DIVISION 16 – ELECTRICAL

PART 1 – GENERAL

1.1 DESCRIPTION OF THE WORK

A. Work under this section includes, but is not necessarily limited to, furnishing and installing the following:
   1. Lighting and power distribution system.
   2. Provide lighting fixtures per light fixture schedule with lamps to match.
   3. Wiring devices, boxes, cover plates, etc.
   4. Source of power for all items of equipment.
   5. Grounding.
   6. Other requirements and/or systems where shown.

B. All work shall be complete and items, equipment, etc., shall be electrically connected for proper and correct operation.

C. All work under this contract shall be installed in accordance with the latest edition of the following codes and standards insofar as they apply:
   1. The 2011 National Electrical Code.
   2. The National Electrical Safety Code.
   3. Underwriter's Laboratories, Inc., Standards and approved listings or other approved 3rd party listing agency.
   4. Electrical Testing Labatories standards.
   5. 2012 North Carolina State Building Code.
   6. 2012 North Carolina State Energy Code.

D. The Electrical Contractor shall be licensed in the State of North Carolina and have all local licenses required for the work.

E. Local permits are not required. All work must be inspected by the Office of State Construction state electrical inspector and the Engineer of Record. Provide certificate of inspection and approval from the state electrical inspector prior to the final inspection. The electrical contractor is responsible for contacting the state electrical inspector for all required inspections.

F. All work shall be done by skilled mechanics and shall present a neat, trim, workmanlike condition when complete.

G. All wiring must be tested, including phase conductors and grounding and the results documented prior to the final inspection.

1.2 INTENT

A. The intent of these specifications and the accompanying drawings is to convey as reasonably as possible the requirements for a complete job ready for the building to operate. The Electrical Contractor shall take this into consideration and include in his base bid allowance for contingencies as will allow him to provide minor pieces of equipment and labor not specifically indicated but required for the job to operate properly, at no additional cost to the Owner.

1.3 COORDINATION

A. Coordinate work with other contractors. Notify Architect of apparent conflicts early to expedite construction. If structural damage appears imminent, stop work and notify Architect for a decision before resuming operations.

B. Locations shown are approximate. The drawings do not give exact details as to elevations and locations of various pipes, fittings, ducts, conduit, etc., and do not show all offsets and other installation details which may be required. Coordinate all locations with architect before any rough–in.

1.4 SHOP DRAWINGS

A. Shop drawings shall be submitted for panels and service equipment, lighting, wiring devices, and cover plates. These may consist of the manufacturer's standard catalog or tear sheets and shall have the exact items being offered clearly identified.

PART 2 – PRODUCTS AND MATERIALS

2.1 GENERAL

A. All material shall be new and shall bear the manufacturer's name, trade name, and be third party acceptable to NCDOI listed and labeled where such standard has been established for the particular material. Materials shall be the standard products of manufacturer's regularly engaged in the manufacturer of the required type of equipment and the manufacturer's latest approved design.
   1. Boxes installed in concealed locations shall be set flush with the finished surfaces.
   2. Provide rated boxes in all fire barriers & walls installed per code.

2.2 CONDUCTORS

A. Conductors shall be color coded, sizes #4 and larger may be color taped on the job. Color coding shall comply with 2011 NEC 200.6.
Phase A– Black
Phase B– Red
Chase C– Blue
Neutral– White
Ground– Green

B. Conductors shall be manufactured by Dodge, Southwire or approved equal. Conductors shall meet the latest requirements of NEMA and IPCEA and shall be third party acceptable to NCDOI approved. The insulation type for interior wiring shall be dual rated THHN/THWN or XHHW. provide individual neutral for each circuit.

C. Metallic sheathed "MC"cable should not be used for this project, without designer authorization. MC cable is allowed for light whips 6'–0" or less and where concealed with–in existing construction to minimize demolition work. If used, MC cable shall be 1/2" with minimum #12 AWG copper wire and green insulated copper ground.

D. Conductors shall be spliced and taped as follows:
   1. Size #10 and #12, use Ideal "Wing Nuts". "Piggy" connectors shall not be used. Connectors shall be rated for 150 degrees C for use in recessed lighting fixtures.
   2. Size #8 and larger shall be solderless screw and screw–clamping type, smoothly covered and shaped with rubber gum type with final cover vinyl plastic electrical type. In lieu of rubber gum and vinyl plastic type, factory fabricated approved preformed insulating covers may be used. All connectors shall be UL approved.
   3. No split–bolt type connectors may be used.

E. All branch wire and connections shall be copper and sized per National Electric Code.

F. All conductors shall be continuous without splice between junction, outlet, device boxes, etc. No splicing will be permitted in panelboard cabinets, safety switches, etc.

G. All wiring in mechanical spaces shall be plenum rated.

H. Provide GFI protection within 6'–0" of any sink.

I. All multi–wire branch circuits shall comply with 2011 NEC, 210.4(B).

2.3 PANELBOARDS, SAFETY SWITCHES

A. Panelboards shall comply with NEMA Standard PB 1 – Latest Edition and as manufactured by Cutler Hammer, Square D or ITE–Siemens. All panel boards must have copper buses with bolt on breakers

B. Safety switches shall be heavy duty type, size and rating as required for lead service. Safety switches shall be fused or unfused as shown and/or as required. Safety switches serving motor loads shall be horsepower rated for load served.

2.4 WIRING DEVICES

A. Wiring devices shall be heavy duty spec grade, 20A by Bryant, Leviton, or approved equal. With matching cover. Color by Architect.

B. Wiring devices installed under a Kitchen Hood shall have stainless steel covers.

C. Wiring devices installed over counters shall comply with ANSI A117.1.

D. All wiring devices must have a dedicated green ground screw Self–grounding type is not acceptable.

2.7 CONDUIT

A. PVC conduit will be allowed under slab. Provide rigid turn–ups.

B. All exposed conduit shall be rigid where exposed to the elements, located less than 8'–0" above grade or where exposed to hazardous conditions.

PART 3 – EXECUTION

3.1 CIRCUIT GROUNDING

A. All circuits shall contain an insulated, green, copper grounding conductor, sized in accordance with Table 250–122 of the NEC. Grounding conductors shall be connected to equipment grounding bus in panelboard and securely attached and grounded to the device or enclosure at the other end.

3.2 GROUNDING TYPE CONVENIENCE OUTLETS AND SWITCHES

A. Outlets and switches shall be solidly grounded to equipment grounding system with a green colored insulated conductor. Electrical connections shall be continuous from equipment ground bus in panelboard to the hex nut on the convenience outlet or switch.

3.3 MOTORS

A. All motors shall be connected to conduit system with short length (minimum length 24" and maximum length 36") of flexible liquidtight conduit.

3.4 EQUIPMENT LABELING

A. Provide permanent penolic plastic name plates for all panelboards, safety switches, wiring troughs, etc., for identification of equipment controlled, services, etc. Nameplates shall be securely and permanently attached to equipment with stainless steel, self tapping screws. Nameplates shall include the name of the equipment and where it is fed from.
Color Coding–
Blue surface with white core– 120/208v equipment
Black surface with white core– 277/480v equipment
Bright red surface with white core– fire alarm systems
Dark red surface with white core– security systems
Green surface with white core– "emergency" systems
Orange surface with white core– telephone systems
Brown surface with white core– data systems
White surface with black core– paging systems
Purple surface with white core– TV systems

B. All switch plates, receptacle plates and outlet covers shall be labeled with machine printed vinyl labels identifying the circuit(s) within.

C. All empty conduit runs shall be identified and indicated where they terminate.

D. Provide typewritten directory in each panelboard to clearly identify each circuit, service, etc.

3.5 JUNCTION AND/OR PULL BOXES

A. Boxes shall be installed where necessary to avoid excessive runs and/or too many bends between outlets.

3.6 PULL WIRE

A. Leave pull wire in each empty conduit run.

3.7 GROUNDING

A. All grounding shall be in accordance with Article 250 of the NEC. In addition, the following requirements shall be met:
   1. Grounding conductors shall be installed as to permit the shortest and most direct path from equipment to ground. All connections to grounding conductors shall be accessible.
   2. Equipment ground continuity shall be maintained through flexible metal conduit.
   3. All wiring devices equipped with grounding connection shall be solidly grounded to ground system with grounding conductors.
   4. The frame of all lighting fixtures shall be securely grounded to the equipment ground system with grounding conductors.
   5. All equipment enclosures, and non–current–carrying metallic parts of electrical equipment, raceway systems, etc., shall be effectively and adequately bonded to ground.
   6. All equipment enclosures, and non–current–carrying metallic parts of electrical equipment, raceway systems, etc., shall be effectively and adequately bonded to ground.
   7. The reaceway system shall not be relied on for ground continuity A green grounding conductor, properly sized per NEC table 250–122, shall be run in all power raceways.

3.8 ELECTRICAL WORK IN CONNECTION WITH OTHER WORK

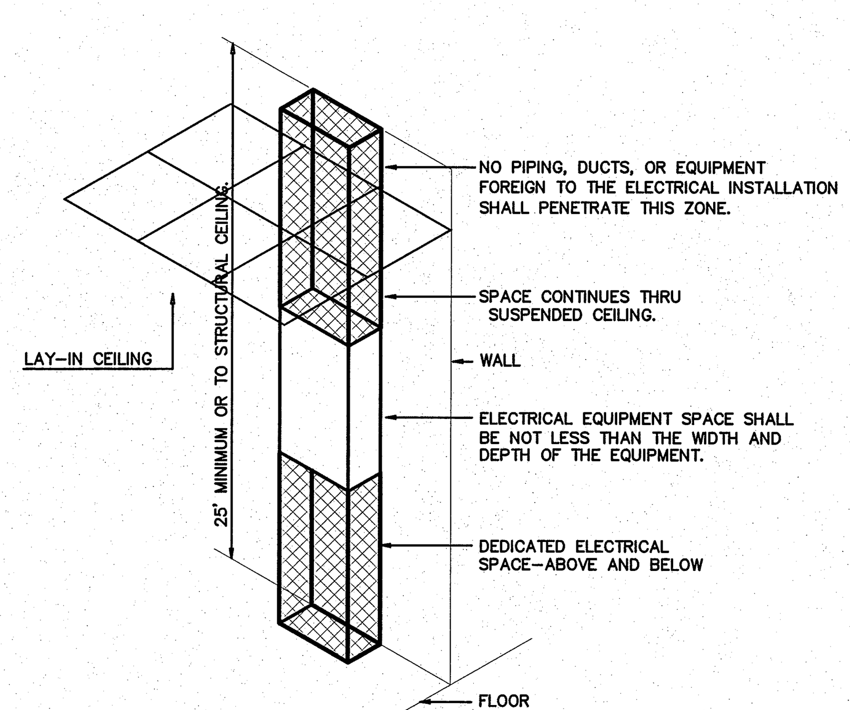
A. The trade(s) furnishing equipment will provide disconnect switches, motor starters, and make final equipment connections. ELECTRICAL CONTRACTOR will make line side connections to disconnect switches or motor starters.

3.9 CLEAN UP

A. During construction, keep the site clean of debris. Upon completion, and before final inspection, clean up the premises to remove all evidence of work. In addition upon completion of construction leave equipment clean.

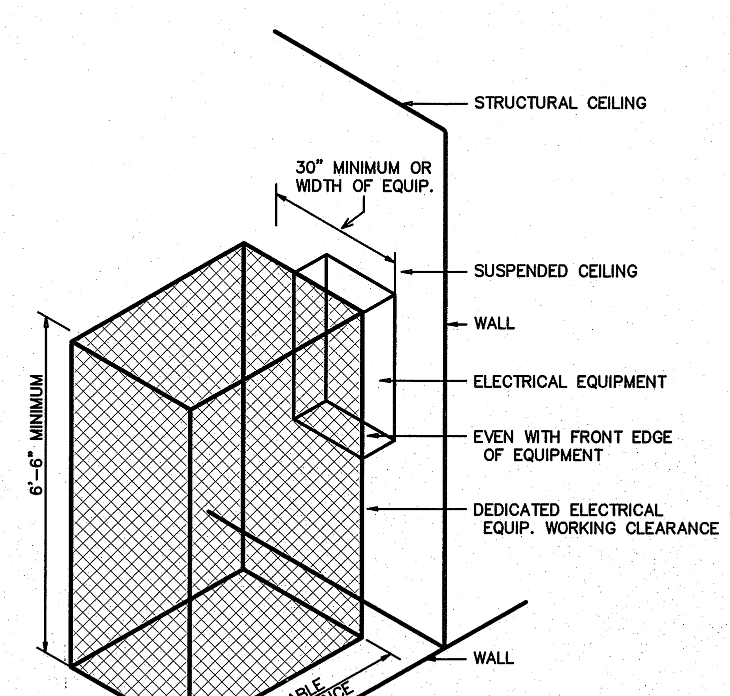
3.10 GUARANTEE

A. Guarantee all materials and labor included in the electrical work for a period of one year from date of final acceptance by the Owner. Any part or parts of the work or equipment which prove to be defective during the guarantee period shall be replaced at no additional cost to the Owner.



ELECTRICAL EQUIPMENT DEDICATED SPACE
PER ARTICLE 110.26.F.1 OF N.E.C.

1/E1 DEDICATED SPACE
NOT TO SCALE



THIS FIGURE ILLUSTRATES THE WORKING SPACE IN FRONT OF THE ELECTRICAL EQUIPMENT REQUIRED BY SECTION 110.26 OF THE N.E.C.

ELECTRICAL EQUIPMENT WORKING CLEARANCE
PER ARTICLE 110.26 OF N.E.C.

WORKING CLEARANCES			
VOLTAGE TO GROUND NOMINAL	MIN. CLEAR DISTANCE IN FEET		
CONDITION:	1	2	3
0–150	3	3	3
151–600	3	3–1/2	4

WHERE THE CONDITIONS ARE AS FOLLOWS:

1 EXPOSED LIVE PARTS ON ONE SIDE OF THE WORKING SPACE AND NO LIVE OR GROUNDED PARTS ON THE OTHER SIDE OF THE WORKING SPACE, OR EXPOSED LIVE PARTS ON BOTH SIDES OF THE WORKING SPACE THAT ARE EFFECTIVELY GUARDED BY INSULATING MATERIALS.

2 EXPOSED LIVE PARTS ON ONE SIDE OF THE WORKING SPACE AND GROUNDED PARTS ON THE OTHER SIDE OF THE WORKING SPACE. CONCRETE, BRICK OR TILE WALLS SHALL BE CONSIDERED AS GROUNDED.

3 EXPOSED LIVE PARTS ON BOTH SIDES OF THE WORK SPACE.

2/E1 ELECTRICAL CLEARANCES
NOT TO SCALE

ELECTRICAL LEGEND

Symbol	Description
A (boxed)	LIGHT FIXTURE: LETTER DENOTES TYPE OF LIGHT FIXTURE (REFER TO LIGHTING PLAN AND FIXTURE SCHEDULE).
WP/GFI	DUPLEX RECEPTACLE – 120V; MOUNT 18" TO CENTER AFF UNLESS NOTED OTHERWISE; 'WP' INDICATES WEATHER PROOF, 'GFI' INDICATES GROUND FAULT CURRENT INTERRUPT PROTECTED.
	QUADRAPLEX RECEPTACLE – 120V
S	LIGHT SWITCH
S_M	LIGHT SWITCH WITH KEY OPERATION. PROVIDE AN INDICATOR LIGHT TO SHOW LIGHTS ON. PROVIDE LABEL.
(S)	MOTOR RATED SWITCH
(J)	JUNCTION BOX
	SINGLE–POLE HOMERUN TO PANELBOARD
	TWO–POLE OR 3–POLE HOMERUN TO PANELBOARD
	BRANCH CIRCUIT WIRING
	SWITCH LEG
	GROUND CONNECTION
PANEL A	DISTRIBUTION PANELBOARD
	DISCONNECTING MEANS AS REQUIRED BY CODE
PC	EXTERIOR PHOTOCELL (PC)

2012 NC ENERGY CODE ELECTRICAL SUMMARY

ELECTRICAL SYSTEM AND EQUIPMENT

Method of Compliance:
Energy Code: ☒ Prescriptive ☐ Performance
ASHRAE 90.1: ☐ Prescriptive ☐ Performance

Lighting schedule (each fixture type)
lamp type required in fixture
number of lamps in fixture
ballast type used in the fixture
number of ballasts in fixture — See Light Fixture Schedule
total wattage per fixture
total interior wattage specified vs allowed (whole building or space by space) — 1460 VA / 1226 VA
total exterior wattage specified vs allowed

Additional Prescriptive Compliance
☐ 506.2.1 More Efficient Mechanical Equipment
☐ 506.2.2 Reduced Lighting Power Density
☒ 506.2.3 Energy Recovery Ventilation Systems
☐ 506.2.4 Higher Efficiency Service Water Heating
☐ 506.2.5 On-Site Supply of Renewable Energy
☐ 506.2.6 Automatic Daylighting Control Systems

CONSTRUCTION DOCUMENTS

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22038 BENJAMIN E. BURKE

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DRAWING TITLE / DISCRIPTION:
ELECTRICAL NOTES AND DETAILS

PROJECT TITLE:
CAMDEN COUNTY REST AREA REFURBISHMENT
2356 HWY 117 NORTH, SOUTH MILLS NC 27976
CAMDEN COUNTY, NORTH CAROLINA

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TIP PROJ. NO.	–
WBS NO.	36059.27
FEDERAL ID NO.	–

ASSET NUMBER:
CO.# SITE.# BLDG.#
15 - 04 - 02

REVISIONS

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