUPERSLICK), UNITED COPPER (SLK), CERRO (SLP), OR APPROVED EQUAL, "PRE-LUBRICATED" BY THE MANUFACTURER.

B. ALL CONDUCTORS SHALL BE COPPER, RATED 75° C WET/DRY EXCEPT WHERE OTHERWISE NOTED OR REQUIRED BY U.L. OR OTHER CODES. ALUMINUM CONDUCTOR MAY ONLY BE UTILIZED WHERE NOTED IN THE DRAWINGS.

C. ALL CONDUCTORS SHALL BE SINGLE INSULATED CONDUCTOR, THHN/THWN-2. SIZES #10 AWG AND SMALLER SHALL BE SOLID, SIZES #8 AWG AND LARGER SHALL BE STRANDED.

D. BRANCH CIRCUITS SHALL NOT BE SMALLER THAN #12 AWG. CONTROL WIRING MAY BE #14 AWG.

E. CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 VOLT SYSTEMS. GROUND CONDUCTOR SHALL BE GREEN ON ALL SYSTEMS. ALL CONDUCTOR SIZES SHALL HAVE COLOR-CODED INSULATION. THE USE OF COLORED TAPE ON LARGER WIRE SIZES SHALL NOT BE ALLOWED.

F. INSULATION SHALL BE DUAL RATED TYPE THHN/THWN-2 FOR FEEDERS AND BRANCH CIRCUITS. FIXTURE TAPS SHALL BE #12 THHN/THWN-2 IN FLEX WITH GREEN #12 AWG GROUNDING CONDUCTOR.

G. ALL CONDUCTORS SHALL BE IN CONDUIT.

H. WIRING TO LIGHTING FIXTURES SHALL BE AS REQUIRED BY UL LABEL.

I. MULTI-WIRE BRANCH CIRCUITS SHALL NOT BE ALLOWED.

J. JOINTS IN #10 AWG AND SMALLER SHALL BE MADE UP WITH CRIMPED CONNECTORS WITH INSULATING CAPS (NO TAPE) OR WIRENUTS (MAXIMUM OF 3 CONDUCTORS UNDER ANY CONNECTOR OR WIRENUT). LARGER WIRE SHALL USE SPLIT BOLTS OR BOLTED CLAMPS.

K. ALL WIRING LUGS THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO, BREAKERS, PANELBOARD/SWITCHBOARD LUGS, SAFETY SWITCH LUGS, MOTOR STARTER LUGS, TRANSFORMERS LUGS, WIRING DEVICE TERMINALS, AND ALL EQUIPMENT LUGS/TERMINALS SHALL BE RATED FOR USE WITH 75 DEGREE INSULATED CONDUCTORS AT THEIR 75 DEGREE AMPACITY AND SHALL BE SIZED AND SELECTED TO MATCH THE CONDUCTOR SIZE AND MATERIAL.

L. CIRCUIT JOINTS SHALL NOT BE MADE ON DEVICE TERMINALS.

M. WIRE WITHIN PANELBOARDS SHALL BE NEATLY TRAINED, SQUARED, BUNCHED, AND TAGGED.

N. ALL SYSTEM FURNITURE CONNECTIONS SHALL COMPLY WITH NEC 605.

O. GROUND ALL EQUIPMENT PER NEC ARTICLE 250. BOND WHERE CONDUITS ENTER ENCLOSURES THROUGH CONCENTRIC KNOCKOUTS. ALL FLEX, INCLUDING FIXTURE TAPS, SHALL INCLUDE GREEN GROUNDING CONDUCTOR, #12 AWG MINIMUM. PROVIDE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT AND FOR EACH CIRCUIT, SIZED PER NEC 250-122.

P. ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300-19.

Q. THE ELECTRICAL CONTRACTOR SHALL FOLLOW AND APPLY THE TABLE BELOW, REGARDLESS WHAT THE PANEL SCHEDULE INDICATES, FOR SIZING ALL 120V, 20 AMP BRANCH CIRCUITS (COPPER CONDUCTORS) TO ALLOW A MAXIMUM OF 3% VOLTAGE DROP FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE ON THE BRANCH CIRCUIT AND ACHIEVE A MAXIMUM OF 5% VOLTAGE DROP ACROSS THE ENTIRE BRANCH CIRCUIT:

VOLTAGE	CONDUCTOR LENGTH *	BRANCH CIRCUIT
120	0' - 50'	#12
120	51' - 90'	#10
120	91' - 140'	#8
120	141' - 255'	#6
277	0' - 125'	#12
277	126' - 200'	#10
277	201' - 330'	#8
277	331' - 525'	#6

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

5. WIRING DEVICES:

A. WIRING DEVICES SHALL BE SPECIFICATION GRADE, MINIMUM, EQUAL TO COOPER QUALITY INDICATED BELOW OR AS MANUFACTURED BY HUBBELL, LEGRAND-PASS & SEYMOUR, LEVITON, OR APPROVED EQUAL, UNLESS OTHERWISE NOTED:

SWITCHES (120V) SHALL BE AS FOLLOWS:

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

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

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

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

B. SEE MOUNTING HEIGHT ELEVATION DETAIL FOR STANDARD MOUNTING HEIGHTS OF ALL DEVICES, UNLESS OTHERWISE NOTED.

C. THE COLOR OF ALL WIRING DEVICES (SWITCHES AND RECEPTACLES) SHALL BE AS DIRECTED BY THE ARCHITECT, UNLESS OTHERWISE NOTED. ALL COVER PLATES SHALL BE 302 STAINLESS STEEL. COVER PLATES IN MASONRY WALLS SHALL BE OVERSIZE TYPE.

D. EACH DUPLEX RECEPTACLE INDICATED TO BE ON A DEDICATED CIRCUIT SHALL BE 20 AMP TYPE.

E. ADJACENT DEVICES SHALL HAVE A COMMON WALL PLATE.

F. WEATHERPROOF COVERS SHALL BE "WHILE-IN-USE" SO PLUGS MAY BE INSTALLED WITHOUT COMPROMISING THE WP FUNCTION. COOPER #WIU-2 DOUBLE-GANG WITH CLEAR COVER OR APPROVED EQUAL.

G. A MAXIMUM OF 10 GENERAL PURPOSE RECEPTACLES SHALL BE ON EACH BRANCH CIRCUIT.

H. ALL WALL MOUNTED OCCUPANCY/VACANCY SENSORS/SWITCHES SHALL BE INSTALLED WITH AN EQUIPMENT GROUNDING CONDUCTOR.

I. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8, INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.

J. ALL GFCI RECEPTACLES SHALL HAVE AUTO-MONITORING / SELF-TEST FUNCTION AND REVERSE LINE-LOAD MISFIRE FUNCTION AND MEET ALL REQUIREMENTS OF UL 943 (LATEST EDITION).

K. TAMPER-RESISTANT RECEPTACLES SHALL BE PROVIDED FOR ALL AREAS PER NEC 406.12, INCLUDING DWELLING UNITS, GUEST ROOMS AND GUEST SUITES OF HOTELS AND MOTELS, CHILD-CARE FACILITIES, PRESCHOOL AND EDUCATION FACILITIES, BUSINESS OFFICES/CORRIDORS/WAITING ROOMS AND THE LIKE IN CLINICS/MEDICAL/DENTAL OFFICES AND OUTPATIENT FACILITIES, ASSEMBLY OCCUPANCIES INCLUDING PLACES OF AWAITING TRANSPORTATION/GYMNASIUMS/SKATING RINKS/AUDITORIUMS, AND DORMITORIES/STUDENT HOUSING.

6. SUPPORTS:

A. ALL EQUIPMENT SHALL BE ADEQUATELY SUPPORTED FROM STRUCTURE.

B. INSERTS IN MASONRY SHALL BE LEAD OR FIBER IN DRILLED HOLES, OR CAST IN PLACE.

C. NAILS OR POWDER ACTUATED FASTENERS SHALL NOT BE USED.

D. EMT/IMC/RGS SUPPORTS SHALL BE A MAXIMUM OF 8'-0" APART AND A MAXIMUM OF 3'-0" FROM BOXES.

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

7. PAINTING:

A. SUITABLE FINISH COAT SHALL BE PROVIDED FOR ALL EQUIPMENT. PANEL TUBS, COVERS, ETC. SHALL BE PRIMED AND ENAMELED TO BLEND WITH ADJACENT SURFACES, OR SHALL BE MANUFACTURER'S STANDARD COLOR BAKED ENAMEL FINISH, OR AS DIRECTED BY THE ARCHITECT.

B. CONTRACTOR TO PAINT WHERE EXISTING EXPOSED PANELBOARDS, SURFACE RACEWAY, SURFACE BOXES, ETC. HAVE BEEN REMOVED DURING THE DEMOLITION PHASE, EITHER FOR TEMPORARY WORK OR PERMANENTLY.

8. TELECOMMUNICATIONS:

A. FURNISH A COMPLETE TELEPHONE CONDUIT SYSTEM AS INDICATED ON THE DRAWINGS.

B. TELECOMMUNICATION OUTLETS SHALL CONSIST OF A 4" SQUARE DEEP BOX WITH SINGLE GANG PLASTER RING. PROVIDE BLANK PLATE WITH KNOCKOUTS FOR OUTLETS, AS PERMANENT COVERS WILL BE PROVIDED BY A SEPARATE INSTALLER.

C. PROVIDE MINIMUM 1" RACEWAY, UNLESS OTHERWISE NOTED, FROM EACH BOX TO ABOVE NEAREST ACCESSIBLE CEILING SPACE FOR J-HOOK SYSTEM OR TO CABLE TRAY AS APPLICABLE. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.

D. PROVIDE RACEWAYS FOR ALL EXTERIOR AND/OR EXPOSED LOCATIONS.

E. PROVIDE GROUNDING FOR ALL TELEPHONE/DATA SYSTEMS AND EQUIPMENT PER REQUIREMENTS AND SPECIFICATIONS PROVIDED BY THE OWNERS DESIGNATED VENDOR.

F. ALL LOW-VOLTAGE CABLING SHALL BE PLENUM-RATED.

G. CONTRACTOR SHALL FURNISH AND INSTALL A #6 AWG GREEN INSULATED COPPER WIRE IN CONDUIT FROM THE MAIN ELECTRICAL GROUNDING BAR TO TELECOMMUNICATIONS GROUNDING BUS BAR.

H. PROVIDE MOUNTING BACKBOARDS FOR COMMUNICATIONS EQUIPMENT. BACKBOARDS SHALL BE OF 3/4" TYPE AC, EXTERIOR PLYWOOD, PAINTED BOTH SIDES AND ALL EDGES WITH 2 COATS OF GRAY FLAME RETARDANT PAINT.

9. LIGHTING FIXTURES:

A. TYPES AND MANUFACTURERS ARE SCHEDULED ON THE PLANS. EQUIVALENT FIXTURES BY OTHERS MAY BE SUBMITTED ONLY AS INDICATED ON THE PLANS AND ARE SUBJECT TO THE APPROVAL OF THE OWNER AND ENGINEER.

B. ALL FIXTURES SHALL BE U.L. LISTED AND LABELED.

C. DRIVERS SHALL BE AS INDICATED IN THE LIGHTING FIXTURE SCHEDULE OR AS OTHERWISE NOTED.

D. ALL FIXTURES SHALL BE PROVIDED FOR PROPER VOLTAGE BASED ON THE CIRCUIT ASSIGNMENT INDICATED ON THE PLANS.

E. CATALOG NUMBERS ARE FOR GENERAL IDENTIFICATION OF FIXTURES ONLY. ALL RELATED PARTS, SUCH AS PLASTER RINGS, JUNCTION BOXES, LOUVERS, SHIELDS, MOUNTING STEMS, CANOPIES, CONNECTORS, STRAPS, NIPPLES, HARDWARE, ACCESSORIES, ETC., TO FIT THEM PROPERLY TO THE CONSTRUCTION, SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR. CONTRACTOR SHALL PROVIDE SUITABLE TRIM AND APPURTENANCES TO MOUNT FIXTURES IN TYPE OF CEILING OR WALL AS SPECIFIED IN ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF CATALOG NUMBER GIVEN.

F. ALL FIXTURES SHALL BE GROUNDED PER THE NEC.

G. FIXTURES CONNECTED WITH FLEX TO THE RIGID RACEWAY PORTION OF THE WIRING SYSTEM SHALL CARRY A GREEN BONDING JUMPER WITHIN THE FLEX. THE JUMPER SHALL BE FASTENED TO BOTH THE FIXTURE AND THE RACEWAY SYSTEM WITH A STEEL CITY "G" CLIP OR APPROVED EQUIVALENT. PHASE AND GROUND CONDUCTORS RUN IN FLEX SHALL BE #12 AWG MINIMUM. MAXIMUM FLEX LENGTH SHALL BE 6'-0".

H. MOUNT ALL FIXTURES PLUMB AND SQUARE WITH ROWS ALIGNED.

I. SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF FIXTURES.

J. CONTRACTOR SHALL COORDINATE FIXTURE TYPE AND TRIM WITH CEILING CONSTRUCTION AND ADJUST ACCORDINGLY WITHOUT ADDITIONAL EXPENSE.

K. ALL LIGHTING FIXTURES SHALL BE THERMALLY PROTECTED PER THE NEC.

L. FIXTURES IN CONTACT WITH INSULATION SHALL BE IC RATED.

10. LIGHTING CONTROLS:

A. FURNISH AND INSTALL WHERE SHOWN AN ELECTRONIC TIME CONTROLLER AS MANUFACTURED BY TORK (NSI), PARAGON, INTERMATIC, OR APPROVED EQUAL. CONTACTS SHALL BE SPST OR AS INDICATED, RATED 120V AT 20A BALLAST LOAD, AND MINIMUM 30,000 SWITCHING CYCLES. PROVIDE WITH THE NUMBER OF CHANNELS INDICATED (MINIMUM 2 CHANNELS) OR AS REQUIRED TO MEET THE INTENT OF THE DRAWINGS. EACH CHANNEL SHALL BE INDIVIDUALLY PROGRAMMABLE WITH 128 ON-OFF OPERATIONS PER WEEK PLUS FOUR SEASONAL SCHEDULES TO MODIFY THE BASIC PROGRAM AND A HOLIDAY SCHEDULE THAT OVERRIDES THE WEEKLY OPERATION. THE CONTROLLER SHALL BE PROVIDED WITH A PHOTOELECTRIC SENSOR, ASTRONOMIC DIAL, AND A BATTERY BACKED-UP, NON-VOLITILE MEMORY FOR SCHEDULES AND TIME CLOCK.

B. LIGHTING CONTACTORS SHALL SWITCH LOADS AT THE VOLTAGE AND AMPERE RATING INDICATED AND SHALL HAVE THE NUMBER OF POLES INDICATED ON THE DRAWINGS OR AS REQUIRED. THE CONTACTOR AND CONTACTS SHALL BE CONTINUOUSLY RATED FOR THE LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH-INRUSH BALLAST LOADS.

C. ALL LIGHTING CONTACTORS SHALL BE ELECTRICALLY HELD AND BE INSTALLED IN A NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED.

11. EQUIPMENT IDENTIFICATION:

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

B. NAMEPLATE COLORS SHALL BE AS FOLLOWS:

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

C. NAMEPLATES UP TO 8 SQUARE INCHES SHALL NOT BE LESS THAN 1/16" THICK. NAMEPLATES LARGER THAN 8 SQUARE INCHES SHALL NOT LESS THAN 1/8" THICK.

D. LETTERING HEIGHT SHALL BE 1/2" MINIMUM.

E. NAMEPLATES SHALL BE ATTACHED WITH SELF-DRILLING/SELF-TAPPING SCREWS, EXCEPT RIVETS SHALL BE USED WHERE END OF SCREW IS NOT PROTECTED. QUANTITY AS FOLLOWS:

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

12. DISCONNECTS:

A. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE IN NEMA 1 ENCLOSURES, UNLESS OTHERWISE NOTED, FUSED OR NON-FUSED AS INDICATED. SWITCHES SHALL HAVE REJECTION-TYPE FUSE CLIPS. SWITCHES SHALL BE BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. WHERE FED FROM A LOAD CENTER, GENERAL-DUTY SWITCHES SHALL BE PERMITTED.

B. FUSES LESS THAN 60A SHALL BE CLASS RK5, DUAL-ELEMENT, TIME-DELAY WITH INDICATION

C. FUSES GREATER THAN 60A SHALL BE CLASS J, DUAL-ELEMENT, TIME-DELAY WITH INDICATION.

D. A SET OF 3 SPARE FUSES OF EACH SIZE AND TYPE SHALL BE FURNISHED TO THE OWNER

13. PANELBOARDS:

A. PANELBOARDS SHALL BE PROVIDED AS MANUFACTURED BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. ALL NEW EQUIPMENT FOR THE PROJECT SHALL BE BY THE SAME MANUFACTURER. LOAD CENTER TYPE PANELBOARDS SHALL BE USED WHERE THE PANELBOARD SERVES A DWELLING UNIT.

B. ALL BUSSING, INCLUDING NEUTRAL AND GROUND, SHALL BE COPPER.

C. ALL BREAKERS SHALL BE AUTOMATIC THERMAL-MAGNETIC TYPE MOLDED CASE BOLT-ON TYPE, CALIBRATED FOR 40 DEGREE C, OR AMBIENT COMPENSATION, UNLESS OTHERWISE NOTED.

D. PANELS SHALL BE FULLY RATED (AIC). NO SERIES AIC RATINGS ARE ALLOWED.

E. PANELS SHALL HAVE FULL SIZE EQUIPMENT GROUNDING BARS AND NEUTRAL BARS, EXCEPT WHERE INDICATED TO BE 200%.

F. ALL PANELBOARD AND BREAKER LUGS SHALL BE SIZED AND RATED PER THE CONDUCTOR SIZE AND MATERIAL.

G. LIGHTING AND APPLIANCE PANELS (100A-600A) SHALL HAVE FRONT ACCESSIBLE HINGED DOOR-IN-DOOR COVERS WITH DEAD FRONT, SHALL BE 20" WIDE MINIMUM WITH MINIMUM 4" WIDE WIRING GUTTERS.

H. DISTRIBUTION PANELS (600A-1200A) SHALL HAVE FRONT ACCESSIBLE DEAD FRONT COVERS.

I. PROVIDE HANDLE LOCK-ON DEVICES FOR ALL CIRCUIT BREAKERS CONNECTED TO EMERGENCY, EXIT, NIGHT LIGHTING, FIRE ALARM, TELEPHONE BOARDS, AND SECURITY SYSTEMS.

J. BREAKERS USED FOR SWITCHING SHALL BE SWITCHING DUTY (SWD) RATED.

K. BREAKERS USED FOR HEATING, AIR-CONDITIONING AND/OR REFRIGERATION SHALL BE HACR RATED.

L. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8, INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.

M. ALL OVERCURRENT DEVICES WHICH COMPRISE THE EMERGENCY SYSTEM OR LEGALLY REQUIRED STANDBY SYSTEM SHALL BE SELECTIVELY COORDINATED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE MANUFACTURER DOCUMENTATION INDICATING COMPLIANCE WITH THE SELECTIVE COORDINATION REQUIREMENTS PER THE NEC.

O. ALL PANELBOARDS SHALL HAVE METAL DIRECTORY FRAME. FOR EACH PANELBOARD, PROVIDE TYPED CIRCUIT DIRECTORY PER NEC 408.4. SPARE CIRCUIT BREAKERS SHALL BE LABELED SPARE AND IN THE OFF POSITION.

P. ALL CIRCUIT BREAKERS RATED 1200A OR HIGHER, OR CAPABLE OF BEING RATED 1200A OR HIGHER (I.E. ADJUSTABLE LONG-TIME PICKUP OR REPLACEABLE TRIP/RATING PLUG), SHALL BE PROVIDED WITH AN ENERGY-REDUCING MAINTENANCE SWITCH WITH LOCAL STATUS INDICATOR PER NEC 240.87(B).

Q. ALL GROUNDING TERMINAL BUSSES OF PANELBOARDS SERVING THE SAME PATIENT VICINITY SHALL BE BONDED TOGETHER WITH 1#10 AWG GREEN INSULATED COPPER GROUNDING CONDUCTOR. THE CONDUCTOR SHALL BE CONTINUOUS EXCEPT THAT IT MAY BE BROKEN AT THE PANELBOARD GROUND BAR IN ORDER TO TERMINATE.

14. FIRE STOPPING:

A. ALL PENETRATIONS OF RATED ASSEMBLIES SHALL BE SEALED WITH RATED MATERIALS MEETING ASTM E-814.

B. PROVIDE FIRESTOPPING DEVICE(S) OR SYSTEM(S) WHICH HAVE BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E-814. INSTALL THE DEVICE(S) OR SYSTEM(S) IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE THE APPROPRIATE DEVICE(S) OR SYSTEM(S) WITH AN 'F' RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED.

C. DEVICE(S) AND/OR SYSTEM(S) SHALL BE BY HILTI, 3M OR EQUIVALENT.

15. SEISMIC:

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

16. ELECTRICAL COORDINATION WITH OTHER TRADES:

A. THE ELECTRICAL CONTRACTOR SHALL CONNECT AND/OR PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT SUPPLIED BY OTHERS APPLICABLE TO THE PROJECT, INCLUDING BUT NOT LIMITED TO, MECHANICAL, PLUMBING, FIRE PROTECTION AND SUPPRESSION, OWNER FURNISHED, KITCHEN, LABORATORY, ETC. UNLESS OTHERWISE NOTED.

B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH-IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.

C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL MOTOR STARTER SWITCHES, DISCONNECT SWITCHES, RECEPTACLES, ETC. TO MECHANICAL AND PLUMBING EQUIPMENT. ALL STARTERS, OTHER THAN MANUAL STARTER SWITCHES, SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY THE ELECTRICAL CONTRACTOR.

D. ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO ORDERING OR INSTALLING. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF LACK OF COORDINATION WILL BE REMOVED AND INSTALLED CORRECTLY AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.

E. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT RUNS AND LIGHT FIXTURE LOCATIONS ABOVE THE CEILING WITH OTHER TRADES PRIOR TO INSTALLATION.

F. ALL DUCT SMOKE DETECTORS SHALL BE PROVIDED AND CONNECTED BY THE ELECTRICAL CONTRACTOR, BUT INSTALLED BY THE MECHANICAL CONTRACTOR.

G. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY OUTLETS FOR HEAT TAPE CONNECTIONS FOR MECHANICAL SYSTEMS. PROVIDE CLASS B (30mA) GFCI PROTECTION ON THE BREAKER SUPPLYING THE HEAT TAPE.

H. THE ELECTRICAL CONTRACTOR SHALL PROVIDE 120V POWER AT EACH HVAC UNIT HAVING A CONTROLS POWER SUPPLY. CIRCUIT(S) SHALL BE DEDICATED 20A SERVING A MAXIMUM OF 10 HVAC UNITS PER CIRCUIT. COORDINATE ALL LOCATIONS WITH THE MECHANICAL CONTRACTOR.

17. DEMOLITION NOTES:

A. PARTIAL AND TOTAL DEMOLITION OF PORTIONS SHALL BE PERFORMED ALONG WITH ALL NECESSARY MODIFICATIONS TO THAT PORTION OF THE EXISTING BUILDING WHICH SHALL REMAIN SO THAT IT CONTINUES TO FUNCTION UNAFFECTED BY THE DEMOLITION AND ASSOCIATED NEW CONSTRUCTION.

B. WHERE INCLUDED AS PART OF THE CONTRACT DOCUMENTS, THE DRAWINGS INDICATE THE GENERAL AREAS OF WORK INVOLVED. HOWEVER, THE ELECTRICAL CONTRACTOR SHALL PERFORM WORK OUTSIDE THOSE AREAS SHOWN AS IS NECESSARY TO COMPLY WITH THE INTENT OF THIS SECTION.

C. THE ELECTRICAL CONTRACTOR SHALL FAMILIARIZE THEMSELVES WITH THE EXISTING BUILDING AND WITH THE WORK OF ALL OTHER TRADES AND INCLUDE ALL WORK NECESSARY TO COMPLY WITH THE INTENT OF THE DEMOLITION.

D. IT SHALL BE UNDERSTOOD THAT FIELD CONDITIONS MAY BE ENCOUNTERED DURING THE EXECUTION OF THIS CONTRACT WHICH WILL REQUIRE EXTENSION OR RELOCATION OF EXISTING SYSTEMS OR EQUIPMENT WHICH ARE NOT SPECIFICALLY SHOWN ON THE DRAWINGS, BUT WHICH ARE REQUIRED TO MEET THE STATED INTENT THAT THE BUILDING CONTINUE TO FUNCTION UNAFFECTED BY THE DEMOLITION AND ASSOCIATED NEW CONSTRUCTION. THE ELECTRICAL CONTRACTOR SHALL INCLUDE SUCH WORK AS WOULD NORMALLY BE EXPECTED IN AN EXISTING BUILDING OF THIS AGE AND TYPE.

E. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL TOOLS, EQUIPMENT, LABOR, ETC. IN ORDER TO ACCOMPLISH THE DEMOLITION PORTION OF THE PROJECT.

F. THE DEMOLITION OF CERTAIN AREAS OF THE EXISTING BUILDING SHALL BE PERFORMED BY THE GENERAL CONTRACTOR. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE GENERAL CONTRACTOR TO DIFFERENTIATE THE SCOPE OF WORK BETWEEN SEPARATE TRADES.

G. THE ELECTRICAL CONTRACTOR SHALL INCLUDE COORDINATION WITH THE GENERAL CONTRACTOR AND SUCH DEMOLITION OF THE EXISTING ELECTRICAL SYSTEMS AS IS NECESSARY SO THAT THE DEMOLITION WORK OF THE GENERAL CONTRACTOR SHALL NOT DAMAGE THOSE PORTIONS OF THE ELECTRICAL SYSTEMS WHICH ARE TO REMAIN IN SERVICE, ARE TO BE REUSED, OR ARE TO BECOME THE PROPERTY OF THE OWNER.

H. TURN OVER TO OWNER, UPON REQUEST OR AS NOTED, ITEMS SHOWN AS BEING REMOVED AND NOT REINSTALLED. ITEMS NOT DIRECTED OR REQUESTED TO BE TURNED OVER TO THE OWNER SHALL BE DISPOSED OF BY THE ELECTRICAL CONTRACTOR.

I. EQUIPMENT OR MATERIALS WHICH ARE TO BE REUSED OR TURNED OVER TO THE OWNER SHALL BE CAREFULLY REMOVED, CLEANED, AND STORED IN A CLEAN AND DRY AREA. SHOULD THE ELECTRICAL CONTRACTOR ENCOUNTER SUCH EQUIPMENT WHICH IS NOT IN SATISFACTORY CONDITION FOR REUSE AND NOT IN WORKING ORDER, THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IMMEDIATELY.

J. DISCONNECT ELECTRICAL SERVICES TO ALL EQUIPMENT REQUIRING REMOVAL. CONDUIT SHALL BE REMOVED BACK TO THE POINT WHERE IT WILL BE CONCEALED AT THE COMPLETION OF THIS CONTRACT. WIRE AND CABLE SHALL BE REMOVED BACK TO THE FIRST OUTLET BOX, CABINET, OR TERMINATION POINT WHICH IS TO REMAIN. CIRCUITS WHICH ARE NOT REUSED SHALL BE REMOVED BACK TO THE SOURCE IN THEIR ENTIRETY.

K. REMOVE AND REINSTALL CEILINGS IN THE EXISTING BUILDING AS REQUIRED FOR THE WORK. COORDINATE WITH THE GENERAL CONTRACTOR. IN SUCH AREAS, REMOVE AND REINSTALL ALL ELECTRICAL DEVICES WHICH ARE TO REMAIN IN OR ON THE CEILING.

L. WHERE NEW CEILINGS CONFLICT WITH EXISTING ELECTRICAL WORK WHICH IS TO REMAIN, RELOCATE THE ELECTRICAL WORK INVOLVED TO CLEAR THE NEW CONSTRUCTION.

M. WHERE NEW WALL OR FLOOR FINISHES CONFLICT WITH EXISTING ELECTRICAL WORK WHICH IS TO REMAIN, RELOCATE THE ELECTRICAL WORK INVOLVED OR PROVIDE BOX EXTENSIONS OR SIMILAR DEVICES AND REINSTALL ON THE NEW FINISH.

N. WHERE EXISTING BRANCH CIRCUITS AND SYSTEMS ARE INTERRUPTED BY NEW WORK OR SYSTEMS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, ETC.), EXTEND AND RECONNECT THOSE EXECUTION OF THIS CONTRACT, PROVIDE TEMPORARY CONNECTIONS UNTIL FINAL CONNECTIONS ARE COMPLETE.

18. COORDINATION DRAWINGS:

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

1. ALL SHOP AND COORDINATION DRAWINGS WILL BE 1/4"=1'-0" SCALE.
2. DRAWINGS WILL BE ORIGINAL DRAWINGS AND NOT OVERLAYS OF THE CONTRACT/DESIGN DRAWINGS.
3. COORDINATION DRAWINGS WILL BE DRAWN ON REPRODUCIBLE MATERIAL 48"x36".
4. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
5. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPILED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, FIRE PROTECTION, IT/DATA, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.

19. TESTING AND DOCUMENTATION:

A. TESTING AND DOCUMENTATION SHALL BE PROVIDED AS FOLLOWS:

1. GFCI EQUIPPED BREAKERS SHALL BE PERFORMANCE TESTED.
2. LIGHTING CONTROL SYSTEMS SHALL BE TESTED FOR PROPER OPERATION OF SETPOINTS.

20. COMMISSIONING:

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

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No.	Date	Description

ISSUE DATE: 07-26-24
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ELECTRICAL
SPECIFICATIONS

E-002

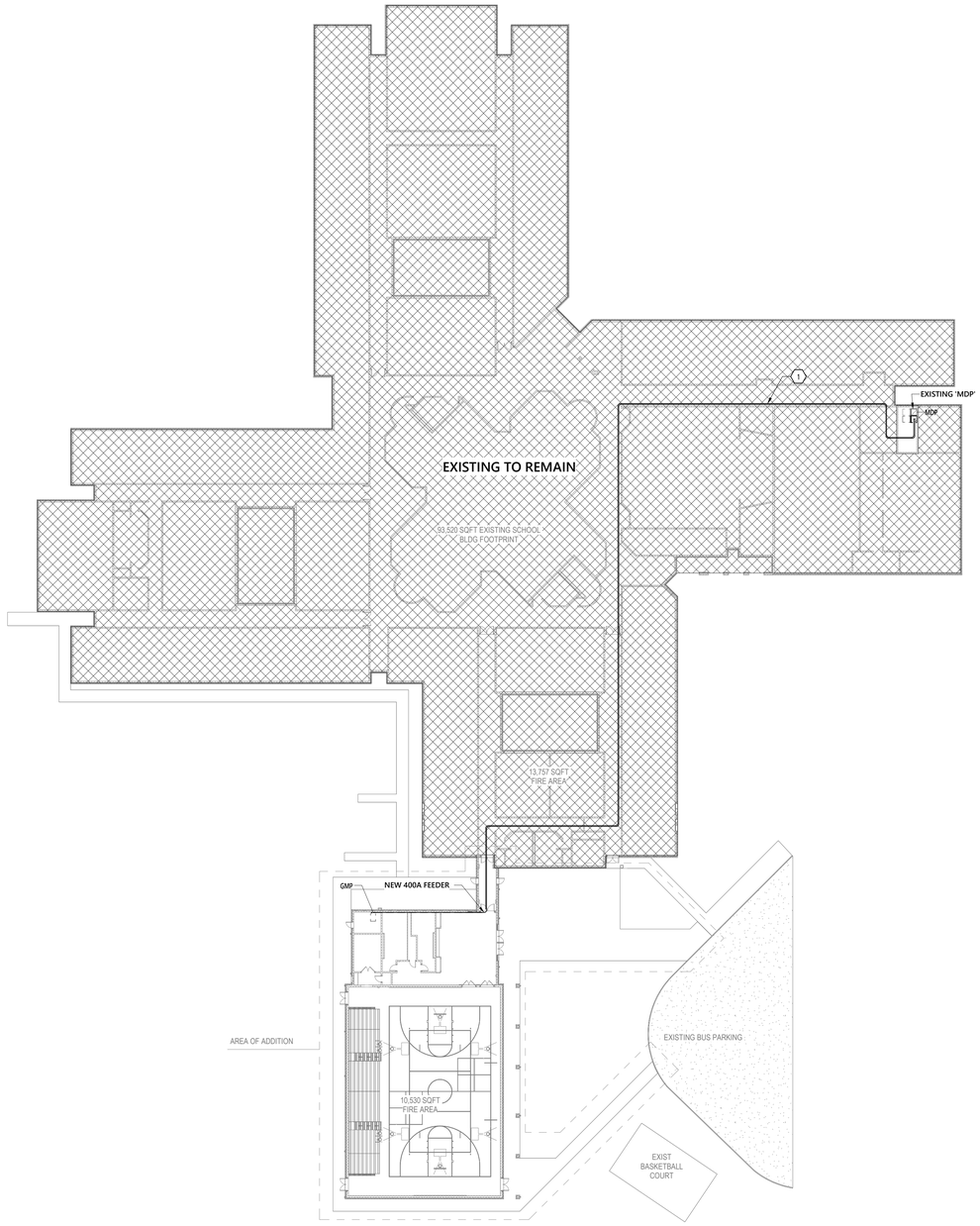
WALL LEGEND	
SYMBOL	DESCRIPTION
	1 HR FIRE RATED
	2 HR FIRE RATED

GENERAL NOTES - SITE PLAN

A. ALL LIGHTING AND POWER CONDUCTORS SHALL BE INSTALLED BETWEEN 24" (MINIMUM) AND 36" (MAXIMUM) BELOW FINISHED GRADE.
B. ALL COMMUNICATIONS CONDUIT AND CABLES SHALL BE INSTALLED 36" (MINIMUM) BELOW FINISHED GRADE.
C. ALL CONDUCTORS FOR EXTERIOR LIGHTING AND POWER CIRCUITS SHALL BE #10 AWG MINIMUM.
D. PROVIDE TRANSFORMER BASE AT ALL POLE MOUNTED FIXTURES, TAP 2 LEGS OF THREE PHASE FEEDER (CIRCUITS DENOTED), PROVIDE BALLAST FUSES AT TAP, AND PROVIDE BRANCH CIRCUITS TO FIXTURES.

KEYNOTES

1 G.C. TO COORDINATE CONNECTION TO EXISTING SERVICE WITH SCHOOL ACTIVITIES. PATCH AND REPAIR EXISTING WALLS AND CEILING AS NEEDED TO RUN NEW FEEDER.



1 OVERALL ELECTRICAL PLAN
1" = 30'-0"

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OVERALL ELECTRICAL PLAN

E-010

Sheet No. 3 of 12

OPTIMA# 24-0045R

WALL LEGEND

SYMBOL	DESCRIPTION
	1 HR FIRE RATED
	2 HR FIRE RATED

GENERAL NOTES - LIGHTING

A. ALL RECESSED LIGHTING FIXTURES IN LAY-IN CEILINGS 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 MAIN ENERGIZED.
E. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHTS TO REMAIN.
F. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

KEYNOTES

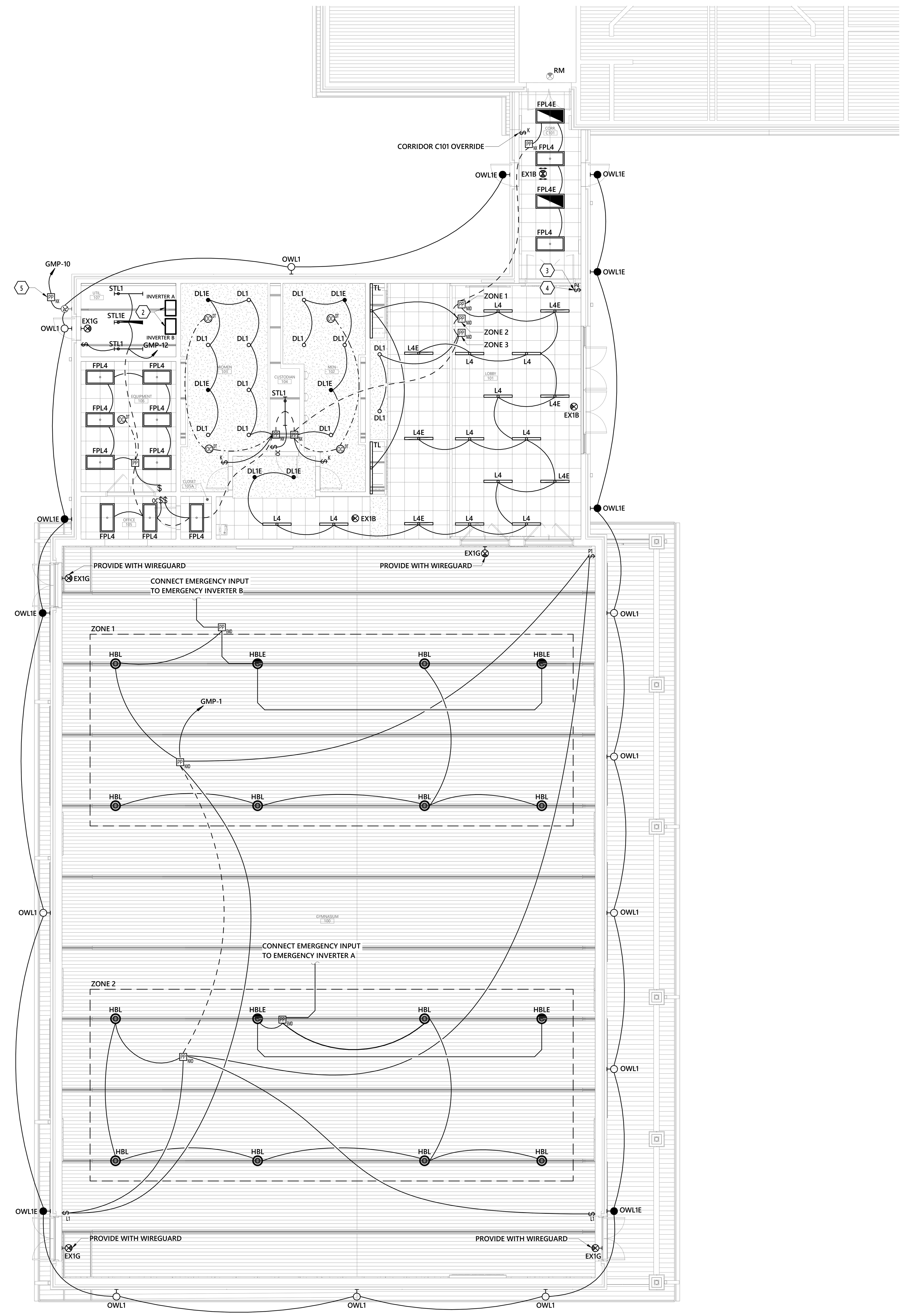
1 DISCONNECT AND REMOVE EXTERIOR LIGHTING FIXTURE. ELECTRICAL CONTRACTOR SHALL RETAIN CIRCUIT CONTINUITY TO ENSURE PROPER OPERATION OF ALL FIXTURES OUTSIDE SCOPE OF WORK WHICH ARE CONNECTED TO EXISTING CIRCUIT.

2 PROVIDE 500VA EMERGENCY INVERTER WITH 90 MINUTES OF BATTERY BACKUP TO PROVIDE EMERGENCY BACKUP POWER FOR GYM HIGH BAY FIXTURES. LIGHTS SHALL BE CONTROLLED BY ADDRESSABLE LIGHTING CONTROL SYSTEM DURING NORMAL OPERATION. UPON POWER FAILURE, LIGHTS SHALL TURN ON AT FULL BRIGHTNESS.

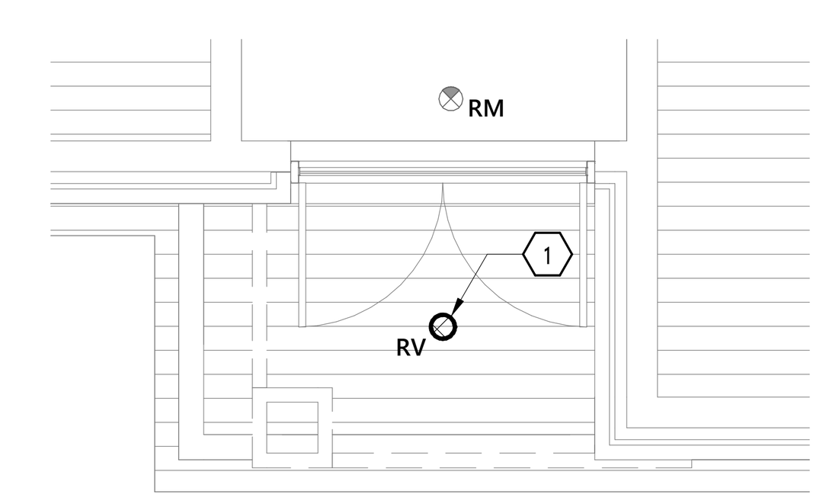
3 3 ZONE OVERRIDE SWITCH. DIMMING CONTROL FOR 3 ZONES IN LOBBY 101:
ZONE 1: TYPE 'L4', 'L4E', AND 'DL1E' FIXTURES IN MAIN LOBBY AREA AND RESTROOM HALLWAY.
ZONE 2: TYPE 'TL' FIXTURES IN TROPHY CASEWORK.
ZONE 3: TYPE 'DL1' FIXTURES IN MAIN LOBBY AREA.

4 PROVIDE LABELS INDICATING ZONES SERVED BY OVERRIDE SWITCH IN LOBBY 101:
ZONE 1: "LOBBY"
ZONE 2: "TROPHY"
ZONE 3: "BENCH"

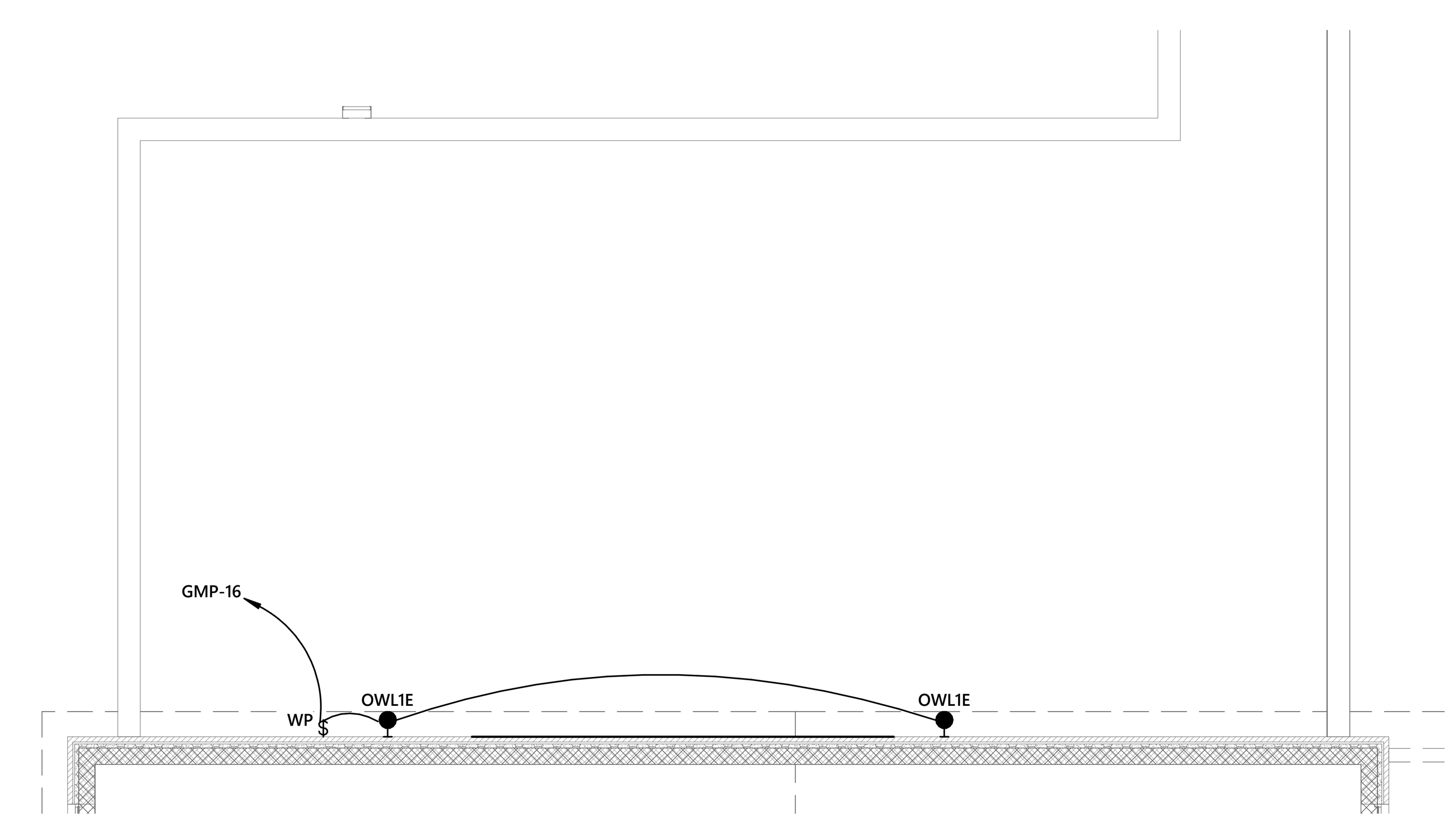
5 LOCATE POWER PACK IN ELECTRICAL ROOM ADJACENT TO PANEL SERVING EXTERIOR LIGHTING.



1 ADDITION LIGHTING PLAN
1/8" = 1'-0"



2 ENLARGED LIGHTING DEMOLITION PLAN
1/4" = 1'-0"



3 ADDITION LIGHTING PLAN - ROOF
1/8" = 1'-0"

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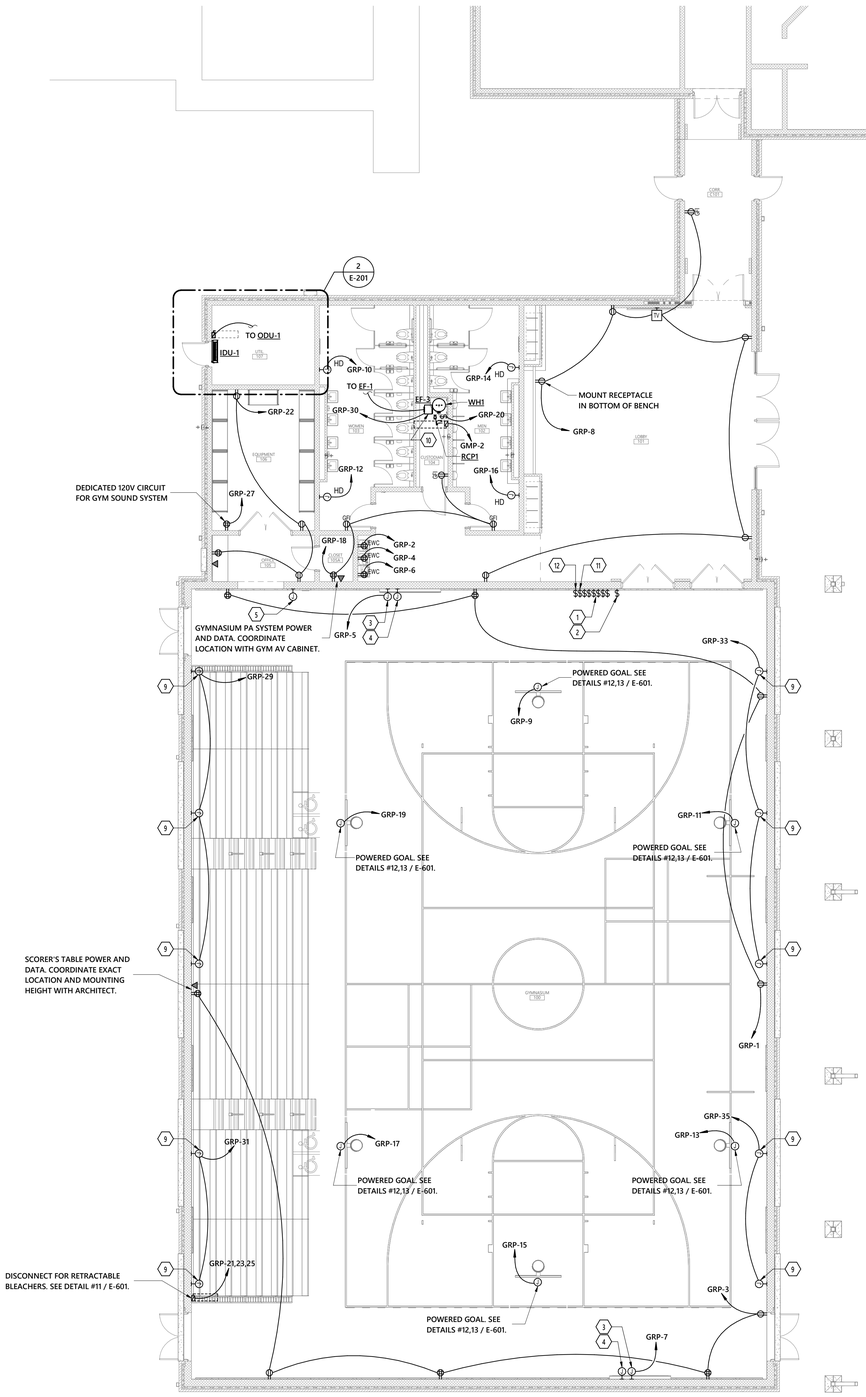
ADDITION LIGHTING PLAN

E-101



WALL LEGEND

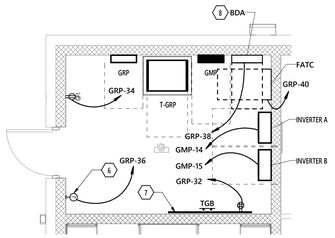
SYMBOL	DESCRIPTION
	1 HR FIRE RATED
	2 HR FIRE RATED

GENERAL NOTES

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

KEYNOTES

1 KEYED SWITCH FOR MOTORIZED GOALS. TYPICAL OF 6. SEE DETAILS 12, 13 / SHEET E-601.
2 KEYED IN/OUT/STOP SWITCH FOR MOTORIZED BLEACHER CONTROL. SEE DETAIL 11 / SHEET E-601.
3 120V CONNECTION TO SCOREBOARD. COORDINATE WITH SCOREBOARD INSTALLER PRIOR TO ROUGH-IN.
4 PROVIDE DOUBLE GANG JUNCTION BOX FOR SCOREBOARD. PROVIDE 1-1/2"C FROM JUNCTION BOX TO CONTROLLER JACK LOCATION. COORDINATE WITH SCOREBOARD INSTALLER PRIOR TO ROUGH-IN.
5 SCOREBOARD CONTROLLER JACK. PROVIDE 4" SQUARE BOX WITH A SINGLE GANG OPENING AND PLASTER RING. COORDINATE WITH SYSTEMS CONTRACTOR.
6 PROVIDE 120V CONNECTION FOR MECHANICAL CONTROLS. COORDINATE WITH MECHANICAL CONTROLS CONTRACTOR PRIOR TO ROUGH-IN.
7 PROVIDE 3/4" FIRE RETARDANT PLYWOOD BACKBOARD FROM FLOOR TO CEILING INSTALLED VERTICALLY STARTING AT 6" AFF. PAINT WITH TWO COATS OF COLOR WHITE FIRE RETARDANT PAINT.
8 CONRACTOR SHALL FIELD VERIFY EXISITNG CONDITION AND INCLUDE IN BID ALL CONDUCTORS, CABLING, CONDUIT, AND EQUIPMENT FOR A FULLY FUNCTIONING EMERGENCY RESPONDER RADIO AMPLIFICATION SYSTEM.
9 120V CONNECTION FOR GYMNASIUM MOTORIZED SHADES. COORDINATE EXACT REQUIREMENTS WITH SHADE INSTALLER AND ARCHITECT PRIOR TO ROUGH-IN.
10 INTERLOCK FAN WITH LIGHTING CONTROLS IN THIS ROOM. PROVIDE RELAY TO INTERLOCK 277V LIGHTING CONTROLS WITH 120V FAN.
11 RAISE/LOWER/STOP SWITCH FOR PLAN EAST GYM MOTORIZED SHADES. COORDINATE EXACT REQUIREMENTS WITH SHADE INSTALLER PRIOR TO ROUGH-IN. ROUTE CONDUIT TO SHADE CONTROLLER.
12 RAISE/LOWER/STOP SWITCH FOR PLAN WEST GYM MOTORIZED SHADES. COORDINATE EXACT REQUIREMENTS WITH SHADE INSTALLER PRIOR TO ROUGH-IN. ROUTE CONDUIT TO SHADE CONTROLLER.



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

2 ENLARGED UTIL. 107 POWER PLAN
1/4" = 1'-0"

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ADDITION POWER PLAN

E-201

Sheet No. 5 of 12

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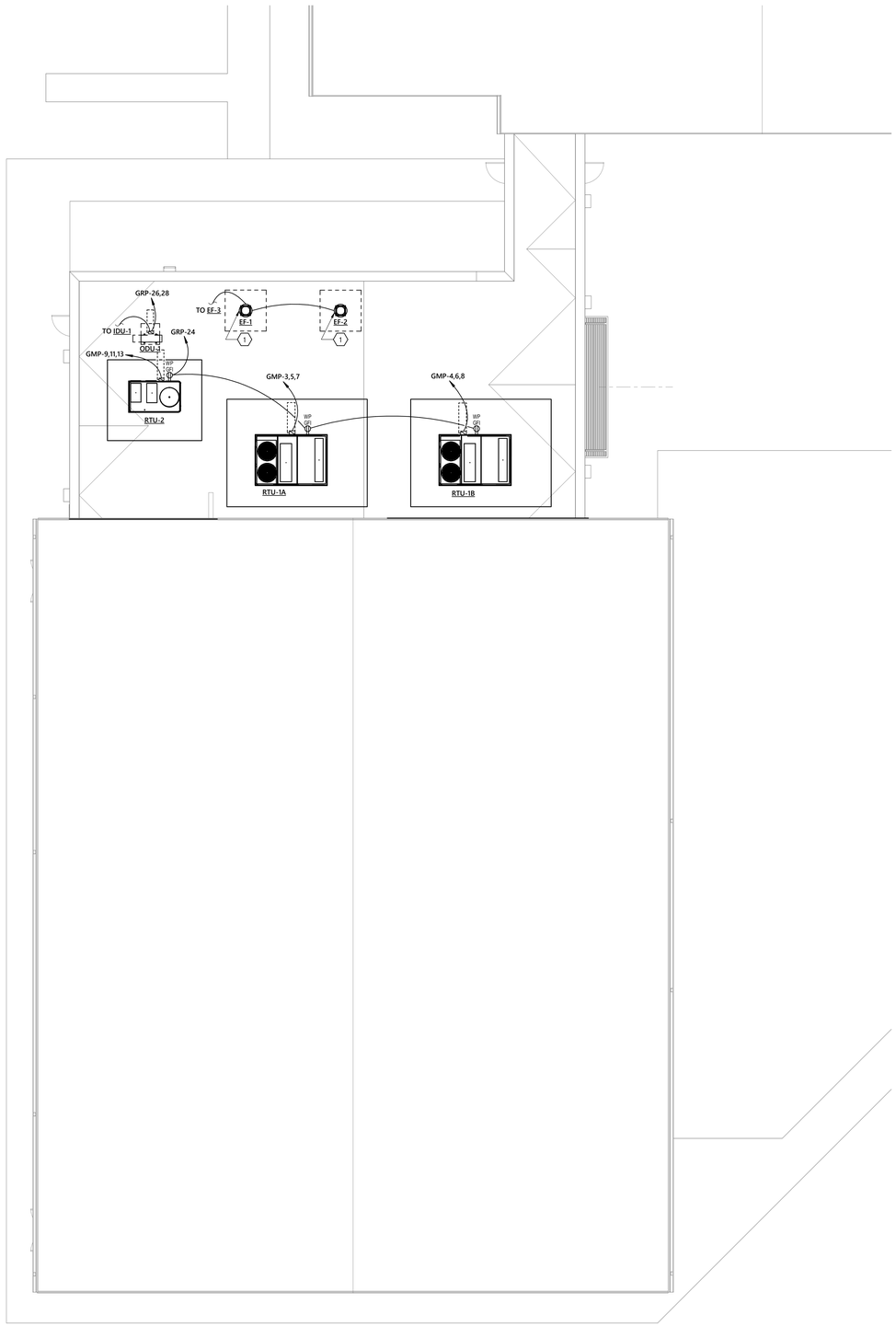

1 ADDITION ROOF EQUIPMENT CONNECTIONS PLAN
1/8" = 1'-0"

WALL LEGEND	
SYMBOL	DESCRIPTION
	1 HR FIRE RATED
	2 HR FIRE RATED

GENERAL NOTES

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

KEYNOTES (#)

1 INTERLOCK FAN WITH LIGHTING CONTROLS IN THE ROOM BELOW. PROVIDE RELAY TO INTERLOCK 277V LIGHTING CONTROLS WITH 120V FAN.

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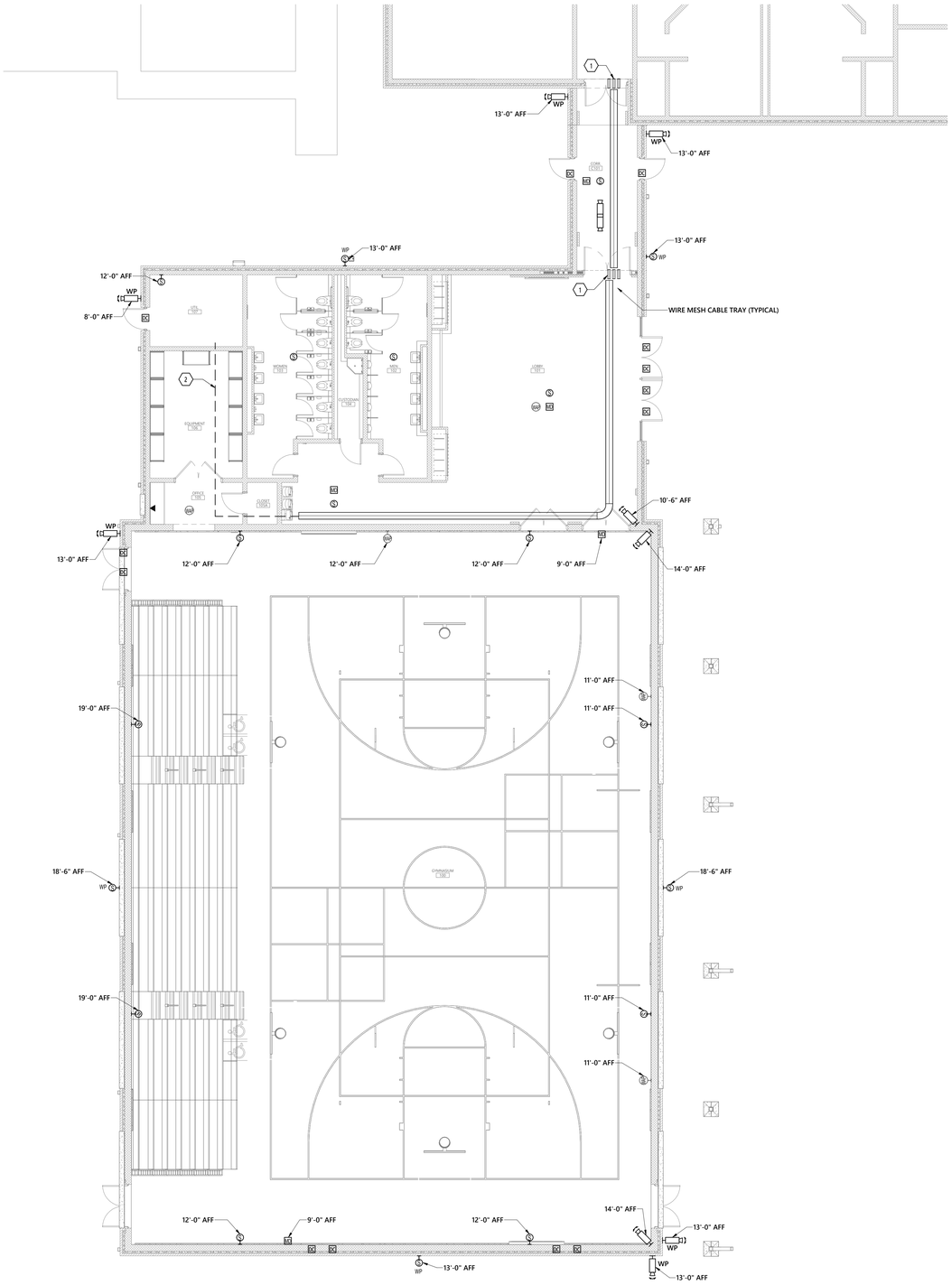
ADDITION ROOF EQUIPMENT CONNECTIONS PLAN

E-301

Sheet No. 6 of 12

OPTIMA# 24-0045R



1 ADDITION SPECIAL SYSTEMS PLAN
1/8" = 1'-0"

WALL LEGEND	
SYMBOL	DESCRIPTION
	1 HR FIRE RATED
	2 HR FIRE RATED

GENERAL NOTES

A. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING ALL ELECTRICAL ITEMS SHOWN ON THE DRAWINGS, EXCEPT ITEMS LISTED ON SHEET E0.01 GENERAL ELECTRICAL NOTES.

KEYNOTES

1 PROVIDE (3) 4" X 4" EZ-PATH FIRE RATED PATHWAYS THROUGH FIRE RATED WALL. PROVIDE GROUNDING BUSHING FOR ALL PATHWAYS AND CONNECT TO GROUND BUS BAR WITH #6 AWG CONDUCTOR.
2 ROUTE (2) 4" CONDUITS FROM CABLE TRAY TO PLYWOOD BACKBOARD.

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LILLINGTON-SHAWTOWN ELEMENTARY ADDITION

Harnett County Schools

855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

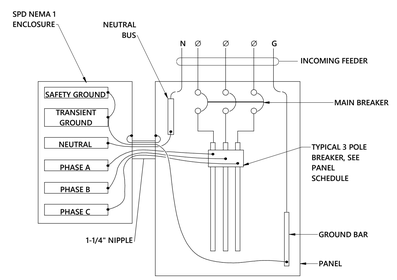
ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ADDITION SPECIAL SYSTEMS PLAN

E-401

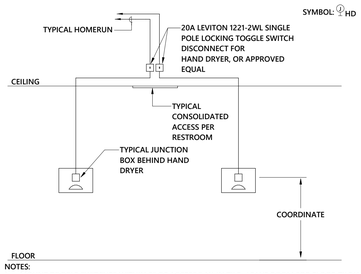
Sheet No. 7 of 12

OPTIMA# 24-0045R



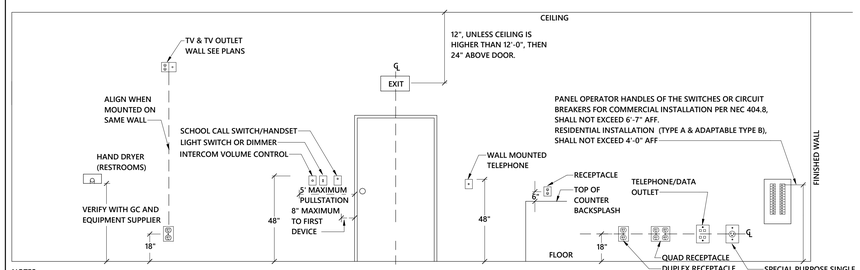
NOTES:
1. ALL WIRING SHALL BE #6 AWG.
2. AVOID SHARP BENDS IN WIRES. ALL WIRE LENGTHS SHALL NOT EXCEED 18" (WHERE POSSIBLE).
3. SEE SPD SPECIFICATION FOR EXACT TYPE FOR LOCATION AS INDICATED ON THE POWER RISER DIAGRAM.

3 SPD CONNECTION DETAIL
NOT TO SCALE



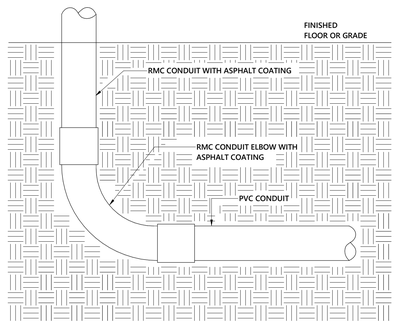
NOTES:
1. MOUNT TOGGLE SWITCHES WITHIN 8" OF ACCESS/LAY-IN TILE. LEAVE ROOM FOR FLOOR TILE/ACCESS PANEL MOVEMENT.
2. PROVIDE ACCESS PANEL FOR NON-ACCESSIBLE CEILING TYPES. COORDINATE WITH G.C. FOR TYPE (MATCH PROJECT ACCESS PANEL TYPES WHEN PROVIDED.) COORDINATE EXACT LOCATION WITH ARCHITECT IN FIELD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

2 HAND DRYER LAYOUT DETAIL
NO SCALE

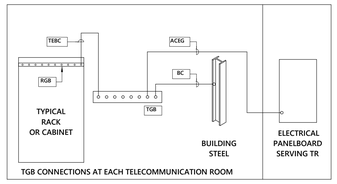


NOTES:
1. LOCATIONS WHERE TV MOUNT IS BACK TO BACK ON SAME WALL, AN OFFSET OF 8-12" WILL BE NEEDED FOR INSTALLATION OF JACK/RECEPTACLE.
2. DEVICES ABOVE COUNTER TOPS SHALL BE A MAXIMUM OF 48" TO TOP OF DEVICE. DEVICES REQUIRED TO BE ADA ACCESSIBLE SHALL BE INSTALLED PER ANSI A117.1.
3. DEVICES NEXT TO DOOR EXIT SHALL BE WITHIN 8" (MAXIMUM) TYPICAL OF DOOR UNLESS OBSTACLES SUCH AS SIDELITES, ETC.
4. DEVICES REQUIRED TO BE ADA ACCESSIBLE SHALL BE INSTALLED PER ANSI A117.1.

1 MOUNTING HEIGHTS OF DEVICES - ELEVATION
NOT TO SCALE



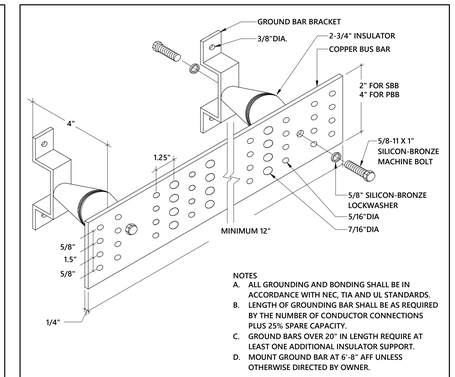
6 CONDUIT TRANSITION DETAIL
NO SCALE



TGB CONNECTIONS AT EACH TELECOMMUNICATION ROOM

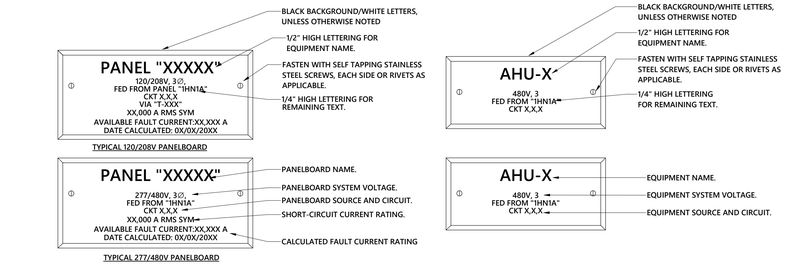
TELECOMMUNICATIONS GROUNDING LEGEND
A. ALL CONDUCTORS SHALL BE GREEN INSULATED OR BARE STRANDED ALL-COPPER CONDUCTORS
B. INSTALLATION SHALL BE PER ANSI/TIA-607-B STANDARDS
TGB TELECOMMUNICATIONS GROUND BAR MOUNTED ON BACKBOARD. BY ELECTRICAL CONTRACTOR.
RGB RACK GROUNDING BUSBAR MOUNTED IN EACH RACK AND/OR CABINET. BY DIVISION 27 CONTRACTOR.
TEBC TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR. MINIMUM #6 AWG GROUND. BY ELECTRICAL CONTRACTOR.
BC BONDING CONDUCTOR. MINIMUM #6 AWG GROUND. BY ELECTRICAL CONTRACTOR.
ACEG ALTERNATING CURRENT EQUIPMENT GROUND. MINIMUM #6 AWG GROUND. BY ELECTRICAL CONTRACTOR.

5 TYPICAL TELECOMMUNICATIONS GROUND BAR CONNECTIONS FOR TELECOMMUNICATIONS ROOM
NO 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.

4 TELECOMMUNICATIONS GROUNDING BAR DETAIL
NO SCALE

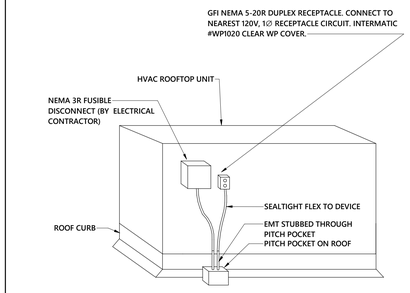


PANELBOARD NAMEPLATES

EQUIPMENT NAMEPLATES

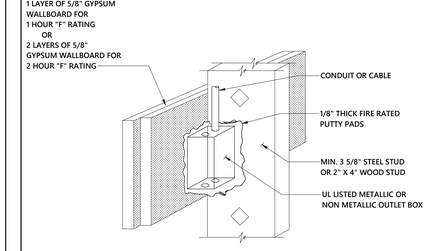
NOTES:
1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS, COLORS, ETC.
2. PROVIDE SHORT-CIRCUIT CURRENT RATING AND AVAILABLE FAULT CURRENT ON EACH NON-DWELLING SERVICE EQUIPMENT NAMEPLATE.

9 TYPICAL NAMEPLATE DIAGRAM
NOT TO SCALE



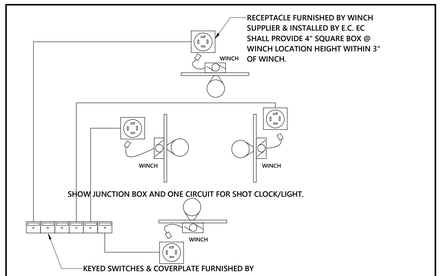
NOTE: TYPICAL FOR ROOF MOUNTED HVAC EQUIPMENT.

8 ROOFTOP RECEPTACLE DETAIL
NOT TO SCALE



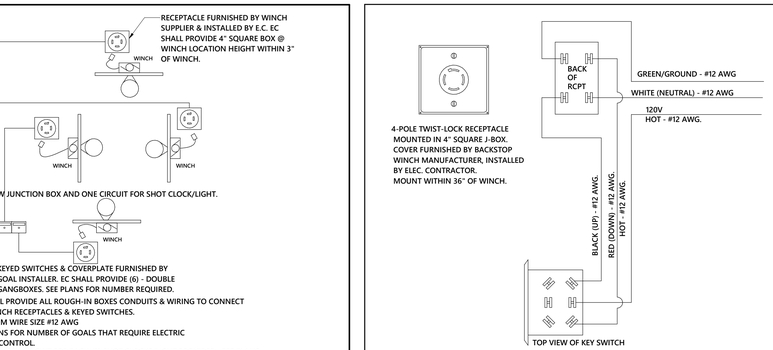
NOTES:
1. REQUIRED FOR METALLIC AND NON-METALLIC ELECTRICAL BOXES EXCEEDING 16 SQ. INCHES IN AREA OR MULTIPLE BOXES SERVING SAME SPACE.
2. REQUIRED FOR BACK TO BACK BOXES IN THE SAME STUD CAVITY.
3. REQUIRED FOR BOXES EXCEEDING 100 SQ INCHES TOTAL IN 100 SQ FEET OF WALL AREA.
4. THE USE OF PUTTY PADS ADHERENCE IS AT THE DISCRETION OF THE LOCAL AUTHORITY HAVING JURISDICTION.
5. REFER TO UL LISTING OF WALL FOR ADDITIONAL RESTRICTIONS OR INFORMATION.

7 WALL OUTLET DETAIL
NOT TO SCALE



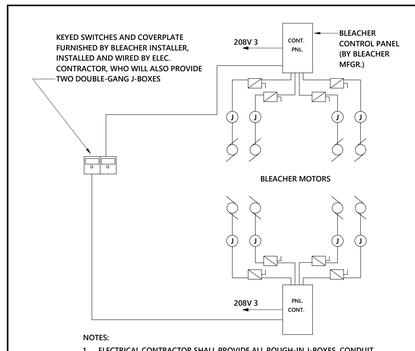
NOTES:
1. EC SHALL PROVIDE ALL ROUGH-IN BOXES CONDUITS & WIRING TO CONNECT THE WINCH RECEPTACLES & KEYED SWITCHES.
2. MINIMUM WIRE SIZE #12 AWG
3. SEE PLANS FOR NUMBER OF GOALS THAT REQUIRE ELECTRIC WINCH CONTROL.
4. PROVIDE 120V CIRCUIT FOR EACH (2) SHOT CLOCKS/LIGHT PROVIDED. SEE PLANS FOR GOAL LOCATIONS. SHOT CLOCKS ARE AT EACH MAIN BASKETBALL GOAL.
5. PROVIDE INTERLOCKING SWITCH SO THAT GOALS LOCATED NEAR BLEACHERS ARE NOT EXTENDED WHEN BLEACHERS ARE EXTENDED. COORDINATE WITH BLEACHER AND BASKETBALL GOAL MANUFACTURER.

13 BASKETBALL GOAL SWITCH RISER
NO SCALE



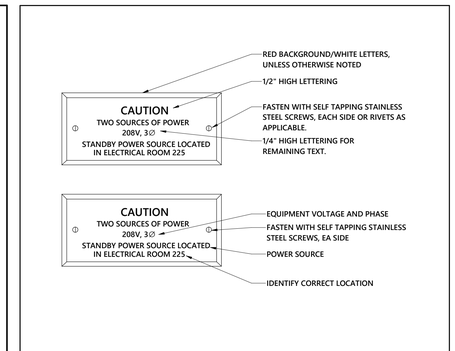
NOTES:
1. KEY SWITCHES AND COVERPLATE SHALL BE FURNISHED BY GOAL INSTALLER. ELEC. CONTRACTOR SHALL PROVIDE AND INSTALL ALL J-BOXES, CONDUIT, AND WIRING.
2. MINIMUM WIRE SIZE SHALL BE #12 AWG.

12 ELECT. BASKETBALL WINCH WIRING DETAIL
NO SCALE



NOTES:
1. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL ROUGH-IN J-BOXES, CONDUIT AND WIRING TO CONNECT THE BLEACHER CONTROL PANELS AND KEYED SWITCHES. PROVIDE A 16"X16"X4" MINIMUM J-BOX AT MAIN ROUGH-IN.
2. MINIMUM WIRE SIZE SHALL BE #12 AWG.
3. PROVIDE 3 PHASE DISCONNECT AT EACH PANEL CONTROLLER, 30A/3P.

11 BLEACHER CONNECTION RISER
NO SCALE



10 EMERGENCY POWER NAMEPLATE
NOT TO SCALE

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SUPPLEMENTARY ADDITION

Harnett County Schools

LILLINGTON-SHAWTOWN ELEMENTARY

855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ELECTRICAL DETAILS

E-601

Sheet No. 8 of 12

OPTIMA# 24-0045R

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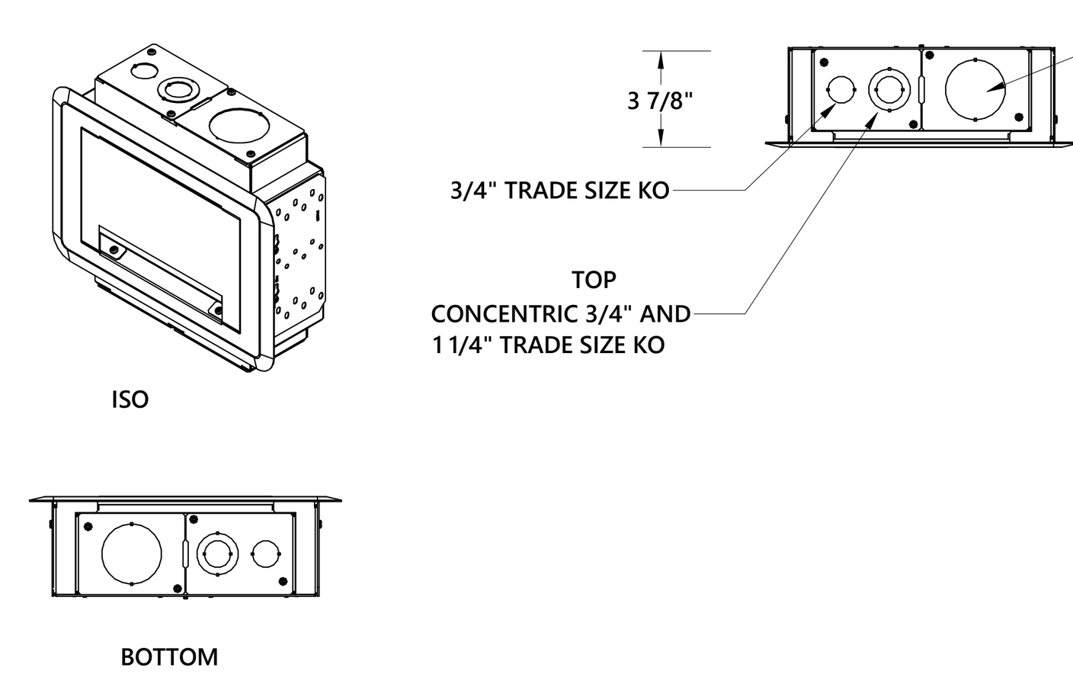
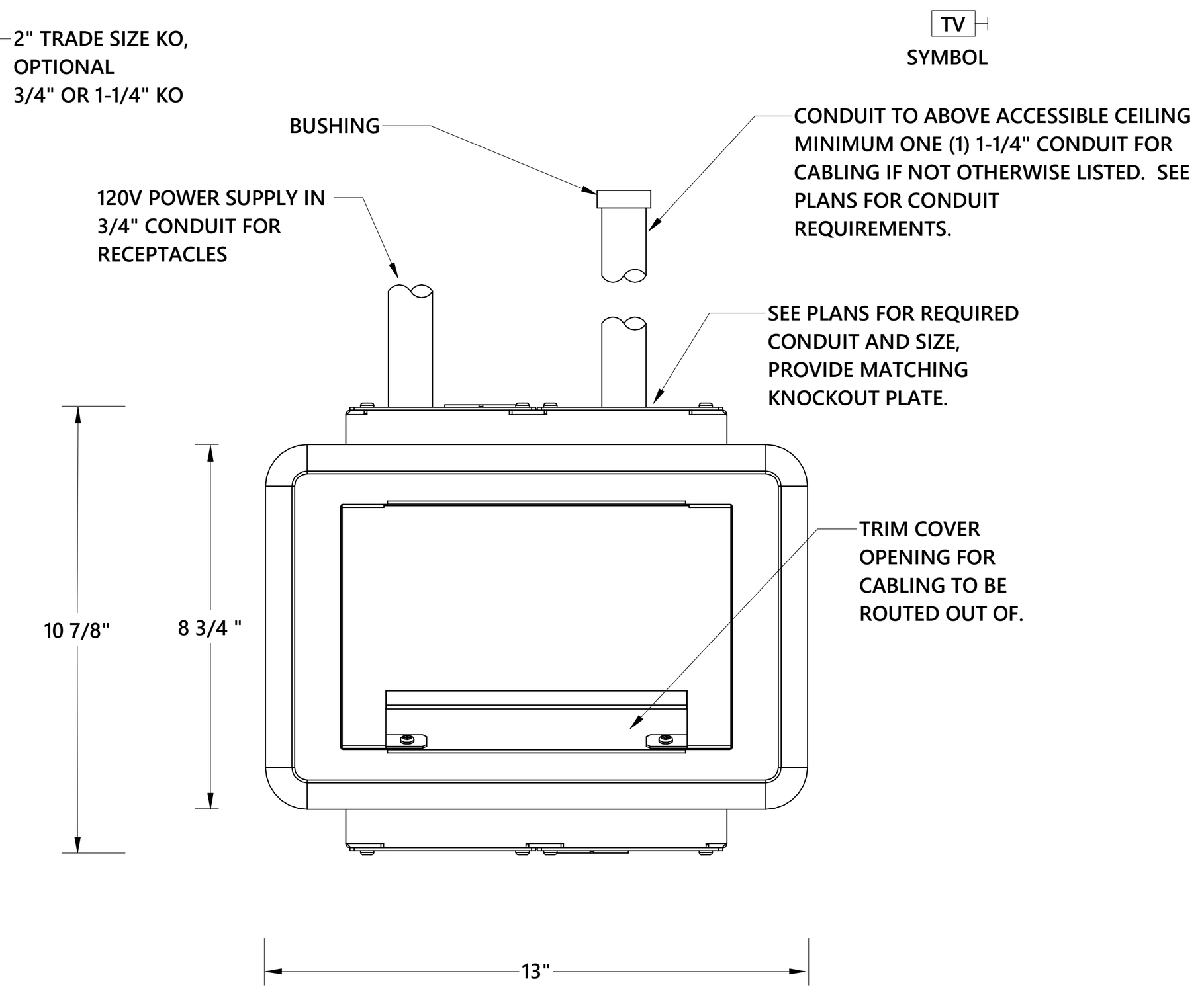


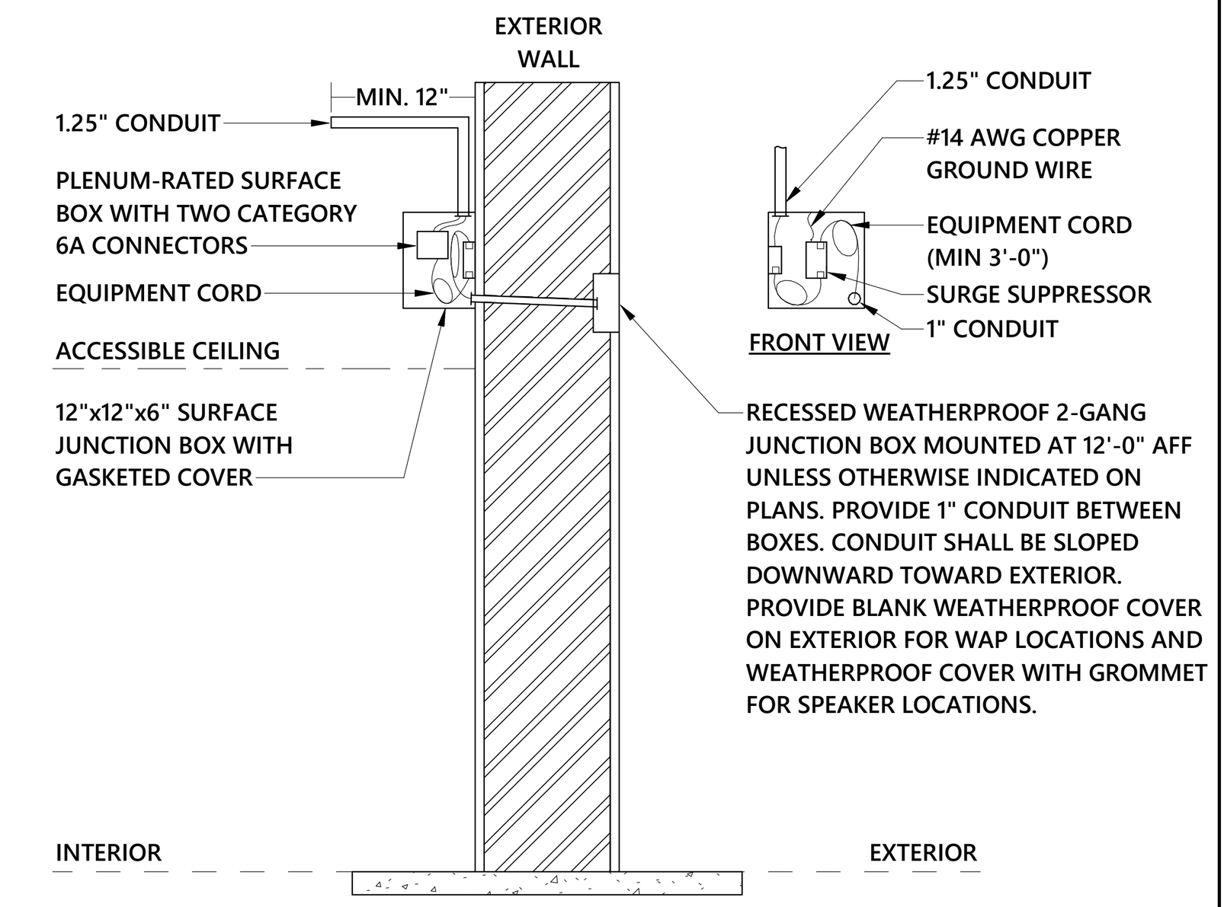


NOTES:

1. BASED ON SYSTEM: LEGRAND EVOLUTION WALL BOX EFSB4 OR APPROVED SUBMITTED EQUAL. PROVIDE PLATES AND MODULES PER REQUIRED CONDUIT SIZING. MINIMUM LAYOUT IS (1) 3/4", (1) 1 1/4", AND (1) 2" KNOCKOUT.
2. PROVIDE DEVICE PLATE PER SPECIFICATIONS.
3. PROVIDE (2) NEMA 5-20R RECEPTACLES, COMMERCIAL GRADE PER SPECIFICATIONS WITH PLATE.
4. DEVICE BRACKETS, BACK BOX, UL LISTED BARRIER, TUNNEL, AND KNOCKOUT PLATES ARE STANDARD. PROVIDE ADDITIONAL KNOCKOUT PLATE BASED ON SPECIFIED CONDUIT.
5. COORDINATE DEVICE LAYOUT IN DEVICE MODULES SO CABLING IS MAXIMIZED TO BE ROUTED OUT OF TRIM FLANGE COVER.
6. (4) TOTAL DEVICES PER BOX, WITH (2) BEING USED FOR RECEPTACLES.
7. FOR ALL MASONRY/CMU APPLICATIONS PROVIDE MASONRY BRACKETS FOR INSTALLATION.

3 TYPICAL TV/MONITOR AND POWER BACK BOX DIAGRAM FOR WALL MOUNTED FLAT SCREEN

NOT TO SCALE

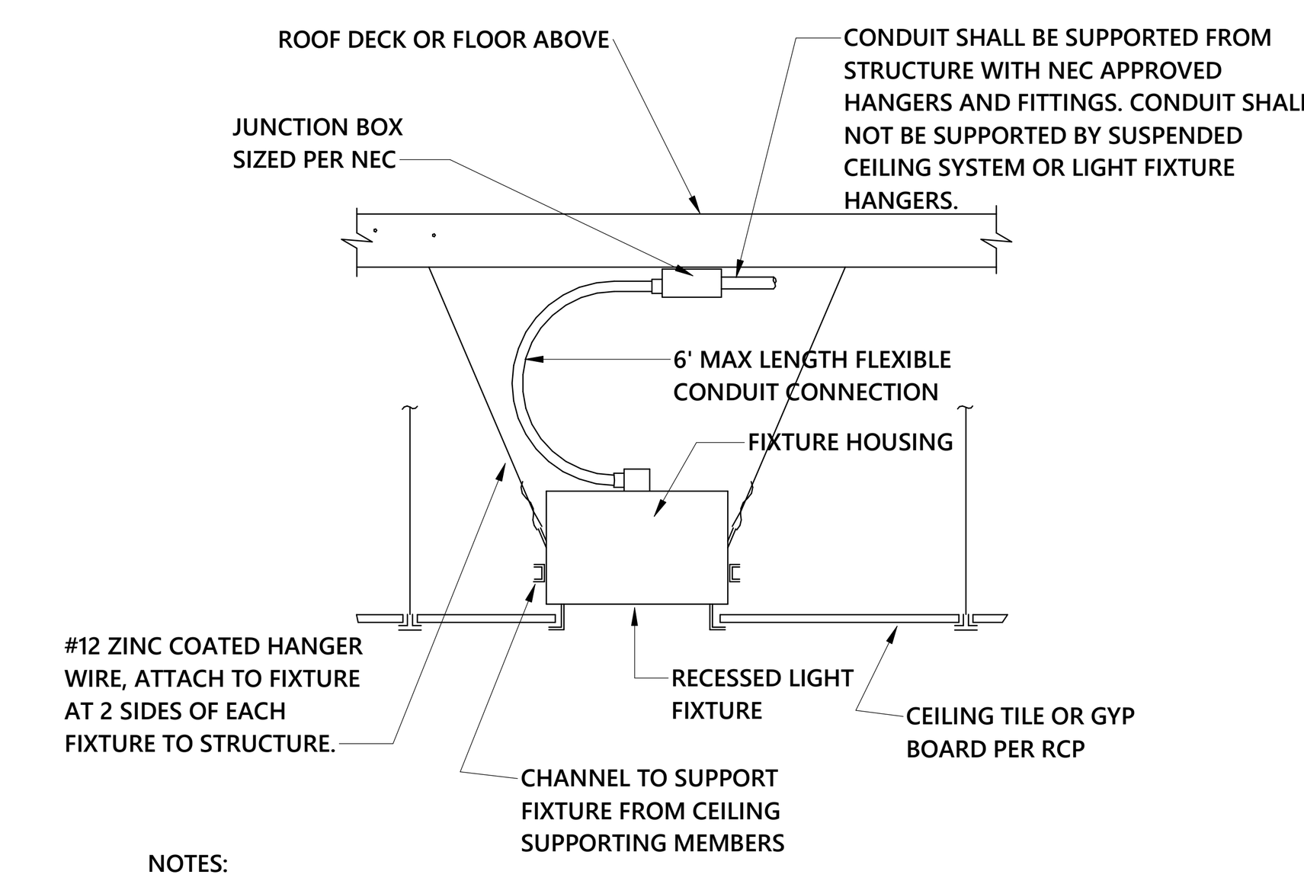


GENERAL NOTES:

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

2 EXTERIOR NETWORK DEVICE DETAIL (ACCESSIBLE CEILING)

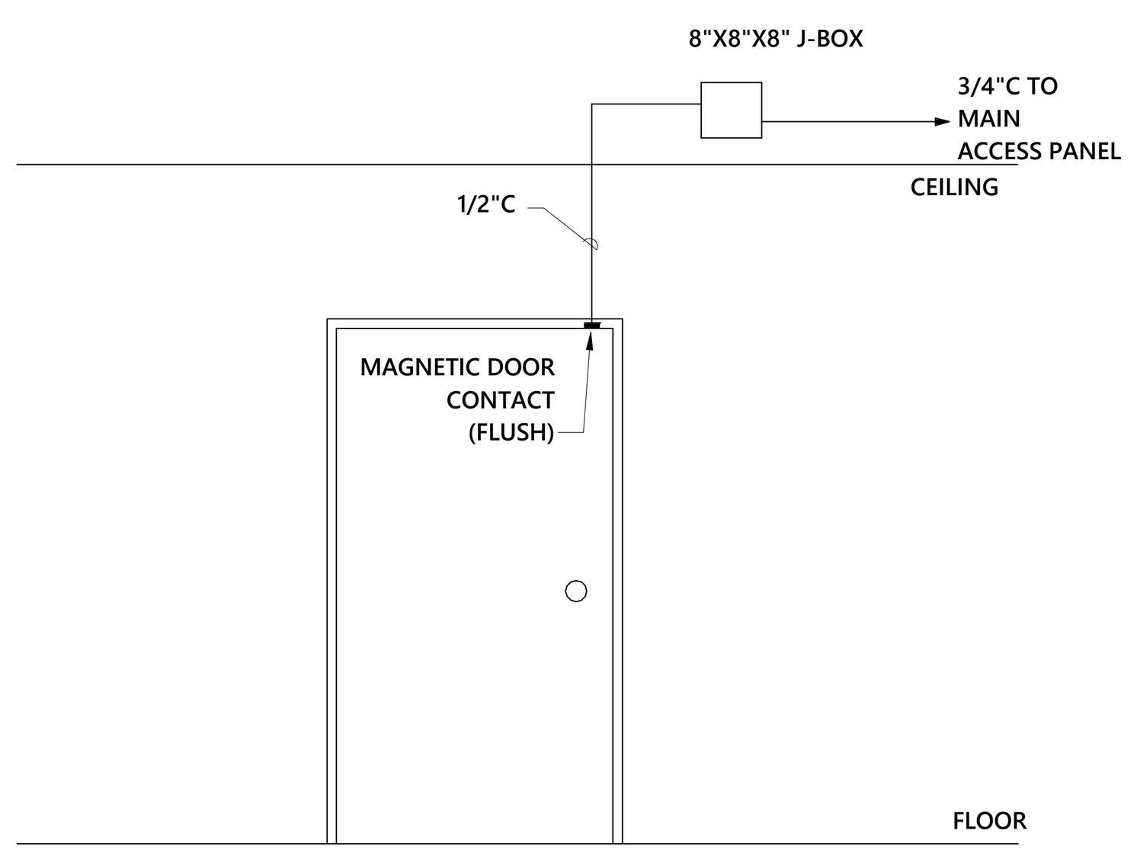
NOT TO SCALE



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.

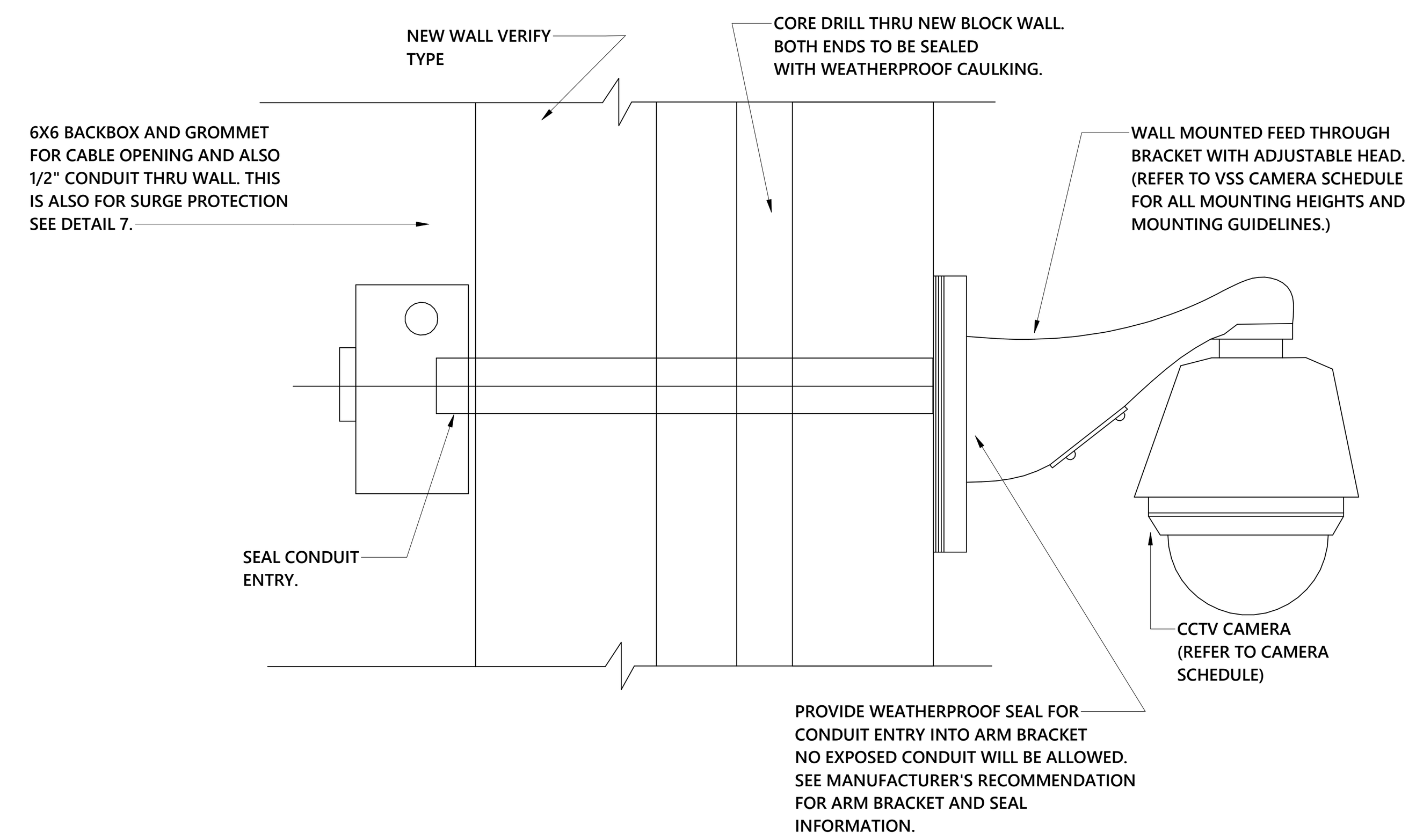
1 TYPICAL RECESSED DOWN LIGHT FIXTURE INSTALLATION DIAGRAM

NOT TO SCALE



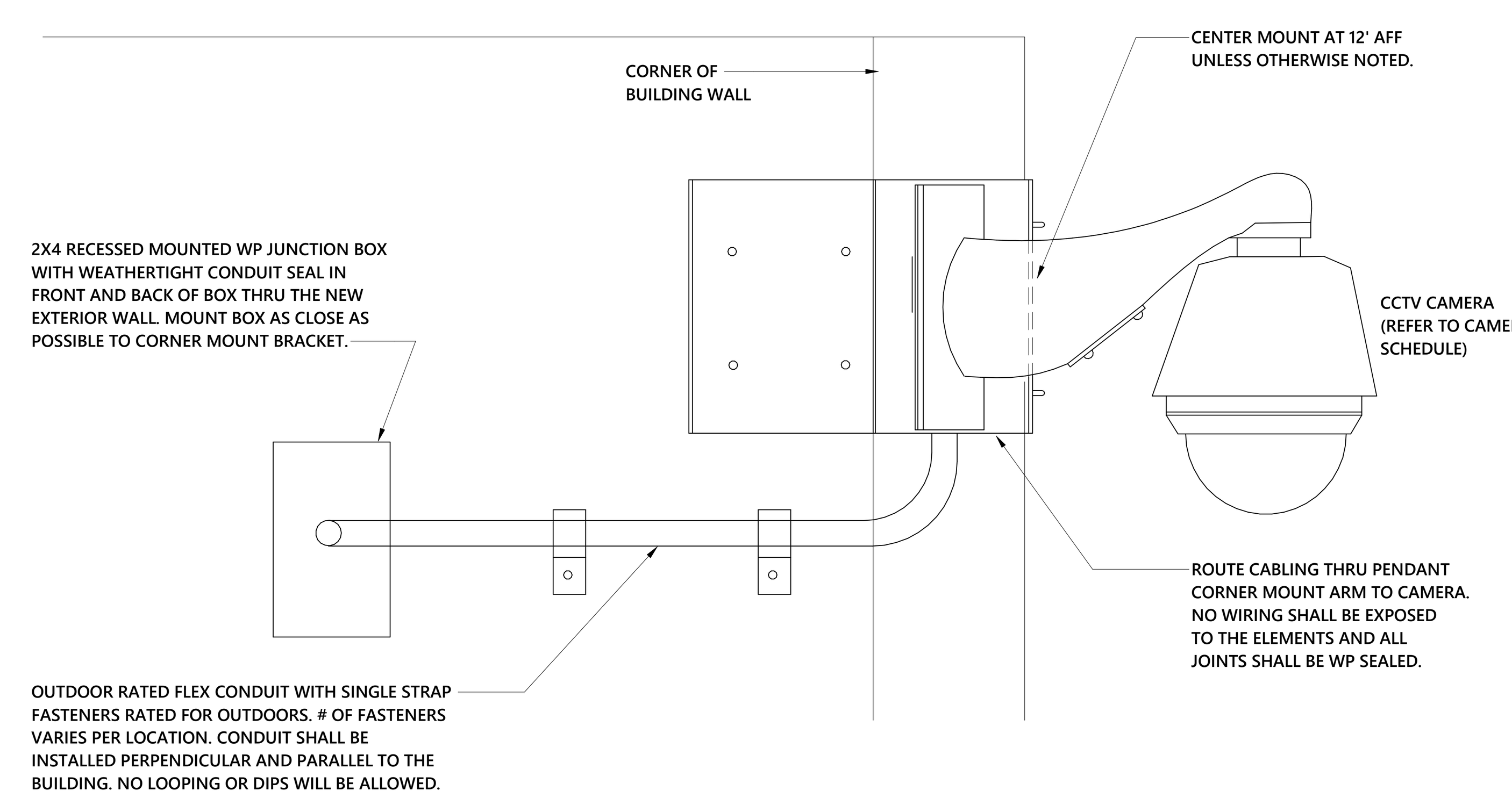
6 DOOR CONTACT ONLY

NOT TO SCALE



5 CAMERA MOUNT EXTERIOR WALL

NO SCALE



4 CAMERA MOUNTING FOR EXTERIOR CORNER MOUNT

NO SCALE

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No.	Date	Description

ISSUE DATE: 07-26-24

PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ELECTRICAL DETAILS

E-602

Autodesk Docs://02110.300 Lillington-Shawtown ES/24-0045R_Lillington-Shawtown ES Addition_MEPFP_R23.rvt

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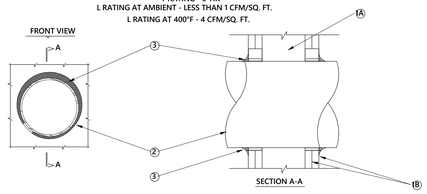

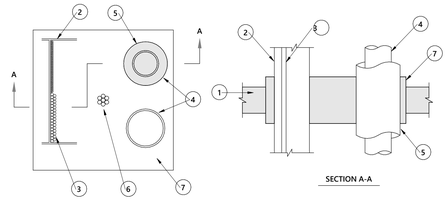

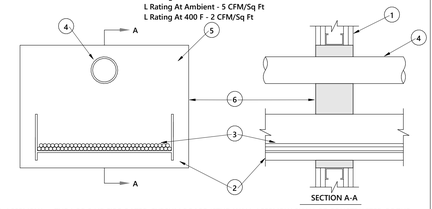

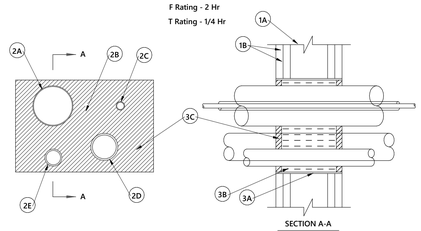

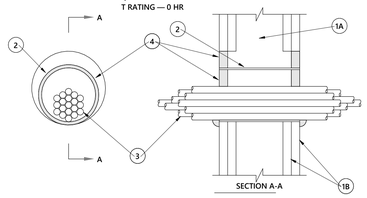

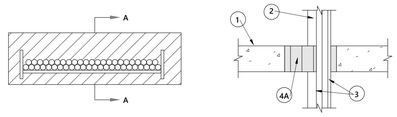

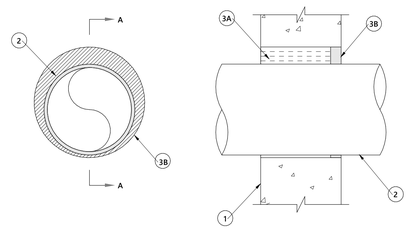

U.L. SYSTEM NO. W-L-1085
F RATING - 1-HR OR 2-HR (SEE ITEM 1B)
T RATING - 0-HR
L RATING AT AMBIENT - LESS THAN 1 CFM/SQ. FT.
L RATING AT 400°F - 4 CFM/SQ. FT.

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

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

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

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

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

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

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

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

HILTI FIRESTOP SYSTEMS

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

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

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

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

1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. WIDE AND SPACED MAX 24 IN. OC. ADDITIONAL FRAMING (NOT SHOWN) MAY BE INSTALLED AROUND THE PERIMETER OF THE OPENING IN LIEU OF THE STEEL WIRE MESH (ITEM NO. 3A).
B. GYPSUM BOARD* TWO LAYERS OF NOM 5/8 IN. THICK GYPSUM WALLBOARD, AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 96 SQ IN. WITH MAX DIMENSION OF 12 IN. MAX WIDTH OF OPENING IN WOOD STUD WALLS IS LIMITED TO 12 IN.
2. THROUGH PENETRANTS THE FOLLOWING TYPES AND SIZES OF PIPES, CONDUITS, TUBING OR CABLES MAY BE USED:
A. NOM 3 IN. DIA (OR SMALLER) ELECTRICAL METALLIC TUBING (EMT).
B. MAX 25 PAIR -- NO. 24 AWG (OR SMALLER) TELEPHONE CABLE WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
C. MAX 3/C WITH GROUND -- NO. 10 AWG (OR SMALLER) TYPE NM CABLE WITH PVC INSULATION AND JACKET.
D. NOM 2 IN. DIA (OR SMALLER) SCHEDULE 40 PVC PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS ONLY.
E. MAX 300 KCMIL (OR SMALLER) POWER CABLE WITH PVC INSULATION AND NYLON JACKET. THE THROUGH PENETRATING ITEMS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY AND LOCATED AS SHOWN IN THE TABLE BELOW:

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

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

HILTI FIRESTOP SYSTEMS

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

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

1. WALL ASSEMBLY — THE 1 OR 2 FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
A. STUDS — WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2-1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD* — NOM 5/8 IN. (16 MM) THICK GYPSUM BOARD, WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIA OF OPENING IS 5-1/2 IN. (138 MM) WHEN SLEEVE (ITEM 2) IS EMPLOYED. MAX DIA OF OPENING IS 4 IN. (102 MM) WHEN SLEEVE (ITEM 2) IS NOT EMPLOYED.
THE F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE FIRE RATING OF THE WALL ASSEMBLY.
2. METALLIC SLEEVE — (OPTIONAL) - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR SCHEDULE 5 (OR HEAVIER) STEEL PIPE OR MIN 0.016 IN. THICK (0.41 MM, NO. 28 GA) GALV STEEL SLEEVE INSTALLED FLUSH WITH WALL SURFACES. THE ANNULAR SPACE BETWEEN STEEL SLEEVE AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25MM). WHEN SCHEDULE 5 STEEL PIPE OR EMT IS USED, SLEEVE MAY EXTEND UP TO 18 IN. (457 MM) BEYOND THE WALL SURFACES.
3. CABLES — AGGREGATE CROSS-SECTIONAL AREA OF CABLE IN OPENING TO BE MAX 45 PERCENT OF THE CROSS-SECTIONAL AREA OF THE OPENING. THE ANNULAR SPACE BETWEEN THE CABLE BUNDLE AND THE PERIPHERY OF THE OPENING TO BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25 MM) CABLES TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL ASSEMBLY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:
A. MAX 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
B. MAX 25 PAIR NO. 24 AWG TELEPHONE CABLE WITH PVC INSULATION AND JACKET.
B1. MAX 4 PR NO. 22 AWG CAT 5 OR CAT 6 COMPUTER CABLES.
C. TYPE RG/U COAXIAL CABLE WITH POLYETHYLENE (PE) INSULATION AND PVC JACKET HAVING A MAX OUTSIDE DIAMETER OF 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

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

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

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

HILTI FIRESTOP SYSTEMS

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

SYSTEM NO. W-J-1088

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

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

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Harnett County Schools
LILLINGTON-SHAWTOWN ELEMENTARY ADDITION
855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ELECTRICAL
DETAILS

E-603

Autodesk Docs://02110.300 Lillington-Shawtown ES/24-0045R_Lillington-Shawtown ES Addition_MEPFP_R23.rvt
7/25/2024 5:03:52 PM

PANEL: GMP

VOLTAGE: 480Y/277 3Ø | **FED FROM:** MDP
MOUNTING: SURFACE | **MAIN TYPE:** MCB
ENCLOSURE: NEMA1 | **PHASE:** 3 | **TYPE:** 20 IN. WIDE
MAIN: 400 A | **WIRE:** 4 | **AIC:** 42 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	B	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
L	GYM 100 LIGHTS	12	20 A	1	1	3.88 4.50			1	2	25 A	-	WH1 (NOTE 9)	WH
				3			14.97 14.97			4				
C	RTU-1A (NOTE 9)	-	70 A	5	3			14.97 14.97	3	6	70 A	-	RTU-1B (NOTE 9)	C
				7		14.97 14.97				8				
				9			5.82 0.94		1	10	20 A	12	EXTERIOR LIGHTS	LE
C	RTU-2 (NOTE 9)	-	25 A	11	3			5.82 1.63	1	12	20 A	12	ADDITION LIGHTS	L
				13		5.82 0.50			1	14	15 A	12	INVERTER A	MS
MS	INVERTER B	12	15 A	15	1		0.50 0.10		1	16	20 A	12	ROOFTOP LIGHTS	LE
	SPACE ONLY	-	--	17	1			-- --	1	18	--	-	SPACE ONLY	
	SPACE ONLY	-	--	19	1	-- --			1	20	--	-	SPACE ONLY	
	SPACE ONLY	-	--	21	1		-- --		1	22	--	-	SPACE ONLY	
	SPACE ONLY	-	--	23	1			-- --	1	24	--	-	SPACE ONLY	
	SPACE ONLY	-	--	25	1	-- --			1	26	--	-	SPACE ONLY	
	SPACE ONLY	-	--	27	1		-- --		1	28	--	-	SPACE ONLY	
	SPACE ONLY	-	--	29	1			-- --	1	30	--	-	SPACE ONLY	
	SPACE ONLY	-	--	31	1	-- --			1	32	--	-	SPACE ONLY	
	SPACE ONLY	-	--	33	1		-- --		1	34	--	-	SPACE ONLY	
	SPACE ONLY	-	--	35	1			-- --	1	36	--	-	SPACE ONLY	
	SPACE ONLY	-	--	37	1	-- 12.73				38				
	SPACE ONLY	-	--	39	1		-- 13.17		3	40	100 A	NOTE 8	T-GRP	F
	SPACE ONLY	-	--	41	1			-- 11.67		42				

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	5.51 kVA	125.00%	6.89 kVA
LE	LIGHTING - EXTERIOR	1.04 kVA	125.00%	1.31 kVA
H	HEATING	0.00 kVA	0.00%	0.00 kVA
C	COOLING	109.55 kVA	100.00%	109.55 kVA
V	VENTILATION	0.23 kVA	100.00%	0.23 kVA
M	MOTORS	0.00 kVA	0.00%	0.00 kVA
K	KITCHEN	0.00 kVA	0.00%	0.00 kVA
R	RECEPTACLES	8.12 kVA	100.00%	8.12 kVA
WH	WATER HEATER	4.50 kVA	100.00%	4.50 kVA
MS	MISC.	27.92 kVA	100.00%	27.92 kVA
S	Spare	0.00 kVA	0.00%	0.00 kVA
E	ELEVATOR	0.00 kVA	0.00%	0.00 kVA
LD	LAUNDRY	0.00 kVA	0.00%	0.00 kVA
EV	EV CHARGING	0.00 kVA	0.00%	0.00 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. PROVIDE "ALL MODES" SPD (40kA / MODE, 80kA / PHASE).
8. SEE RISER DIAGRAM / THIS SHEET FOR WIRE & CONDUIT SIZE.
9. REFER TO MECHANICAL SCHEDULES / SHEET E-701 FOR WIRE SIZE.

TOTAL KVA...	156.88 kVA	TOTAL PER PHASE: (CONNECTED)	
TOTAL KVA (DEMAND):	158.51 kVA	207.8 A	183.0 A	177.1 A
TOTAL AMP....	189 A		
TOTAL AMP. (DEMAND):	191 A	**TOTAL AMP. (DEMAND) x 125%**	238.3 A

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

PANEL: GRP

VOLTAGE: 208Y/120 3Ø | **FED FROM:** T-GRP
MOUNTING: SURFACE | **MAIN TYPE:** MCB
ENCLOSURE: NEMA1 | **PHASE:** 3 | **TYPE:** 20 IN. WIDE
MAIN: 225 A | **WIRE:** 4 | **AIC:** 10 KAIC

LC Abbr	Load Served	Wire	Trip	Ckt No	Pole	A	B	C	Pole	Ckt No	Trip	Wire	Load Served	LC Abbr
R	GYM 100 REC	12	20 A	1	1	1.08 0.50			1	2	20 A	12	LOBBY 101 EWC (NOTE 7)	R
R	GYM 100 REC	12	20 A	3	1		1.44 0.50		1	4	20 A	12	LOBBY 101 EWC (NOTE 7)	R
MS	GYM 100 SCOREBOARD	12	20 A	5	1			1.00 0.50	1	6	20 A	12	LOBBY 101 EWC (NOTE 7)	R
MS	GYM 100 SCOREBOARD	12	20 A	7	1	1.00 1.44			1	8	20 A	12	LOBBY 101 REC	R
MS	GYM 100 POWERED GOAL	12	20 A	9	1		1.50 1.00		1	10	20 A	12	WOMEN 103 HAND DRYER (NOTE 10)	MS
MS	GYM 100 POWERED GOAL	12	20 A	11	1			1.50 1.00	1	12	20 A	12	WOMEN 103 HAND DRYER (NOTE 10)	MS
MS	GYM 100 POWERED GOAL	12	20 A	13	1	1.50 1.00			1	14	20 A	12	MEN 102 HAND DRYER (NOTE 10)	MS
MS	GYM 100 POWERED GOAL	12	20 A	15	1		1.50 1.00		1	16	20 A	12	MEN 102 HAND DRYER (NOTE 10)	MS
MS	GYM 100 POWERED GOAL	12	20 A	17	1			1.50 0.90	1	18	20 A	12	RR 102/103 REC	R
MS	GYM 100 POWERED GOAL	12	20 A	19	1	1.50 0.06			1	20	20 A	-	RCP1 (NOTE 11)	MS
				21			1.50 0.90		1	22	20 A	12	EQUIPMENT 106 REC	R
MS	GYM 100 BLEACHERS	10	30 A	23	3			1.50 0.54	1	24	20 A	12	ROOF REC	R
				25		1.50 1.15			2	26	30 A	-	ODU-1 (NOTE 11)	C
MS	GYM 100 SOUND SYSTEM	12	20 A	27	1		0.50 1.15			28				
MS	GYM 100 MOTORIZED SHADES	12	20 A	29	1			1.50 0.23	1	30	20 A	-	EF-1, EF-2, EF-3 (NOTE 11)	V
MS	GYM 100 MOTORIZED SHADES	12	20 A	31	1	1.00 0.50			1	32	20 A	12	UTIL. 107 TBB REC	R
MS	GYM 100 MOTORIZED SHADES	12	20 A	33	1		1.50 0.18		1	34	20 A	12	UTIL. 107 REC	R
MS	GYM 100 MOTORIZED SHADES	12	20 A	35	1			1.00 0.50	1	36	20 A	12	UTIL. 107 MECHANICAL CONTROLS	MS
Sp...	SPARE	-	20 A	37	1	0.00 0.50			1	38	20 A	12	BDA (NOTE 12)	MS
Sp...	SPARE	-	20 A	39	1		0.00 0.50		1	40	20 A	12	FATC (NOTE 12)	MS
Sp...	SPARE	-	20 A	41	1			0.00 0.00	1	42	20 A	-	SPARE	Sp...

	LOAD	Connected Load	Demand Factor	Estimated Demand
L	LIGHTS	0.00 kVA	0.00%	0.00 kVA
LE	LIGHTING - EXTERIOR	0.00 kVA	0.00%	0.00 kVA
H	HEATING	0.00 kVA	0.00%	0.00 kVA
C	COOLING	2.29 kVA	100.00%	2.29 kVA
V	VENTILATION	0.23 kVA	100.00%	0.23 kVA
M	MOTORS	0.00 kVA	0.00%	0.00 kVA
K	KITCHEN	0.00 kVA	0.00%	0.00 kVA
R	RECEPTACLES	8.12 kVA	100.00%	8.12 kVA
WH	WATER HEATER	0.00 kVA	0.00%	0.00 kVA
MS	MISC.	26.92 kVA	100.00%	26.92 kVA
S	Spare	0.00 kVA	0.00%	0.00 kVA
E	ELEVATOR	0.00 kVA	0.00%	0.00 kVA
LD	LAUNDRY	0.00 kVA	0.00%	0.00 kVA
EV	EV CHARGING	0.00 kVA	0.00%	0.00 kVA

NOTES:
1. BREAKER FRAME SHALL BE AS REQ'D PER PANEL AIC RATING.
2. SHALL BE FULLY RATED - SERIES RATINGS NOT ALLOWED.
3. ALL BUSSING, INCL GND AND NEUTRAL, SHALL BE COPPER.
4. ALL INCOMING PANEL & BRKR LUGS SHALL MATCH FEEDERS.
5. PROVIDE HINGED DOOR-IN-DOOR WITH OUTER DOOR LOCK.
6. PROVIDE METAL DIRECTORY FRAME.
7. PROVIDE CLASS A GFI (6mA-PERSONNEL) BRKR (250' MAX).
8. PROVIDE PANEL WITH FEED-THRU LUGS.
9. LOAD TOTAL INCLUDES FEED-THRU SECTION.
10. PROVIDE BREAKER CAPABLE OF BEING LOCKED IN THE OPEN POSITION. PROVISIONS FOR LOCKING SHALL REMAIN IN PLACE WITH OR WITHOUT THE LOCK INSTALLED.
11. REFER TO MECHANICAL SCHEDULES / SHEET E-701 FOR WIRE SIZE.
12. PROVIDE BREAKER WITH HANDLE LOCK ON DEVICE.

TOTAL KVA...	37.56 kVA	TOTAL PER PHASE: (CONNECTED)	
TOTAL KVA (DEMAND):	37.56 kVA	107.4 A	111.1 A	97.3 A
TOTAL AMP....	104 A		
TOTAL AMP. (DEMAND):	104 A	**TOTAL AMP. (DEMAND) x 125%**	130.3 A

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

EXISTING SWITCHBOARD: MDP

VOLTAGE: 480Y/277 3Ø | **MAIN TYPE:** MCB | **MANUFACTUR...** SQUARE D
MOUNTING: FLOOR | **PHASE:** 3 | **TYPE:** QED
MAIN: 2000 A | **WIRE:** 4 | **AIC:** 65 KAIC

MAIN CB NOTES:

CKT/ID	LOAD SERVED	FRAME	TRIP	POLE	FEEDER	NOTES	Load
1	CHILLER CH-1	200 A	200 A	3			0.0 kVA
2	PANEL 'AH'	225 A	225 A	3			0.0 kVA
3	PANEL 'BH'	150 A	150 A	3			0.0 kVA
4	PANEL 'CH'	150 A	150 A	3			0.0 kVA
5	TRANFORMER T-1	450 A	450 A	3			0.0 kVA
6	SPARE	100 A	100 A	3			0.0 kVA
7	PANEL 'GH'	225 A	225 A	3			0.0 kVA
8	CHILLER CH-2	500 A	500 A	3			0.0 kVA
9	PANEL 'DH'	150 A	150 A	3			0.0 kVA
10	PANEL 'EH'	150 A	150 A	3			0.0 kVA
11	PANEL 'FH'	225 A	225 A	3			0.0 kVA
12	TRANSFORMER T-2	225 A	225 A	3			0.0 kVA
13	SPARE	225 A	225 A	3			0.0 kVA
14	**PANEL 'GMP'**	**400 A**	**400 A**	**3**	**NOTE 2**		156.9 kVA

SWITCHBOARD NOTES:
1. BOLD TEXT INDICATES NEW WORK. PROVIDE ACCORDINGLY.
2. REFER TO RISER DIAGRAM FOR WIRE SIZE.

FEEDER SCHEDULE FOR ALUMINUM CONDUCTORS

FEEDER AMPS	WIRE SIZE TEMP 75°C (AL)
400 A	(2) 4-250 KCMIL, 1#1 G, 3"C

NOTES:
1.) FOR TERMINATIONS RATED 100A OR LESS, THE ELECTRICAL CONTRACTOR SHALL VERIFY THE TERMINATIONS ARE LISTED FOR 75°C. WHERE 100A OR LESS RATED TERMINATIONS ARE LISTED 60°C, THE ELECTRICAL CONTRACTOR SHALL USE THE 60°C FEEDER LISTED IN THE TABLE.
2.) WHERE ALUMINUM CONDUCTORS ARE ALLOWED BY THE ENGINEER, THE CONTRACTOR SHALL MAKE EVERY PROVISION TO INSTALL ALUMINUM CONDUCTORS CORRECTLY, INCLUDING TERMINATIONS IN PANELBOARDS, DISCONNECTS, ETC. ALL TERMINALS SHALL BE LISTED SUITABLE FOR ALUMINUM. APPLY OXIDE INHIBITING PASTE TO ALUMINUM CONDUCTORS AT TERMINATIONS.

DRY-TYPE TRANSFORMER SCHEDULE

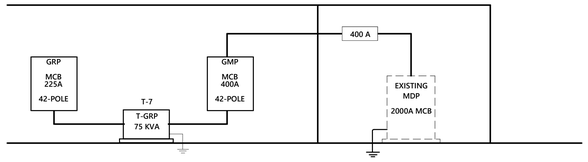
TRANSFORMER	VOLTAGE		KVA	PRIMARY			SECONDARY			
TYPE	PRIMARY	SECONDARY	RATING	FLA	BREAKER	WIRE & CONDUIT	FLA	BREAKER	WIRE & CONDUIT	SERVICE GROUND
T-7	480 V	208Y/120	75	90.2	100	3#1/0, 1#4G, 2"C	208	225	4-300KCMIL, 1#1/0G., 3"C.	#2, 1"C

NOTE 1. HOUSEKEEPING PADS SHALL HAVE OSHA COMPLIANT, SAFETY YELLOW, EPOXY PAINT SUITABLE FOR CONCRETE. 2. ALL CONDUCTORS BASED ON ALUMINUM.

MDP LOAD SUMMARY

EXISTING PK LOAD PER MDP USER INTERFACE	-	608 KVA
LIGHTING KVA @ 125% DEMAND	-	8.20 KVA
RECEPTACLES @ 100% DEMAND	-	8.12 KVA
COOLING @ 100% DEMAND	-	109.55 KVA
VENTILATION @ 100% DEMAND	-	0.23 KVA
WATER HEATERS @ 100% DEMAND	-	4.5 KVA
MISC. LOAD @ 100% DEMAND	-	27.92 KVA

TOTAL KVA = 766.5 KVA
923 AMPS @ 277/480 3-PHASE
ON EXISTING 2000A SERVICE



NOTES:
1. ALL WIRE SIZES ARE SHOWN FOR ALUMINUM MATERIAL, UNLESS OTHERWISE NOTED.

1 **POWER RISER DIAGRAM**
NOT TO SCALE

ROOFTOP UNIT SCHEDULE (DX COOLING, GAS HEAT, R-410 REFRIGERANT)

SYMBOL	NOMINAL TONS	COMPRESSOR (EA)		CONDENSER FAN		SUPPLY FAN		COMB. FAN	RELIEF FAN		POWER SUPPLY				DISCONNECT SIZE	CONDUIT & CONDUCTOR SIZE
		QTY	RLA	QTY	FLA	HP	FLA	FLA	QTY	FLA	MCA	MOCP	VOTAGE	PH		
RTU-1A	20	2	21.3	2	2.2	3.0	0.0	0.0	0	0	54.0	70.0	480	3	100A/F70A-3P-3R	4#4, 1#8G., 1-1/4"C.
RTU-1B	20	2	21.3	2	2.2	3.0	0.0	0.0	0	0	54.0	70.0	480	3	100A/F70A-3P-3R	4#4, 1#8G., 1-1/4"C.
RTU-2	7.5	2	8.2	1	1.5	3.0	0.0	0.0	0	0	21.0	25.0	480	3	30A/F25A-3P-3R	4#10, 1#10G., 3/4"C.

DUCTLESS INDOOR UNIT SCHEDULE

ID	ELECTRICAL DATA			INTERLOCK ID	DISCONNECT SIZE	CONDUIT & CONDUCTOR SIZE
	MCA	VOLTAGE	PH			
IDU-1	1.0 A	208 V	1	ODU-1	30A/F15A-2P-1	3#12, 1#12G., 3/4"C.

DUCTLESS OUTDOOR UNIT SCHEDULE

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

FAN SCHEDULE

ID	ELECTRICAL DATA				DISCONNECT SIZE	CONDUIT & CONDUCTOR SIZE
	WATTS	H.P.	VOLT	PH		
EF-1		0.13 hp	115 V	1	PROVIDED BY MC	2#12, 1#12G., 3/4"C.
EF-2		0.13 hp	115 V	1	PROVIDED BY MC	2#12, 1#12G., 3/4"C.
EF-3	30 W	0.00 hp	115 V	1	PROVIDED BY MC	2#12, 1#12G., 3/4"C.

PLUMBING EQUIPMENT SCHEDULE

SYM.	DESCRIPTION	DISCONNECT SIZE	CONDUIT & CONDUCTOR SIZE
WH1 TYP. OF 1	WATER HEATER, ELECTRIC ELEC: 277V; SINGLE PHASE; 4.5KW	30A/F25A-2P-1	2#10, 1#10G., 3/4"C.
RCP1	CIRCULATION PUMP ELEC: 120V, 1/12HP	MOTOR RATED SWITCH	2#12, 1#12G., 3/4"C.

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CONSTRUCTION DRAWINGS

Harnett County Schools
LILLINGTON-SHAWTOWN ELEMENTARY ADDITION
855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

ELECTRICAL DIAGRAMS AND PANEL SCHEDULES

E-701

Sheet No. 11 of 12

OPTIMA# 24-0045R

LIGHTING SEQUENCE OF OPERATION

A COMPLETE AND OPERATIONAL LIGHTING CONTROL SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS (SECTION 260923 AND 260943) AND AS INTENDED ON THESE PLANS. ALL CONTROL POINTS AND EQUIPMENT SEQUENCES OF OPERATION LISTED IN SPECIFICATION SECTION 260923 SHALL BE CONSIDERED IN ADDITION TO THOSE LISTED HERE. IN THE EVENT THAT THE VERBIAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY.

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

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

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

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

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

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

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

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

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

INDIVIDUAL AREAS INTENT OF CONTROL:
- MAIN CORRIDORS/HALLWAYS: TIME SCHEDULE ZONED. MANUAL LOW VOLTAGE OVERRIDE IN LOCAL CORRIDOR. CORRIDOR SWITCHES SHALL BE LOCKED OUT (PUBLIC AREAS) DURING "NORMAL OPERATING HOURS."
- GROUP RESTROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFARED). OCCUPANCY SENSORS SHALL OPERATE NORMAL AND EMERGENCY FIXTURES IN THIS AREA.
- INDIVIDUAL RESTROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFARED).
- UTILITY ROOMS, ETC.: ON/OFF WALL SWITCH OCCUPANCY SENSORS.
- STORAGE ROOMS: ON/OFF WALL SWITCH VACANCY SENSORS (PASSIVE INFARED).
- GYM: TIME SCHEDULE ZONED. ON/OFF WITH FULL DIMMING. EMERGENCY RATED RELAYS FOR SWITCHED EMERGENCY APPLICATION OF ON/OFF DIMMING. EMERGENCY IS ZONED WITH LOCAL NORMAL ZONE.

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

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

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	LAMP	MINIMUM LUMENS	TOTAL FIXURE WATTAGE	DRIVER	VOLTAGE	MANUFACTURER	MODEL	REMARKS
DL1	6" RECESSED LED DOWNLIGHT	LED	2,000	19.7 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	GOTHAM PATHWAY JUNO COOPER SPECTRUM	EVO6 20 AR LS MVOLT APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	6" APERATURE MINIMUM 2000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SPECULAR
DL1E	SAME AS TYPE 'DL1' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	2,000	19.7 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	GOTHAM PATHWAY JUNO COOPER SPECTRUM	EVO6 20 AR LS MVOLT E10WCP APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	6" APERATURE MINIMUM 2000 LUMEN PACKAGE MINIMUM 10% DIMMING CLEAR SPECULAR PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
EX1B	THERMOPLASTIC EXIT SIGN	LED	5	1.0 W	INTEGRAL LED DRIVER	UNIV	LITHONIA HUBBELL JUNO COOPER PHILLIPS	QUANTUM LQM S W R 120/277 EL N APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	NICKEL CADMIUM BATTERY EXIT SIGN 90 MINUTE OPERATION SEE PLANS FOR FACE STYLE UL LISTED FOR DAMP LOCATIONS RED
EX1G	WALL MOUNTED THERMOPLASTIC EXIT SIGN	LED	5	1.0 W	INTEGRAL LED DRIVER	UNIV	LITHONIA HUBBELL JUNO COOPER PHILLIPS	QUANTUM LQM S W R 120/277 EL N APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	NICKEL CADMIUM BATTERY EXIT SIGN 90 MINUTE OPERATION SEE PLANS FOR FACE STYLE UL LISTED FOR DAMP LOCATIONS RED PROVIDE WITH WIREGUARD
FPL4	2X4 LED FLAT PANEL	LED	4,000	38.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	LITHONIA H.E. WILLIAMS CORONET	CPX 2X4 4000LM MIN10 APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS
FPL4E	SAME AS TYPE 'FPL4' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	4,000	38.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	LITHONIA H.E. WILLIAMS CORONET	CPX 2X4 4000LM MIN10 E10WLCP APPROVED EQUAL APPROVED EQUAL	4000 MINIMUM LUMENS UL LISTED DAMP LOCATIONS PROVIDE WITH 10W CONSTANT POWER EMERGENCY DRIVER
HBL	12" LED HIGH BAY (LOW PROFILE)	LED	31,200	240.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	UNIV	TGS LIGHTING LITHONIA HUBBELL	CHB-P 240W 40K WD U D SM W WG SQ APPROVED EQUAL APPROVED EQUAL	SURFACE MOUNT BRACKET DIFFUSING ACRYLIC, WIRE GUARD MINIMUM 31200 LUMENS WIDE OUTPUT MINIMUM 10% DIMMING
HBLE	SAME AS TYPE 'HBL' EXCEPT CONNECTED TO EMERGENCY INVERTER	LED	31,200	240.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	UNIV	TGS LIGHTING LITHONIA HUBBELL	CHB-P 240W 40K WD U D SM W WG SQ APPROVED EQUAL APPROVED EQUAL	SURFACE MOUNT BRACKET DIFFUSING ACRYLIC, WIRE GUARD MINIMUM 31200 LUMENS WIDE OUTPUT MINIMUM 10% DIMMING
L4	4' RECESSED LINEAR LED	LED	3,500	30.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	UNIV	CORONET APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	LSR4 4 _ HIGH UNV DB W FL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COORDINATE MOUNTING WITH ARCHITECT PRIOR TO ROUGH-IN
L4E	SAME AS TYPE 'L4' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	LED	3,500	30.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	UNIV	CORONET APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	LSR4 4 _ HIGH UNV DB W FL EMPCK APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COORDINATE MOUNTING WITH ARCHITECT PRIOR TO ROUGH-IN PROVIDE WITH 90 MINUTE BATTERY BACKUP
OWL1	WALL PACK TRAPEZOID LED	2-MODULE LED	6,000	47.0 W	INTEGRAL LED DRIVERS (2)	277V	LITHONIA HUBBELL JUNO PHILLIPS	WDGE3 LED P1_RFT MVOLT APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COORDINATE FINISH WITH ARCHITECT MINIMUM 6000 LUMENS WET LOCATION LISTED
OWL1E	SAME AS TYPE 'OWL1' EXCEPT PROVIDE WITH 90 MINUTE BATTERY BACKUP	2-MODULE LED	6,000	47.0 W	INTEGRAL LED DRIVERS (2)	277V	LITHONIA HUBBELL JUNO PHILLIPS	WDGE3 LED P1_RFT MVOLT E15WH APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	COORDINATE FINISH WITH ARCHITECT MINIMUM 6000 LUMENS WET LOCATION LISTED PROVIDE WITH 90 MINUTE BATTERY BACKUP
STL1	4 FT. LED STRIP	LED	5,000	40.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	LITHONIA COLUMBIA CREE COOPER DAY-BRITE	CLX LED L48 5000LM SEF FDL MVOLT GZ10 _K 80CRI APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	PROVIDE CHAIN FOR PENDANT MOUNTING PROVIDE WIRE GUARD 4000 MINIMUM LUMENS LENSED
STL1E	4 FT. LED STRIP	LED	4,000	40.0 W	INTEGRAL LED DRIVER (STANDARD 0-10V DIMMING)	277V	LITHONIA COLUMBIA CREE COOPER DAY-BRITE	CLX LED L48 5000LM SEF FDL MVOLT GZ10 _K 80CRI E10WLCP APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL APPROVED EQUAL	PROVIDE CHAIN FOR PENDANT MOUNTING PROVIDE WIRE GUARD 4000 MINIMUM LUMENS LENSED PROVIDE WITH 90 MINUTE BATTERY BACKUP
TL	CASEWORK LED TAPE LIGHT	LED		30.0 W	REMOTE LED DRIVER	UNIV	NOVA FLEX LIGHTING WAC LIGHTING LED LINEAR	PRO SERIES W/ REMOTE DIMMABLE POWER SUPPLY W/ SURFACE MOUNTED CHANNEL WITH DOT FREE LENSE APPROVED EQUAL APPROVED EQUAL	CONTRACTOR TO FIELD VERIFY LENGTH PROVIDE REMOTE DRIVER AND SURFACE MOUNTED CHANNEL WITH DOT FREE LENSE. COORDINATE INSTALLATION WITH CASEWORK VENDOR PRIOR TO ROUGH-IN MINIMUM 200 LUMENS PER FOOT PROVIDE SEAMLESS ILLUMINATION ALONG THE LENGTH OF THE CASEWORK 3.0 W/FT MAXIMUM

LIGHTING FIXTURE SCHEDULE NOTES:
1. ALL FIXTURES SHALL BE LED UNLESS OTHERWISE SPECIFIED. COLOR TEMPERATURE SHALL BE 3500K UNLESS OTHERWISE NOTED.
2. LED DRIVERS SHALL BE PROVIDED FROM PER MANUFACTURER RECOMMENDATION. AS PART OF THIS RECOMMENDATION COORDINATE THE REQUIRED WAVE OUTPUT SO THEY ARE COMPATIBLE. THIS INCLUDES EMERGENCY DRIVERS.
3. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT FIXTURE LOCATIONS.
4. FIXTURES IN FIRE RATED CEILING SHALL BE PROVIDED WITH FIRE RATED TENTS AS REQUIRED.
5. SUSPEND ALL FOUR CORNERS WITH WIRE TO STRUCTURE. DO NOT ALLOW GRID ALONE TO SUPPORT FIXTURE.
6. FIXTURES WITH EMERGENCY BATTERY PACKS SHALL BE SUPPLIED WITH 1100 LUMEN INVERTERS.
7. PROVIDE INTEGRAL SURGE PROTECTION ON ALL EXTERIOR LED DRIVER FIXTURE TYPES.
8. DIMMING OF FIXTURES SHALL BE WITH A SWITCH AS RECOMMENDED BY THE DRIVER MANUFACTURER.
9. THE CONTRACTOR SHALL VERIFY THE LEAD TIME OF ALL PRODUCTS SPECIFIED IN THIS SCHEDULE AT THE TIME OF PACKAGE QUOTE.
10. DURING THE BID PROCESS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER OF ANY DELIVERY/SCHEDULING ISSUES.
11. NO SUBSTITUTIONS WILL BE ALLOWED DUE TO LACK OF COORDINATION OF DELIVERY DATES AND CONSTRUCTION SCHEDULE AFTER BID.
12. ALL EXPEDITED EXPENSES SHALL BE THE RESPONSIBILTY OF THE CONTRACTOR.
13. FIXTURES TO BE INSTALLED IN CEILINGS, INDICATED ON ARCHITECTURAL PLANS AS HAVING INSULATION IN CONTACT WITH CEILING SURFACE, SHALL BE IC RATED BY MANUFACTURER.
14. LED DRIVERS LOCATED IN UNCONDITIONED SPACES SHALL BE RATED FOR 90 DEGREES F.
15. PROVIDE 90 MINUTE EMERGENCY BATTERY BACK UP. EMERGENCY BACK UP SHALL BE BASED ON TYPE OF FIXTURE, LED DRIVER, BALLAST, ETC. EMERGENCY BACKUP SHALL BE DUAL INPUT FOR BOTH SWITCHING AND CHARGING. PROVIDE UNSWITCHED "HOT" FROM LOCAL CIRCUIT UNLESS OTHERWISE INDICATED ON PLANS. PROVIDE WITH INDICATOR LIGHT. INSTALL LED INDICATOR ON LIGHT FIXTURE UNLESS DECORATIVE. DECORATIVE FIXTURES SHALL HAVE INDICATOR PLACED AT LOCAL CEILING. BODINE, PHILLIPS, POWER SENTRY OR EQUAL.
16. PROVIDE EMERGENCY RELAY BASED ON MINIMUM BODINE GLCD-208 OR EQUAL. SEE PLANS FOR INTENT. PROVIDE EMERGENCY GENERATOR/INVERTER CIRCUIT AND SWITCH LEG NORMAL CIRCUIT. SEE DETAIL.
17. POLES PROVIDED FOR LED FIXTURES SHALL BE METAL, REGARDLESS OF SPECIFICATION FOR GROUNDING PURPOSES.

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CONSTRUCTION DRAWINGS

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Harnett County Schools

LILLINGTON-SHAWTOWN ELEMENTARY ADDITION

855 Old US Highway 421
Lillington, NC 27546

ENERGY STAR PARTNER

No.	Date	Description

ISSUE DATE: 07-26-24
PROJECT #: 02110.300
DRAWN BY: JSD
CHECKED BY: MKG

LIGHTING FIXTURE SCHEDULE

E-801

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OPTIMA# 24-0045R