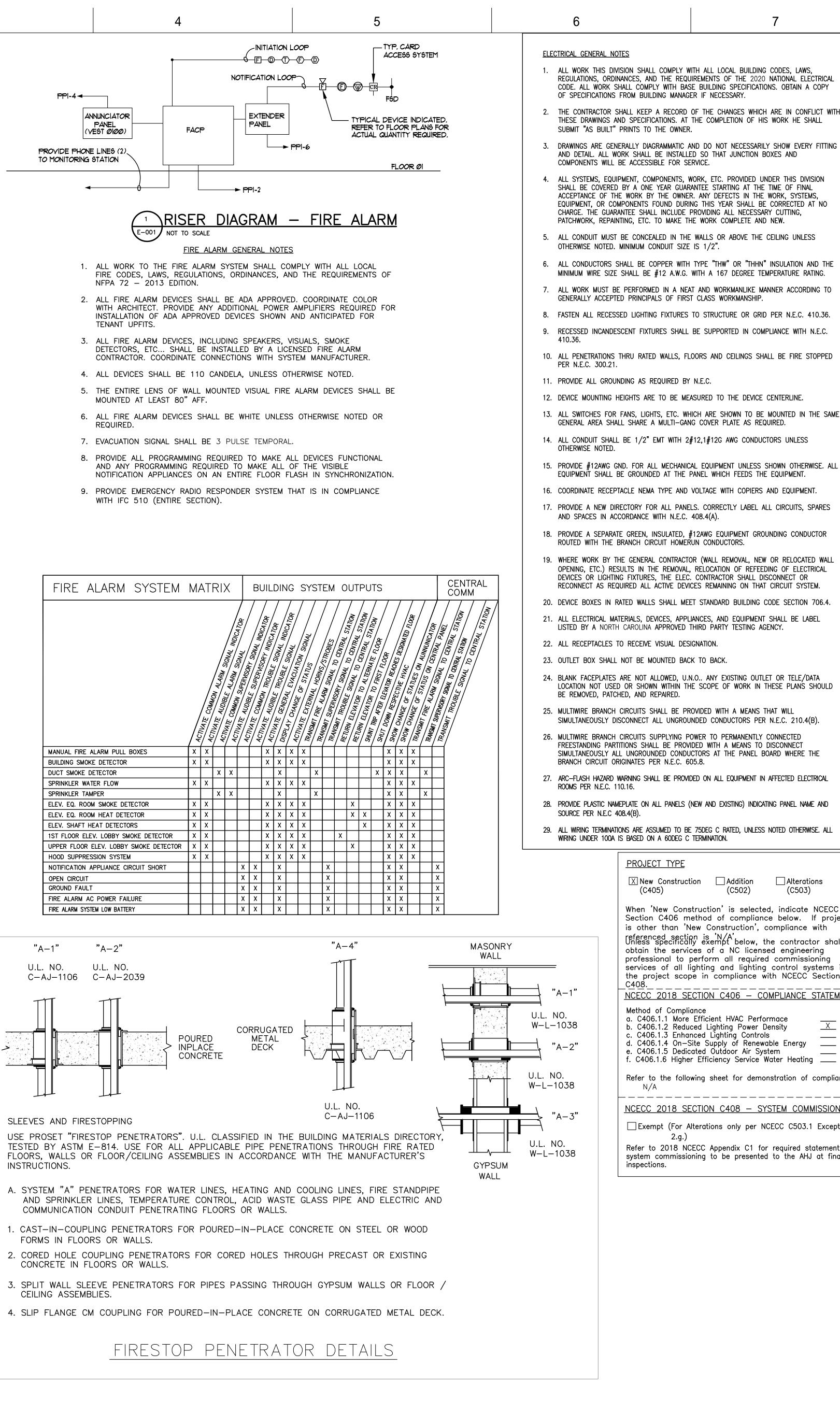
ELECTRICAL SYSTEM AND EQUIPMENT Method of Compliance Energy Cost Budget Prescriptive <u>X</u> Performance _____ Provide a standard riser diagram which indicates designated points for check metering. Provide a standard panel schedule description which idenifies different enduse loads. Standard riser diagram is on Sheet - E0.4 Standard panel schedules are on - E0.4 Lighting Schedule SEE LIGHTING FIXTURE SCHEDULE lamp type required in fixture SEE LIGHTING FIXTURE SCHEDULI number of lamps in fixture ballast type used in the fixture SEE LIGHTING FIXTURE SCHEDULE number of ballasts in fixture SEE LIGHTING FIXTURE SCHEDULE SEE LIGHTING FIXTURE SCHEDULE total wattage per fixture total interior wattage specified vs. allowed OPS Occupancy: gross area of 13,963.82 sq. ft. TRUCK BAY Occupancy: gross area of 7,468.59 sq. ft. Exterior gross area 1,058,147.45 sq ft. Per 2018 North Carolina Energy Code: <u>Specified</u> Allowable OFFICE $(0.82 \times 13,963.82 \text{ SQFT}) = 11,450.33 \text{ WATTS}$ 11.274 WATTS WHAREHOUSE $(0.66 \times 7,468.82 \text{ SQFT}) = 4,929.27 \text{ WATTS}$ <u>+3,612 WATTS</u> TOTAL = 11,45033+4929.27 = 16,379.6 WATTS 14.886 WATTS total exterior wattage specified vs. allowed ZONE 2 (600W) + Parking Areas and Drives (0.06 X 320511.83 SQFT) TOTAL = 600 + 320,511.83 = 19,833.11 WATTS 14.167 WATTS Equipment schedules with motors (not used for mechanical systems) motor horsepower N/A number of phases N/A minimum efficiency N/A motor type N/A N/A # of poles ELECTRICAL DESIGNER STATEMENT I hereby certify that the design of this building complies with the mechanical systems, service systems and equipment requirements of the 2018 North Carolina Energy Code. signed____ _____ date_05/24/2023 Name JONATHAN ERDMANN

3



Title <u>Project Engineer</u>

3

		1	

REGULATIONS, ORDINANCES, AND THE REQUIREMENTS OF THE 2020 NATIONAL ELECTRICAL CODE. ALL WORK SHALL COMPLY WITH BASE BUILDING SPECIFICATIONS. OBTAIN A COPY

2. THE CONTRACTOR SHALL KEEP A RECORD OF THE CHANGES WHICH ARE IN CONFLICT WITH THESE DRAWINGS AND SPECIFICATIONS. AT THE COMPLETION OF HIS WORK HE SHALL

DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EVERY FITTING

EQUIPMENT, OR COMPONENTS FOUND DURING THIS YEAR SHALL BE CORRECTED AT NO

MINIMUM WIRE SIZE SHALL BE #12 A.W.G. WITH A 167 DEGREE TEMPERATURE RATING.

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WP

E,EX/RE/N

GFI

ABOVE COUNTER

WEATHER PROOF

EXISTING/RELOCATED/NEW

GROUND FAULT INTERRUPTING CIRCUIT

-()- 0V

15. PROVIDE #12AWG GND. FOR ALL MECHANICAL EQUIPMENT UNLESS SHOWN OTHERWISE. ALL

OPENING, ETC.) RESULTS IN THE REMOVAL, RELOCATION OF REFEEDING OF ELECTRICAL RECONNECT AS REQUIRED ALL ACTIVE DEVICES REMAINING ON THAT CIRCUIT SYSTEM.

LOCATION NOT USED OR SHOWN WITHIN THE SCOPE OF WORK IN THESE PLANS SHOULD

Addition Alterations (C502) (C503)When 'New Construction' is selected, indicate NCECC Section C406 method of compliance below. If project is other than 'New Construction', compliance with referenced section is 'N/A' Unless specifically exempt below, the contractor shall

obtain the services of a NC licensed engineering professional to perform all required commissioning services of all lighting and lighting control systems in the project scope in compliance with NCECC Section

_____ NCECC 2018 SECTION C406 - COMPLIANCE STATEMENT

X

a. C406.1.1 More Efficient HVAC Performace b. C406.1.2 Reduced Lighting Power Density

d. C406.1.4 On-Site Supply of Renewable Energy e. C406.1.5 Dedicated Outdoor Air System

f. C406.1.6 Higher Efficiency Service Water Heating _____ Refer to the following sheet for demonstration of compliance:

_____ NCECC 2018 SECTION C408 - SYSTEM COMMISSIONING

Exempt (For Alterations only per NCECC C503.1 Exception

Refer to 2018 NCECC Appendix C1 for required statement of system commissioning to be presented to the AHJ at final

ON CENTER SYMBOL DESCRIPTION MTG. HT. CONCEALED CONDUIT IN CEILING OR WALL .---CONCEALED CONDUIT IN FLOOR OR UNDERGROUND CIRCUIT HOMERUN TO PANEL; EACH ARROWHEAD = 1 CIRCUIT NO. OF CONDUCTORS IN CONDUIT; EACH CROSSHATCH = 1 WIRE \sim FLEXIBLE CONDUIT OR S.O. CORD EXPOSED CONDUIT CONDUIT STUBBED UP OR TURNED DOWN 0 PLYWOOD BACKBOARD SURFACE MOUNTED RACEWAY MULTI OUTLET SURFACE MOUNTED RACEWAY $\varphi \varphi \varphi$ WALL MOUNTED SINGLE RECEPTACLE OUTLET 18" 18" WALL MOUNTED DUPLEX RECEPTACLE OUTLET AS REQUIRED WALL MOUNTED DUPLEX RECEPTACLE OUTLET - ABOVE COUNTER WALL MOUNTED G.F.C.I. DUPLEX RECEPTACLE OUTLET 18" WALL MOUNTED G.F.C.I. DUPLEX RECEPTACLE OUTLET - ABOVE COUNTER AS REQUIRED ⇒ IG WALL MOUNTED ISOLATED GROUND DUPLEX RECEPTACLE OUTLET 18" ⇒ WALL MOUNTED DOUBLE DUPLEX RECEPTACLE OUTLET 18"

ELECTRICAL SYMBOL LEGEND

 $\bigcirc \dashv$ WALL MOUNTED SPECIAL RECEPTACLE OUTLET 18" \bigcirc \bigcirc JUNCTION BOX 18" WALL MOUNTED COMBINATION DATA/VOICE OUTLET. PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING. 18" WALL MOUNTED VOICE OUTLET. PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING. WALL MOUNTED DATA OUTLET. PROVIDE JUNCTION BOX WITH 18" 3/4" CONDUIT TO ABOVE CEILING. JUNCTION BOX FOR TV. PROVIDE JUNCTION BOX WITH 3/4" CONDUIT TO ABOVE CEILING. 2-GANG JUNCTION BOX FOR AV, LOW-VOLTAGE WIRING BY OTHERS. PROVIDE JUNCTION BOX WITH 1-1/4" CONDUIT TO ABOVE CEILING. U.N.O. JUNCTION BOX FOR CARD READER. PROVIDE JUNCTION 42" BOX WITH 3/4" CONDUIT TO ABOVE CEILING. DOME CAMERA (PROVIDED BY SECURITY CONTRACTOR) WIRELESS ACCESS POINT, CEILING MOUNTED (BY OTHERS) SPEAKER LOCATION (BY OTHERS) \odot FLOOR BOX DEVICES WITH POWER, TELE/DATA, AV PER PLANS (SEE DRAWINGS FOR MODEL#) FLOOR BOX DEVICES WITH POWER AND TELE/DATA PER PLANS $\mathbf{\nabla}$ (SEE DRAWINGS FOR MODEL#) FLOOR BOX DEVICES WITH QUAD RECEPT & TELE/DATA OUTLETS (SEE DRAWINGS FOR MODEL#) FLOOR BOX DEVICES WITH QUAD RECEPT & TELE/DATA/AV OUTLETS **⊕**av **v** (SEE DRAWINGS FOR MODEL#) FLOOR BOX DEVICES WITH ONLY TELE/DATA/AV OUTLETS (SEE DRAWINGS FOR MODEL#) PD FLOOR BOX DEVICE TO MODULAR FURNITURE JUNCTION BOX FOR POWER CONNECTION TO MODULAR PU_H 18" FURNITURE. COORD. EXACT LOCATION WITH ARCH. PROVIDE ALL REQ. CONNECTIONS (THE # OF WORKSTATIONS TO BE POWERED ARE DENOTED BY A NUMBER NEXT TO THE POWER JUNCTION) JUNCTION BOX FOR TELE/DATA CONNECTION TO MODULAR FURN. T∕DϢ⊣ COORD. EXACT LOCATION WITH ARCH. PROVIDE 1-1/4" EMPTY CONDUIT WITH PULLSTRING TO ABOVE ACCESSIBLE CEILING. PROVIDE AND INSTALL JUNCTION BOX ABOVE CEILING TO

> WORKSTATIONS TO BE POWERED ARE DENOTED BY A NUMBER NEXT TO THE POWER POLE) 120/208 VOLT PANELBOARD RECESSED MOUNTED 120/208 VOLT PANELBOARD

TRANSFORMER LIGHT FIXTURE EXIT SIGN - CEILING, WALL MT. LIGHT FIXTURE ON EMERGENCY 90 MINUTE BATTERY PACK WALL MOUNTED S.P.S.T. TOGGLE SWITCH 42" WALL MOUNTED 3-WAY TOGGLE SWITCH 42" WALL MOUNTED 4-WAY TOGGLE SWITCH 42 WALL MOUNTED DIMMER SWITCH (WATTAGE AS REQUIRED) 42 WALL MOUNTED TIMER SWITCH WALL MOUNTED MANUAL OVERRIDE SWITCH 42" (TO OVERRIDE CIRCUIT DESIGNATED AT LIGHTING CONTACTOR PANEL) MOTION DETECTOR SWITCH W/ MANUAL OVERIDE - WALL MOUNTED. 42" MOTION DETECTOR - CEILING MOUNTED

SUPPLY POWER WHICH SHALL SUPPLY EACH WORKSTATION WITH

TWO (2) DUPLEX AND ONE (1) VOICE DATA. POWER POLE TO

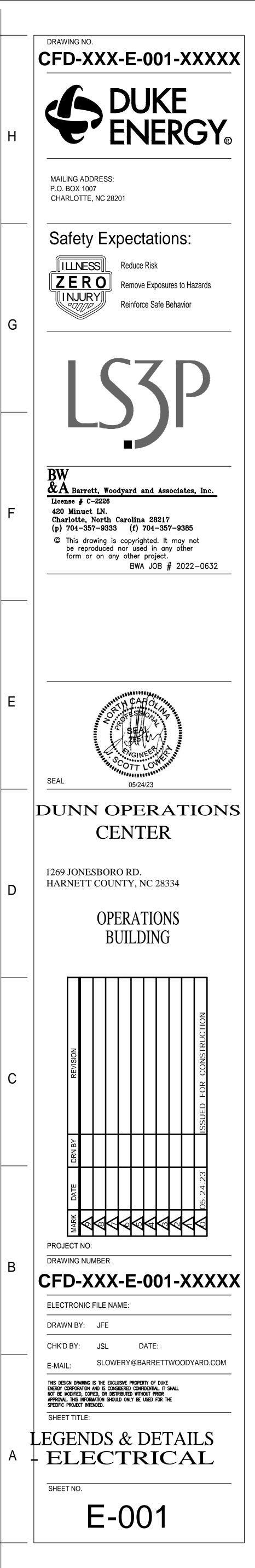
BE SUPPLIED BY TENANT AND INSTALLED BY E.C. (THE # OF

DAYLIGHT SENSOR MOTOR RATED TOGGLE SWITCH AS REQ'D. -()- M COMBINATION MOTOR STARTER/DISCONNECT SWITCH ্র (30/3) DISCONNECT SWITCH (FRAME/POLES/FUSE-IF REQUIRED) MOTOR - NUMBER INDICATES HORSEPOWER (F=FRACTIONAL) FIRE ALARM ADA APPROVED VISUAL ALARM - WALL MOUNTED 80" A.F.F. FIRE ALARM ADA APPROVED VISUAL ALARM - CEILING MOUNTED FIRE ALARM ADA APPROVED AUDIO/VISUAL ALARM - WALL MOUNTED ΕŊ 80" A.F.F. FIRE ALARM ADA APPROVED AUDIO/VISUAL ALARM - CEILING MOUNTED FIRE ALARM PULL STATION 48" A.F.F. SMOKE DETECTOR - CEILING MOUNTED DUCT MOUNTED SMOKE DETECTOR MAGNETIC DOOR HOLD DEVICE TO INTERLOCK WITH FIRE ALARM SYSTEM TAMPER SWITCH – FIRE ALARM FLOW SWITCH - FIRE ALARM HEAT DETECTOR - FIRE ALARM F.B.O. FURNISHED BY OTHERS ABOVE FINISHED FLOOR/ABOVE FINISHED GRADE AFF/AFG BELOW CEILING

E.C. EMPTY CONDUIT (PROVIDE PULLSTRING IN ALL EMPTY CONDUIT) FPMR FUSE PER MANUFACTURER'S RECOMMENDATION ISOLATED GROUND

1. COORDINATE LOCATION AND SPECIFIC MOUNTING HEIGHT WITH ARCHITECT. MOUNTING HEIGHTS SHALL BE AS INDICATED IN THE LEGEND UNLESS OTHERWISE NOTED ON THE PLANS.

NOTES:



1	2	3
BW&A 26 01 00ELE.DOC 26 01 00- CSI MASPEX (Revised 1/13)Electrical G SECTION 26 01 00 ELECTRICAL GENERAL		 Busway Ground fault system Disconnect switches Lighting fixtures Lighting control system Dimming system Life safety system
Drawings. Provide all labor, materials	tions in the 260000 Series and the accompanying Electric and equipment, and all necessary operations to provide ms intended under this Division. Division 26 is not a sta Project Documents.	the and alone C. All shop drawings and submitta
	nat there are many interfaces between the work required or Divisions. Provide the necessary interface and coording project.	
1.2 EXISTING CONDITIONS [NOT APPLIC		 D. All submittals shall bear the not E. All shop drawings and submittathas been reviewed for compliance wittindication also represents the fact thall other Divisions and certifies by here
1.3 CODES AND REGULATIONS A. All work under this Division shall and the requirements of the 2011 Na	comply with all local building codes, laws, regulations, o tional Electrical Code.	stamp shall include the date, name certification of compliance and appro review it. ^r dinances F. The engineer will review an ind again on the second review, the con
B. Where conflicts of installation red the Contract Documents, the most res	quirements occur between the aforementioned codes, regu strictive shall govern.	for additional reviews. Such paymer application. 2.3 RECORD (AS-BUILT) DRAWINGS
	and pay all fees required by local authorities. Arrange fo authorities having jurisdiction and provide written certifica designated representative.	r all i i i i i i i i i i i i i i i i i i
	ete set of project Drawings and Specifications.	B. At job completion, submit to the for all equipment furnished on the p
B. Provide: Furnish, install and cor C. Work: All materials installed, inc	nnect. Iuding all labor to provide complete system.	PART 3 – EXECUTION 3.1 COORDINATION
D. Wiring or Wired: All wire or cab connected at both ends with all requir	le installed in conduit from panelboard to equipment and red boxes, connectors, couplings, etc.	A. Coordinate all space requiremer such that adequate space will be all also will allow room for future acces
•	ermediate metal conduit (I.M.C.), electrical metallic tubing netal tubing (ENT), or flexible steel conduit.	increasing the contract price.
	together are to be considered as the Contract Document the other, or implied by either, shall be provided to give	
complete project. B. Should any conflicts exist betwee shown/called for which is not clearly	en the Drawings and Specifications or there is an item defined, immediately submit a request for clarification.	3.2 PROTECTION OF MATERIALS A. All equipment shall have the or lo
-	when a conflict is resolved or an item is more clearly a are not intended to show the exact location outlets, etc	 B. Protect equipment during const all conduit openings so that no fore
lights, etc.) shall be as located by ot Structural and Mechanical Documents work described in this Division so that	requiring electrical connections (mechanical equipment, el her Divisions of the Contract Documents. Refer to the Arc for dimensions and details of building construction and p t it conforms to the details of the project. The right is other outlet a maximum of 10'-0" before it is permanen the Contract amount.	chitectural, rovide reserved tly B. Any work found not to be in c
1.6 SITE VISIT		replaced without incurring any addition C. Provide to the Owner, all instru- provided under this Division. Provide
submitting Contract price.	ar with all aspects of the site and existing conditions bef	ore instructions. 3.4 GUARANTEE
B. No allowance will be made for lo1.7 DEVIATIONS	ack of knowledge of existing conditions.	A. All systems, equipment, compor one year guarantee starting at the t
A. No deviations from the Contract consent of the Architect.	Documents shall be made without the full knowledge and	the work, systems, equipment or cor The guarantee shall include providing complete and new.
B. If the existing conditions make it item, provide a written request to the	t desirable to modify the Contract Documents in regard t Architect.	o any B. Present this guarantee and any systems to the Architect. All equipn
PART 2 – PRODUCTS 2.1 STANDARDS FOR MATERIALS AND	WORKMANSHIP	END OF SECTION
	and shall be stamped with the label of Underwriters Labo	ratories, SECTION 26 10 00
	idards of the following associations and institutes where o	ELECTRICAL BASIC MATERIALS & METH Ipplicable: PART 1 — GENERAL
 National Fire Protection Association American Society of Testing Materia 		1.1 DESCRIPTION
 American National Standards Inst National Electrical Manufacturer's 		A. All work specified in this Section
5. Institute of Electrical and Electron		B. This Section describes the basi and applicable to Division 26.
and set the standard of quality. All bi material not specified shall be conside	ng numbers specified herein are intended to describe the ids shall be based on material specified. Requests for a pered if the request is in written form and submitted to the days before bid date. All requests shall conform with the entary conditions.	pproval of PART 2 - PRODUCTS ne
D. Samples of materials requested t Architect.	to be substituted shall be furnished upon the request of	the A. Galvanized rigid steel conduit s threaded joints.
2.2 SHOP DRAWINGS AND SUBMITTAL		B. Intermediate metal conduit (IMC joints.
•	rawings or submittals is a cursory review to check for ge sign intent of the Contract Documents. The Engineer's r	

the Contractor.

H

G

· -----

B

5. Under floor duct

6. Metering equipment

10. Fuses

G. Liquid-tight flexible metal conduit and liquid-tight non-metallic conduits shall be liquid-tight and sunlight resistant.

3

C. Electrical metallic tubing (EMT) shall be steel, galvanized both inside and out.

D. Plastic conduit (PVC) shall be schedule 40 PVC heavy wall type. A grounding conductor shall be provided.

E. Electrical non-metallic tubing (ENT) shall be of such material that it is resistant to moisture, chemical atmospheres and is flame retardant. A grounding electrode conductor shall be provided.

F. Flexible metal conduit shall be flexible steel conduit tubing and shall meet Underwriters Laboratories Standard for Flexible Steel Conduit.

does not relieve the Contractor of his responsibility of complying with the Contract Documents. All coordination of the work in strict compliance with the Contract Documents is the sole responsibility of

B. The following items shall be submitted for review:

1. Conduit and wire

2. Grounding system

3. Devices

4. Coverplates

7. Panelboards

8. Switchboards

9. Transformers

11 Overcurrent devices

2.2 CONDUIT FITTINGS

A. Rigid conduit and IMC conduit fittings shall be zinc-coated, ferrous metal and taper t B. EMT fittings shall be zinc-coated steel and hexnut compression or set-screw type. E

connectors shall have insulated throats.

C. PVC fittings, elbows and cement shall be produced by the same manufacturer. All join solvent welded in accordance with the manufacturer's recommendations.

D. Conduit connections to switchboards, motor control centers, transformers, panel cabinet boxes shall have grounding wedge lugs between the bushing and the box or locknuts designed into the metal.

E. Each conduit end shall be provided with either an insulated throat connector or separa and insulated bushing. Bushing shall be installed before any wire is pulled.

F. Conduit fittings approved manufacturers are Raco, Steel City, O.Z. Gedney, Thomas & Appleton.

G. Expansion fittings shall be provided in all conduit which crosses and expansion joint.

2.3 CONDUCTORS

A. Conductors shall be copper of 98% conductivity, 600 volt insulation. Sizes specified gauge for No. 4/0 and smaller and circular mils (MCM) for all sizes larger than no. 4/0. No. 10 and smaller shall be solid and type "THHN" or "THWN" insulation. No. 8 and larger stranded and type "THW" or "XHHW" insulation.

B. Aluminum conductors may be used for service lateral conductor if the same or larger the conductors specified. Aluminum conductors shall be Alcan 8000 series, Stabiloy or appro

2.4 OUTLETS

A. Outlet boxes and covers shall be of such form and dimensions as to be adapted to usage, locations, size and quantity of conduit, and size and quantity of conductors entering In special "Fire Rated" partitions, outlets shall comply with ASTM No. E119.

B. Flush ceiling outlets for surface or pendant mounted lighting fixtures shall be one-piece or octagonal pressed steel boxes. Boxes for devices in unfinished masonry walls or stud pressed steel, square corner, sectional switch boxes, or shall be 4" square box with a squa tile wall cover, set flush with masonry construction. Boxes in concrete ceiling slab shall be shallow concrete boxes. Welded boxes are not acceptable.

C. All outlet boxes in plaster or masonry walls or ceiling shall be provided with plaster riv

D. Junction boxes and all outlets not indicated as containing wiring devices or lighting fix have covers. Covers for outlets in walls shall be as specified for wall switches and recepta

E. Outlet boxes exposed to the weather and outlet boxes for vaportight lighting fixtures shall be of cast iron corrosion resistant type.

F. Outlet box approved manufacturers are Appleton, Raco, Steel City, or Crouse-Hinds.

2.5 DISCONNECT SWITCHES

A. Disconnect switches shall be "heavy-duty" type, enclosed switches of quick-make, quic construction. Switches shall be horsepower rated for 600 volts AC as required. Lugs shall for copper and aluminum.

B. Padlocking provisions shall be provided for padlocking in the OFF position.

C. Switches shall be furnished in NEMA 1 General purpose enclosure unless noted otherwis located on the exterior of the building or in "wet" locations shall have NEMA 3R enclosures.

D. Fused disconnect switches shall have rejection type fuse clips with dual element, currer fuses of rating shown.

E. Disconnect switches shall be mounted to structure. Disconnect switches shall not be mechanical equipment or ductwork.

2.6 NAMEPLATES

- A. Nameplates shall have 3/8" high engraved letters.
- B. 120 or 208 volts: white core laminated bakelite with black finish.
- C. 277 or 480 or higher volts: white core laminated bakelite with red finish.

Nameplate shall indicate the panel name and the name of the device or equipment wh power supply/feeder originates.

2.7 WALL SWITCHES

A. Wall switches shall be plastic, totally enclosed, quiet type, self-grounding, 277 volts an and shall match existing if possible and equal the following (or equal by Leviton, P&S, or

1.	Single Pole:	Hubbell No. CS1221	
2.	Double Pole:	Hubbell No. CS1222	
3.	Three—Way:	Hubbell No. CS1223	
4.	Four-Way:	Hubbell No. CS1224	

B. Color shall be as selected by architect.

C. Flush motor switches with red pilot light and with overload protection for fractional hor motors shall be Hubbell No. HBL1221PL.

D. Key switches shall be Hubbell No. HBL1221L 20A Series or approved equal by P&S or

2.8 WALL MOUNTED OCCUPANCY SWITCHES

A. The passive infrared sensor shall be a completely self-contained control system that standard toggle switch. Sensor shall have ground wire for safety. Switching mechanism sh latching air gap relay, compatible with electronic ballasts, compact fluorescent and inductive Triac and other harmonic generating devices shall not be allowed.

- B. Sensor shall cover up to 1000 sq. ft. for walking motion, with a field of view of 180
- C. Sensor shall have system which provides superior 180 degree coverage.
- D. Sensor shall operate at 120 VAC or 277 VAC.

E. Sensor shall have no minimum load requirement and shall be capable of switching from watt incandescent; 0 to 800 watts fluorescent or 1/6 hp @ 120 VAC, 60 Hz; and 0 to 120 fluorescent or 1/3 hp @ 277 VAC, 60 Hz.

F. For accuracy and consistency, sensor shall have a DIP switch controlled, digital time adjustable from 15 seconds to 30 minutes.

G. Sensor shall have standard 5 year warranty and shall be UL and CUL listed.

H. Sensor shall be Wattstopper WI Series, Leviton Decora Series, or approved equal by eng

2.9 RECEPTACLES

A. Duplex receptacles shall be plastic, two-pole, three wire, self-grounding, side wired, 1 15A rating and shall match existing if possible and be equal to the following (or equal by or Cooper):

als shall be submitted in compliance with the requirements of the ns. No more than four (4) copies of submittal data will be reviewed. ed unmarked. The responsibility of copying review comments on any the contractor.

ame of the manufacturer to be used.

als shall include a stamped indication signifying that the submittal with the Contract Documents by the Contractor. This stamped that the Contractor has checked this submittal for its interaction with his signature or initials that all coordination has taken place. The of the Contracting Firm, the signature of the Contractor, oval. This stamp shall be on the submittal before the Engineer will

ividual submittal not more than twice. If the submittal is rejected ntractor will bare all responsibility for paying for the engineer's time ents to the engineer shall be withheld from the next monthly pay

AND MAINTENANCE MANUALS

the Architect, a set of prints showing all deviations from the shall also have dimensions locating all underground conduits.

the Architect, three (3) sets of maintenance and instruction manuals project.

ents with all other Divisions before installing any work. Install work llotted for all other work from other Divisions to be installed and ess for repair and maintenance.

per coordination shall be relocated at the Architect's direction without

the pricing for a guaranteed maximum price, coordinate with all of work required in Division 26. Any work shown or implied in vision 26 shall be included in the Contract price regardless of vision 26.

riginal finish when the building is turned over to the Owner.

ruction from dirt, water, chemical, mechanical damage, etc. Protect eign material will enter the conduit. STRUCTIONS

this Division in the presence of the Owner or a designated the work. Demonstrate that the installation is in accordance with

compliance with the Contract Documents shall be repaired or ons to the Contract price.

uction on maintenance and operation of all systems and equipment e all necessary tools and personnel to thoroughly present these

nents, work, etc. provided under this Division shall be covered by a time of final acceptance of the work by the Owner. Any defects in imponents found during this year shall be corrected at no charge. all necessary cutting, patchwork, repainting, etc. to make the work

additional warranties or guarantees on furnished equipment or ment or system guarantees are in addition to the general guarantee.

HODS

ion shall comply with the provisions of Section 26 01 00.

sic electrical materials and installation methods that are acceptable

shall be low carbon, hot—dipped galvanized both inside and out with

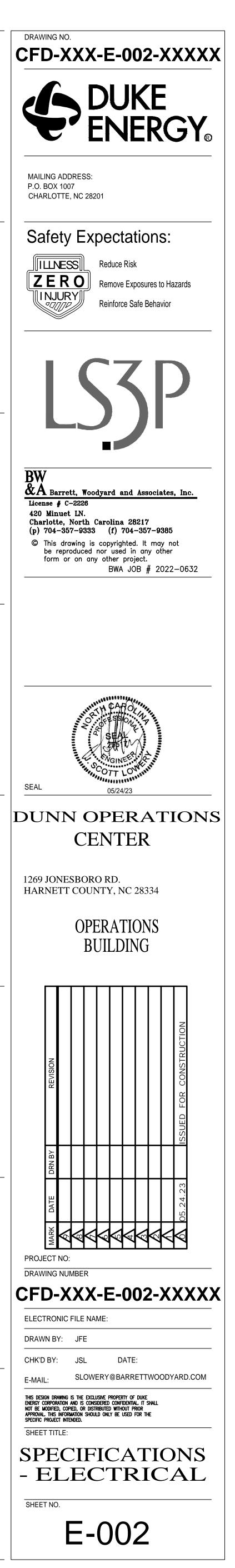
C) shall be steel, galvanized both inside and out with threaded

H. Steel conduit approved manufacturers are Allied, Triangle and Republic.

I. PVC and ENT conduit approved manufacturers are Carlon and Triangle.

1. Standard receptacle: Hubbell No. 5362 Series

	7		8		9			
threaded type. EMT joints shall be	 Tamper resistant type:Hubbell No. CR20*TR Series Isolated ground type: Hubbell No. CR5352IG Series Hospital grade (HG) type: Hubbell No. HBL8300 Series HG Tamper resistant type: Hubbell No. HBL8300SG Series GFCI: Hubbell No. GF20*LA Series GFCI HG: Hubbell No. GFR8300H*LA GFCI HG tamper resistant: Hubbell No. GFR8300H*TR 							
nets, and pull		•	ree wire, self-grounding, si equal by Leviton, P&S, or		20A			
igned to bite	·	le: Hubbell No. HBL53 pe: Hubbell No. IG5361						
arate locknut	C. Color shall be as	selected by the Archite	ect.					
& Betts and	D. Receptacles in al	patient care areas she	all be hospital grade type	per NEC article 517.18.				
	E. Receptacles in al 2.10 COVERPLATES	pediatric care areas s	shall be tamper resistant ty	vpe per NEC article 517.1	18(C).			
are AWG . Conductors jer shall be	Hubbell "P" Series or o	equal by Leviton, P&S,			ze,		G	
er capacity of	C. Coverplates for e	xterior devices shall be	hall have same finish as a self—closing, die—cast aluı		equal by			
pproved equal.	Leviton, P&S, or Coope 2.11 PLYWOOD BACKBC					-		
o their specified ng the boxes.	A. Provide plywood l	ackboards where showr	n. Backboards shall be m d to be mounted thereon.	inimum 3/4" thick and s	sized as			
iooo 4" oouero	B. Secure plywood t	o the building structure	and paint with two coats	of gray paint.				
viece 4" square walls shall be juare cornered	2.12 SMOKE AND FIRE	STOP FITTINGS					F	
be octagonal, rings. fixtures shall ptacles.	conduit either on the intumescent material, "FIRE—SEAL" or Dow Co	outside of the conduit, which expands to fill all prning silicone RTV foan ling or wall through wh	IL listed for that purpose. busway or cable or interno I voids. Smoke and fire s n with an hourly fire—rating ich the cable or conduit p	ally shall have heat active top fittings shall be 0.Z., g equal to or higher thar	ated /Gedney n the			
and devices	2.13 FLOOR OUTLETS					_		
	vertical angular adjustr	nent, brushed brass fro	boxes, Hubbell B2436 Serie ame, brushed brass floor p equired. Adjacent boxes sh	late and gasket. Larger	than			
uick-break all be UL listed	plate where installed in	carpeted floor and a have a S2625 plate a	e Hubbell No. S3825 floor Hubbell CR5262 Series dup Ind Hubbell single receptacl	olex receptacle. Single fl	loor		E	
	2.14 FUSES							
wise. Switches es.	interrupting rating (200	,000 Amps), current lin	the same manufacturer. niting type and manufactur ecified quantity of fuses sh	ed by Bussmann. Fuses	s shall			
rrent limiting e mounted to	Dual Element Fuses LF separate overload and minimum of 10 second	N-RK (250 volts) or LI short-circuit clearing c Is and be listed by Und	ected by rejection type, cur PS—RK (600 volts). All du chamber. The fuse must h derwriter's Laboratories, Inc es shall be UL Class RK—1	ual—element fuses shall h hold 500% of rated currents., with an interrupting rate	nave nt for a			
	Fuses KRP—C. Fuses melamine fuse barrel. of rated current for a	shall employ "O" rings The terminals shall be minimum of 4 seconds r's Laboratories, Inc., w	protected by current limiting as positive seals between opened. Fuses shall be ti s, clear 20 times rated cu vith an interrupting rating o	the end bells and the gla me—delay and must hold rrent in 0.1 seconds or l	ass 500% less and		D	
where the	three fuses) for each	type and rating of fuse alled exceeds five (5)	ninimum of one (1) set of e used. When the number sets, furnish an additional	of fuse sets of the sam	ne type			
		in which to store all s acturers are Bussmann	spare fuses, Bussmann Cat or equal by Littelfuse.	talog No. SFC				
and 20A rating r Cooper):	PART 3 – EXECUTION							
	3.1 CONDUIT							
	A. Rigid steel (or IM exposed to damage.	C) shall be used for se	ervice entrance and all fee	ders and branch circuits	where		С	
	B. EMT shall be use concrete in contact wi		ire alarm and telephone wh	nen not underground or i	in			
horsepower		-	underground feeders, service nder the lowest floor slab.	e entrance conductors wh	nen			
or Leviton.	ENT may be environmental air plenu		its in concealed areas whic	ch is not used as an				
t replaces a shall be a ve loads.	box. Conduit shall en electrically continuous cabinets and junction	er and be secured to from service to all outh poxes shall terminate ir	to outlet, from outlet to a all boxes, etc., in such a ets such that a good grou n approved outlet boxes or ed hub shall be double locl	manner that each system Ind is provided. All cond conduit fittings. Condui	n will be duit from			
30 degrees.			ere shown and where nece it sizes shown may increas				В	
from 0 to 500 1200 watts	at right angles to the with approved galvanize supported independent installed high enough t hangers for supporting	building walls and supp d iron clamps or hang of ceiling construction. o permit removal of ce single conduit. Use tr	dicated otherwise. Install e port from walls or ceilings yers. Concealed conduit at Where ceilings of lay—in eiling panels and lighting fi rapeze hangers consisting o ge minimum steel for suppo	at intervals required by (pove the ceiling shall be type are used, conduit n xtures. Use threaded roo of double—nutted threaded	Code nust be ds and			
e delay		panel designated. Hor	s shall not be smaller than me runs shown shall not b	•				
engineer.			aded so that they meet in uplings of the Erikson Type				٨	
125 volto		•	wire, or for data commur ine as manufactured by Id				A	
125 volts and y Leviton, P&S,	J. Expansion fittings expansion joints.	shall be installed in al	ll conduit which pass throu	igh the cross—sectional a	area of			
	<u></u>	· · · · · · · · ·						



	1	2	3
	Gardner Bender duct seal, for each conduit entering passing from one space into another which is norm		A. Where more than one device is indi
	L. Provide watertight conduit hubs on conduit ter weather.		 where more than one device is indicombined multi-gang boxes and covered by the devices and voltages being used. 3.8 COVERPLATES
Н	M. Space in sleeves or around conduit that pass floors or ceilings shall be closed by packing with a the rating of the barrier penetrated.	through fire resistive or fire rated walls, partitions, n unlabelled fire resistive material that will maintain	A. All junction boxes, outlet boxes, mu a coverplate. The coverplate shall be a
	3.2 FLEXIBLE CONDUIT		B. Coverplates shall be mounted vertic
	A. PVC extruded cover flexible conduit shall be u or vibrating machinery or equipment. The flexible o possible, but shall have a minimum length of 12".	sed in making short flexible connections to rotating conduit at these locations shall be as short as	3.9 GROUNDING A. Ground connections shall be in acco
	directly from a non-flex conduit to a rotating or v		 Provide a grounding electrode system x 10'-0", driven 24" below grade a mini bonded together with No. 4/0 conductors effect the building ground. If the resisted driven and bonded together until a reading
G	C. Flexible metal (MC) conduit system may be ut MC Cable shall run from point of exit from wall or box. MC cable will not be permitted to be installed through a fire rated partition. Conductor colors of	d in the above ceiling space and shall not pass	of the grounding system, measure the sy directly to the Architect two (2) copies Owner's representative.
0	1. MC cable shall be constructed to have an inst bare aluminum conductor shall not be used as the	ulated, copper ground conductor. Sheathing with a ground.	2. Extend from the electrodes to the conductor in a 1" conduit and connect t
	2. MC cable in patient care areas shall be hospi	tal grade (HCF) to comply with NEC 517.13.	3. Provide a No. 4/0 copper insulated with clamps to the water line on each s
	3.3 CONDUIT PROTECTIONA. All conduit installed in the ground outside the	building exterior line (with the exception of exterior	4. Provide a No. 4/0 copper insulated pipe ahead of first valve to the main se frame.
	lighting circuits) shall be encased in 4" of concrete 3000 P.S.I. mix. All threaded joints in rigid condui- joint compound applied. All conduit installed outsid minimum of 30" below finished grade but in no cas is installed below the ground floor slab inside the b the floor slab and the vapor barrier. These condui	e on all sides. Concrete shall be a minimum of t that is encased in concrete shall have a U.L. listed le the building underground shall be buried a se shall be buried deeper than 48". Where conduit building exterior line, the conduit shall be run between ts shall be installed in the slab itself where feasible.	5. Where nonmetallic insulating coupling systems, provide a No. 4/0 copper, insu attached with clamps to the water line o
F	When a conduit duct bank must be installed then t and installed per Appendix B of the NEC. Derating the responsibility of the contractor. Conduit installed the bottom steel and below the top steel.		 All ground connections in the building All ground clamps shall be equipped
	 B. Conduit shall be secured in place and protected during construction. The ends of all conduit shall 		compression device clamping the pipe or 8. All steel conduit entering the main
	All conduit shall be blown out and swabbed clear o C. Provide identifying marker tape the entire leng	f water and trash prior to pulling wire. th of each conduit installed in the ground outside	grounding bushings. All bushings shall b a No. 4 bare conductor. B. Provide an insulated green bonding
	soil, and shall be a minimum 4 mil thickness. The words, "CAUTION — ELECTRIC LINE BURIED BELOW," i imprint shall repeat itself for the entire length of t	imprinted with contrasting permanent ink. The he tape. The tape shall be buried at a maximum of	City "GEE" clip or a sheet metal screw in mounting screws will not be acceptable.
	18" below finished grade, above a portion of the ea Reef Industries, Inc., P.O. Box 33248, Houston, Texa	• •	C. Provide one (1) #6 AWG ground in company main distribution frame or servi
	3.4 WIRINGA. All conductors shall be installed in conduit.	No conductors shall be pulled into the conduit until	D. Provide a signal reference grounding reference grid shall be as manufactured
Е		ed. Wire pulling lubricants shall be Gardner-Bender	1. The signal reference grid shall be 2 directions. The grid shall be laid out su square.
	All splices and joints shall be carefully and securely pressure type connectors, Gardner Bender "Winggard	outlet and from outlet to junction box or pull box. / made to be mechanically and electrically solid with " or Ideal "Wingnut". Tape shall be "Scotch" No. 33	2. All crossovers shall have a welded
	terminals of more than 30 amperes capacity and w to any terminal, copper terminal lugs shall be bolte	der No. 95-661. Where connection is made to any where conductors larger than No. 10 are connected ed to the conductors. Where multiple connections are gs for each conductor shall be used. Aluminum	3. The grid shall be in sections (16' with the roll protected for shipment.
	conductors, if used for service conductors, shall be by Square D, Ideal or MAC.		4. A 2" wide, 26 AWG gage x 72" cop computer equipment) shall be installed fo equipment provided.
	C. Each conduit shall have a minimum of two (2 is noted as being for systems other than electrical otherwise.	?) conductors pulled in unless that particular conduit circuitry and/or future use or unless noted	5. All ground connections shall be the
D	D. Conductors for lighting and receptacle circuits color coded with the same color used with its resp	shall have color coded jackets. The wiring shall be ective phase through the entire job as follows:	6. Every sixth pedestal in each direction copper conductor.
U	208/120 Volt System 480/277	7 Volt System	7. The grid is not required to be bond mastic may be used. Consider this step
	Phase B — Red Phase B	– Brown – Orange	8. All columns within and at the perim path using a #6 AWG, 7 strand copper c
	Phase C — Blue Phase C Neutral — White Neutral — Gro Ground — Green Ground — Gr	-	9. All conduits, pipes, ducts, miscellan 7 strand copper conductor.
	E. The feeder and service entrance conductors sl tape applied within 6" of each conductor end.	hall be color coded by the use of colored plastic	10. The installation of the signal referent recommendations.
		than No. 12 and where the home run from center	3.10 TELEPHONE CONDUIT SYSTEM
С	G. For branch circuits terminating in outlet without	ut device, leave minimum of 12" of slack wire coiled	A. Telephone service shall include wood conduit as shown.
	junction boxes at panelboards within 6" of conducto	be identified with proper circuit numbers at terminals, or ends.	B. Telephone service entrance cable, a by the telephone equipment vendor.
	3.5 OUTLETSA. Provide galvanized steel or cast type boxes for	or all outlets.	C. Provide an outlet and conduit syste readiness for wiring by others. Provide uniform height with smooth insulated bus
	B. Where outlet boxes are used to support lightir structural members of the building per NEC 370-13	ng fixtures, the outlet box shall be anchored to the 3.	D. Telephone wall outlets shall be pres
		ey are specifically shown as being used with exposed	indicated. Coverplate shall have a bushe E. Telephone floor outlets shall be floo
	-	n or below floor slabs, the conduit shall be stubbed und the conduit.	3.11 CONNECTION TO EQUIPMENT
В	E. Cuts for outlet boxes in masonry walls shall b the cut. The mounting height of switch, receptacle	be made so that the coverplate will completely cover and other outlets may be varied slightly, with the	A. Equipment furnished by the Owner of elevators, escalators, signs, kitchen equip and make the electrical circuit connection
	devices that fit into the outlet boxes shall be screw	th the surface in which they are recessed. The ved tight before the coverplate is installed and the	B. Provide PVC insulated flexible cord equipment. Cords shall be sized in acco cords shall be "SO" cable with PVC jacke
		nd different mounting heights are specified for each,	3.12 CORING, CUTTING AND PATCHING
	they shall be mounted one directly over the other, 3.6 NAMEPLATES		A. Set sleeves for conduit accurately b forms so as to leave openings in the flo Fill in the voids around the sleeves with
	A. Provide specified nameplates on the main swit breakers, panelboards motor control centers, discon start—stop push buttons and motor switches.	chboard, distribution panels, feeder switches, feeder nect switches, contactors, starters, transformers,	B. Should the performance of this pre- order to install conduit, then the expense conditions shall be accomplished without
А	B. Provide nameplates on every device in the ma centers.	in switchboard, distribution panels and motor control	3.13 EQUIPMENT ANCHORING
	C. Nameplates for surface mounted equipment sh sheetmetal screws. Nameplates for flush or recess inside of the panel door or cover with epoxy cemer		A. All items of electrical equipment, su standby generator, etc., shall be securely accomplished by utilizing a minimum size of equipment. A minimum of two (2) a equipment with the following exceptions:

3.7 WALL SWITCHES AND RECEPTACLES

3

per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole. dicated at a location, the devices shall be gang-mounted in jointly by a common coverplate. Provide barriers as required Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided. ulti-gang switch boxes, utility boxes, etc., shall be covered with END OF SECTION I finished plate as specified unless designated otherwise. cally unless designated otherwise. SECTION 26 20 00 cordance with the National Electrical Code. SERVICE AND DISTRIBUTION em consisting of a minimum of three (3) copperweld rods, 3/4" PART 1 – GENERAL nimum of 72" apart in the form of an equilateral triangle, . Install rods a minimum of 36" clear of foundation walls to 1.1 DESCRIPTION ance to ground exceeds 25 ohms, additional rods shall be ing of 25 ohms or less to ground is obtained. After completion system ground resistance with a "Megger Earth Tester". Submit A. All work specified in this Section shall comply with the provisions of Section 26 01 00. of each test report certified by the testing technician and the B. Provide a complete electrical distribution system. The system shall include the service entrance, main switchboard, feeders, transformers, distribution panels, panelboards, busway, remote control main service disconnect with a No. 4/0 copper insulated ground switches, contactors, etc., to provide a complete system. to the neutral bar, housing and frame. C. All distribution switchgear (branch circuit panelboards, switchboard, distribution panelboards, conductor across the water meter with the conductor attached transformers, busway, etc.) shall be the unit responsibility of one manufacturer. All component parts of side of the meter. the above listed items shall be of the same manufacturer except where a written request for deviation from this requirement has been approved prior to bid date. ground conductor in a 1" conduit from cold water entrance ervice disconnect and connect to the neutral bar, housing and D. Shop drawings for equipment specified in this Section shall show that all specified requirements have been incorporated. ngs or dielectric flanges are used in metallic water piping Coordination studies shall be done prior to shop drawing submittals. Shop drawings shall include all breakers that meet the coordination study. If study is performed after the shop drawings are submitted, ulated ground conductor across the couplings with the conductor any revisions to breakers or panels shall be at no additional cost to the project. on each side of the coupling. F. All floor mounted distribution equipment shall be mounted on a 4" high concrete pad. ling system ground shall be done with Cadweld. ed with compression type cable lugs independent of the 1.2 ELECTRICAL SERVICE (From pad mounted transformer) rod A. Make all arrangements with the power company and pay all charges made by the power company service disconnect shall have threaded conduit insulated for permanent electric service. In the event that the power company's charges are not available at the be bonded together and bonded to the main grounding bus with time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included. jumper from the grounding lug of all receptacles to a Steel The power company will provide the underground primary service and the pad mounted in the outlet box. The ground wire installed behind the device transformer. C. Provide the pad for the pad-mounted transformer in accordance with the power company 3/4" conduit from the system ground to the telephone specification. vice cabinet and to each telephone backboard. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 a arid under the raised floor in the computer room. The signal Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to by Cadweld and shall include the following as a minimum: the main switchboard. 2" wide, 26 AWG gage copper strips on 2' centers in both 1.3 ELECTRICAL SERVICE (From pole, underground) uch that the raised floor pedestals are centered in each 2' x 2' A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the joint. time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included. wide as a maximum and rolled on tubes with the outside of B. The power company will provide the transformers on the pole and the connection of the secondary conductors to the transformers. opper strip with 5/16" hole in one end (for connection to the C. Provide the trench and backfill for the underground secondary service. for each piece of equipment and the connection to the D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to Cadweld process. the main switchboard. ion shall be connected to the grid using #6 AWG, 7 strand 1.4 ELECTRICAL SERVICE (From pole, overhead) A. Make all arrangements with the power company and pay all charges made by the power company nded to the floor. However, if any section does not lie flat, a only after all connections are made. for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included. meter of the room shall be bonded to the grid at the shortest conductor. B. The power company will provide the secondary conductors, overhead from the pole terminating at the weatherhead, and the connection of the overhead conductors to the service conductors. neous steel, etc., shall be bonded to the grid using a #6 AWG, C. Provide the insulated terminals for the overhead conductors, the weatherhead(s), and the conduit and wire for the service entrance, terminating at the main switchboard. ence grid shall be in compliance with Cadweld's installation D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. 1.5 METERING (From pole, underground) od backboards and equipment cabinets with service entrance A. Metering equipment will be by the power company. The power company will furnish the meter base for installation at a location as directed by the power company. The power company will provide all branch cabling and telephone instruments shall be provided meter, control wires to the meter, and the current transformers. B. Provide the current transformers cabinet and a 1" conduit with fish-wire to the meter base. em for the telephones as shown and leave the same in Install all equipment as directed by the power company. pull line in all telephone conduit. Terminate all conduit at a shings at the telephone wood backboards. 1.6 METERING (From pole, overhead) ssed steel sectional switch boxes, wall mounted at the locations ed hole. A. Provide a 1" conduit with a weather-head from the point of attachment of the service conductors to the meter base. or boxes as specified at the locations indicated. 1.7 METERING (From pad mounted transformer) A. Metering equipment will be by the power company. The power company will furnish the meter cabinet for installation at a location as directed by the power company and as detailed at the or under other Sections, such as mechanical equipment. pad-mounted transformer. pment, etc., will be installed by others. Provide electrical service on to this equipment. B. Provide a 1" conduit from the transformer to the meter cabinet as shown. The power company will provide the control wires to the meter. sets for all cord and plug connected building appliances and ordance with electrical circuits indicated. Multiple conductor et and green insulated ground conductor PART 2 - PRODUCTS 2.1 BRANCH CIRCUIT PANELBOARDS before the concrete floors are poured, or set boxes on the A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted loors in which the required sleeves can be subsequently located. as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the concrete. manufacturer of the circuit breakers. Panels shall be for the voltage indicated with the quantity of poles and ampacity of circuit breakers shown. eliminary work be neglected and should cutting be required in se of the cutting and restoring of surfaces to their original B. Boxes and trim shall be made from code gauge steel. Boxes shall be sufficient size to provide a incurring additions to the Contract. minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5 3/4" depth. C. Hinaed door covering all device handles shall be included in all panel trim. Doors shall have

such as switchboards, motor control centers, transformers, y anchored to the building structure. The anchoring shall be e of 3/8" steel anchor bolts in the structure and to the item anchor bolts shall be provided on each side of each item of

Exception No. 1: If the equipment manufacturer includes more than two (2) anchor holes

be furnished each panel door.

flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners

concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall

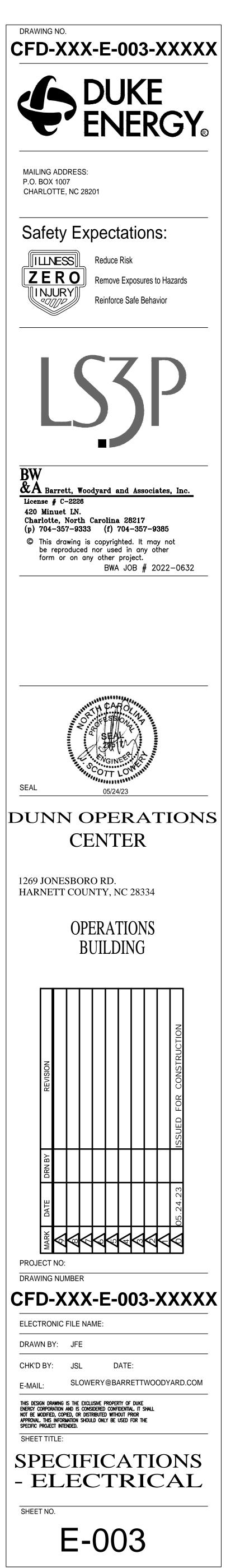
D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have

the same width and height as the box. Trims shall be mountable by a screwdriver without the need

for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when

at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be

	7	8	9	
		f the trim shall be cleaned and finished with gray pai	nt :	
		assembled with protective devices, wire connectors, etc be of the anti-turn solderless type and all shall be	s. All	Н
		es can be replaced without disturbing adjacent units c nd shall be so designed that devices may be changed		
		per sized in accordance with U.L. standards. Full size vith single pole branches shall be arranged for sequen		
		ut reduction. Cross and center connectors shall be o	f the I	
		o bond the neutral wire to the neutral bus through ho eutral bus utilizing flathead screws to hold the neutral		
	K. Spaces for future devices shall be inclue rated device that can be fitted into them.	ded as indicated and shall be bussed for the maximur	m	G
-	automatic, of the ampacity and poles as indi manual and automatic operation. Breakers s handle going to a position between ON and C shall have internal common trip. The minimu 10,000 amperes RMS symmetrical for 120/20 volt unless indicated otherwise on the riser d	ow) shall be manually operated, thermal—magnetic, cated. They shall be quick—make, quick—break, both hall be over—the—center toggle operating type, with the DFF to indicate automatic tripping. All multi—pole brea im interrupting capacity of the breakers furnished shal 8 volt and 14,000 amperes RMS symmetrical for 480, iagram. The breakers furnished shall be determined by ed RMS symmetrical amperes interrupting capacity at co on and rigidly braced.	e Ikers I be /277 the	
Ι	shall have solid state trip units that are inse push-to-trip button to mechanically check th conditions. Interchangeable rating plugs shall An interlock in the rating plug shall trip the	ergency panel or main breaker for an emergency pane nsitive to changes in ambient temperature and a e trip mechanism or for the use under emergency trip establish the continuous current rating of each break breaker if an attempt is made to remove the plug wit moved, it shall not be possible to close the breaker.	p .er.	
)	magnetic breakers. In addition, the magnetic coordination and selective tripping with downs	de long delay and magnetic tripping similar to thermal trip shall include a short time delay permitting tream devices. It shall be possible to check the brea without dismantling equipment and with minimum down	ker .	F
	0. Provide arc—fault circuit breakers for all dwelling units.	branch circuits supply areas defined by NEC 210.12	in all	
	P. Panels having sub—feed lugs for feeding lug end and on one side.	through shall have 8" minimum extra gutter space a	t the	
	Q. Each panel as a complete unit shall have the equipment rating indicated.	ve a short—circuit current rating equal to or greater t	han	
	R. All circuit breakers serving the fire alarr mechanism per NFPA 72.	n system shall include red marking and a listed lockin	ng . I	_
	S. Panels shall be as manufactured by ABE2.2 DISTRIBUTION PANELBOARDS	3 — General Electric, Square D, Siemens, or Eaton.		E
,	manufacturer of the circuit breakers, complete circuit breakers shall be as indicated. The m rated as and of capacity equal to or greater	e of the circuit breaker type, factory assembled by the e with front door cover. The main breaker and the b nain bus shall be 98% conductivity silver plated copper than the rating or setting of the over—current protec suitable for the voltage and phase indicated. Provide	ranch ,	
	clamps and door with chromium plated comb	d as indicated, with baked—on enamel trim, adjustable ination cylinder lock and catch, all locks keyed alike. e and a blank (not engraved) nameplate for each spar		
	C. Provide energy reducing active arc flash breakers rated 1200 amps or can be adjuste	mitigation system to comply with NEC 240.87 for all d to 1200 amps or higher.		D
;		o bond the neutral bus through holes drilled in the ne head screws to hold the neutral wires will not be	eutral	
	poles as indicated. They shall be quick-mak operation. Breakers shall be over-the-center	erated, thermal—magnetic, automatic, of the ampacity e, quick—break both on manual and on automatic toggle operating type, with the handle going to a po tripping. All multi—pole breakers shall have internal		
		e breakers furnished shall be 10,000 amperes RMS operes RMS symmetrical for 480/277 volt unless indico	ated .	
	vertically mounted molded case circuit breake and down for "OFF", when viewed from the n	ed below) shall be molded case and vertically mounted rs shall be mounted so that the handle is up for "ON ormal standing position. All vertically mounted molded ved for feeding in the bottom and out the top.	"	С
	have solid state trip units that are insensitive button to mechanically check the trip mechan Interchangeable rating plugs shall establish th	y panel or main breaker for an emergency panel shal to changes in ambient temperature and a push—to—t ism or for the use under emergency trip conditions. e continuous current rating of each breaker. An inter attempt is made to remove the plug with the breake shall not be possible to close the breaker.	lock	
	magnetic breakers. In addition, the magnetic coordination and selective tripping with downs	le long delay and magnetic tripping similar to thermal trip shall include a short time delay permitting tream devices. It shall be possible to check the brea without dismantling equipment and with minimum down	ker	
	J. All circuit breakers, including any connec	ctors to the main bus, shall be bolted and rigidly brac	ced.	
	rather than a single trip size or frame size. and required bus connectors such that future connectors on the main bus and without usin the trip size and interrupting capacity would	case circuit breakers are specifically by range of trip The spaces so scheduled shall be complete with all I breakers can be installed without adding or changing og a larger (frame size) or more expensive breaker the require. If the bus connectors furnished on the main luplicate sets of connectors shall be furnished on the	bus an bus	В
	L. Distribution panels shall be as manufact Eaton.	ured by ABB — General Electric, Square D, Siemens, o	r .	
	2.3 TRANSFORMERS			_
I	indicated.	ers shall be the dry type and shall have the ratings		
	÷ .	volt primary and 120/208 volt secondary. Three pha and 120/208 volt grounded type secondary. Transfor four (4) 2.5% full capacity primary taps.		A
	that under full load, the average conductor to	ed 220 degree insulation system and shall be designed emperature rise does not exceed 115 degree C. rise o oes not exceed a 50 degree C. rise at any point.		
9	non-hygroscopic, thermosetting varnish. All c steel with high magnetic permeability, and low	uous wound construction and shall be impregnated with cores to be constructed of high grade, non-aging silic a hystersesis and eddy current losses. Magnetic flux <u>on point. The core laminations shall be clamped toge</u> 8	on .	



	1 2	3 4
	with structural steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration—absorbing mounts. There shall be no metal—to—metal contact between the core and coil and the enclosure. On transformers 500 kVA and	25. Trip unit shall provide local trip indication. 26. Ground-fault protection shall be available for solidly grounded three-phase, three-wire or three-phase, four-wire systems. Trip unit shall be capable of the following types of ground-fault
	smaller, the vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable. Sound levels shall be guaranteed by the manufacturer not to exceed the following: 25 to 50 kVA - 45 DB; 51 to 150 kVA - 50 DB; 151 to 300 kVA - 55 DB; 301 to 500 kVA - 60 DB.	protection: residual, source ground return, and modified differential. Ground—fault sensing systems m be changed in the field. 27. Ground—fault settings for circuit breaker sensor sizes 1200 A or below shall be in nine bands from 0.2 to 1.0 times In. The ground—fault settings for circuit breakers above 1200 A shall be nine
н	E. Transformers 24 kVA and larger shall be in a heavy gauge, sheet steel, ventilated enclosure. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standard for ventilated enclosures. Transformers 25 kVA through	bands from 500 to 1200 A. 28. Trip units shall be available to provide real time metering. Metering functions include current, voltage, power and frequency. Metering accuracy shall be 1.5% current, 0.5% voltage, and 2% power These accuracy's shall be total system including CT and meter and shall be of reading not full sca
	112.5 kVA shall be designed so that they can be either floor or wall mounted. Above 112.5 kVA, they shall be floor—mounted design. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with a gray, baked enamel	a range of 5 — 500%. 29. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.
	F. Transformers shall be compliant with the 2016 DOE efficiency standards:	E. Distribution Circuit Breakers
	Table I.6——Electrical Efficiencies for All Low—Voltage Dry—Type Distribution Transformer Equipment Classes Equipment Class 3 (Single—Phase) Equipment Class 4 (Three—Phase)	 Electrical circuits shall be protected by molded case circuit breakers. Each pole shall provide inverse time delay and instantaneous circuit protection. Circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break overcenter switching mechanism that is mechanically trip free from the handle so that
	kVA % kVA % 15 97.70 15 97.89 25 98.00 30 98.23	contacts cannot be held closed against short circuits and abnormal circuits. Tripping due to overlo or short circuit shall be indicated by the handle automatically assuming a position midway between and OFF positions. 3. Breakers must be completely enclosed in a molded case. Non—interchangeable trip breakers s
G	37.5 98.20 45 98.40 50 98.30 75 98.60	have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible. Contacts s be of the non—welding silver alloy. Arc extinction must be accomplished by means of arc chutes.
Ū	75 98.50 112.598.74 100 98.60 150 98.83 167 98.70 225 98.94 250 98.80 300 99.02	4. All circuit breakers with frame sized 600 amps and larger shall have solid state trip units tha insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall estal the continuous current rating of each breaker. An interlock in the rating plug shall trip the breake an attempt is made to remove the plug with the breaker in the ON position. With the plug remove shall not be possible to close the breaker.
	333 98.90 500 99.14 750 99.23 1,000 99.28 G. Transformers that are of the floor-mounted type shall be mounted on Korfund Vibration Eliminators	5. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the break electrically and mechanically while in service without dismantling equipment and with minimum down
	of the pad type.	time. 6. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.
	H. Transformers shall be as manufactured by ABB — General Electric, Square D, Siemens, or Eaton. 2.4 MAIN SWITCHBOARD	E Cround Fault Protection
	A. General	F. Ground Fault Protection 1. An adjustable ground fault protection system shall be provided as an integral part of the mai
F	1. Provide where indicated, a front and rear accessible dead front type, completely metal enclosed, self-supporting structure independent of wall supports. It shall consist of the required number of vertical sections bolted together to form one rigid switchboard approximately 90" high incorporating switching and protective devices of the number, ratings and type noted herein or shown with necessary interconnections, instrumentation and control wiring. The sides, top and rear shall be covered with removable screw-on plates. Front plates shall be sectionalized and removable. All covers shall be secured by self-tapping screws. Ventilation openings shall be provided where required. The switchboard	 circuit breaker or main fused switch, designated feeder breakers and fused switches. 2. The ground fault protection system shall consist of a current sensor enclosing all phase and neutral conductors of the circuits to be monitored, appropriate relaying equipment to provide the deground current sensitivity and time-current response characteristics, and equipped to function in conjunction with the other elements of the system. 3. The current sensor shall be of sufficient size to encircle the phase and neutral conductors of circuit to be monitored. Current sensor output shall be coordinated with the required input to the delay. The current sensor shall have a ground fault current pick-up range of 200 to 1200 amper
	shall be vermin proof. 2. All sections of the switchboard shall be 20 inches deep except service sections containing large ampacity main circuit breaker or pressure contact type main fusible switch which may be deeper. All section of the switchboard shall align so that the back of the complete structure may be placed flush against a wall. Construction shall allow maintenance of incoming line terminations, main device	A test winding shall be included to simulate the flow of ground fault current through the sensor to the operation of the ground fault protection system. The frame of the current sensor shall be constructed so that one leg can be opened to allow removal or installation around cable without disturbing that cable.
	connections and all main bus bolted connections to be performed with front and rear access. 3. The feeder or branch devices shall be removable from the front and shall be panel mounted with the necessary device line and load connections front accessible.	4. The ground fault relay shall be solid state construction, except that a coil operated output rel may be provided to control 120 volt power to operate a fusible bolted pressure contact switch. Th relay shall have an adjustable current sensitivity for ground fault pick—up currents from 200 ampero 1200 amperes.
E	 4. All exterior and interior steel surfaces of the switchboard shall be cleaned and finished with gray hard dried enamel over a rust—inhibiting phosphatized coating. 5. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished when required. All groups of control wires leaving the switchboard shall be provided with terminal blocks with numbering strips. 	 5. Provide a monitor panel on the switchboard, including a push-to-test button for the test circ and a red ground fault indicator light to indicate the circuit interrupter has opened due to a groun fault condition. The unit shall operate on a 120 volt AC source. 6. Provide a pulsating audible horn that is activated when a ground fault condition occurs. Horn stop when ground fault protection system is reset. Horn shall operate during testing of ground fault protection system.
	B. Bussing	G. Short Circuit Current Rating
	1. The bus shall be tin plated aluminum or silver plated copper adequately braced and supported to withstand mechanical forces exerted during short circuit conditions. The main horizontal bus bars shall be mounted on glass polyester insulators with all three phases arranged in the same vertical plane. The main bus shall be braced for short circuits up to the RMS ampere value as shown.	1. The switchboard as a complete unit shall be given a single short circuit current by the manufacturer of the rating as shown. Such a rating shall be established by actual test in accorda with U.L. specifications.
	 A ground bus shall be provided firmly secured to each vertical structure and shall extend the entire length of the switchboard. A ground lug shall be furnished attached to the ground bus in an accessible location. Provide a removable link (solid bar) in the neutral bus where the main disconnect device is provided. 	H. Provide integral digital meter in the switchboard to display at a minimum the following measur values: Real—Time readings, Energy Readings, Demand Readings, and Harmonics. The meter shall an Ethernet Communications device.
	 provided. 4. Provide a bonding strap from the neutral bus to the switchboard frame. The bonding strap shall be located on the line side of the removable neutral link. C. Main Circuit Breaker 	l. Provide ammeter with selector switch and voltmeter with selector switch and all associated inte wiring. Ammeter, voltmeter and associated selector switches shall be flush mounted on front of switchboard.
D	1. Circuit breaker shall be draw—out type [manually] [electrically] operated. Acceptable manufacturers	J. Main switchboards shall be as manufactured by ABB — General Electric, Square D, Siemens, or Eaton.
	are Square D Masterpact or equal by GE, Siemens, or Eaton. 2. The case of the circuit breaker shall be a polyester thermoset material providing high dielectric strength.	2.5 BUSWAY
	 3. Interrupting rating shall be available up to 200,000 amperes RMS symmetrical without fuses. 4. All circuit breaker operating mechanisms are to be two-step, fully-stored energy devices for quick-make, quick-break operation with a maximum of a five-cycle closing time. Open-close-open (0-C-O) cycle shall be possible without recharging. Motor operator shall automatically charge when circuit breaker is closed. Actuation of the operating handle or an operation cycle of the circuit breaker motor is to charge the closing springs (step one) and operation of a local "close" button is to close 	A. Provide aluminum, totally enclosed, non—ventilated plug—in or feeder busway as shown, three—phase, of the ratings scheduled or shown. When a neutral bus is specified, the neutral shall full size unless designated otherwise. Busway shall be of the low impedance type. The busway sho drawings shall show in detail the design of the totally enclosed busway including in detail, the desig the joint connection. Perforated ventilating housings will not be acceptable.
	 the circuit breaker contact (step two). Closing the circuit breaker contacts shall automatically charge the opening springs. 5. Current-carrying components shall be completely isolated from the accessory mounting area and 	B. When a ground bus is specified, it shall be sized in accordance with the National Electrical Co based on the overcurrent protective device.
	 double insulated from the operator with accessory cover in place. 6. Each phase inside the circuit breaker shall be completely isolated from other phases and ground by polyester thermoset material. 7. Padlocking provisions shall be furnished to receive up to three padlocks when circuit breaker is in 	C. The aluminum bus bars shall be tin plated over their entire surface. All bolted connections sl be equipped with Belleville type spring washers. The temperature rise at full rated amperage at any point in the duct shall not exceed 55 degrees C. above ambient temperature.
С	the disconnected position, positively preventing unauthorized closing of the circuit breaker contacts. 8. Provisions for up to two key locks shall be furnished allowing locking in the disconnected position. Provisions for locking in the connected, test and disconnected positions by padlock or key lock shall be available as an option.	D. Access shall be required to only one side of the busway for tightening joint bolts. It shall be possible to remove any one length without disturbing the two lengths to which it connects. On fee busway, tap—offs shall be made with sections specifically designed for that purpose. In these cases plug—in busway sections shall not be used.
	9. Located on the face of the circuit breaker shall be buttons, with optional lockable clear cover, to open and close the circuit breaker and indicators to show the position of the circuit breaker contacts, status of the closing springs, and circuit breaker position in the cell. An indicator shall show "charged—not OK to close" if closing springs are charged but circuit breaker is not ready to close. Circuit breaker racking system must have positive stops at the connected, test, disconnected and withdrawn positions.	E. The ampere ratings, approximate footage, fittings, etc., are shown. Final field measurements to be made prior to release of the busway for fabrication. The responsibility for routing the duct as shown shall be included in this Section.
	 10. Circuit breaker must be equipped with an interlock to discharge the stored energy spring before the circuit breaker can be withdrawn from its cell. Circuit breaker must provide a positive ground contact check between the circuit breaker and cell when the accessory cover is removed while the circuit breaker is in the connected, test or disconnected positions. 11. Primary connectors that can be rotated to provide flexible vertical or horizontal connections shall be available as an option. Front connections shall also be available for shallow depth equipment designs. 	F. The busway shall be securely supported at intervals not exceeding 10'—0". The busway shall complete with all elbows connectors, expansion joints, floor and wall flanges and offsets shown or required to meet job conditions. Wall flanges shall be provided at each wall and floor flanges at e floor where busway passes through. The openings between the flanges and the floor or wall should caulked with suitable insulation material. Expansion joints shall be provided at building expansion joints at least one in each horizontal run of 100'—0" and a maximum of 150'—0" apart throughout the
	12. Ready—to—close contact must be available to indicate remotely that the circuit breaker is "ready to close." The circuit breaker is ready to close when it is open, spring mechanism is charged, a maintained closing order is not present, a maintained opening order is not present, and the circuit breaker is in an operational position.	busway length. G. The busway shall be Underwriter's Laboratories approved for mounting in any position with dero The short circuit stress bracing shall be 100,000 amperes RMS symmetrical.
В	 13. Secondary wiring shall be front accessible and available in cage clamp or ring terminal connections. Secondary wiring must not be accessible when switchgear door is closed. 14. Circuit breaker shall provide long service life. The 3200 A circuit breaker frame and those of lower ratings must be certified to perform a minimum of 10,000 operations without maintenance. The 4000 A 	H. Busway shall be of the same manufacturer as the main switchboard where connected to switchboard. Busway not connected to switchboard shall be ABB — General Electric, Square D, Sien or Eaton.
	and 5000 A frames must be certified to 5,000 operations without maintenance. 15. Circuit breaker shall be equipped with a visual contact wear indicator. 16. Low-voltage power circuit breaker arc chutes containing asbestos will NOT be accepted.	2.6 SINGLE PHASE PROTECTION
	 17. Circuit breaker trip system shall be an electronic trip unit. 18. All trip units shall be removable to allow for field upgrades. 19. Trip Units shall incorporate "True RMS Sensing", and have LED long-time pickup indications. 20. Trip unit functions shall consist of adjustable long-time pickup and delay, optional short-time pickup and delay, instantaneous and ground-fault pickup and delay. 	A. Provide Taylor Electronics Model #PND-3, 6, 9, 12 ADJ-REM LED's, or equal, single phase rela behind hinged panel in switchboard. Provide green and amber LED's on a plug in cable for mounti on face of switchboard. Provide snap on lenses and labels identifying the green LED as "SYSTEM NORMAL" and the amber LED as "SINGLE PHASE CONDITION".
	21. Adjustable long-time pickup (Ir) and delay shall be available in an adjustable rating plug that is UL Listed as field-replaceable. Adjustable rating plug shall allow for nine long-time pickup settings from 0.4 to 1 times the sensor plug (In). Other adjustable rating plugs shall be available for more precise settings to match the application. Long-time delay settings shall be in nine bands from 0.5-24 seconds at six times Ir.	 B. Provide shunt trip coils on all main devices, operated by the phase failure relay. C. Provide capacitive trip unit to guarantee relay and shunt trip operation during a single phase occurrence.
А	22. Short-time pickup shall allow for nine settings from 1.5 to 10 times Ir. Short-time delay shall be in nine bands from $0.1-0.4 + 2/t$ ON and $0-0.4$	PART 3 – EXECUTION
	 I 2/ t OFF. 23. Instantaneous settings on the trip units with LSI protection shall be available in nine bands from 2 to 15 times In. The instantaneous setting shall also have an OFF setting when short-time pick-up is 	3.1 INSTALLATION

23. Instantaneous settings on the trip units with LSI protection shall be available in nine bands from 2 to 15 times In. The instantaneous setting shall also have an OFF setting when short-time pick-up is provided.

24. All trip units shall have the capability for the adjustments to be set and read locally by rotating a switch.

indication.

provide real time metering. Metering functions include current. ng accuracy shall be 1.5% current, 0.5% voltage, and 2% power. em including CT and meter and shall be of reading not full scale in

ected by molded case circuit breakers. Each pole shall provide circuit protection.

ted by a toggle type handle and shall have a quick—make, chanism that is mechanically trip free from the handle so that the inst short circuits and abnormal circuits. Tripping due to overload the handle automatically assuming a position midway between ON

nclosed in a molded case. Non-interchangeable trip breakers shall tampering. Ampere ratings shall be clearly visible. Contacts shall Arc extinction must be accomplished by means of arc chutes.

sized 600 amps and larger shall have solid state trip units that are mperature and a push-to-trip button to mechanically check the trip nergency trip conditions. Interchangeable rating plugs shall establish h breaker. An interlock in the rating plug shall trip the breaker if plug with the breaker in the ON position. With the plug removed, it

tection system shall be provided as an integral part of the main , designated feeder breakers and fused switches. stem shall consist of a current sensor enclosing all phase and be monitored, appropriate relaying equipment to provide the desired current response characteristics, and equipped to function in

of the system. sufficient size to encircle the phase and neutral conductors of the nsor output shall be coordinated with the required input to the e a ground fault current pick—up range of 200 to 1200 amperes. simulate the flow of ground fault current through the sensor to test otection system. The frame of the current sensor shall be opened to allow removal or installation around cable without

solid state construction, except that a coil operated output relay power to operate a fusible bolted pressure contact switch. The nt sensitivity for ground fault pick—up currents from 200 amperes to

n that is activated when a ground fault condition occurs. Horn shall stem is reset. Horn shall operate during testing of ground fault

unit shall be given a single short circuit current by the Such a rating shall be established by actual test in accordance

the switchboard to display at a minimum the following measured Readings, Demand Readings, and Harmonics. The meter shall have

switch and voltmeter with selector switch and all associated internal

sed, non-ventilated plug-in or feeder busway as shown, ed or shown. When a neutral bus is specified, the neutral shall be Busway shall be of the low impedance type. The busway shop sian of the totally enclosed busway including in detail, the design of

ntilating housings will not be acceptable. d, it shall be sized in accordance with the National Electrical Code

be tin plated over their entire surface. All bolted connections shall g washers. The temperature rise at full rated amperage at any 5 degrees C. above ambient temperature.

ly one side of the busway for tightening joint bolts. It shall be vithout disturbing the two lengths to which it connects. On feeder sections specifically designed for that purpose. In these cases,

te footage, fittings, etc., are shown. Final field measurements shall sway for fabrication. The responsibility for routing the duct as

supported at intervals not exceeding 10'-0". The busway shall be expansion joints, floor and wall flanges and offsets shown or all flanges shall be provided at each wall and floor flanges at each The openings between the flanges and the floor or wall should be rial. Expansion joints shall be provided at building expansion joints, of 100'-0" and a maximum of 150'-0" apart throughout the

r's Laboratories approved for mounting in any position with derating. l be 100,000 amperes RMS symmetrical.

manufacturer as the main switchboard where connected to to switchboard shall be ABB - General Electric, Square D, Siemens,

A. Provide a typewritten directory under plastic for all panelboards with spares marked in pencil. Circuit identification shall include sufficient detail to allow each circuit to be distinguished from all others. Include specific tenant suite numbers in multi-tenant buildings in the circuit description. Provide

a label on each breaker in a switchboard or distribution panelboard with the same level of circuit identification details.

B. Provide all necessary hardware to level and secure the switchgear as required by the manufacturer's instructions. Make all electrical connections for supply and load circuits and leave in operating condition.

C. Clean enclosure of all switchgear of all foreign matter, including dust.

D. Remove all rust marks and repaint to leave switchgear in new condition.

3.2 STUDIES

As a requirement for the project documents to be delivered by the contractor, provide a complete short circuit and selective coordination study from the service entrance to all end devices. The study shall be provided by the switchgear manufacturer or their vendor and shall utilize time current curves that are developed by the gear manufacturer selected for use in the building. The study shall be made available for review by the engineer and local code enforcement authorities no later than at the times they deem necessary for certificates of occupancy to be issued. Obtain critical dates from the inspections department of the local code enforcement department during the inspection process to determine when presentation of the selective coordination study to the inspections department is necessary for timely issuance of the certificate of occupancy.

The selective coordination study shall be broken into parts where the systems described in NEC Articles 700.27, 701.18, 708.54 and 620.62 are isolated in the report to simplify the review of those isolated systems.

As a minimum requirement for the details that are necessary in the selective coordination study, refer to the requirements for selective coordination in the NEC Articles 700.28, 701.27, 708.54 and 620.62.

The minimum NEC requirement for the selective coordination study is applicable to the systems described in NEC Articles 700.28, 701.27, 708.54, 620.62, and as indirectly referenced for essential electrical systems in Article 517. The minimum project requirement described in A. above shall not be scaled back to the minimum NEC code requirement unless gareed to by all parties associated with the construction of the project including, but not limited to, the owner, architect, engineer, developer, etc.

END OF SECTION

SECTION 26 30 00

LIGHTING

PART 1 – GENERAL

1.1 DESCRIPTION

A. All work in this Section shall comply with the provisions of Section 26 01 00.

B. Provide all lighting fixtures and lamps as specified herein and as shown.

C. All lamps shall be operating at the time of the final inspection and for a period of six (6) months after the final acceptance of the project by the Owner.

D. Confirm exact locations of all lighting fixtures by coordination with the Architects Reflected Ceiling Plans and mechanical equipment above or on the ceiling.

E. Confirm all ceiling types before ordering lighting fixtures.

F. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Each lighting fixture shall be as specified in the Lighting Fixture Schedule corresponding with its fixture type indication (letter).

B. Most lighting outlets are lettered or groups of outlets are indicated by a letter.

C. Each lighting fixture shall have a manufacturer's label affixed and shall comply with the requirements of all authorities having jurisdiction.

D. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule.

2.2 LAMPS

A. The type lamps shall be as specified for each lighting fixture in the lighting fixture schedule.

The lamp catalog number is the catalog number is generally for Sylvania Lighting and is given as a standard of the quality and performance required. Equal lamps by General Electric or Philips will be acceptable. When a lamp manufacturer's name is used along with the catalog number in the lighting fixture schedule, it is considered unequaled by any other lamp and shall not be substituted for. The lamp performance with energy conserving ballasts furnished under this Section shall be certified by a nationally recognized independent testing laboratory.

C. Fluorescent lamps shall be as specified in the Lighting Fixture Schedule.

D. Incandescent lamps shall be as specified in Lighting Fixture Schedule.

E. All incandescent lamps, except quartz tubes, shall be rated for 130 volt operation.

F. High Intensity Discharge (HID) lamps shall be as specified in the Lighting Fixture Schedule.

2.3 BALLASTS

A. Fluorescent ballast shall be electronic type manufactured by Motorola, Magnetek or Advance.

B. Ballast shall operate lamps at a frequency or 25 KHz or higher with less than 2% lamp flicker.

C. Ballast shall operate at an input voltage of 108 - 132 Vac (120V line) or 249 - 305 Vac (277V line) at an input frequency of 60 Hz. Light output shall remain constant for line voltage fluctuation of + 5%.

D. Ballast shall comply with EMI and RFI limits set by the FCC (CFR 47 part 18) for non-residential applications and not interfere with normal electrical equipment.

Ballast shall withstand transients as specified by ANSI C.62.41 for location category A3 in the normal mode and location category A1 in the common mode.

- F. Ballast shall meet applicable ANSI standards
- G. Ballast shall have a minimum power factor of 0.99.
- H. Ballast shall not be potted or weigh more than 1.3 pounds.
- I. Ballast shall have less than 10% Total Harmonic Distortion.
- J. Ballast shall have less than 6% Third Harmonic Distortion.
- K. Ballast height shall be less than or equal to 1.5 inches.
- L. Ballast shall have a poke-in wiretrap connector.

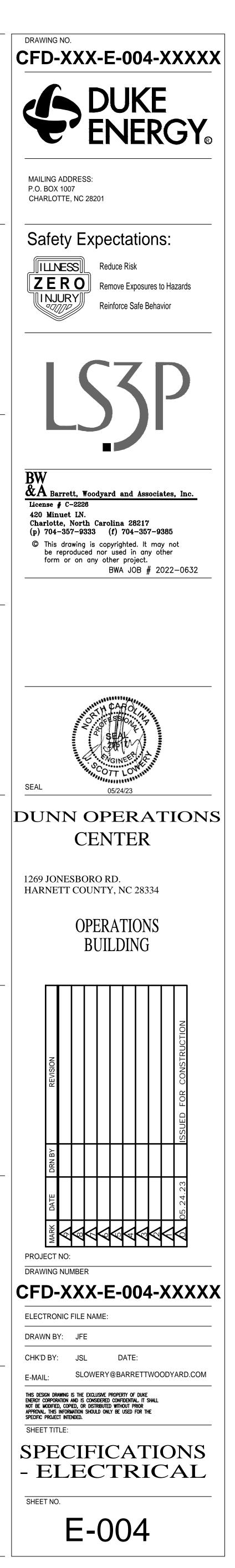
M. Ballast shall meet sound rating "A".

N. Ballast must be Underwriters Laboratories (UL) listed Class P, Type 1 Outdoor.

7	8	9	
0. Ballast shall provide normal rated lamp	life as stated by lamp manufacturers.		
P. Rapid start ballasts are series wired and	d shall maintain full cathode heat during operation.		
Q. Rapid start ballast shall have less than ballasts have less than a 1.7 LCCF.	a 1.5 Lamp Current Crest Factor (LCCF) and instant	start	
R. Instant start ballast shall have parallel l	amp operation.		Н
S. Ballast factor standard is .875+0.025 or	n all normal light output products.		
	be coordinated with lamps and 2—pin or 4—pin atch lamps. Manufacturer for "PL" fluorescent fixtures	shall	
U. Ballasts for High Intensity Discharge (HI type or equal type with minimum power facto	D) lamps shall be Constant Wattage Autotransformer (C or of 0.9.	CWA)	
2.4 DIFFUSERS			
	diffusers for fluorescent lighting fixtures shall be prism measured from the back side to the peak of the prism		
B. All wraparound lenses shall be virgin acı	rylic, one-piece and injection molded.		G
2.5 EMERGENCY BATTERY LIGHTING			
provide emergency lighting by using a standar ballast. The ballast shall consist of a field r cadmium battery, charger and electronic circu charging indicator light to monitor the charge	gs to be provided with an emergency battery ballast s rd fluorescent lamp or lamps and an emergency batte replaceable high temperature, maintenance free nickel uitry contained in one metal case. Provide a solid sto er and battery, double pole test switch and installation hower to the fluorescent lamp upon failure of the norm	ry ate	
B. The test button and indicator light shall within or on the surface of the fixture so as	be integral in the fixture reflector and shall be positi to be accessible and identifiable.	oned	
	shall keep the batteries at full charge. Upon loss of e the fluorescent lamp or lamps for 90 minutes.		
D. Battery recharge time shall not exceed milliamperes charging current	16 hours to fully recharge and shall not exceed 225		F
E. The lumen output of the lamp or lamps lumens initially for a four—foot fluorescent lar	s powered by battery unit shall be not less than 1,100 mp.)	
Lighting and Power Equipment" and shall be U	d all the requirements set forth in UL924 "Emergency UL listed for installation on top of or remote from the exceed the requirements set forth in the National Ele equirements.		
2.6 LIGHT FIXTURE TRIM			
grid, concealed spline, exposed panel, etc.) in	a trim to match the type of ceiling (plaster, exposed which it is being installed, regardless of catalog num ed ceiling plan to provide the right trim for the type o	nber	
	ered ceiling of any type shall have a plaster frame.		E
2.7 RECESSED INCANDESCENT FIXTURES A. All recessed incandescent fixtures shall	comply with Article 410–65, C of the N.E.C.		
2.8 FLUORESCENT FIXTURES			
	ouble ended lamps or that are supplied from multi—wir eans that complies with Article 410—73, G of the N.E.		
PART 3 – EXECUTION			
3.1 SUPPORT OF LIGHTING FIXTURES			
	building structure. The fixtures shall be supported in ng equally distributed from each support and the fixtur		D
	a suspended ceiling system shall be supported from es on each corner of the fixture. In addition, the fixt uspension system.		
mentioned above shall be supported with cond and shall be located where recommended by supports for each 4' or 8' fixture chassis.	ny ceiling other than a suspended ceiling system speci cealed steel rods. Rods shall be 1/4" diameter minim the fixture manufacturer. Provide a minimum of two Supports shall be maximum of 48" centers. For be used by attaching the wire to the fixture mounting	num (2)	
	shall be stem supported by a fixture stud mounted in nall have mounting stems located as per the manufact less than two (2) stems per chassis.		С
3.2 AIMING OF ADJUSTABLE LIGHT FIXTURES			
	ters, rotation, or other types of adjustments during the a day lighting is predominant will be adjusted after sur		
3.3 LIGHTING FIXTURES IN MILLWORK	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
A. Special attention shall be given to lightin otherwise incorporated into millwork or cabine	ng fixtures indicated to be mounted within, under, on try.	or	
	details for specific dimensions. This coordination shall sures will fit the space limitations of the millwork.	I	
C. This requirement is intended to preclude to small or too large for the space.	e incurring additions to the Contract due to fixtures be	bing	
3.4 FINAL PREPARATION			В
A. All plastic covers shall be removed from	n fluorescent fixtures.		
B. Clean all lens and reflectors from debris	s, fingerprints, dust, etc.		
END OF SECTION			
SECTION 26 35 00			
DIMMING SYSTEM			
PART 1 – GENERAL			

1.1 SCOPE

A. The Electrical Contractor as part of the work of this section, shall coordinate, receive, mount, connect and place into operation all equipment. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware, and other incidental items necessary for the complete and properly functioning lighting control and dimming system as described herein and shown on the plans.



	1	2	3
	1.2 RELATED DOCUMENTS		H. All dimmer modules shall be U.L. listed
	A. General Conditions		I. All dimmer types shall be availabl
	B. Electrical Section General Provisions		120 volts and 5500 watts to 27,700 watts o derating required. Primary and secondary ci breakers shall be rated not less than 10,000
Н	C. Conduit D. Wire and Cable		2.5 DIMMER MODULE TYPES
	1.3 MANUFACTURER'S SERVICES		A. Each dimmer system may require one capacity of the following dimmer types as sl
	A. Shop drawings shall be submitted for approval fabrication of equipment is to proceed prior to appro		1. Incandescent dimmers
	contain (6) six sets of the following:		a. Incandescent dimmers shall be available varieties at 120 volts, 240 volts, and 277 v intensity changes shall be instantaneous in r
	 Complete bill of materials. Sets of catalog cut sheets for standard equipments 	nent	smooth without flicker or stepping.
	3. Sets of shop drawings detailing all mechanical	and electrical equipment including on line diagrams,	2.6 EIGHT SCENE PRESET CONTROL A. The master station shall consist of eigl
G	wire counts, internal wiring, and physical dimensions unacceptable.	of each item. Marked up catalog cut sheets are	Manual select switches, integral Infrared Rece and up to sixteen manual control channel sl
•	B. Upon completion of all line, load and interconnu lamped, a qualified factory representative shall compl system. At the time of the checkout and testing, the instructed in the proper operation to the	ne owner's representative shall be thoroughly	B. Each slide controller shall be a 30mm handle. This LED shall light and remain lit intensity from preset level or when station is Raise/Lower switches with LED bar graph ind
	C. Within two weeks after the system turn—on is a sets of as—built drawings and three (3) sets of ope systems.	completed, the manufacturer is to provide three (3) rations and maintenance manuals for the dimming	C. The flush wall mounted master station latching cover of machined aluminum, not pl
	1.4 QUALITY ASSURANCE		D. Systems shall be available with multiple portable wireless infrared controls, Audio Visu and motion sensors. Provide opt
	A. Manufacturer's products shall be listed by Unde the National Electrical Code (NEC) and local building	rwriters Laboratories, Inc. (U.L.) and comply with codes that apply.	PART 3 – EXECUTION
_	dimmer and cabinet fabrication must take place in t	ordinated product of a single manufacturer. All he manufacturer's plant. The use of subcontracted	3.1 INSTALLATION
F	component assemblers is not acceptable. C. The manufacturer shall be one who has been a	continuously engaged in the manufacture of	A. It shall be the responsibility of the Elec materials and equipment for dimming system include everything required for proper and co
	D. All equipment shall be 100% tested as a comp	imum of ten years. lete system. Manufacturers using sample testing	even though every item may not be specific trades any equipment that must be installed
	methods are not acceptable.	in of the management of the second	B. The Electrical Contractor shall be respo size of all equipment with the architectural r installed.
	1.5 WARRANTYA. All equipment shall be warranted free of defect		C. The Electrical Contractor shall install al manufacturer's shop drawings.
	eighteen (18) months from date of shipment or twe occurs first.	ve (12) months from date to turn—on, whichever	D. All branch load circuits shall be live te to the dimmer system load terminals.
	PART 2 – PRODUCTS 2.1 MANUFACTURER'S REQUIREMENTS.		3.2 MANUFACTURER'S SERVICES
Е		by Macro Electronics Corporation of Austin, Texas,	A. Upon completion of the installation, inc the dimming system manufacturer that the s
	 (512) 837-5100 and shall serve to indicate the quarequipment by Macro Electronics Corporation. If alter an add or deduct from the base bid price and shall B. Other manufacturers who wish to bid must sub information listing qualifications and experience to th permission to bid. All manufacturers must comply we have a statement of the second second	nate equipment is proposed, it shall be shown as be subject to approval. mit a complete bill of materials with company e Architect ten days prior to bid date for	to be given in writing two weeks prior to the At the manufacturer's discretion, formal turn system unless specifically authorized by writt
	2.2 SYSTEM TESTING		END OF SECTION SECTION 26 61 00
	A. All dimmers shall be assembled into the dimme factory prior to shipment. All dimmers shall be sim	•	EMERGENCY SYSTEM
	stations shall be connected to the dimmer cabinet (complete system under power at the factory prior to functions, such as take control, transferring, masteri	or cabinets) and testing shall be done as a shipment. This testing shall include exercising all ng, fading, or other special control provisions, and	PART 1 – GENERAL
D	this shall be done for each individual control and co systems shipped as components for job site assemb at the factory prior to shipping shall not be accepta	ly or that are not completely tested as a system	1.1 DESCRIPTIONA. All work specified in this Section shall
	2.3 DIMMER CABINETS		B. Provide all labor and material necessar
	A. The cabinets shall contain all dimmer modules, supplies, primary and secondary circuit breakers, bar lighting circuits, and all wiring as required for lighting	riered section for power separation of emergency	complete and operating condition. C. The engine-generator set shall be suite
	The dimmer cabinet shall contain main lugs for term termination of all branch circuits. The dimmer syste volt, three phase, four wire service plus equipment g	rms shall be fed from 120/208 volt or 277/480 pround or 120/240 single phase, 3 wire service plus	enclosure and components.
	equipment ground. Emergency feeds shall be as sha B. This system shall have a dimmer cabinet const	own on dimming schedules. ructed of #14 U.S. gauge steel, welded, and painted	A. Furnish information showing manufactur
	in a textured medium blue color two part epoxy type rear, wall mount or floor standing, and so arranged serviceable and removable from the front of the cab	e paint. Dimmer cabinet shall be dead front, dead that all dimmers and related components are	generator and major auxiliary equipment. B. Submit copies of pertinent drawings an
0	C. Internal power wiring shall be U.L. Listed (UL31 neatly placed and bundled with suitable tie wraps. (following: 1. Engine generator set including plans an
C	and all wiring shall be terminated in compression typ wiring. The complete system shall be a U.L. Listed	be terminals for installation of job site contractor's	the interconnections required.
	D. Dimmer cabinets shall be convection cooled. In fans are permitted only if they are controlled by a cabinet. Dimmers shall operate in 0 to 40 degrees	•	 Engine generator/exciter control cubicle Fuel consumption rate at various loads,
	air temperature. Heat load generated by the dimme E. The dimmer cabinets and controls shall be stor	rs shall not exceed 2% of connected load.	4. Exhaust mufflers and vibration isolators
	location free from dirt and dust until ready to instal temporary light or power for construction activities.		5. Battery charger, battery and battery rac
	2.4 DIMMING MODULES		6. Day tank fuel connection points.
	silicon Controlled Rectifiers (SCR) as power handling cycle surge rating of 600 amps or greater. Dimmer	s using Triac Thryistors, air gap relays or special	 Automatic load transfer control switch. 8. Actual electrical diagrams including sch
В	bypass jumpers for system installation are not accep B. The Silicon Controlled Rectifiers, along with the	filter inductor and control printed circuit board,	all equipment to be provided. 9. Legends for all devices on all diagrams
	shall be mounted in modular dimming units. The di finned aluminum heat sink with aluminum wrap—arou requiring no bolting or unbolting of electrical connect	mmer module shall be constructed on a heavy—duty nd. Each module shall be connectorized to plug in,	10. Weather-protective housing.
	to the air the heat generated by the silicon controlle		C. The specified standby KW shall be for normal utility source and shall be certified b
	directly exposed to ambient air, and operation in am Fahrenheit shall not require fans for cooling.		PART 2 – PRODUCTS
	cards shall be of U.L. listed fire retardant epoxy gla integrated circuit and transistor type active elements	and shall employ feedbacks techniques to assure	2.1 MANUFACTURER
	long term stability with no periodic calibrations or ac incorporate voltage compensation to reduce the effec		A. The equipment shall be as manufacture Kohler of the size and ratings indicated.
А	frequency interference (R.F.I.) and reduce filament no of 350 microseconds from 0% to 90% measured und	der full load at 90 degree conduction angle. Filter	B. Equipment shall include weather-protect
	chokes shall be securely mounted and adequately ve F. Dimmer efficiency shall be 98% at full output o		2.2 ENGINE
	G. Dimmer control voltage shall be 0 to 10 volts		A. The engine shall be water cooled in—lir diesel. It shall meet specifications when ope requiring premium fuels will not be considere air filters, lube oil cooler, fuel transfer pump
	1	2	3

mounted instruments, water temperature gauge, lubrication oil pressure gauge and battery charging ammeter. listed to control the lighting loads connected to it. B. A gear driven hydraulic governor shall maintain frequency regulation not to exceed 3% to 5% from available in capacity ratings from 1440 watts to 12,000 watts at no load to full rated load. Generator sets above 150KW shall have an electronic isochronous type watts at 277 volts. Dimmer ratings shall be full capacity, no governor. dary circuit breakers shall be at least 20% over-rated. All 10,000 AIC at 120 volts and 14,000 AIC at 277 volts. The unit shall be mounted on a structural steel sub-base and shall be provided with suitable isolators. D. Safety shut-off for high water temperature, low oil pressure overspeed and engine overcrank, with one or more types of dimmers. Provide the quantity and alarm for low water temperature shall be provided. Alarms per NFPA-110 Level 1. as shown on the drawings or in dimmer schedules. E. Guards shall be provided over all exposed moving parts as required by OSHA. 2.3 GENERATOR vailable to operate tungsten lamps including quartz and halogen 277 volts. Dimming range shall be from 0% to 100%. All lighting us in response to control changes. Dimming shall be visually A. The generator shall be rated for continuous standby service at ratings indicated with 0.8 power factor, 277/480 volts, three-phase, four wire, 60 hertz, 1800 RPM. B. The generator shall be a three phase, 60 hertz, single bearing, rotating field, synchronous type built to NEMA standards. A voltage regulator shall be provided to match the characteristics of the generator and engine. Voltage regulation shall be +/-2% from no load to full rated load. Readily of eight Preset Select switches. Maximum (full on). Off and accessible voltage droop, voltage level and voltage gain controls shall be provided. Voltage level Receiver for preset recall, Record and station Enable key switch, adjustment shall be a minimum of +/-5%. Generator and exciter shall be inherently capable of nnel sliders and a programmable fade rate controller. parallel operation with other power sources of equivalent electrical characteristics, and stator shall include a twelve lead, reconnectable bus system for each load reconnection. Generator shall be 30mm linear potentiometer with an integral LED indicator in the brushless permanent magnet, and shall sustain short circuit current at 300% of rated current up to 10 ain lit whenever the slide controller has taken control of channel seconds. ation is in manual mode. Systems suing thumbwheels or uph indicators shall not be acceptable. 2.4 COOLING SYSTEM station shall be constructed of machined aluminum with a hinged A. A radiator with blower type fan shall be provided to maintain safe operation at 110 dearees F not plastic. Station shall be supplied with a back box. ambient temperature. Air flow restriction from the radiator shall not exceed 0.5" H20. Provide ductwork with flexible connecting section between radiator and discharge louver frame. Provide an multiple remote options including remote preset select stations, engine coolant heater with thermostat to maintain coolant temperature at not lower than 60 degrees F. Heater shall operate on 120 VAC. Heater shall have an oil pressure disconnect to turn heater off when lio Visual (s/v) interface, engine is operating. de optional accessories as indicated on drawings. B. The engine cooling system shall be pretreated by the system supplier for the inhibition of internal corrosion and freezing. Obtain necessary connection to heater from base building panel in core (HM or L as necessitated by voltage required). 2.5 FUEL SYSTEM he Electrical Contractor to receive and store the necessary system. It is the intent of these specifications and plans to A. Provide a diesel skid mounted fuel tank with all required black iron fuel oil piping. Provide a low and complete installation and operation of the dimming system, fuel indicator and alarm. Tank shall be double wall, closed top dike, UL labeled, sized as required by pecifically mentioned, the contractor shall timely deliver to other local code. ***(24 hour)*** run time minimum based on GPH rating of manufacturing engine. stalled during construction. 2.6 OUTDOOR HOUSING AND EXHAUST MUFFLER responsible for field measurements and coordinating the physical ctural requirements of the spaces into which they are to be A. Housing shall consist of an enclosure to completely enclose the engine generator and accessories. Housing shall protect the engine generator from the environment, yet be conducive to easy maintenance. Housing shall have removable swing doors on each side and lockable rear door for access to meters stall all lighting control dimming equipment in accordance with the and controls. Side doors shall have a means to lock. Construction of housing shall be of a minimum 14 gauge sheet steel and painted manufacturers' standard color. live tested by the Electrical Contractor before connecting the loads B. Exhaust muffler shall be mounted on top of housing. The exhaust muffler shall be a critical grade muffler. Muffler shall be factory installed so that its weight is not supported by the engine. A flexible exhaust fitting shall be supplied and installed between the muffler and exhaust manifold. All accessories shall be factory installed. This includes flanges, muffler, tail pipe and raincap. on, including testing of load circuits, the contractor shall notify 2.7 INDOOR UNIT EXHAUST SYSTEM the system is available for formal checkout. This notification is to the time factory trained personnel are needed on the job site. A. A critical type silencer/muffler, companion flanges and flexible stainless steel exhaust fittings shall al turn—on can be waived. No power is applied to the dimming be provided according to the manufacturer's recommendations. Mounting shall be supported by building written instructions from the manufacturer. structure. The silencer shall be mounted so that its weight is not supported by the engine. Exhaust pipe size shall be sufficient to ensure that exhaust back-pressure does not exceed the maximum limitations specified by the engine manufacturer. B. The muffler and all indoor exhaust piping shall be lagged to maintain a surface temperature not to exceed 150 degrees F. The insulation shall be installed so that it does not cover or interfere with the functioning of the flexible exhaust fitting. Insulation shall be supplied under Division 15. 2.8 AUTOMATIC STARTING SYSTEM A. A DC electric starting system with positive engagement shall be provided. The motor voltage shall be as recommended by the engine manufacturer. shall comply with the provisions of Section 26 01 00. B. Fully automatic generator set start-stop controls in the generator control panel shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, overspeed and overcrank. Controls shall include a 45 second single cranking cycle limit with lockout. cessary to install a standby diesel engine-generator set in a C. A belt driven battery charging alternator shall be provided with transistorized voltage regulator. Voltage shall match the electric starting system. suitable for outdoor use and complete with weather-protective D. A lead-acid storage battery set of the heavy duty starting type shall be provided. Battery voltage shall be compatible with the starting system. The battery set shall be rated as required by generator manufacturer in amp hours. Necessary cables and clamps shall be provided. ufacturers' model numbers, dimensions and weights for the engine, Battery racks shall be provided for each battery and shall conform to NEC 480-7,a,1. They shall be constructed of metal and so treated as to be resistant to deteriorating action by battery electrolyte. Further, construction shall be such that nonconducting insulation material directly supports the cells. ngs and schematic diagrams for approval and include the F. A current limiting battery charger shall be provided to automatically recharge batteries. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, equalize timer and fused AC input. AC input voltage shall be 120 volts, single phase. ans and elevations clearly indicating entrance points for each of Amperage output shall be no less than 10 amperes. Alarm shall be provided for low-battery voltage and battery charger fault in the charger. Control circuit shall be wired from charger to generator control panel by electrical contractor for indication on control panel. Obtain power for battery charger from base building panel in core (HM or L as necessitated by voltage reguried). cubicle. 2.9 GENERATOR CONTROL PANEL loads, ventilation and combustion CFM requirements.

olators.

ery racks.

ng schematic diagrams and inter-connection wiring diagrams for

for continuous electrical service during interruption of the tified by the manufacturer for the actual unit supplied.

Ifactured by Cummins's, Detroit Diesel Caterpillar/Olympian or

protective housing for outdoor use.

in-line or vee-type two or four stroke cycle compression ignition nen operation on Number 2 domestic burner oil. Diesel engines nsidered. The engine shall be equipped with fuel, lube oil, intake pump, fuel priming pump, engine driven water pump and unit

2.10 MAIN LINE CIRCUIT BREAKERS

short-circuit conditions.

A. A generator mounted NEMA 1 type vibration isolation control panel shall be provided. Panel shall

8. Individual fault indicator lights for low oil pressure, high water temperature, overspeed, oversrank

10. Running time meter, oil pressure, battery charging ammeter and water temperature gauges.

A. Provide main-line, molded case circuit breakers sized as shown and mounted upon the generator. The outputs of the generator shall be protected by load circuit interrupting and protection devices.

They shall operate both manually for normal switching functions and automatically during overload and

B. The trip unit for each pole shall have elements providing inverse time delay during overload

conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall

contain, but shall not be limited to, the following equipment:

1. Frequency Meter, 3 1/2", dial type.

2. Voltmeter, 3 1/2", 2% accuracy.

3. Ammeter, 3 1/2", 2% accuracy.

4. Ammeter/Voltmeter phase selector switch.

5. Automatic starting controls as specified.

Voltage level adjustment rheostat.

and low water temperature.

7. Contacts for remote alarms wired to terminal strips.

9. Three position function switch marked, RUN-STOP and REMOTE.

meet standards as established by U.L., NEMA and the N.E.C.

2.11 AUTOMATIC LOAD TRANSFER SWITCHES

A. The amperage rating of the automatic load transfer switch shall be as shown.

B. The automatic transfer switch shall be mechanically held on both the emergency and the normal side. The switch shall be double throw with the main contacts riaidly and mechanically interlocked to insure only two possible positions: Normal or Emergency. A manual operator must be provided to enable manual operation without having to assemble the handle.

C. The automatic load transfer control shall be rated for continuous duty when enclosed in a non-ventilated NEMA 1 enclosure. It shall be rated for all classes of load, including inductive and noninductive, at 600 volts and tungsten lamp load at 250 volts. The transfer switch portion of the control shall be designed, built and tested to close on an inrush current up to and including twenty (20) times the continuous rating of the switch without welding or excessive burning of the contacts. The transfer switch shall be capable of enduring six thousand (6000) cycles of operation, at rated current, at a rate of six (6) cycles per minute, without failure. One cycle shall consist of one complete opening and closure of both sets of contacts on an inrush current of ten (10) times the continuous rating of the switch.

D. The transfer switch shall be as listed under U.L. 1008. Switch utilizing reversing contactor mechanisms as a means to transfer load are disallowed and will not be considered.

E. The automatic load transfer switch shall include the following accessories:

1. Engine starting contacts to provide for generator starting.

2. Full phase protection. Three-phase relays shall be field adjustable, close differential type with 92-95% pickup and 82-85% drop out. Relays are to be connected across live lines.

3. Test switch, to simulate a power outage.

4. Adjustable time delay on engine starting to override momentary outages and nuisance voltage dips.

Adjustable time delay on transfer of load to emergency source. Adjustable time delay to open transfer switch contact to allow motor loads to decay.

Adjustable time delay on retransfer of load to normal with 5 minute cool-down timer wherein the generator set runs unloaded after transfer to line.

7. Plant exerciser to start and run the generator set with or without load each 168 hours for a 30 minute interval. Selector switch will be provided for with-load or without-load testing.

8. One auxiliary contact closed on emergency and one auxiliary contact open on emergency.

9. Pilot lights to indicate the normal and emergency position of the transfer switch.

10. Isolated (underground) neutral bar.

11. Disconnect plug.

2.12 WEATHER-PROTECTIVE ENCLOSURE

A. Enclosure and all other items to be designed and built by manufacturer as an integral part of the entire generator set and be designed to perform without overheating in the ambient temperature of the area installed. Constructed of 14- and 18- gauge sheet metal, suitably reinforced to be vibration free in the operating mode. Four hinged doors provide complete access without their removal. Each door to have at least two latch-bearing points. Side and rear panels to be completely and simply removable to major service access. Roof to be peaked to allow drainage of rain water. Enclosure doors shall be lockable from the enclosure manufacturer.

B. Provide baked enamel finish with primer and finish coat to be painted before assembly. All fasteners to be rust resistant. Unit shall have sufficient guards to prevent entrance by small animals. Batteries to fit inside enclosure and alongside the engine. Batteries under the generator are not acceptable.

C. Unit shall have coolant and oil drains outside the unit to facilitate maintenance. Each drain line is to have a high quality valve located near the fluid source. Fuel filter must be inside the base perimeter and located so spilled fuel cannot fall on hot parts of engine or generator. A cleanable primary fuel strainer shall be used to collect water and sediment between tank and main engine fuel filter. Crankcase fumes disposal shall terminate in front of the radiator to prevent oil from collecting on the radiator core and reducing cooling capacity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount generator on 4 inch thick re-enforced 3000 psi concrete pad. Concrete shall be 1 foot larger in all directions than footprint of generator.

3.2 MANUFACTURING

A. The unit shall be shipped to the job by the manufacturer's authorized dealer having a parts and service facility within a 120 mile radius of the job. In addition, and in order not to penalize the Owner for unnecessary or prolonged periods of time for service or repairs to the emergency system, the bidding generator set supplier must have replacement parts in stock at all times. Certified proof of this requirement shall be available from the dealer and a personal inspection of the dealer's facilities may be made by the Architect or his appointed representative to substantiate claims made by the generator set supplier.

3.3 TESTING

A. Prior to acceptance of the installation, equipment shall be tested to show it is free of any defects and will start automatically and be subjected to full load test through the use of portable, dry-type load banks supplied for this purpose at the job by the generator set supplier.

B. The load bank shall be capable of definite and precise incremental loading and shall not be dependent on the generator control instrumentation to read amperage and voltage of each phase. Rather, the test instrumentation will serve as a check of the generator set meters.

C. Saltwater brine tanks or those load banks requiring water as a source for cooling are not acceptable for this purpose and are disallowed and shall not be utilized for this test.

D. Load bank testing shall be done in the presence of the Owner or his appointed representative only after the unit is permanently installed in accordance with the Contract Documents. Testing shall be for a period of four (4) hours under full load.

3.4 START UP AND INSTRUCTIONS

A. On completion of the installation, start up shall be performed by the engine manufacturers' trained dealer service representative.

B. Operating and maintenance instruction manual shall be furnished and procedures explained to operating personnel.

3.5 SYSTEM SERVICE CONTRACT

A. The supplier of the standby power system must furnish a copy of, and make available to the Owner, his standard service contract which, at the Owner's option, may be accepted or refused. This contract will accompany any documents, drawings, catalog cuts, specification sheets, wiring or outline drawings, etc. submitted for approval. This contract shall be for the complete power system.

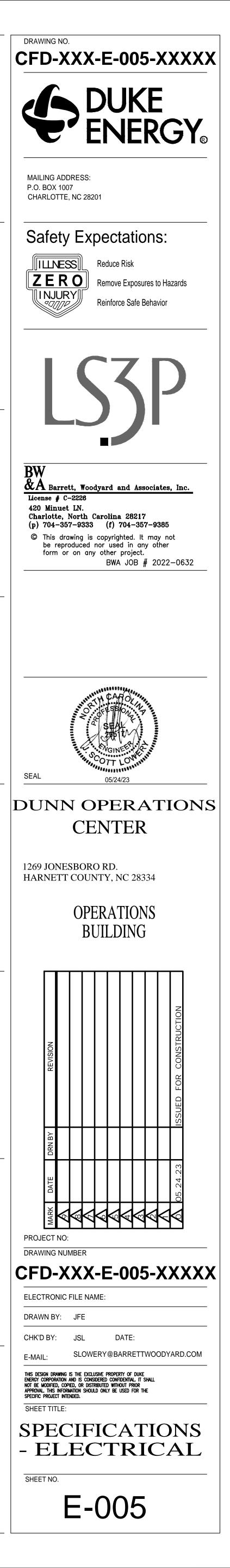
3.6 GUARANTEE

A. Equipment provided under this Section shall be guaranteed against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranty. But in no event shall it be for a period of less than five (5) years from date of initial start up of the system and shall include labor and travel time for necessary repairs at the job.

END OF SECTION

SECTION 26 65 00

SURGE PROTECTION DEVICES



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С

	1	2	3	4	
	PART 1 – GENERAL		3. Line to Line: [1800 V for 480Y/277 V]	[1200 V for 208Y/120 V]	
	1.1 DESCRIPTION		F. Protection modes and UL 1449 VPR for exceed the following:	240/120 V, single-phase, three-wire circuits shal	
	A. All work in this Section shall comply with the pr	rovisions of Section 260100.	 Line to Neutral: 700V Line to Ground: 700 V 		
Н	1.2 DEFINITIONS		3. Line to Line: 1200V		
	A. I/nominal: Nominal discharge current		G. Unit shall have a short-circuit current re	•	
	B. MCOV: Maximum continuous operating voltage		H. Unit shall have an I/nominal rating of 2 surge protection.	0 kA and shall comply with all UL96A requirement	
	C. Mode(s), also Modes of Protection: The pair of D. MOV: Metal—oxide varistor; an electronic compo	electrical connections where the VPR applies		repetitive category C3 (20kV/10kA) surges with ne surge values will not be accepted. Manufacturer	
	characteristic			um of 100 temporary over voltage events, defined	
	E. OCPD: Overcurrent protective device F. SCCR: Short-circuit current rating		available fault current, 30 cycles duration, 10	second interval between events. emporary over voltages from damaging the MOVs.	
•	G. SPD: Surge protective device		Voltages shall be limited per the following:	emporary over voltages from damaging the Movs.	
G	H. VPR: Voltage protection rating		L. The basis of design for this unit is the	Select SI 3 series	
	1.3 CODES AND REGULATIONS		2.3 DISTRIBUTION PANELBOARD SURGE PROTEC		
	A. The following codes and regulations shall govern	the design of the surge protection device:	A. Unit shall be listed as a Type I or Type	Il surge protection device per UL 1449, 3rd/ edi	
	1. Underwriters Laboratories, Inc. Standard No. 144		B. Unit shall have the following features:		
	 Underwriters Laboratories, Inc. Standard No. 128. National Electrical Manufacturers Association (NEM) 		1. It shall consist of parallel connections or	nly. Series elements shall not be used.	
	4. IEEE 587 A&B Waveforms, IEEE C62.41		2. The primary suppression path shall not I	be to ground.	
F	5. National Electrical Code — NFPA 70			power flow resulting in an interruption to the load	
	a. Article 110.9 — Interrupting Capacity b. Article 240.21 — Equipment complying with tap	conductor rules	components.	sta the unit before damaging internal suppressor	
	c. [Only applies to NEC 2014]Article 700.8 - Requi		5. Indicator LED light display for power and component failure while continuing to allow the	protection status. Lights indicating only internal e main power flow are NOT acceptable.	
	1.4 SUBMITTALS		status. Contacts shall reverse on failure of c	d one normally closed, for remote monitoring of p any surge diversion module or on opening of any n requirements with building power monitoring and	
	A. For each different model of device to be used,1. Dimensional drawings and installation instructions	·	system.]	in requiremente with building power memoring and	
	 The rated capacities, operational characteristics, 		7. Compression lugs that can accept up to	#2 AWG wire,	
	accessories and options.3. Copy of the UL Category Code certification, listir	a the tested values for VPPs. Losmingly ratings		e provided with unit, thereby improving the connec stem shall utilize a minimum wire size of #6 AWG	
Е	MCOVs, type designations, any OPCD requirements, mo protection.		C. Unit shall have a maximum attenuation MIL—STD—220B.	of 34dB based on 50 ohm insertion loss test per	
	1.5 WARRANTY		D. Unit shall have a minimum single-phase	pulse surge current rating of [50 or 100] kA pe	
	A. Manufacturer's Warranty: Manufacturer agrees to workmanship within specified warranty period of each	o replace or replace SPDs that fail in materials or Type of device.		e arithmetic sum of the ratings of the individual lependent 3rd/ party testing, validating that unit is Iting.	
	1. Warranty period for all Type 1 SPDs shall be tw	enty (20) years.	E. Protection modes and UL 1449 VPR for three-phase, four-wire circuits shall not exce	grounded wye circuits with [480Y/277 V] [208Y/1	
	2. Warranty period for all Type 2 SPDs shall be fift 1.6 MANUFACTURERS	teen (15) years.	1. Line to Neutral: [1200 V for 480Y/277	-	
	A. The surge protection system shall be manufactu	red by Current Technology.	 Line to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V] Neutral to Ground: [1000 V for 480Y/277 V] [700 V for 208Y/120 V] 		
D	B. The specific series of surge protection device sh on the drawing.	all be as defined by the application or as defined	4. Line to Line: [2000 V for 480Y/277 V]		
	PART 2 – PRODUCTS		F. Protection modes and UL 1449 VPR for exceed the following:	240/120 V, single-phase, three-wire circuits shal	
	2.1 GENERAL		 Line to Neutral: 700V Line to Ground: 700 V 		
	A. All units shall be listed and labeled as defined i marked for intended location and application.	n NFPA 70, by a qualified testing agency, and	 Neutral to Ground: 700V Line to Line: 1200V 		
	B. The MCOV of the SPD shall be the nominal volta MCOV of the device shall be a tested value per section	age of the system to which it is connected. The on 37.7.3 of UL 1449.	G. Unit shall have a short-circuit current re	ating of 200 kA.	
	2.2 SERVICE ENTRANCE [AND TRANSFER SWITCH] SURG	GE PROTECTION	H. Unit shall have an I/nominal rating of 2		
	A. Unit shall be listed as a Type I surge protection	device per UL 1449, 3rd/ edition.	 The basis of design for this unit is the 2.4 PHYSICAL REQUIREMENTS 	Currentguard series.	
С	B. Unit shall have the following features:		A. Interior installations shall have a NEMA 2	50, Type 1 enclosure.	
	1. It shall consist of parallel connections only. See		B. Exterior installations shall have a NEMA 2	250, Type 4X enclosure.	
	2. Integral disconnect switch — unit shall not requir for testing and/or maintenance.	re disconnection of power to customer equipment	2.5 ENVIRONMENTAL REQUIREMENTS		
	3. The primary suppression path shall not be to gr		(0.682 BTU/hr.).	conditioning load. Heat load shall not exceed 0	
	4. The unit shall not short or crowbar the power f5. Internal thermal protection that disconnects the		B. Average power consumption shall be less harmonic distortion shall not result from use	s than 0.2 kVA. Average power factor inefficiencie (THD – 0%).	
	components.		C. No audible noise shall be generated.		
В	6. Indicator LED light display for power and protect component failure while continuing to allow the main		D. No appreciable magnetic fields shall be location (in a computer room) without danger	generated. All units shall be capable of use in a to disc units, disc packs or tapes.	
	7. Form-C contacts, one normally open and one n status. Contacts shall reverse on failure of any surg current-limiting device. [Coordinate connection requir	· • •	E. Operating Conditions:		
	system.]		1. $-40 - 185$ degrees F		
	8. Compression lugs that can accept up to #2 AWG		2. 5% – 95% humidity non-condensing PART 3 – EXECUTION		
	9. A low impedance cabling system shall be provide the SPD to the electrical system. Cabling system sha	all utilize a minimum wire size of #6 AWG.	3.1 INSTALLATION		
	C. Unit shall have a maximum attenuation of 54dB MIL—STD—220B.	based on 50 ohm insertion loss test per	A. The unit must be installed in accordance warranty. All local and national codes must l	e with the manufacturer's printed instruction to mapped observed.	
	The peak surge current rating shall not be the arithm	-	B. For service entrance units, wiring harnes	s shall be connected to the line side bussing of ·	
А	a given mode. Manufacturer shall provide independen of surviving a single surge at the specified rating.	ic oray party testing, valiaating that unit is capable	service entrance electrical equipment as shown C. For distribution panelboard units, install (n on the drawings. OCPD as required to comply with the UL listing of	
	E. Protection modes and UL 1449 VPR for grounde three-phase, four-wire circuits shall not exceed the f		SPD.		
	 Line to Neutral: [1200 V for 480Y/277 V] [700 Line to Ground: [1200 V for 480Y/277 V] [700 		straight as possible. In panelboard application	suppressor and points of attachment as short ar ns, adjust circuit—breaker positions to achieve sho SPD leads. Do not exceed manufacturer's recomm	
	1	2	3	4	
		-			

for 240/120 V, single-phase, three-wire circuits shall not

20 kA and shall comply with all UL96A requirements for ac

00 repetitive category C3 (20kV/10kA) surges with no more ve surge values will not be accepted. Manufacturer shall

imum of 100 temporary over voltage events, defined as: 30A 10 second interval between events.

/pe II surge protection device per UL 1449, 3rd/ edition.

and one normally closed, for remote monitoring of protection any surge diversion module or on opening of any tion requirements with building power monitoring and control

be provided with unit, thereby improving the connection of system shall utilize a minimum wire size of #6 AWG.

ase pulse surge current rating of [50 or 100] kA per mode. the arithmetic sum of the ratings of the individual MOVs in independent 3rd/ party testing, validating that unit is capable ratina.

for grounded wye circuits with [480Y/277 V] [208Y/120 V], xceed the following:

for 240/120 V, single-phase, three-wire circuits shall not

air conditioning load. Heat load shall not exceed 0.2 kVA less than 0.2 kVA. Average power factor inefficiencies or se (THD - 0%).

ance with the manufacturer's printed instruction to maintain be observed.

ness shall be connected to the line side bussing of the own on the drawings.

all OCPD as required to comply with the UL listing of the

een suppressor and points of attachment as short and itions, adjust circuit-breaker positions to achieve shortest and SPD leads. Do not exceed manufacturer's recommended

lead length. Do not bond neutral and ground.

E. Use crimped connectors and splices only. Wire nuts are not acceptable.

3.2 STARTUP SERVICES

A. Complete startup checks according to manufacturer's written instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the

testing is over. C. Energize SPDs after power system has been energized, stabilized, and tested.

D. Train owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION

SECTION 26 92 00

MOTOR CONTROLS AND WIRING

PART 1 – GENERAL

1.1 SCOPE

A. All work specified in this Section shall comply with the provisions of Section 26 01 00.

B. All motors shall be provided under Division 23.

C. A motor starter shall be provided under this Section for each motor except for those specified in Division 23 to be furnished with integral starters. Motor starters shall be installed either in a Motor Control Center or separately mounted adjacent to the motor served.

D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at the motor terminals.

E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 23 unless specifically shown on the electrical drawings.

F. Power wiring shall be connected through all line voltage control devices such as fire-stats and thermostats.

PART 2 - PRODUCTS

2.1 MOTOR STARTERS

A. Starters for motors 1/3 horsepower or smaller shall be manual unless remote or automatic starting is required, in which case the starters shall be magnetic, full voltage, non-reversing, single-speed, unless otherwise indicated. All other starters shall be magnetic.

B. Each starter for a three-phase motor shall be furnished with three (3) overload relays sized for the full load running current of the motor actually provided. Provide an external "HAND-OFF-AUTO" selector switch with green "RUNNING" light. Provide a red pilot light to indicate motor "STOPPED". Each pilot light shall have a legend plate indicating reason for signal.

C. Each overload relay shall have a normally open alarm contact which will close only when actuated by an overload (not to be confused with N.O. or N.C. auxiliary contacts). These contacts shall be properly wired to their respective blue pilot light provided on the starter front cover and having a "TRIPPED" legend plate.

Individually mounted motor starters shall be in a NEMA Type 1 general purpose enclosure in unfinished areas and shall be flush mounted in all finished areas. All starters mounted in exterior areas shall have a NEMA 3R enclosure. Each starter shall have a laminated nameplate to indicate Division 23 unit number, function and circuit number.

E. A control power transformer shall be provided at each motor starter for connection to the controls provided under Division 23. The control power transformer shall be mounted inside the motor starter enclosure. All control transformers at 50 VA or greater shall have primary fusing. Coordinate all control equipments with Division 23 and equipment manufacturers.

F. All motor starters, push buttons and pilot lights shall be of the same manufacturer as the switchboard and shall be General Electric, Square D, Siemens, Joslyn Clark Controls, or Eaton.

2.2 COMBINATION STARTERS

A. Combination starters shall consist of a circuit breaker and a motor starter mounted in a common NEMA Type 1 general purpose enclosure.

B. The motor starter components shall be as specified in paragraph 2.01 for motor starters.

C. The circuit breaker component shall be a minimum 22,000 amperes RMS interrupting capacity and shall be as required in Section 26 20 00.

2.3 MOTOR CONTROL CENTER

A. The Motor Control Center shall consist of a combination starter for each motor, plus other associated equipment. Combination starters shall be plug-in circuit breaker or switch and fuse type, as scheduled, with voidable cover interlock, provision for padlocking the cover closed and provision for padlocking the operating handle in either the open or closed position. Switches shall be quick-make, quick-break type of quantity, size and poles as scheduled. All switches shall be rated at 600 volts, fused as scheduled. Circuit breakers shall have the interrupting capacity scheduled with 22,000 amperes RMS minimum.

B. Motor starters shall be mounted in individual steel compartment immediately below the breaker or the switch and fuse associated with it. A mechanical interlock shall prevent opening the starter compartment door unless the device is in the off position.

C. Each section in the Motor Control Center shall include an individual 480/120 volt control circuit transformer, with fused secondary.

D. Provide a control terminal strip in the Motor Control Center. The control wiring from these terminal strips, external to the Motor Control Center, to the respective control device, shall be included in Division 23.

E. All circuit breakers, motor starters, push buttons and pilot lights shall be of the same manufacturer as the main switchboard.

F. Each starter shall have a laminated nameplate engraved to indicate Division 23 unit number, function and Motor Control Center circuit number.

G. The Motor Control Center shall be General Electric, Square D, Siemens, or Eaton.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide power wiring to and install all motor starters, unless integrally factory mounted on a piece of equipment.

B. Provide power wiring to all motors except packaged units that are prewired between the starter and motor.

C. Where line voltage control devices are mounted at, on or inside a unit, such as aqua-stats, fire-stat for single phase devices, etc., the power wiring to the unit shall be connected through such a control device.

D. On final inspection, it shall be demonstrated to the Architect or his representative, that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removing any wiring or disconnecting any current carrying parts.

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SECTION 28 72 10

LIFE SAFETY SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, and coordinated system.

B. The fire alarm system shall comply with requirements of the NFPA Standard 72 for Protected Premises Signaling Systems and all local codes and regulations. The system shall be electrically supervised and monitor the integrity of all conductors. The manufacturer shall confirm all codes have been met and all necessary devices provided prior to submitting price.

C. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto the Signaling Line Circuits.

D. The system shall be an active/interrogative type system where each transponder is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel/node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.

E. The system shall be arranged such that not less than 20 percent additional transponders may be inserted into any network communication loop.

F. The FACP and peripheral devices shall be manufactured by Notifier, Edwards, or Siemens.

G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site. To guide the final checkout and to ensure the systems integrity, the submitting company shall employ NICET Level IV minimum managers and engineers. Proof of NICET level training shall be included as part of submittal package and kept on site with personnel.

H. The installing company shall be UL listed for fire alarm installations. UL certificate shall accompany submittal package. The certification listing category shall be UUJJ and shall be indicated in the project submittal.

The Contractor shall make arrangements and pay all fees in connection with the testing of the Life Safety System. All system devices shall be tested for their correct operation, except non-restorable type heat detectors which shall be sample tested. All tests carried out shall meet the requirements of the local authority having jurisdiction.

J. The system shall have proper listing and/or approval from the following nationally recognized agencies:

1. Factory Mutual Systems 2. Underwriters Laboratories

1.2 SCOPE

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance

1. Each SLC loop shall be wired NFPA 72 Class B, Survivability Level 1

2. Initiation Device Circuits (IDC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit.

3. Notification Appliance Circuits (NAC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit or a panel circuit.

NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, which ever is greater.

5. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

C. Basic System Functional Operation

1. As part of the fire alarm; when a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

a. FACP will sound and display the alarm condition showing the device address, location, zone information, time/date, and device type.

b. The remote annunciator will sound and display the same information as shown on the FACP display unit.

c. Via system programming, the horn/bell outputs for all zones will activate and sound in temporal 3-3 pattern in synchronized fashion until silenced from FACP panel.

d. All strobes on floors with activated horn/bell outputs shall flash in a synchronized pattern per floor until silenced from the FACP panel.

e. Automatic functions including, but not limited to: elevator(s) recall, smoke evacuation, smoke door release and supply/return fan shutdown shall be activated via system programming as directed by codes and/or drawings.

f. Release all magnetically held smoke doors.

Provide signals to the mechanical controls including smoke dampers to shut down or reroute air-handling systems to prevent the recirculation of smoke.

h. Provide a DACT (Digital Alarm Communicator Transmitter) and a signal via DACT for connection to a central station or local municipal fire department (connection and leased line, if required, shall be provided by building owner).

i. Initiate a preprogrammed timing sequence.

Additionally, actuation of a lobby elevator smoke detector shall cause immediate non-stop return of all automatic elevators served by that lobby to the primary discharge level; except that, when the alarm has been initiated on the primary discharge level, the elevators, shall be returned to the designated alternate discharge level per the requirements of ANSI ASME A17.1.

k. Additionally, actuation of any elevator equipment room or shaft smoke detector shall cause immediate non-stop return of all automatic elevators served by that equipment room or shaft, to the primary discharge level per the requirements of ANSI ASME A17.1. Provide all required signals from FACF to elevator controls for smoke detector in elevator machine room per the requirements of ANSI ASME Δ17 1

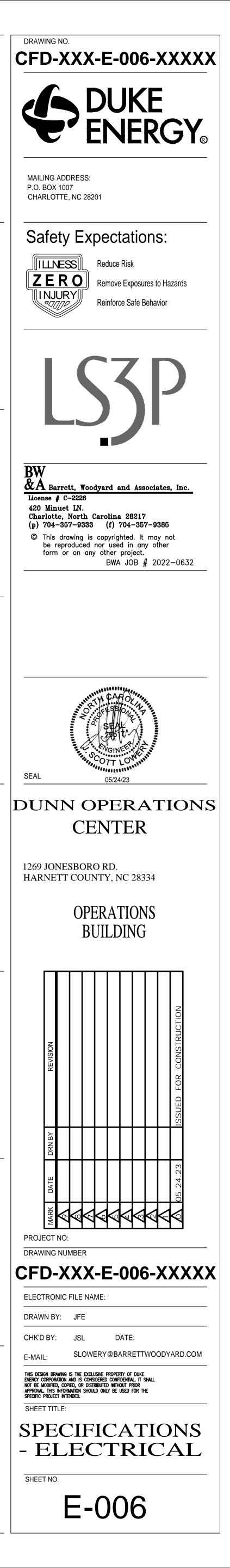
Additionally, actuation of any smoke detector located in the air handling units and/or equipment rooms shall activate signals to the mechanical controls indicating the floor of occurrence.

m. It shall be possible to silence the alarm signals by operating the signal silence switch. However, the activation of another zone shall repeat the entire alarm process, thus causing the signals to resound.

n. Silencing the alarm shall cause all speakers to silence. Firelights will continue to flash.

o. Fire pump (if applicable) normal power availability, fire pump phase reversal and fire pump run status shall be monitored. Loss of normal power, phase reversal shall annunciate as supervisory alarms and pump running shall annunciate as an alarm.

p. Provide a signal to activate the elevator shunt trip breaker upon activation of the heat detector(s) in the elevator shaft or elevator machine rooms.



	1	2	3
	2. General Operation		
		ngement of the system wiring or components shall be	B. Wiring shall be in accordance with lo recommended by the manufacturer of the
	the trouble LED shall remain lit until the system ha 1.3 SUBMITTALS	he audible trouble signal may be silenced, however, as been returned to normal operating condition.	C. All wire and cable shall be listed and protective signaling system.
Н	A. General		D. The fire alarm control panel shall be
	 Copies of all submittals shall be submitted to of system. 	the Architect/Engineer for review prior to acceptance	20 amperes from the 120 volt normal pov E. All junction boxes and conduit utilized
	2. All references to manufacturer's model numbe	ers and other pertinent information herein is intended	F. All circuit breakers serving the fire a
	to establish minimum standards of performance, fu		mechanism per NFPA 72. 2.2 MAIN FIRE ALARM CONTROL PANEL:
		ied prior to installation of equipment and wiring. g specifications, wiring diagrams, battery and power be submitted for approval.	A. The FACP shall be completely microp
	conform with the performance, type and quality of	or the Owners Representative, are found not to products as well as all other requirements of these	B. System Capacity and General Operation
	Owner's extra expenses for subsequent review(s) of deducted from payments by the Owner to the Cont	ractor. Approval of the submittals by the Owner	1. Configure size of panel to operate n handles no greater than 70% load of capo
G	shall, in no case, relieve the Contractor of the res specification.	ponsibility to meet the requirements of this	2. The fire alarm control panel shall inc
	B. Shop Drawings		80-character Liquid Crystal Display (LCD). 3. The system shall be fully field progra
	1. Drawings shall include the following minimum		external keyboards for programming and c
	 a. Point-to-point wiring/conduit layout for all de b. Device placement showing all addresses and control 		4. The FACP shall provide the minimuma. Drift compensation to extend detector
	c. All panel and equipment terminations.		 a. Drift compensation to extend detector b. Detector sensitivity test, per NFPA 72
	d. All circuit voltage drop and current calculatior	ns spread sheets.	c. Maintenance alert, to warn of excess
F	e. All battery calculation spreadsheets. f. Legend reflecting device description, manufacti	urer, model number, and back—box requirement.	d. Multiple sensitivity levels for alarm, s
Г	g. Wiring legend reflecting wire function, type, an		e. System status reports to display and
	h. Full sequence of operations.		f. Alarm verification, with verification co
	i. Power supply and amplifier calculations.		g. Cross zoning with the capability of c
	2. Specification data sheets on each individual s	ystem component.	h. Walk test. i. UL—1076 security monitor points.
	C. Data Sheets		j. Control-by-time with holiday schedul
	 Submit simultaneously with the shop drawings, showing product description, listings, and specs. 	, complete manufacturer's technical data sheets	k. Day/night automatic adjustment of d
Е	2. Copies of NICET II and IV certifications.		I. Device blink control for sleeping area
	 Copy of company UL listing certificate. APPLICABLE STANDARDS AND SPECIFICATIONS: 		m. Releasing capability.
	A. The specifications and standards listed below	form a part of this specification. The system shall	n. Pre-Alarm. o. Selectable sensitivity levels, three min
	comply with the latest standards. 1. National Fire Protection Association (NFPA), 20	200 Edition - USA:	o. Selectable sensitivity levels, three min p. History Storage, with a minimum of
	1. National Fire Protection Association (NFPA), 20 No. 13 Sprinkler Systems	Joo Latton – USA.	q. Point Enable/Disable.
	No. 13A Halon 1301 Extinguishing No. 17 Dry Chemical Exting		r. Point Read (status and level of obsc
	No. 17A Wet Chemical Extinguishi Clean Agent Extinguishing No. 70	g Systems	s. Output point for connection to any b C. Signaling Line Circuits (SLC)
D	No. 70 National Electrical Specifically Article 760 No. 72 National Fire Alarm		1. Each SLC interface shall provide pow
	No. 101 Life Safety Code		photoelectric or thermal) and 99 intelligent
	 International Building Code American National Standard A17.1-1980 		 Each SLC circuit shall not exceed 70 D. Serial Interface
	4. Underwriter's Laboratories Fire Resistance Dire	ctory	1. The system shall include two serial E
	5. Local and State Building Codes		connecting UL Listed Electronic Data Proce a. One serial port shall support a serial
	6. ADA Public Law 101—336		 b. One serial port shall support a CRT/
С	7. All requirements of the Authority Having Jurisc	diction (AHJ)	c. The system shall include an EIA-485
	1.5 APPROVALS		LCD displays. E. Field Charging Power Supply (FCPS):
	A. The system shall have proper listing, approval agencies:	and labeling from the following nationally recognized	24-volt power supply or used to power No
	FM Factory Mutual Systems UL Underwriters Laboratories		 The FCPS shall offer up to 6.0 amps include an integral charger designed to ch 60-hour standby with ten minutes of alarn be capable of recharging all batteries to s
	1.6 SYSTEM FEATURES		2. The Field Charging Power Supply sha
	A. The system shall include the following feature:	s as a minimum:	available for connection to the Notification 3. Provide 20-watt spare capacity in ec
	1. During an alarm condition, the LCD annunciate acknowledged. This shall allow determination of wh		Locate in a junction box clearly labeled "t
В	2. Ground fault detection in wiring on either plus	s or minus side.	4. Provide 1ea. Field Charging Power Su NAC devices. At no time shall there excee levels. Provide power capacity as follows:
	3. Separate alarm and trouble shall be displayed	on the LCD annunciator.	Floor Size Capacity
	 Resound feature. Dead Front" design control panel with all LED 	alarm trouble and power on indicators and all	<25,000 gross sq. ft. 6 amps D 25,001 to 35,000 gross sq. ft. 10 c 35,001 gross sq. ft. and greatercons
	switches located behind a locked tempered glass d	•	5. Locate audible (where required) and
	 Solid state construction. All alarm initiating circuit wiring, signal circuit 	wiring, speaker circuit wiring shall be supervised.	location within each room approved by the 6. Provide battery capacity and amplifier
	8. Automatic transfer to standby batteries upon		tenant devices described above.
А	9. Lightning and surge protection.		F. Provide and install ceiling mounted so 2.3 SYSTEM COMPONENTS
-	PART 2 – PRODUCTS		A. Horns/Bells
	2.1 CONDUIT AND WIRE		1. All Horns/Bells shall be installed as
	A. All fire alarm wiring shall be installed in cond specification Section 26 10 00.	luit. Conduit shall be installed as required by	codes.

3	4	5	6	
be in accordance with local, st	ate and National codes (e.g., NEC Article 760) and as	2. Horns in corridors and all public spaces average ambient noise levels with a minimum	s shall produce a nominal sound output of 15 dBA abo n sound output of 15 dBA.	ve
the manufacturer of the fire al		3—3 pattern	vacuation and operate on 12 or 24 voltage in a tempo	oral
ng system.	proved by a recognized testing agency for use with a		led to protect the speaker cone from damage and dus	t.
	cted to a separate dedicated branch circuit, maximum ırce or from a generator powered source if available.	5. Speakers shall be bone white in color.		
boxes and conduit utilized for f	ire alarm system cabling shall be painted red.		per 25,000 sq.ft. This unit cost shall be applied to the request of the Fire Marshal during field inspections.	
preakers serving the fire alarm system shall include red marking and a listed locking NFPA 72.		B. Strobe Lights		
ALARM CONTROL PANEL:		1. All strobe lights shall meet the requiren	nents of the ADA, UL Standard 1971.	
shall be completely microprocesso	or based.	2. Strobe intensity and flash rate shall me	et the requirements of UL 1971, ADA and NFPA 72.	
pacity and General Operation:		3. Combination horn/strobe devices shall r requirements listed herein.	neet all above requirements as well as horn/bell	
• •	of SLC circuits in a fashion so that each circuit a maximum of 5 floors per circuit.		square electrical outlet box. The strobe light shall have hen the unit is combination speaker/strobe, the speaker	
arm control panel shall include a juid Crystal Display (LCD).	full—featured operator interface and backlit	portion shall comply with the requirements st	ated in A. above.	
shall be fully field programmabl ds for programming and changes	e from the display panel. Panels requiring the use of are not acceptable.	meet NFPA 72 requirements for the layout s	intensities from 15 to 110 cd. The intensity selected s hown on the drawings.	naii
shall provide the minimum followi	ng features:	6. Strobe spacing shall be as follows:		
ensation to extend detector accur	acy over life.		100' apart in corridors and of every corridor to comply with the	
nsation to extend detector accuracy over life. nsitivity test, per NFPA 72, Chapter 7.		requirements of NFPA 72.		
e alert, to warn of excessive sma	oke detector dirt or dust accumulation.	b. Strobes in open areas shall be provided	to comply with NFPA 72.	
nsitivity levels for alarm, selected	by detector.		as restrooms, kitchens, breakrooms, cafeterias, conferent where six or more people are likely to gather.	ce
tus reports to display and printe	r. Provide printer.		ncluding required signal circuits per 25,000 sq.ft. This u at may be required at the request of the fire marshal	nit
ication, with verification counters.		C. Manual Fire Alarm Stations		
ng with the capability of counting	two detectors in alarm.			••••
		 Manual fire alarm stations shall be dua key lock so that they may be tested without 	I—action, non—coded, non—break glass type, equipped w operating the handle.	ith
ecurity monitor points.		2. Stations must be designed such that at except by key reset. Units shall be master k	fter an actual activation, they cannot be restored to no eyed with control equipment.	rmal
-time with holiday schedules.		3. An operated station shall automatically	condition itself so as to be visually detected, as operat	ed,
automatic adjustment of detector	sensitivity.	at a minimum distance of 100 feet (30.5 m remaining at a right angle to the station boo) front or side. This shall be achieved with the pull lev dy until reset.	er
c control for sleeping areas.		4. The station body shall be constructed s	so that chips and scratches will not expose metal.	
apability.		5. Manual fire alarm stations shall be loca Code.	ted as required by NFPA 101 and the International Buil	ding
		D. Duct Smoke Detectors		
sensitivity levels, three minimum.			uble type with visual alarm and power indicators. Provide	
rage, with a minimum of 400 ev	ents.		rs are mounted in non—visible areas such as above cei	5
e/Disable.		air sampling tubes where required. Provide	ne composite supply/return air ducts(s), with properly si smoke detectors in each return air path of any mechar CFM to meet the requirements of NFPA 72 and 90A.	
(status and level of obscuration).	Provide smoke detectors in each supply and	return air path of any mechanical equipment that move quirements of NFPA 72 and 90A. Confirm quantities of	

oint for connection to any building EMS.

interface shall provide power to communicate with 99 intelligent detectors (ionization, thermal) and 99 intelligent modules (monitor or control).

circuit shall not exceed 70%, load capacity or cover more than 5 floors.

m shall include two serial EIA-232 interfaces. Each interface shall be a means of _isted Electronic Data Processing (EDP) peripherals.

port shall support a serial printer.

port shall support a CRT/NRT device.

m shall include an EIA—485 port for the serial. connection of annunciators and remote

jing Power Supply (FCPS): The FCPS is a device designed for use as either a remote supply or used to power Notification Appliances.

shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24-volt power. It shall gral charger designed to charge 7.0 amp hour batteries. Provide batteries to support by with ten minutes of alarm indication at the end of this period. Battery charger shall recharging all batteries to seventy percent capacity in twelve hours.

Charging Power Supply shall have four outputs (Survivability Level 1) and shall be nnection to the Notification devices.

)—watt spare capacity in each electrical room on each floor for tenant audible circuits. ction box clearly labeled "tenant fire alarm audible circuits".

ea. Field Charging Power Supply (DC) per floor to allow for tenant build-out expansion of no time shall there exceed 70% load capacity of any FCPS on any of the common

6 amps DC 00 gross sq. ft. 10 amps DC oss sq. ft. and greaterconsult engineer

dible (where required) and visual power supplies adjacent to one another and in a each room approved by the engineer.

ttery capacity and amplifier capacity in the main fire control panel for addition of

nd install ceiling mounted smoke detector within 5 horizontal feet of FACP.

Bells shall be installed as shown on drawings and in accordance with NFPA 72 and local

means will not be accepted.

Detector shall have a dual purpose red LED that flashes continuously to show that the device is operating and, that comes on steady to show that the device is in alarm.

3. Nominal detector sensitivity shall be 1.4% per foot obscuration with a range of 1% to 1.84%. Regardless of sensitivity settings, the detector's stability shall be unaffected by high air velocity. No radioactive materials shall be used.

4. Provide smoke detectors in elevator lobbies, at stairwell doors, in telephone rooms, electrical rooms, mechanical rooms, elevator pits, the top of the elevator shaft, adjacent to the fire alarm control panel, fire pump room, computer rooms as defined by NFPA 90, chiller plants, pump rooms, UPS rooms and elevator machine rooms.

C. Linear Beam Smoke Detector

1. Each beam shall be comprised of a solid state infrared (IR) transmitter, photodiode receiver and microprocessor based control module. Should IR output be attenuated below the desired alarm obscuration level as a result of smoke interference an alarm will be annunciated. Total obscuration of the beam is annunciated as a beam blockage trouble signal. All wiring from the control module to the transmitter and receiver heads is supervised.

2. The projected beam smoke detector system shall have an operating range of 10M. (33 ft.) to 100M. (330 ft.) and be listed for spacing the beam 30 ft. from a wall and 60 ft. on center. The transmitter and receiver optical elements shall be adjustable +/-90 degrees horizontally and +/-30degrees vertically. The sensitivity shall be field selectable from 7% to 50% obscuration.

Intelligent Thermal Detectors

smoke detectors required for mechanical equipment with Division 23. Room detectors may be used to

3. Each duct detector shall be installed along with addressable control module as needed for fan

4. Duct detectors shall be provided by this division, installed by the mechanical contractor and

shutdown and/or smoke control. Detectors zoned with other devices shall be capable of operating its

2. Provide a smoke detector at each smoke damper location to meet the requirements of NFPA 72.

Confirm quantities and locations of smoke detectors required for smoke dampers with Division 23.

1. The alphanumeric display annunciator shall be a supervised, backlit LCD display containing a

located as shown on the drawings or at the location selected by the local fire department.

minimum of eighty, (80) characters for alarm annunciation in clear English text. Annunciator shall be

2. The LCD annunciator shall display all alarm, supervisory, and trouble conditions from the FACP via

1. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire

2. Addressable photoelectric smoke and thermal detectors shall provide alarm and power/polling LEDs.

LED(s) shall flash under normal conditions and LED(s) shall be placed into steady illumination by the

3. The fire alarm control panel shall permit detector sensitivity adjustment through field programming

4. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values.

The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the

6. Any additional equipment required to program devices are not acceptable.

sensitivity of each detector to be set in the FACP program and allowing the system operator to view

5. All field wiring is to be terminated on the detector base, not on the sensor head. Addressing of

detectors shall be via integral decade switches built into sensor. Devices requiring separate addressing

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and

shall, on command from the control panel, send data to the panel representing the analog level of

2. Provide photoelectric smoke detector heads with bases as required. Detectors shall be of the

receiving element to form a highly accurate means of smoke detection. Internal detector circuits shall

solid state photoelectric type utilizing a stable LED light source and a silicone photo diode as the

be shielded against electrical interference and resistant to transients, noise and, RF interference. Detector shall be low profile, the complete unit including base shall not exceed 1.875 inches in depth.

accomplish smoke detection in the supply/return air paths if the application permits.

control module even if all other devices on their circuit have gone into alarm.

electrically connected to the fire alarm system by the electrical contractor.

Provide 120 volt power as required for operation of smoke dampers.

1. Smoke dampers shall be provided by Division 23.

F. LCD Alphanumeric Display Remote Annunciator

2.4 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

alarm control panel signaling line circuits.

control panel, indicating an alarm condition.

the current analog value of each detector.

B. Intelligent Photoelectric Smoke Detector

E. Smoke Dampers

the serial card.

of the system.

smoke density.

Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device such as flow, tamper, release systems, etc.) to one of the fire alarm control panel SLCs.

2. The IDC zone shall be suitable for Survivability Level 1 operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include an LED.

4. Monitor module shall be provided for all sprinkler flow and tamper switches. Switches are furnished and installed by others and electrically connected to the fire alarm system by the electrical contractor. Verify quantities and locations and coordinate installation of devices required with fire protection shop drawings. Provide connections to devices per fire protection shop drawings.

Addressable Control Module:

Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay. Each relay shall have a red LED mounted on its cover to indicate if that relay has been activated

2. The control module NAC may be wired for Class (A/B) Survivability Level 1 with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

G. Door Holders

Provide door holders for wall mounting and for floor mounting. Door holders shall operate on 24 volt dc power and each holder shall not draw more than 70 milliamps of power.

2. Coordinate quantities of door holders required with architect's door schedule.

2.5 BATTERIES

A. The batteries shall be sealed, 12 volt nominal (two required).

B. The battery shall have sufficient capacity to power the fire alarm system for the time required in NFPA 72. This time shall be based on the type of system installed. At the end of this period the system shall be capable of operating all alarm notification appliances used for evacuation or to direct aid to the location of an emergency for 5 minutes upon a normal AC power failure.

2.6 ELEVATOR VISUAL SIGNAL (NC & FLA)

A. Provide 1/8" diameter minimum red LED mounted in a single gang polished stainless steel coverplate. Engrave nameplate "DO NOT USE ELEVATOR" with 1/8" high black filled letters. Coordinate installation of this device with the architect prior to rough-in to assure this component is integrated into the architecture of all elevator lobbies.

B. Provide gasketed coverplate for elevator lobbies in parking decks and similar damp locations.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Provide all equipment, wiring, conduit and outlet boxes required for the erection of a complete and operating system in accordance with applicable local, state and national codes, the manufacturer's recommendations, these plans and specifications. Color code shall be used throughout.

3.2 TEST

A. The manufacturer's authorized representative shall provide supervision of final system panel connections, perform a complete functional test of the system and submit a written report to the contractor attesting to the proper operation of the system.

3.3 FINAL INSPECTION

A. Upon completion of the installation, the electrical contractor shall provide to the architect, with a copy to the manufacturer's representative, a signed written statement attesting that all system equipment was installed in accordance with these specifications and in accordance with wiring diagrams, instructions and directions provided to the contractor by the manufacturer.

3.4 INSTRUCTION

Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components shall be provided and shall include one session for a period of 8 hours. Additional time that may be required for end-user training will be at added cost to owner.

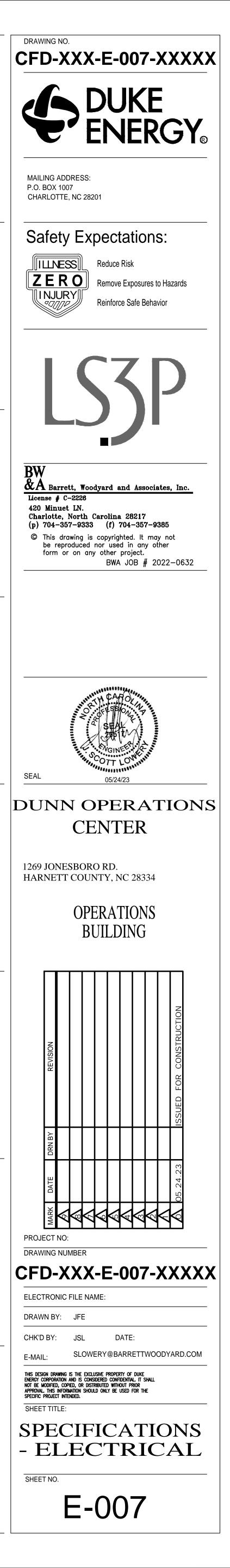
3.5 GUARANTEE

A. All equipment and wiring shall be guaranteed against defects in materials and workmanship for a two year period from the start up and beneficial use of the system. Warranty service for the equipment shall be provided by the manufacturer's factory trained representative during normal working hours, Monday through Friday excluding holidays. Emergency service provided at times other than as stipulated above shall be available from the same source at additional cost to the owner.

3.6 INSPECTIONS

A. Upon satisfactory completion of the system test, the manufacturer's representative shall present for the owner's consideration, a proposal to provide semi-annual inspection and tests of the system.

END OF SECTION



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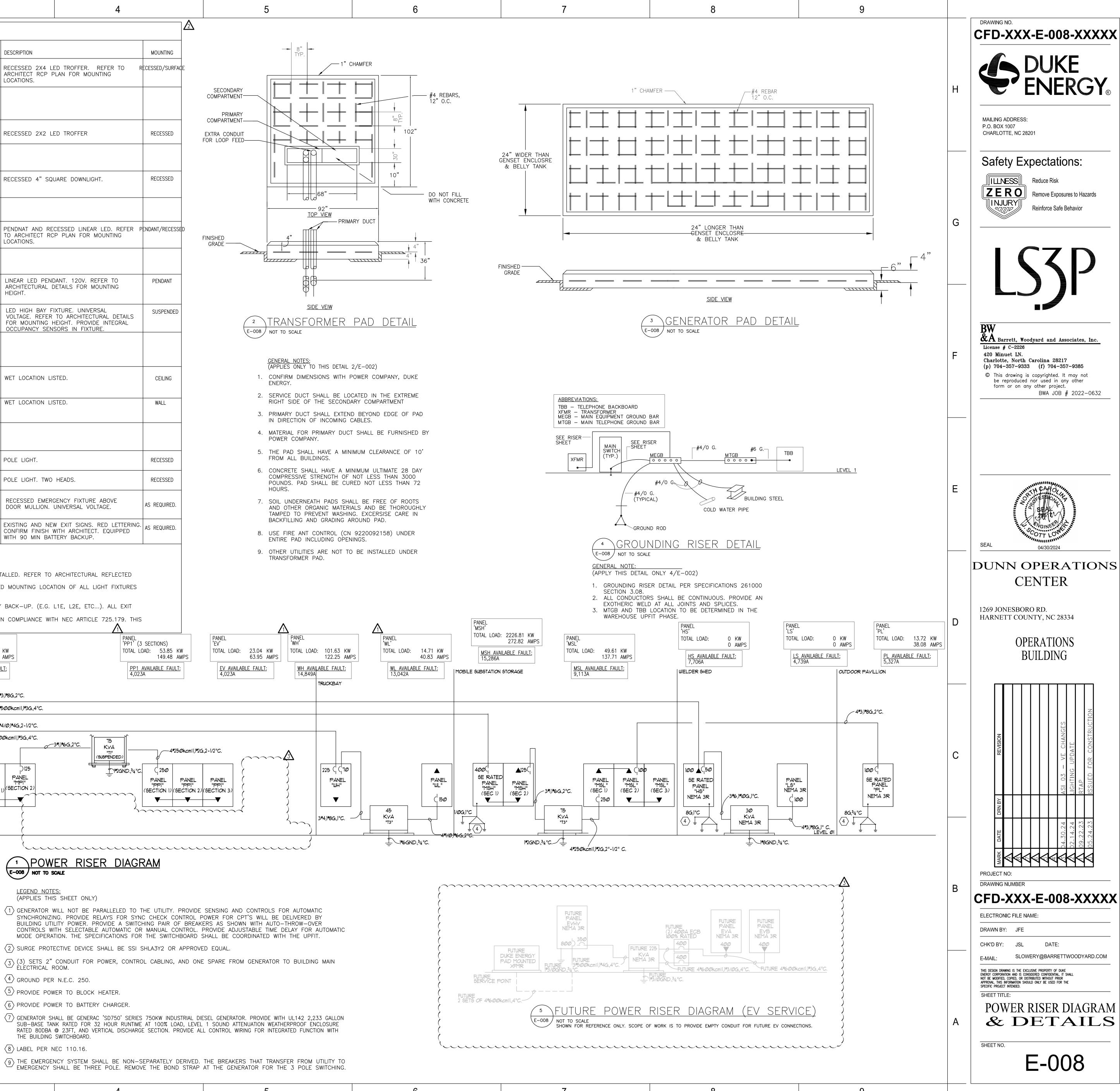
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			LIG	HTING	FIXTU	JRE S	CHEDU	ILE	1		
FIXTURE TYPE	MANUFACTURER AND CATALOG INFORMATION		QTY.	LAMPS TYPE LED	WATTS	B QTY.	ALLAST/DRIVE	ER WATTS	TOTAL WATTS	INPUT VOLTAGE	DESCRIPTION
\bigcirc	MANUFACTURER: METALUX MODEL#: CRUZE ST 24CZ2		-	5500LUM 4000K 80+CRI	50.1W	1	LED DRIVER 0-10V DIMMING	50.1W	50.1W	UNIVERSAL	RECESSED 2X ARCHITECT RC LOCATIONS.
	SAME AS TYPE ABOVE EXCEPT PRO WITH A 90 MIN EMERGENCY BATTE										
	MANUFACTURER: METALUX MODEL#: CRUZE ST 22CZ2		-	LED 5500LUM 4000K	39.4W	1	LED DRIVER 0-10V	39.4W	39.4W	UNIVERSAL	RECESSED 2X
	SAME AS TYPE ABOVE EXCEPT PRO WITH A 90 MIN EMERGENCY BATTE			- 80+CRI			DIMMING				
	MANUFACTURER: LUMENWERX MODEL#: VIOLA 4" DOWNLIGHT		-	LED 1849LUM 4000K	19.7W	1	LED DRIVER 0-10V DIMMING	19.7W	19.7W	UNIVERSAL	RECESSED 4"
٠	SAME AS TYPE ABOVE EXCEPT PRO WITH A 90 MIN EMERGENCY BATTE			80+CRI			DIMMING				
	MANUFACTURER: AXIS LIGHITNG MODEL#: BEAM SQUARE 2		_	LED 1200LM/FT	10W/FT	1	LED DRIVER 0-10V	10W/FT	10W/FT	UNIVERSAL	PENDNAT AND TO ARCHITECT
	SAME AS TYPE ABOVE EXCEPT PR WITH A 90 MIN EMERGENCY BATTE			4000K 80+CRI			DIMMING				LOCATIONS.
(\mathbf{F})	MANUFACTURER: LIGHT ART MODEL: COIL PENDANT		_	LED 2000LUM	25W	1	DRIVER 0-10V	25W	25W	120V	LINEAR LED F ARCHITECTURA
•	MANUFACTURER: METALUX						DIMMING				HEIGHT.
0	MODEL#: UHB		-	LED 24000LUM 4000K	197W	1	DRIVER 0-10V	197W	197W	UNIVERSAL	VOLTAGE. REI FOR MOUNTIN OCCUPANCY
۲	SAME AS ABOVE EXCEPT EQUIPPED AN EMERGENCY BATTERY PACK.	WITH									
	WET LOCATION LISTED DOWNLIGHT. MANUFACTURER TO BE DETERMINED		_	LED	60W	1	DRIVER 0-10V	60W	60W	UNIVERSAL	WET LOCATION
	EXTERIOR WALL PACK. COOPER LUMAR		_	2000LUM LED	60W	1	DRIVER	60W	60W		WET LOCATION
	SERIES. OR APPROVED EQUAL.			2000LUM			0-10V			UNIVERSAL	
<u> </u>	SAME AS ABOVE EXCEPT EQUIPPED AN EMERGENCY BATTERY PACK.) WITH		LED			LED DRIVER				
<u>В</u>	MANUFACTURER: LUMARK MODEL#: PREVAIL DISCRETE LED		-	52086LUM 4000K LED	366W	1	0-10V DIMMING	366W	366W	UNIVERSAL	POLE LIGHT.
P	MANUFACTURER: LUMARK MODEL#: PREVAIL DISCRETE LED RECESSED EMERGENCY FIXTURE. CO	OPER	-	52086LUM 4000K	732W	1	0-10V DIMMING	732W	732W	UNIVERSAL	
₽	AEL2 SERIES OR APPROVED EQUAL PROVIDED WITH 90 MINUTE BATTER		-	LED	5W	1	LED DRIVER	5W	5W	UNIVERSAL	RECESSED EN DOOR MULLIC
⊗	MODEL#: ES SERIES		-	LED	5W	1	LED DRIVER	5W	5W	UNIVERSAL	EXISTING AND CONFIRM FINIS WITH 90 MIN
 RE WI 4. AL 5. FIX AN 6. AN 	EILING PLANS FOR EXACT CEILING TY FER TO THE ARCHITECTURAL REFLEC ITHIN. LL FLUORESCENT FIXTURES TO BE P XTURE TYPES NOTED ON PLAN WITH ND EMERGENCY FIXTURES SHALL BE NY LOW-VOLTAGE CLASS 2 WIRING C PPLIES TO POWER WIRING AND CONT	CTED CEILIN ROVIDED WI SUFFIX 'E' FED FROM DUTSIDE THE ROL WIRING	IG PLANS ITH INTER INDICAT LOCAL E LIGHT S.	S AND MII RNAL BAL ES FIXTUI LIGHTING FIXTURE	LWORK LAST DIS RE TO B BRANCH HOUSING	DETAILS, CONNECT E PROVIE CIRCUIT SHALL E SWITCHBOA MSB' TOTAL LOAI	WHERE AF ING MEANS DED WITH S PER NEC BE PLENUN RD D: 639.38 769.08	5. 90 MINU 700.12(1 1 RATED, KW AMPS	TE MINIMU I)(2). I.E. TYPE MP1' (TW TOTAL LO	JM BATTERY	' BACK-UP. (E N COMPLIANCE KW AMPS
		Exterior of i	BUILDING	ELECTRICAL	_ ROOM	<u>MSB_AV</u> 21,915A	<u>AILABLE FAUL</u> A	<u>_]:</u>	21,65	8A	
ASED ON TILITY CO	SHORT CIRCUIT FAULT CURRENT N INFORMATION PROVIDED BY THE OMPANY, THE CALCULATED								[<i>6</i>	*3,1*8G.,2"C. *500kcmil,1*3G.,4"C.
HE POIN L EQUIF	FAULT CURRENT AVAILABLE AT T OF SERVICE IS 22,610 AMPS. PMENT SHALL BE COORDINATED										*4/0,1*4G.,2-1/2°C.
	D NO LESS THAN THE AVAILABLE IRRENT AS CALCULATED.			GENERA INCOMI 1000, 3PH, 4	TOR NG A	'MSB' 1000A 3PH, 4W	DISTRIBUT SECTIOI 10004 3PH, 4U	N N SPD			ØØkcmil,I*3G.,4"C.
	GEN1' TOTAL LOAD: 544.67	7 KW 5 AMPS					60	<u> </u>		400)125 PANEL "MP1"
	150 KW GENE 480/2777 3P						400			(SECTION	VGECTION 2)
	DUKE ENERGY PAD MOUNTED XFMR	$\left \begin{array}{c} 1 \\ \hline 9 \end{array} \right $							4*6,1*10	G.,I"C.	
	3/ØG.,1"C. ≟		÷ .				<u> </u> 	<u></u>			
		0F 4*400KC		,4"C. →		 					1 PC E-008 NOT
	3 SETS OF 4#400KCMIL,4"C.										<u>LEGEND I</u> (APPLIES
											(1) GENERATO SYNCHRO BUILDING
											CONTROLS MODE OP
											(3) (3) SETS ELECTRIC
											$\langle 6 \rangle$ provide $\langle 7 \rangle$ generator
											SUB-BASE RATED 801

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<u>№</u> ION	<u>ISB</u> 1	AM MA

		NEW	PANEI	L	<u>MSB</u>	
				SECTIO	N 1	
VOLTAGE	:	277/480				AMF
PHASE	:	<u>3</u>				MAI
DESCRIPTION	KW	BKR	CK	PH	CK	BKF
MP1	91.898	400/3	1	A	2	- 1
	90.44		3	В	4	_
	97.235		5	C	6	_
MSH	80.177	400/3	7	A	8	_
	79.237		9	В	10	
	74.685		11	C	12	-
WH	35.562	/	13	A	14	_
	32.974		15	B	16	-
	32.194		17	C	18	-
PANEL HS	0	100/3	19	A	20	
	0		21	B	22	-
	0		23	C	24	_
SPD	0	60/3	25	A	26	-
	0		27	B	28	
	0		29	C	30	
SPACE	0	-/3	31	A	32	_
	0		33	В	34	-
	0		35	С	36	
SPACE	0	-/3	37	A	38	_
	0		39	В	40	-
	0		41	C	42	-
	_					-
A TOTAL		207.64		VLL	PH	
B TOTAL		202.65		480	3	
C TOTAL	_	204.11				
	_					
CONN. kW		614.40				
CONN. Amps	_	739.03]			

TOTAL DEMAND LOAD

RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= 4
HEAT: 100% :	= 236
AC/MOTORS: 125% LARGEST + 100% REMAINING:	= 250
LIGHTING: 125%:	= 27.76
MISC: 100%:	= 1
WATER HEATER: 125%:	=
ELEVATORS: PER NEC:	=
KITCHEN EQUIP: PER NEC :	
TOTAL DEMAND LOAD KW:	=593.30
TOTAL DEMAND LOAD AMPS:	= 71

		11111	DAND	r				AIC 10K
		NEW	PANE					
		100 /000		SECTIO	DN I			050
VOLTAGE:		120/208				AMP:		250
PHASE:		<u>3</u>				MAIN:		MCB
							1	
DESCRIPTION	KW	BKR	СК	PH	СК	BKR	KW	DESCRIPTION
DED REC BREAKROOM	0.18	20/1	1	A	2	20/1		FLOORBOX TOWNHALL
DED REC BREAKROOM	0.18	20/1	3	В	4	20/1		FLOORBOX TOWNHALL
DED REC BREAKROOM	0.18	20/1	5	С	6	20/1		FLOORBOX TOWNHALL
DED REC BREAKROOM	0.18	20/1	7	A	8	20/1	0	SPARE
DED REC BREAKROOM	0.18	20/1	9	В	10	20/1		FLOORBOX TOWNHALL
DED REC BREAKROOM	0.18	20/1	11	С	12	20/1		FLOORBOX TOWNHALL
DED REC BREAKROOM	0.18	20/1	13	A	14	20/1	0.72	REC TOWNHALL CLOSET & CLOSE
DED REC FRIDGE	0.6	20/1	15	В	16	20/1	0.18	DED REC AV CLOSET
DED REC FRIDGE	0.6	20/1	17	С	18	20/1	0.18	DED REC AV CLOSET
REC BREAKROOM	0.72	20/1	19	A	20	20/1	0.18	DED REC WATER FOUNTAIN
REC OFFICE	0.9	20/1	21	В	22	20/1	0.36	REC BATHROOMS
REC OFFICE	0.9	20/1	23	С	24	20/1	1.08	REC OFFICES
MOD FURN OPEN AREA	0.9	20/3	25	A	26	20/1	1.08	REC OFFICES
	0.9		27	В	28	20/1	1.08	
	0.9		29	С	30	20/1	0.9	DED REC COPIER
MOD FURN OPEN AREA	0.9	20/1	31	A	32	20/1	0.9	DEC REC PLOTTER
REC CONFERENCE & PHONE RM	1.08	20/1	33	B	34	20/1		DED REC COPY
REC CONFERENCE	0.9	20/1	35	C	36	20/1		DED REC COPY
REC TOWN HALL	0.72	20/1	37	A	38	20/1		DED REC WELLNESS
DED REC TOWNHALL	0.18	20/1	39	B	40	20/1		DED REC WELLNESS
DED REC TOWNHALL	0.18	20/1	41	C	42	20/1	0.18	
	0110					~~~		
A TOTAL		7.56	1	VLL	PH]	18.18	RECEPTACLES
B TOTAL		7.44		208		1		HEATING
C TOTAL		7.80]		AC/MOTORS
0 10 11 12]					LIGHTING
SECTION 2 TOTAL kW		35.87	1					MISC.
SECTION 3 TOTAL KW		10.25						WATER HEATERS
		10.20	J					ELEVATORS
CONN. kW		68.92	1					KITCHEN EQUIP
CONN. Amps		191.31	1				0.00	
COMM. Amps		131.01]					

TOTAL DEMAND LOAD		
		0.5
	=	25.
HEAT: 100% :	=	
AC/MOTORS: 125% LARGEST + 100% REMAINING:	=	1C
LIGHTING: 125%:	=	0.
MISC: 100%:	=	17.
WATER HEATER: 125%:	=	
ELEVATORS: PER NEC:	=	
KITCHEN EQUIP: PER NEC :		
TOTAL DEMAND LOAD KW:	=	53.
TOTAL DEMAND LOAD AMPS:	=	149.
	RECEPTS: 100% 1ST 10 KW + 50% REMAINING: HEAT: 100% : AC/MOTORS: 125% LARGEST + 100% REMAINING: LIGHTING: 125%: MISC: 100%: WATER HEATER: 125%: ELEVATORS: PER NEC: KITCHEN EQUIP: PER NEC : TOTAL DEMAND LOAD KW:	RECEPTS: 100% 1ST 10 KW + 50% REMAINING: = HEAT: 100% : = AC/MOTORS: 125% LARGEST + 100% REMAINING: = LIGHTING: 125%: = MISC: 100%: = WATER HEATER: 125%: = ELEVATORS: PER NEC: = KITCHEN EQUIP: PER NEC : = TOTAL DEMAND LOAD KW: =

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AIC 42K SE RATED

): N:		<u>1000</u> <u>MCB</u>
	KW	DESCRIPTION
/3	0	SPACE
	0	
	0	
 /3	0	SPACE
	0	
 /3	0	
/3	0	SPACE
	0	
	0	
 /3	0	SPACE
	0	
	0	
/3	0	SPACE
	0	
	0	
/3	0	SPACE
	0	
	0	
/3	0	SPACE
	0	
	0	
	236.39 250.47 22.21	RECEPTACLES HEATING AC/MOTORS LIGHTING
	19.24	MISC.

19.24 MISC. 15.20 WATER HEATERS 0.00 ELEVATORS 0.00 KITCHEN EQUIP

0.45	KVA	
.385	KVA	
.468	KVA	
5125	KVA	
9.24	KVA	
19	KVA	
0	KVA	
0	KVA	
425	KVA	
3.66	AMP	

5.16	KVA
0	KVA
10.8	KVA
0.45	KVA
7.44	KVA
0	KVA
0	KVA
0	KVA
3.85	KVA
9.48	AMP
	\sim

	277/480		SECTIO				
	2777/480		SECHO	N 1			400
					AMP:		400
	<u>3</u>				MAIN:		MLO
	BKR	СК	PH	СК	BKR	KW	DESCRIPTION
	20/1	1	A		20/3		P-5
2.87	20/1	3	B	4		2	
3.025	20/1	5	C	6		2	
2.585	20/1	7	A	8	20/3	2	P-6
1.38	20/1	9	В	10		2	
27.33	125/3	11	С	12		2	
27.33		13	A	14	20/1	2.5	P-7
27.33		15	В	16	20/3	1.67	P-8
5.8	25/3	17	С	18		1.67	
5.8		19	A	20		1.67	
5.8		21	В	22	20/3	1.83	P-9
12.2	60/1	23	С	24		1.83	
23.18	125/3	25	A	26		1.83	
22.28		27	В	28	20/3	2	P-10
20.56		29	С	30	35/3	4.67	P-11
4	25/1	31	A	32		4.67	
4	25/1	33	В	34		4.67	
1.83	20/3	35	С	36	40/3	5.33	P-12
1.83		37	A	38		5.33	
1.83		39	В	40		5.33	
4	20/1	41	С	42	20/1	0	SPARE
-	87.71	1		РН	1	40.68	RECEPTACLES
					1		HEATING
			00		J		AC/MOTORS
_		J					LIGHTING
-	46.08	1					
_		J					WATER HEATERS
-	311.02	1					ELEVATORS
							KITCHEN EQUIP
	2.983 2.87 3.025 2.585 1.38 27.33 27.33 27.33 5.8 5.8 5.8 5.8 12.2 23.18 22.28 20.56 4 4 1.83 1.83 1.83	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					

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RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= 25.34 KVA
HEAT: 100% :	= 0 KVA
AC/MOTORS: 125% LARGEST + 100% REMAINING:	= 181.78 KVA
LIGHTING: 125%:	= 16.05375 KVA
MISC: 100%:	= 63.52 KVA
WATER HEATER: 125%:	= 15.25 KVA
ELEVATORS: PER NEC:	= 0 KVA
KITCHEN EQUIP: PER NEC :	0 KVA
TOTAL DEMAND LOAD KW:	=301.94375 KVA
TOTAL DEMAND LOAD AMPS:	= 363.19 AMP

								AIC 10k	<	1										AIC 10K	
		NEW	PANEL		<u>PP1</u>									NEW	PANEL		<u>PP1</u>				
				SECTIO												SECTIO					
VOLTAGE:		120/208				AMP:		<u>250</u>			v	/OLTAGE:		120/208				AMP:		<u>250</u>	
PHASE:		3				MAIN:		MCB				PHASE:		<u>3</u>				MAIN:		MCB	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW		DESCRIPTION		DESCRIPTION		KW	BKR	СК	PH	CK	BKR	KW		ESCRIPTION
DED REC IT	0.36	20/1	43	A	44	20/3	_		JRN TEAM RM		CU-1		.98	25/2	85	А	86	20/1	0	SPARE	
JBOX SECURITY PANEL	0.5	20/1	45	В	46		0.9		-				.97		87	В	88	20/1	0	SPARE	
DED REC IT	0.36	20/1	47	C	48		0.9		-		BATTERY CHARGER		0.5	20/1	89	С	90	20/1	0	SPARE	
DED REC IT	0.36	20/1	49	A	50	20/1	0.9	MOD FU	JRN TEAM RM		BATTERY HEATER		0.5	20/1	91	А	92	20/1	0	SPARE	
DED REC IT	0.36	20/1	51	В	52	20/1	0.9	MOD FU	JRN TEAM RM		FIRE ANNUNCIATOR		0.5	20/1	93	В	94	20/1	0	SPARE	
JBOX SECURITY PANEL	0.5	20/1	53	C	54	20/3	0.9	MOD FU	JRN TEAM RM]	PROJECTOR MOTOR		1	20/1	95	С	96	20/1	0	SPARE	
DED REC IT	0.36	20/1	55	A	56		0.9		-]	PROJECTOR	(0.18	20/1	97	А	98	20/1	0	SPARE	
DED REC IT	0.36	20/1	57	B	58		0.9		-]	BREAK RM LTS	(0.36	20/1	99	В	100	20/1	0	SPARE	
REC HALLS & ADA BATHROOM & JAN CLOSE	T 1.08	20/1	59	С	60	20/1	0.9	REC TE	AM RM]	RTU1 MAINTENANCE O)UTLET (0.18	20/1	101	С	102	20/1	0	SPARE	
MOD FURN TEAM RM	0.9	20/3	61	A	62	20/1	0.9	MOD FU	JRN TEAM RM		SPARE		0	20/1	103	А	104	20/1	0	SPARE	
	0.9		63	В	64	20/3	0.9	MOD FU	JRN TEAM RM]/1\	MAINTENANCE OUTLET	. (0.18	20/1	105	В	106	20/1	0	SPARE	
	0.9		65	С	66		0.9		-		VEHICLE BAY DOORS	().35	20/2	107	С	108	20/1	0	SPARE	
MOD FURN TEAM RM	0.9	20/1	67	A	68		0.9		-	1		().35		109	А	110	20/1	0	SPARE	
REC TEAM RM	0.9	20/1	69	В	70	20/1	0.9	MOD FU	JRN TEAM RM	1	VEHICLE BAY DOORS	().35	20/2	111	В	112	20/1	0	SPARE	
REC TEAM RM	0.72	20/1	71	С	72	20/1	0.72	REC ST	ORAGE	1		().35		113	С	114	20/1	0	SPARE	
MOD FURN TEAM RM	0.9	20/1	73	A	74	20/1	1.08	REC ST	ORAGE & HALLWAY	1	EF-B	(D.65	20/1	115	А	116	20/1	0	SPARE	
MOD FURN TEAM RM	0.9	20/1	75	B	76	20/1	1.08	REC ST	ORAGE & HALLWAY	1	TEF-1	(D.65	20/1	117	В	118	20/1	0	SPARE	
MOD FURN TEAM RM	0.9	20/3	77	С	78	20/1	1.08	REC ST	ORAGE & HALLWAY	1	MOD CONTROLLER		0.2	20/1	119	С	120	20/1	0	SPARE	
	0.9		79	A	80	25/2	1.98	CU-2		1	SPARE		0	20/1	121	А	122	20/1	0	SPARE	
	0.9		81	В	82		1.97		-	1	SPARE		0	20/1	123	В	124	20/1	0	SPARE	
REC TEAM RM	0.9	20/1	83	С	84	20/1	0.5	RP-A]	SPARE		0	20/1	125	С	126	20/1	0	SPARE	
	-		-		1	-				-							1	-			
A TOTAL		12.24		VLL	PH	1		D RECEPT			A TOTAL			3.66		VLL	PH	4		1 RECEPTAC	CLES
B TOTAL		12.37		208	3 3						B TOTAL			4.01		208		3		HEATING	
C TOTAL	_	11.26						5 АС/МОТ			C TOTAL			2.58						5 АС/МОТОІ	RS
	-		-					DLIGHTIN	3											5 LIGHTING	
CONN. kw		35.87						2 MISC.			CONN. kw			10.25					1	MISC.	
CONN. amps	-	99.57					1) WATER			CONN. amps			28.45					1	D WATER HE	
								D ELEVATO												DELEVATOR	
							0.00	D KITCHEN	I EQUIP										0.0	NITCHEN	EQUIP
										_											

	NEW	PANE		WH			AIC 22K
OLTAGE: PHASE:	<u>277/480</u> <u>3</u>)	SECTIO	DN 1	AMP: MAIN:		<u>225</u> MCB
N KW	BKR	СК	PH	СК	BKR	KW	DESCRIPTION
1.67	20/3	1	A	2	20/3	4.3	UH-A
1.67		3	B	4		4.3	
			С				
			A		20/3		UH-A
	20/3		_				
				-			
							SPARE
	20/3						SPARE
							SPARE
		_	+				SPARE
						-	SPARE
				_		-	SPARE
						-	SPARE
		_		_		-	SPARE
	-						SPARE
							SPARE
			_				SPARE
			_				SPARE
			_				SPARE
							SPARE
4.724	·	41		42	20/1	0	SPARE
	35.56	7	VLL	PH]	1.80	RECEPTACLES
							HEATING
					J		AC/MOTORS
		_					LIGHTING
							MISC.
	100.73						WATER HEATERS
							ELEVATORS
		4					KITCHEN EQUIP
	PHASE: N KW 1.67 1.67 1.67 3.612 4.3 4.3 4.3 4.3 4.3 4.3 4.3 4.3	PHASE: 3 N KW BKR 1.67 20/3 1.67 1.67 3.612 20/1 4.3 20/3 5.504 4.724 35.56 32.97 32.19 32.19	PHASE: $\underline{3}$ N KW BKR CK 1.67 $20/3$ 1 1.67 $$ 3 1.67 $$ 3 1.67 $$ 3 1.67 $$ 3 1.67 $$ 5 3.612 $20/1$ 7 4.3 $20/3$ 9 4.3 $20/3$ 9 4.3 $20/3$ 15 4.3 $20/3$ 15 4.3 $20/3$ 15 4.3 $20/3$ 21 4.3 $$ 19 4.3 $20/3$ 21 4.3 $$ 23 4.3 $$ 25 4.3 $$ 29 4.3 $$ 31 0 $20/1$ 33 0 $20/1$ 35 4.48 $70/3$ 37 5.504 $$ 39	PHASE: $\underline{3}$ N KW BKR CK PH 1.67 20/3 1 A 1.67 3 B 1.67 3 B 1.67 3 B 1.67 5 C 3.612 $20/1$ 7 A 4.3 $20/3$ 9 B 4.3 $$ 11 C 4.3 $$ 13 A 4.3 $20/3$ 15 B 4.3 $$ 17 C 4.3 $$ 17 C 4.3 $$ 19 A 4.3 $20/3$ 21 B 4.3 $$ 23 C 4.3 $$ 29 C 4.3 $$ 31 A 0 $20/1$ 33 B 0 $20/1$ 35 C 4.4.4	PHASE: $\underline{3}$ N KW BKR CK PH CK 1.67 20/3 1 A 2 1.67 20/3 1 A 2 1.67 3 B 4 1.67 5 C 6 3.612 20/1 7 A 8 4.3 20/3 9 B 10 4.3 20/3 9 B 10 4.3 20/3 15 B 16 4.3 20/3 15 B 16 4.3 20/3 21 B 22 4.3 20/3 21 B 22 4.3 20/3 27 B 28 4.3 20/3 27 B 28 4.3 20/3 27 B 28 4.3 20/3 37 A 38 5.504 39 B 40 4.724 39	PHASE: $\underline{3}$ MAIN: N KW BKR CK PH CK BKR 1.67 20/3 1 A 2 20/3 1.67 20/3 1 A 2 20/3 1.67 3 B 4 1.67 5 C 6 3.612 20/1 7 A 8 20/3 4.3 20/3 9 B 10 4.3 20/3 15 B 16 20/1 4.3 17 C 18 20/1 4.3 19 A 20 20/1 4.3 19 A 20 20/1 4.3 23 C 24 20/1 4.3 25 A 26 20/1 4.3 29 C 30 20/1 4.3 31 A 32	PHASE: $\underline{3}$ MAIN: N KW BKR CK PH CK BKR KW 1.67 20/3 1 A 2 20/3 4.3 1.67 3 B 4 4.3 1.67 5 C 6 4.3 3.612 20/1 7 A 8 20/3 4.3 4.3 20/3 9 B 10 4.3 4.3 20/3 9 B 10 4.3 4.3 20/3 15 B 16 20/1 0 4.3 20/3 15 B 16 20/1 0 4.3 17 C 18 20/1 0 4.3 19 A 20 20/1 0 4.3 23 C 24 20/1 0 4.3 29 C 30 20/1 0

5

TOTAL DEMAND LOAD KW: TOTAL DEMAND LOAD AMPS:

6

= 101.633 KVA = 122.25 AMP

								AIC 42K
		NEW	PANEI		MP1			AIC 42K
		11211	1 /11/11					
	VOLTAGE:	277/480		DECITO	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	AMP:		400
	PHASE:	3				MAIN:		MLO
	1111021	2						<u></u>
DESCRIPTIO	K~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	BKR	К К	PH	СК	BKR	KW	DESCRIPTION
SPARE	0	20/1) 43	A	44	20/1	0	SPARE
SPARE	0	20/1) 45	B	46	20/1	0	SPARE
SPARE	0	20/1) 47	С	48	20/1	0	SPARE
UH-B		20/3~	49	A	50	20/1	0	SPARE
	1.67		51	B	52	20/1	0	SPARE
	1.67		53	C	54	20/1	0	SPARE
UH-B	1.67	20/3	55	A	56	20/1	0	SPARE
	1.67		57	B	58	20/1	0	SPARE
	1.67		59	C	60	20/1	0	SPARE
UH-B	1.67	20/3	61	A	62	20/1	0	SPARE
	1.67		63	B	64	20/1	0	SPARE
	1.67		65	C	66	20/1	0	SPARE
UH-B	1.67	20/3	67	A	68	20/1	0	SPARE
	1.67		69	B	70	20/1	0	SPARE
	1.67		71	C	72	20/1	0	SPARE
P-13	2.7	20/3	73	A	74	20/1	0	SPARE
	2.7		75	B	76	20/1	0	SPARE
	2.7		77	C	78	20/1	0	SPARE
SPARE	0	20/1	79	A	80	20/1	0	SPARE
SPARE	0	20/1	81	B	82	20/1	0	SPARE
SPARE	0	20/1	83	C	84	20/1	0	SPARE
			-		-	-		
A TOTAL		9.38		VLL	PH		1	RECEPTACLES
B TOTAL		9.38		480	3		1	HEATING
C TOTAL		9.38						AC/MOTORS
			_				1	LIGHTING
CONN. kw		28.14					1	MISC.
CONN. amps		33.85]				1	WATER HEATERS
							1	ELEVATORS
							0.00	KITCHEN EQUIP

8

7

			NEW	PANE		<u>WL</u>			AIC 10K
	VOLTAGE: PHASE:		<u>120/208</u> <u>3</u>		SECTIO	ON 1	AMP: MAIN:		<u>150</u> MCB
DES	SCRIPTION	KW	BKR	СК	PH	СК	BKR	KW	DESCRIPTION
VEHICLE E	BAY DOORS	0.35	20/2	1	A	2	20/2	0.35	VEHICLE BAY DOORS
		0.35		3	В	4		0.35	
VEHICLE E	BAY DOORS	0.35	20/2	5	С	6	20/2	0.35	VEHICLE BAY DOORS
		0.35		7	A	8		0.35	
VEHICLE E	AY DOORS	0.35	20/2	9	В	10	20/1		REC CEILING
		0.35		11	C	12	20/1		REC CEILING
VEHICLE E	AY DOORS	0.35	20/2	13	A	14	20/1	0.18	DED REC
		0.35		15	В	16	20/1	0.18	DED REC
VEHICLE E	AY DOORS	0.35	20/2	17	С	18	20/1	0.1	LOUVER CONTROL
		0.35		19	A	20	20/1		LOUVER CONTROL
VEHICLE E	AY DOORS	0.35	20/2	21	B	22	20/2	0.754	EF-A
		0.35		23	С	24			
VEHICLE E	AY DOORS	0.35	20/2	25	A	26	20/2	0.35	VEHICLE BAY DOORS
		0.35		27	В	28		0.35	
VEHICLE E	AY DOORS	0.35	20/2	29	С	30	20/2	0.35	VEHICLE BAY DOORS
		0.35		31	A	32		0.35	
VEHICLE E	AY DOORS	0.35	20/2	33	В	34	20/2	0.35	VEHICLE BAY DOORS
		0.35		35	С	36		0.35	
VEHICLE E	AY DOORS	0.35	20/2	37	A	38	20/2	0.35	VEHICLE BAY DOORS
		0.35		39	В	40		0.35	
		0	20/1	41	C	42	20/1	0	SPARE
				1			-		
A TOTAL			4.48	1	VLL	PH	4		RECEPTACLES
B TOTAL			5.50		208	3 3	<u>'</u>		HEATING
C TOTAL			4.72	J					AC/MOTORS
	1		4 4 7 4	1					MISC.
CONN. kW			14.71	1					WATER HEATERS
CONN. Am	05		40.83	J					
								0.00	KITCHEN EQUIP
TOTAL DEM	AND LOAD								
RECEDTS.	100% 1ST 10 KW	+ 50		NG		=	1 2	KVA	
		т JU		NG.		_		KVA	
145870 1000		⊥ 10		JINC		=			
HEAT: 100		+ IU	U% REMAI	ning.		_		KVA	
AC/MOTOR:						=	. 0	IV VA	
AC/MOTORS	125%:					_	. ∩ ?	K//A	
AC/MOTOR: LIGHTING: MISC: 1005	125%: %:					=		KVA	
AC/MOTOR: LIGHTING: MISC: 1005 WATER HEA	125%: %: .TER: 125%:					=	0	KVA	
AC/MOTOR: LIGHTING: MISC: 1009 WATER HEA ELEVATORS	125%: %: .TER: 125%: : PER NEC:						0 0	KVA KVA	
AC/MOTORS LIGHTING: MISC: 1009 WATER HEA ELEVATORS KITCHEN E	125%: %: .TER: 125%:					=	000000000000000000000000000000000000000	KVA KVA KVA	

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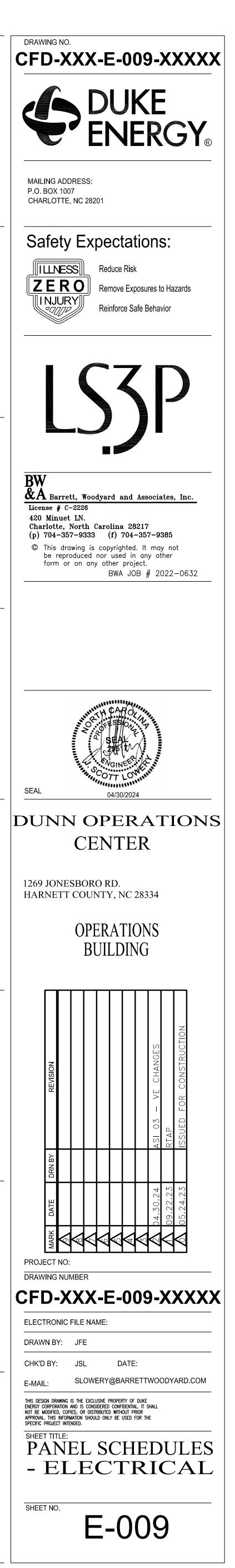
B

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3 4	5	6 7	8
AIC 22K NEW PANEL <u>MSH</u> SE RATED SECTION 1 VOLTAGE: <u>277/480</u> AMP: <u>400</u>	AIC 22 NEW PANEL <u>MSH</u> SECTION 2 VOLTAGE: <u>277/480</u> AMP: <u>400</u>	2K NEW PANE VOLTAGE: <u>120/208</u>	NEMA 3R IEL <u>PL</u> AIC 10K SECTION 1 SE RATED AMP: <u>100</u>
PHASE: <u>3</u> MAIN: <u>MCB</u>	PHASE: <u>3</u> MAIN: <u>MCB</u>	PHASE: <u>3</u>	MAIN: <u>MCB</u>
DESCRIPTION KW BKR CK PH CK BKR KW DESCRIPTION	DESCRIPTION KW BKR CK PH CK BKR KW	DESCRIPTION DESCRIPTION KW BKR CK	PH CK BKR KW DESCRIPTION
WAREHOUSE LTS 3.612 20/1 1 A 2 15/3 0.663 EF-A	UH-A 4.3 20/3 43 A 44 -/1 0 SPACE	E PAVILLION REC 0.18 20/1 1	A 2 20/1 0 SPARE
WAREHOUSE LTS 1.422 20/1 3 B 4 0.663	4.3 45 B 46 -/1 0 SPACE		
FAN 1.67 20/3 5 C 6 0.663	4.3 47 C 48 -/1 0 SPACE		C 6 20/2 1 208 PAVILLION REC
1.67 7 A 8 15/3 0.663 EF-A	UH-A 4.3 20/3 49 A 50 -/1 0 SPACE	E 208 PAVILLION REC 1 20/2 7	A 8 1
1.67 9 B 10 0.663	4.3 51 B 52 -/1 0 SPACE	E 1 9	B 10 20/1 0 SPARE
10 TON CRANE 7.59 40/3 11 C 12 0.663	4.3 53 C 54 -/1 0 SPACE	E PAVILLION REC 0.18 20/1 11	C 12 20/1 0 SPARE
7.58 13 A 14 15/3 0.663 EF-A	UH-A 4.3 20/3 55 A 56 -/1 0 SPACE	E PAVILLION REC 0.18 20/1 13	B A 14 20/1 0 SPARE
7.58 15 B 16 0.663	4.3 57 B 58 -/1 0 SPACE	E 208 PAVILLION REC 1 20/2 15	5 B 16 20/1 0 SPARE
UH-A 4.3 20/3 17 C 18 0.663	4.3 59 C 60 -/1 0 SPACE	E 1 17	C 18 20/1 0 SPARE
4.3 19 A 20 15/3 0.663 EF-A	UH-A 4.3 20/3 61 A 62 -/1 0 SPACE	E 208 PAVILLION REC 1 20/2 19	A 20 20/1 0 SPARE
4.3 21 B 22 0.663	4.3 63 B 64 -/1 0 SPACE	E 1 21	B 22 -/1 0 SPACE
WALLPACK LTS 1.62 20/1 23 C 24 0.663	4.3 65 C 66 -/1 0 SPACE	E PAVILLION REC 0.18 20/1 23	B C 24 -/1 0 SPACE
UH-A 4.3 20/3 25 A 26 20/1 3 WATER HEATER	UH-A 4.3 20/3 67 A 68 -/1 0 SPACE	E PAVILLION REC 0.18 20/1 25	5 A 26 -/1 0 SPACE
4.3 27 B 28 20/1 3.2 SITE LIGHTING	4.3 69 B 70 -/1 0 SPACE	E 208 PAVILLION REC 1 20/2 27	7 B 28 -/1 0 SPACE
4.3 29 C 30 20/1 3.2 SITE LIGHTING	4.3 $$ 71 C 72 $-/1$ 0 SPACE		C 30 -/1 0 SPACE
UH-A 4.3 20/3 31 A 32 20/1 3.2 SITE LIGHTING	UH-A 4.3 20/3 73 A 74 -/1 0 SPACE	E 208 PAVILLION REC 1 20/2 31	A 32 $-/1$ 0 SPACE
4.3 33 B 34 20/1 0 SPARE	4.3 $$ 75 B 76 $-/1$ 0 SPACE	E –––– 1 ––– 33	B B 34 $-/1$ O SPACE
4.3 35 C 36 20/1 0 SPARE	4.3 $$ 77 C 78 $-/1$ 0 SPACE		
UH-A 4.3 20/3 37 A 38 20/1 0 SPARE	EF-A 0.663 15/3 79 A 80 -/1 0 SPACE		
4.3 39 B 40 20/1 0 SPARE	0.663 81 B 82 -/1 0 SPACE		
4.3 41 C 42 20/1 0 SPARE	0.663 $$ 83 C 84 $-/1$ 0 SPACE		
75KVA 18.42 125/3 SUB A			
XFMR TO 22.07 FE - B	A TOTAL 26.46 VLL PH 0.00 RECEP	PTACLES A TOTAL 4.72	VLL PH 17.44 RECEPTACLES
PANEL MSL 18.39 ED C	B TOTAL 26.46 480 3 79.39 HEATIN		208 3 0.00 HEATING
	C TOTAL 26.46 0.00 AC/MC		0.00 AC/MOTORS
A TOTAL 57.33 VLL PH 0.00 RECEPTACLES B TOTAL 55.79 480 3 59.56 HEATING	0.00 LIGHTI	NG	0.00 LIGHTING
B TOTAL 55.79 480 3 59.56 HEATING	CONN. kw 79.389 0.00 MISC.		0.00 MISC.
<u>C TOTAL</u> 52.32 27.76 AC/MOTORS	CONN. amps 95.49 0.00 WATER		0.00 WATER HEATERS
16.25 LIGHTING	0.00 ELEVA		0.00 ELEVATORS
SECTION 2 TOTAL kW 79.39 0.00 MISC.		EN EQUIP	0.00 KITCHEN EQUIP
3.00 WATER HEATERS			
CONN. kW 244.84 0.00 ELEVATORS			
CONN. Amps 294.50 0.00 KITCHEN EQUIP		TOTAL DEMAND LOAD	
		RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= 13.72 KVA
		HEAT: 100% :	= 0 KVA
TOTAL DEMAND LOAD		AC/MOTORS: 125% LARGEST + 100% REMAINING:	
		LIGHTING: 125%:	= 0 KVA
RECEPTS: 100% 1ST 10 KW + 50% REMAINING: = 19.03 KVA		MISC: 100%:	= 0 KVA
HEAT: 100% : = 138.945 KVA		WATER HEATER: 125%:	= 0 KVA
AC/MOTORS: 125% LARGEST + 100% REMAINING: = 56.38 KVA		ELEVATORS: PER NEC:	= 0 KVA
$\begin{array}{c} - & - & - & - & - & - & - & - & - & - $		KITCHEN EQUIP: PER NEC :	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		TOTAL DEMAND LOAD KW.	= 13.72 KVA

TOTAL

RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= '
HEAT: 100% :	= 138
AC/MOTORS: 125% LARGEST + 100% REMAINING:	= !
LIGHTING: 125%:	= 20.
MISC: 100%:	=
WATER HEATER: 125%:	=
ELEVATORS: PER NEC:	=
KITCHEN EQUIP: PER NEC :	
TOTAL DEMAND LOAD KW:	= 240.
TOTAL DEMAND LOAD AMPS:	= 28

								AIC
		NEW	PANEL	SECTIO	MSL			
VOLTAGI	<u>ج</u> .	120/208		SECHO	'IN I	AMP:		25
PHAS		<u>180/200</u>				MAIN:		MC
	J.	<u>v</u>				MININ.		<u> </u>
DESCRIPTION	KW	BKR	CK	PH	СК	BKR	KW	
VEHICLE BAY DOORS	0.35	20/2	1	Α	2	20/2	0.35	VE
	0.35		3	В	4		0.35	
VEHICLE BAY DOORS	0.35	20/2	5	С	6	20/2	0.35	VE
	0.35		7	Α	8		0.35	
VEHICLE BAY DOORS	0.35	20/2	9	В	10	20/2	0.35	VE
	0.35		11	С	12		0.35	
VEHICLE BAY DOORS	0.35	20/2	13	Α	14	20/2	0.35	VE
	0.35		15	В	16		0.35	
VEHICLE BAY DOORS	0.35	20/2	17	С	18	20/2	0.35	VE
	0.35		19	Α	20		0.35	
VEHICLE BAY DOORS	0.35	20/2	21	В	22	20/2	0.35	VE
	0.35		23	С	24		0.35	
VEHICLE BAY DOORS	0.35	20/2	25	Α	26	20/2	0.35	VE
	0.35		27	В	28		0.35	
VEHICLE BAY DOORS	0.35	20/2	29	С	30	20/2	0.35	VE
	0.35		31	A	32		0.35	
VEHICLE BAY DOORS	0.35	20/2	33	В	34	20/2	0.35	VE
	0.35		35	С	36		0.35	
VEHICLE BAY DOORS	0.35	20/2	37	A	38	20/2	0.35	VE
	0.35		39	В	40		0.35	
CEILING REC	0.9	20/1	41	C	42	20/1	0.72	CE
	_		1			1		
A TOTAL		4.90		VLL	PH -	-	1.62	
B TOTAL		4.90		208	3		0.00	
C TOTAL		5.82					14.00	
			1				0.00	
SECTION 2 TOTAL kW		35.60					0.00	
SECTION 3 TOTAL KW		7.66					0.00	
							0.00	
CONN. kW		58.88					0.00	KIT
CONN. Amps		163.44						

TOTAL DEMAND LOAD		
RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	_	-
HEAT: 100% :	_	
AC/MOTORS: 125% LARGEST + 100% REMAINING:	=	2
LIGHTING: 125%:	=	
MISC: 100%:	=	
WATER HEATER: 125%:	=	
ELEVATORS: PER NEC:	=	
KITCHEN EQUIP: PER NEC :		
TOTAL DEMAND LOAD KW: TOTAL DEMAND LOAD AMPS:	=	17
	_	1.
NEW PANEL <u>HS</u>		

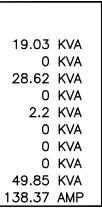
TOTAL DEMAND LOAD KW:					=			
TOTAL DEMAND LOAD AMPS:					=	138.37	AMP	
								AIC 10K
		NEW	PANEI		<u>HS</u>			SE RATED
				SECTIO	N 1			
VOLTAGE:		<u>277/480</u>				AMP:		<u>100</u>
PHASE:		<u>3</u>				MAIN:		MLO
							1011	
DESCRIPTION	KW	BKR	CK	PH	СК	BKR	KW	DESCRIPTION
SPARE	0	20/1	1	A	2	50/3	0	PANEL LS
SPARE	0	20/1	3	B	4		0	
SPARE	0	20/1	5	C	6		0	
SPARE	0	20/1	7	A	8	20/1	0	SPARE
SPARE	0	20/1	9	B	10	20/1	0	SPARE
SPARE	0	20/1	11	C	12	20/1	0	SPARE
SPARE	0	20/1	13	A	14	20/1	0	SPARE
SPARE	0	20/1	15	B	16	20/1	0	SPARE
SPARE	0	20/1	17	С	18	20/1	0	SPARE
SPARE	0	20/1	19	A	20	20/1	0	SPARE
SPARE	0	20/1	21	В	22	20/1	0	SPARE
SPARE	0	20/1	23	С	24	20/1	0	SPARE
SPARE	0	20/1	25	A	26	20/1	0	SPARE
SPARE	0	20/1	27	В	28	20/1	0	SPARE
SPARE	0	20/1	29	C	30	20/1	0	SPARE
SPARE	0	20/1	31	A	32	20/1	0	SPARE
SPARE	0	20/1	33	В	34	20/1	0	SPARE
SPARE	0	20/1	35	C	36	20/1	0	SPARE
SPARE	0	20/1	37	A	38	20/1	0	SPARE
SPARE	0	20/1	39	В	40	20/1	0	SPARE
SPARE	0	20/1	41	C	42	20/1	0	SPARE
			1			1	0.00	
A TOTAL B TOTAL		0.00		VLL	PH	4		RECEPTACLES HEATING
		0.00		480	3	J		
C TOTAL		0.00	l					
			T					MISC.
CONN. KW		0.00						WATER HEATERS
CONN. Amps		0.00	l					ELEVATORS
							0.00	KITCHEN EQUIP

TOTAL DEMAND LOAD	
· · · · · · · · · · · · · · · · · · ·	
RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	=
HEAT: 100% :	=
AC/MOTORS: 125% LARGEST + 100% REMAINING:	=
LIGHTING: 125%:	=
MISC: 100%:	=
WATER HEATER: 125%:	=
ELEVATORS: PER NEC:	=
KITCHEN EQUIP: PER NEC :	
TOTAL DEMAND LOAD KW:	=
TOTAL DEMAND LOAD AMPS:	=
2	

B

9.03	KVA
.945	KVA
6.38	KVA
3175	KVA
2.2	KVA
3.75	KVA
0	KVA
0	KVA
6225	KVA
9.43	AMP

13 AMP										AIC 10K	
				NEW	PANE	L	<u>MSL</u>				
	AIC 10K					SECTIO	DN 2				
		VOLTAGE:		<u>120/208</u>				AMP:		<u>250</u>	
		PHASE:		3				MAIN:		MLO	
	<u>250</u>										
	MCB	DESCRIPTION	KW	BKR	CK	PH	CK	BKR	ΚW	DESCRIPTION	- 1
		VEHICLE BAY DOORS	0.35	20/2	43	A	44	20/2	0.35	VEHICLE BAY DOORS	
KW	DESCRIPTION		0.35		45	В	46		0.35		DES
0.35	VEHICLE BAY DOORS	VEHICLE BAY DOORS	0.35	20/2	47	C C	48	20/2	0.35	VEHICLE BAY DOORS	LOUVER CO
0.35			0.35		49	Â	50		0.35		LOUVER CO
0.35	VEHICLE BAY DOORS	VEHICLE BAY DOORS	0.35	20/2	51	B	52	20/1		CEILING REC	LOUVER CO
0.35			0.35	~~/~ 	53		54	20/1	0.9	CEILING REC	LOUVER CO
0.35		VEHICLE BAY DOORS	0.35		55	A	56			CEILING REC	CU-1
0.35			0.35	20/2	57		58	20/1		CEILING REC	
	VEHICLE BAY DOORS	VEHICLE BAY DOORS	0.35		57		60	20/1		CEILING REC	CU_2
0.35		VEHICLE BAI DOORS		20/2				20/1			
0.35			0.35		61		62	20/1		WALL REC	WATER COP
0.35		VEHICLE BAY DOORS	0.35	20/2	63	B	64	20/1		OFFICE REC	DED REC I
0.35			0.35		65	С	66	20/1		OFFICE REC	FIRE ANNU
0.35		VEHICLE BAY DOORS	0.35	20/2	67	A	68	20/1		OFFICE REC	- SPARE
0.35			0.35		69	В	70	20/1		BATHROOM REC	SPARE
		VEHICLE BAY DOORS	0.35	20/2	71	С	72	20/1		DED REC	- SPARE
0.35			0.35		73	A	74	100/3		PANEL PL	- SPARE
	VEHICLE BAY DOORS	VEHICLE BAY DOORS	0.35	20/2	75	B	76		7.18		SPACE SPACE
0.35			0.35		77	C	78		5.54		
0.35		VEHICLE BAY DOORS	0.35	20/2	79	A	80	20/1	0.6	TEF-A	SPACE
0.35			0.35		81	В	82	20/1	0.6	TEF-A	SPACE
0.35		CEILING REC	0.72	20/1	83	С	84	20/1	0.1	LOUVER CONTROL	SPACE
0.35					•			1			SPACE
0.72	CEILING REC	A TOTAL	-	10.99	1	VLL	PH	7	25.90	RECEPTACLES	SPACE
		B TOTAL		13.46		208		5		HEATING	
1.62	2 RECEPTACLES	C TOTAL		11.15				4		AC/MOTORS	A TOTAL
0.00	HEATING	0 100.2	-		1					LIGHTING	B TOTAL
14.00	AC/MOTORS	CONN. kw	-	35.6	I					MISC.	C TOTAL
0.00		CONN. amps		98.82						WATER HEATERS	
	MISC.		-	30.02	1					ELEVATORS	CONN. kw
	WATER HEATERS									KITCHEN EQUIP	CONN. amp
	ELEVATORS									INITOTEN EQUIP	
	KITCHEN EQUIP										



		NEW	PANEI		LS			
VOLTAC	יםי.	120/208		SECTIC	DN I	AMP:		100
PHAS		<u>120/200</u> <u>3</u>				MAIN:		<u>MCB</u>
	ייור.	2				WIAIN.		MCD
DESCRIPTION	KW	BKR	СК	PH	СК	BKR	KW	DESCRIPTION
SPARE	0	20/1	1	A	2	20/1	0	SPARE
SPARE	0	20/1	3	В	4	20/1	0	SPARE
SPARE	0	20/1	5	С	6	20/1	0	SPARE
SPARE	0	20/1	7	A	8	20/1	0	SPARE
SPARE	0	20/1	9	В	10	20/1	0	SPARE
SPARE	0	20/1	11	С	12	20/1	0	SPARE
SPARE	0	20/1	13	A	14	20/1	0	SPARE
SPARE	0	20/1	15	В	16	20/1	0	SPARE
SPARE	0	20/1	17	С	18	20/1	0	SPARE
SPARE	0	20/1	19	A	20	20/1	0	SPARE
SPARE	0	20/1	21	В	22	20/1	0	SPARE
SPARE	0	20/1	23	С	24	20/1	0	SPARE
SPARE	0	20/1	25	A	26	20/1	0	SPARE
SPARE	0	20/1	27	В	28	20/1	0	SPARE
SPARE	0	20/1	29	С	30	20/1	0	SPARE
SPARE	0	20/1	31	A	32	20/1	0	SPARE
SPARE	0	20/1	33	В	34	20/1	0	SPARE
SPARE	0	20/1	35	С	36	20/1	0	SPARE
SPARE	0	20/1	37	A	38	20/1	0	SPARE
SPARE	0	20/1	39	В	40	20/1	0	SPARE
SPARE	0	20/1	41	С	42	20/1	0	SPARE
A TOTAL		0.00	I	VLL	PH	1	0.00	RECEPTACLES
B TOTAL		0.00		208				HEATING
C TOTAL		0.00		200	- J	l		AC/MOTORS
C TOTAL		0.00	1					
								MISC.
CONN. kW		0.00	I					WATER HEATERS
CONN. Amps		0.00						ELEVATORS
		0.00	1					KITCHEN EQUIP
							0.00	KITCHEN EQUIP
TOTAL DEMAND LOAD								
RECEPTS: 100% 1ST 10	KW + 50	% REMAINI	NG:		=	0	KVA	
HEAT: 100% :					=	0	KVA	
AC/MOTORS: 125% LARGE	EST + 10	0% REMAIN	NING:		=	0	KVA	
LIGHTING: 125%:					=		KVA	
MISC: 100%:					=	0	KVA	
WATER HEATER: 125%:					=		KVA	
ELEVATORS: PER NEC:					=	0	KVA	
KITCHEN EQUIP: PER NEC	:						KVA	
TOTAL DEMAND LOAD KW:					=	0	KVA	
TOTAL DEMAND LOAD AMP					=	0.00		
						_		

0 KVA 0 KVA

AIC 10K

								AIC 10K		
		NEW	PANEL		MSL					
SECTION 3										
VOLTAGE:		120/208				AMP:		<u>250</u>		
PHASE:		3				MAIN:		MLO		
DESCRIPTION	KW	BKR	СК	PH	СК	BKR	KW	DESCRIPTION		
LOUVER CONTROL	0.1	20/1	8 5	A	86	-/1	0	SPACE		
LOUVER CONTROL	0.1	20/1	87	В	88	-/1	0	SPACE		
LOUVER CONTROL	0.1	20/1	89	C	90	-/1	0	SPACE		
LOUVER CONTROL	0.1	20/1	91	A	92	-/1	0	SPACE		
CU-1	1.14	15/2	9 3	B	94	-/1	0	SPACE		
	1.14		95	C	96	-/1	0	SPACE		
CU-2	1.97	25/2	97	A	98	-/1	0	SPACE		
	1.97		99	В	100	-/1	0	SPACE		
WATER COP	0.18	20/1	101	C	102	-/1	0	SPACE		
DED REC IT	0.36	20/1	103	A	104	-/1	0	SPACE		
FIRE ANNUNCIATOR	0.5	20/1	105	B	106	-/1	0	SPACE		
SPARE	0	20/1	107	C	108	-/1	0	SPACE		
SPARE	0	20/1	109	A	110	-/1	0	SPACE		
SPARE	0	20/1	111	В	112	-/1	0	SPACE		
SPACE	0	-/1	113	C	114	-/1	0	SPACE		
SPACE	0	-/1	115	A	116	-/1	0	SPACE		
SPACE	0	-/1	117	B	118	-/1	0	SPACE		
SPACE	0	-/1	119	C	120	-/1	0	SPACE		
SPACE	0	-/1	121	A	122	-/1	0	SPACE		
SPACE	0	-/1	123	В	124	-/1	0	SPACE		
SPACE	0	-/1	125	С	126	-/1	0	SPACE		
				_		_				
A TOTAL		2.53		VLL	PH		0.54	RECEPTACLES		
B TOTAL		3.71		208	3			HEATING		
C TOTAL		1.42				_		AC/MOTORS		
								LIGHTING		
CONN. kw		7.66					0.90	MISC.		
CONN. amps		21.26					0.00	WATER HEATERS		
								ELEVATORS		
							0.00	KITCHEN EQUIP		

= 13.72 KVA = 38.08 AMP

TOTAL DEMAND LOAD KW: TOTAL DEMAND LOAD AMPS:

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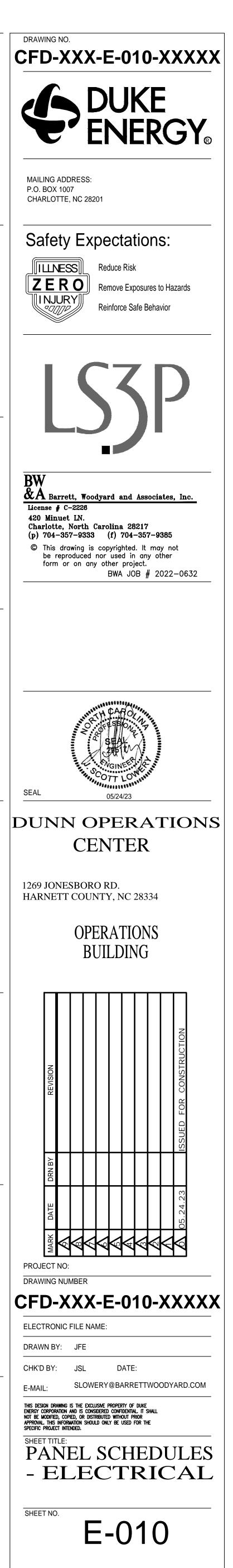
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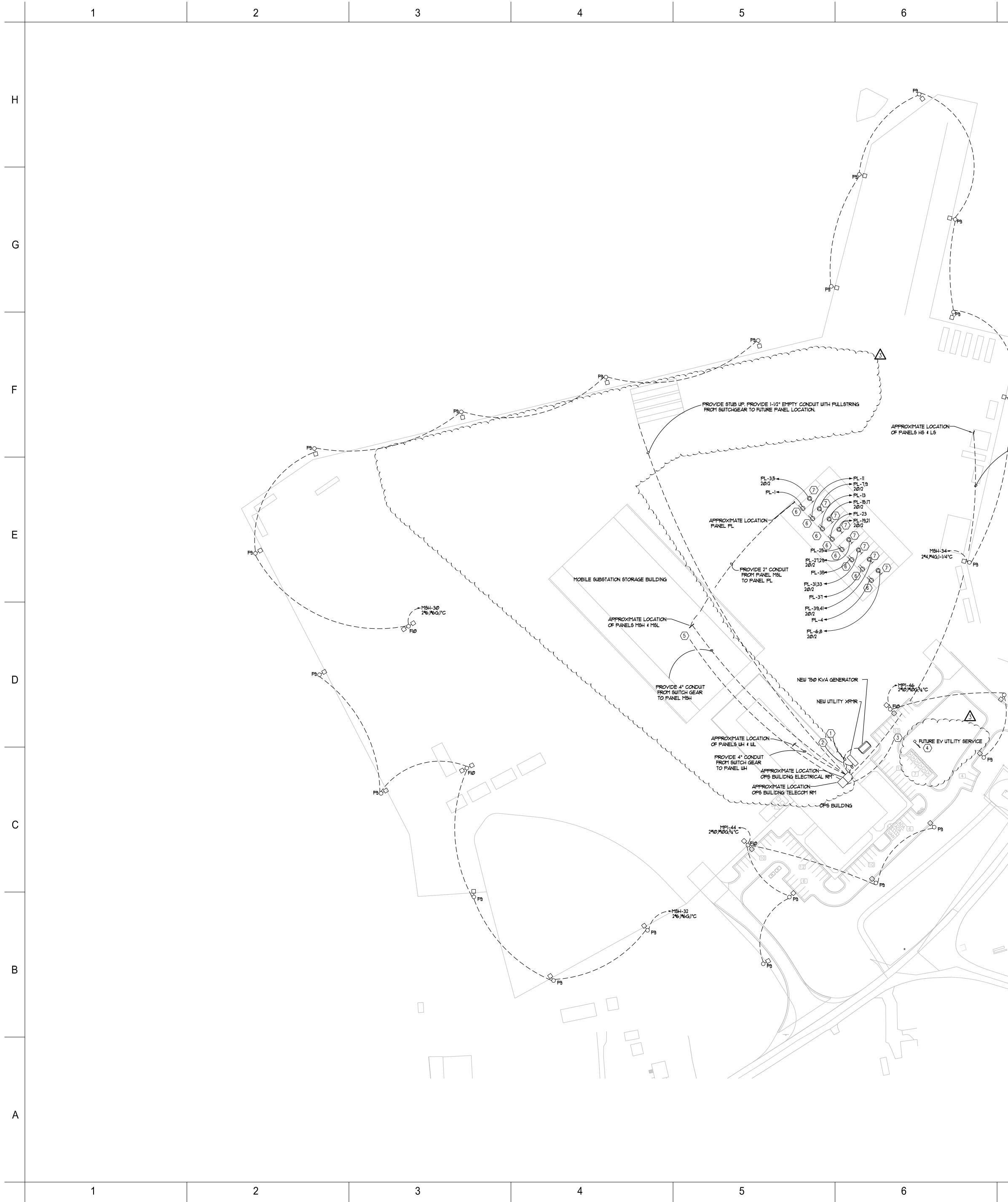
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$\underbrace{1}_{E-100} SITE PLAN - ELECTRICAL$

<u>LEGEND NOTES:</u> (APPLY TO THIS SHEET ONLY)

- PROVIDE 2" CONDUIT FROM SWITCHGEAR TO PANEL LOCATION.

1 FEEDER FROM BUILDING MAIN ELECTRICAL ROOM TO GENERATOR PAD STUB-UP LOCATION. REFER TO RISER DIAGRAM ON SHEET E0.2 FOR EXACT QUALITY AND SIZE OF CONDUITS.

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- 2 SERVICE LATERAL FROM BUILDING MAIN ELECTRICAL ROOM TO UTILITY TRANSFORMER STUB-UP LOCATION. REFER TO RISER DIAGRAM ON SHEET E-0002 FOR EXACT QUANTITY AND SIZE OF CONDUITS.
- 3 PROVIDE AND INSTALL (4) 4" EMPTY CONDUIT WITH PULL-STRING FROM BUILDING TELECOM ROOM TO TELEPHONE COMPANY MANHOLE. COORDINATE EXACT LOCATION WITH GENERAL CONTRACTOR AND TELEPHONE COMPANY. 4 FUTURE EV CHARGING INFRASTRUCTURE LOCATION. CONTRACTOR TO REFER TO FUTURE EV CHARGER RISER DIAGRAM FOR CONDUIT REQUIREMENTS. CONTRACTOR TO INSTALL CONDUIT FOR FUTURE INSTALLATION OF EV
- CHARGERS. COORDINATE EXACT LOCATIONS OF FUTURE EV SERVICE UTILITY TRANSFORMER AND ELECTRICAL GEAR AS SHOWN ON FUTURE RISER DIAGRAM WITH OWNER IN FIELD PRIOR TO INSTALLATION.

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- 5 PROVIDE 2" EMPTY CONDUIT WITH PULLSTRING FROM BUILDING TELCOM ROOM TO MOBILE SUBSTATION TELECOM ROOM.
- $\langle 6 \rangle$ provide weather proof outlet
- $\langle 7 \rangle$ provide weather proof nema L5–20r

DRAWING NO. CFD-XXX-E-100-XXXXX MAILING ADDRESS: P.O. BOX 1007 CHARLOTTE, NC 28201 Safety Expectations: Reduce Risk **ZERO** Remove Exposures to Hazards Reinforce Safe Behavior SEAL 04/30/202 **DUNN OPERATIONS** CENTER 1269 JONESBORO RD. HARNETT COUNTY, NC 28334 **OPERATIONS** BUILDING PROJECT NO: DRAWING NUMBER CFD-XXX-E-100-XXXXX ELECTRONIC FILE NAME: DRAWN BY: JFE CHK'D BY: JSL DATE: SLOWERY@BARRETTWOODYARD.COM E-MAIL: -----THIS DESIGN DRAWING IS THE EXCLUSIVE PROPERTY OF DUKE ENERGY CORPORATION AND IS CONSIDERED CONFIDENTIAL. IT SHALL NOT BE MODIFIED, COPIED, OR DISTRIBUTED WITHOUT PRIOR APPROVAL. THIS INFORMATION SHOULD ONLY BE USED FOR THE SPECIFIC PROJECT INTENDED. SHEET TITLE: SITE PLAN -ELECTRICAL SHEET NO. E-100

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8 G Ε D $\int_{E^{-100.1}} \frac{\text{SITE PLAN}}{1^{"}} = 70^{'}-0^{"}}$ <u>LEGEND NOTES:</u> (APPLY TO THIS SHEET ONLY) (1) (2) 30"x48"x36" TIER 22 RATED HANDHOLE FOR TELECOM/FIBER CONDUIT. COORDINATE EXACT LOCATION WITH DUKE TELECOM IN FIELD PRIOR TO INSTALLATION. (3) 4" EMPTY CONDUIT WITH PULLSTRING FROM TELECOM ROOM TO HANDHOLE. (1) 4" CONDUIT WILL BE ROUTED TO THE "B" HANDHOLE AND THE OTHER (2) 4" CONDUITS WILL BE ROUTED TO THE "A" HANDHOLE. ALL 90' TURNS SHALL BE SWEEPING. COORDINATE EXACT STUB-UP LOCATION IN TELECOM ROOM AND ROUTING WITH TELECOM AND CIVIL DRAWINGS. С (1) 4" EMPTY CONDUIT WITH PULLSTRING FROM TELECOM ROOM TO CADMIUM POLE LOCATION IN YARD. COORDINATE EXACT STUB-UP LOCATION IN TELECOM ROOM AND ROUTING WITH CIVIL DRAWINGS. COORDINATE EXACT LOCATION OF CADMIUM POLE IN YARD WITH DUKE TELECOM PRIOR TO INSTALLATION. В

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DRAWING NO. CFD-XXX-E-100-XXXXX MAILING ADDRESS: P.O. BOX 1007 CHARLOTTE, NC 28201 Safety Expectations:

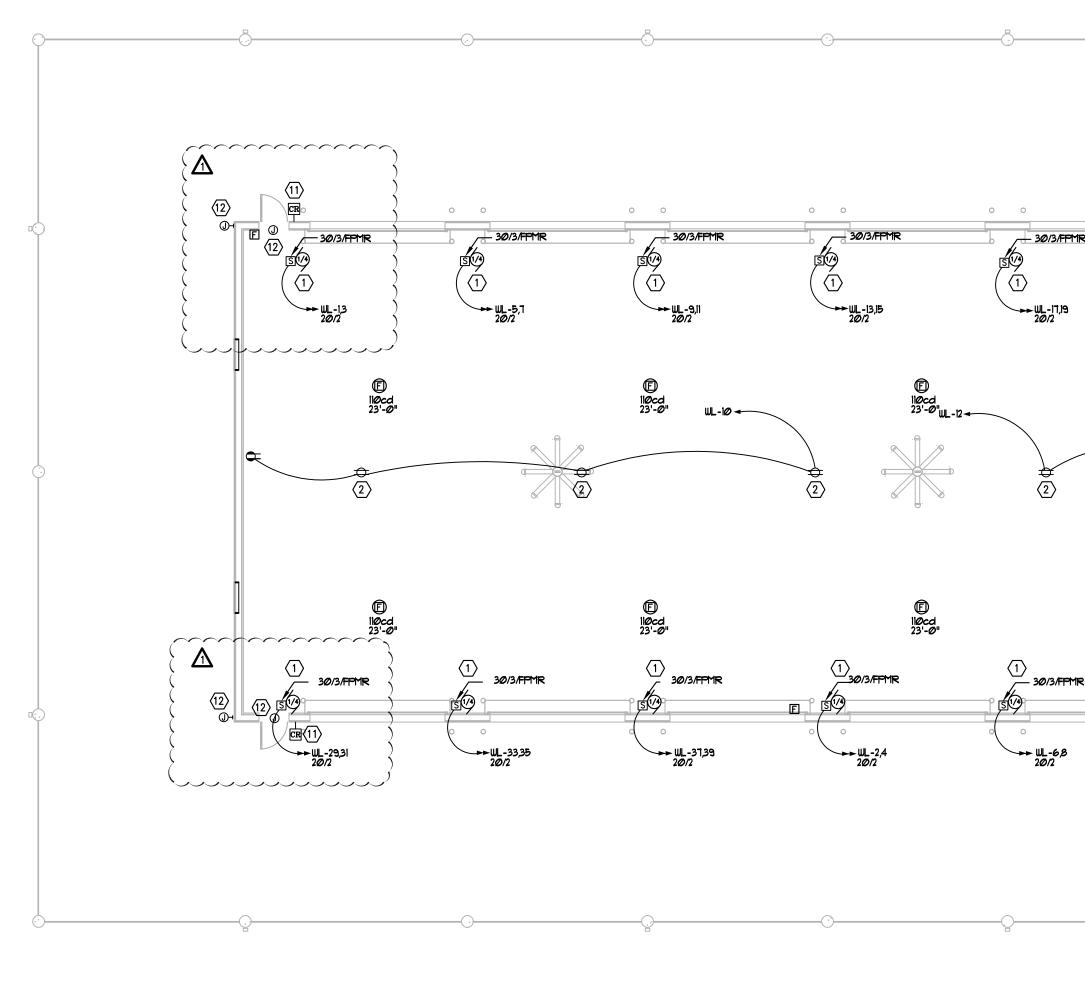
 ZERO
 Remove Exposures to Hazards

 INJURY
 Reinforce Safe Behavior

 SEAL 04/30/20 DUNN OPERATIONS CENTER 1269 JONESBORO RD. HARNETT COUNTY, NC 28334 **OPERATIONS** BUILDING PROJECT NO: DRAWING NUMBER CFD-XXX-E-100-XXXXX ELECTRONIC FILE NAME: DRAWN BY: JFE CHK'D BY: JSL DATE: SLOWERY@BARRETTWOODYARD.COM E-MAIL: _____ THIS DESIGN DRAWING IS THE EXCLUSIVE PROPERTY OF DUKE ENERGY CORPORATION AND IS CONSIDERED CONFIDENTIAL. IT SHALL NOT BE MODIFIED, COPIED, OR DISTRIBUTED WITHOUT PRIOR APPROVAL. THIS INFORMATION SHOULD ONLY BE USED FOR THE SPECIFIC PROJECT INTENDED. SHEET SITE PLAN -FIBER-TELCO CONDUIT SHEET NO. E-100.1

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TRUCK BAY FLOOR PLAN – ELECTRICAL

LEGEND NOTES: (APPLY THIS SHEET ONLY)

- (1) MOTORIZED DOOR LOCATION. CONTRACTOR TO PROVIDE AND INSTALL DISCONNECT TO SERVE AS DISCONNECTING MEANS FOR DOOR MOTOR. COORDINATE EXACT LOCATION WITH DOOR INSTALLER. COORDINATE EXACT REQUIREMENTS WITH EQUIPMENT MANUFACTURER. PROVIDE ALL PARTS FOR A COMPLETE AND OPERATIONAL SYSTEM INCLUDING JUNCTION BOXES, CONDUIT, AND WIRING. ALL CONTROLS PROVIDED AND INSTALLED BY DOOR INSTALLER.
- 2 DROP CORD LOCATION. CONTRACTOR TO PROVIDE CEILING MOUNTED CORD REEL RECEPTACLE WITH 5-20R RECEPTACLE. COORDINATE EXACT LOCATION WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.

GENERAL NOTES: (APPLY THIS SHEET ONLY)

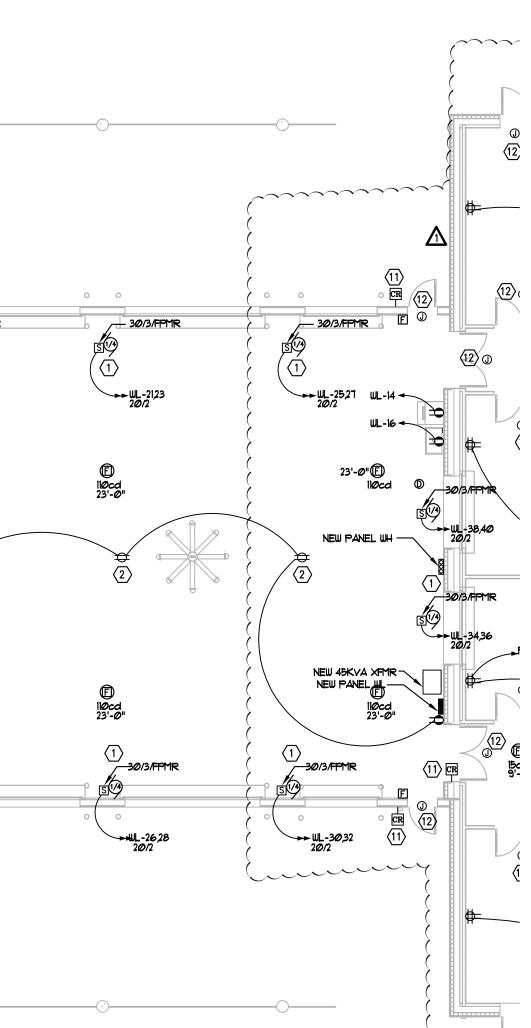
- VENDOR PRIOR TO INSTALLATION.
- 2. HATCHED AREA NOT IN THIS SCOPE OF WORK.
- 3. 'E' DENOTES EXISTING DEVICE TO REMAIN. 'R' DENOTES EXISTING DEVICE TO BE RELOCATED.
- INTENDED OR HAVE ABOVE NORMAL WEAR OR DEFECTS.
- 5. ALL ACCESS CONTROLLED EGRESS DOORS SHALL BE PROVIDED PER 2018 NCBC SECTION OF OPERATION ON SHEET EXX1 FOR FURTHER DETAILS.
- 6. DEDICATED OUTLETS SHALL BE 20A RATED, U.N.O. BREAKER CONFIGURATIONS WOULD NEED TO BE REVISED TO MATCH.
- 8. COORDINATE ALL CORE DRILL LOCATIONS THROUGH SLAB WITH THE ARCHITECT AND LANDLORD LOCATE ANY OBSTRUCTIONS.
- 9. RECEPTACLES SHALL BE INSTALLED PER ANSI A117.1.
- TO BE TYPEWRITTEN; BLACK LETTERS ON WHITE BACKGROUND.
- SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION.
- PROVIDED WITH A BUSHING. 13. DIVISION 26 CONTRACTOR SHALL COORDINATE WITH DIVISION 23 TO MAKE SURE RETURN AIR
- OPENINGS ARE KEPT CLEAR OF ANY CONDUITS.
- 14. ALL RECEPTACLES WITHIN 6'-0" OF ANY WATER SOURCE SHALL BE 'GFCI' TYPE.

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1. COORDINATE ALL DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH THE ARCHITECT & FURNITURE

4. VERIFY PROPER FUNCTIONALITY OF ALL EXISTING AND RELOCATED ELECTRICAL DEVICES, INCLUDING THEIR COVERPLATES. PROVIDE REPLACEMENTS AS REQUIRED IF ANY ARE NOT OPERATING AS

1010.1.9.7, 1010.1.9.8, & 1010.1.9.9 (WHERE APPLICABLE) TO ALLOW FREE EGRESS AT ALL TIMES. DELAYED EGRESS SHALL NOT BE MORE THAN 15 SECONDS. REFER TO ARCHITECTURAL AND SECURITY DRAWINGS FOR COMPLIANCE WITH THIS CODE SECTION. SEE THE FIRE ALARM SEQUENCE

7. A 3+1 WIRING CONFIGURATION HAS BEEN ASSUMED FOR THE MODULAR FURNITURE. NO ISOLATED GROUND (IG) RECEPTACLE PROVISIONS HAVE BEEN PROVIDED. IF A DIFFERENT CONNECTION IS REQUIRED PLEASE NOTIFY ENGINEER AND ARCHITECT AS SOON AS POSSIBLE. THE BRANCH CIRCUIT

PRIOR TO DRILLING. FOR ANY SLAB WITH POST-TENSION CABLING A SCAN SHALL BE PROVIDED TO

10. LABEL ALL OUTLETS AND JUNCTION BOXES WITH THE CORRESPONDING CIRCUIT DESIGNATION. LABEL

11. CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES, WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL

12. PROVIDE PULL STRINGS FOR ALL EMPTY CONDUIT. EACH NON-TERMINATED CONDUIT END SHALL BE

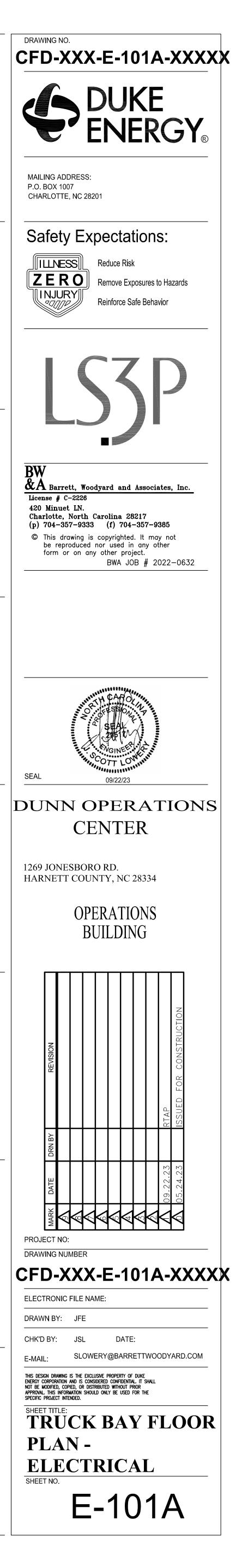
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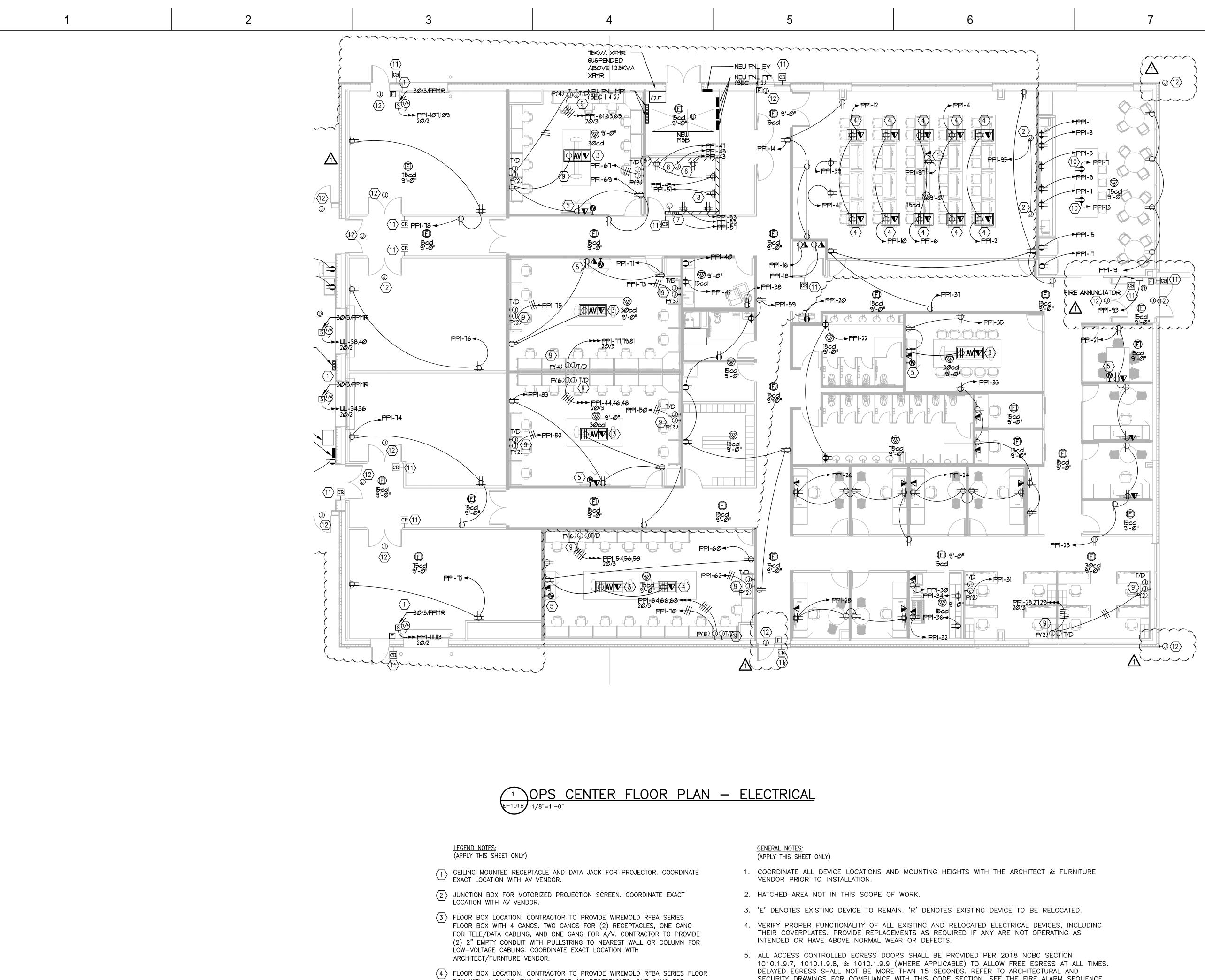
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- ARCHITECT/FURNTURE VENDOR. INSTALLATION OF EQUIPMENT.

IS NOT VISIBLE.

- LOCATION WITH SECURITY VENDOR.
- SECHRITY VENIDOR

- BOX WITH 4 GANGS. TWO GANGS FOR (2) RECEPTACLES, ONE GANG FOR TELE/DATA CABLING, AND ONE GANG FOR FUTURE LOW VOLTAGE CONNECTIONS. CONTRACTOR TO PROVIDE (2) 2" EMPTY CONDUITS WITH PULLSTRING TO NEAREST WALL OR COLUMN FOR LOW-VOLTAGE CABLING. COORDINATE EXACT LOCATION WITH
- $\overline{(5)}$ TV LOCATION. PROVIDE DUPLEX POWER, DATA, AND A/V BOXES APPROXIMATELY 80" AFF. COORDINATE EXACT DEVICE MOUNTING HEIGHT WITH ARCHITECT AND A/V VENDOR. PROVIDE (1) 1-1/4" EMPTY CONDUIT WITH PULLSTRING TO ABOVE ACCESSIBLE CEILING FOR A/V CABLING. RECEPTACLE BEHIND TV SHALL BE LEVITON '689' SERIES RECESSED TYPE OR APPROVED EQUAL TO FACILITATE A FLUSH
- (6) PROVIDE AND INSTALL 8'x3/4" FIRE RESISTANT PLYWOOD BACKBOARD ON EACH WALL SHOWN. PROVIDE 12" GROUND BAR (0.5 OHMS TO GROUND) 6" UP FROM BOTTOM OF PLYWOOD BACKBOARD WITH #6 STRANDED COPPER GROUND TO NEAREST BUILDING GROUNDING ELECTRODE SYSTEM.
- $\langle 7 \rangle$ (3) 4" EMPTY TELECOM CONDUIT STUB UP LOCATION. REFER TO SITE PLAN FOR ADDITIONAL INFORMATION. COORDINATE EXACT LOCATION WITH DUKE TELECOM.
- $\langle 8 \rangle$ JUNCTION BOX FOR HARD WIRED CONNECTION TO SECURITY PANELS. COORDINATE EXACT LOCATION WITH SECURITY DRAWINGS AND DUKE TELECOM.
- (9) BASEFEED LOCATION. PROVIDE (1) 2" EMPTY CONDUIT WITH PULLSTRING TO ABOVE ACCESSIBLE CEILING FOR LOW-VOLTAGE CABLING. PROVIDE STEEL 90' STRAIN RELIEF CORD CONNECTOR WITH FACEPLATE TO DIRECT CABLE TO FLOOR ALLOWING FOR CLOSE PLACEMENT OF FURNITURE SYSTEM. COORDINATE EXACT LOCATION WITH ARCHITECT AND FURNITURE VENDOR.
- TO STUB UP LOCATION FOR RECEPTACLE PLACED IN MILLWORK. PROVIDE CONDUIT FOR POWER AND PROVIDE 3/4" EMPTY CONDUIT WITH PULLSTRING FOR TELE/DATA CABLING. CONTRACTOR TO UTILIZE MC CABLE FROM STUB UP LOCATION TO RECEPTACLE LOCATION IN MILLWORK. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF RECEPTACLE WITH ARCHITECT/MILLWORK PROVIDER. ENSURE MC CABLE
- $\langle 11 \rangle$ CARD READER LOCATION. PROVIDE EMPTY JUNCTION BOX WITH 3/4" EMPTY CONDUIT STUBBED UP TO ABOVE ACCESSIBLE CEILING. COORDINATE EXACT
- $\langle 12 \rangle$ SECURITY LOCATION. PROVIDE EMPTY JUNCTION BOX WITH 3/4" EMPTY CONDUIT STUBBED UP TO ABOVE ACCESSIBLE CEILING. COORDINATE EXACT LOCATION WITH

- SECURITY DRAWINGS FOR COMPLIANCE WITH THIS CODE SECTION. SEE THE FIRE ALARM SEQUENCE OF OPERATION ON SHEET EXX1 FOR FURTHER DETAILS.
- 6. DEDICATED OUTLETS SHALL BE 20A RATED, U.N.O.
- 7. A 3+1 WIRING CONFIGURATION HAS BEEN ASSUMED FOR THE MODULAR FURNITURE. NO ISOLATED GROUND (IG) RECEPTACLE PROVISIONS HAVE BEEN PROVIDED. IF A DIFFERENT CONNECTION IS REQUIRED PLEASE NOTIFY ENGINEER AND ARCHITECT AS SOON AS POSSIBLE. THE BRANCH CIRCUIT BREAKER CONFIGURATIONS WOULD NEED TO BE REVISED TO MATCH.
- 8. COORDINATE ALL CORE DRILL LOCATIONS THROUGH SLAB WITH THE ARCHITECT AND LANDLORD PRIOR TO DRILLING. FOR ANY SLAB WITH POST-TENSION CABLING A SCAN SHALL BE PROVIDED TO LOCATE ANY OBSTRUCTIONS.
- 9. RECEPTACLES SHALL BE INSTALLED PER ANSI A117.1.
- 10. LABEL ALL OUTLETS AND JUNCTION BOXES WITH THE CORRESPONDING CIRCUIT DESIGNATION. LABEL TO BE TYPEWRITTEN; BLACK LETTERS ON WHITE BACKGROUND.
- 11. CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES, WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION. 12. PROVIDE PULL STRINGS FOR ALL EMPTY CONDUIT. EACH NON-TERMINATED CONDUIT END SHALL BE
- PROVIDED WITH A BUSHING.
- 13. DIVISION 26 CONTRACTOR SHALL COORDINATE WITH DIVISION 23 TO MAKE SURE RETURN AIR OPENINGS ARE KEPT CLEAR OF ANY CONDUITS.
- 14. ALL RECEPTACLES WITHIN 6'-0" OF ANY WATER SOURCE SHALL BE 'GFCI' TYPE.

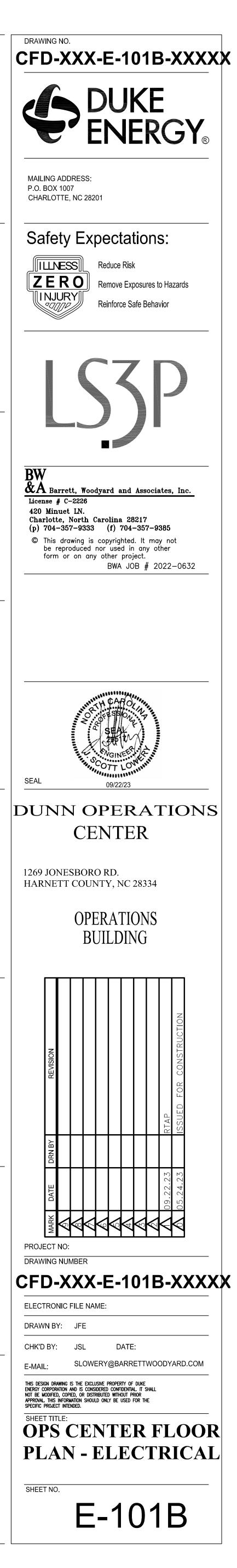
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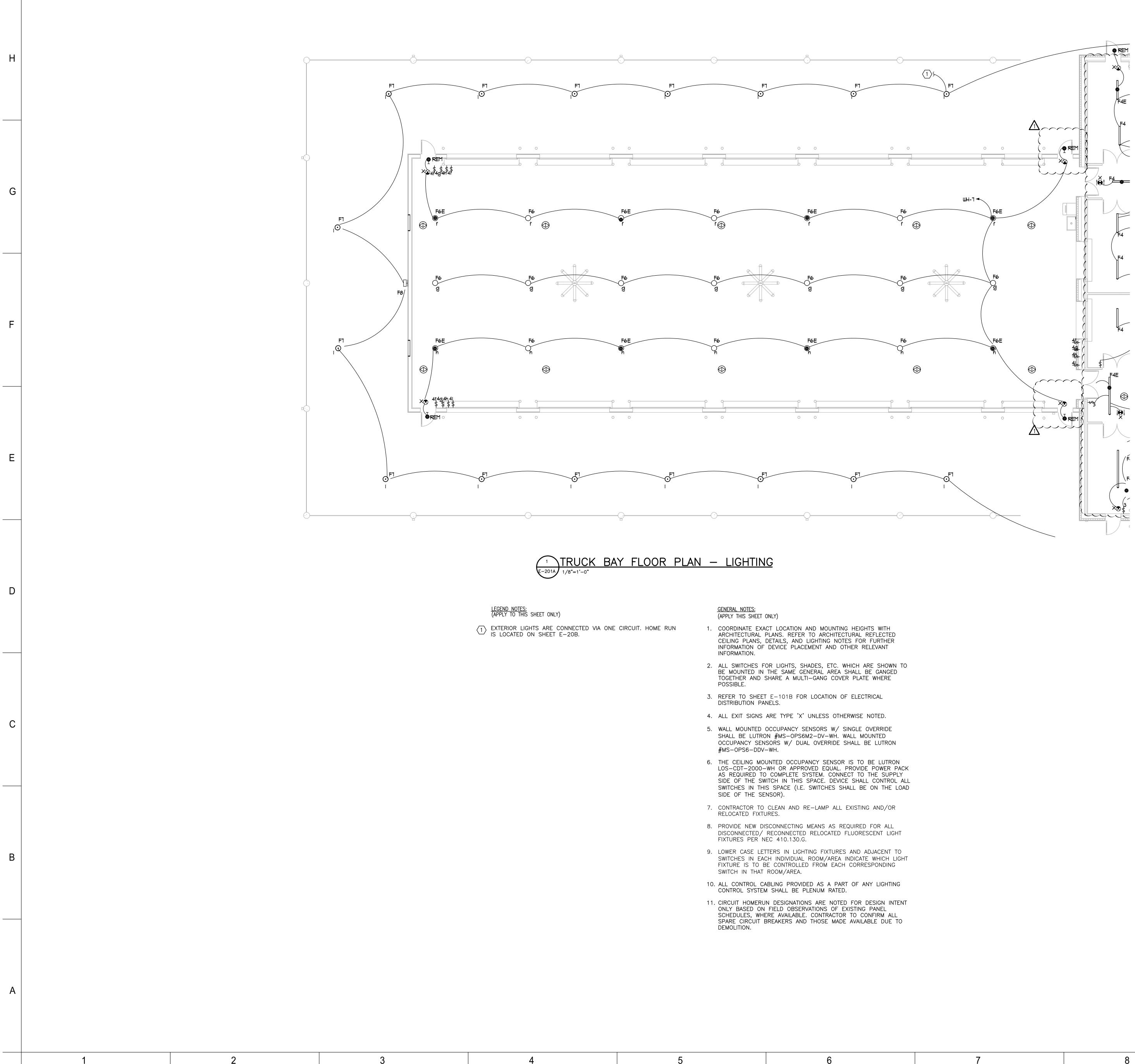
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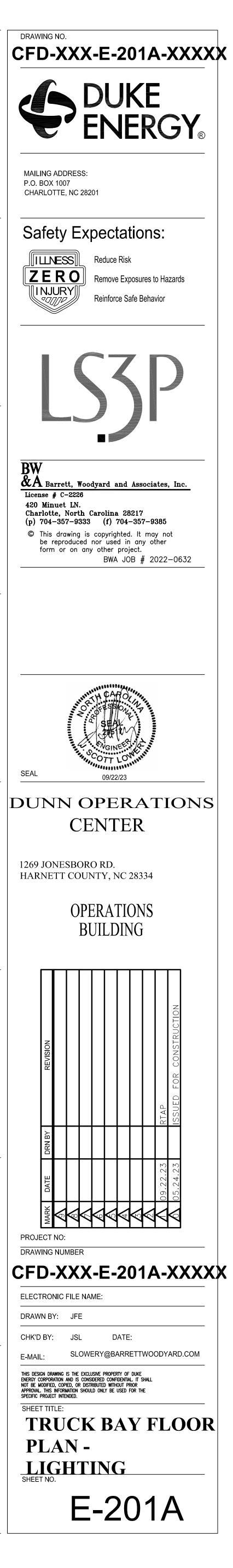
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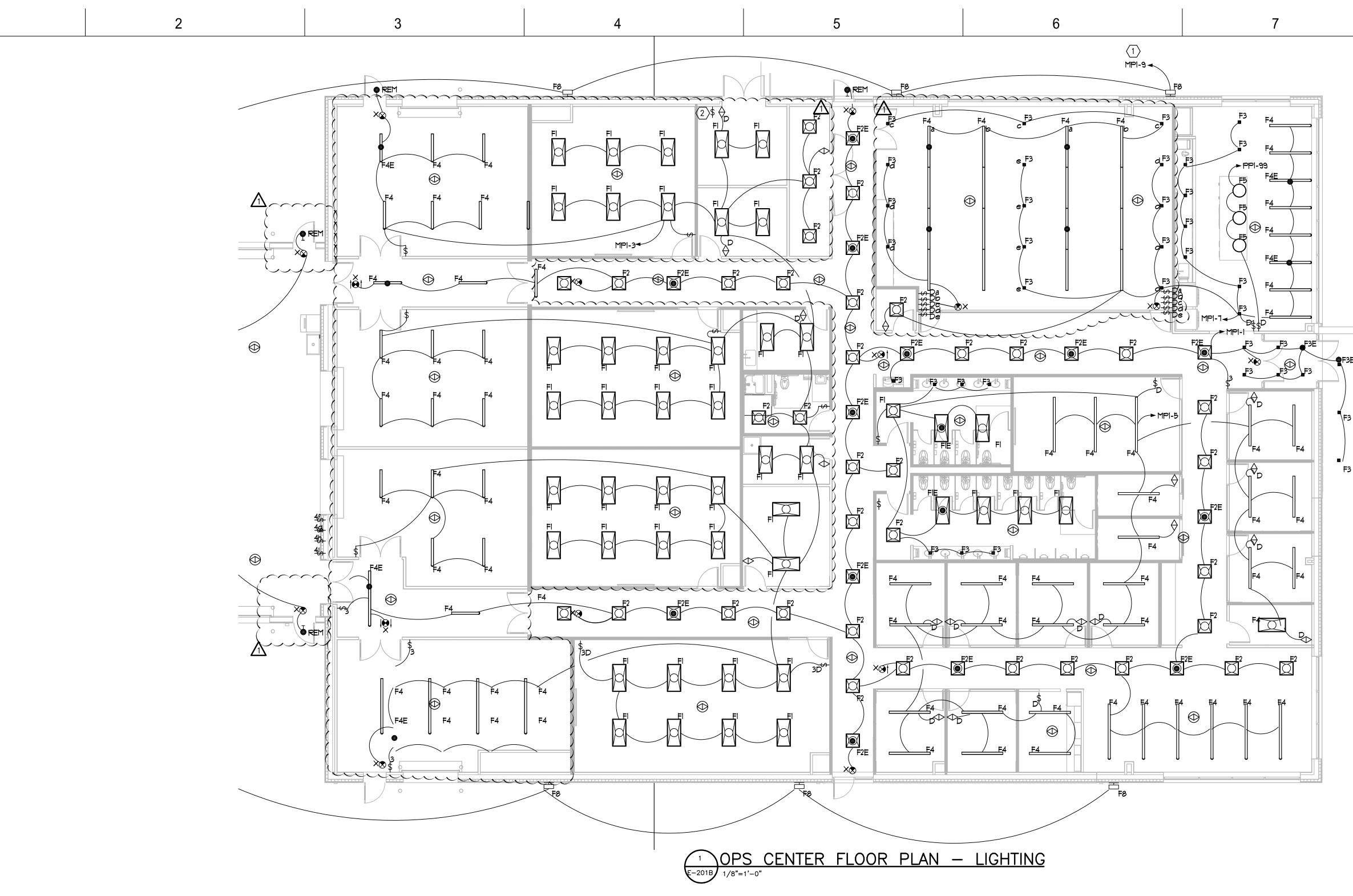
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<u>LEGEND NOTES:</u> (APPLY TO THIS SHEET ONLY)

- $\langle 1 \rangle$ PROVIDE PHOTO CELL FOR CONTROL.
- $\langle 2 \rangle$ OVERRIDE FOR EXTERIOR LIGHTS.

GENERAL NOTES: (APPLY THIS SHEET ONLY)

- 1. COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, DETAILS, AND LIGHTING NOTES FOR FURTHER INFORMATION OF DEVICE PLACEMENT AND OTHER RELEVANT INFORMATION.
- 2. ALL SWITCHES FOR LIGHTS, SHADES, ETC. WHICH ARE SHOWN TO BE MOUNTED IN THE SAME GENERAL AREA SHALL BE GANGED TOGETHER AND SHARE A MULTI-GANG COVER PLATE WHERE POSSIBLE.
- 3. REFER TO SHEET E-101B FOR LOCATION OF ELECTRICAL DISTRIBUTION PANELS.
- 4. ALL EXIT SIGNS ARE TYPE 'X' UNLESS OTHERWISE NOTED. 5. WALL MOUNTED OCCUPANCY SENSORS W/ SINGLE OVERRIDE SHALL BE LUTRON #MS-OPS6M2-DV-WH. WALL MOUNTED OCCUPANCY SENSORS W/ DUAL OVERRIDE SHALL BE LUTRON
- #MS-OPS6-DDV-WH. 6. THE CEILING MOUNTED OCCUPANCY SENSOR IS TO BE LUTRON LOS-CDT-2000-WH OR APPROVED EQUAL. PROVIDE POWER PACK AS REQUIRED TO COMPLETE SYSTEM. CONNECT TO THE SUPPLY SIDE OF THE SWITCH IN THIS SPACE. DEVICE SHALL CONTROL ALL SWITCHES IN THIS SPACE (I.E. SWITCHES SHALL BE ON THE LOAD SIDE OF THE SENSOR).
- 7. CONTRACTOR TO CLEAN AND RE-LAMP ALL EXISTING AND/OR RELOCATED FIXTURES.
- 8. PROVIDE NEW DISCONNECTING MEANS AS REQUIRED FOR ALL DISCONNECTED/ RECONNECTED RELOCATED FLUORESCENT LIGHT FIXTURES PER NEC 410.130.G.
- 9. LOWER CASE LETTERS IN LIGHTING FIXTURES AND ADJACENT TO SWITCHES IN EACH INDIVIDUAL ROOM/AREA INDICATE WHICH LIGHT FIXTURE IS TO BE CONTROLLED FROM EACH CORRESPONDING SWITCH IN THAT ROOM/AREA.
- 10. ALL CONTROL CABLING PROVIDED AS A PART OF ANY LIGHTING CONTROL SYSTEM SHALL BE PLENUM RATED.
- 11. CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES, WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION.

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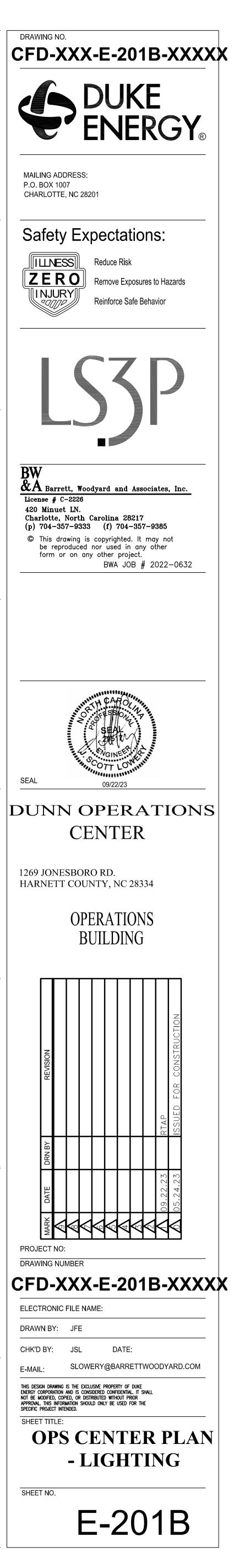
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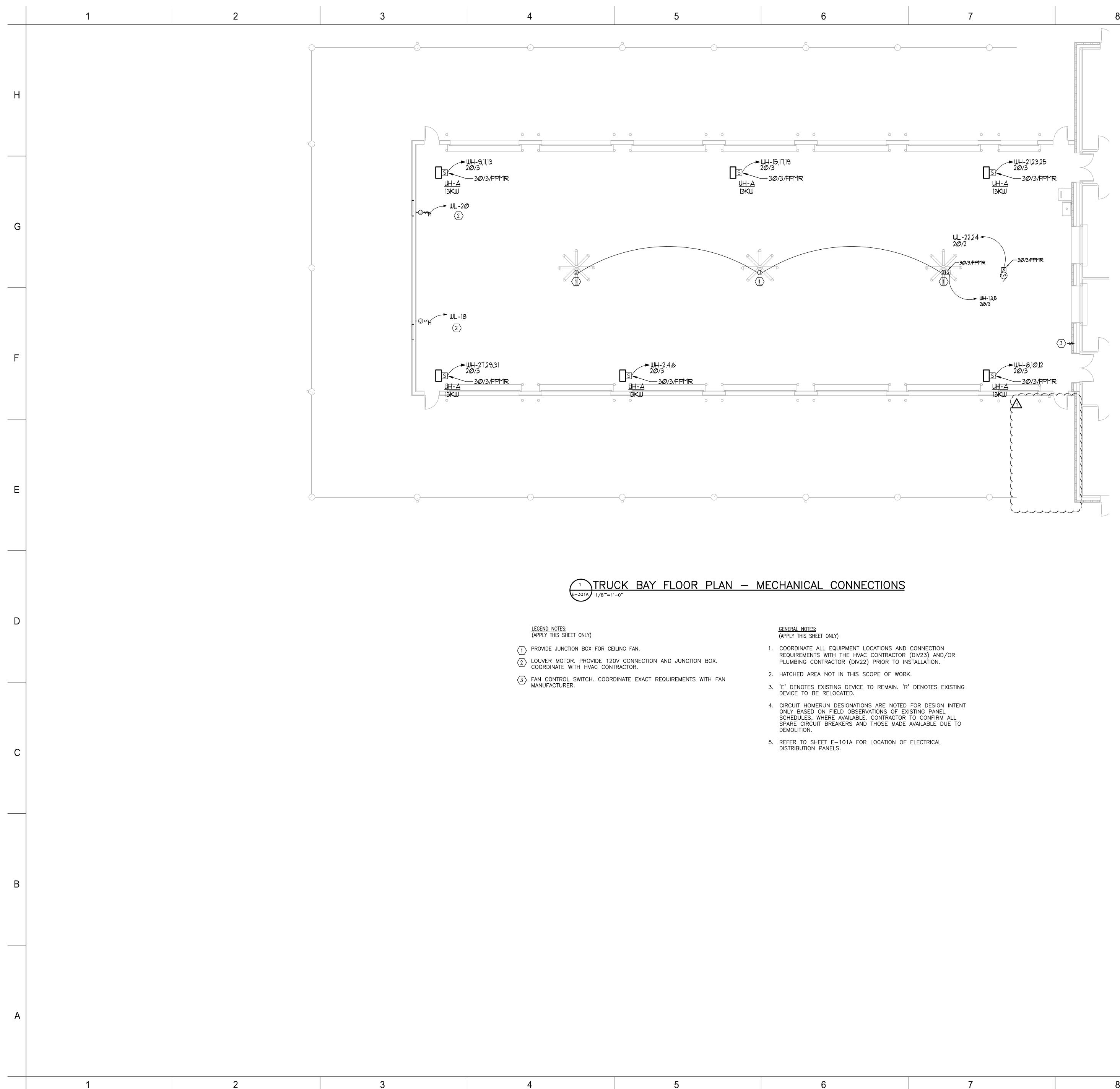
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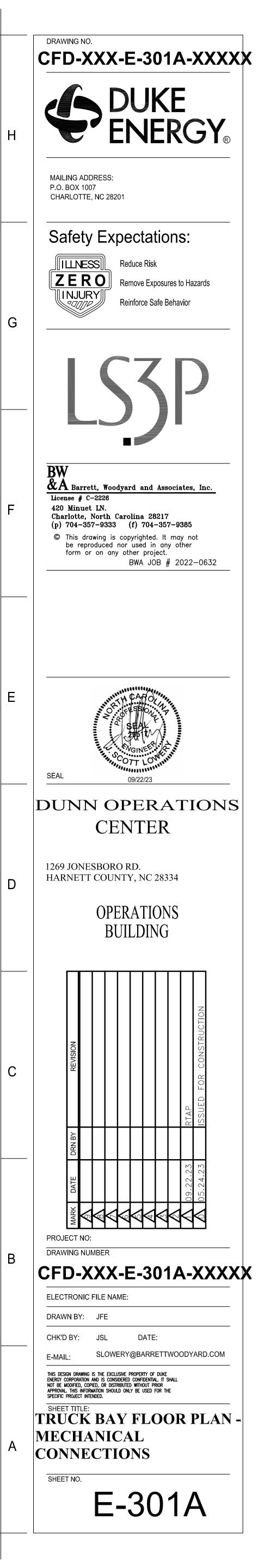
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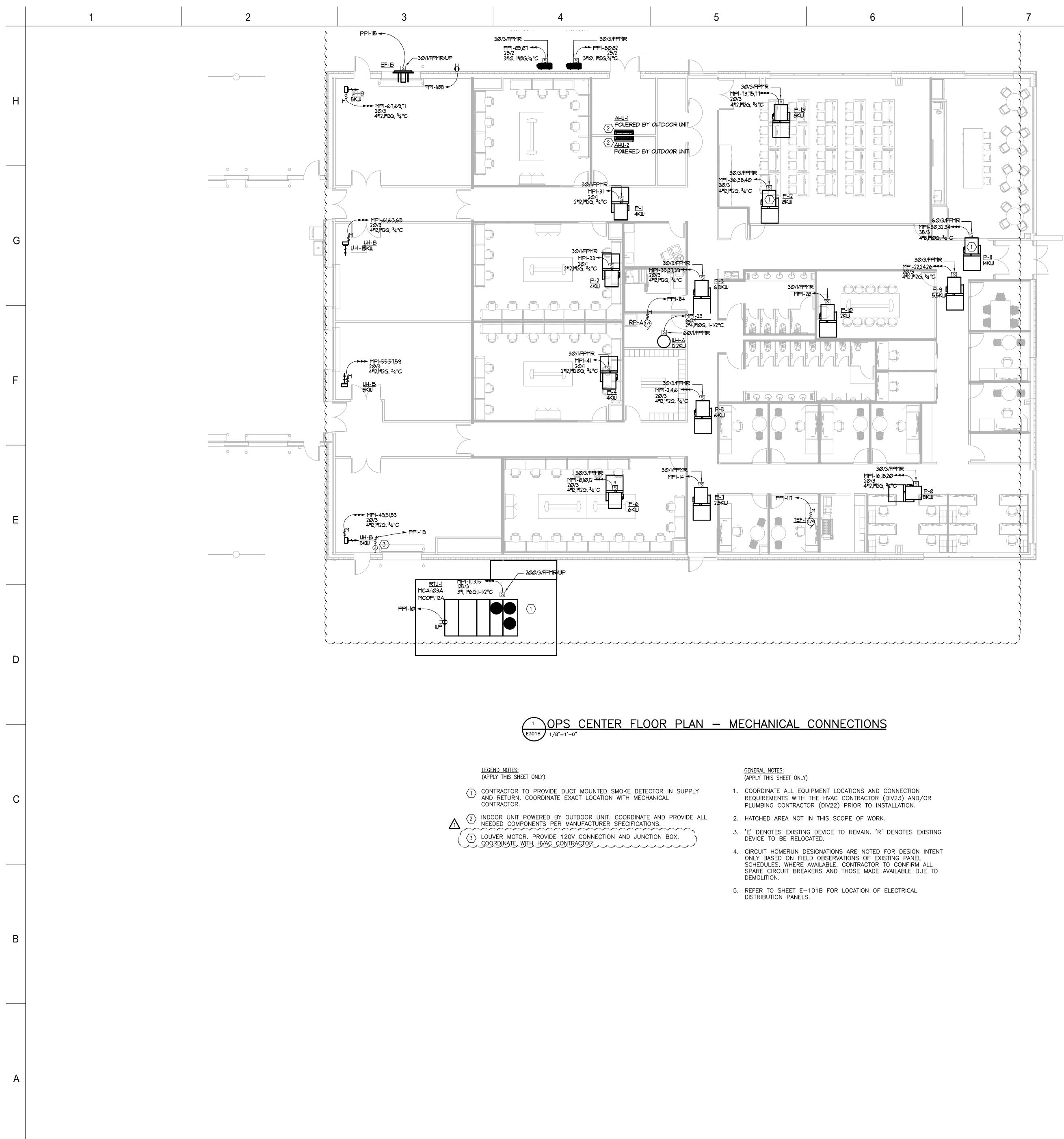


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