

ARCHITECT TYCH & WALKER ARCHITECTS, L.L.P.

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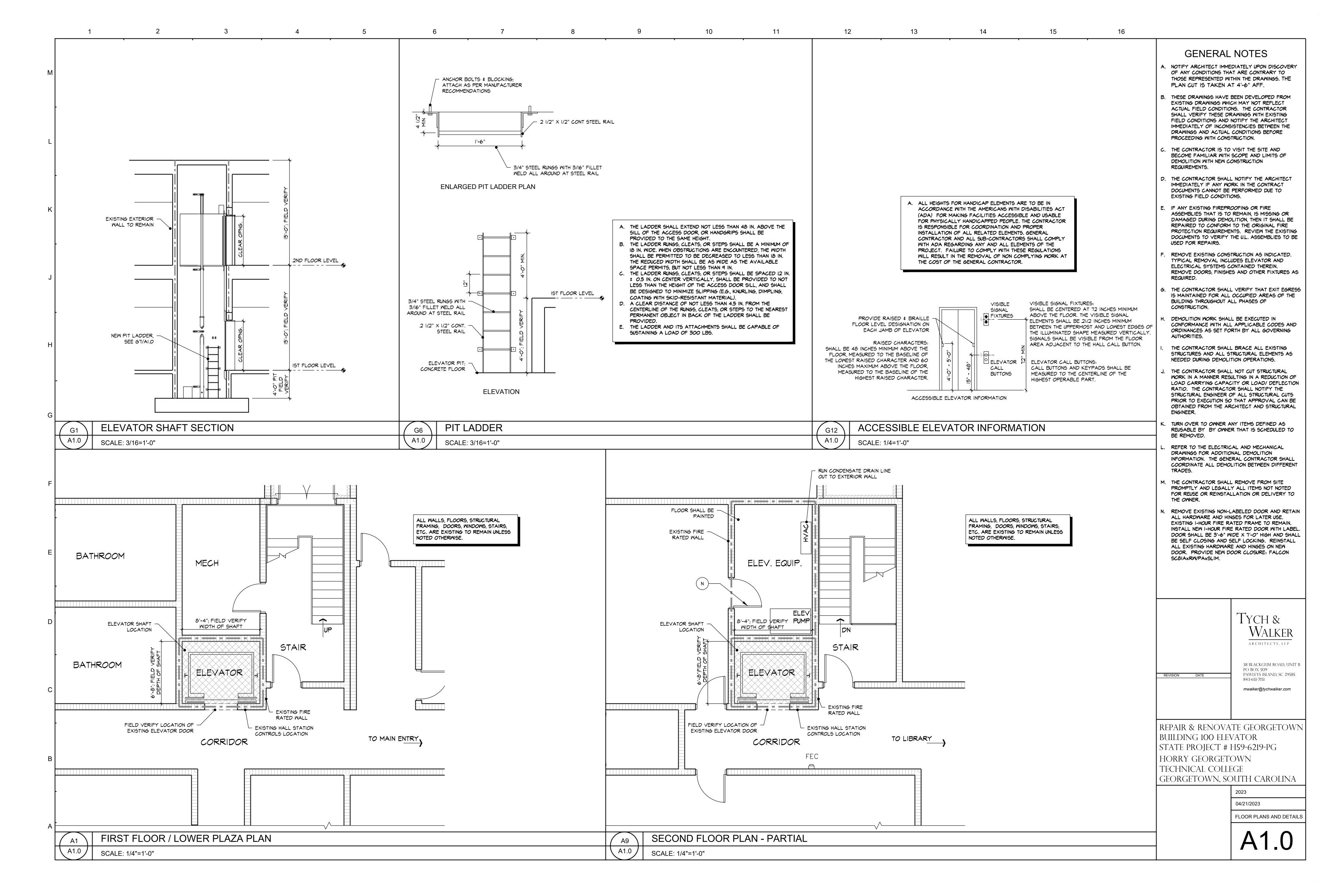
PM & E ENGINEER McKNIGHT SMITH WARD GRIFFITH ENGINEERS, INC.

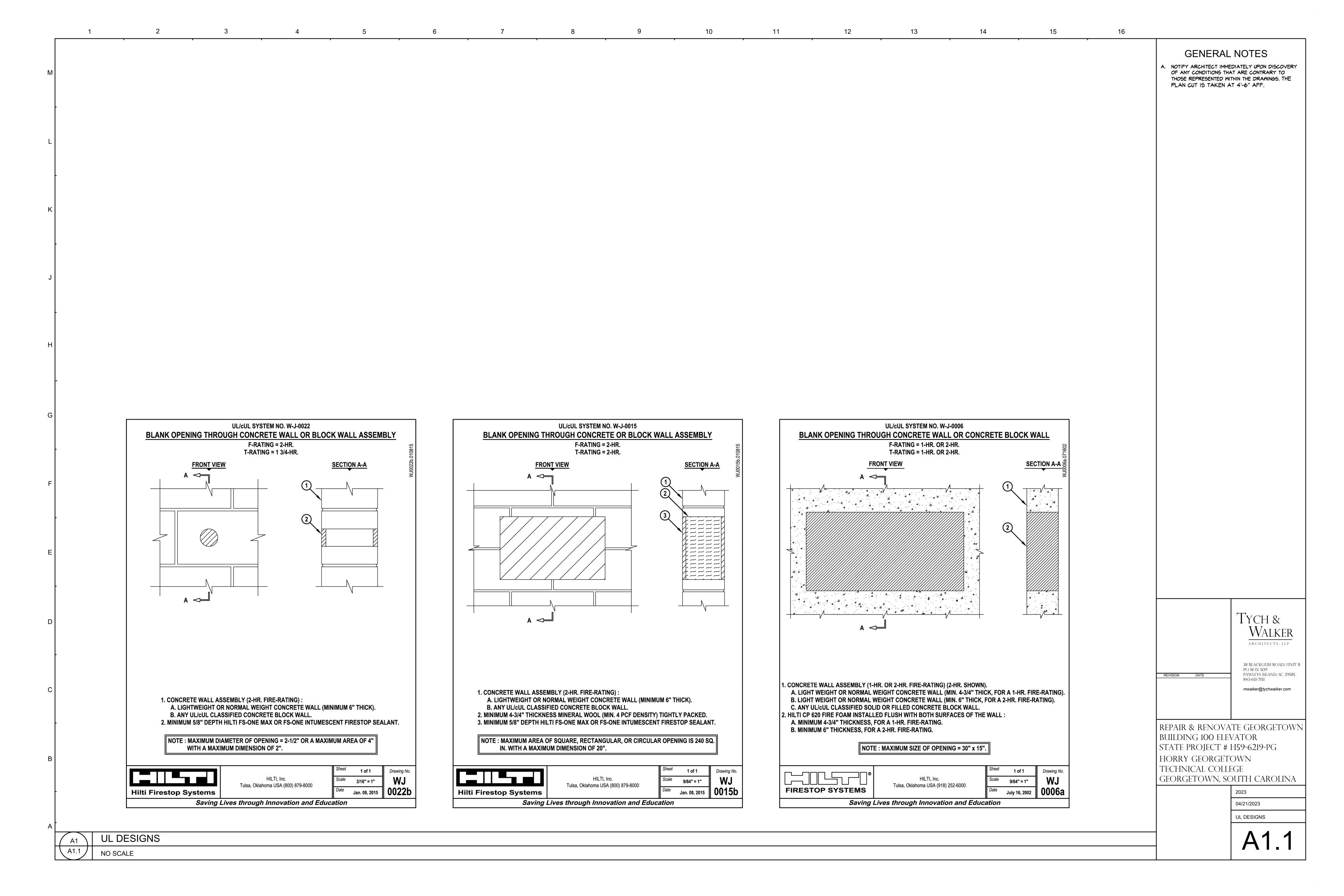
CHARLOTTE, NORTHCAROLINA (704)-527-2112

REPAIR & RENOVATE GEORGETOWN BUILDING 100 ELEVATOR

HORRY GEORGETOWN TECHNICAL COLLEGE
GEORGETOWN COUNTY, SOUTH CAROLINA

STATE PROJECT #H59-6219-PG





6 7 8 9 10 11 5 12 13 14 15 16

	SYMBOL SCHEDULE
	SYMBOLS
SYMBOL	DESCRIPTION
	CONDUIT RUN CONCEALED ABOVE CEILINGS OR IN WALLS.
	CONDUIT RUN CONCEALED IN OR BELOW FLOORS OR UNDERGROUND.
	CONDUIT RUN EXPOSED.
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
	SQUARE ON CONDUIT SYMBOL INDICATES THAT CIRCUIT CONTINUES BUT NOT SWITCHLEG.
─────	HOMERUN TO PANEL AND CIRCUIT(S) DESIGNATED. ARROW(S) INDICATE QUANTITY OF CIRC
0	JUNCTION BOX PER N.E.C.
◆	SPECIAL NOTE, NUMERALS IDENTIFY, SEE SCHEDULE.
1	SPECIAL CONNECTION TO A SPECIFIC ITEM OF EQUIPMENT. SEE CONNECTION SCHEDULE.
Ø	MOTOR CONNECTION. RATING AS NOTED.
LIGHTING SYMBOL	DESCRIPTION
SIMBUL	DESCRIP HON
ю	LED LIGHTING FIXTURE, WALL MOUNTED.
DISTRIBUT	TON
SYMBOL	DESCRIPTION
5 7773	CONTROL CABINET, FLUSH OR SURFACE MOUNTED.
ㅁ	DISCONNECT SWITCH, NON-FUSIBLE.
☑₁	DISCONNECT SWITCH, FUSIBLE.
 1•	GROUND CONNECTION.
WIRING D	EVICES
SYMBOL	DESCRIPTION
€	DUPLEX RECEPTACLE, 125V, 3-WIRE GROUNDING TYPE.
⇒GFI	DUPLEX RECEPTACLE, GROUND FAULT CIRCUIT INTERRUPTING.
⇒wp	DUPLEX GFCI RECEPTACLE. PROVIDE WITH OPERABLE, IN-USE WEATHERPROOF COVER.
▼	WALL OUTLET FOR TELECOMMUNICATIONS. SEE SPECIFICATIONS AND/OR DRAWINGS FOR CONDUIT REQUIREMENTS.
s	LIGHT SWITCH, SINGLE-POLE,
FIRE ALAF	RM SYSTEM
SYMBOL	DESCRIPTION
S	FIRE ALARM SYSTEM CEILING MOUNTED PHOTOELECTRIC TYPE SMOKE DETECTOR.

ABBREVATIONS

A ACC AFF AFG C CKT DN ECT ENT ENC GFI HPF HX IMC IS JB A	AMPERES ARMORED CLAD CABLE ABOVE FINISHED FLOOR ABOVE FINISHED GRADE FIRE ALARM ANNUNCIATOR CABINET CONDUIT CIRCUIT BREAKER CIRCUIT CEILING DOWN DISHWASHER EMPTY CONDUIT ELECTRICAL METALLIC TUBING ELECTRICAL NON-METALLIC TUBING ELECTRIC WATER COOLER FIRE ALARM CONTROL PANEL FLEXIBLE METAL CONDUIT GROUND GROUND FAULT INTERRUPTER HAND OFF AUTOMATIC HORSEPOWER HIGH POWER FACTOR HIGH REACTANCE ISOLATED GROUND INTERMEDIATE METAL CONDUIT INSTANT START JUNCTION BOX KILOVOLT-AMPERES	PWR REC RMC RS SW SWBD TTB TEL TV TYP V VP W WG	KILOWATTS LIQUIDTIGHT FLEXIBLE NON-METALLIC CONDUIT LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT LOW VOLTAGE CONTROL CABINET MAIN CIRCUIT BREAKER METAL CLAD CABLE MAIN LUGS ONLY MOUNTED NON-METALLIC CLAD CABLE PULLBOX PANELBOARD PROGRAM RAPID START PROGRAM START POWER RECEPTACLE RIGID METAL CONDUIT RAPID START SWITCH SWITCHBOARD TELEPHONE TERMINAL BOARD TELEPHONE TELEVISION TYPICAL VOLTS VAPOR PROOF WALL MOUNTED WIRE GUARD
KVA	KILOVOLT-AMPERES	WP	WEATHER PROOF
FPN	FUSE PRE NAMEPLATE	XFMR	TRANSFORMER

MOUNTING HEIGHTS

(DISTANCE FROM FINISHED FLOOR TO CENTER OF DEVICE UNLESS OTHERWISE NOTED)

RECEPTACLE GENERAL 18" AFF. (UNLESS OTHERWISE NOTED)
46" AFF. (UNLESS OTHERWISE NOTED) ABOVE COUNTER TOP <u>LIGHT SWITCH</u> 46" AFF. (UNLESS OTHERWISE NOTED)

TELECOMMUNICATIONS GENERAL

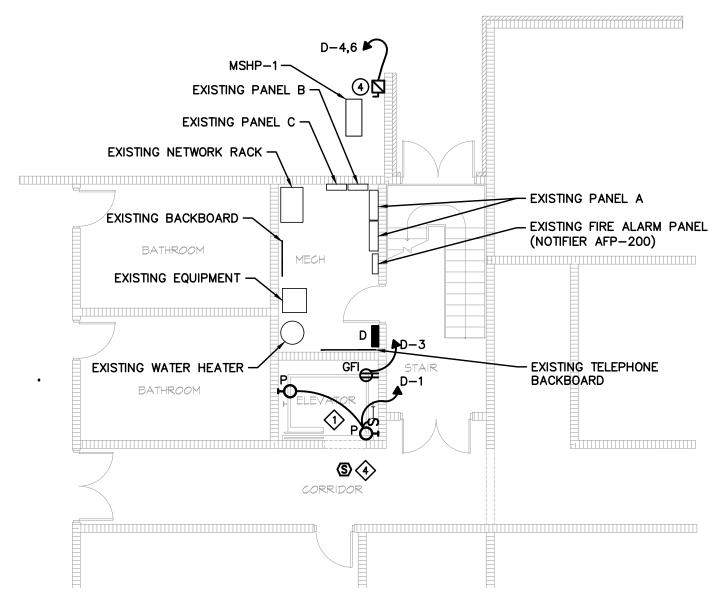
18" AFF. (UNLESS OTHERWISE NOTED) ABOVE COUNTER TOP 46" AFF. (UNLESS OTHERWISE NOTED) 46" AFF.

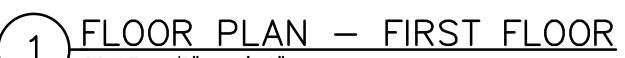
18" AFF. (UNLESS OTHERWISE NOTED) <u>TELEVISION</u>

FIRE ALARM PULL STATION

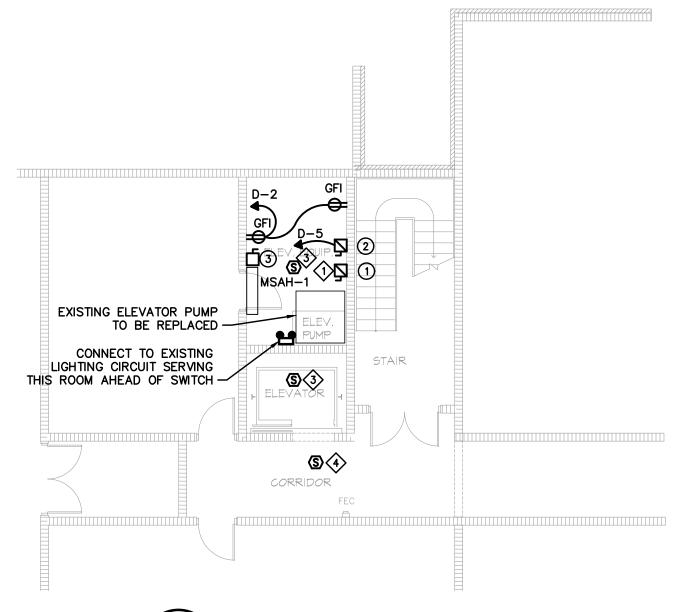
THE BOTTOM OF THE APPLIANCE SHALL BE: 80" ABOVE THE FINISHED FLOOR. AUDIBLE/STROBE COMBINATION OR STRÓBE DEVICE ONLY

		LIGH	TING	FIXT	URE S	SCHED	ULE	_	LITHON	IA VOLUMETRIC			
TYPE	DESCRIPTION					LAN	(PS	MOUNTING	MANUF. CATALOG NO.				
	DESCRIPTION	VOLT.	QTY	TYPE	BULB	BASE	TEMP	CRI	LUMENS	TYPE	WATTS	WOOTTING	MANOI: OATALOO NO.
Р	LED ENCLOSED AND GASKETED, 24 INCH NOMINAL LENGTH, FIBERGLASS HOUSING, INTEGRAL PERIMETER CHANNEL, INJECTION—MOLDED ACRYLIC LENS, WET LOCATION, 2000 NOMINAL LUMEN PACKAGE, MEDIUM DISTRIBUTION.	MVOLT	1	LED	ı	_	4000 K	80	2612	0-10V DIMMING	18	WALL, SURFACE	LITHONIA #DMW2 SERIES OR APPROVED EQUAL
e	LED EMERGENCY LIGHTING UNIT, WITH SELF—CONTAINED NI—CAD BATTERY RESERVE, WHITE THERMOPLASTIC HOUSING, FOR WALL OR CEILING MOUNTING, CONNECT FIXTURE AHEAD OF ALL LOCAL AREA SWITCHING. FIXTURE SHALL NOT BE SWITCHED.	120	2	LED	LED	_	-	_	_	_	3	WALL, 1 FT. BELOW CEILING EXCEPT 8 FT. AFF. MAX.	LITHONIA #ELM2L LED SERIES EXITRONIX #LED-90 SERIES LSI #LTEM LED SERIES WILLIAMS #EMER/LED SERIES



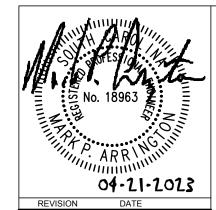


- REFER TO DIAGRAM "ELEVATOR CONTROL" FOR ADDITIONAL INFORMATION.
- UTILIZE EXISTING 150/3 ELEVATOR CIRCUIT BREAKER IN PANEL "A" AND FEEDER FOR NEW ELEVATOR PUMP CONNECTION. REPLACE EXISTING DISCONNECT SWITCH WITH NEW FUSED DISCONNECT SWITCH AS INDICATED IN EQUIPMENT CONNECTION SCHEDULE. CONNECT TO ELEVATOR CONTROLLER WITH 3#3,1#8G,1-1/4"C.
- PROVIDE NEW SMOKE DETECTOR WHERE INDICATED FOR ELEVATOR CONTROLS. CONNECT TO EXISTING FIRE ALARM SYSTEM AS REQUIRED.
- UTILIZE EXISTING SMOKE DETECTOR FOR CONTROL OF NEW ELEVATOR SYSTEM. REFER TO ELEVATOR CONTROL DIAGRAM FOR ADDITIONAL INFORMATION.



2 FLOOR PLAN — SECOND FLOOR SCALE: 1/8" = 1'-0"





ARCHITECTS, LLP 38 BLACKGUM ROAD, UNIT B

PO BOX 509 PAWLEYS ISLAND, SC 29585 843-651-7151

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ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE GEORGETOWN, SOUTH CAROLINA



2023 04/21/2023 SYMBOLS, SCHEDULES AND FLOOR PLANS

E1.0



3 5 6 10 11 12 13 14 15 16

SI PANELBOARD:	D				GROUN	D BUS		SC RAT	ING:	22 KAMPS RMS SYMM.			
SERVICE:	208Y/	120V 3P	H 4W						MOUNTI	NG:	SURFACE		
MAINS:	60	AMP	мсв		TYPE:	BRANCH			ENCLOS	URE:	NEMA 1		
LOAD DESCRIPTION	WIRE	BKR	СКТ		CONNEC	TED LOAD	(KVA)	СКТ	BKR	WIRE	LOAD DESCRIPTION		
LTG: ELEV. PIT	12	20/1	1A	0.1 0.4	0.1 0.4			2A	20/1	12	REC: ELEV. MACH. RM.		
REC: ELEV. PIT	12	20/1	3B	0.2		0.2 0.8		4B	15/2	12	MSHP-1, MSAH-P		
LTG: ELEV. CAB	12	15/1	5C	0.1			0.1 0.8	6C	/	12	·		
SPARE		20/1	7A	0.0 0.1	0.0 0.1			8A	20/1	12	ELEV. CONTROL		
SPARE		20/1	9B	0.0 0.0		0.0 0.0		10B	20/1		SPARE		
SPARE		20/1	11C	0.0 0.0			0.0	12C	20/1		SPARE		
SPACE ONLY		/3	13A		0.0 0.0			14A	/3		SPACE ONLY		
		/	15B			0.0 0.0		16B	/				
		7	17C				0.0	18C	/				
SPACE ONLY		/3	19A		0.0 0.0			20A	/3		SPACE ONLY		
		7	21B			0.0 0.0		22B	/				
		7	23C			0.0	0.0	24C	/				
		7					0.0	2.0	/				
		7							/				
		7							/				
		7							,				
		7							,				
		7							/				
		7							/				
		7							/				
		7							,				
				0.8	0.6	1.0	0.9				·		
NOTES:								LIGHT RECE MOTO HEAT KITCH CMPT OTHE TOTAL	PTS RS IEN R R	0.2 0.5 1.6 0.0 0.0 0.0 0.1 2.4	KVA KVA KVA KVA KVA KVA KVA		

		LIGH	TING	FIXT	URE S	CHEC	ULE	_	LITHON	IA VOLUMETRIC				
TYPE	DESCRIPTION	VOL T				LAM	IPS			DRIVER	WATTS	MOUNTING	MANUF. CATALOG NO.	
TIFE	DESCRIPTION	VOL 1.	QTY	TYPE	BULB	BASE	TEMP	CRI LUMENS		TYPE	WATIS	MOONTING	MANOI. CATALOG NO.	
	LED ENCLOSED AND GASKETED, 24 INCH NOMINAL LENGTH, FIBERGLASS HOUSING, INTEGRAL PERIMETER CHANNEL, INJECTION-MOLDED ACRYLIC LENS, WET LOCATION, 2000 NOMINAL LUMEN PACKAGE, MEDIUM DISTRIBUTION.	MVOLT	1	LED	ı	-	4000 K	80	2612	0-10V DIMMING	18	WALL, SURFACE	LITHONIA #DMW2 SERIES OR APPROVED EQUAL	
2	LED EMERGENCY LIGHTING UNIT, WITH SELF—CONTAINED NI—CAD BATTERY RESERVE, WHITE THERMOPLASTIC HOUSING, FOR WALL OR CEILING MOUNTING, CONNECT FIXTURE AHEAD OF ALL LOCAL AREA SWITCHING. FIXTURE SHALL NOT BE SWITCHED.	120	2	LED	LED	-	-	-	-	_	3	WALL, 1 FT. BELOW CEILING EXCEPT 8 FT. AFF. MAX.	LITHONIA #ELM2L LED SERIES EXITRONIX #LED-90 SERIES LSI #LTEM LED SERIES WILLIAMS #EMER/LED SERIES	

	EQUIPMENT CONNECTION SCHEDULE														
			VOLTAGE/			DISCONN	ECT			RACI	EWAY				
SYMBOL	EQUIPMENT	LOAD	PHASE	TYPE	RATING	POLES	TRIP/FUSE	ENCLOSURE	CONDUCTORS	TYPE	SIZE	NOTES			
1	ELEVATOR	20 HP	208/3	FDS	200	3	2>	1	3#3,1#8G	FMC	1-1/4"C	3			
2	ELEVATOR CAB LIGHTS	100W	120/1	FDS	30	2	15	1	2#12,1#12G	FMC	1/2"	\Diamond			
3	MSAH-1	.19 FLA	208/1	NFDS	30	2	_	1	2#12,1#12G	FMC	1/2"	4			
4	MSHP-1	.5 FLA, 7.0 RLA	208/1	FDS	30	2	2	3R	2#12,1#12G	LFMC	1/2"	4			

ETCB = ELECTRONIC-TRIP CIRCUIT BREAKER

FDS = FUSIBLE DISCONNECT SWITCH MCP = MOTOR CIRCUIT PROTECTOR

NFDS = NON-FUSIBLE DISCONNECT SWITCH ST/DS = COMBINATION STARTER/DISCONNECT SWITCH TMCB = THERMAL-MAGNETIC CIRCUIT BREAKER

TOG = TOGGLE SWITCHC/DS = COMBINATION CONTACTOR/DISCONNECT SWITCH

DISCONNECT ENCLOSURE TYPES RACEWAY TYPES EMT = ELECTRIC METALLIC TUBING

3R = NEMA 3R ENCLOSURE 4 = NEMA 4 ENCLOSURE

1 = NEMA 1 ENCLOSURE

4X = NEMA 4X ENCLOSURE

FMC = FLEXIBLE METAL CONDUITIMC = INTERMEDIATE METAL CONDUIT LFMC = LIQUID-TIGHT FLEXIBLE METAL CONDUIT

PVC = NON-METALLIC PVC CONDUIT RMC = RIGID METAL CONDUIT

CFVNR = COMBINATION FULL VOLTAGE, NONREVERSING

HOA = HAND-OFF-AUTORPL = RED PILOT LIGHT

AUX = AUXILLARY CONTACTS (2 N.O., 1 N.C.)CT50 = 50 VA CONTROL TRANSFORMER

ALL ELECTRICAL CHARACTERISTICS SCHEDULED ABOVE ARE BASED ON INFORMATION AVAILABLE AT THE TIME OF DESIGN. ELECTRICAL CONTRACTOR SHALL VERIFY ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT WITH EQUIPMENT SUPPLIER(S) PRIOR TO ROUGHING, AND SHALL VERIFY EXACT LOCATION AND EXACT TYPE OFCONNECTION. ALL EQUIPMENT SHALL BE PROPERLY AND SECURELY GROUNDED. ANY SIGNIFICANT CHANGES IN LOCATION, ELECTRICAL REQUIREMENTS, OR TYPE OF CONNECTION REQUIRED FOR ANY EQUIPMENT SCHEDULED ABOVE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN WRITING PRIOR TO PROCEEDING.

CONDUCTORS AND RACEWAY SPECIFIED IN THE ABOVE SCHEDULE ARE FOR FINAL CONNECTION TO UNIT AND SHALL BE EXTENDED FROM THE DISCONNECT SHOWN ON THE FLOOR PLANS TO THE EQUIPMENT TERMINATION BOX.

CONDUIT AND BOXES REQUIRED FOR EQUIPMENT CONNECTIONS SHALL BE INSTALLED IN SUCH A WAY AS TO NOT COVER UP EQUIPMENT NAMEPLATES, SERVICE AREAS, AIR FLOW AREAS, ETC.

(1) UTILIZE ONLY ONE POLE OF TWO POLE DISCONNECT SWITCH FOR CIRCUIT DISCONNECTION. DO NOT SWITCH CIRCUIT NEUTRAL.

FUSE PER MANUFACTURER'S RECOMMENDATION.

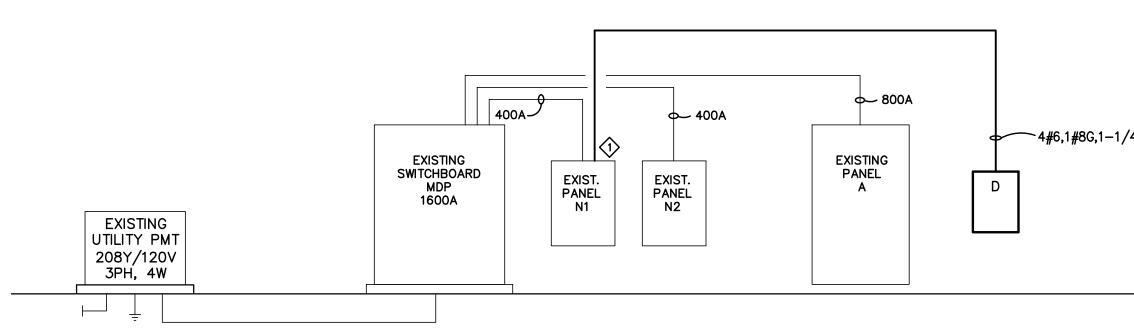
PROVIDE ELEVATOR DISCONNECT SWITCH WITH FORM C AUXILIARY CONTACTS FOR DISCONNECTING THE ELEVATOR CONTROLLER INTERNAL BATTERY FROM POWER SUPPLY WHEN THE ELEVATOR DISCONNECT SWITCH IS OPENED.

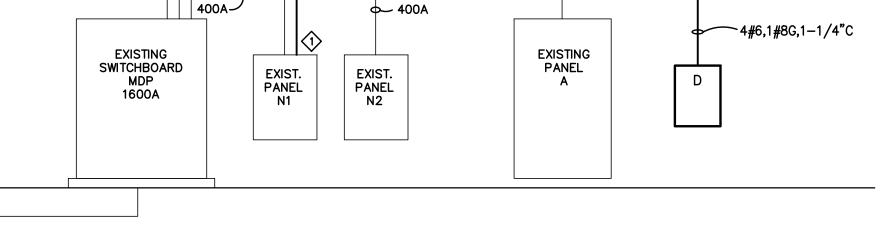
4 INDOOR UNIT POWERED FROM OUTDOOR UNIT.

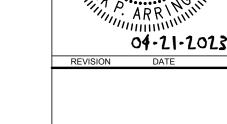
NON-D	NON-DUCTED MINI-SPLIT HEAT PUMP SCHEDULE																							
Unit Tag	Area Served	CFM	CFM		Fan Motor	r	Cooling	Perfori	mance	Heating	Performance	Outdoor Unit										Model	Model	Remarks
		High	Low	FLA	Volts	Phase	EAT	MBH	Efficiency	EAT	MBH	Unit Tag	Fan Compressor		MCA	MOCP	Volts	Phase	(Outdoor Unit)	(Indoor Unit)	1			
								Total	SEER		Total		No.	FLA(ea)	No.	LRA	RLA							
MSAH-1	ELEV. EQUIP. RM.	. 435	265	0.19	208/230	1	80/67	12	21	70/60	18	MSHP-1	1	0.5	1	12	7	11	28	208/230	1	PUZ-A12NKA7-BS	PKA-A12LA	1-6

- REFER TO APPROVED MANUFACTURER LIST FOR ACCEPTABLE EQUAL MANUFACTURERS. COORDINATE POWER REQUIREMENTS FOR ALL SUBSTITUTIONS.
- WIRED REMOTE CONTROLLER WITH BAS INTERFACE. REFRIGERANT LINES AND ACCESSORIES PER SPECS AND AS RECOMMENDED BY UNIT MFG.
- 4. PROVIDE FACTORY CONDENSATE PUMP POWERED FROM AIR HANDLER. ROUTE 3/4" PUMPED CONDENSATE TO DRAIN WITH MINIMUM 1" AIR GAP. 5. VARIABLE SPEED, INVERTER DRIVEN.

6. INDOOR UNIT IS POWERED BY OUTDOOR UNIT. COORDINATE SUBSTITUTE MANUFACTURER ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR AT NO ADDITIONAL COST TO OWNER.









MSWG Project

23-035

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ELEVATOR RENOVATIONS

PO Box 787692

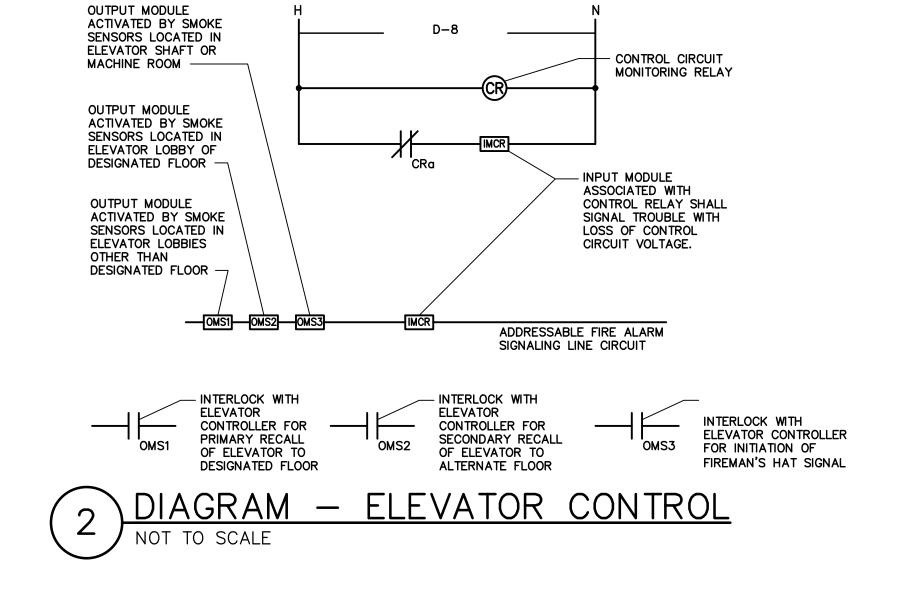
mswg.com

Charlotte, NC 28271 704-527-2112

HORRY GEORGETOWN TECHNICAL COLLEGE GEORGETOWN, SOUTH CAROLINA



2023 04/21/2023 RISER DIAGRAM AND SCHEDULES





IN SPACE AVAILABLE IN EXISTING PANEL N1 (208Y/120V, 3PH, 4W, 400A MCB) PROVIDE NEW 60/3 CIRCUIT BREAKER AND CONNECT TO NEW PANEL D AS INDICATED.

1.1 <u>SCOPE:</u>

- a. Applicable requirements of the General Conditions of the Contract, Amendments, Supplementary General Conditions, and Special Conditions govern work under this Division.
- b. Work covered by this Division consists of providing all labor, equipment, supplies, and materials; and performing all operations, including trenching, backfilling, cutting, patching, and chasing necessary for the installation of complete electrical systems in strict accordance with these specifications and the applicable drawings.
- c. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.
- d. This Contractor is referred to the General and Special Conditions of the contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.
- e. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

a. The word "Contractor" as used in this section of the specification refers to the Electrical Contractor unless specifically noted otherwise. The word "provide" means furnish, fabricated, complete, install, erect, including labor and incidental materials necessary to complete in place and ready for operation or use the item referred to or described herein and/or referred to on the Contract Drawings.

1.3 CONTRACTOR'S QUALIFICATIONS:

a. It is assumed that the Contractor has had sufficient general knowledge and experience to anticipate the needs of a construction of this nature. The Contractor shall furnish all items required to complete the construction in accordance with reasonable interpretation of the intent of the Drawings and Specifications. Any minor items required by code, law or regulations shall be provided even if not specified or specifically shown, where it is part of a major system.

1.4 CONTRACT DOCUMENTS:

- a. The contract drawings are diagrammatic and are not intended to indicate every detail of construction, or every item of material or equipment required, or exact locations. Indicated locations of outlets, equipment, and connections are approximate and shall be verified by reference to related documents.
- b. The Contractor shall procure complete drawings and specifications on all coincident construction and fit the Electrical work in with it. He shall cooperate with other trades to achieve well-coordinated progress and result; and avoid conflicts with other trades. He shall make minor moves and changes necessary to accommodate other equipment and/or preserve symmetry without claim for extra payment. Should there be any doubt as to the spacing intent, or location of equipment, the Contractor shall have the point clarified by the Architect/Engineer before proceeding with the installation.

1.5 <u>RECORD DRAWINGS:</u>

- a. During construction of this project, the Contractor shall maintain one complete set of electrical contract drawings, on which shall be recorded all significant changes. This set of drawings shall be used for no other purpose. Upon completion of the work, the Contractor shall submit these drawings to the Architect/Engineer for approval and presentation to the Owner.
- b. Upon completion of the project, the Contractor shall prepare an Operation and Maintenance Manual, which shall include catalog data, equipment information, wiring diagrams, and warranty information for the electrical installation. Submit in three copies to the Architect/Engineer for approval and presentation to the Owner.

1.6 REGULATIONS AND COMPLIANCE:

- a. The requirements of the South Carolina State Building Code, the National Electrical Code, and of all other State and Local codes, ordinances, regulations, and interpretations by authorities having jurisdiction are binding upon this Contractor, and nothing contained in, or inferred by, these specifications or the applicable drawings may be construed as waiving those requirements. The latest edition of the National Electrical Code, referred to herein and on the drawings as "N.E.C.", forms a part of these specifications; and under no circumstances may the installation fail to meet the minimum requirements therein.
- b. This Contractor shall secure and pay for all permits, fees, inspections, and licenses required. Upon completion of the project and prior to his request for final payment he shall present to the Architect/Engineer a certificate of inspection and approval from the inspection authorities.
- c. The Contractor shall include in his work, without extra cost to the Owner, any labor, materials, service, apparatus, drawings, to comply with all applicable laws, ordinances, rules, and regulations, whether shown on drawings and/or specified.
- All materials furnished, and all work installed shall comply with the National Fire Codes of the National Fire or shown on the drawings and not called for in the specifications must be furnished by the Contractor Protection Association, and with the requirements of all governmental departments having jurisdiction.
- e. All materials and equipment shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc., or any other third-party listing organization acceptable to the South Carolina State Building Code Council. Refer to the list of acceptable testing agencies on the NC OSFM website under "Code Enforcement Resources".
- f. It is the responsibility of the Contractor to notify the local electrical inspector to schedule the required inspections.

1.7 ELECTRICAL TESTING:

- a. Conduct full-scale tests with all lights, equipment and appliances in operation and prove the electrical system satisfactory for operation and free from defects. Pay attention to the balancing of the single-phase loads on the three-phase system. Promptly remedy all defects.
- b. All current phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance, continuity, and accidental grounds. This shall be done with a 500-volt megger. The procedures listed
- 1. Minimum readings shall be one million or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
- 2. After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low reading is found. The contractor shall correct troubles, reconnect, and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
- 3. At final inspection, the contractor shall furnish a megger and show that the panels comply with the above requirements. He shall also furnish an ammeter (hook-on type) and voltmeter to take current and voltage readings as directed.
- c. All tests specified shall be completely documented indicating time of day, date, temperature, and all pertinent test information.
- d. All required documentation of readings indicated above shall be submitted to Engineer prior to, and as one of the prerequisites for, final acceptance of the project.
- e. All elements of the electrical system provided, furnished, installed, or otherwise altered under this contract shall be subjected to testing required under this contract. Where test results indicate failure, the contractor shall repair, adjust, or replace as required and repeat the testing at no extra cost.
- f. Testing shall be performed by qualified testing agencies and field services companies as necessary to augment the contractor's own capabilities. Testing and reporting methods shall comply with published standards. All test results shall be published on the Contractor's or testing company's letterhead or test forms bearing the legal name and address of the

1.8 GUARANTEE:

a. The Contractor shall guarantee that the work done has been done in accordance with the Contract Documents, free of imperfect materials and defective workmanship. For a period of one year after acceptance by the Owner, the Contractor shall repair or replace, at no additional expense to the Owner, any imperfect materials or defective workmanship.

2.1 GENERAL:

 Except where reuse of existing items is specifically indicated or permitted, all materials and equipment shall be new and shall conform to the standards of the National Electrical Manufacturer's Association and Underwriter's Laboratories,

- Inc. in every instance where such a standard has been established for the item involved.
- b. Catalog numbers and trade names in these specifications and drawings are intended only to set forth and convey to bidders the general style, type, character, and quality of product desired. Similar products of other manufacturers; of equal quality, size, capacity, character, and appearance may be substituted on the written approval of the Architect/Engineer. Requests for approval of substitutions shall be made after the award of the contract in accordance with the bidding
- c. It is the intent of the drawings and specifications that the installation be complete, of finished appearance, and ready for operation. Manufacturers' catalog numbers as used herein and on the drawings are indicative of the type of product to be installed, and do not necessarily identify all parts and accessories required for the proper assembly, installation, and utilization of the product. All required parts and accessories shall be provided.
- d. Materials shall be inspected by the Contractor upon their arrival at the site to be sure they are correct. Material and equipment stored on the site shall be protected against physical damage, dirt and damage caused by precipitation, wind, condensation, excessive humidity, and extremes of temperature. Materials shall be stored in their original cartons within substantial, clean, and dry storage facilities provided under this Contract. Conduit, large, galvanized boxes, and lighting poles may be stored outdoors on suitable blocks or racks clear of the earth and undergrowth and pitched to drain. Large electrical equipment intended for ultimate installation outdoors may be stored in the weather on suitable blocks or platforms clear of the earth and undergrowth, and with interior lamps or space heaters continuously energized to prevent condensation. Alternate storage provisions may be submitted to the Architect/Engineer for approval prior to the arrival of the material. Under no circumstances shall equipment be stored in the weather under a cover of polyethylene or tarpaulin. The Architect/Engineer will be the sole judge as to the acceptability of storage facilities, and when directed by the Architect/Engineer, improperly stored or damaged material shall be removed from the site and replaced with new material.

2.2 SUBMITTALS:

- a. Submittal data shall be thoroughly reviewed and approved by the Contractor prior to being forwarded to the Architect/Engineer. Submittal data received from the Contractor will be considered to have been reviewed and approved by the Contractor as suitable for the application and for installation in the space allotted.
- b. The submittal of shop drawings shall be with the Contractor stamp affixed. This stamp indicates that the Contractor, by approving and submitting shop drawings, represents that he has determined and verified all field measurements and quantities, field construction criteria, material, catalog material, and similar data that he has reviewed and coordinated information in the shop drawings with the requirements of the work and the Contract Documents. It, also, indicates that any deviation from the Contract Documents has been shown on the submittal and clearly defines the deviations from the specifications.
- c. Approval rendered on shop drawings shall not be considered as a guarantee of quantities, measurements, or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail. Said approval does not in any way relieve the Contractor from his responsibilities or necessity of furnishing material or performing work as required by the contract drawings and specifications.
- Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of default will be allowed.
- e. Contractor shall keep on the job at all times copies of all approved shop drawings.

 a. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Contractor at his own expense and submitted for approval by the Architect/Engineer.

b. Where such approved deviation requires a different quantity and arrangement of wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such structural supports, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

a. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere to assure a complete and satisfactory installation. Work such as excavation, backfill, concrete, flashing, wiring, etc., which is required by the work of this section shall be performed in accordance with the requirements of the applicable section of the specifications.

b. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the work "provide" is used, it shall mean "furnish and install complete and ready for use".

3.2 DUTIES OF CONTRACTOR:

- a. Contractor shall furnish and install all materials called for in these Specifications and accompanying drawings and must furnish the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings
- b. Contractor is responsible for familiarizing himself with the details of the construction of the building. Work under these specifications installed improperly or which requires changing due to improper reading or interpretation of building plans shall be corrected and changed as directed by the Architect/Engineer without additional cost to the Owner.
- c. The Contractor shall follow drawings in laying out work and check drawings or other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, Architect/Engineer shall be notified before proceeding with installation.
- d. While every effort has been made to accommodate the equipment necessary for the work of this contract, it is the responsibility of the Contractor to ensure that equipment supplied as a part of this contract will fit in the spaces provided for by the drawings. Any concern by the contractor regarding the adequacy of a space for the equipment supplied, shall be brought to the attention of the Architect/Engineer in a written form prior to the approval of the related equipment submittals and prior to any rough-in associated with this equipment.
- e. The plans are diagrammatic and are not intended to show each fitting or a complete detail of all the work to be done; but are for illustrating the type of system, etc., and special conditions considered necessary for the experienced mechanic to take off his materials and lay out his work. This Contractor shall be responsible for taking such measurements as may be necessary at the job and adapting his work to local conditions.
- f. Conditions sometimes occur which require certain changes in drawings and specifications. If such changes in drawing and specifications are necessary, the same are to be made by the Contractor without expense to the Owner, providing such changes do not require furnishing more materials, or performing more labor than the true intent of the drawings and specifications demands. It is understood that while the drawings are to be followed as closely as circumstances will permit, the Contractor is held responsible for the installation of the system according to the true intent and meaning of the drawings. Anything not entirely clear in the drawings and specification will be fully explained if application is made to the Architect/Engineer. Should, however, conditions arise where in the judgment of the Contractor certain changes will be advisable, the Contractor will communicate with the Architect/Engineer and secure his approval of these changes before going ahead with the work.
- g. The right to make any responsible change in location of apparatus, equipment, routing of conduit up to the time of roughing in, is reserved by the Architect without involving any additional expense to the Owner.
- h. It shall be the duty of prospective Contractors to visit the job site and familiarize themselves with job conditions. No extras will be allowed because of additional work necessitated by, or changes in plans required because of evident job conditions, that are not indicated on the drawings.
- Contractor shall leave the premises in a clean and orderly manner upon completion of the work and shall remove from the premises all debris that has accumulated during the progress of the work.

- a. This Contractor shall coordinate the work of all subs and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- b. Where the work will be installed near, or may interfere with the work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 3/8" = 1'-0", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination, or to cause any interference with work of any subs, he shall make the necessary changes in his work to correct the condition without extra
- The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for coordinating adjacent work.
- 3.4 <u>SLEEVES, CUTTING, AND PATCHING:</u>

- a. Contractor shall place his own sleeves and advise other trades of required chases and openings, so they can be properly built in. Sleeves provided under this division shall be formed out of no less than schedule 40 galvanized rigid steel conduits. Where any raceway supports installed under this Contract pierce the roof, suitable pitch pockets shall be provided and coordinated with the roofing contractor as necessary to be acceptable to the Architect/Engineer. Provide suitable fittings where any raceways or equipment cross expansion joints.
- b. Permitted cutting or patching necessary shall be done by Contractor. Structural members shall not be cut except by written permission of Architect/Engineer.

3.5 PROTECTION AND CLEAN-UP:

- a. Protect all material and work from damage during construction. Equipment installed in the building prior to its being closed in and dried out shall be protected from the elements in the same manner as previously specified for stored materials. Protect finished surfaces from splattering of mortar, paint, dirt, plaster, etc. Do not install device plates, face plates, canopies, flush cabinet trims, or fixtures on walls or ceilings until after painting or cleaning of the surface has been completed and arrange for such items that are required to be field painted to be painted before being mounted. Repair, clean and touchup or replace all damaged material. At the completion of the project, remove all dust from finished surfaces, including lighting
- The Contractor shall keep premises free of debris resulting from his work.

3.6 PAINTING AND FINISHING:

a. Suitable finishes shall be provided on all items of electrical equipment and materials which are exposed. This shall consist of either an acceptable finish as manufactured and supplied to the job or application of suitable finishes after

- b. When installed in finished areas, exposed equipment and materials shall be supplied with prime coat and shall be professionally painted or enameled as directed to match or blend with adjacent surfaces.
- In unfinished areas such as equipment rooms, exposed equipment shall be furnished with suitable factory applied finishes (e.g., standard gray enamel finish for panelboards, etc.).
- Equipment furnished in finishes such as stainless steel and brushed aluminum shall not be painted.
- e. All finishing shall be as directed by, and shall be satisfactory to, the Architect/Engineer.
- f. Paint material shall be selected from the products listed below and, insofar as practical, products of only one manufacturer shall be used. Contractor shall submit to the Architect/Engineer the listed manufacturer he proposes to use in the work. Should the Contractor desire to use products of a manufacturer not listed below, or products made by a listed manufacturer but not scheduled herein, Contractor shall submit complete technical information on the proposed products to the Architect/Engineer for approval. Only products approved by the Architect/Engineer shall be used.

3.7 OBSERVATION:

a. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect/Engineer at least 72 hours in advance when any work to be covered up is ready for inspection. No work shall be covered up until after observation has been completed.

EQUIPMENT CONNECTIONS AND COORDINATION

1.1 <u>SCOPE:</u>

- a. The connection of all equipment provided under any Division of these specifications or by the owner requiring electrical connection shall be provided as part of this Division, unless otherwise indicated or specified. A special outlet, where indicated, is the electrical connection to the equipment.
- b. Drawings indicate approximate equipment capacity (including motor horsepower) and approximate location of connection. It is the responsibility of this Contractor to determine the exact characteristics of equipment being supplied; and to SCOPE: provide proper branch circuit connections, conductor protection, and grounding.

2.1 GENERAL:

a. Heating, Ventilating, Air Conditioning, Refrigeration and Plumbing Equipment: Unless otherwise indicated, provide all power wiring, including feeders and branch circuits, to the terminals of the equipment, including mounting of motor starters; feeder and branch circuit over-current protection; disconnecting means within sight of each motor and each starter, whether specifically indicated on drawings. Motor Control Centers indicated, complete as scheduled and specified.

b. Elevator Equipment:

- 1. Provide an elevator equipment power circuit, including a mounted shunt-trip circuit breaker, a fused disconnect switch with fuses as sized by Elevator Manufacturer, and connection to the elevator controller.
- 2. Provide elevator fused disconnect switch with two sets of Form C auxiliary contacts for use by the elevator installer to disconnect the elevator controller internal battery from the power supply when the elevator disconnect switch is opened.
- 3. Provide a duplex NEMA 5-20R receptacle adjacent to the disconnect switch (or switches where there is 2.2 MATERIALS AND APPLICATIONS: more than one controller in the machine room) connected to a dedicated circuit. Provide a 20-amp, 120-volt dedicated circuit with 30-amp, heavy duty, fused disconnect switch (from emergency source when available) for car lighting. Terminate circuit on controller as directed by elevator installer, Provide a 20-amp, 120-volt dedicated circuit with 30-amp heavy duty, fused disconnect switch for control power. Terminate circuit on controller as directed by elevator installer.
- 4. Provide telephone raceway to the elevator controller from the nearest telephone backboard or cable tray. The raceway shall consist of a 3/4" concealed conduit complete with nylon pull cord. Terminate at the controller as directed by elevator installer.
- Provide pit lighting fixtures and switch and pit receptacles (5-20R GFCI).
- 6. Provide fire alarm system relay contacts to signal each elevator controller that shall be activated whenever smoke or by-products of combustion are detected in any of the elevator lobbies served by the elevator, in the elevator hoist way or in elevator machine room. Run No. 14 AWG conductors in raceway from relay contacts to the applicable elevator controller. Terminate as directed by elevator installer.
- 7. Contractor shall locate electrical equipment, including lighting fixtures, in elevator equipment room and elevator pit, and shall make all connections to elevator equipment, as directed by elevator installer.

BASIC MATERIALS AND METHODS

1.1 WIRING METHODS:

- a. Unless otherwise indicated or specified, the Wiring Method for this project shall consist of copper conductors with 600-volt insulation installed in metal raceways.
- b. The word "Raceway" and the word "Conduit" (or abbreviation "C") used herein or on the drawings indicate Rigid Metal Conduit, and where permitted, Intermediate Metal Conduit, Electrical Metallic Tubing, Rigid Nonmetallic Conduit, Flexible Metal Conduit, or Liquidtight Flexible Metal Conduit.
- Reference to "Rigid Conduit" or "RMC" indicates heavy-wall Rigid Metal Conduit only.
- Reference to "IMC" indicates Intermediate Metal Conduit.
- e. Reference to "PVC" indicates Rigid Nonmetallic Conduit.

Reference to "EMT" or "Tubing" indicates Electrical Metallic Tubing.

g. Reference to "Flex" or "Flexible Conduit" indicates Flexible Metal Conduit, or, where required, Liquidtight Flexible Metal Conduit.

1.2 FASTENING METHODS:

a. Acceptable fastening methods include wood screws and nails on wood construction, toggle bolts on hollow masonry, expansion bolts and lead anchors on brick and concrete, and machine screws on metal surfaces.

- b. Explosive fasteners may be used in steel and concrete in accordance with the manufacturer's recommendations.
- Wire, perforated metal strap, and wooden plugs are not acceptable as fastening material.

suspended ceiling unless noted so on the Drawings or specifically permitted by the Architect/Engineer.

- d. Materials used shall be good quality, made of zinc or cadmium coated steel or other non-corroding material.
- Materials, whether exposed or concealed, shall be firmly and adequately held in place. Fastening and support shall afford safety factor of three or higher and shall be in full compliance with the seismic protection requirements of the South Carolina State Building Code.
 - f. Fixtures, raceways, and equipment shall be supported from the structure. Nothing may be supported on
- g. Equipment and raceways attached to outside walls, or interior walls subject to permanent moisture, shall be shimmed out with non-corrodible material to provide 1/4" air space between wall and equipment or raceway.

1.3 <u>EQUIPMENT IDENTIFICATION:</u>

 Suitable nameplates shall be provided for the identification of electrical equipment including switchboards, panelboards, dry-type transformers, motor starters, safety switches and circuit breakers.

b. Nameplates shall be of engraved white core plastic laminate, not less than 1/16" thick. Nameplate identification shall include equipment name, source of power supply and voltage.

- Nameplate engraving shall be of professional quality, with block style letters, minimum 1/4" high.
- d. Nameplates shall be attached with sheet metal screws. They shall be sized to allow for installation of screws without obscuring text.
- e. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by tags with string or wire attached to conduit or outlet.
- 1.4 SLEEVES AND PENETRATIONS:
- a. The Electrical Contractor shall provide sleeves and openings for his penetrations through exterior walls, interior walls and partitions, floors, and roofs. Provisions for all such penetrations shall be as approved by the Architect/Engineer.

b. For any raceway passing through an exterior wall, above or below grade, provide appropriate sleeve and water proofing. Center the conduit in the sleeve and fill the space between conduit and sleeve with appropriate compound such as lead and oakum, and then apply caulking compound - Thiocaulk or approved equal - flush with the wall surfaces.

- c. For raceways penetrating floor slabs, smoke partitions, and fire-rated walls, provide steel pipe sleeves and seal with high-temperature non-shrink grout or other material as approved by the Architect/Engineer, Materials and installation methods shall be UL listed as a Through-Penetration Firestop System suitable for use with the UL Fire Resistance Design encountered. Refer to the UL fire protection details shown on the drawings. Refer to the UL fire penetration details shown on the drawings.
- d. Conduits penetrating roof surfaces for purpose of connecting to roof-top mechanical equipment shall utilize openings and curbs provided for the equipment where possible.
- e. For other raceway penetrations through the roof the Contractor shall provide appropriate prefabricated roof curb assemblies - "Pipe Portal System" as manufactured by Roof Products and System Corp., Addison, Illinois, or equal method as approved by Architect/Engineer and Roofing Subcontractor.

1.5 SUBMITTALS:

Submit for approval manufacturer's data sheets for all basic materials.

RACEWAYS AND FITTINGS

- a. Provide complete raceway systems as indicated on the drawings, as herein specified, and as required by applicable codes.
- All wiring shall be installed in raceways unless specifically noted otherwise.

Submit for approval manufacturer's data sheets for all raceway system components.

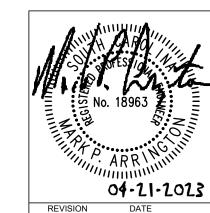
other approved manufacturers.

- 2.1 MANUFACTURERS:
- b. Non-metallic raceway system components shall be as manufactured by Carlon, Queen City Plastics, Ipex or other approved manufacturers

a. Metal raceway and components shall be as manufactured by Allied, Triangle, Wheatland, Thomas & Betts, or

- Rigid Metal Conduit shall be zinc-coated Schedule 40 steel or alloy 6063-T42 aluminum with threaded couplings and fittings. Termination at sheet metal enclosures shall consist of double locknuts and insulating bushings. Rigid Steel conduit shall be used for all exposed and concealed work except where other raceways are indicated or permitted. Aluminum conduit complete with aluminum fittings may be used in lieu of steel conduit except in wet locations, underground, or in poured concrete. Steel and aluminum shall not be mixed in the same run of conduit. Where using aluminum conduit, Contractor shall use couplings, fittings, boxes and supports with appropriate dielectric means to prevent corrosion with dissimilar metals.
- Intermediate Metal Conduit (IMC) with threaded couplings and fittings may be used for exposed and concealed work in lieu of rigid metal conduit except underground outside the building foundation, or where supporting lighting fixtures, or in hazardous locations, or when exposed to severe impact or injury. Termination at sheet metal enclosures shall consist of double locknuts and insulating bushings.
- c. Electrical Metallic Tubing (EMT) may be used for concealed work in lieu of Rigid Metal Conduit except underground or in poured concrete. EMT may be used for exposed work in lieu of Rigid Metal Conduit except outdoors, or above a roof, or where supporting lighting fixtures, or when exposed to severe impact or injury, or in hazardous locations, or less than 10 feet above a floor or platform in other than in electrical, mechanical, or communications closets or equipment
- d. Rigid PVC Conduit shall be Schedule 40, UL listed for use with 90°C. Conduit run underground or run in or under a poured concrete slab shall be rigid PVC. Vertical elbows and vertical extensions from underground or concrete embedded PVC conduits smaller than 3" trade size may also be of PVC if they remain concealed or otherwise protected but shall be of Rigid Steel Conduit (or IMC where permitted) where they stub up into exposed locations or trade size is 3" or larger. An insulating bushing or end bell shall be provided at each termination. Conduit run underground and not under a poured concrete slab shall have installed continuously above it a warning tape. Tape shall be 12 inches wide, centered on conduit and located 12 inches below finished grade.
- e. Flexible Metal Conduit shall be of zinc coated steel of minimum length and shall be used in lieu of Rigid Metal Conduit for connections to moving or vibrating apparatus, recessed lighting fixtures, dry-type transformers, and motors. Flexible Metal Conduit may be used where rigid connections are impractical due to obstructions or space limitations. Flexible Metal Conduit used in wet, damp, or corrosive location shall be PVC jacketed liquid-tight complete with liquid-tight connectors.
- Fittings for steel conduit and tubing shall be of zinc coated steel or malleable iron. Insulating bushings of plastic provided for Rigid and Intermediate Metal Conduits shall be rated for 150°C. Bonding bushings shall be steel or malleable iron with non-removable plastic throats rated 150°C. EMT fittings shall be of the compression type and concrete tight or rain tight as applicable. Setscrew, indenter, pressure cast and die cast fittings are not acceptable. Connectors for EMT, Flexible Metal Conduit and Liquid-tight Flexible Metal Conduit shall be the insulated throat type. Connectors for Flexible Metal Conduits shall be of the "Tite-Bite" design.
- g. Conduit expansion fittings shall be of zinc coated cast or malleable iron and steel conduit, complete with flexible bonding straps. Expansion fittings shall allow longitudinal conduit movement of 4 inches.
- h. Minimum raceway size shall be 1/2", except Flexible Metal Conduit connections to individual lighting fixtures may be 3/8". Other raceway sizes, unless indicated on the drawings, shall be determined by the Contractor in accordance with NEC requirements for type THW insulated conductors, or the actual insulation used if it is thicker than type THW.
- Raceway in patient care areas (as defined by NEC 517) shall comply with the requirements of NEC 517.13(A).





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ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE GEORGETOWN, SOUTH CAROLINA



2023 04/21/2023 **SPECIFICATIONS**



NO SCALE

b. Except when run under a concrete slab on grade, underground conduits shall be installed a minimum of 30" below grade. Trenching and backfilling shall comply with Section 16010 Electrical General Requirements.

damp, and wet locations shall be made with threaded conduit hubs of zinc coated malleable iron.

c. All underground conduits shall have metalized warning tape installed above the conduit that identifies the specific system buried below. The warning tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5 mils). Tape shall be 6 inches wide with black lettering imprinted on a color-coded background that conforms to APWA color code specifications. Tape shall be installed 18 inches above the conduit and in no case less than 6 inches

d. Installation of PVC conduit shall be in accordance with the manufacturer's recommendations using solvent welded couplings and fittings. Field bends shall be made with approved heating equipment. Open flames are not permitted. An insulating bushing or end-bell shall be provided at each termination.

e. Conduits shall be rigidly supported not more than 8 feet on center and shall be concealed within walls, ceilings, and floors, except as indicated or specifically approved by the Architect/Engineer; kept at least 6" from flues and steam or hot water pipes; and protected against the entry of dirt, plaster, or trash. Raceways shall be supported independently of suspended ceiling members and suspension wires.

f. PVC conduits that turn up inside walls shall transition to EMT no greater than 60 inches above slab or at the first box encountered, whichever comes first.

g. Suspended EMT shall be provided with additional hangers at elbows and bends, and where necessary to avoid strain at couplings and connectors.

h. Exposed conduits, where permitted, shall be run parallel or perpendicular to walls, structural members, and ceilings; with right-angle turns consisting of symmetrical bends or cast metal fittings with threaded hubs. Offsets may be used where necessary if they are of minimum length.

i. Conduits crossing expansion and contraction joints shall cross perpendicular to the joint and shall be provided with expansion fittings. Conduits shall not be embedded in the concrete slabs at the expansion and contraction joints.

Conduit may not be installed laterally in any concrete slab where the outside diameter of the conduit, measured at a coupling, exceeds one-third the thickness of the concrete. Conduits shall occupy the middle third of the slab when practical and leave at least 3/4-inch concrete cover. Where reinforcing bars occur at the 3/4-inch level the conduit shall be run inside them toward the center of the slab. Conduits may cross each other within the slab provided the 3/4-inch concrete cover is maintained. Conduits shall be tied to the reinforcing rods or otherwise supported when necessary to prevent sagging when concrete is poured. They shall be laterally spaced not closer that three diameters on centers to allow complete coverage.

k. Immediately after installation, conduit openings shall be covered to prevent entrance of foreign matters. Covers shall remain in place throughout the rough-in stage.

When installing conduit on interior surface of exterior walls, mount ¼ inch from wall with clamp backs or strut.

CONDUCTORS

1.1 <u>SCOPE:</u>

a. Furnish and install a complete system of wire and cable.

1.2 SUBMITTALS:

a. Submit for approval manufacturer's data sheets for all conductor types. All wire shall be listed by an "approved" third party testing agency.

2.1 <u>MATERIALS:</u>

- a. Insulated conductors shall be as manufactured by Encore, Southwire, General Cable or approved equal.
- b. Unless otherwise indicated, all wire and cable conductors shall be copper.

c. Conductors shall be not smaller than #12 AWG except that #10 AWG minimum is required for the entire length of 120-volt branch circuits whose distance to the center of the load exceeds 75 feet. #14 AWG may be used for signal and remote-control circuits. #16 AWG may be used for taps to individual recessed lighting fixtures on circuits protected by overcurrent devices rated at 20 amperes or less and contained within flexible metal conduits that do not exceed 6 feet in length. Conductors that are smaller than #14 AWG may be used only where specifically indicated on the drawings or specified herein.

- d. Conductors #10 AWG and smaller shall be solid, dual rated type THWN/THHN.
- e. Conductors #8 AWG and larger shall be Class B stranded, dual rated type THWN/THHN.
- f. Each conductor shall bear easily readable markings along entire length, indicating size and insulation type.

h. Conductors in any location subject to abnormal temperature shall be furnished with an insulation type suitable for

g. Insulation on conductors #10 AWG and smaller shall be suitably colored in manufacture.

i. Where no indication is made of wire size, the conductor shall be of N.E.C. size to match its overcurrent protective

device, but in no case smaller than #12 AWG.

j. Joints in solid conductors shall be spliced using Ideal "wire-nuts", 3M Company "Scotchlock" or T&B connectors in junction boxes, outlet boxes and lighting fixtures.

k. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuit connections.

3.1 SPLICES, TAPS, AND CONNECTIONS:

a. Splices in conductors #10 AWG and smaller shall be made with twist-on spring steel devices UL listed as Pressure Cable Connectors, with integral insulating covers rated 75°C at 600 volts, except that those used for connections to light fixtures and other heat-producing equipment shall comply with temperature ratings marked on the equipment but not less than

b. Splices in copper conductors #8 AWG and larger shall be made with mechanical devices UL listed as Pressure Cable Connectors and insulated with thermoplastic tape UL listed for use as sole insulation. Tape may be omitted from connectors supplied with securely fastened insulating covers which completely enclose the connector and the conductors. Insulating covers shall be rated 75°C at 600 volts.

c. Connect solid wires to equipment, switches, and devices equipped with binding screw terminals by looping the wire under the screw head in such a manner that the loop is tightened as the screw is tightened. Straight-in wiring under screw

d. Stranded wires shall not be inserted into back-wiring holes on devices, nor shall they be directly connected to screw head terminals. They shall be fitted with insulated crimp-on type spade terminals for connection under the screw head.

e. Joints in stranded conductors shall be spliced by approved mechanical connectors and gum rubber tape or friction tape. Solderless mechanical connectors for splices and taps, provided with U/L-approved insulating covers, may be used instead of mechanical connectors plus tape.

f. Conductors, in all cases, shall be continuous from outlet to outlet and no splicing shall be made except within outlet or junction boxes, troughs and gutters.

g. All single-phase circuits shall be provided with individual neutral. Utilizing multi-pole breakers for single-phase circuits sharing a neutral is not allowed. No more than three current carrying conductors allowed per conduit, except three single-phase branch circuit conductors, each with individual neutrals, shall be allowed in a conduit.

3.2 <u>COLOR CODING:</u>

a. All wiring shall be color-coded.

b. On 120/208V, 3 phase, 4 wire power systems, conductor insulation shall be color coded Black (Phase A), Red (Phase B), Blue (Phase C), and White (Neutral).

d. Conductors #4 AWG and larger may be identified with two or more bands of appropriate color plastic tape applied near each splice and termination. Painting of wire will not be acceptable.

e. Phase sequence shall be "A", "B" and "C" from left to right, top to bottom or front to back when facing equipment.

f. Control and signal wiring shall not use the above-named colors except green for grounding. Any other colors or striping may be used but the coding shall provide same color or striping between any two terminals being joined.

g. Switch legs, including "Travelers", shall be the same color as phase circuit conductors.

3.3 BRANCH CIRCUIT RACEWAY WIRING:

a. Three-phase circuits shall be limited to one such circuit per raceway. They shall consist of three different phase wires, and a neutral where required.

b. A neutral shall not serve more than one circuit. Run a separate neutral for each 120 Volt circuit.

c. The neutral carrying all or any part of the current of any specific load shall be contained in the same raceway or enclosure with the phase wire or wires also carrying that current.

Circuits shall be connected to panels as shown in the panel schedules.

e. Conductors supplying lighting outlets may be combined in the same raceways with conductors supplying receptacles; but lighting outlets and receptacle outlets shall not be connected to the same circuits unless specifically indicated on the drawings.

3.4 SERVICE & FEEDER CONDUCTORS:

a. Unless specifically shown otherwise, each feeder and each set of service conductors shall be installed in a 1.2 SUBMITTALS

b. Where paralleling of conductors is shown for feeders or service entrance, it is absolutely required they be the same length between terminations.

b. Where service or feeder conductors are so installed that the conductor markings cannot be read without moving or twisting conductors, they shall be provided with suitable tags indicating the conductor size and insulation.

GROUNDING AND BONDING

a. The electric system neutral, the neutral of each separately derived system, and all non-current-carrying metal parts, raceways, and enclosures shall be permanently and effectively grounded.

b. Grounding and bonding shall be provided in strict accordance with the National Electrical Code, and as specified herein and on the drawings.

The Contractor shall note that required grounding conductors and connections are not all shown on the drawings.

NEC requirements apply.

1.2 SUBMITTALS:

Submit for approval manufacturer's data sheets for grounding and bonding materials.

2.1 MATERIALS AND APPLICATIONS:

a. Grounding conductors shall be of THWN insulated copper, unless otherwise indicated.

Grounding bus bars in distribution equipment shall be bare copper.

c. Aluminum and aluminum alloys are not acceptable as grounding materials.

d. Clamps for attaching conductors to water pipes and ground rods shall be of bronze. Ground rod clamps shall be U.L. listed for direct burial.

e. Clamps for attaching conductors to building steel shall be of steel, bronze, or malleable iron.

f. Threaded hubs for bonding metal raceways to the contained grounding electrode conductors and to the water pipe clamps shall be of bronze or malleable iron. Similar hubs shall be used to bond the same raceways to the conductors and

g. Driven grounding electrodes shall consist of copper clad steel rods. Rods shall be 10 feet long and 3/4" diameter unless otherwise indicated.

Bonding bushings shall be of steel or malleable iron with non-removable plastic throats rated 150°C.

Bonding locknuts and wedges for service conduits shall be of zinc coated steel. Grounding type insulated bonding bushings and jumpers shall be provided where conduits terminate in service entrance equipment, generator feeders, transfer switches, transformers, and where concentric, eccentric, or over-sized knockouts are encountered. The jumpers shall be sized per NEC Table 250-66 for services, generator feeders, and transformers, and per Table 250-122 for branch circuits.

3.1 ELECTRICAL EQUIPMENT GROUNDING:

a. All non-current-carrying metal parts, raceways, and enclosures of the electrical system and of equipment supplied through the electrical system shall be permanently and effectively grounded.

b. Equipment grounding conductors shall be provided for each feeder and for each branch circuit and shall be contained within the same raceways as the feeder and branch circuit conductors. The equipment grounding conductor shall be THWN insulated copper, not smaller than #12 AWG.

c. Copper bonding strips normally included in small sizes of liquid-tight flexible metal conduit and dependent upon the terminal connectors for bonding continuity will not be accepted in lieu of the equipment grounding conductors specified

d. Grounding terminals on wiring devices, other than isolated ground receptacles, but including switches, shall be connected to the equipment grounding conductor included in the branch circuit raceway, and to the device box with suitable jumpers and lugs bolted to the box, not the plaster ring. "G" clips are not acceptable, and "self-grounding" type device mounting screws will not be accepted as the device grounding method.

e. Where metal raceways enter sheet metal enclosures through knockouts provide bonding bushings and jumpers to the enclosure under any of the following conditions:

Voltage exceeds 250 volts to ground.

2. Branch circuit conduit exceeds 1" in size.

Feeder conduit regardless of voltage and size.

f. Where isolated grounds are indicated, or required to serve isolated ground type receptacles, provide two equipment grounding conductors of equal size; one to ground raceways, boxes, and other enclosures; the other to connect to the isolated grounding terminals on the equipment or its special receptacle. Both grounding conductors shall be provided in each branch circuit and each feeder raceway back to the point where the service neutral, or the separately derived system neutral, is connected to ground.

3.2 GROUNDING OF OTHER SYSTEMS:

a. All metal piping systems including water piping, gas piping and sprinkler piping shall be permanently and effectively bonded to the electrical equipment ground system as required by N.E.C. 250.

Provide intersystem bonding termination device for other systems as required by N.E.C. 250.94

c. Structural metal systems shall be permanently and effectively bonded to the electrical grounding electrode system as required by N.E.C. 250.

3.3 SEPARATELY DERIVED SYSTEMS:

a. The secondary of a Dry-Type Transformer, and the output of a Generator or UPS with a neutral that is not solidly connected to the service neutral is a Separately Derived System and must be grounded per NEC 250.

b. The Grounding Electrode Conductor for the neutral and equipment of each Separately Derived System shall be connected to the nearest accessible member of the grounded structural metal building frame where applicable; or, in the absence of suitable structural metal, to the nearest accessible cold-water pipe. This connection shall remain accessible after

c. Grounding Electrode Conductors for Separately Derived Systems shall be without splice and shall be contained

d. Bond the following together within the enclosure of each Dry-Type Transformer, unless otherwise indicated:

Transformer secondary neutral.

5. Equipment Grounding Conductor included in raceway with secondary service conductors.

BOXES

a. Furnish and install outlet boxes, switch boxes, pull boxes, terminal boxes, junction boxes and floor boxes complete as shown and specified.

a. Unless specifically noted or approved otherwise, boxes shall be of zinc coated steel or cast ferrous alloy as manufactured by Steel City, Raco, Crouse-Hinds, Appleton, or approved equal.

c. For exposed work in interior dry locations less than 8 feet above a floor or platform in other than Electrical, 3.1 INSTALLATION: Mechanical or Communications Closets or Equipment Rooms, boxes shall be of cast metal with threaded conduit hubs and matching covers; or of zinc coated sheet steel of NEC gauge and size with screw fastened covers and no knockouts or

d. For exposed work in interior dry locations in Electrical, Mechanical, or Communications Closets or Equipment Rooms; or, in other dry areas, 8 feet or more above a floor or platform, boxes 5" square and larger shall be NEC gauge and size of zinc coated sheet steel. 4" octagonal, 4" square and 4-11/16" square "knockout" boxes shall be of zinc coated steel, NEC gauge and size. Box extensions are not permitted on exposed "knockout" boxes and covers shall be of the raised surface

e. For concealed work, fixture outlet boxes shall be 4" octagonal minimum, provided with plaster rings in plastered surfaces. Concrete ring boxes shall be used in poured concrete. Switch and outlet boxes in plastered and dry walls shall be 4" square minimum or one-piece multi-gang with appropriate plaster rings. Switch and outlet boxes in exposed brick, block or tile walls shall be single or multi-gang one-piece boxes not less than 3-1/2" deep with square corners and with internal device mounting holes, equal to Steel City Type GW. Boxes in walls finished with ceramic tile or wood paneling shall be 4" square minimum or one-piece multi-gang boxes, fitted with appropriate tile rings having square corners and internal device mounting holes. Gangable boxes are not permitted.

3.1 <u>INSTALLATION:</u>

Set recessed boxes with edges flush with finished surfaces.

b. Immediately after installation cover boxes to prevent entrance of foreign matter.

the Contractor's responsibility to comply with the evident intent for centering or symmetric arrangement in ceiling and wall spaces. Special attention is also directed to the location of any outlets which are built into, or located in relation to, other features such as shelving, work counters, and equipment. The Contractor shall consult plans and shop drawings on such features and locate outlets as thereby indicated.

d. Mounting heights indicated herein and on the drawings are approximate dimensions of the center of the box to the floor and may vary slightly to clear obstructions and match joints in masonry. References to "Horizontal" and "Vertical" apply to the orientation of the long dimension of a single-gang plate and of the device mounting strap. Alignment tolerance shall be 1/16 0.2% inch. Unless otherwise indicated wall outlet boxes shall be mounted as follows:

1. Receptacle, and communications outlets shall be installed vertical, 18" up.

2. Outlets indicated as "counter height," as well as boxes for wall switches, fire alarm manual stations, and wall telephones shall be installed vertical, 46" up, clear of wall cabinets, back-splashes, and wainscot interferences.

with the bottom of the device 80" above the floor, whichever is lower. 4. Switch boxes shall be installed vertical, 46" up. Switch boxes beside doors shall be on the strike side, with

e. Junction and pull boxes may be used as necessary to facilitate wiring provided, they are hidden from sight (but accessible), or installed in locations where exposed wiring is permitted, or flush mounted at locations approved by the Architect/Engineer.

WIRING DEVICES

1.1 <u>SCOPE:</u>

a. The Contractor shall furnish and completely install lighting switches, convenience outlets, and special purpose

b. When connection to an item of equipment is required under this contract, and where such equipment requires a receptacle for connection, the Contractor shall furnish and install the appropriate device, whether the device is specifically shown or specified.

1.2 SUBMITTALS:

Submit for approval catalog data sheets for all wiring devices.

Leviton, or Eagle.

b. Catalog numbers of one or more of the manufacturers are used herein and, on the drawings, to set a standard of quality and capacity. Equivalent products of the other named manufacturers are also acceptable, provided they are submitted and approved in accordance with Section 16010, Electrical General Requirements.

c. All wiring devices of any one general type (e.g., all duplex receptacles or all light switches) shall be of the same manufacturer and shall match throughout.

2.2 WIRING DEVICES AND PLATES - GENERAL:

Wiring devices shall be industrial specification grade unless otherwise indicated.

Receptacles shall be listed to meet the requirements of Fed Spec WC596.

Switches shall be listed to meet the requirements of Fed Spec W-5-896E.

Unless otherwise indicated or directed, wiring devices shall be gray in color.

e. Unless otherwise indicated, plates for flush outlets shall be stainless steel (type 302) and shall be standard size. Those for surface cast boxes shall be of steel, of shape and finish to match the box. Screws shall be steel slotted head oval type to match the plate. Quantity of 2% spare cover plates of each type shall be provided to the owner.

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f. Each wiring device (including each switch) shall be equipped with a Hex-Head green grounding screw for grounding the device and plate to the outlet box and to the equipment grounding conductor run with the circuit conductors. "Self-Grounding" type mounting screws will not be accepted as the device grounding method.

a. Switches used for lighting control shall be listed to Fed. Spec. W-S-896E and rated 20 amps, 120-277 VAC, side wired, Hubbell 1221 series.

b. Switches used for disconnecting small single-phase motors and appliances shall be listed to Fed. Spec. W-S-896E and rated 20 or 30 amps to match the branch circuit rating and comply with their horsepower ratings, 120-277 VAC, side wired. Hubbell 1221 and 3031 series.

c. Weatherproof switches shall be equipped with stainless steel covers UL listed for wet locations with cover closed, Pass and Seymour WP-1.

d. Switches with collars around the operating toggle will not be accepted.

2.4 <u>RECEPTACLES:</u>

a. Receptacles shall be listed to UL498 and Fed Spec W-C-596. Unless otherwise indicated or required, receptacles shall be the duplex type, side and back wired, with nylon face. On circuits supplying two or more such receptacles, they shall be rated 15 amps, 125 volts, NEMA 5-15R. Duplex receptacles on individual circuits shall be rated 20 amps, 125 volts, NEMA 5-20R. Receptacles shall conform to NEMA WD-1, WD-6 and UL498.

b. When no other features are indicated on the drawings provide Hubbell 5262 and 5362 series for 5-15R and 5-20R respectively.

c. When indicated on the drawings provide Ground Fault Circuit Interrupter receptacles, Hubbell GF5262 and GF5362 series for 5-15R and 5-20R respectively. GFCI receptacles shall be Class A, listed to UL standard 943.

d. When indicated on the drawings, weather-resistant receptacles shall consist of Ground Fault Circuit Interrupter receptacles as specified above with a weather-resistant "WR" rating. Provide with aluminum covers UL listed for wet locations while-in-use, Pass and Seymour WIUCAST1.

a. Devices shall be mounted tightly to boxes and be adjusted plumb and level. Devices shall be mounted flush with its associated coverplate. Ears on flush devices shall be in uniform contact with wall surfaces, or the devices shall be fitted with Caddy RLC device levelers. Device plates shall not be used for support of flush devices.

b. When two or more devices are indicated for gang installation, they shall be trimmed with gang type plates.

c. Grounding type receptacles shall be grounded with insulated copper grounding conductors routed with the circuit

The Contractor shall provide suitable testers, and demonstrate, when directed, that receptacles are operational and correctly wired; and that ground fault circuit interrupter type receptacles will trip when current to ground has a value in the range of 4 through 6 milliamperes.

MISCELLANEOUS MATERIALS

a. Contractor shall furnish and install miscellaneous materials as indicated on the drawings and as herein specified.

1.2 <u>SUBMITTALS:</u>

Submit for approval manufacturer's data sheets on each device specified by this section.

otherwise noted, contact rating shall be 10 amps, continuous for the applied voltage level.

The relay coil shall operate satisfactorily with coil voltages within 85% to 110% of its voltage rating. Unless

b. Time delay relays shall be provided with on-delay or off-delay as required, and repetitive accuracy of plus or minus

c. Relays shall be installed in a suitable enclosure to fit the environment of their location.

Relays shall be manufactured by GE, Square D, Eaton or approved equal.

2.2 CONTACTORS:

its voltage rating.

a. Contactors shall be "electrically held" or "mechanically held" type, as indicated on drawings.

b. Electrically held contactors shall include auxiliary contacts as indicated and line and load terminal connectors.

c. Mechanically held contactors shall be industrial type, single or dual solenoid operator, with mechanism capable of

withstanding reduction or loss of control voltage without change of position. Contactor shall incorporate control power cut-out contacts so that the magnetic solenoid operator is only momentarily energized during the instant the switch changes position. d. Contactor core and coil assembly, or operators, shall operate satisfactorily with coil voltage within 85% or 110% of

e. All contacts shall be of non-welding, non-corroding silver alloy.

f. Rating of contactors shall be as indicated on drawings. Auxiliary relays shall be provided as applicable. Contactors shall be contained in a suitable enclosure for the environment of their location. Contactors shall be suitable for a continuous load not less than 100% of their electrical rating.

g. Contactors shall be manufactured by GE, Square D, Eaton or approved equal.

positions and the marking of nameplates as indicated on drawings or otherwise specified.

2.3 <u>INDIVIDUAL PUSHBUTTONS, SELECTOR SWITCHES AND INDICATING LIGHTS:</u> a. Pushbuttons shall be heavy-duty, oil-tight, momentary, or maintained contact, as applicable, devices rated 600 volts with the number of buttons and the marking of nameplates in accordance with NEMA Publication No. ICS.

closed circuit-opening contacts, or combination thereof. Pushbuttons shall have positive make and break non-welding, noncorroding silver alloy contacts. c. Selector switches for control circuits shall be heavy-duty, oil-tight maintained contact devices with the number of

b. Pushbuttons shall be designed with the indicated number of normally open circuit-closing contacts, normally

d. Indicating lights for control circuits shall be oil-tight, instrument type devices with threaded base and collar for flush mounting and translucent convex lens. Indicating lights shall be long life type, rated 7500 hours, minimum. Provide Owner with two spare indicating lights of each size and type used.

e. Pushbuttons, selector switches and indicating lights shall be contained in an enclosure suitable for the

environment of their location, and shall be Square D Class 9001, Type T Series, or equivalent as accepted by the A-E, and

shall be Square D Class 9001, Type T Series, or approved equal. 2.4 CONTROL CIRCUIT TRANSFORMERS:

a. Control circuit transformers shall be provided within the enclosure of magnetic contactors when indicated on drawings or specified otherwise and the line voltage is more than 120 volts. The transformer shall be dry type single phase, 60 hertz alternating current with a 120-volt isolated secondary winding in accordance with NEMA Publication STL "Specialty

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04-21-2023

REVISION DATE

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MSWG Project

23-035

ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE GEORGETOWN, SOUTH CAROLINA



2023 04/21/2023 **SPECIFICATIONS**

SPECIFICATIONS

NO SCALE

E3.1

Insulation for grounding conductors on all systems shall be Green.

within steel raceways and bonded to the raceway at both ends. Raceway may be omitted only where specifically indicated on 2.3 <u>SWITCHES:</u>

Grounding Electrode Conductor described above.

Transformer enclosure. Equipment Grounding Conductor included in raceway with primary feeder conductors.

Submit for approval manufacturer's data sheets for all box types.

2.1 MATERIALS AND APPLICATIONS:

b. For exposed work on the exterior of the building, and in damp or wet interior locations, boxes shall be of cast metal with threaded conduit hubs and gasket sealed covers; or of zinc coated sheet steel of NEC gauge and size with screw fastened gasket sealed covers and threaded conduits hubs of zinc coated malleable iron and no knockouts or extraneous openings. Cover screws shall be stainless steel.

extraneous openings. Cover screws shall be steel.

type. "Handy" boxes are not permitted.

c. Scaling of plans for outlet locations is not necessarily accurate enough for the intent of these specifications. It is

3. Fire alarm signal devices shall be installed with the top of the device approximately 6" below the ceiling or

edge approximately 2" from door jamb or trim.

receptacles along with appropriate outlet boxes and device plates as indicated on the drawings and as herein specified.

a. Wiring devices and device plates shall be manufactured by Hubbell, Bryant, Arrow Hart, Pass and Seymour,

PANELBOARDS specified. the bolt-on type. these functions. **SPECIFICATIONS**

NO SCALE

Transformers".

- b. The rated primary voltage of the transformer shall be not less than the rated voltage of the controller. The rated secondary current of the transformer shall be not less than continuous duty current of the control circuit.
- c. The voltage regulation of the transformer shall be such that with rated primary voltage and frequency the secondary voltage will not be less than 95% or more than 105% of rated secondary voltage.

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d. The source of supply for control circuit transformers shall be taken from the load side of the main disconnecting device. The primary and secondary windings of the transformer and control circuit wiring shall be protected against overloads and short circuits with properly selected fuses. The secondary winding of the control circuit transformer shall be grounded.

PART 3: EXECUTION

- 3.1 <u>INSTALLATION:</u>
 - a. Devices specified by this section shall be installed such that only one wire is terminated on any given screw.
- 3.2 <u>COMMISSIONING:</u>

a. For all lighting control devices specified in this section, provide a factory-certified field service engineer to make a site visit to ensure proper system installation and operation under following parameters:

- Qualifications for factory-certified field service engineer:
- (a) Minimum experience of 2 years training in the electrical/electronic field.
- (b) Certified by the equipment manufacturer on the system installed.
- 2. Make a visit upon completion of installation of lighting control device:
- (a) Verify connection of power feeds and load circuits. (b) Verify connection and location of controls.
- (c) Program system data.
- (d) Verify proper operation of manufacturers interfacing equipment.
- (e) Obtain sign-off on system functions. (f) User to be trained on system operation.

1.1 SCOPE:

Furnish and install Lighting, Power, and Distribution Panelboards as indicated on the drawings and as herein

1.2 <u>SUBMITTALS:</u>

- Submit for approval panelboard shop drawings which include as a minimum the following information:
 - Cabinet dimensions.
 - Mounting requirements.
 - Bussing arrangement.
 - Circuit breaker arrangement. Accessories.

2.1 BRANCH CIRCUIT PANELBOARDS:

- Panelboard types, ratings, and contents shall be as shown on the Drawings.
- Equipment shall be built to NEMA Standard PB-1, UL Standards UL50 and UL67, and NEC requirements.
- Panelboard back-boxes shall be constructed of galvanized sheet steel and shall be securely fabricated with screws, bolts, rivets, or by welding. Back-boxes shall be a minimum 20" wide and 5-3/4" deep, unless noted otherwise, and heights shall not exceed 72" overall. Top or bottom gutter space shall be increased 6" where feeder loops through panel. End plates shall be supplied without knockouts.
 - d. Covers shall be constructed of high-grade flat sheet steel with:

1. Door-in-door construction shall be provided. The inside hinge door shall allow access to device ndles only. Door shall close flush with cover and against a full inside trim stop. Hinges shall be inside type. The outer hinged door shall allow access to wiring gutter.

- 2. A flush latch and tumbler type lock, so panel door may be held closed without being locked. All such locks shall be keyed alike. Furnish to the Owner two keys with each lock, or a total of 10 keys for the project. 3. Four or more cover fasteners of a type which will permit mounting plumb on box. Cover shall also have inside support studs to rest on lower edge of back-box while being fastened. For flush mounted panelboards, cover fastening hardware shall be concealed behind the hinged door.
- e. A means shall be provided for readily adjusting projection of panel interior assembly with all connections in place. A method requiring stacking of washers is not acceptable. Interior trim shall fit neatly between interior assembly and cover leaving no gaps between the two.
- Panelboard phase and neutral bus bus-work shall be copper. A copper ground bus shall be provided in each
- Minimum short circuit rating of any panelboard assembly shall be 10,000A. Furnish panelboards with higher rating where so noted or where evidently intended by specification of circuit breakers with higher interrupting capacity.
 - h. Ampacity of mains shall be equal to, or greater than, the ampacity of the feeder unless otherwise indicated.
- Where drawing schedules indicate spaces for addition of future circuit breakers; furnish all necessary buswork, strap, brackets, hardware, and removable blank covers.
- Breakers in panelboards shall be physically arranged in locations shown in panel schedules on the drawings where possible. They shall be connected to the phases as shown. Unless otherwise indicated and where available for the panelboard type specified, circuit breakers shall be of
- Provide surge suppressor external to panelboard as indicated on the drawings and by Section 16401 of the specifications for limiting surge voltages and to prevent continued flow of follow current while remaining capable of repeating

3.1 <u>INSTALLATION:</u>

- Equipment shall be perfectly plumb and level.
- Openings in back-boxes shall be cut or sawed with tools made for that purpose. Burning of openings is unacceptable.
 - Unused openings shall be closed.
- Only one solid wire is allowable under a screw. Provide approved lugs for connecting stranded wire or more than one solid conductor.
- e. Centered above the breakers in each panelboard attach a nameplate indicating panel designation for example "PANEL A", or "PANEL MDP". Nameplates shall comply with <u>SECTION 16100 BASIC MATERIALS AND</u> METHODS.
- Panelboard back-boxes shall be mounted with their tops 6'-8" above the floor.

LIGHTING FIXTURES AND ACCESSORIES

1.1 <u>SCOPE:</u>

a. The Contractor shall furnish and completely install Lighting Fixtures and Accessories as indicated on the

drawings and as herein specified.

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 A lighting fixture shall be provided for each lighting outlet indicated. Outlets lacking fixture designations shall be brought to the attention of the Architect/Engineer before submitting proposal; otherwise, units selected by the Architect/Engineer shall be furnished and installed at no additional charge.

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1.2 <u>SUBMITTALS:</u>

a. Submit for approval complete manufacturer's data sheets for all fixtures. Indicate all components, characteristics, and options.

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b. Submit for approval Lighting Fixture samples as requested by the Architect/Engineer. Samples shall be equipped with lamps, cords, plugs, and ballasts for 120-volt operation.

2.1 <u>LIGHTING FIXTURES:</u>

- All fixtures shall be labeled by Underwriters' Laboratories, Inc.
- Fixture designations on the drawings generally consist of a letter indicating the fixture type. Fixture types are identified in the Lighting Fixture Schedule or Symbol Schedule; however, the Schedule does not necessarily list all accessories and hardware necessary for the complete installation, nor does it detail the construction to be encountered at the fixture locations. It is the Contractor's responsibility to properly determine and provide correct components, accessories, and hardware required for the installation.
- Plastic materials indicated to be "acrylic" shall be of 100% virgin methyl methacrylate produced by Rohm and Haas, Dupont, or Cyanamid.

2.2 <u>LED DRIVERS:</u>

- Provide with ten-year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity
- Drivers shall be designed and tested to withstand electrostatic discharges up to 15,000 V without
- impairment per IEC801-2. Electrolytic capacitors shall operate at least 20 degrees C below the capacitor's maximum temperature rating when the driver is under fully loaded conditions and under maximum case
- Provide with a maximum inrush current of 2 amperes for 120V and 277V drivers. Drivers shall withstand up to a 4,000-volt surge without impairment of performance as defined by
- ANSI C62.41 Category A. Drivers shall be manufactured in a facility that employ ESD reduction practices in compliance with
- ANSI/ESD S20.20. Drivers shall have a Class A Sound Rating – Inaudible in a 27-dBA ambient.
- Drivers shall have no visible change in light output with a variation of plus/minus 10 percent line voltage input.
- Drivers shall have Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements.
- Drivers shall track evenly across: Multiple fixtures.
- All light levels.
- Constant current drivers shall: Support from 200mA to 2.1 Amps (in 10mA steps) to ensure a compatible driver exists.
- Support LED arrays up to 40W or 50W (710mA to 1.05A in 10mA steps).
- a. Support from 10V to 40V (in 0.5V steps) to ensure a compatible driver exists. Support LED arrays up to 40W.
- Drivers shall operate properly from a supply voltage of 120 through 277VAC at 60Hz.

2.3 <u>EMERGENCY EGRESS LUMINARE:</u>

- a. Shall be completely self-contained, provided with maintenance-free 12-volt battery, automatic charger, two lamps, and other features. Luminaire shall be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, South Carolina State Building Code, Volume X Energy Code, NFPA-101, and NEMA Standards.
- Pilot light shall indicate the unit is connected to A.C. power. The battery shall have high-rate charge pilot light, unless self-diagnostic type. A test switch shall simulate the operation of the unit upon loss of A.C. power by energizing the lamps from the battery. This simulation must also exercise the transfer relay. An LED charging indicator light must be easily visible after installation and a remote test switch shall be installed adjacent to the fixture.
- c. Battery shall be sealed, maintenance free type, with minimum of 90 minutes operating endurance. Battery have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0-degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive terminal and – negative terminal.
- Charger shall be fully automatic solid-state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.
- e. The entire unit shall be warranted for three years. The battery must have an additional two more years' prorated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.
- Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection. Any unit which fails the test must be repaired or replaced and tested again. The test shall demonstrate that the batteries conform to the requirements of NEC 700.12 (F).

PART 3: EXECUTION

3.1 <u>COORDINATION:</u>

 Contractor shall verify ceiling or wall type in or on which each fixture is to be mounted, and shall furnish unit with appropriate trim type, mounting hardware, and accessories to fit the construction; and feed through junction boxes as required to maintain proper access to system wiring.

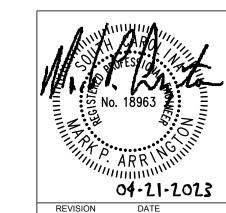
3.2 <u>INSTALLATION:</u>

- Lighting fixtures shall be installed in accordance with the manufacturer's instructions.
- b. Lighting fixtures shall be supported from the building structure using corrosion resistant steel hardware in compliance with Section 16100, Basic Materials and Methods.
- fixture unless otherwise indicated or approved by the Architect/Engineer. The supports shall be located at diagonal corners of rectangular fixtures and angled away from fixture. A minimum of three full twists shall be made at each end to secure wire. d. In addition to the supports from the structure, fixtures shall also be secured to suspended ceilings on which

A minimum of two No. 12 gauge wire supports attached to the structure shall be provided for each lighting

- they are mounted, or in which they are recessed. Where fixtures are secured to suspended ceilings, the primary supports from the building structure shall be slack.
- e. Where installed recessed in grid type ceilings, the fixtures shall be attached to the main runners of the suspended ceiling at all four corners using sheet metal screws.
- Conductors in fixture taps shall be #16 AWG minimum, type TFN, in 3/8" flexible metal conduit of 72" maximum length. A green insulated equipment grounding conductor shall be included.
 - Mount fixtures plumb and square. Keep rows in perfect line.
 - At time of project completion, fixtures shall be clean and fully operational.





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ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE GEORGETOWN, SOUTH CAROLINA



2023 04/21/2023

SPECIFICATIONS