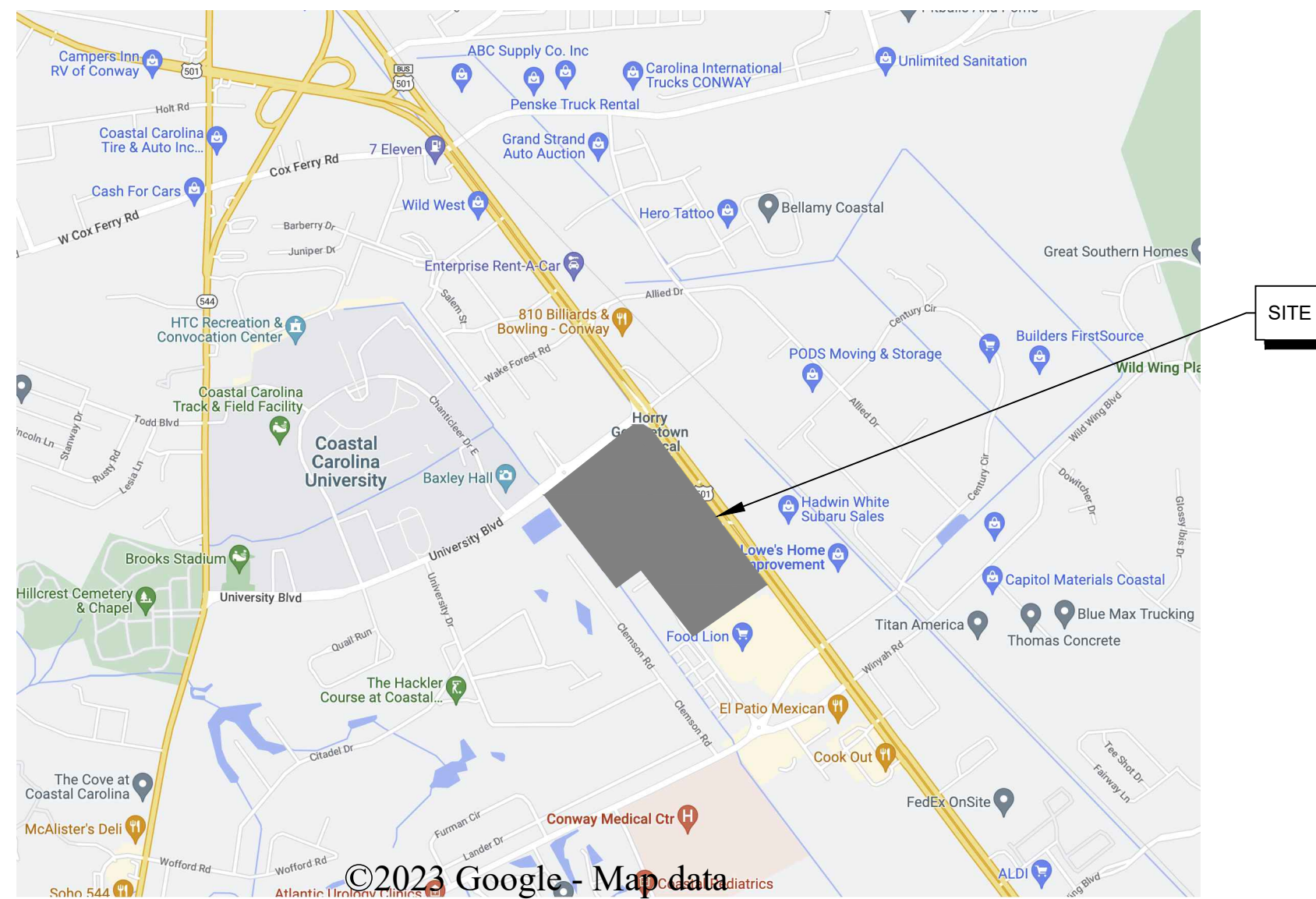
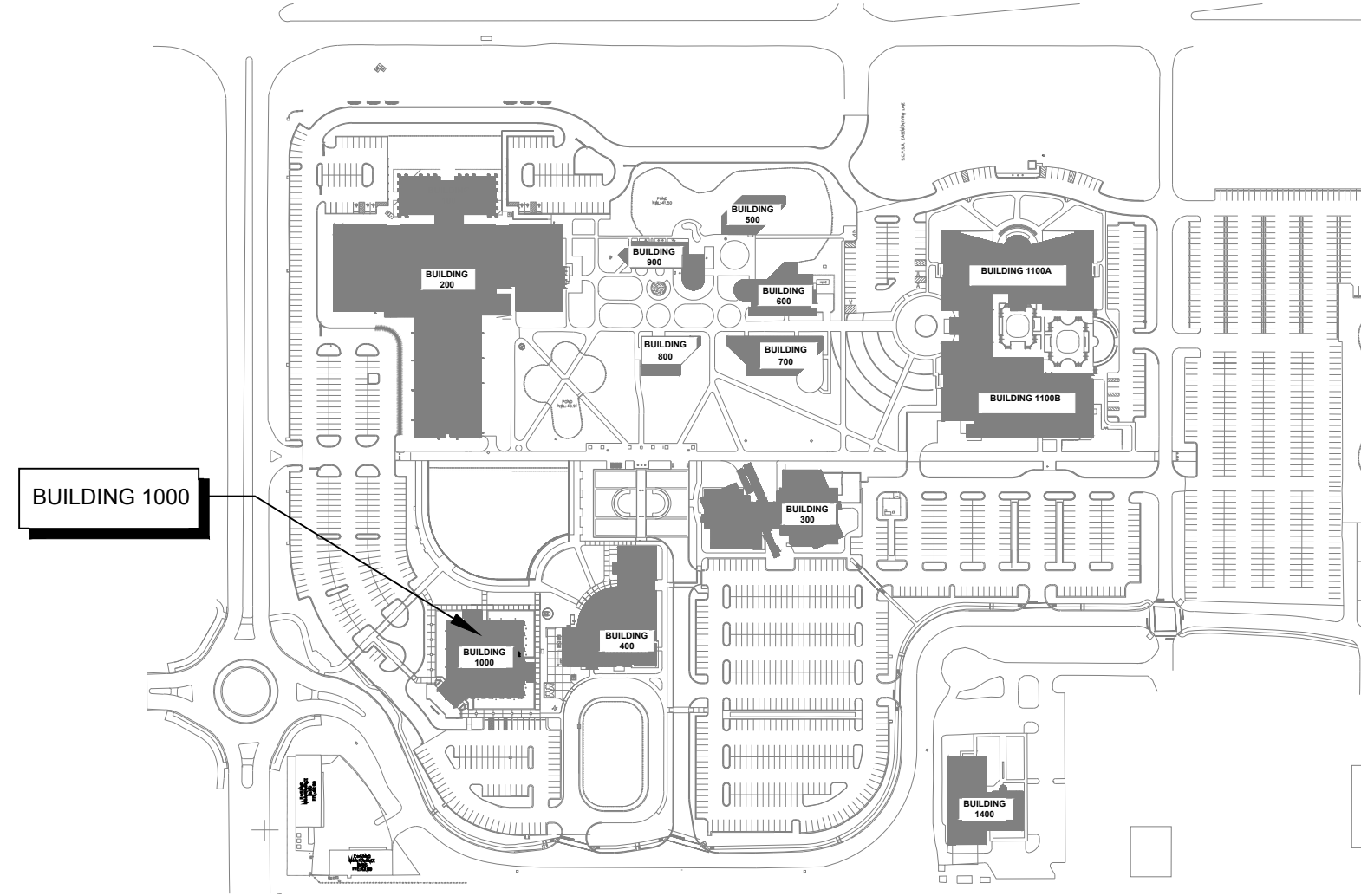


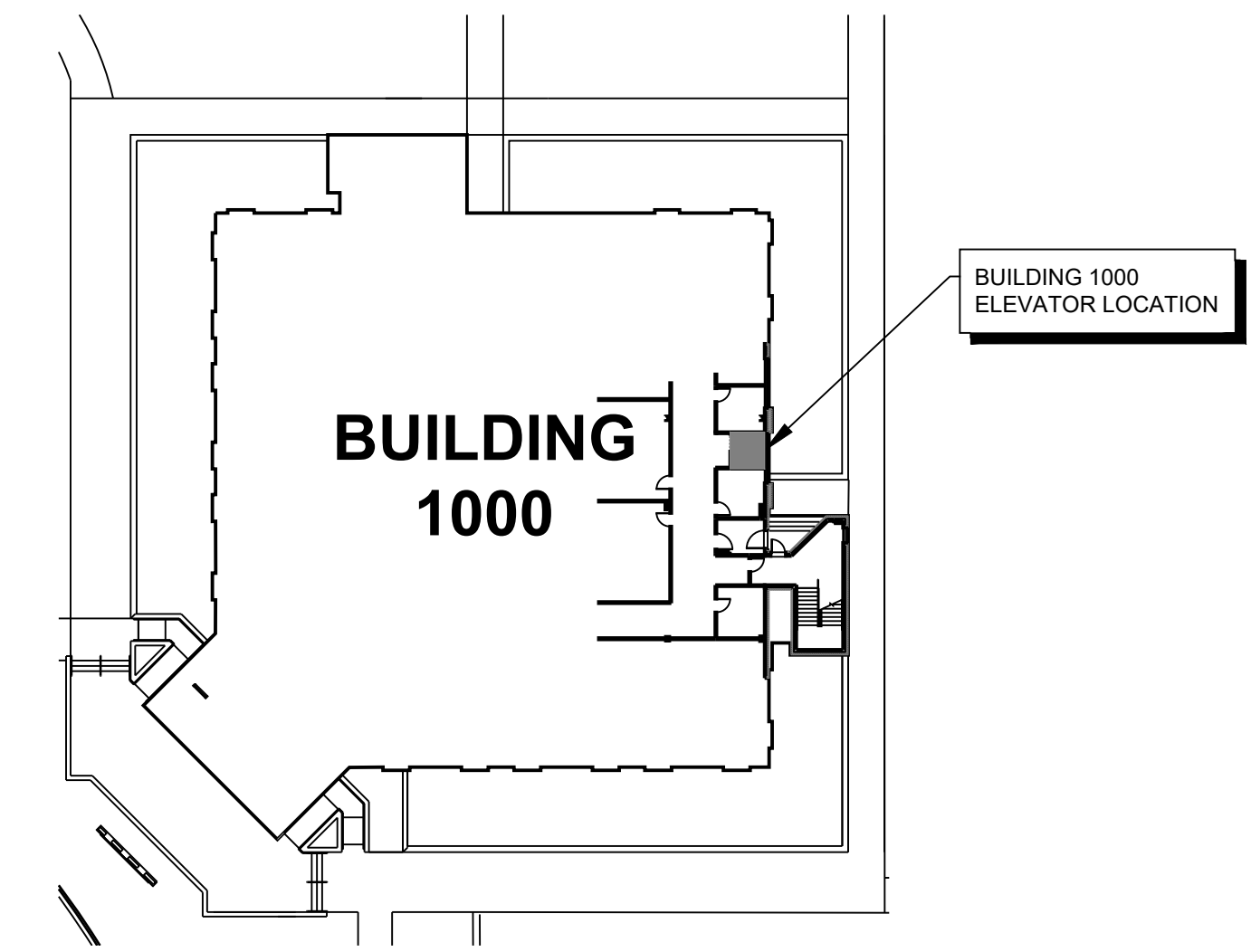
VICINITY MAP - HORRY GEORGETOWN
TECHNICAL COLLEGE



HORRY GEORGETOWN TECHNICAL
COLLEGE
ENLARGED MAP



BUILDING 1000 ELEVATOR
LOCATION
ENLARGED MAP



CODE INFORMATION

DRAWING INDEX

SYMBOLS AND ABBREVIATIONS

PROJECT DESIGNED IN ACCORDANCE WITH:

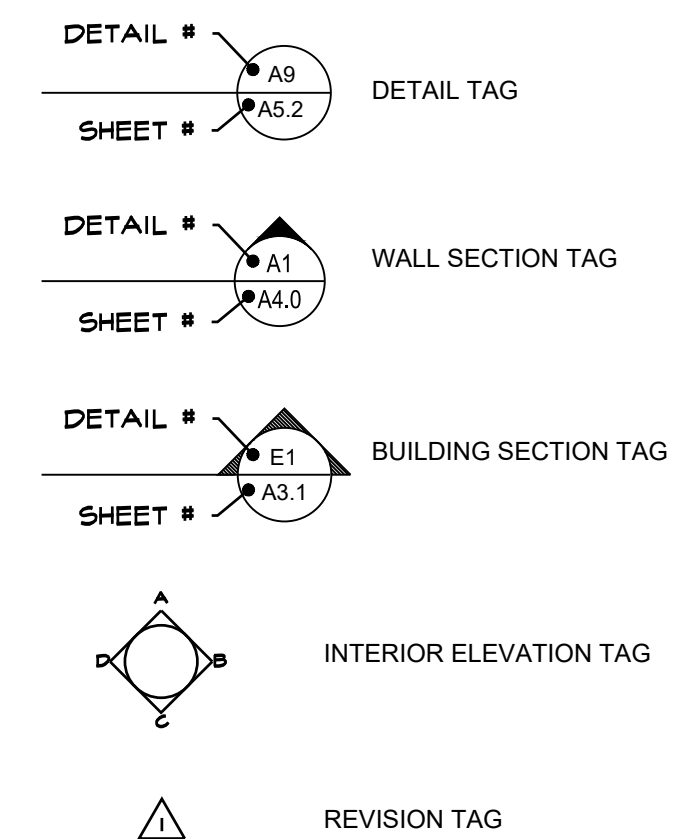
- A. International Building Code (IBC), 2021 Edition with SCBC modifications
- B. International Existing Building Code (IEBC), 2021 Edition
- C. International Fire Code (IFC), 2021 Edition with SCBC modifications
- D. International Energy Conservation Code (IECC), 2009 Edition
- E. International Fuel Gas Code (IFGC), 2021 Edition with SCBC modifications
- F. International Mechanical Code (IMC), 2021 Edition with SCBC modifications
- G. International Plumbing Code (IPC), 2021 Edition with SCBC modifications, and the following insertions:
 - 1. Section 305.4.1, insert "18" and insert "18"
 - 2. Section 903.1, insert "8"
- H. International Code Council Performance Code (ICCPC), 2021 Edition, upon State Engineer's approval
- I. National Electrical Code (NEC) (NFPA-70), 2020 Edition with SCBC modifications
- J. Latest edition of the ICC A117.1, American National Standard: Accessible and Usable Buildings and Facilities - 2017 Edition
- K. State Fire Marshal rules, regulations, and policies.
- L. South Carolina Elevator, Code, & Regulations.
- M. ASME A17.1 - 2019 Safety Code for Elevators and Escalators

ARCHITECTURAL

- A1.0 FLOOR PLANS AND DETAILS
- A1.1 UL DESIGNS

ELECTRICAL

- E1.0 SYMBOLS AND FLOOR PLANS
- E2.0 RISERS AND SCHEDULES
- E3.0 SPECIFICATIONS
- E3.1 SPECIFICATIONS
- E3.2 SPECIFICATIONS
- E3.3 SPECIFICATIONS



THE FOLLOWING IS A LIST OF ABBREVIATIONS (BUT NOT LIMITED TO); FOR USE WITH ALL ARCHITECTURAL DRAWINGS.

- | | |
|--|---|
| ACMU = ARCHITECTURAL CONCRETE MASONRY UNIT | MATL. = MATERIAL |
| ACT = ACOUSTICAL CEILING TILE | MANUF. = MANUFACTURER |
| ADA = AMERICAN DISABILITIES ACT | MTL. = METAL |
| AFF = ABOVE FINISH FLOOR | NA = NOT APPLICABLE |
| ALUM. = ALUMINUM | NL = NOT IN CONTRACT |
| AP = ACCESS PANEL | OC = ON CENTER |
| BM. = BEAM | OFCC = OWNER FURNISHED CONTRACTOR INSTALLED |
| BTM. = BOTTOM | OFOI = OWNER FURNISHED OWNER INSTALLED |
| CLS. = CEILING | ORD. = OVERFLOW ROOF DRAIN |
| CMU = CONCRETE MASONRY UNIT | PLY = PLYWOOD |
| COL. = COLUMN | PLYND. = PLYWOOD |
| COORD. = COORDINATE | PT = PRESSURE TREATED |
| CPT = CARPET | PTD. = PAINTED |
| CT = CERAMIC TILE | PVD = PLYWOOD |
| CTB = CERAMIC BASE TILE | RCP = REFLECTED CEILING PLAN |
| CTM = CERAMIC WALL TILE | RD. = ROOF DRAIN |
| DR = DOOR | RE = REFER TO / REFERENCE SHEET |
| DTL. = DETAIL | RNB = RUBBER WALL BASE |
| EA. = EACH | SAP = SECURITY ACCESS PANEL |
| ELEV. = ELEVATION | SCHED. = SCHEDULE |
| EXT. = EXTERIOR | SHLV. = SHELVES |
| FD = FLOOR DRAIN | SHM = SECURITY HOLLOW METAL |
| FEC = FIRE EXTINGUISHER CABINET | SIM. = SIMILAR |
| FFE = FINISH FLOOR ELEVATION | SNL = SECURITY NARROW LITE |
| FOM = FACE OF MASONRY | TYP. = TYPICAL |
| FRP = FROST PROOF HYDRANT | UNC. = UNLESS NOTED OTHERWISE |
| FRP = FIBERGLASS REINFORCED PANEL | VGT = VINYL COMPOSITION TILE |
| GALV. = GALVANIZED | W. = WITH |
| GYP. BD. = GYPSUM WALL BOARD | WGTS. = WEIGHTS |
| GWB = GYPSUM WALL BOARD | |
| HWL. = HARDWARE | |
| HST. = HEIGHT | |
| HM = HOLLOW METAL | |
| INFO. = INFORMATION | |
| INT. = INTERIOR | |
| LAV. = LAVATORY | |

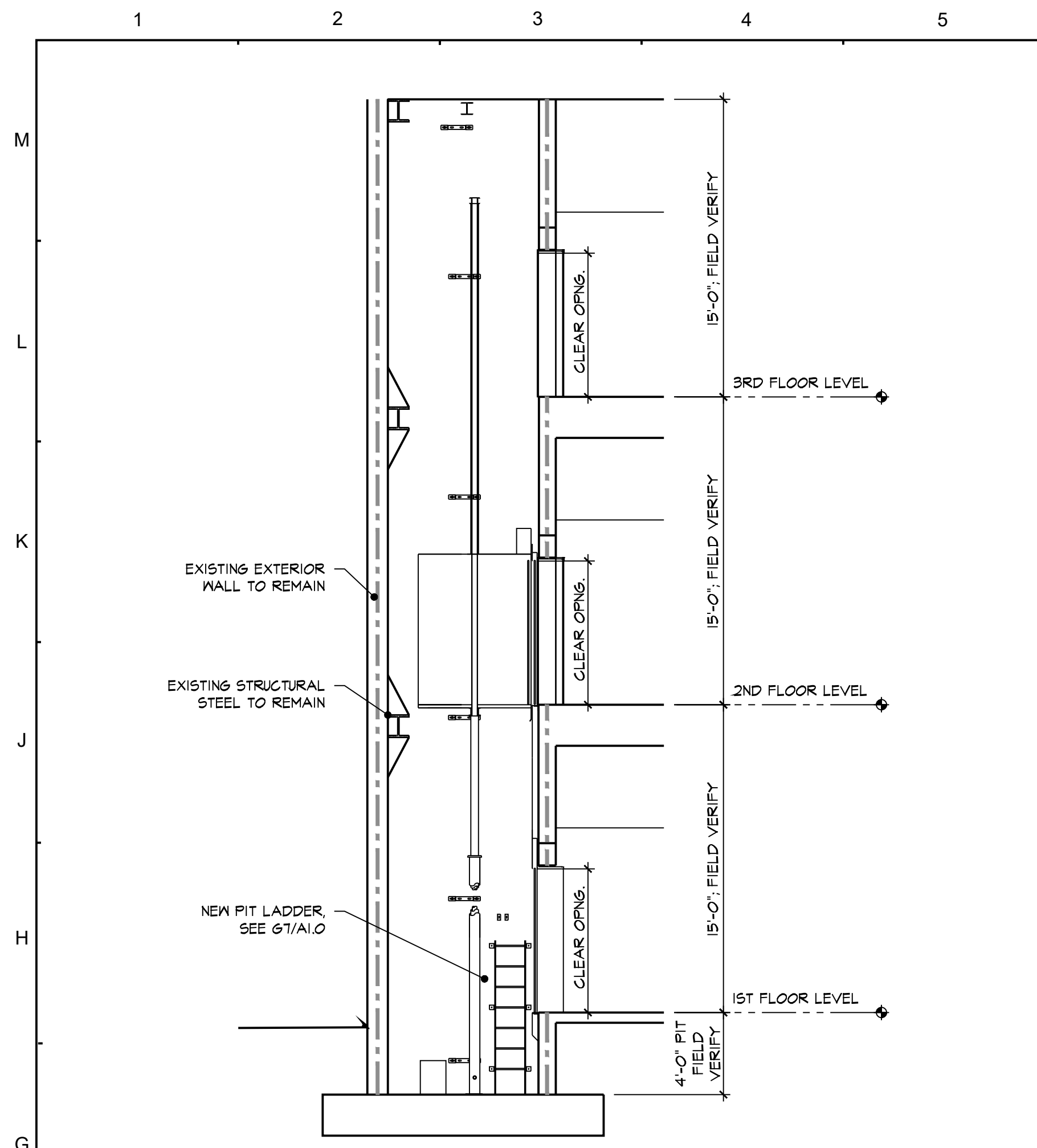
ARCHITECT
TYCH & WALKER ARCHITECTS, L.L.P.
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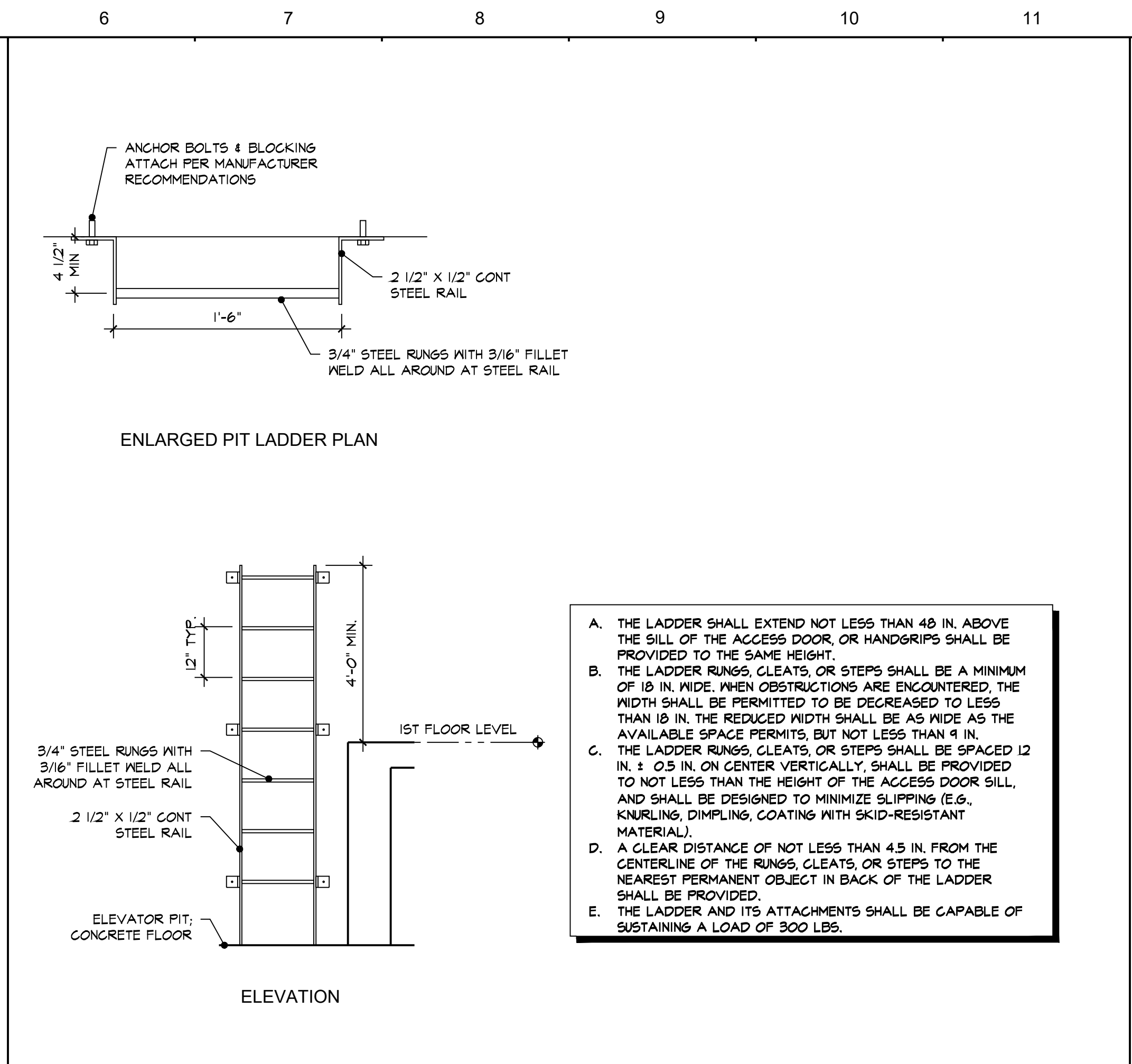
REPAIR & RENOVATE CONWAY BUILDING 1000 ELEVATOR

HORRY GEORGETOWN TECHNICAL COLLEGE
CONWAY, SOUTH CAROLINA

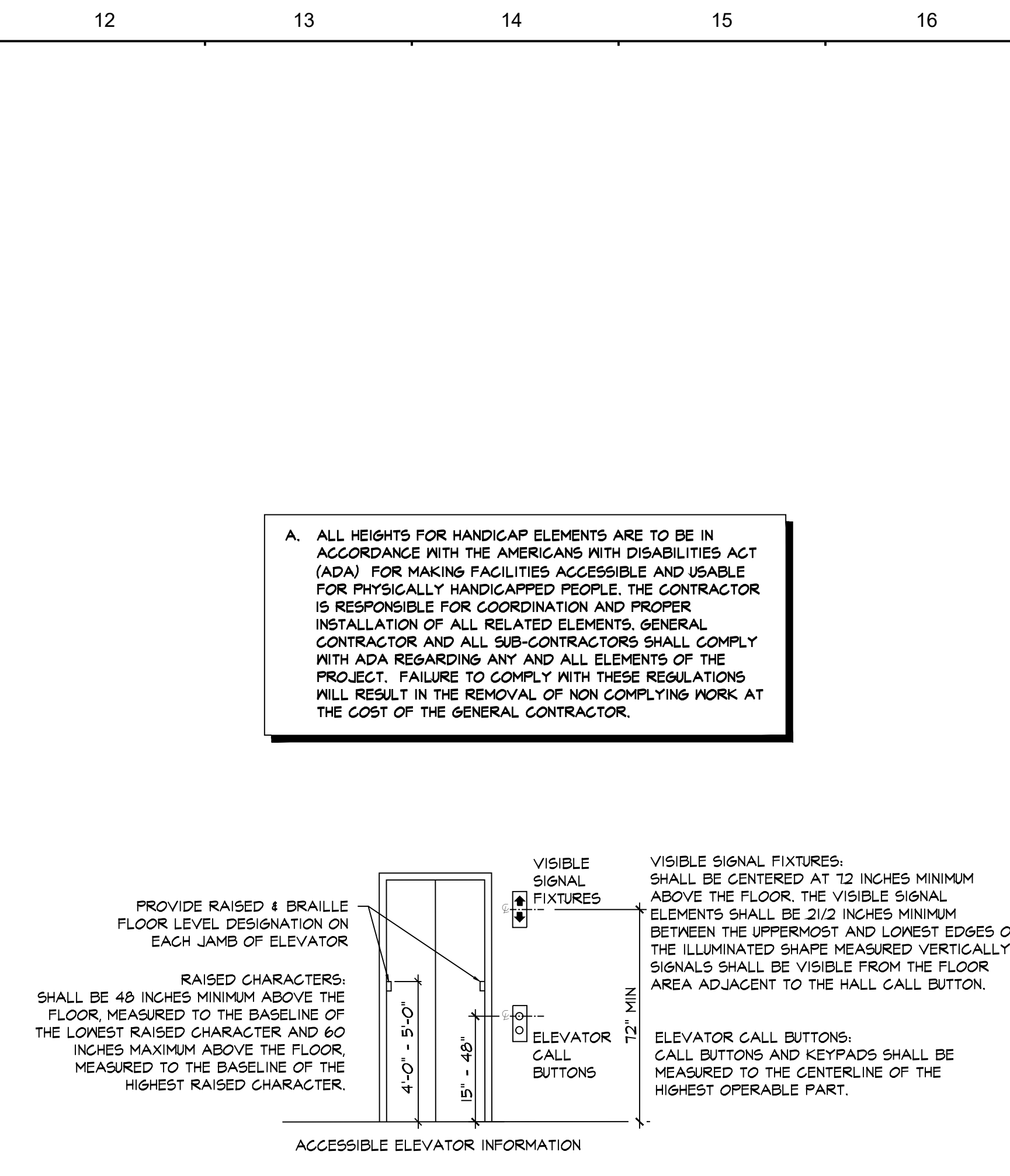
STATE PROJECT
#H59-6218-PG



G1 ELEVATOR SHAFT SECTION
A1.0 SCALE: 3/16"=1'-0"

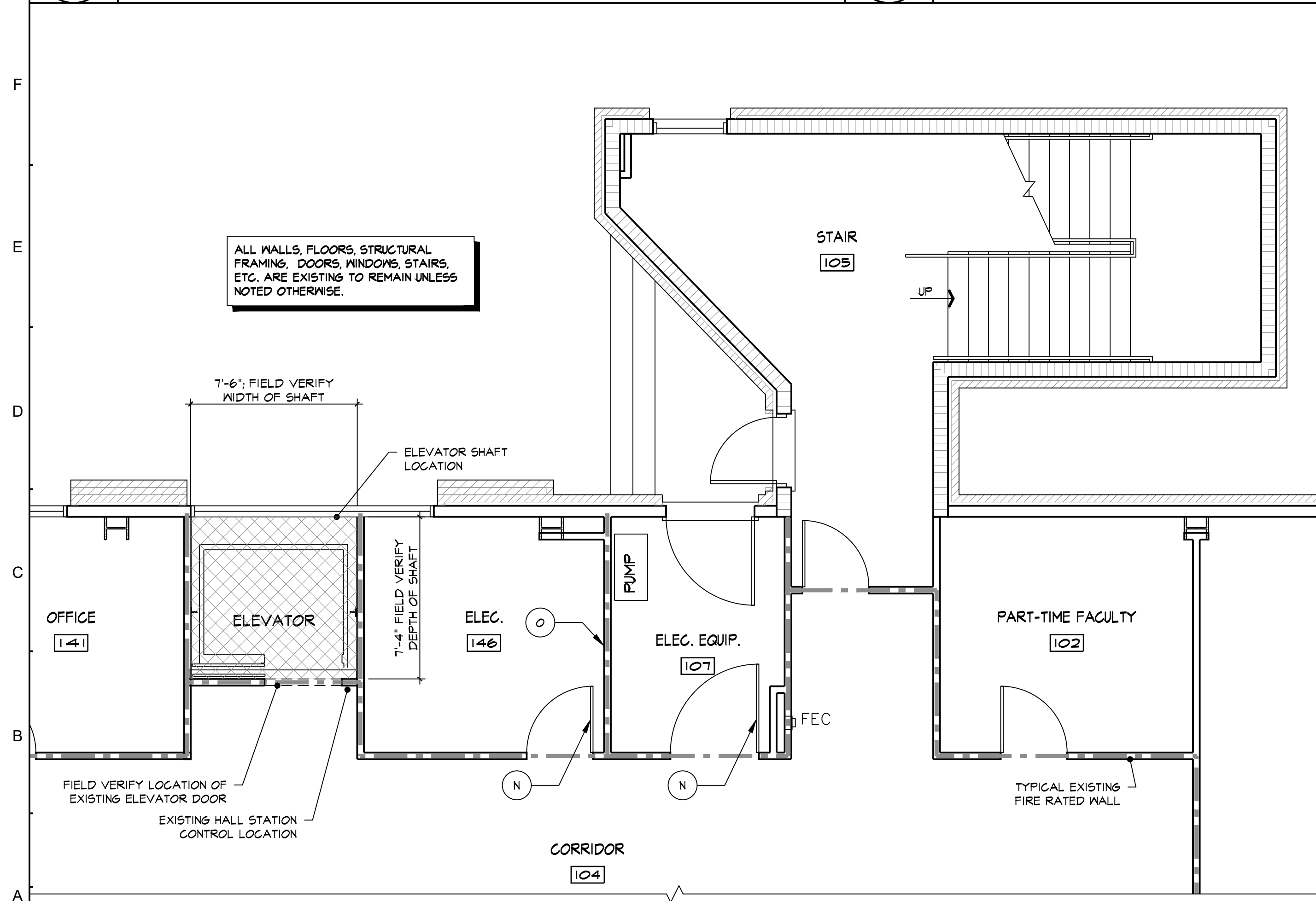


G6 PIT LADDER
A1.0 SCALE: 3/16"=1'-0"

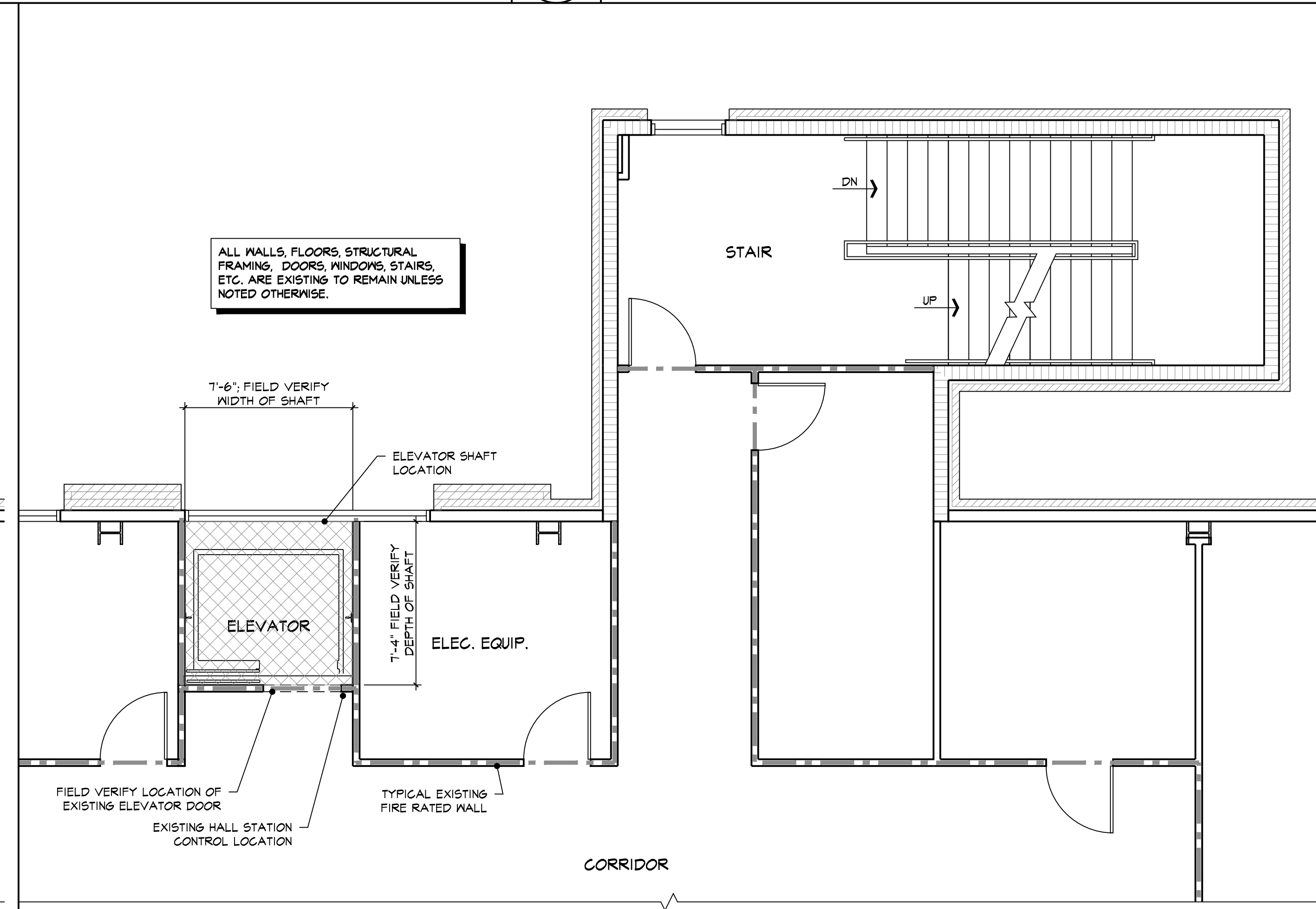


G12 ACCESSIBLE ELEVATOR INFORMATION
A1.0 SCALE: 1/4"=1'-0"

- GENERAL NOTES**
- A. NOTIFY ARCHITECT IMMEDIATELY UPON DISCOVERY OF ANY CONDITIONS THAT ARE CONTRARY TO THOSE REPRESENTED WITHIN THE DRAWINGS. THE PLAN CUT IS TAKEN AT 4'-6" AFF.
 - B. THESE DRAWINGS HAVE BEEN DEVELOPED FROM EXISTING DRAWINGS WHICH MAY NOT REFLECT ACTUAL FIELD CONDITIONS. THE CONTRACTOR SHALL VERIFY THESE DRAWINGS WITH EXISTING FIELD CONDITIONS AND NOTIFY THE ARCHITECT IMMEDIATELY OF INCONSISTENCIES BETWEEN THE DRAWINGS AND ACTUAL CONDITIONS BEFORE PROCEEDING WITH CONSTRUCTION.
 - C. THE CONTRACTOR IS TO VISIT THE SITE AND BECOME FAMILIAR WITH SCOPE AND LIMITS OF DEMOLITION WITH NEW CONSTRUCTION REQUIREMENTS.
 - D. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY IF ANY WORK IN THE CONTRACT DOCUMENTS CANNOT BE PERFORMED DUE TO EXISTING FIELD CONDITIONS.
 - E. IF ANY EXISTING FIREPROOFING OR FIRE ASSEMBLIES THAT IS TO REMAIN, IS MISSING OR DAMAGED DURING DEMOLITION, THEN IT SHALL BE REPAIRED TO CONFORM TO THE ORIGINAL FIRE PROTECTION REQUIREMENTS. REVIEW THE EXISTING DOCUMENTS TO VERIFY THE U.L. ASSEMBLIES TO BE USED FOR REPAIRS.
 - F. REMOVE EXISTING CONSTRUCTION AS INDICATED. TYPICAL REMOVAL INCLUDES ELEVATOR AND ELECTRICAL SYSTEMS CONTAINED THEREIN. REMOVE DOORS, FINISHES AND OTHER FIXTURES AS REQUIRED.
 - G. THE CONTRACTOR SHALL VERIFY THAT EXIT EGRESS IS MAINTAINED FOR ALL OCCUPIED AREAS OF THE BUILDING THROUGHOUT ALL PHASES OF CONSTRUCTION.
 - H. DEMOLITION WORK SHALL BE EXECUTED IN CONFORMANCE WITH ALL APPLICABLE CODES AND ORDINANCES AS SET FORTH BY ALL GOVERNING AUTHORITIES.
 - I. THE CONTRACTOR SHALL BRACE ALL EXISTING STRUCTURES AND ALL STRUCTURAL ELEMENTS AS NEEDED DURING DEMOLITION OPERATIONS.
 - J. THE CONTRACTOR SHALL NOT CUT STRUCTURAL WORK IN A MANNER RESULTING IN A REDUCTION OF LOAD CARRYING CAPACITY OR LOAD/ DEFLECTION RATIO. THE CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER OF ALL STRUCTURAL CUTS PRIOR TO EXECUTION SO THAT APPROVAL CAN BE OBTAINED FROM THE ARCHITECT AND STRUCTURAL ENGINEER.
 - K. TURN OVER TO OWNER ANY ITEMS DEFINED AS REUSABLE BY OWNER THAT IS SCHEDULED TO BE REMOVED.
 - L. REFER TO THE ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION. THE GENERAL CONTRACTOR SHALL COORDINATE ALL DEMOLITION BETWEEN DIFFERENT TRADES.
 - M. THE CONTRACTOR SHALL REMOVE FROM SITE PROMPTLY AND LEGALLY ALL ITEMS NOT NOTED FOR REUSE OR REINSTALLATION OR DELIVERY TO THE OWNER.
 - N. REMOVE EXISTING NON-LABELED DOORS AND RETAIN ALL HARDWARE AND HINGES FOR LATER USE. EXISTING 1-HOUR FIRE RATED FRAME TO REMAIN. INSTALL NEW 1-HOUR FIRE RATED DOOR WITH LABEL. PROVIDE 3'-0" X 7'-0" DOOR INTO ELEC 146, AND 4'-0" X 7'-0" DOOR INTO ELEC EQUIP 107; DOORS AND SHALL BE SELF CLOSING AND SELF LOCKING. REINSTALL ALL RETAINED HARDWARE AND HINGES ON NEW DOORS. PROVIDE NEW DOOR CLOSURE FOR EACH DOOR. FALCON SC81A&R/W/P&X&LIM.
 - O. EXISTING WALL TO HAVE 5/8" TYPE "X" FIRE RATED GYP BOARD INSTALLED AT TOP OF WALL TO COVER EXPOSED METAL STUDS; EXTEND GYP BOARD UP TO BOTTOM OF STRUCTURE ABOVE TO MAINTAIN REQUIRED FIRE RATINGS.
 - P. NO SUMP PUMP IS REQUIRED FOR ELEVATOR PIT.



A1 FIRST FLOOR / LOWER PLAZA PLAN
A1.0 SCALE: 1/4"=1'-0"



A9 SECOND FLOOR PLAN - PARTIAL (THIRD FLOOR SIMILAR)
A1.0 SCALE: 1/4"=1'-0"

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REPAIR & RENOVATE CONWAY BUILDING 1000 ELEVATOR STATE PROJECT # H59-6218-PG HORRY GEORGETOWN TECHNICAL COLLEGE CONWAY, SOUTH CAROLINA

REVISION	DATE

2023
04/21/2023
FLOOR PLANS AND DETAILS

A1.0

GENERAL NOTES

A. NOTIFY ARCHITECT IMMEDIATELY UPON DISCOVERY OF ANY CONDITIONS THAT ARE CONTRARY TO THOSE REPRESENTED WITHIN THE DRAWINGS. THE PLAN CUT IS TAKEN AT 4'-6" AFF.

UL/cUL SYSTEM NO. W-J-0022
BLANK OPENING THROUGH CONCRETE WALL OR BLOCK WALL ASSEMBLY
F-RATING = 2-HR.
T-RATING = 1 3/4-HR.

FRONT VIEW

SECTION A-A

WJ0022b.010815

1. CONCRETE WALL ASSEMBLY (2-HR. FIRE-RATING) :
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL (MINIMUM 6" THICK).
 - B. ANY UL/cUL CLASSIFIED CONCRETE BLOCK WALL.
2. MINIMUM 5/8" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT.

NOTE : MAXIMUM DIAMETER OF OPENING = 2-1/2" OR A MAXIMUM AREA OF 4" WITH A MAXIMUM DIMENSION OF 2".

	HILTI, Inc. Tulsa, Oklahoma USA (800) 879-8000	Sheet 1 of 1	Drawing No. WJ
		Scale 3/16" = 1"	0022b
		Date Jan. 08, 2015	

Saving Lives through Innovation and Education

UL/cUL SYSTEM NO. W-J-0015
BLANK OPENING THROUGH CONCRETE OR BLOCK WALL ASSEMBLY
F-RATING = 2-HR.
T-RATING = 2-HR.

FRONT VIEW

SECTION A-A

WJ0015b.010815

1. CONCRETE WALL ASSEMBLY (2-HR. FIRE-RATING) :
 - A. LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL (MINIMUM 6" THICK).
 - B. ANY UL/cUL CLASSIFIED CONCRETE BLOCK WALL.
2. MINIMUM 4-3/4" THICKNESS MINERAL WOOL (MIN. 4 PCF DENSITY) TIGHTLY PACKED.
3. MINIMUM 5/8" DEPTH HILTI FS-ONE MAX OR FS-ONE INTUMESCENT FIRESTOP SEALANT.

NOTE : MAXIMUM AREA OF SQUARE, RECTANGULAR, OR CIRCULAR OPENING IS 240 SQ. IN. WITH A MAXIMUM DIMENSION OF 20".

	HILTI, Inc. Tulsa, Oklahoma USA (800) 879-8000	Sheet 1 of 1	Drawing No. WJ
		Scale 9/64" = 1"	0015b
		Date Jan. 08, 2015	

Saving Lives through Innovation and Education

UL/cUL SYSTEM NO. W-J-0006
BLANK OPENING THROUGH CONCRETE WALL OR CONCRETE BLOCK WALL
F-RATING = 1-HR. OR 2-HR.
T-RATING = 1-HR. OR 2-HR.

FRONT VIEW

SECTION A-A

WJ0006a.071602

1. CONCRETE WALL ASSEMBLY (1-HR. OR 2-HR. FIRE-RATING) (2-HR. SHOWN).
 - A. LIGHT WEIGHT OR NORMAL WEIGHT CONCRETE WALL (MIN. 4-3/4" THICK, FOR A 1-HR. FIRE-RATING).
 - B. LIGHT WEIGHT OR NORMAL WEIGHT CONCRETE WALL (MIN. 6" THICK, FOR A 2-HR. FIRE-RATING).
 - C. ANY UL/cUL CLASSIFIED SOLID OR FILLED CONCRETE BLOCK WALL.
2. HILTI CP 620 FIRE FOAM INSTALLED FLUSH WITH BOTH SURFACES OF THE WALL :
 - A. MINIMUM 4-3/4" THICKNESS, FOR A 1-HR. FIRE-RATING.
 - B. MINIMUM 6" THICKNESS, FOR A 2-HR. FIRE-RATING.

NOTE : MAXIMUM SIZE OF OPENING = 30" x 15".

	HILTI, Inc. Tulsa, Oklahoma USA (918) 252-6000	Sheet 1 of 1	Drawing No. WJ
		Scale 9/64" = 1"	0006a
		Date July 16, 2002	

Saving Lives through Innovation and Education

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REVISION	DATE

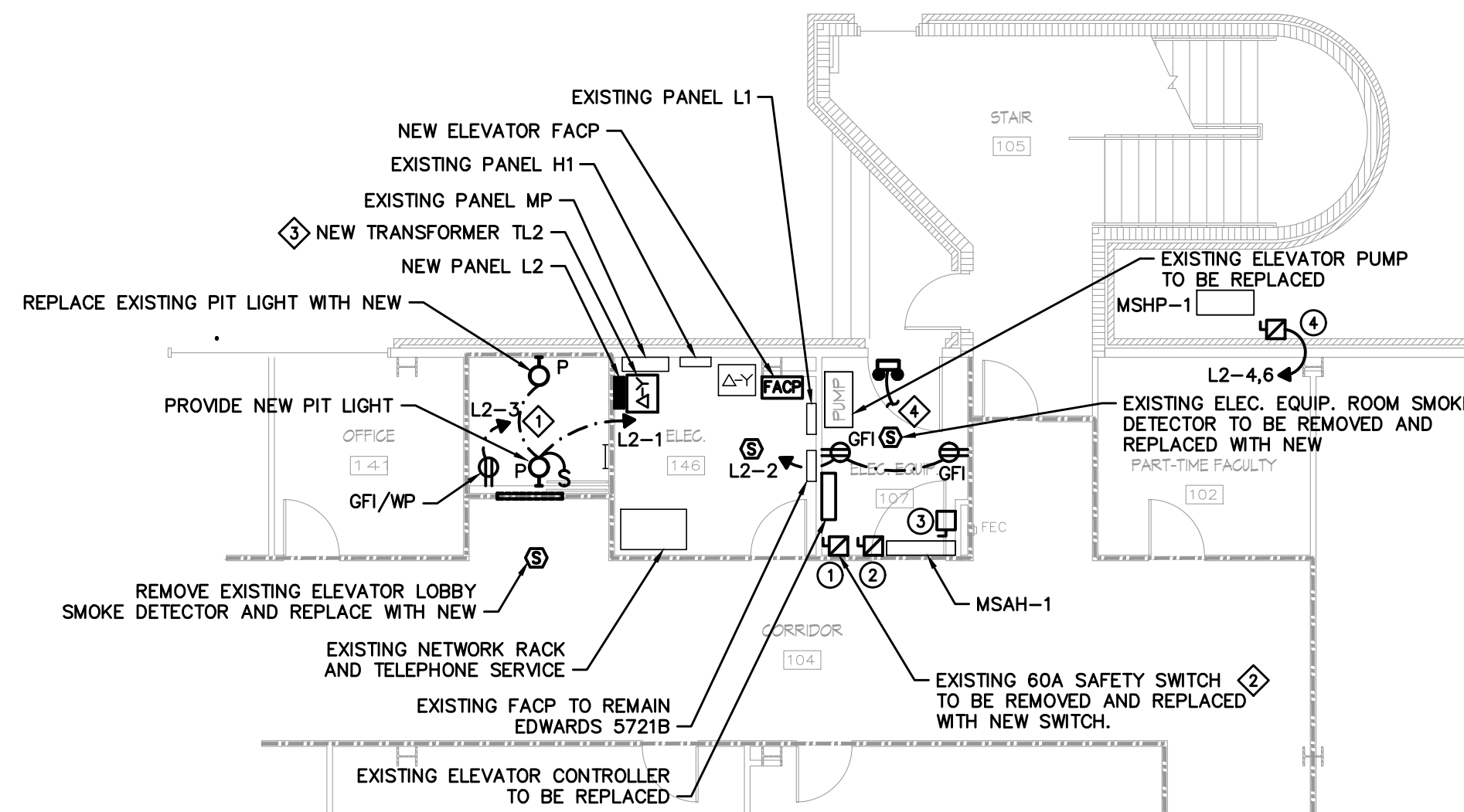
REPAIR & RENOVATE CONWAY BUILDING 1000 ELEVATOR STATE PROJECT # H59-6218-PG HORRY GEORGETOWN TECHNICAL COLLEGE CONWAY, SOUTH CAROLINA

2023
04/21/2023
UL DESIGNS

A1.1

SYMBOL SCHEDULE	
GENERAL 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 CIRCUITS.
⊕	JUNCTION BOX PER N.E.C.
Ⓢ	SPECIAL NOTE, NUMERALS IDENTIFY, SEE SCHEDULE.
①	SPECIAL CONNECTION TO A SPECIFIC ITEM OF EQUIPMENT. SEE CONNECTION SCHEDULE.
Ⓜ	MOTOR CONNECTION. RATING AS NOTED.
LIGHTING	
SYMBOL	DESCRIPTION
○	LED LIGHTING FIXTURE, WALL MOUNTED.
DISTRIBUTION	
SYMBOL	DESCRIPTION
☐	CONTROL CABINET, FLUSH OR SURFACE MOUNTED.
⊞	DISCONNECT SWITCH, NON-FUSIBLE.
⊞	DISCONNECT SWITCH, FUSIBLE.
—	GROUND CONNECTION.
WIRING DEVICES	
SYMBOL	DESCRIPTION
Ⓢ	DUPLEX RECEPTACLE, 125V, 3-WIRE GROUNDING TYPE.
ⓈGFI	DUPLEX RECEPTACLE, GROUND FAULT CIRCUIT INTERRUPTING.
ⓈGFI 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 ALARM SYSTEM	
SYMBOL	DESCRIPTION
FACP	FIRE ALARM SYSTEM CONTROL PANEL.
Ⓢ	FIRE ALARM SYSTEM CEILING MOUNTED PHOTOELECTRIC TYPE SMOKE DETECTOR.

LIGHTING FIXTURE SCHEDULE – LITHONIA VOLUMETRIC													
TYPE	DESCRIPTION	VOLT.	LAMPS					DRIVER	WATTS	MOUNTING	MANUF. CATALOG NO.		
			QTY	TYPE	BULB	BASE	TEMP					CRI	LUMENS
P	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	-	-	4000 K	80	2612	0-10V DIMMING	18	WALL, SURFACE	LITHONIA JDMW2 SERIES OR APPROVED EQUAL



1 FLOOR PLAN – FIRST FLOOR
SCALE: 1/8" = 1'-0"

- NOTES:**
- REFER TO DIAGRAM "SMOKE AND HEAT DETECTION IN ELEVATOR SHAFTS" FOR ADDITIONAL INFORMATION.
 - UTILIZE EXISTING 50/3 ELEVATOR CIRCUIT BREAKER (MP-25,27,29) 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#8,1#10G,1"C.
 - RELOCATE EXISTING ELECTRICAL EQUIPMENT AS NECESSARY TO MAKE SPACE FOR NEW TRANSFORMER AND PANEL L2. MOUNT NEW TRANSFORMER TL2 ON WALL ABOVE NEW PANEL L2.
 - CONNECT NEW EMERGENCY BATTERY LIGHT TO UNSWITCHED LEG OF EXISTING LIGHTING CIRCUIT IN THIS SPACE.

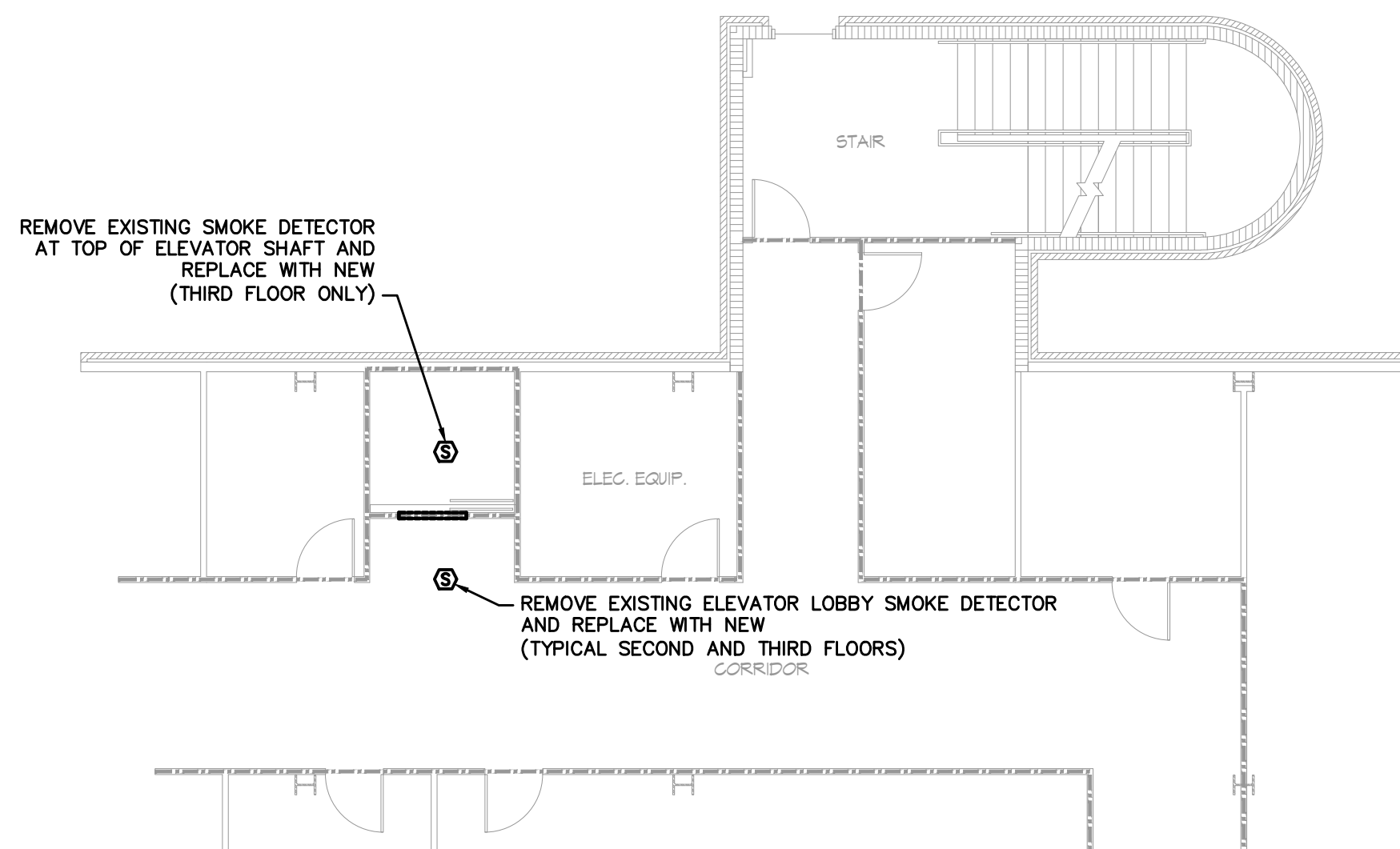
ABBREVIATIONS

A AMPERES	KW KILOWATTS
ACC ARMORED CLAD CABLE	LFNC LIQUIDTIGHT FLEXIBLE NON-METALLIC CONDUIT
AFF ABOVE FINISHED FLOOR	LFMC LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT
AFG ABOVE FINISHED GRADE	LVC LOW VOLTAGE CONTROL CABINET
ANN FIRE ALARM ANNUNCIATOR CABINET	MCB MAIN CIRCUIT BREAKER
C CONDUIT	MCC METAL CLAD CABLE
CB CIRCUIT BREAKER	MLO MAIN LUGS ONLY
CKT CIRCUIT	MTD MOUNTED
CLG CEILING	NMC NON-METALLIC CLAD CABLE
DN DOWN	PB PULLBOX
DW DISHWASHER	PNL PANELBOARD
EC EMPTY CONDUIT	PRS PROGRAM RAPID START
EMT ELECTRICAL METALLIC TUBING	PS PROGRAM START
ENT ELECTRICAL NON-METALLIC TUBING	PWR POWER
EWC ELECTRIC WATER COOLER	REC RECEPTACLE
FACP FIRE ALARM CONTROL PANEL	RMC RIGID METAL CONDUIT
FMC FLEXIBLE METAL CONDUIT	RS RAPID START
G GROUND	SW SWITCH
GFI GROUND FAULT INTERRUPTER	SWBD SWITCHBOARD
HOA HAND OFF AUTOMATIC	TTB TELEPHONE TERMINAL BOARD
HP HORSEPOWER	TEL TELEPHONE
HPF HIGH POWER FACTOR	TV TELEVISION
HX HIGH REACTANCE	TYP TYPICAL
IG ISOLATED GROUND	V VOLTS
IMC INTERMEDIATE METAL CONDUIT	VP VAPOR PROOF
IS INSTANT START	W WALL MOUNTED
JB JUNCTION BOX	WG 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)
ABOVE COUNTER TOP	46" AFF. (UNLESS OTHERWISE NOTED)
LIGHT SWITCH	46" AFF. (UNLESS OTHERWISE NOTED)
TELECOMMUNICATIONS	
GENERAL	18" AFF. (UNLESS OTHERWISE NOTED)
ABOVE COUNTER TOP	46" AFF. (UNLESS OTHERWISE NOTED)
WALL	46" AFF.
TELEVISION	18" AFF. (UNLESS OTHERWISE NOTED)
FIRE ALARM	
PULL STATION	46" AFF.
AUDIBLE/STROBE COMBINATION OR STROBE DEVICE ONLY	THE BOTTOM OF THE APPLIANCE SHALL BE: 80" ABOVE THE FINISHED FLOOR.



2 FLOOR PLAN – TYPICAL SECOND AND THIRD FLOORS
SCALE: 1/8" = 1'-0"

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MSWG Project
23-035

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ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE
CONWAY, SOUTH CAROLINA

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

E1.0

ELECTRICAL GENERAL REQUIREMENTS

1.1 SCOPE:

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.

1.2 DEFINITION:

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 RECORD DRAWINGS:

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.

d. All materials furnished, and all work installed shall comply with the National Fire Codes of the National Fire 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 below shall be followed:

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 company.

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:

a. 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 requirements of these specifications.

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.

d. 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.

2.3 EQUIPMENT DEVIATIONS:

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 therefor, 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.

3.1 GENERAL:

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 word "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 or shown on the drawings and not called for in the specifications must be furnished by the Contractor.

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 assure 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.

i. 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.

3.3 COORDINATION:

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 charge.

c. 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 SLEEVES, CUTTING, AND PATCHING:

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 touch-up or replace all damaged material. At the completion of the project, remove all dust from finished surfaces, including lighting fixtures, lenses and lamps.

b. 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 installation.

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.

c. 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.).

d. 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 SCOPE:

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 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 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.

5. Provide pilot lighting fixtures and switch and pilot 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.

c. Reference to "Rigid Conduit" or "RMC" indicates heavy-wall Rigid Metal Conduit only.

d. Reference to "IMC" indicates Intermediate Metal Conduit.

e. Reference to "PVC" indicates Rigid Nonmetallic Conduit.

f. 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.

c. Wire, perforated metal strap, and wooden plugs are not acceptable as fastening material.

d. Materials used shall be good quality, made of zinc or cadmium coated steel or other non-corroding material.

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

g. Equipment and raceways attached to outside walls, or interior walls subject to permanent moisture, shall be shimmied out with non-corrodible material to provide 1/4" air space between wall and equipment or raceway.

1.3 EQUIPMENT IDENTIFICATION:

a. 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.

c. 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:

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

RACEWAYS AND FITTINGS

1.1 SCOPE:

a. Provide complete raceway systems as indicated on the drawings, as herein specified, and as required by applicable codes.

b. All wiring shall be installed in raceways unless specifically noted otherwise.

1.2 SUBMITTALS:

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

2.1 MANUFACTURERS:

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

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

2.2 MATERIALS AND APPLICATIONS:

a. 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.

b. 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 electrical, mechanical, or communications closets or equipment rooms.

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.

f. 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 light or rain light as applicable. Setscrew, indenter, pressure cast and die cast fittings are not acceptable. Connectors for EMT, Flexible Metal Conduit and Liquid-light Flexible Metal Conduit shall be the installed 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.

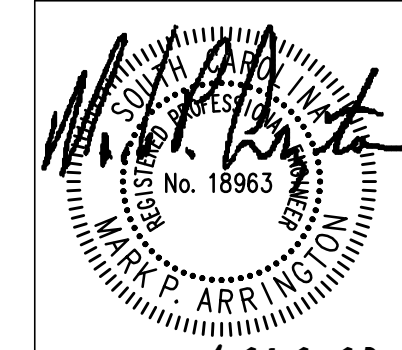
i. Raceway in patient care areas (as defined by NEC 517) shall comply with the requirements of NEC 517.13(A).

3.1 INSTALLATION:



PO Box 787692
Charlotte, NC 28271
704.527.2112
mswg.com

MSWG Project
23-035



TYCH & WALKER ARCHITECTS, LLP

38 BLACKGUM ROAD, UNIT B
PO BOX 509
PAWLEYS ISLAND, SC 29585
843-651-7151
mwalker@tychwalker.com

Table with 2 columns: REVISION, DATE. Row 1: 4-21-2013

ELEVATOR RENOVATIONS

HORRY GEORGETOWN
TECHNICAL COLLEGE
CONWAY, SOUTH CAROLINA

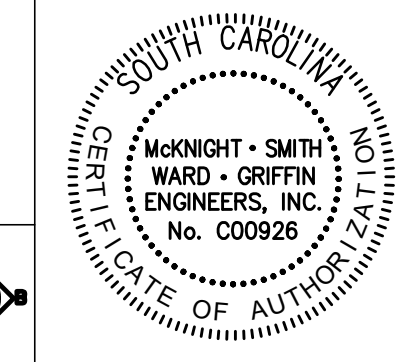


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SPEC

M a. Rigid and Intermediate Metal Conduits shall be made up with full threads, to which a conductive pipe compound (T & B Kopr-Shield or equal) has been applied and butted in coupling. Terminations at sheet metal enclosures in indoor dry locations shall be made with double locknuts and an insulating bushing. Terminations at sheet metal enclosures in outdoor, damp, and wet locations shall be made with threaded conduit hubs of zinc coated malleable iron.

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.

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 below grade.

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.

j. 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 than 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.

l. When installing conduit on interior surface of exterior walls, mount 1/4 inch from wall with clamp backs or strut.

CONDUCTORS

1.1 SCOPE:

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 MATERIALS:

- 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 over-current 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.
- g. Insulation on conductors #10 AWG and smaller shall be suitably colored in manufacture.
- h. Conductors in any location subject to abnormal temperature shall be furnished with an insulation type suitable for temperature encountered.
- 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 90°C.
- 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 terminals is not acceptable.
- 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 UL-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 COLOR CODING:

- 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).

- c. On 277/480V, 3 phase, 4 wire power systems, conductor installation shall be color coded Brown (Phase A), Orange (Phase B), Yellow (Phase C) and Gray (Neutral).
- d. Insulation for grounding conductors on all systems shall be Green.
- e. 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.
- f. Phase sequence shall be "A", "B" and "C" from left to right, top to bottom or front to back when facing equipment.
- g. Control and signal wiring shall not use the above-named colors except green for grounding. Any other colors or stripping may be used but the coding shall provide same color or stripping between any two terminals being joined.
- h. 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.
- d. 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 separate raceway.
- b. Where paralleling of conductors is shown for feeders or service entrance, it is absolutely required they be the same length between terminations.
- c. 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

1.1 SCOPE:

- 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.
- c. The Contractor shall note that required grounding conductors and connections are not all shown on the drawings. NEC requirements apply.

1.2 SUBMITTALS:

a. 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.
- b. 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 to sheet metal equipment enclosures.
- g. Driven grounding electrodes shall consist of copper clad steel rods. Rods shall be 10 feet long and 3/4" diameter unless otherwise indicated.
- h. Bonding bushings shall be of steel or malleable iron with non-removable plastic throats rated 150°C.
- i. Bonding locknuts and wedges for service conduits shall be of zinc coated steel.
- j. 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 herein.
- 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:
 - 1. Voltage exceeds 250 volts to ground.
 - 2. Branch circuit conduit exceeds 1" in size.
 - 3. 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.
- b. 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 construction is complete.
- c. Grounding Electrode Conductors for Separately Derived Systems shall be without splice and shall be contained within steel raceways and bonded to the raceway at both ends. Raceway may be omitted only where specifically indicated on the drawings.
- d. Bond the following together within the enclosure of each Dry-Type Transformer, unless otherwise indicated:
 - 1. Grounding Electrode Conductor described above.
 - 2. Transformer secondary neutral.
 - 3. Transformer enclosure.
 - 4. Equipment Grounding Conductor included in raceway with primary feeder conductors.
 - 5. Equipment Grounding Conductor included in raceway with secondary service conductors.

BOXES

1.1 SCOPE:

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

1.2 SUBMITTALS:

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

2.1 MATERIALS AND APPLICATIONS:

- 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.
- 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 or no knockouts or extraneous openings. Cover screws shall be stainless steel.
- c. For exposed work in interior dry locations less than 8 feet above a floor or platform in other than Electrical, 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 extraneous openings. Cover screws shall be steel.
- 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 type. "Handy" boxes are not permitted.
- 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 INSTALLATION:

- a. Set recessed boxes with edges flush with finished surfaces.
- b. Immediately after installation cover boxes to prevent entrance of foreign matter.
- c. Scaling of plans for outlet locations is not necessarily accurate enough for the intent of these specifications. It is 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 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, 48" up, clear of wall cabinets, back-splashes, and wainscot interferences.
 - 3. Fire alarm signal devices shall be installed with the top of the device approximately 6" below the ceiling or with the bottom of the device 80" above the floor, whichever is lower.
 - 4. Switch boxes shall be installed vertical, 48" up. Switch boxes beside doors shall be on the strike side, with edge approximately 2" from door jamb or trim.
- 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 SCOPE:

- a. The Contractor shall furnish and completely install lighting switches, convenience outlets, and special purpose receptacles along with appropriate outlet boxes and device plates as indicated on the drawings and as herein specified.
- 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:

a. Submit for approval catalog data sheets for all wiring devices.

2.1 MANUFACTURERS:

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

a. Wiring devices shall be industrial specification grade unless otherwise indicated.

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

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

d. 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.

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.

2.3 SWITCHES:

- 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 RECEPTACLES:

- 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.

3.1 INSTALLATION:

- 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 conductors.
- d. 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

1.1 SCOPE:

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

1.2 SUBMITTALS:

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

2.1 CONTROL RELAYS:

- a. The relay coil shall operate satisfactorily with coil voltages within 85% to 110% of its voltage rating. Unless otherwise noted, contact rating shall be 10 amps, continuous for the applied voltage level.
- b. Time delay relays shall be provided with on-delay or off-delay as required, and repetitive accuracy of plus or minus 0.2%.
- c. Relays shall be installed in a suitable enclosure to fit the environment of their location.
- d. Relays shall be manufactured by GE, Square D, Eaton or approved equal.

2.2 CONTACTORS:

- 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 out-cut 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 its voltage rating.
- 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.

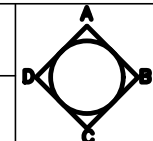
2.3 INDIVIDUAL PUSHBUTTONS, SELECTOR SWITCHES AND INDICATING LIGHTS:

- 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. 1CS.
- b. Pushbuttons shall be designed with the indicated number of normally open circuit-closing contacts, normally closed circuit-opening contacts, or combination thereof. Pushbuttons shall have positive make and break non-welding, non-corroding silver alloy contacts.
- c. Selector switches for control circuits shall be heavy-duty, oil-tight maintained contact devices with the number of positions and the marking of nameplates as indicated on drawings or otherwise specified.
- 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

A1 E3.1 SPECIFICATIONS NO SCALE



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Professional Engineer Seal for Mark P. Arrington, No. 18963, State of North Carolina

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ELEVATOR RENOVATIONS

HORRY GEORGETOWN TECHNICAL COLLEGE CONWAY, SOUTH CAROLINA

2023 04/21/2023 SPECIFICATIONS

Professional Engineer Seal for McKnight-Smith Ward-Griffin Engineers, Inc., No. C00926, State of North Carolina

E3.1

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 Transformers".

PART 3: EXECUTION

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

PANELBOARDS

- 1.1 SCOPE:
a. Furnish and install Lighting, Power, and Distribution Panelboards as indicated on the drawings and as herein specified.
1.2 SUBMITTALS:
a. Submit for approval panelboard shop drawings which include as a minimum the following information:
2.1 BRANCH CIRCUIT PANELBOARDS:
a. Panelboard types, ratings, and contents shall be as shown on the Drawings.

- 3.1 INSTALLATION:
a. Equipment shall be perfectly plumb and level.
b. Openings in back-boxes shall be cut or sawed with tools made for that purpose. Burning of openings is unacceptable.
c. Unused openings shall be closed.
d. Only one solid wire is allowable under a screw. Provide approved lugs for connecting stranded wire or more than one solid conductor.

DRY-TYPE BUILDING TRANSFORMERS

- 1.1 SCOPE:
a. Contractor shall furnish and install Dry-Type Transformers as indicated on the drawings and as specified herein.

- b. Transformers and their installation shall comply with applicable requirements of SECTION 16400 - SECONDARY DISTRIBUTION EQUIPMENT.
c. Transformers shall be energy efficient. Transformers shall meet or exceed NEMA TP-1 requirements. A Class 220°C insulation system and a 115°C temperature rise rating shall be provided.
d. The energy policy act of 2005 (EPACT 2005), public Law 109-58, came into effect January 1, 2007, will be enforced.

SUBMITTALS

- a. Submit for approval manufacturer's data sheets for each dry-type transformer provided. Submittal shall show as a minimum the following information:
1. Electrical characteristics.
2. Impedance.
3. Primary taps available.
4. Insulation class.
5. Decibel ratings.
6. Enclosure dimensions.
7. Installation and maintenance instructions.
2.1 RATINGS:
a. Voltage and KVA ratings shall be as indicated on the drawings.

CONSTRUCTION FEATURES

- a. Enclosures shall be ventilated for indoor use unless otherwise indicated.
b. Transformers shall be designed for floor or platform mounting; however they shall be provided with wall mounting brackets where wall mounting is indicated on the drawings.
c. Windings shall be of copper or aluminum. Windings shall be designed for full load operation at a maximum temperature rise of 115°C above a 40°C ambient; however winding insulation shall be rated 220°C.

INSTALLATION

- a. For floor mounted units, provide 4" high poured concrete pads. Provide vibration isolating pads under frame supports.
b. Where transformers designed for floor mounting are indicated to be wall mounted, provide manufacturer's standard mounting brackets, or provide steel channel frames, attached to the wall and suspended from the building structure using 1/2" diameter threaded steel rods.

CONDUIT CONNECTIONS

- a. Where feasible, conduits shall enter the enclosures of floor mounted transformers from underneath.
b. Where conduits must attach to transformer housing, utilize 12" lengths of flexible conduit terminated with connectors and bonding bushings.

SECONDARY CONNECTIONS

- a. Transformer enclosures and secondary neutrals shall be grounded as Separately Derived Systems. See Section 16130.
b. Transformer secondary protection shall be provided in accordance with the requirements of the NEC and local requirements.

LABELING

- a. Each unit shall bear manufacturer's nameplate indicating transformer rating and connection diagram.
b. Provide nameplate indicating transformer designation, voltage, and device from which transformer is supplied. Nameplates shall be in accordance with the requirements of Section 16100, Basic Materials and Methods.

ADJUSTMENTS

- a. The Contractor shall adjust the transformer taps to produce, approximately, the secondary voltages indicated at no load.

NOISE AND VIBRATION

- a. Transformers producing objectionable sound or vibration shall be corrected as directed by the manufacturer or replaced.

LIGHTING FIXTURES AND ACCESSORIES

- 1.1 SCOPE:
a. The Contractor shall furnish and completely install Lighting Fixtures and Accessories as indicated on the drawings and as herein specified.
b. 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.
1.2 SUBMITTALS:
a. Submit for approval complete manufacturer's data sheets for all fixtures. Indicate all components, characteristics, and options.
b. Submit for approval Lighting Fixture samples as requested by the Architect/Engineer. Samples shall be equipped with lamps, cords, and ballasts for 120-volt operation.

LIGHTING FIXTURES

- a. All fixtures shall be labeled by Underwriters' Laboratories, Inc.
b. 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.

LED DRIVERS

- a. General
1. Provide with ten-year operational life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
2. Drivers shall be designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC601-2.
3. 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 temperature.
4. Provide with a maximum inrush current of 2 amperes for 120V and 277V drivers.
5. Drivers shall withstand up to a 4,000-volt surge without impairment of performance as defined by ANSI C62.41 Category A.
6. Drivers shall be manufactured in a facility that employ ESD reduction practices in compliance with ANSI/ESD S20.20.
7. Drivers shall have a Class A Sound Rating - Inaudible in a 27-dBA ambient.
8. Drivers shall have no visible change in light output with a variation of plus/minus 10 percent line voltage input.
9. Drivers shall have Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements.
10. Drivers shall track evenly across:
a. Multiple fixtures.
b. All light levels.
11. Constant current drivers shall:
a. Support from 200mA to 2.1 Amps (in 10mA steps) to ensure a compatible driver exists.
b. Support LED arrays up to 40W or 50W (710mA to 1.05A in 10mA steps).

EMERGENCY EGRESS LUMINAIRE

- 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.
b. 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 shall 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.
d. 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' pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.
f. 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

COORDINATION

- a. 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.

INSTALLATION

- a. 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.
c. A minimum of two No. 12 gauge wire supports attached to the structure shall be provided for each lighting 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 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.
f. 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.
g. Mount fixtures plumb and square. Keep rows in perfect line.
g. At time of project completion, fixtures shall be clean and fully operational.

FIRE ALARM SYSTEM, ADDRESSABLE

SCOPE

- a. Contractor shall furnish and install a complete Fire Detection and Alarm System as indicated on the drawings and as specified herein.
b. System shall include all devices, wiring, equipment, raceways, and connections required for a complete and satisfactorily operating system, whether every such item is specifically shown or mentioned.
c. System shall be fully supervised microprocessor based multiplex type utilizing addressable devices.
d. All initiation devices shall be analog addressable devices. The notification devices shall be installed where required to meet ADA, NFPA 72 and the South Carolina State Building Code.

STANDARDS AND CODES

- a. The equipment and installation shall comply with the current provisions of the following standards and codes:
1. The latest edition of the South Carolina State Building Code.
2. National Fire Protection Association Standards:
NFPA 70 National Electric Code
NFPA 72 National Fire Alarm Code
NFPA 90A Air Conditioning Systems
NFPA 101 Life Safety Code
3. Underwriters Laboratories Inc. Standards:

(a) Underwriters Laboratories Inc. for use in fire protective signaling systems shall list the system and all components. The UL Label shall be considered as evidence of compliance with this requirement. The equipment shall be listed by UL under the following standards as applicable:

- UL 864/UOJZ, APOU
UL 1076/APOU
UL 268
UL 268A
UL 217
UL 521
UL 228
UL 464
UL 1638
UL 38
UL 346
UL 1971
UL 1481
Americans with Disabilities Act (ADA).
Control Units for Fire Protective Signaling Systems.
Proprietary Burglar Alarm Units and Systems.
Smoke Detectors for Fire Protective Signaling Systems.
Smoke Detectors for Duct Applications.
Smoke Detectors Single Station.
Heat Detectors for Fire Protective Signaling Systems.
Door Holders for Fire Protective Signaling Systems.
Audible Signaling Appliances.
Visual Signaling Appliances.
Manually Activated Signaling Boxes.
Water flow Indicators for Fire Protective Signaling systems.
Visual Signaling Appliances.
Power Supplies for Fire Protective Signaling Systems.

CONTRACTOR QUALIFICATIONS

- a. Equipment and materials shall be provided by a factory-authorized distributor to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service. The factory-authorized distributor is required to have been in the fire alarm industry (service and installation) for a minimum of 5 years.

SUBMITTALS

- a. Shop drawings shall be submitted for each item of equipment to be furnished.
b. Submittal shall include:
1. A complete wiring and conduit layout on the building floor plan.
2. System battery calculations.
3. Notification appliance circuit voltage drop calculations. This data must be prepared by an authorized representative of the system manufacturer. Layout shall indicate conductor sizes, quantities, and color coding for each conduit run, as well as required conduit sizes.

c. Evidence of listing by Underwriters' Laboratories for all proposed equipment for use as Fire Alarm equipment. (Ref.: Underwriters' Laboratories, Section UOJZ).

- d. A copy of the Contractor's Training Certification, issued by the manufacturer of the Fire Alarm Control Equipment, shall be provided. These qualification credentials shall not be more than two years old, to ensure up-to-date product and application knowledge on the part of the installing contractor.

- e. Proof shall be furnished that the manufacturer of the Fire Alarm System Components is certified as an ISO 9001 company in each of the following disciplines: Design Engineering, Manufacturing, Technical Support, Documentation, Training, and Marketing. In lieu of such proof, the manufacturer must be able to show that the method that they employ in those disciplines is equivalent to ISO 9001 requirements.

CLOSEOUT DOCUMENTS

- a. A complete set of record wiring schematics, drawn to scale; showing all device locations, wire routing and connections, etc. shall be provided prior to final inspection.
b. Warranty Statement from the manufacturer: Warranty statement will state the period of warranty for all the products proposed for the project and shall include the name and address of the authorized manufacturers' agent who will honor all warranty claims.
c. Written Certification by the Fire Alarm Contractor that no power supply or circuit in the system has an electrical load greater than 80% of its rated capacity.
d. A scaled plan of the building showing the placement of each item of fire alarm equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. This shall be submitted in AutoCAD format on CD-ROM.
e. A Single Line System Block Diagram and written System Operational Overview.
f. Complete battery and voltage drop calculations which include loads for all system components.
g. Field Connection Drawings: A complete set of drawings, one for each Fire Alarm Control Panel module which has any external (field) wiring connected to it, and one for each system detector, module or signaling appliance, shall be supplied.
h. Print-out report detailing the sensitivity of each smoke detector installed in the system. Include date on report.
i. A reset procedure for resetting the elevators after a system alarm.
j. Two copies of the operating system program on CD-Rom and two appropriate cables to load the program from a laptop computer.
k. An address map of the building showing the physical location of the devices and the associated addresses shall be provided.

SYSTEM FUNCTION

- a. In general, system function shall be as evidently intended by selection of equipment indicated herein.
b. The Fire Alarm System shall assume primary control of elevator operation when a smoke detector located in any associated elevator lobby, elevator machine room or elevator hoist-way initiates.

SYSTEM COMPONENTS

- a. Control Panel: The panel shall include a master controller board and all modules and components required for specified function including, but not limited to:
1. 24 VDC system power and supervisory control.
2. Signaling line circuit modules (Style S, Class A).
3. Notification appliance circuit modules (Style Y, Class B).
4. Auxiliary control circuit modules.
5. Battery, charger, control, and metering. Batteries shall be lead-calcium sealed-cell type. Capacity shall be adequate to operate system for 60 hours minimum in standby, plus 5 minutes in alarm.
6. Modules and/or relays as required for special system functions. Control panel enclosure shall include spare space for a minimum of five additional modules.
b. Multiple Addressable Peripheral Network:
1. The system must provide communications with initiating and control devices individually. All these devices will be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:
(a) Alarm
(b) Trouble
(c) Open
(d) Short
(e) Device missing/failed

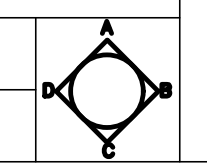
- 2. The fire alarm system shall be microprocessor driven with stored program controllers. Each panel (node) on the network shall use a multiple microprocessor design so that the failure of a single microprocessor will not result in a local failure. Fire alarm systems that utilize only one microprocessor for system (node) and SLC control will not be accepted.
3. An Electronic 100% digital Loop Controller shall be provided in the Fire Alarm Control Panel to interface between the panel and the analytical microprocessor-based detectors and modules.
4. All system programming and history shall be permanently stored in non-volatile memory to ensure that no programming or history is lost. Systems which store initial programming or field programming changes in battery backed memory will not be accepted.
5. Electronic Loop Controller shall detect the electrical location of each connected detector and module.

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ELEVATOR RENOVATIONS
HORRY GEORGETOWN TECHNICAL COLLEGE
CONWAY, SOUTH CAROLINA
2023
04/21/2023
SPECIFICATIONS
E3.2

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E3.2
SPECIFICATIONS
NO SCALE



The location and type of each connected device shall be mapped and stored in memory in the loop controller. It shall be possible to access and display this map at any time.

6. Addressable devices shall have the capability of being disabled or enabled individually. Up to 250 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.

7. The communication format must be a completely digital poll/response protocol. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

8. Each addressable device must be uniquely identified by an address code entered on each device at time of installation. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable.

9. Wiring types shall be approved by the equipment manufacturer. The system shall allow a line distance of up to 2,500 feet to the furthest addressable device.

10. The system control panel must be capable of communicating with the types of addressable devices specified below. Addressable devices shall be located as shown on the drawings. There shall be no limit to the number of detectors, stations, or Addressable Modules, which may be activated or "in alarm" simultaneously.

c. Addressable Devices

1. System shall use analytical detectors that are capable of full digital communications with the Fire Alarm System using both broadcast and polling communications protocols. Each detector shall be capable of performing independent advanced fire detection algorithms. The fire detection algorithm shall measure sensor dimensions, fire patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted nuisance alarms caused by environmental events. Signal patterns that are not typical of fires shall be eliminated by digital filters and will not cause a system alarm condition. Devices not capable of combining different fire parameters or employing digital filters will not be acceptable.

2. Each detector shall be capable of identifying diagnostic codes to be used for system maintenance. All diagnostic codes shall be stored in the detector. Each smoke detector shall be capable of transmitting pre-alarm, alarm, and maintenance signals to the Fire Alarm Control Panel via the Electronic Loop Controller.

3. All detectors and their bases will also be required to be labeled with engraved Lexan labels to identify device address and intended location. Labels shall be red background with white letters; letters shall be a minimum of 1/4" in height.

4. Photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to detect visible particulates produced by combustion. The detector shall dynamically examine values from the sensor and initiate a system alarm based on the analysis of data. Detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5% smoke obscuration per foot. Each photo detector shall be suitable for operation in the following environment:

- (1) Temperature: 32oF to 120oF (0oC to 49oC)
(2) Humidity: 0-93% RH, non-condensing
(3) Elevation: no limit

6. Mounting base shall support all Smoke detector types detailed in this specification, and have the following minimum requirements:

- (1) Removal of the respective detector will not affect electronic loop communications with other detectors on that loop.
(2) Field Wiring Connections shall be made to the room side of the base, so that wiring connections can be made or disconnected by the contractor without the need to remove the mounting base from the electrical box.
(3) The base shall be capable of supporting remote alarm annunciation.
(4) The base shall have the option of external L.E.D. operation, relay base or data line isolator base.
(aa) Relay base shall mount in a standard electrical box described above and provide Form "C" contacts rated at 1 amp @ 30VDC and listed for "pilot duty".
(bb) Isolator bases shall operate within a minimum of 23 msec. Of a short circuit on the data line, shall run self-test procedure to re-establish normal operation, and shall operate in a class 'A' operation as well as class 'B'.

5. The Fire Alarm System shall incorporate addressable modules for the monitoring and control of system input and output functions over a 2-wire electronic communications loop, using both broadcast and serial polling protocols. All modules shall display communications and alarm status via LED indicators. The function of each connected module shall be determined by the module type and shall be defined in the system software through the application of a personality code. Simply changing the associated personality code may change module operation at any time. All addressing of the Addressable Modules shall be done electronically, and the electrical location of each module shall be automatically reported to the Fire Alarm Control Panel, where it may be downloaded into a PC, or printed out. The addressing of the modules will not be dependent on their electrical location on the circuit. All field wiring to the Addressable Modules shall be supervised for opens and ground faults and shall be location annunciated to the module of incidence. Diagnostic circuitry, and their associated indicators, with reviewable Trouble Codes, shall be integral to the Addressable Modules to assist in troubleshooting system faults.

(1) Addressable Input Modules shall be used to provide supervised input circuits capable of latching operation for use with contact devices, non-damped water-flow Switches, non-latching supervisory sprinkler switches.

(2) Addressable Output Modules shall provide one form "C" dry relay contact rated at 2 amps @ 24 VDC or 0.5 amps at 120 VAC to control external appliances or equipment processes. The control relay module shall be rated for pilot duty applications and releasing systems service. The position of the relay contact shall be confirmed by the system firmware.

11. The Addressable Fire Alarm Stations shall be a Lexan single action fire alarm stations and fit in a standard electrical box. Stations shall be key reset. Station shall be in red with white lettering. When shown on drawings, provide tamper-resistant manual pull station cover. The cover shall be clear Lexan, suitable for surface mount or semi-flush mount depending on the application. The cover shall have a local sounder option, which when operated, shall sound a local signal only.

d. Relays: Relays for remote control wiring, where the wiring is provided under another contract, shall have DPDT contacts rated 10 amperes at 115 VAC, minimum.

e. Central Station Service Interface: The Contractor shall provide all necessary conductors, conduit and relays to terminate the following signals into a central station service interface:

- 1. Fire Alarm
2. Sprinkler Water flow Alarm
3. Fire Alarm System AC Power Trouble (only if 120vac interrupted for 8 hours)

Interface shall be capable of being disconnected and removed without affecting the building system. The interconnection shall be supervised. Upon any fire alarm initiated by a water flow switch, manual station, thermal detector, or a verified smoke detector alarm, one general alarm signal shall be sent to the central station. Upon the activation of any supervisory switch in the building connected to circuits reporting to the CPU, one separate signal shall be forwarded off-site. Upon the activation of the main FACP trouble, one trouble signal shall be sent to the central station.

The precedence of signals transmitted shall be as follows:

- 1. Fire Alarm
2. Security Alarm
3. Supervisory Signal
4. Trouble Signal

The central station service interface shall be an eight circuit Digital Alarm Communicating Transmitter (DACT) installed and connected to two separate communications methods in accordance with NFPA 72. Where a DACT is used with public switched telephone as the means of communication, then, one of the following alternative transmission methods shall be employed as a redundant, secondary path:

- 1. One-way private radio alarm system (NFPA 72:26.6.3.3.2)
2. Two-way RF multiplex system (NFPA 72:26.6.3.3.1)
3. Performance based method (NFPA 72:26.6.3.1) These permissible performance-based methods

include phone communication from alternate telephone provider than the primary including cellular; or, use of IP DACT, i.e. equipment that transmits data across a public switched network using IP.

4. Upon approval of the local jurisdiction with fire response authority a second telephone line will be permitted to be used.

All UL Standards and NFPA Standards for reliability shall be met. The Contractor shall verify all conditions relating to telephone numbers on both sending and receiving ends, being reliable according to NFPA Standards. All equipment shall be UL listed and shall provide a detailed narrative description in the operation and maintenance manuals of the final installed conditions and arrangements, including telephone circuits used on-site and numbers call off-site. Once the new system is complete, tested, and accepted, it shall be placed in service and connected to the off-site, central station, fire alarm reporting service.

The Contractor shall provide all necessary conductors, conduit and relays to terminate the following signals into a central station service interface and transmitter panel:

- 1. Fire Alarm
2. Sprinkler Water flow Alarm
3. Fire Alarm System AC Power Trouble (only if 120vac interrupted for 8 hours)

The precedence of signals transmitted shall be as follows:

- 1. Fire Alarm
2. Security Alarm
3. Supervisory Signal
4. Trouble Signal

Panel shall be in its own cabinet (not within the main panel) and shall be capable of being disconnected and removed without affecting the building system. The interconnection shall be supervised. Upon any fire alarm initiated by a water flow switch, manual station, thermal detector, or a verified smoke detector alarm, one general alarm signal shall be sent to the central station. Upon the activation of any supervisory switch in the building connected to circuits reporting to the CPU, one separate signal shall be forwarded off-site. Upon the activation of the main FACP trouble, one trouble signal shall be sent to the central station.

f. Elevator Control: Provide contacts for each elevator in the elevator machine room that shall be activated whenever smoke or by-products of combustion are detected in any of the elevator lobbies served by the elevator, or in machine room, or in the hoist way. Run No. 10 AWG conductors in raceway from each set of contacts to the applicable elevator controller. Terminate conductors with 12" taped slack in a junction box adjacent to elevator controller. Connect N.O. or N.C. as directed by Elevator Installer for return of elevator to main floor or designated alternate floor upon smoke detection by elevator lobby or machine room detectors. Detection of smoke in Main Floor Lobby shall signal elevator to go to alternate floor. Detection of smoke in lobby other than main floor lobby or in machine room shall signal elevator to go to main floor.

3.1 INSTALLATION:

a. Wiring shall be in accordance with manufacturer's recommendations for proper system operation.

b. Signal line circuit cable for monitoring and control of addressable devices shall be not less than a #18 AWG twisted shielded pair type FPL/FPLR/FPLP fire alarm cable. Unless specifically noted or approved otherwise, other conductors shall be of stranded copper not smaller than #14 AWG, with THWN/THHN insulation. Color coding shall be as follows:

- 1. Signaling Line Circuit Red (+) Black (-)
2. 24 VDC Operating Power Yellow (+) Brown (-)

c. All wiring shall be in metal raceway, unless specifically shown otherwise. Raceways shall be sized for the wiring requirements of the system proposed, with maximum conduit fill of 40%.

d. In multistory buildings, all wiring leaving the riser on each floor shall run through a labeled terminal block located in a hinged cabinet accessible from the floor. Terminations shall have pressure wire connectors of the self-lifting or box lug type.

e. Wall-mounted system devices shall be flush mounted where construction permits. Where necessary and approved by the Architect/Engineer, surface mounting enclosures may be utilized. Contractor shall coordinate trim types.

f. Automatic detectors shall be located at least three feet from any HVAC diffuser.

g. An identification map showing all initiating devices and their address numbers shall be provided and mounted beside the main panel for quick and easy location of alarmed or troubled devices. System map shall be mounted under Plexiglas.

h. All addressable loop controller (signaling line) circuits shall be Class A with no T-taps made. Each circuit shall have a minimum 20% spare addresses for future use.

i. All junction and connection boxes shall be painted red for easy identification.

j. Field-connected devices must be installed and wired by a Factory Trained and Authorized Fire Alarm System Sub-Contractor or a licensed electrical contractor under direct supervision of a Factory Trained and Authorized Fire Alarm System Sub-Contractor.

k. All auxiliary power supplies or other fire panels shall be in electrical or mechanical rooms. They shall be mounted at a height between 48 to 60 inches from floor level. All such panels shall be "supervised" by the main Fire Alarm Panel. A smoke detector shall be located on the ceiling within five feet of all auxiliary power supplies.

l. No wiring associated with the fire alarm system shall be spliced other than at device or cabinet terminal blocks. Permanent wire markers shall be used to identify all connections at the fire alarm control panel, power supplies and terminal cabinets.

n. Provide all necessary power and control wiring for smoke dampers furnished and installed by Mechanical Contractor. Coordinate voltage requirements for smoke damper actuators with Mechanical Contractor.

3.2 MANUFACTURER'S RESPONSIBILITIES:

a. Final system connections shall be made by or under the direct supervision of an authorized representative of the manufacturer, who shall verify to the Architect/Engineer that the system has been left in full and proper operating condition. Programming of the fire alarm system shall be as specified by the owner.

b. Manufacturer's representative and a Record of Completion presented upon completion shall verify system installation and operations. The manufacturer's representative shall be responsible for an on-site demonstration of the operation of the system and initial staff training.

c. Manufacturer shall supply a 2-year warranty from date of manufactured Control System and Field Devices and appliances.

d. System shall be maintained in perfect operating condition for a period of two years following completion of the project, at no additional cost to the Owner.

e. Manufacturer shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor. Other defects shall be repaired within 48 hours of the owner notifying the contractor.

3.4 SURGE PROTECTION AND GROUNDING:

a. All equipment shall be properly grounded. Main panel shall be grounded directly to 'earth ground'. Surge protection and lightning arrestors shall be installed on the AC supply and all initiating, notification and monitoring circuits.

- 1. Ditek DTK-LVLP Series for low voltage data and signal line protection.
2. EPI HWM-120 or equal for AC line protection for 120 VAC. For added protection, wind small coil (5 to 10 turns, 1-inch diameter) in the branch circuit phase conductor just downstream of the suppressor connection. Install the suppressor in a listed enclosure near the electrical panelboard and trim excess lead lengths.

3.5 SYSTEM TEST AND CERTIFICATION/DEMONSTRATION:

a. The completely installed fire alarm system shall be fully tested in compliance with Testing Procedures for Signaling Systems (NFPA 72) under the supervision of a trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

b. The Fire Alarm System Sub-Contractor shall test:
1. Every alarm initiating device for proper response and program execution.
2. Every notification appliance for proper operation and audible/visual output.
3. All auxiliary control functions such as elevator capture, smoke door and damper release, and functional override of HVAC, ventilation, and pressurization controls.

c. The Contractor shall provide all necessary two-way radios, ladders and any other materials needed to test the

system.

d. The Engineer and Owner must be notified at least 10 working days prior to the scheduled testing so that he may be present for such testing.

e. After the system has been completely tested to the satisfaction of the Engineer and Owner, the Fire Alarm System Sub-Contractor shall complete the Fire Alarm System Certification of Completion form published by the NFPA.

f. The completed form signed by a principal of the Fire Alarm System Sub-Contractor and shall be delivered to the Architect/Engineer with the other system documentation required by these specifications.

3.6 INSTRUCTION OF OWNER:

a. The Fire Alarm System Sub-Contractor shall schedule and execute an instruction class for the Building owner, which details the proper operation of the installed fire alarm system. The instruction shall also cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer. This training shall also include, but not be limited to the following subjects:

- 1. How to replace heads and set addresses if not set automatically.
2. How to locate short in the circuit.
3. How to replace electronic cards and where to mount them in the panel.
4. Each electronic card shall be third party listed.
5. Get familiar with functionality of each electronic card.
6. How to do dirty head test report and sensitivity test report.
7. How to synchronize the strobe lighting for the entire building.
8. How to check the circuit ground fault and how to clear it.
9. How to interpret the display field codes (A=Alarm, S=Supervisory, T=Trouble, M=Modules).
10. How to locate faulty Module from the trouble display codes.

b. The instruction shall be a minimum of 8 hours in duration and presented in an organized and professional manner by a person factory-trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

c. The Fire Alarm System Sub-Contractor shall provide service and operation manuals or any other curricula that may enhance the instruction of the Building Owners or Local Municipal Fire Department in the operation and maintenance of the system. Also provide software and hardware necessary to troubleshoot and completely program the system.

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Project title: ELEVATOR RENOVATIONS, Location: Horry Georgetown Technical College, Conway, South Carolina, Date: 04/21/2023, Drawing Title: SPECIFICATIONS, Scale: E3.3

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